

**P81-08**  
**THE PROTECTIVE EFFECTS OF QUERCETIN ON RAT HEPATOCYTES AGAINST OXIDATIVE STRESS IN METABOLOMICS**

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**OBJECTIVE:** To explore the metabolic effects of quercetin on oxidative stress of the rat hepatocytes.

**METHODS:** Nuclear magnetic resonance spectrometer was used to identify the changes of metabolites of hepatocytes after oxidative stress and being pretreated by quercetin.

**RESULTS:** Compared with control, the most notable changes were as follows: (1) dimethylamine (DMA) increased significantly in the quercetin and quercetin +H<sub>2</sub>O<sub>2</sub> group; (2) acetate increased, pyruvate decreased remarkably in the H<sub>2</sub>O<sub>2</sub>, quercetin and quercetin +H<sub>2</sub>O<sub>2</sub> group. The secondary changes included (1) lactate (Lac) and glutamine (Gln) increased in quercetin group; (2) Lac and taurine (Tau) increased, and histidine (His) decreased in the H<sub>2</sub>O<sub>2</sub> group; (3) Lac, Tau and Gln increased, and His decreased in the quercetin +H<sub>2</sub>O<sub>2</sub> group.  
**CONCLUSION:** Quercetin could increase the production of DMA, acetate, Lac and Tau, the utilization of pyruvate, and reduce the uptake of Gln in the hepatocytes under oxidative stress.

**P81-09**  
**HEALTH POLICY INTERVENTION IN SCHOOLS PROMOTE PHYSICAL ACTIVITIES AMONG THE PUPILS**

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Now, more than ever, there are serious health concerns for obese and overweight children. Schools are the perfect setting for children to learn, and this influence can play an important role in preventing children from becoming obese and overweight. The study concerns the behaviors of Health Promoting School (HPS) according to a broad definition of HPS in World Health Organization (WHO), or dependent on schools own health promoting policies. The purpose of study research is to examine whether promoting physical activity among the children at schools in relation to a school health policy such as Food and Nutrition Policy (FNP). This was determined through the comparisons between the FNP based schools and non-policy based schools. The study undertook surveys among school food coordinators in the selected Danish primary schools through a web-based questionnaire. The questions in the survey were more focused on physical activity in internal and external school environment. The data shows the relations regarding the promoting physical activities among the pupils between different types of schools. Results indicate that health policy intervention can be effective in improving the physical activities and preventing the development of obesity and overweight issues among the children in schools.

**P81-10**  
**EFFECT OF ENDURANCE TRAINING ON PLASMA AND STOMACH OBESTATIN CONCENTRATIONS IN WISTAR RAT**

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**OBJECTIVES:** Ghrelin and obestatin both are effective orexis peptides which are secreted from gastrointestinal tracts. The purpose of this study was to investigate fundus obestatin concentrations responses to a treadmill exercise running program in Wistar rats.

**METHODS:** Fourteen Wistar male rats (12–14 weeks old, 235–250 g) were divided into control and training groups. Training

group was given exercise on a treadmill at 25 m/min for 60 min/day, 5 days/week for 6 weeks. Plasma, fundus and liver were excised for determination of obestatin and ATP concentrations and liver glycogen.

**FINDINGS:** Data analyses for determine of difference of mean between groups and in each group were done by using of independent t-test and paired t-test. Obestatin concentrations were significantly low in trained rat fundus ( $P < 0.05$ ). Liver glycogen content was significantly higher in trained rats ( $P < 0.05$ ). Changes in plasma obestatin levels and Fundus ATP content were not significant.

**CONCLUSION:** Data indicate that treadmill exercise was able to reduce fundus obestatin concentrations and this reduction was accompanied with a higher liver glycogen content in trained rats. Exercise training might modulate fundus obestatin levels via an improvement of energy source.

**P81-11**  
**EFFECTS OF DIETARY FISH OIL ON IMMOBILIZATION-INDUCED MUSCLE ATROPHY AND ITS MECHANISMS**

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Modern inactive lifestyle promotes disuse muscle atrophy from many people. It has been known that dietary fish oil rich in DHA and EPA is capable of preventing loss of muscle protein in diabetes and cancer by anti-insulin resistant and anti-inflammatory mechanisms. The present study investigated how dietary fish oil affects on the disuse muscle atrophy. Following 10 days of hind limb immobilization of adult male SD rats fed corn oil- (CON) or fish oil-based diet (FO), soleus muscle weight and myosin heavy chain (MHC) level was significantly reduced. However, dietary fish oil attenuated the loss of soleus muscle weight and MHC content. In addition, Dietary fish oil inhibited perturbations in activation of Akt and p70s6k protein as well as gene expression of muscle-specific E3 ubiquitin ligases (MAFbx/atrogen-1 and MuRF-1) and subsequent ubiquitination of MHC. Insulin receptor substrate 1 (IRS1) associated with p85 subunit of phosphoinositide 3-kinase (PI3K) did not alter during immobilization. Dietary fish oil also inhibited alterations in gene expression of cyclooxygenase-2 (COX-2) and inducible nitric oxide synthase (iNOS) with no additional production of oxidative stress. These results suggest that dietary fish oil reduces immobilization-induced muscle atrophy through Akt pathway involving E3 ubiquitin ligases and p70s6k.

**P81-12**  
**WEIGHT LOSS IN OBESE ADULTS ATTENDING FITNESS CENTRES: EFFECT OF DIET AND PHYSICAL ACTIVITY**

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Improved standards of living with decrease in customary work have contributed to the problem of obesity. The proliferation of fitness centers provides an avenue to lose weight and look good. The present study assessed the effect of physical activity and counseling for dietary changes on weight loss in 70 obese adults freshly recruited with 3 fitness centers. Data was collected on dietary patterns, anthropometry and physical activity done at the centre and in routine life. The subjects were involved in aerobics, treadmill, cycling and stretching exercises at the fitness centers. After three months, there was a significant reduction in weight (mean 6.4kg in females and 7.8kg in males) and waist circumference (mean 5.6cm in females and 6.0cm in males). BMI shifted from grade I, II and III to overweight or normal. The energy and fat intake decreased and the mean daily energy expenditure increased by 142 kcals/day in females and 106kcal/day in males. Dietary control and regular physical exercise combined with motivation is effective in bringing

about an appreciable weight loss.

## **P82: Nutrition Education/Communication and Behavioral Changes II**

### **P82-01 COOKING IN THE PROMOTION OF A HEALTHY DIET: AN EDUCATIVE MODEL**

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**OBJECTIVE:** To present the designing and testing of an educational methodology for healthy diet promotion.

**METHODS:** Theoretical references adopted: health promotion precepts, critical approach of health education, food and nutrition security and reflections about food culture in the contemporary context. Steps of the project: identification of target groups (school and health professionals, adolescents); designing and testing the education model and analysis of the collected material.

**RESULTS:** The model consisted in an educative workshop structured in: experiencing cooking; a debate among the participants; a meeting called "Seasoning Concepts", when the issues that appeared in the previous debate were discussed, and an evaluation meeting. Eight educative workshops were carried out involving 116 participants, who indicated that the education model was able to motivate them with respect to the subject for their personal life and professional activity.

**CONCLUSION:** The model tested proved to be feasible and represents a methodological innovation in healthy diet promotion

### **P82-02 ASSESSMENT OF WOMEN'S CANCER PREVENTION KNOWLEDGE USING**

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**RATIONALE & OBJECTIVE:** Sound nutrition knowledge is necessary for disease prevention. Women teachers' knowledge on diet and lifestyle guidelines for cancer prevention was assessed using a valid and reliable questionnaire.

**MATERIALS & METHODS:** An initial item pool of 180 questions was developed based on the World Cancer Research Fund (2007) cancer prevention guidelines. 90 items were retained after evaluation for content validity. The preliminary questionnaire was piloted for face validity in a volunteer group of women teachers. The edited version was refined through item analysis and internal consistency.

**RESULTS:** The final questionnaire comprised 42 items in three subscales: diet, physical activity and weight management, and lifestyle. The total score was 42 points. Cronbach's alpha coefficients were >0.7 for subscales and total knowledge. Teachers were randomly assigned to intervention (I, n=108) or control (C, n=102) groups. The mean total knowledge score was 24 for both groups. Total knowledge was moderate but low for physical activity and weight management.

**CONCLUSION:** Valid and reliable knowledge questionnaires are paramount for diet and lifestyle interventions.

### **P82-03 ASSESSMENT OF PROMOTION NUTRITIONAL KNOWLEDGE BEFORE AND AFTER NUTRITION WORKSHOP TO RAISING BELIEFS FOR BETTER HEALTH**

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**OBJECTIVE:** Globally, women have higher rates of obesity than men do, although men may have higher rates of overweight. Prevalence of overweight and obesity is increasing due to environmental and behavioral change in world wide at an alarming rate in both developed and developing regions.

**MATERIALS & METHODS:** Cross sectional study obtaining 275 girl's age 11-13 years old from two schools in Tehran. Data was collected by questionnaire and interviewing girls. Nutrition education was evaluated by pretest and posttest before and after four weeks about promotion of lifestyle, related to nutrition intake.

**DISCUSSION:** The nutrition knowledge and beliefs of young girls who become mother in their future lives significantly change nutrition habits and decreasing the number of disease such as obesity, high blood pressure, diabetes, stroke and cardiovascular disease.

### **P82-04 STRENGTHENING TEACHERS' COMMUNICATION SKILLS FOR EFFECTIVE LEARNING PROCESS ON FOOD AND NUTRITION IN PRIMARY SCHOOLS**

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This study aimed to strengthen communication skills on food and nutrition, and instructional media creative production to primary school teachers in the 1st stage. The procedures included (1) Analyzing communication teaching situation through documents, consultation with related veteran s, and participation in the integrated nutrition. (2) Developing a draft workshop program. (3) Organizing academic forum for experts for suggestion and idea transfers. The scope of workshop covered a) Strengthening self-confident and empowerment, b) Basic knowledge and perception of current situation on food and nutrition, c) Basic knowledge of principle, communication process and related approaches, and d) Skill development of instructional media production. (4) Organizing a workshop for 36 teachers of the integrated nutrition program under the office of basic education commission, Bangkok metropolitan administration, municipality government and the office of the private education commission. The workshop provided good atmosphere for learning process and direct experience with the impression scores of subject matter and satisfaction were 9.6 and 9.7, respectively from 10 scores. A 1-month follow up after workshop through questionnaire and group discussion showed that the most technique to be applied in classroom was the origami in various patterns such as pot, vegetables and fruit, together with story narration or spin yarns. These techniques could motivate students to show their creativity and pride of their works. Therefore, the overview of this workshop was regarded as an important tool to strengthen teachers' potential in creating effective learning process for their students to be eligibly take care of their health on food and nutrition.

## P82-05

### AN ANALYSIS OF THE NUTRITION EDUCATION PROGRAM FOR ELEMENTARY SCHOOL STUDENTS BY OFFICE OF EDUCATION IN KOREA

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Today, the Korean society is experiencing an increase in serious nutrition problems, such as children obesity. The increase in these problems is caused by rapid change that has taken place within our society, which has emasculated the power of our traditional values and behavior patterns to cope with contemporary life styles. There is an urgent need to revitalize and increase the effects of the nutrition education program for elementary school students. This research was conducted in order to find a way to revitalize and to increase the effects of the program so that more and more children can participate and receive benefits from it. We have analyzed the program's contents and the current condition on how the program is actually conducted. Then we have compared real case examples of the program and analyzed the current situation and its problems. The purpose of this work is to analyze various nutrition education programs and related studies for elementary school students to extract meaningful suggestions, and to develop some nutrition education programs contents to realize our suggestions. We were able to extract some important aspects for developing nutrition education programs contents. Especially in this study we took notice of systematization of nutrition problems, and suggested a model of systematization of nutrition education program.

## P82-06

### DEVELOPMENT OF THE ICT NUTRITION EDUCATION PROGRAM FOR THE 4TH GRADE ELEMENTARY SCHOOL STUDENTS IN KOREA

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In current nutrition education of school, teachers try to develop and apply a variety of ICT-oriented instructional methods and materials. There is a necessity raised for a new systematic instructional model to develop concurrently the nutrition inquiry competency and the information literacy. Therefore, this study was purposed to suggest a practical nutrition-learning model that would overcome a direct instruction of diffusing the knowledge and a piecemeal approach of applying the information in nutrition education. The purpose of this study was to develop ICT nutrition education program for the 4th grade elementary school students. The contents of 4th grade curriculum and textbooks were analyzed. Based on these analyses 5 subjects ICT lesson plans on nutrition education were developed. Experimental groups have significantly more increased in the knowledge and understanding of the nutrition contents than have comparison groups. Thus, The ICT nutrition education program plans were found to be more effective than regular one in knowledge and attitude for nutrition.

## P82-07

### PATIENTS' PERCEPTION AND SATISFACTION ON NUTRITION COUNSELING AT HOSPITALS IN BUSAN, REPUBLIC OF KOREA

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The patients' perception was determined through interviews with questionnaires for understanding, importance, satisfaction on nutrition counseling. The subjects were 155 therapeutic-diet inpatients at four general hospitals with over 400 beds and a university hospital with over 800 beds in Busan, of Korea.

Fifty-eight percent of patients had experience to the nutrition counseling. In the methods of the nutrition counseling, 34.1% and 58.0% of patients participated in the group counseling and the private training, respectively. In the perception on contents of the nutrition counseling, 75.0% of patients understood very well on them, 83.0% of respondents perceived very importantly, and 79.5% were satisfied very much. In the satisfaction with the nutrition counseling, the patients having good appetite showed significantly ( $p < 0.01$ ) higher rate to satisfaction with the nutrition counseling than them having poor and neutral appetite. On the scale of 5.00 for satisfaction with the nutrition counseling, the total average score was 3.80. The average scores for the items were 3.80 for knowledge communication skill, 3.71 for cognitive communication skill, 4.05 for affective communication skill, and 3.61 for facilitation skill. The patients having good appetite showed significantly higher average scores in knowledge skill ( $p < 0.01$ ), cognitive skill ( $p < 0.05$ ), affective skill ( $p < 0.01$ ), and facilitation skill ( $p < 0.01$ ) compared with those having neutral appetite. The reasons for the dissatisfaction with the nutrition counseling were lack of the nutrition education materials (42.9%), unnecessary of the nutrition counseling (28.6%), and difficulty of the dietitians' explanation (14.3%). There was a significantly ( $p < 0.01$ ) positive correlation between perception and satisfaction of the nutrition counseling. In conclusion, most of patients perceived the importance of the nutrition education, but the understanding and the satisfaction levels on the nutrition education was low. Therefore, it was suggested that the dietitians develop the practical materials for the nutrition education to increase the satisfaction with the nutrition education of patients.

## P82-08

### FACTORS PREDICTING THE INTENTION TO CONSUME GRAIN AMARANTH ENRICHED PORRIDGE IN MAKUYU DIVISION, KENYA

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**RATIONALE AND OBJECTIVE:** Use of psychosocial theories is effective in determining key predictors of dietary behaviors and has been suggested as useful in designing and targeting nutritional education programs. The objective of this study was to identify psychosocial factors that would predict the intention of mothers to feed their children with grain amaranth enriched porridge based on an integrated model of Theory of Planned Behavior and Health Belief Model.

**MATERIALS AND METHODS:** A cross-sectional study was carried out among 150 mothers with children aged 1-3 years in Kenya. Data was collected using a questionnaire and Likert scale was used to score the various constructs.

**RESULTS:** Majority of the respondents agreed that grain amaranth was a good source of iron (97.3%) and associated its intake with the prevention of iron deficiency/anemia (90.7%). Behavioral intention was a significant predictor of prior behavior ( $\beta = 0.69$   $P = 0.000$ ). Knowledge ( $\beta = 0.603$   $P = 0.000$ ) and health value ( $\beta = 0.310$   $P = 0.002$ ) were significant predictors of health behavior identity.

**CONCLUSION:** Knowledge, health value and prior behavior are potential important predictors on whether to feed children with grain amaranth enriched porridge. These factors could be targeted in nutritional educational interventions on iron deficiency anaemia and nutritional benefits of grain amaranth.

**P82-09**  
**RELATIONSHIP OF FOOD CONSUMPTION BEHAVIOUR AND NUTRITION STATUS OF OVERWEIGHT PRIMARY SCHOOL STUDENTS**

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Types of food consumptions were related directly to bodyweight. The food consumption behavior of over weight students was undertaken during November 2006 – July 2007. Primary school students grade IV and V, 41 boys and 25 girls participated. Weight and height measurements were performed, and standardized to the Thai population measurements as a reference. Frequencies of overweight students were classified. Each student recorded one own for present food consumption for 3 days during Friday and Sunday once a month. Food frequencies of each food items were grouped and calculated such as rice, fried foods, milk and products and snacks etc. It was found that some types of foods were associated with nutritional status such as obese boys had significantly higher fried foods than pre-obese ( $p = 0.00$ ). Pre-obese girls consumed significantly more rice, fried foods and snack than overweight and obese girl ( $p=0.00, 0.03, 0.02$ ) respectively. In summary, the overweight students consumed more fried foods, snack and less vegetables and fruits. Nutritional education should be introduced more frequently and continual during intervention.

**P82-10**  
**TARGET GROUP-SPECIFIC OPTIMIZING OF DIETETIC QUALITY**

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**OBJECTIVE:** With its projects FIT KID, Schule + Essen = Note 1 (School + Food = Grade 1), Job&Fit and fit in Alter (fit in old age), the German Nutrition Society (DGE) aims for the establishment of balanced community nutrition for all target groups.

**ACTIONS:** Definition and circularization of quality standards for demand-oriented nutrition

Support in the quality standard implementation phase including certification via training courses, material, Internet portals.

**METHODOLOGY:** An external assessment carried out by Univation, Institute for Evaluation, between 2007 and 2008 examined the impact of the projects. Methods: Questionnaires, interviews, qualitative analysis of the Internet portals, output monitoring, workshops with project staff.

**RESULTS:** All Internet portals see intensive use with 1.3 to 3.2 million hits per page. The print version of school meal quality criteria“ were ordered some 40.000 times in 15 months (excl. downloads). All materials were in strong demand. In the participating daycare facilities for children, the projects caused an improvement of both the range of meals and the standard of nutrition education. The quality standards facilitate the quality assurance of an optimal nutrition.

**CONCLUSION:** Further implementation of quality criteria is necessary and the aim of our effort.

**P82-11**  
**A DELPHI STUDY OF THE CHILDREN'S NUTRITION\***

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The objective of this study was to identify the nutrition problems, to develop a desirable education method and to suggest effective nutrition education supporting system for school aged children in Korea. For these purpose, a three-round Delphi methods was used to collect data through a series of survey to obtain the consensus of experts in child nutrition. In the first-round was sent to 309 experts open-ended

questionnaires. In the second(107 experts) and third round(48 experts), the summarized results of the first and second round were delivered to rate(5 Likert scale) the importance of each item for confirmation and validation of the results. Data were analyzed using contents analysis and descriptive statistics. The results were summarized as follows: The major health related nutritional problem in Korean children, were obesity(4.5), a lifestyle disease(4.4). The desirable education methods were a learning from practical experience about nutrition(4.6) such as cooking class or super market experience. To expert the more effective nutrition education, it should be prepared the political supporting system(4.7), and to improve a school meal service(4.7). Based on these findings, the result was suggested to develop cost-effective assessment tools for the nutrition education programs for school aged children in Korea.

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**P82-12**  
**DEVELOPMENT AND EVALUATION OF Na REDUCTION PROGRAM FOR PRIMARY SCHOOL STUDENTS**

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The purpose of this study was to evaluate the sodium reduction program for school aged children. The nutrition education program of sodium reduction called 'Na' program using leaflets, teacher's guide book which were developed by the KFDA (Korea food and drug Association) and lecture materials which were developed. 'Na' program was implemented to a special class taken 40 minute by a nutrition teacher and the effectiveness was evaluated by pre-post test. The subject group was designed by control and experimental group. The structured questionnaire was used; the contents were consisted of the knowledge and food attitude about high Na contents in foods. Data were obtained for 389 who are 4th grade students; education group (Ex group) was 234, non-education group (Control) was 154. The nutritional knowledge scores after education was significantly increased from 3.21 to 4.05( $p<0.001$ ). Eating habits of the Ex group was significantly different from control ( $p<0.001$ ). We found the behavioral changes to food selection in Ex group through the Na program. Ex group had more frequently checked the sodium contents in snack and changed the lower Na-content-snack selection than control. But, a long-term follow-up study must be needed to check the existence of behavioral changing.

**P82-13**  
**DEVELOPMENT OF NUTRITION EDUCATION TOOLS FOR PRE-PRIMARY SCHOOL CHILDREN IN THE VAAL REGION, SOUTH AFRICA**

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**OBJECTIVE:** The focus of this project is to address malnutrition through the development, implementation and evaluation of a nutrition education programme (NEP). The specific objective of this paper was to develop the nutrition education tools for pre-primary school children.

**MATERIALS & METHODS:** The methodology was based on the Food and Agriculture Organization NEP framework. Two schools were purposively chosen and teachers ( $n=25$ ) completed a needs assessment questionnaire for data on the design of the media and tools required, as well as the content of the NEP.

**RESULTS & FINDINGS:** The majority of teachers indicated that nutrition is included in the school syllabus (92%) for 30-60 minutes per week (60%). No nutrition education tools were

available (100%) and a need for nutrition education in schools was identified (100%). The majority selected activity books (76%), card games (68%) and puzzles (64%) with brightly colored (96%) drawings (72%) in both English and the home language (88%) for the NEP tools to be developed.

**CONCLUSION:** These results were used to successfully develop nutrition education tools (activity book, card and board game, and food group puzzle) and will be implemented in a NEP to test the impact on the nutrition knowledge of pre-primary school children.

#### P82-14

##### **BEHAVIORAL CHANGES OF CHILDREN IN A NATIONAL FRUIT SCHEME PROGRAM IN FRANCE**

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**OBJECTIVES:** Fruit consumption is low in France, among youth and disadvantaged populations. Children's learning fruit in schools is appropriate. The relay by the family is important for influencing behavior that it's difficult to change. The French government has implemented "Un Fruit à la Récré" program, free distribution of fruit in schools. The objective of this paper is to assess the impact of this program on knowledge, attitudes and behavior.

**METHODS:** Sample of 2500 children (9-11 years) and their parents, with a focus on disadvantaged populations and a control group without action. Surveys include 16 focus groups, questionnaires before and after distribution of fruits.

**RESULTS:** Children like fruit and are well informed about health benefits. Frequency of consumption is close to the recommendations. They are willing to consume more natural form or juice. The diversity of fruit is essential. It is consumed during the meal and not associated with snacking. Parents, even in deprived areas, regularly buy and consume fruits. They are sensitive to the interests of fruit for children.

**CONCLUSION:** The situation seems more favorable than what national statistics show. A key to the success of this type of action is to involve children in their achievement.

#### P82-15

##### **EFFECT OF NUTRITION EDUCATION ON DIETARY PATTERN OF FAT CONSUMPTION IN RURAL DISTRICT OF BORKHAR (ISFAHAN\_IRAN)**

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**INTRODUCTION:** Dietary fat is a nutrient needed for an overall healthful lifestyle. Fat is the most concentrated source of energy in the diet. Dietary fat supplies essential fatty acids, which are especially important to children for proper growth. In addition, fat is required for maintenance of healthy skin, for regulation of cholesterol metabolism, and as a precursor of prostaglandins, hormone-like substances that regulate many body functions. It is also needed to carry and aid in the absorption of fat-soluble vitamins A, D, E, and K and carotenoids. The main concern about excess fats in the diet centers on their potential role in raising blood cholesterol, a risk factor in the development of coronary heart disease (CHD). The prevalence of cardiovascular risk factors is increasing in industrialized communities. The aim of present study is assessing the effect of Education on the behavior of families about dietary pattern of fat consumption.

**METHODS:** In this cross-sectional study 10977 rural families were selected, and studied during 2 steps:

1) Before Education: practice assessment about type of Dietary fat (which they consumed during food cooking and preparation) was introduced by interview and filling of questionnaire, then education about the types of edible oils and fats was done by pamphlets, booklets about health effects of different kinds of

dietary fats.

2) One year After Education: we collected the information about the subject's practice again. We studied the changes of behavior about fat consumption in the family. Data were analyzed by SPSS software. Different groups were compared by using chi square test. P values below 0.05 were considered as significant.

**RESULTS:** Data Analysis at the first step showed that 15.5 and 26 % of families consumed oil (PUFA) and hydrogenated fat respectively. After intervention and education the above data significantly changed to 30 and 22 %. In this study the type of fat for frying was assessed too; specific frying fat consumption was significantly increased from 3 to 20%, and hydrogenated fat uses for frying was decreased from 43 to 25%(p-value <0.0001).

**DISCUSSION:** The evolving research behind dietary fats offers a great opportunity for nutrition scientists and food scientists to work in concert to deliver nutrition recommendations that promote health.

#### P82-16

##### **A SYSTEM REVIEW ON GROWTH MONITORING PROGRAM IN NARMADA, WEST LOMBOK DISTRICT, INDONESIA**

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**BACKGROUND:** Growth Monitoring Program (GMP) is one essential health service program done in Indonesia to prevent growth faltering among under five of age children. GMP is implemented monthly in integrated health posts by volunteer health workers. GMP system review was done in West Lombok to portrait the main problems faced by the health workers in the area where the prevalence of under nutrition was still high.

**METHOD:** Health System Analysis (HSA) was applied to assess the essential system components of GMP and their inter-relationships. The study assessed staffs in district of health, head of primary health centers in 2 sub-districts, 51 integrated health post in villages and its health volunteer workers.

**RESULT:** Authority's supervision was ineffective and intersectoral coordination was not optimal. Score of planning and management by primary health center was 50%, while score for integrated health posts in villages was 71%. Volunteer health workers and caregivers had low GMP knowledge. Community involvement was not sufficient to allow high coverage of GMP.

**CONCLUSION:** GMP essential system components were lacking in term of inadequate resources in integrated health post, low quality of monitoring system, insufficient knowledge of volunteer health workers, improper plan and management of primary health center in sub-district and insufficient of intersectoral coordination. The situation directs to low achievement of GMP outcomes

#### P82-17

##### **DEVELOPMENT OF AN INTERACTIVE NUTRITION EDUCATION WEBSITE FOR PATIENTS WITH TYPE 2 DIABETES MELLITUS**

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**RATIONALE & OBJECTIVE:** Despite the ability of the Internet to hold wide-scale health promotion, no published study focused on dietary behavior change in adults with type 2 diabetes mellitus via a website-based system were found. The objective of this study is to develop and evaluate an interactive nutrition education website for patients with type 2 diabetes mellitus.

**MATERIALS & METHODS:** A user-friendly website will

be developed using the Transtheoretical Model and Object Oriented Programming approach. Modularity, simplicity, clarity, reliability, safety and maintainability will be used as criteria in the development of the system. The system will be built using PHP and powered by MySQL.

**RESULTS & FINDINGS:** This will be a theory-based interactive website that will emphasize on nutrition behavioral modification. Immediate feedback received will imitate the responses usually given during face-to-face counseling. Besides providing evidence-based recommendations that is modified to the local context, this website will also provide reliable and comprehensive nutritional information to the patients.

**CONCLUSION:** The website is hoped to improve patients' KAP, while reducing the cost and burden of face-to-face counseling.

#### **P82-18 EVIDENCE OF HOUSEHOLD COUNSELING IN IMPROVING NUTRITION BEHAVIORS**

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Three of the four leading causes of death in Jordan can be attributed to poor dietary behaviors. Healthcare professionals continue to struggle with the most effective ways to deliver nutrition messages that will result in changes in dietary behavior. Nutrition education strategies targeted at increasing awareness of the benefits of chronic disease risk factor management while promoting behavioral change are marginal. In this study, we illustrate how a weekly evidence-based nutrition column published in a leading daily newspaper of Jordan, and written by a registered dietitian, results in improving household and community level nutrition behavior outcomes when compared with nutrition-related news items from other local daily newspapers. It presents an analytical perspective of expected and unexpected outcomes of a representative survey of readers in Jordan. The study revealed a strong dearth in the availability of effective, evidence-based nutrition communication tools and highlighted consumer confusion towards conflicting media messages. We conclude that media is a valuable and effective tool in communicating nutrition education when supported by scientific information from nutrition professional and when used as an adjunct to national food and nutrition policy initiatives, and has the potential to significantly improve a broad range of household-based nutrition behaviors.

#### **P82-19 FOOD ASSISTANCE PROGRAM ACCESS: REACHING OUT TO LOW INCOME LATINOS IN THE USA**

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The Supplemental Nutrition Assistance Program (SNAP), formerly known as the Food Stamp Program, is the largest federal program for the prevention of hunger and food insecurity in the U.S.A. The main goal of the SNAP Outreach Program at the Hispanic Health Council is to increase awareness of and participation in this program among low-income Latinos in Connecticut, using a multi-strategy approach including outreach, social marketing and application assistance. The program's social marketing efforts include: advertisements placed in public buses and Latino mass media channels (radio, TV, printed media); and the development of two fotonovelas. Results from the evaluation of the mass media campaign indicated high level of coverage (78%) and public satisfaction with the campaign (70%-80%) and a positive impact on SNAP applications. Since 2005, the program has reached thousands of clients with information about the SNAP program and provided direct services to almost 5,000 clients. This program is funded

by USDA SNAP-Outreach.

#### **P82-20 NUTRITION EDUCATION IN ECD TEACHER TRAINING AND PRIMARY SCHOOL CURRICULUM IN KENYA**

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A curriculum is defined as a guide which defines for teachers and educators the knowledge and skills for learners. The purpose of this project was to review the existing ECD teacher training and primary school curriculum in, to identify opportunities where knowledge, skills, behavioral change and attitudes on nutrition and health can be reinforced. Identified also were supplementary teaching materials available and what would be required for effective nutrition Education. The scope of the work was to review the existing syllabus to identify "entry points" on nutrition in all subjects which can be enriched with support materials and practical actions. Curriculum coverage for ECD was found to be adequate however in depth assessment of teaching methods needs to be done. Curriculum audit for primary schools found that there was more emphasis on classroom teaching and therefore recommend a tripartite approach to make it needs – based. There is need to update and broaden the scope and content for textbooks and other learning materials.

#### **P82-21 APPLICABILITY OF THEORY OF PLANNED BEHAVIOR IN PREDICTING WEIGHT MANAGEMENT BEHAVIORS IN KOREAN AMERICANS**

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**RATIONALE & OBJECTIVES:** Obesity has become an important global health problem, however, preventing and/or treating obesity has not been very successful. This study examined whether the Theory of Planned Behavior (TPB) could be effectively used in body weight management research with Korean Americans.

**MATERIALS & METHODS:** This cross-sectional mail survey sent a set of Korean/English questionnaires to 1200 Korean Americans residing in metropolitan areas. The questionnaires obtained information on body weight status, weight management behaviors (B), and the factors of the TPB (attitude (A), subjective norm (SN), perceived behavioral control (PBC), behavioral intention (BI) and demographic information.

**RESULTS & FINDINGS:** The mail survey resulted in a usable sample of 410 questionnaires. Among Korean American men and women, 30.6 % and 7.6% (BMI: 25.0-29.9) were overweight and 4.9 % and 1.8% (BMI > 30) were obese by the WHO standards, respectively. Performing any body weight management behaviors was significantly related to their current body weight status. Among the major factors of the TPB, attitude appeared to be more important than SN or PBC in forming BI in both men and women, multiple regression analyses controlling for age, body weight status, and other demographic status. The regression analyses showed reasonable explaining power (R<sup>2</sup>: .30-.45), which indicates the TPB could be useful in weight management research.

**CONCLUSION:** Applying social science theories such as the TPB would enhance effectiveness of nutrition education/counseling programs for obesity prevention and treatment.

## P82-22

### DIETARY DIVERSIFICATION AMONG PRIMARY SCHOOL CHILDREN IN VHEMBE DISTRICT OF LIMPOPO PROVINCE: AN INTERVENTION TO IMPROVE THE CONSUMPTION OF INDIGENOUS FOODS

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**RATIONALE:** Nutrition knowledge is one of the factors that can influence eating habits. In South Africa the importance of indigenous foods is not very high. They have been labeled as food for the poor people with knowledge associated to it as old. These labels led to a shift in food use and less willingness of the youth to learn about them.

**OBJECTIVES:** The aim of the study was to determine knowledge of primary school children about indigenous foods. An intervention to improve their knowledge was developed.

**MATERIALS & METHODS:** Design is quasi experimental. The population was children aged 9-14 in grade 5 and 6 in two primary schools from Dzimauli and Phaphazela. Data was collected using knowledge questionnaire to test children's knowledge of indigenous foods at baseline and after intervention. The information was obtained from 154 children. Data was analyzed using SPSS version 15.0.

**RESULTS AND FINDINGS:** The results indicated that many children had prior knowledge about indigenous foods particularly fruits and vegetables at 94.2% and 96.1% respectively. Data also suggest that the knowledge fairly increased six months after intervention.

**CONCLUSION:** Knowledge of indigenous foods depends on availability and accessibility in the community where children live as well as at household level. However, there is need to include indigenous foods as part of curriculum to improve awareness.

## P82-23

### SOURCES OF MATERNAL KNOWLEDGE OF APPROPRIATE COMPLEMENTARY FEEDING IN NORTHERN GHANA

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Maternal knowledge about childcare is accumulated from different sources. These sources include formal education, grandmothers/mothers-in-laws, peers, healthcare workers, etc. The content of these information are sometimes contradictory yet the mothers have to synthesize the information, make decisions and translate these into childcare practices. The choices the mother makes are influenced by social and cultural factors, compounding the difficulty of the mother making a sovereign decision. To effectively inform the mother, it is important to know the most significant source for effective targeting. This study assessed the most significant source and content of information on complementary feeding in maternal knowledge in northern Ghana.

Eighty-eight mothers of children (6-24 mo) attending 4 post-natal clinics were randomly studied on their sources of complementary information. The husbands, grandmothers, and the best friend of each of the 92 mothers were also interviewed. Community health nurses of the clinics the mothers attended were as well interviewed. Complementary information in publications available at the clinics, a national daily newspaper and the most popular national weekly newspaper were eventually studied for their content and frequency.

The most significant source of appropriate complementary feeding was the health worker (45%), followed by the grandmother (22%) and then the peers. None of the respondents mentioned printed material as the source of information. Some messages from the nurses were contradictory to that of the

grandmothers of which 25% of the respondents practiced what the grandmothers said.

Grandmothers should be targeted to reduce contradictory appropriate complementary feeding information reaching mothers.

## P82-24

### MID DAY MEAL: A TOOL FOR IMPARTING NUTRITION/HEALTH EDUCATION TO PRIMARY SCHOOL CHILDREN

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**BACKGROUND:** In India, Nutrition Support to Primary Education / Mid-Day Meal (MDM) Programme entitles primary school children a daily meal providing 300 KCal and 8-12g protein. It is envisaged that this Programme could serve as a platform for imparting nutrition messages to promote healthier practices.

**OBJECTIVE:** To impart nutrition and health education (NHE) to child beneficiaries of ongoing MDM Programme.

**METHODOLOGY:** 1,110 Municipal Corporation of Delhi school children in grade IV were imparted NHE by the researcher / their teachers (orientated for effectively imparting NHE), using MDM as a tool. Employing specifically designed IEC material such as nutrition games, mime, puppet show and puzzles, these children were taught about balanced food, hygiene and food safety.

**RESULTS:** Comparison of the pre and post intervention data indicates a significant improvement in knowledge scores and a positive change in certain practices, both in the researcher taught and the teachers taught groups.

**CONCLUSION:** MDM can be an effective tool for imparting NHE to schoolchildren.

## P83: Food Regulation (Labeling & Claim)

### P83-01

#### GLOBAL TRENDS IN FOOD AND NUTRITION LABELING

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Consumers in many countries seek labeling information that relates to the health, safety, environmental and socioeconomic characteristics of food products. In responding to these demands, regulatory agencies and the food industry must ensure that labels are accurate, truthful and not misleading. To be effective, labels must be easily understood by diverse population groups. This presentation will provide information about the latest international developments in mandatory and voluntary food labeling. The status of mandatory nutrition labeling and new developments in the presentation of nutrition information will be discussed. Voluntary labeling related to environmental and social issues will be explained. The challenges of harmonization of food labeling and the particular needs of developing countries will be described.

### P83-02

#### **GINKGO BILOBA: CONTENT, SAFETY AND EFFICACY**

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**OBJECTIVE:** Ginkgo biloba (GB) is claimed to improve blood circulation and memory, and to diminish symptoms of old age. We applied a multidisciplinary approach to test 1) the content, 2) the safety and 3) the efficacy of GB-containing herbal products on the market.

**MATERIALS&METHODS:** The content of presumed active ingredients was measured in 29 products. The safety of GB was assessed by evaluating publicly available data on toxicity. The efficacy of GB was evaluated upon literature search by applying the Passclaim criteria to three health claims.

**RESULTS:** For most of the products their contents did not comply with the declaration on the label. In case studies bleedings are reported, and the presence of genotoxic and carcinogenic substances cannot be excluded. Further toxicity data on GB are too scarce to allow establishment of a safe level. There was insufficient scientific evidence for three health claims.

**CONCLUSION:** There is no proof of safety and efficacy of GB-containing herbal products currently on the market, and many do not contain what is declared on the label. The multidisciplinary approach gives a good insight into the aspects that are relevant for the evaluation of health claims for herbal substances.

Report (in Dutch) available at <http://www.rivm.nl/bibliotheek/rapporten/320106001.html>

### P83-03

#### **SCORING EVALUATION OF NUTRIENTS (ENERGY, SUGAR, FAT AND SODIUM) FROM NUTRITION INFORMATION OF PACKAGED SNACKS**

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**RATIONALE & OBJECTIVE:** Committee for Nutrition Claim and Health, Thai FDA established a guideline for healthy snacks. Four main nutrients (energy, sugar, fat and sodium) that affect non communicable disease were evaluated in commercial snacks using scoring system.

**MATERIALS & METHODS:** Data was collected from nutrition information on snacks' packages. A score was given according to the guideline: 10, 5 or 0 which represent nutrient content less than 5%, between 5-10% and more than 10% of Thai RDI, respectively. Total score of all nutrients was averaged and the accepted score value for healthy snack is proposed to be > 7.5 out of 10.

**RESULTS:** The score of 416 samples were graded according to the guideline for healthy snacks. Seventeen out of 183 (9.3%) bakery products, 7 out of 84 (8.3%) extruded carbohydrate based, 7 out of 85 (8.2%) nuts and seeds, 16 out of 32 protein based snacks and none of 32 different kinds of chips were classified as healthy snacks

**CONCLUSION:** Snacks with the scores of > 7.5, especially protein based snacks, could be promoted as a choice of healthy snacks. However, the consumption of these products should not be more than twice a day.

### P83-04

#### **THE FRENCH OBSERVATORY OF FOOD QUALITY**

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The French national nutrition program encourages manufacturers to improve the nutritional quality of the processed food. In this context, the French Observatory of Food Quality (Oqali) was set up in 2008, financed by authorities and implemented by Afssa and INRA.

Oqali's goal is to monitor the global changes in the food supply by measuring the evolution of processed and packaged foodstuffs in the French market, in terms of nutritional and socio-economic parameters. Oqali records in a database, and analyses, at the product level, the data on foodstuffs (nutritional information, claims, market shares, prices...) using several sources: manufacturers' information, packaging, nutrient analyses and food consumption and purchases data.

Partnerships have been formed with manufacturers to validate the scientific methods used to analyze the data.

Different categories of food products (breakfast cereals, sweet biscuits and fresh dairy products) have already been surveyed and additional products (pre-packed meat products, stewed and canned fruit...) will be studied in 2009.

An annual report, reporting the main results, is published and available on Internet: [www.oqali.fr](http://www.oqali.fr).

So, Oqali provides tools to meet public health challenges on nutritional information.

### P83-05

#### **THE EFFECTS OF AWARENESS OF NUTRITION LABELING ON DIETARY ATTITUDES AND NUTRITION KNOWLEDGE BY HIGH SCHOOL STUDENTS IN JEONJU AREA**

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This study was carried out to investigate dietary attitude nutrition knowledge of high school students in Jeon-ju, and to investigate their awareness of nutrition labeling. In addition, this study was carried out of analyze the effect of awareness of nutrition labeling on dietary attitude and nutrition knowledge, in order to provide a fundamental data for nutrition training for health diet to adolescents. The results of this study were: the mean height and BMI were 175.8cm, 68.3kg, 22.1kg/m<sup>2</sup> and 162.1cm, 51.4kg, 19.6kg/m<sup>2</sup> of males and females respectively. The score in the identification of nutrition labeling was 2.66 in total with 2.39 in males and 2.91 in females. The score in the importance of nutrition labeling elements was 3.39 in total with 3.31 in males and 3.47 in females. The score in the knowledge of nutrition labeling was 3.40 in total with 3.18 in males and 3.62 in females. Regression analysis results when awareness of nutrition labeling is high, then the nutrition knowledge also high.

### P83-06

#### **EUROPEAN FOOD SAFETY AUTHORITY AND NUTRITION & HEALTH CLAIMS: THE STORY SO FAR**

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University College Dublin

**RATIONAL & OBJECTIVES:** The European Food Safety Authority (EFSA) has received 4,185 applications under EU Regulation 1924/2006 on nutrition and health claims and has begun publishing opinions. The objective of this study was to review opinions published thus far.

**MATERIALS & METHODS:** The complete opinions published by EFSA were studied in detail for each application.

**RESULTS & FINDINGS:** To date, EFSA has adopted opinions

on 56 different applications for nutrition and health claims. The largest category of opinions published were Food supplements (48%). Whole food and drink represent 30.3% of opinions and the rest (21.4%) are Constituents for addition or inclusion in a food or drink. The largest proportion (37.5%) of opinions published thus far were in the Brain/Concentration/Cognition/Anxiety field while GI issues, Eyes/vision and Other fields were the second most highly represented (10% each). Twelve of the opinions published have received approval and 43 were rejected. Applications were rejected on the grounds that no cause and effect relationship had been established.

**CONCLUSION:** Few applications for a nutrition or health claim are receiving approval through this process. For now and so far, it seems that with a few exceptions, EFSA is not satisfied that the scientific evidence supporting the applications is robust enough.

## **P84: Nutrient Supplementation (single, multiple combinations) II**

### **P84-01**

#### **EFFECTIVENESS OF DAILY AND WEEKLY IRON SUPPLEMENTATION IN THE PREVENTION OF ANEMIA IN INFANTS**

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**OBJECTIVE:** To evaluate the effectiveness of universal prophylactic supplementation with iron sulfate (IS) on daily or weekly basis in the prevention of anemia in infants.

**METHODS:** Randomized clinical field trial with children 6-12 months seen at primary health care units in the municipality of Rio de Janeiro, Brazil, between 2004 and 2005. Three concurrent cohorts were compared: daily group (n=150; 12.5mg Fe/day); weekly group (n=147; 25mg Fe/week); and control group. The intervention consisted of universal supplementation with IS for 24 weeks, combined with educational adherence-promoting measures. Effectiveness was evaluated using multiple regression analysis.

**RESULTS:** High adherence to protocol was observed in both groups. After adjustment, only the daily regimen showed a protective effect even in the adherence analysis (dose-response effect). No protective effect was detected for the weekly regimen.

**CONCLUSIONS:** Universal supplementation with IS from six to 12 months of age was effective in increasing serum Hb and decreasing risk of anemia only when administered on a daily basis.

### **P84-02**

#### **EFFECT OF SOY PROTEIN INTAKE IN PEPTIDE FORM ON DELAYED-ONSET MUSCLE SORENESS INDUCED BY ECCENTRIC EXERCISE**

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The purpose of the study was to evaluate the ability of soy-peptide intake to reduce the symptoms of delayed onset muscle soreness (DOMS). A randomized, placebo-controlled, crossover study (1 mo washout) was performed with 16 healthy, untrained female adults between the ages of 18 and 30. Subjects

were randomized to receive 150g of an experimental beverage containing soy-peptide (equivalent to an 8g intake of soy-peptide) or a nitrogen-free placebo beverage prior to a sequence of squat tasks as the eccentric exercise. Muscle soreness in thigh before and after exercise and the following 2 days were evaluated using a visual-analogue scale. Blood was also sampled just prior to drink-intake, immediately post-exercise, and again at 24 and 48 hours post-exercise. There were no significant differences between groups in creatine phosphokinase, lactic acid, and growth hormone levels, etc, whereas changes of amino acids concentration in serum were significantly different, especially Arg, Asn, Met, and BCAA. The ingestion of soy-peptide prior to the exercise resulted in a significant decrease of muscle soreness at 1 or 2 days post-exercise compared with the placebo. These results suggest that soy-peptide intake prior to eccentric exercise decrease DOMS. Soy-peptide would be useful for muscle recovery following exercise.

### **P84-03**

#### **IN VITRO RELEASE OF FOLIC ACID FROM PHARMACEUTICALS PREPARATION**

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To ensure the quality of folic acid tablets, USP 24 was established as a standard dissolution test using water as the test solution. However, human digestive secretions do not consist only of water. Thus, an experiment to observe the in vitro release of folic acid from pharmaceutical preparations was carried out utilizing simulated human gastrointestinal fluid. The applied factors were type of test solution (simulated gastric fluid, simulated gastric and intestinal fluid, water) and type of tablets (folic acid, folic acid and iron, B complex, multivitamin and minerals). Folic acid was extracted from tablets following USP 24 procedure. The type of test solutions gave significant effect toward the tablet disintegration profile, whereas for the folic acid dissolution profile, the type of test solutions and the interaction of it and the type of tablets affected the results significantly. The combination of simulated gastric and intestinal fluid gave the highest results, where it disintegrated 89.1% of the tablets' dry weight and dissolved 47.7% of the labeled folic acid content from the tablets. These results showed that a combination of simulated gastric and intestinal fluid could be proposed as a test solution in standard dissolution test.

### **P84-04**

#### **INVESTIGATING THE EFFECTS OF VITAMIN D SUPPLEMENTATION ON METABOLIC HEALTH PARAMETERS IN HEALTHY ADULTS**

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**RATIONALE:** Accumulating evidence from association studies suggests that vitamin D deficiency increases the risk of insulin resistance, cardiovascular disease and the metabolic syndrome. The effects of vitaminD3 supplementation on markers of the metabolic syndrome were investigated using a combination of biochemical and metabolomic techniques.

**METHODS:** Healthy males and females (18-65years, n=160) underwent a 4-week supplement trial of vitaminD3 with blood, urine and faecal samples collected at baseline and endpoint. Food diaries were used to estimate habitual diet and monitor intervention compliance. Serum 25-hydroxyvitaminD [25(OH)D] and factors related to the metabolic syndrome (e.g. glucose, insulin, c-peptide, IL-6, CRP, TAG, NEFA, cholesterol, fatty-acid profiles, leptin, resistin, adiponectin, and TNF $\alpha$ ) were

measured. Biofluid samples were analysed using <sup>1</sup>H-NMR followed by multivariate data analysis.

**RESULTS:** Serum 25(OH)D increased significantly from 63.1±27.4 to 78.4±22.3nmol/l (p<0.001) following supplementation with vitaminD3. Expected differences due to season were also noted; with higher 25(OH)D levels following summer months (Spring 25(OH)D levels=53.5±25.0nmol/l, Autumn=68.8±28.1nmol/l, p<0.001). There were no significant changes in markers of the metabolic syndrome. Metabolomic profiles will examine global metabolic changes.

**CONCLUSION:** Supplementation with 15µg/d of vitaminD3 results in significant increases in serum 25(OH)D with no effects on biochemical markers of the metabolic syndrome in healthy subjects.

#### P84-05

##### **EFFECT OF INULIN CONTAINING FERMENTED MILK ADMINISTRATION ON HUMAN INTESTINAL BACTERIAL FLORA**

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This study is to understand whether ingestion of inulin containing fermented milk would alter the human intestinal bacterial flora. The human clinical trial employed randomized, placebo controlled, double blind design. 48 healthy participants with aged 18 to 27 years were randomly divided into three groups. The daily meals were supplied during the 7 weeks of experimental period, including an initial one week without fermented milk (run-in period), 4 weeks with two bottles (330 mL each) per day of fermented milk, inulin containing fermented milk, and placebo, respectively (administration period), and 2 weeks follow-up period. The total aerobic bacteria, Bifidobacterium spp., Lactobacillus spp., E. coli, and Clostridium perfringens of each fresh stool sample were analyzed. Results showed the Bifidobacterium in stool were significantly increased (p<0.05) whereas the harmful E. coli and Clostridium perfringens were decreased after ingesting the fermented milk and inulin containing fermented milk for 4 weeks, even during the follow-up period when supplement consumption was discontinued, but no significant difference was found for placebo. In conclusion, ingestion of fermented milk or inulin containing fermented milk for 4 weeks is beneficial in improving the intestinal function by increasing the number of stool bifidobacteria and suppressed E. coli and Clostridium perfringens.

#### P84-06

##### **EFFECTS OF ORAL SUPPLEMENTATION WITH GLUTAMINE AND ALANYL-GLUTAMINE ON GLUTAMINE METABOLISM AND GLUTATHIONE STATUS IN RATS**

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**RATIONALE & OBJECTIVES:** We investigated the effect of supplementation with the dipeptide L-alanyl-L-glutamine (DIP) and free L-glutamine and L-alanine, on glutamine metabolism and glutathione status (GSH/GSSG) in rats subjected to long duration exercise.

**MATERIALS & METHODS:** 36 rats were subjected to sessions of swim training. Twenty-one days before sacrifice, the animals were supplemented with DIP, a solution of free L-glutamine and L-alanine (GLN+ALA), or water (CON). Animals were sacrificed before (TR) or after (LD) long-duration exercise. Plasma, muscle and liver concentrations of glutamine, glutamate and reduced and oxidized (GSSG) GSH were measured.

**RESULTS & FINDINGS:** Higher concentrations of plasma glutamine were found in the DIP-TR and GLN+ALA-TR groups (p<0.05). Higher concentrations of glutamine, glutamate, and

GSH/GSSG in the soleus muscle and GSH/GSSG in the liver were found in the DIP-TR and GLN+ALA-TR groups (p<0.05). DIP-LD and GLN+ALA-LD groups exhibited higher GSH/GSSG in the soleus muscle and liver compared with the CON-LD group (p<0.001).

**CONCLUSION:** Chronic oral administration of DIP and free GLN+ALA before long-duration exercise represents an effective source of glutamine and glutamate, which may improve the redox state of the cell.

Supported by FAPESP/Brazil.

#### P84-07

##### **EFFECTS OF ORAL SUPPLEMENTATION WITH GLUTAMINE AND ALANYL-GLUTAMINE ON PARAMETERS OF MUSCLE DAMAGE AND INFLAMMATION IN TRAINED RATS**

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**RATIONALE & OBJECTIVES:** We investigated the effect of supplementation with the dipeptide L-alanyl-L-glutamine (DIP) and free L-glutamine and L-alanine on parameters of muscle damage and inflammation in trained rats.

**MATERIALS & METHODS:** Rats were subjected to sessions of swim training for 6 weeks. Twenty-one days before sacrifice, the animals were supplemented with DIP (1.5 g/kg, n = 6), a solution of free L-glutamine (1 g/kg) and free L-alanine (0.61 g/kg; GLN+ALA, n = 6), or water (CON, n = 6). Plasma glutamine, creatine kinase (CK), lactate dehydrogenase (LDH), tumor necrosis factor-α (TNF-α) and prostaglandin E2 (PGE2) were measured.

**RESULTS & FINDINGS:** Higher concentrations of plasma glutamine were found in the DIP and GLN+ALA groups (p<0.05). DIP and GLN+ALA groups showed less CK (p<0.05) and TNF-α compared with the CON group (p<0.001).

**CONCLUSION:** Chronic oral administration of DIP and free GLN+ALA represents an effective source of glutamine, which may reduce the damage and inflammation induced by exercise. Supported by FAPESP/Brazil.

#### P84-08

##### **IRON, THIAMINE, AND MICRONUTRIENT STATUS IN PREGNANT AND BREAST-FEEDING WOMEN: ASSESSMENT OF FOOD RATIONS AND SUPPLEMENTATION IN MAELA REFUGEE CAMP, NORTHERN THAILAND**

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**RATIONALE:** Micronutrient malnutrition remains prevalent in the displaced population on the north-western border of Thailand. Deficiency of thiamine and vitamin A as well as high prevalence of anaemia were documented in pregnant and postpartum women. During antenatal care pregnant and lactating women receive additional supplementary food rations and supplements of thiamine, folic acid and ferrous sulphate.

**OBJECTIVES:** Assessment of provided food rations and micronutrient supplements for pregnant and postpartum women in Maela refugee camp.

**METHODS:** Cross-sectional and follow-up studies among pregnant (n>1000, 1st to 3rd trimester) and breast-feeding women (n>600, at week 12 post partum) between 2004 and 2007 for the determination of iron status (serum ferritin, soluble transferrin receptor), whole blood thiamine, serum micronutrients (retinol, α-tocopherol, β-carotene, zinc, copper), and of iron, thiamine and micronutrient levels in breast milk.

**RESULTS:** Iron status, serum retinol, zinc, and β-carotene decreased during pregnancy. Retinol, β-carotene and zinc were higher in post partum than in early pregnancy whereas iron

status was significantly lower. Whole blood thiamine increased with the number of weeks the supplement was provided and was still high at 12 weeks post partum.  $\alpha$ -tocopherol and copper increased concurrently with serum cholesterol and triglycerides during pregnancy and were significantly lower in post partum. Milk levels of iron, thiamine and micronutrients except zinc were positively correlated to their respective blood levels in post partum.

**CONCLUSION:** Thiamine status is sufficient in this population reflecting good compliance of supplementation. Iron deficiency is still prevalent despite the provision of ferrous sulphate. Vitamin A deficiency is not a severe public health problem. Additional zinc supplements or zinc-enriched food rations might reduce the high prevalence of zinc deficiency in Macla camp.

#### P84-09

##### SOURCES OF SUPPLEMENTARY VITAMINS AND MINERALS IN SERBIAN NUTRITION

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**RATIONALE & OBJECTIVES:** On Serbian health product's market there are a great number of dietary supplements, but also fortified and functional foods and the consumption of these products is common in Serbian population. In this study Serbian health products market was surveyed for products that can be used as sources of supplementary vitamins and minerals.

**METHODS:** A market survey of all products with vitamins and minerals (supplements and fortified foods) was carried out in pharmacies, megastores and healthy stores.

**RESULTS:** Our findings showed that vitamins and mineral supplements were second abundant supplements on the market, with more than 300 hundred different mono or multicomponent products. Magnesium and vitamin C were the most frequent constituents; most of the used vitamins and minerals were in the chemical forms that were in accordance with EU regulations; their quantities often surpassed RDA values. Fortified foods are significantly less present on Serbian market with only iodine as a part of state fortification policy. Milk, margarine and juices were three different food categories most frequently used for fortifying purposes.

**CONCLUSION:** This investigation identified several problems concerning additional vitamin and mineral sources on Serbian market, including inadequate labeling and lack of legislative.

#### P84-10

##### EFFICACY OF IRON AND FOLIC ACID SUPPLEMENTS DELIVERED AS SPRINKLES OR TABLETS TO CONTROL ANAEMIA DURING PREGNANCY

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**RATIONALE AND OBJECTIVE:** A powdered mixture of mineral and vitamins (PMV) in a small sachet, sprinkles, is efficacious in controlling anemia in young children. A similar mixture targeted to pregnant women might be appropriate. The study was aimed at determining the efficacy of a PMV packaged in single serving sachets compared to iron folic acid tablet (IFA) in pregnant women.

**MATERIALS AND METHOD:** A randomized trial was carried out in 42 antenatal care centres operated by BRAC in Bangladesh. Pregnant women aged 15–45 years, gestational age 14–20 weeks and Hemoglobin (Hb) 70–110 g/L were allocated to either PMV (n=121) or tablets (n=92). Each PMV sachet or tablet contained 60mg elemental iron as ferrous fumarate and

400 $\mu$ g folic acid. Data collection was done at baseline and at gestational weeks 24, 28 and 34. Hb was measured using HemoCue®. Adherence was assessed by counting the number of sachets or tablets consumed.

**RESULTS AND FINDINGS:** Hb did not differ significantly between the tablet and PMV groups at 24 and 28 weeks. However, at week 32, mean Hb was lower in PMV group (105.6 g/L, SD 11.1) compared to tablet (110.2 g/L, SD 11.1) (P<0.05). At week 32, mean percent adherence was 58% in PMV group and 76% in tablet (P<0.05). After controlling for adherence, however, the Hb response did not differ between the groups.

**CONCLUSION:** Efficacy of iron and folic acid delivered by PMV in a sachet or tablet was comparable when adherence was controlled for.

#### P84-11

##### PROTECTIVE EFFECT OF DAILY SESAME OIL SUPPLEMENT ON GENTAMICIN-INDUCED RENAL INJURY IN RATS

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**RATIONALE & OBJECTIVES:** Gentamicin, an aminoglycoside antibiotic, is widely used in the treatment of Gram-negative infections; however, dose-limiting nephrotoxicity restricts its optimal use. This study aimed to investigate the effect of daily sesame oil supplement on oxidative-stress-associated renal injury induced by once-daily dose of gentamicin in rats.

**MATERIALS & METHODS:** Renal injury was induced by once-daily dose of gentamicin (100 mg/kg/d for 7d), then the effects of sesame oil (0.25, 0.5, and 1 mL/kg/d for 7d, orally) on renal injury, oxidative stress, hydroxyl radical, superoxide anion, nitric oxide were assessed after treatments.

**RESULTS & FINDINGS:** Sesame oil inhibited gentamicin-induced renal injury, lipid peroxidation, hydroxyl radical and superoxide anion, as well as nitric oxide production. In addition, sesame oil also inhibited xanthine oxidase activity and inducible nitric oxide synthase expression in gentamicin-challenged rats.

**CONCLUSION:** We hypothesize that daily sesame oil supplement attenuates oxidative-stress-associated renal injury via reduction of oxygen free radical and lipid peroxidation in gentamicin-treated rats.

#### P84-12

##### IMPACT OF IRON FORTIFIED VS NON-FORTIFIED FOOD SUPPLEMENTATION ON IRON STATUS (HEMOGLOBIN / SERUM FERRITIN) AND GROWTH OF THE CHILDREN BELONGING TO LOWER INCOME GROUP FAMILIES

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**RATIONALE AND OBJECTIVES:** Iron Supplementation is the most sustainable long-term solution for IDA especially among school-age children. The study was aimed to assess the impact of iron-fortified vs. non-fortified biscuit supplementation on iron status of children from lower socio-economic strata.

**MATERIALS AND METHODS:** After obtaining written child/parental consent, 379 children (boys / girls) aged 6-12 years were enrolled from three MCD schools. By Cluster-random sampling, children were assigned the experimental or the placebo group and were dewormed a week prior to supplementation. In sub-study I, the experimental group was given 2 biscuits per child/day (10mg of elemental iron) for 84 school days while the placebo group received similar non-iron fortified biscuits. In sub-study II, the experimental group

was given 4 biscuits per child/day (2 + 2 providing 20mg of elemental iron) for a period of 50 school days while the placebo group received similar non-iron fortified biscuits. The dietary intake data, anthropometry and hemoglobin / serum ferritin levels were compared for all the groups both before and after supplementation.

**RESULTS AND FINDINGS:** Post-supplementation data indicate an improvement in hemoglobin status and height / weight measurements in the experimental groups, though statistically non-significant.

**CONCLUSIONS:** Long-term supplementation with iron-fortified foods can be an effective strategy to overcome IDA.

#### **P84-13**

##### **EFFECTIVENESS OF A NATIONAL NUTRITION SUPPLEMENTATION PROGRAMME (PACAM) ON VITAMIN B12 DEFICIENCY IN ELDERLY CHILEAN**

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**OBJECTIVE:** To assess the impact of PACAM on vitamin B12 (B12) deficiency in community-living elderly of Santiago Chile.

**SUBJECTS AND METHODS:** 24-month cluster-randomised trial conducted among 389 subjects aged 65.0-67.9 years at baseline attending 20 health centres in Santiago enrolled in the CENEX study. Subjects were randomly assigned to PACAM (205) or Control (189) groups. Plasma levels of B12 (pmol/L) were determined by radio-immunoassay at the beginning and after the intervention. Deficiency was categorized in marginal (221-148 pmol/L) and severe (>148 pmol/L). Intention to treat analysis was performed to estimate the effect of the intervention.

**RESULTS:** The frequency of B12 deficiency was similar in both groups PACAM and Control at the beginning (12.7% vs 9.4%,  $p=0.112$ ) and after the intervention (19% and 18%,  $p=0.228$ ) respectively. Initial mean B12 plasma levels for the control group were 580.9, 95%CI 530.7-631.2 and final 402.4, 95%CI 364.6-440.3. In the PACAM group initial values were 541.0; 95%CI 493.0-589.0 and final 407.0; 95%CI 363.3-450.6.

**CONCLUSION:** The amount of B12 provided by the national supplement nutrition programme to elders has not effect on the B12 deficiency.

Support by grants Fondecyt 1070592

#### **P85: Food & Nutrition Intervention for Health (Others) II**

##### **P85-01**

##### **THE RELATIONSHIP BETWEEN EATING BEHAVIOR AND MENTAL HEALTH-AN EXAMINATION OF FEMALE UNIVERSITY STUDENTS**

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In recent years, University students have become increasingly night oriented and it has been suggested many problems exist with their health and lifestyle. In addition, the views regarding health and lifestyle habits of today's generation are extremely important as it is these people who create homes and families and raise the next generation. The current study aims to assess eating behavior and dieting as well as lifestyle habits such as eating and sleeping habits, and to clarify how these factors relate to mental health. In July 2007, 427 female University students were given self-assessment surveys and a total of 394 usable responses were received and examined. Previous research had shown that those who have problems concerning their eating behavior also tend to have poorer mental health. Not only did the results of the current study support this view,

but a correlation with feeling relaxed was also seen. The current research showed that feeling relaxed was linked to eating habits and cognitive restraint of eating behaviors. Accordingly, psychological factors may be considered as a new direction for future studies. Although a correlation was not seen between mental health and food related dieting, a relationship was seen between mental health and exercise or lifestyle related dieting.

##### **P85-02**

##### **WATER EXTRACT OF GLYCYRRHIZA URALENSIS FISCHER SUPPLEMENTATION AMELIORATED OXIDATIVE STRESS IN HEALTHY MALE SMOKERS**

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In oriental medicine, Glycyrrhiza uralensis Fisch (GU) has been known to possess various pharmaceutical functions, including detoxification, antiulcer, anti-inflammation, antiviral, anti-atherogenic, and anticarcinogenic activities. In this study, it was tested that a daily regimen of supplementation with water extract of GU would ameliorate oxidative stress in human. Fifty-two healthy male smokers aged 20-60 were divided evenly into two groups and given either 130 ml of GU extract or placebo prepared by oriental medical doctor every day for 8 weeks without any change of usual food intake, and blood samples were drawn before and after the intervention. 8 weeks of GU supplementation significantly increased the erythrocytic activities of antioxidant enzymes (catalase and glutathione peroxidase) and plasma total radical trapping potential (TRAP). Additionally, GU supplementation resulted in a significant decrease in H<sub>2</sub>O<sub>2</sub>-induced DNA damage in leucocytes determined using comet assay. This result indicates that the supplementation of Glycyrrhiza uralensis water extract may ameliorate oxidative stress in smokers by increasing plasma total antioxidant capacity and erythrocytic antioxidant enzyme activities and thus protecting DNA damage in peripheral leukocytes.

##### **P85-03**

##### **EFFECT OF ONION JUICE SUPPLEMENTATION ON LIPID AND ANTIOXIDANT METABOLISM IN HEALTHY YOUNG WOMEN**

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Many studies have suggested that onions contain heavy metal detoxification, antibiotic, blood sugar reduction, cardiovascular disease prevention, xanthine oxidase inhibition, antioxidant, and anticancer components. This study was performed to examine the effects of onion juice supplementation on lipid and antioxidant metabolism in fourteen healthy young women. The study was randomized single blind placebo controlled cross-over design consisting of two washout periods and two diet periods of 4 wks (total 10 wks). The subjects were given either 150 ml onion juice (300 g onion) or 150 ml of placebo per day. During the onion supplementation period, plasma HDL-cholesterol concentration increased significantly, although there no changes in total cholesterol and triglycerides. 4 wks of onion juice supplementation resulted in significant increase of plasma  $\alpha$ - and  $\gamma$ -tocopherol levels and erythrocytic superoxide dismutase activity, while no changes were found in the placebo period. These results indicate the consumption of onion juice for 4 wks exerts health benefits through the modulation of physiological functions including lipid profile and antioxidant status in healthy young women.

#### P85-04

##### **PATIENTS' PERCEPTION AND SATISFACTION ON THERAPEUTIC-DIET AT HOSPITALS IN BUSAN, REPUBLIC OF KOREA**

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The study purpose was to investigate the patients' perception for therapeutic-diet explanation and satisfaction on therapeutic-diet at hospitals in Busan, of Korea. The subjects were 155 inpatients at four general hospitals with each over 400 beds and a university hospital with over 800 beds. The research was performed through the interviewing process using questionnaires. A seventy-five percentage of patients had experience to hear explanation for their therapeutic-diet. In the patients' perception on the therapeutic-diet explanation, 74.6% of the patients understood very well on it, 78.9% of them perceived very importantly, and 67.5% of them were satisfied. There was no significant difference in the perception by patients' conditions such as number of hospitalization, length of hospitalization, status of appetite, degree of pain. On a scale of 5.00 for the therapeutic-diet satisfaction, the average scores were 2.95 for meal characteristics, 3.06 for service characteristics. The items of low scores in the therapeutic-diet satisfaction were taste, seasoning and appearance of meals, consideration of personal preference, and provision of selective menu. There were significant ( $p < 0.05$ ) increases to satisfaction in meal and service for increasing age. The patient group of  $\leq 50$  years old had significantly lower scores in taste of meal ( $p < 0.05$ ), appearance of meals ( $p < 0.01$ ), and variety of menu ( $p < 0.05$ ) compare with those of 51~59 year old group. The middle school graduated patient group had significantly ( $p < 0.01$ ) higher scores in snack provision and variety of menu than those of college graduated patient group. The patients group with little appetite showed significantly ( $p < 0.001$ ) lower average scores in meal, service than those with much appetite. There was a significant ( $p < 0.05$ ) positive correlation between satisfaction for therapeutic-diet explanation and therapeutic-diet satisfaction. Therefore, it was suggested that hospitals increase the dietitians' support for the therapeutic-diet explanation and develop the menu for the patients' preference and taste of meal

#### **P86: Nutritional Advances in Omics (i.e. nutrigenomics, epigenetics, proteomics, etc.)**

##### **P86-01**

##### **POLYPHENOLS FROM PROPOLIS: POTENTIAL INHIBITORS OF ANGIOGENESIS**

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**RATIONALE & OBJECTIVES:** Dietary polyphenols have multiple effects on human health. Our aim was to evaluate the influence of total polyphenols from different propolis on angiogenesis.

**MATERIALS & METHODS:** Brazilian Green, Red, Brown and Chilean Brown propolis were used. Polyphenols from propolis were identified by LC/MS using commercial standards. Angiogenesis was evaluated by HUVEC migration and expression of VEGF, FGF and HIF-1 mRNA, chorio-allantoic chicken embryo assay and by the rat aortic ring sprouting assay.

**RESULTS & FINDINGS:** Total polyphenols (10ug/mL) extracted from Green, Red, Brown and Chilean propolis inhibited HUVEC migration in 50%, 48.75%, 56.25% and 52.5% respectively, when compared to controls ( $p < 0.05$ ). No differences were observed in endothelial cell sprouting from murine aortic rings among the distinct propolis types, but all

of them induced less sprouting when compared to controls ( $p < 0.05$ ). In the chorio-allantoic chicken embryo assay all types of propolis inhibited new blood vessels formation in comparison with controls ( $p < 0.05$ ). The polyphenols from Red propolis induced lower new blood vessel formation than those of Green, Brown and Chilean propolis. Moreover, polyphenols from Red propolis decreased the expression of VEGF and FGF mRNA as compared with the others ( $p < 0.05$ ).

**CONCLUSION:** Our data indicate that polyphenols from different types of propolis could be used as potential inhibitors of the neovascularization.

Financial Support: FAPESP (grant 08/0590-3 to D.S.P.A. and scholarship to Daleprane J.B.).

##### **P86-02**

##### **EPIGENETIC EFFECTS OF DIFFERENTIATION-INDUCING NUTRITIONAL COMPOUNDS RESEMBLE EFFECTS OF CHROMATIN-TARGETING DRUGS IN THE HL-60 PROMYELOCYTIC LEUKEMIA CELL LINE**

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**INTRODUCTION:** Nutritional compounds such as genistein and vitamin D3 induce differentiation in HL-60 leukemia cells similar to chromatin-targeting drugs. The aim of this study was to compare epigenetic effects of such drugs to genistein and vitamin D3.

**METHODS:** HL-60 cells were incubated for 72 hours with decitabine 5 $\mu$ M, zebularine 25 $\mu$ M, valproate (200 $\mu$ M), genistein (9 $\mu$ M) or vitamin D3 (10nM). Following bisulphite conversion of genomic DNA, evaluation of the methylation status of tumor suppressors was quantified using a real-time PCR system (RTQPCR) which was also applied for analysis of mRNA expression.

**RESULTS:** We show that DNA-methyltransferase-inhibitors (decitabine and zebularine), a histone-deacetylase-inhibitor (valproate) as well as the nutritional compounds genistein and vitamin D3 converted the 100% hypermethylated P15INKB and estrogen receptor alpha ESR1-promoters to a hemimethylated state. At the mRNA-level, this induced a stimulation of tumor-suppressor genes such as ESR1 (6-fold with valproate or vitamin D3, 16-fold with Zebularine and 9-fold with decitabine) and P15INKB (9-fold stimulation with valproate or vitamin D3). DNA-methyltransferases and histone deacetylase were downregulated by 50% (+/-20%).

**CONCLUSION:** Results of this study show that genistein and vitamin D3 affect epigenetic pathways which are also targeted by specific drugs.

**ACKNOWLEDGEMENT:** This study was supported by Jubiläumsfonds der Österreichischen National Bank.

##### **P86-03**

##### **REGULATION OF IL-8 AND IL-17 EXPRESSION BY BUTYRATE, FOLIC ACID, AND GENISTEIN INCLUDES DNA-METHYLATION AND HISTONE ACETYLATION**

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IL-8 and IL-17 regulate interactions between immune cells and epithelia in the GI-tract, involving epigenetic mechanisms. Because of the epigenetic activities of the SCF butyrate, produced by intestinal microbiota, genistein and folic acid we analyzed effects on histone acetylation and DNA-methylation on the genes interleukine 8 and 17.

We analyzed gene expression by real time PCR, DNA-methylation by bisulfite sequencing PCR, and histone

acetylation by Chromatin immunoprecipitation in the CACO-2 cell line model.

IL-8 and IL-17 expression was increased by genistein, butyrate, and folic acid. Folic acid increased the IL-8-DNA-methylation on the sites-1342 and-1412. Butyrate enhanced the histone acetylation on H3 lysine 9 at IL-8. Genistein and butyrate also stimulated apoptose relevant caspase3. Changes in butyrate producing GI-microbiota (Clostridium cluster IX and XIVa) were found due to nutrition.

As the levels of genistein, folic acid, and butyrate in the GI-tract can be influenced by nutrition, nutritional concepts may be feasible to interfere with IL-8 and IL-17 expression in inflammatory GI diseases.

#### **P86-04** **EXPRESSION PROFILING OF GENES TARGETED BY BILBERRY IN MACROPHAGES BY DNA MICROARRAY**

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**OBJECTIVE:** Bilberry is anthocyanins-rich plant. To evaluate the anti-inflammatory function and underlying genes targeted by bilberry, gene expression profiling by DNA microarray was performed on bilberry extract-treated macrophages.

**MATERIAL & METHODS:** RAW264 macrophages were treated with LPS in the presence or absence of bilberry extract. RNA was extracted for DNA microarray with Agilent mouse 22,050 oligonucleotides.

**RESULTS:** The expression levels of 998 genes among 22,050 were increased by  $\geq 2$ -fold in LPS-activated RAW264 cells, 358 gene signals of which were attenuated by bilberry extract. Expression levels of 2,086 genes were decreased by  $\geq 2$ -fold in LPS-activated cells, of which 939 gene signals were enhanced by bilberry extract. Utilizing Panther group analysis, 226 genes affected by bilberry extract were classified into 43 categories relating to biological processes (97), molecular functions (186), and signaling pathways (26) with  $\geq 1.5$ -fold change. The genes categorized as "defense, inflammatory response, cytokines activities, and receptor activities" were highly affected by bilberry extract.

**CONCLUSION:** Our DNA microarray results provide a molecular basis for the anti-inflammatory effects of bilberry.

#### **P86-05** **A COMMON VARIANT IN PCSK1 WAS ASSOCIATED WITH OBESITY AND RELATED PHENOTYPES IN A CHINESE HAN POPULATION**

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**RATIONALE & OBJECTIVES:** Common variants in PCSK1 gene have been report to be associated with obesity in white Europeans. We aimed to replicate this association in Chinese Hans.

**MATERIALS & METHODS:** Two PCSK1 variants rs6234 and rs6235 (in strong LD with each other,  $r^2=0.98$ ) were genotyped in a population-based cohort of Chinese Hans including 1,423 men and 1,787 women, and only rs6234 was used for further analyses.

**RESULTS & FINDINGS:** The minor G-allele of rs6234 was associated with increased risk of obesity (OR 1.25[0.97-1.61],  $P=0.08$ ) and overweight/obesity combined (OR 1.22[1.04-1.43],  $P=0.0175$ ) in men but not in women ( $P=0.0487$  and  $P=0.12$  for interaction, respectively). Consistently, the G-allele of rs6234 was significantly associated with increased BMI ( $P=0.0047$ ), waist circumference ( $P=0.0097$ ) and body fat percentage ( $P=0.046$ ) in men but not in women ( $P=0.0069$ , 0.0064 and 0.16 for interaction, respectively). Notably, the rs6234 C-allele also showed significant association with

increased HOMA-B ( $P=0.0059$ ) and decreased HOMA-S ( $P=0.0349$ ) with adjustment for BMI, but not with type 2 diabetes.

**CONCLUSION:** In this population-based sample of Chinese Hans, we demonstrated that the PCSK1 rs6234 variant was significantly associated with overweight and related phenotypes in men only. Notably, the rs6234 also showed significant association with beta-cell function and insulin sensitivity in both genders independently of obesity.

#### **P86-06** **DATA STORAGE AND COMPARATIVE ANALYSIS OF GENE EXPRESSION PROFILES FOR PROMOTION OF NUTRIGENOMICS STUDY**

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The prevalence of transcriptomics analyses in food and nutrition science now forces researchers in these fields to cope with massive amounts of information. This study aimed to develop an information infrastructure with novel analytical tools specifically oriented to nutrigenomics data. We cross-compared transcriptome responses to calorie restriction (CR) to evaluate the potency of this database.

The database (<http://133.11.220.243/nutdb.html>) was designed to store both publication information and gene expression profile data. The publication data enable one to search for nutrigenomics reports by, for example, specific terms. With the help of the tools accompanying the database, the gene expression profile data accumulated in the database can be used for comparison and analysis over multiple microarray platforms. We obtained multiple sets of gene expression profiles in the liver of rats under mild CR conditions. Cross-sectional comparisons using the present results and several other sets of publicized CR data identified a few genes commonly and markedly modulated by various levels of CR. They included the CYP4A14 gene and may be used as markers for effective CR mimetics.

The database proved to be a highly effective tool for comparative analysis of transcriptome data in food and nutrition research.

#### **P86-07** **IRON LOADING REGULATES DUODENAL DMT1 (DIVALENT METAL TRANSPORTER 1) AND FERRITIN EXPRESSION IN IRON DEFICIENT RATS**

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It has been reported that DMT1 was upregulated and Ferritin was downregulated by Iron deficiency. In the present study, we examined the effect of intestinal iron loading, in the iron deficient condition, on mRNA and protein expressions of DMT1 and Ferritin. Wistar rats were fed AIN-93G or iron-free diet for 3weeks. In Exp.1, rats were narcotized, and the test solutions, contained 200 or 1000  $\mu\text{g}$  of iron as  $\text{FeSO}_4$  in 10mM HCl, was administered in the ligated duodenum for 1 hour. In Exp.2, rats were given the test solution intragastrically and followed fasting for 6 hours. After 1 or 6 hours, the duodenum were removed and mucosal epithelial cells were scraped using a slide glass. The relative expression of DMT1 and Ferritin mRNA were determined by real-time PCR (Bio-Rad Laboratories Inc., CA.), and the values of gene expression were normalized by GAPDH. After 1 hour of iron loading, there was not any effect on DMT1 and Ferritin mRNA regardless of the iron concentration. After 6 hours from intragastric iron loading, DMT1 mRNA was significantly downregulated by 1000  $\mu\text{g}$  iron loading. In the Ferritin, there was no effect on mRNA expression, but protein was significantly upregulated.

#### P86-08

### INFLUENCE OF VITAMIN C LEVEL ON THE GENE EXPRESSION IN PRIMARY HEPATOCYTE OF ODS RAT

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**RATIONALE AND OBJECTIVES:** Vitamin C (L-ascorbic acid; AsA) plays many important roles in various biochemical reactions in vivo. It is predicted that the bioavailability of AsA is related closely to the AsA levels in several tissues. Previously, we verified that AsA levels in liver of ODS rats affects mRNA expression of SVCT (sodium dependent vitamin C transporter). However, no sufficient information on the other gene expressions by AsA level in the tissues has been reported. Consequently, we investigated the influence of AsA level on the gene expression in primary hepatocyte of ODS rat.

**MATERIALS AND METHODS:** In this experiment, primary hepatocyte of ODS rat were divided into three groups: a) no AsA-added medium; b) 0.05 mM AsA-added medium (normal); and c) 5 mM AsA-added medium. After incubation with AsA for 48 hours, level of AsA concentration were measured using HPLC-ECD, and gene expression by DNA microarray (Affymetrix, Inc.). The raw data were statistically analyzed by global normalization method. The expression of genes was dependent on the AsA level added into medium. The increase/decrease tendency of the expression of gene was confirmed by real time RT-PCR method.

**RESULTS AND FINDINGS:** The expression of some genes, such as lysyl oxidase (Lox), HRAS-like suppressor family, member 5 (Hrasls 5) increased in the 5 mM AsA-added medium, while the expression of some other genes increased in the no-AsA-added medium. However, the increase/decrease expression of gene related redox reaction, such as SOD (superoxide dismutase); glutathione reductase (GSR) had no significant difference.

**CONCLUSION:** The results suggested that AsA level in tissues, reflecting the AsA ingestion level, might regulate some gene expression level.

#### P86-09

### IMPACT OF GENE-NUTRITION INTERACTION ON THE EXERCISE PERFORMANCE OF TAIWANESE ELITE ATHLETES

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The purpose of this study was to investigate the interactions of genotype, dietary intake, and exercise performance of Taiwanese elite athletes. Based on gender and exercise type, athletes were divided: endurance/male (n=23, 20.2±1.4 y/o), sprint/male (n=104, 20.1±1.4 y/o), endurance/female (n=24, 20.1±1.5 y/o), and sprint/female (n=84, 19.7±1.1 y/o). We examined the genotypes of ACE, ACTN3, and AGT, dietary behavior, and exercise training, along with calcaneus broadband ultrasound attenuation (BUA). The distribution of ACE genotypes of the endurance/female group was significantly different from the Control. There were significant differences in the distributions of ACE and ACTN3 genotypes between endurance and sprint groups, regardless of gender. The distributions of ACTN3 genotypes of the endurance/male, sprint/male, and sprint/female were significantly different from the Control. The distribution of AGT genotypes, however, was no different among all the groups. The BUA and percentage of protein intake were significantly different between sprint/female and endurance/

female. The consumption frequency of drinks in the endurance/male was significantly higher than that of the sprint/male. The ACE and ACTN3 genotypes might play roles in the exercise performance of Taiwanese elite athletes.

#### P86-10

### METABOLOMICS AS A TOOL IN NUTRITION INTERVENTION STUDIES

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**RATIONALE AND OBJECTIVES:** Novel approaches for merging metabolomics data with traditional nutrition intervention data have not been extensively explored. The objective was to assess the application of metabolomics in a dietary fat intervention.

**MATERIALS AND METHODS:** Urine and plasma samples were collected from 60 men and women before and after a 12-week isoenergetic dietary fat manipulation. Samples were analyzed using <sup>1</sup>H NMR and gas chromatography. Metabolomics data was merged with fatty acid data and assessed using multivariate data analysis.

**RESULTS:** Urine from younger subjects and male subjects had higher levels of creatinine. Urine from female subjects had higher levels of trimethylamine-N-oxide (TMAO) and citrate. Analysis of the merged <sup>1</sup>H NMR and fatty acid datasets showed an elevation of clupanodonic acid (C22:5 n-3), stearidonic acid (18:4 n-3),  $\gamma$ -linolenic acid (18:3 n-6) and arachidonic acid (20:4 n-3) following a high monounsaturated fat diet.

**CONCLUSIONS:** This study demonstrated that metabolomics is a useful tool for characterising biological samples. The merging of the plasma metabolomics and fatty acid data showed changes resulting from diet that were not picked up when the datasets were assessed independently. Metabolomics may serve as a useful tool for exploring the global metabolic impact of a dietary treatment.

#### P86-11

### HEALTH BENEFITS FROM DIETARY FIBER; INFLUENCE ON HUMAN METABOLOME

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**RATIONALE AND OBJECTIVES:** The effects of dietary fiber in healthy subjects can be subtle; thus looking at several early biomarkers simultaneously by multivariate statistics might better explain the beneficial effects. The aim was to identify unique biomarkers of different dietary fiber exposures, and search for early biochemical changes in plasma and urine metabolites, and any gender differences related to this exposure.

**MATERIALS AND METHODS:** In a randomized cross-over intervention, 25 subjects were given either a high fiber diet or a low fiber diet. Plasma and 24-h urine were collected for metabolomics profiling by UPLC-QTOF-MS. Raw data were aligned to detect peaks and collect markers to identify specific markers. Different multivariate data analyses were used to explore the data and discriminate between groups.

**RESULTS AND FINDINGS:** Metabolomic changes can be detected after a long-term high dietary fiber intake. Detailed results will be presented at the poster session.

## **P86-12 PROTEOMIC EFFECTS OF SOY ON PROSTATE TISSUE**

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Soy consumption has been inversely linked to prostate cancer incidence and mortality. The objective was to identify prostate proteins that are altered after 6-month soy supplementation using a proteomics approach. Men (n=23) at high risk of developing cancer were assigned to receive either soy protein isolate providing 107 mg/d isoflavones (SPI+), SPI depleted of isoflavones (SPI-) or a placebo comprised of milk protein isolate (MPI) for 6 months. Post-intervention prostatic tissue was obtained and relative protein quantitation and identification were determined using iTRAQ® and LC-MALDI-MS. Analyses of individual proteins indicated 20 proteins that showed more than a 20% change between the SPI+ and MPI group. Several of these proteins interact with the nuclear factor kappa B (nf-κB) complex. Intake of isoflavones at nutritionally relevant doses was able to induce changes in the prostate proteome providing *in vivo* mechanistic evidence of the chemopreventive actions of soy.

## **P86-13 HEALTH BENEFITS FROM DIETARY FIBER; INFLUENCE ON HUMAN TRANSCRIPTOME**

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**RATIONALE AND OBJECTIVES:** Consumption of soluble dietary fiber is correlated with beneficial health effects related to source and processing. Characterized fiber fractions were selected for a human meal study including traditional and transcriptomic approaches in analysis.

**MATERIALS AND METHODS:** 13 healthy volunteers ingested meals with fibers from different sources, a meal with a mixture of three fibers and a control meal without fiber.

**RESULTS AND FINDINGS:** Soluble fiber-rich meals, especially those also containing insoluble fiber, decreased postprandial glucose and insulin concentrations, with more pronounced effects in women. Triglyceride levels increased after fiber intake. The fiber mixture indicated responses attributable to each fiber type. Fiber-meals resulted in differentially expressed genes, but this effect was small compared to the fasting/non-fasting effect.

**CONCLUSION:** Soluble dietary fiber influences traditional postprandial biomarkers depending on fiber source, dose and gender. Gene expression changes in blood leukocytes can be identified after intake of a fiber-rich meal.

## **P86-14 USE OF PROGRAM THEORY TO IMPROVE IMPLEMENTATION OF LIVELIHOOD INTERVENTIONS INTEGRATED WITH HIV CARE AND TREATMENT PROGRAMS IN UGANDA**

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**RATIONALE & OBJECTIVES:** Despite significant improvements in access to anti-retroviral therapy (ART), this alone is insufficient in the context of widespread food insecurity among HIV-infected individuals in sub-Saharan Africa. Increasingly, organizations are providing services that integrate food assistance and livelihood programming with HIV care and

treatment services to improve food security of their clients and households.

In this paper we examine these livelihood programs that are integrated with an AIDS care and treatment organization in Uganda, utilizing a program theory framework. The main objectives are to assess if these integrated programs share a clearly elucidated causal pathway to impact and to examine their service delivery and utilization plans to realize the intended impact on food security.

**METHODS:** We conducted multiple in-depth key informant interviews, along the program chain, with staff from The AIDS Support Organization (TASO) in Uganda and 20 of its partner livelihood program implementing organizations in eastern and northern Uganda.

**FINDINGS:** We present our results using a program theory framework that highlight the key steps along the process pathway as they relate to successful delivery of interventions, program participation, and uptake of services by beneficiaries. Key research questions include the following: Do programs possess coherent, consistent and plausible objectives and approaches to attaining them? Are impact and process theories clearly defined and logical? Through analysis of program staff interviews, we highlight critical gaps in conceptualization of causal pathways and program processes that need to be addressed in order to maximize impacts.

**CONCLUSIONS:** We propose ways that program theory can be utilized to design and deliver better programs that integrate livelihood security interventions to improve food security with HIV care and treatment services.

## **P86-15 ISOLATED SOY ISOFLAVONE SUPPLEMENTS FOR POSTMENOPAUSAL BONE LOSS: SYSTEMATIC REVIEW AND META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS**

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**RATIONALE & OBJECTIVES:** Clinical trials to examine the effects of soy isoflavone supplements on bone mass in postmenopausal women have yielded conflicting results. The present study was conducted to clarify the effect of isolated soy isoflavone supplements on postmenopausal bone loss.

**MATERIALS & METHODS:** PubMed, CENTRAL, ICHUSHI, CNKI, Wanfang Data, CQVIP, and NSTL up to September 2008 were searched for randomized placebo-controlled trials published in English, Japanese, or Chinese reporting the outcomes of isoflavone supplements on lumbar spine or hip bone mineral density (BMD) in postmenopausal women. Trials were identified and reviewed for inclusion and exclusion eligibility. Data on study design, participants, interventions and outcomes were extracted and trials were assessed for quality in accordance with the established methods.

**RESULTS & FINDINGS:** From 3126 relevant trials identified, 7, 5, 4, and 3 trials were selected for estimation of effects on the lumbar spine, femoral neck, hip total, and trochanter BMD respectively. Meta-analysis of 6 high-quality trials including 712 postmenopausal women with low bone mass, found that daily ingestion of an average of 65 mg isolated soy isoflavones for 6 months to one year significantly increased lumbar spine BMD by 22.05 mg/cm<sup>2</sup> (95% CI, 1.62 to 42.48; P=0.03), or by 2.49% (95% CI, 0.23 to 4.76; P=0.03) compared with placebo. Results of 5 trials with 693 participants showed that a daily average of 56 mg soy isoflavones tended to increase femoral neck BMD by 13.67 mg/cm<sup>2</sup> (95% CI, -2.69 to 30.03; P=0.10), or by 2.01% (95% CI, -0.39 to 4.40; P=0.10). No significant effects on hip total and trochanter BMD were found. Soy isoflavone supplements were well tolerated and no serious adverse events were reported.

**CONCLUSION:** Isolated soy isoflavone supplements can be used to offset naturally occurring postmenopausal bone loss,

and are applicable for complementary or alternative use in women with postmenopausal osteopenia.

#### P86-16

##### EFFECTS OF ACUTE HYPOXIA ON PLASMA METABOLOME IN MICE

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**RATIONALE & OBJECTIVES:** To explore the metabolic effects of acute hypoxia on plasma in mice.

**MATERIALS & METHODS:** Fourteen mice were randomly divided into two groups: control and hypoxia group. The mice of hypoxia group were exposed to a simulated altitude of 6000 meters for 8 hours. Nuclear magnetic resonance spectrometer was used to identify the metabolic changes after acute hypoxia.

**RESULTS & FINDINGS:** Compared with control, the most notable metabolic changes in plasma were as follows: carnitine decreased remarkably and lactate increased significantly after acute hypoxia exposure. Decreases in levels of ethanol glycerol, glutamate, glycine and serine, and increased levels of lipids and pyruvate, alanine, taurine, choline, glucose, and glutamine were also observed in hypoxia group.

**CONCLUSION:** Significant changes in the plasma carbohydrate, lipid and amino acid profiles were observed following acute hypoxia, suggesting a hypoxia-induced alteration in energy and related substances metabolism.

#### P86-17

##### METABOLOMIC APPROACH IN STUDYING BIOCHEMICAL EFFECTS OF A-TOCOPHEROL DEFICIENCY USING A RAT MODEL

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Metabolomics is a new approach in which profiles of metabolites in different tissues and/or biofluids are investigated to understand the changes, which is induced in the profile of metabolites, following an induced modulation. We have used this approach to investigate the biochemical activities of  $\alpha$ -tocopherol in the liver using a rat model. 21-day Rats were either fed a sufficient control (n=10) or a deficient diet (n=10) for two months before sacrifice. Their livers were collected and extracted with chloroform-methanol-water. The extracts were analyzed using 1H-NMR and the data was analyzed using multivariate statistical method (PCA and OPLS-DA). The statistical analysis revealed that  $\alpha$ -tocopherol modulates the contents of some amino acids and pantos moiety, and methyl donors. The significance of these finding are presented.

#### P86-18

##### IMPLICATION OF DIETARY NATURAL COMPOUNDS IN EPIGENETIC MODIFICATIONS AS A NEW APPROACH TO CANCER CHEMOPREVENTION

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A number of studies provide evidence that vitamins and polyphenolic compounds are potent bioactive molecules with anticarcinogenic properties since they can interfere with the initiation and progression of cancer by affecting cell proliferation, differentiation, apoptosis, angiogenesis, and metastasis. These effects can partly be connected with inhibition of DNA methylation, one of the mechanisms of epigenetic regulation of gene expression, and re-establishing normal DNA methylation patterns. Numerous tumor suppressor genes have been reported to be transcriptionally

silenced by hypermethylation of their promoter during cancer development. Therefore, inhibition of DNA methyltransferase, catalyzing DNA methylation, may be a putative mechanism that contributes to repression of cancer growth and/or cancer initiation. A growing body of literature demonstrates that natural compounds, such as tea catechins (catechin, epicatechin, (-)-epigallocatechin-3-gallate-EGCG), bioflavonoids (quercetin, fisetin, myricetin), genistein from soybean, and coffee polyphenols (caffeic acid, chlorogenic acid), as well as all-trans retinoic acid (ATRA), vitamin D3, and resveratrol, are able to prevent or reverse promoter hypermethylation-induced silencing of key tumor suppressor genes and induce their expression in cancer cells. Demethylation and reactivation of methylation-silenced tumor suppressor genes by ATRA, vitamin D3, resveratrol, and genistein may result from their involvement in indirect down-regulation of DNMT1 enzymatic activity and/or DNMT1 gene expression via stimulation of p21 and PTEN expression, activation of retinoblastoma (Rb) protein and inhibition of E2F transcription factor activity, inactivation of ER $\alpha$ , and/or inhibition of AP-1 complex activity. Influence of food compounds with catechol group on DNA methylation can be referred to catechol-O-methyltransferase (COMT)-mediated methylation reaction. These compounds are excellent substrates for this reaction resulting in depletion of the methyl donor SAM and formation of SAH which is a potent feedback inhibitor of DNA methylation. The above facts raise the possibility that these natural compounds, which participate in regulation of DNA methylation, may be an effective approach to cancer chemoprevention.

#### P86-19

##### APOA5 -1131T>C POLYMORPHISM, LIPIDS, METABOLIC SYNDROME AND CARDIOVASCULAR DISEASE IN THAIS

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**OBJECTIVES:** To investigate the relationships between the APOA5-1131C>T (rs662799) polymorphism and MetS-related phenotypes and risk of CAD in large-scale study in Thais.

**MATERIALS & METHODS:** Cross-sectional study in 1124 patients (523 men and 613 women) undergoing coronary computed tomographic angiography at Ramathibodi Hospital.

**RESULTS:** The APOA5-1131T>C polymorphism was strongly associated with TG concentrations and explained 2.0% of its variance. Thus, CC individuals had significantly higher TG concentrations (1.46 mmol/L) compared to TC (1.30 mmol/L) and TT (1.16 mmol/L) individuals (P for trend<0.0001). Moreover, the-1131C allele was subsequently associated with greater risk for MetS (OR=1.64; 95% CI: 1.04-2.58 for CC and OR=1.28; 95% CI: 0.99-1.65 for TC, P for trend=0.0354), primarily through the higher risk of hypertriglyceridemia (P=0.0044) and for CAD (OR= 2.15; 95% CI: 1.25-3.70 for CC and OR

**CONCLUSION:** The APOA5-1131T>C polymorphism is a potential predictor of MetS and CAD by modulating TG concentrations. This polymorphism may serve as a candidate marker for assessment of genetic susceptibility to MetS and CAD in Thais.

## P86-20

### GENDER-SPECIFIC ASSOCIATION OF THE CETP TAQ1B POLYMORPHISM WITH CARDIOVASCULAR DISEASE IN THAIS

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**OBJECTIVES:** To examine the association between CETP Taq1B polymorphism (rs708272) and HDL-C concentrations and CAD risk, and their modification by environmental factors in a large scale study in Thais.

**MATERIALS & METHODS:** The Taq1B polymorphism was genotyped in 1124 patients (523 men and 613 women) undergoing coronary computed tomographic angiography.

**RESULTS:** The Taq1B polymorphism was an independent predictor of HDL-C concentrations ( $P < 0.0001$ ) and accounted for 2.2% and 1.9% of its variance in men and women, respectively. Thus B1B1 individuals had the lowest HDL-C concentrations (1.11 mmol/L) compared to B1B2 (1.17 mmol/L) and B2B2 (1.24 mmol/L) individuals. Moreover, the significant association of Taq1B polymorphism with CAD risk was observed only in women (OR=2.849, 95% CI: 1.189-6.827 for B1B1, and OR=2.357, 95% CI: 0.997-5.572 for B1B2,  $P$  for trend=0.038). However, the association was no longer present after controlling for HDL-C ( $P=0.061$ ). We did not support the significant interaction of Taq1B polymorphism with gender, obesity, hypertriglyceridemia, smoking, or alcohol consumption in determining HDL-C concentrations.

**CONCLUSIONS:** Our findings support the role of CETP Taq1B influencing HDL-C concentrations and add insight to a gender specific association between the polymorphism and risk of C AD. Thus B1 allele carriers were associated with lower HDL-C concentrations and subsequently higher risk for CAD especially in Thai women. The relationship was mediated partly through HDL-C.

## P86-21

### PROTEOMIC ANALYSIS FOR FUNCTIONALITY OF TOONA SINENSIS

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Our previous in vitro study showed that extract of *Toona sinensis* leaves (TSL-2) impaired sperm functions at high concentrations. Here, we further investigate the functionality of TSL-2 in testes of rats fed with normal diet, vitamin C (0.2 g/kgBW/day), or TSL-2 (0.053 g/kgBW/day) daily for 8 weeks by proteomic analysis of two-dimensional gel electrophoresis (2DE) and matrix-assisted laser desorption ionization time-of-flight (MALDI-TOF). Results of the 2DE analysis by ImageMaster 2D Platinum Software indicated that 10 proteins were differentially expressed more than 1.5 folds. Further identifying these proteins with MALDI-TOF showed that these proteins included glutathione S-transferase (GST), phospholipids hydroperoxide glutathione peroxidase (PHGPx), fatty acid binding protein 9 (FABP9), and thioredoxin were downregulated by TSL-2 and involved in detoxification and spermatogenesis. In conclusion, TSL-2 decreases the expression of proteins involved in the spermatogenesis and sperm maturation leading to the impairment of sperm functions.

## P86-22

### ANTIOXIDATIVE CAPACITY OF SAITHE (POLLACIUS VIRENS) AND SHRIMP (PANDALUS BOREALIS) AS AFFECTED BY DIGESTION

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**RATIONALE AND OBJECTIVES:** Lately the interest in marine by-products as raw material for the production of nutraceuticals or functional foods ingredients has been growing with particular attention towards non-hazardous antioxidants. Substances with antioxidative capacity (AOC) are also present in foods and are released during gastrointestinal (GI) digestion. **MATERIALS AND METHODS:** Changes in AOC of saithe, shrimp and aliquots thereof during a simulated in vitro GI digestion were measured using the oxygen radical absorbance capacity (ORAC) assay and the ferric reducing ability of plasma (FRAP) assay. Blueberry was included for comparison.

**RESULTS AND FINDINGS:** The AOC increased in all samples during digestion. After digestion, the AOC of muscle of both autumn saithe and shrimp were approximately 8-fold higher than the related press juices and higher than both digested blueberry (1.5 fold) and muscle of winter saithe when measured by ORAC. When measured by FRAP, blueberry exhibited ten times the AOC of seafood muscle.

**CONCLUSION:** These results imply that antioxidative species from seafood increase during and can withstand the GI digestion and thus may have a physiological impact.

## P86-23

### PHYTOSTEROL CONCENTRATIONS IN BLOOD CELL MEMBRANES IS HIGHER IN CHILDREN RECEIVING LIPID EMULSIONS

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**RATIONALE & OBJECTIVES:** Children with intestinal failure receive lipid emulsions which are usually olive-oil or soy-oil based. In a significant number of cases parenteral nutrition (PN) is complicated by liver dysfunction whose pathogenesis remains poorly understood. Data from the literature show a correlation between lipid emulsions administration, higher serum phytosterols (Campesterol and Sitosterol) and cholestasis. However, no data regarding phytosterol levels in blood cell membranes are currently available. The aim of the study was to evaluate phytosterol concentrations in plasma and blood cell membranes of children receiving PN.

**MATERIAL & METHODS:** Plasma and blood cell membrane levels of Cholesterol (Ch), Desmosterol (Ds), 7Dehydrocholesterol (Dhc), Lathosterol (Lt), Campesterol (Cp) and Sitosterol (St) have been evaluated in 3 newborn infants receiving PN and 3 controls by using a gas chromatography mass-spectrometry method. The blood samples were taken 12 hours after the interruption of lipid infusion. The duration of PN and the amount of intravenous doses of lipids, glucose and nitrogen were assessed.

**RESULTS & FINDINGS:** The mean duration of lipid administration in patients was  $4,3 \pm 2,5$  days and the mean total amount of lipids infused was  $7,6 \pm 6$  grams. Phytosterolemia (percentage of total sterols) in patients was  $0,8 \pm 1,3$  and in controls was  $0,2 \pm 0,05$  ( $p=0,15$ ).

Table 1. Sterol concentrations in blood cell membranes.

	Ch (%)	Ds (%)	Dhc (%)	Lt (%)	Cp (%)	St (%)
Controls	99,36±0,13	0,03±0,01	0,03±0,01	0,38±0,1	0,11±0,06	0,08±0,01°
Patients	97,22±1,9	0,04±0,04	0,04±0,04	0,26±0,1	0,55±0,31	0,97±0,51°

°  $p < 0.05$

**CONCLUSION:** The data of our study suggest that Sitosterol accumulation in blood cell membranes is an early onset event in children receiving lipid emulsions, preceding any significant increment of phytosterolemia. This could be a useful marker to study endogenous metabolism of phytosterols and evaluate their role in the pathogenesis of PN-associated liver disease.

#### P86-24

##### **TOCOMIN SUPRABIO™: PATENTED BIOENHANCED ORAL DELIVERY SYSTEM**

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**RATIONAL & OBJECTIVES:** Palm tocotrienol (vitamin E) showed promising health benefits including cardiovascular protective effects, preventing stroke-induced brain damages, anticancer properties, preventing UV-induced skin aging and hair loss. However, like all other fat-soluble vitamins, oral absorption of tocotrienols is low and erratic especially when taken with fat-poor diet. A self-emulsifying formula (Tocomin SupraBio™) was developed and tested in a clinical trial.

**MATERIALS & METHODS:** A crossover study was conducted with 12 healthy volunteers. They were divided into 2 groups, one group received softgel containing Tocomin oil extract while the other group received Tocomin SupraBio™ (each contain 50mg tocotrienols). After 1-week wash out period, 2 groups switched to receive the other formula. Blood samples were collected and plasma levels of tocotrienols analyzed. Pharmacokinetic parameters ( $C_{max}$ ,  $T_{max}$ ,  $AUC_{0-\infty}$ ) were calculated and ANOVA procedure was applied.

**RESULTS & FINDINGS:** The extent of absorption of tocotrienols from Tocomin SupraBio™ was significantly higher (average 250%) than Tocomin oil extract ( $p < 0.01$ ). The rate of absorption from Tocomin SupraBio™ is faster & commenced at an earlier stage.

**CONCLUSION:** The patented SupraBio™ delivery system increases the rate and extent of oral tocotrienol absorption.

#### P87: Macronutrients (Protein/Carbohydrates/Lipids)

##### P87-01

##### **SATIETY EFFECTS OF WHEY PROTEIN-ENRICHED WATER BEVERAGES IN OVERWEIGHT WOMEN: A DOSE RESPONSE STUDY**

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Protein is recognised as the most satiating macronutrient. There is currently little information on whether satiety is maintained when proteins are consumed as beverages. This study investigated the dose-response of whey protein-enriched water beverages on post-ingestive satiety and energy intake [EI] in overweight women.

Using a cross-over design 46 participants completed four 500mL pre-load treatments [0%, 8kJ; 1%, 93kJ; 2%, 178kJ; 4% w/w, 348kJ ClearProtein™] at least 3 days apart. Following a standard evening meal and breakfast, beverages were consumed 120 mins before an ad libitum lunch, where EI was measured. Feelings of hunger, fullness and satisfaction were measured using visual analogue scales (VAS).

There was a significant effect of beverage pre-load on hunger (treatment\*time;  $P = 0.0074$ ), whereby the 1%, 2% and 4% protein treatments decreased hunger compared to the water

control during the 2h following the beverage ( $P < 0.05$ ). Similarly, fullness (treatment\*time;  $P = 0.0020$ ) and satisfaction (treatment\*time;  $P = 0.0356$ ) were significantly increased by 1% and 4% protein treatments. The 4% beverage decreased EI at the ad lib lunch by 8 percent compared to water control but did not reach statistical significance (0%, 3028kJ; 1%, 3080kJ; 2%, 2924kJ; 4%, 2781kJ,  $P > 0.05$ ).

Whey protein-enriched water beverages impacted positively on key measures of VAS-assessed satiety, but had no impact on EI.

##### P87-02

##### **EFFECTS OF SHORT TERM INGESTION OF DIACYLGLYCEROL (DAG) RICH MUSTARD OIL ON HYPERCHOLESTEROLEMIC RATS**

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**RATIONAL & HYPOTHESIS/OBJECTIVE:** Excess calorie intake in industrialized countries has prompted development of fat substitutes and other low calorie dietary items to reduce obesity and related problems. Studies on various structured lipids have been conducted for the management of obesity; Diacylglycerol (DAG) oils are among them. DAG is a component (2–10%) of the normally consumed edible fats and it has been recognized as an intermediate in the process of TAG digestion in the digestive tract. But absorption and metabolism of DAG oil differs from that of TAG. Literature revealed that DAG oil lowers postprandial lipemia and an increased proportion of fatty acids being oxidized instead of stored. Preliminary studies suggest that these differences in energy partitioning between DAG and TAG may be usefully exploited to reduce the amount of fat stored in the body. Mustard oil is a major edible oil of India containing 45–55% erucic acid and C18:2 and C18:3 fatty acids in appreciable amount. Therefore conversion of some parts of TAG of mustard oil to DAG may produce a high fat, lesser calorie cooking oil. In our laboratory, we have prepared DAG-rich mustard oil and its nutritional characteristics and dietary effects were studied and the results will be presented in this paper.

**MATERIALS & METHODS:** DAG-rich oil was produced by reacting mustard oil with glycerol in 1:2 molar ratios in presence of lipase catalyst. The reaction was carried out for 26 hrs at 60° C with mixing rate of 200 rpm under vacuum.

Feeding experiment was conducted for 28 days with 32 male albino rats of Charles foster strain. The rats were placed in four groups and each group was fed with 20% fat. The four groups: group MO, MODG, MOCh, MODGCh were fed mustard oil, DAG-rich mustard oil, mustard oil with cholesterol and DAG-rich mustard oil with cholesterol respectively. Growth rate, Food efficiency ratio, various parameters of blood & tissues and leptin hormone were determined following standard methods and using standard enzyme kits.

**RESULTS & FINDINGS:** The composition of the DAG-rich oil fed was TAG : 42%, DAG : 52%, MAG: 4%. The total fatty composition of the DAG-rich oil was same with original mustard oil.

**RESULTS OF FEEDING EXPERIMENT:** The results showed that DAG diet decreased the total cholesterol of plasma, EM, mesentery and liver than original mustard both in normal and hypercholesterolemic dietary groups. The TAG concentration of plasma was significantly lower in the DAG fed group than the Br group. Liver and EM lipid profile show that the phospholipids content was significantly increased in the EM in DAG fed group than the control groups (MO and MOCh). Leptin concentration was found to be significantly lower in the DAG fed groups, MODG and MODGCh than the original oil control groups, MO and MOCh. Decreased leptin concentration in the blood indicates lowering of depot fat in the body especially in the mesentery and in liver.

**CONCLUSION:** The results indicate that DAG rich oil reduces

tissue cholesterol, TAG and leptin content than the TAG oil which may possibly reduce the risk of obesity related diseases.

### **P87-03**

#### **CHARACTERIZATION OF ANIMAL-DERIVED FATTY ACIDS BY GCXGC-TOF-MS FOR FOOD AUTHENTICATION**

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Lipid as one of the major component in diet plays an important roles in human health. The source of lipid is important not only related to the ratio of saturated and unsaturated fatty acid or the presence of trans fatty acid but also from the religious aspect. Islam, Jewish, and Hinduism prohibiting their followers for consuming any food containing porcine products. Nevertheless, in some countries, food manufacturers choose to blend vegetable or animal fats with lard to reduce the production cost. This study demonstrated the approach of comprehensive two dimensional gas chromatography coupled to Time-of-Flight Mass Spectrometry (GCxGC-TOF-MS) for discriminating the lipids from animal fats. The method approach was applied on the characterization of four common animal derived fats included lard (LA), chicken fat (CF), beef tallow (BF), and mutton tallow (MF). In accordance to the normalized FAME data, Principal Components Analysis (PCA) revealed a clear discrimination of LA grouping from the other species, which was attributed by several FAME constituents involving methyl 6,9,12,15-heneicosatetraenoate (C21:4n6), methyl 11,14-eicosadienoate (C20:2n6), trans-9,12-methyl octadecadienoate (C18:2n6t), trans-9-methyl octadecenoate (C18:1n9t) and methyl hexadecanoate (C16:0).

### **P88: Food Cultures, Cuisines, & Traditional Diets II**

#### **P88-01**

#### **TRADITIONAL CONSUMPTION OF TORBANGUN (Coleus amboinicus Lour) AMONG BATAKNESE PEOPLE IN INDONESIA**

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For many developing countries increasing national agricultural production alone cannot improve food security. Food production must be actively combined with evaluation selection and domestication and greater utilization of underutilized or wild edible plants that are of local or regional importance in order to effectively increase nutrition security. By improving the linkage between production and utilization, biodiversity of traditional crops can be safeguarded, and indigenous knowledge of these traditional foods can be used to improve nutrition security.

Edible wild plants have been reported to be an important aspect of micro-nutrient food security. Wild species continue to provide important energy and micronutrient needs during drought or specific period. An ethnobotanical study among Bataknese people in North Sumatera, Indonesia, showed that Torbangun plant (*Coleus amboinicus* Lour) is used as edibles for their medical properties, such as vitality and lactagogue. The present paper reports the use of Torbangun among Bataknese people. Clinical studies in consumption of Torbangun in human and animals will be reported. Findings from the studies suggest the positive effects of Torbangun consumption on health and on nutritional status.

#### **P88-02**

#### **AMINO ACID AND VITAMIN LOSS OF COOKED HORSE MACKEREL**

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Cooking are important parameters for chemical composition and nutritive value of fish muscle. Horse mackerel is of the most commercially important fish species in Turkey and world. It is generally consumed as fresh. The aim of the present study was to determine the effects of different methods of cooking (frying, grilling and steaming cooking) on the amino acids and vitamins composition of horse mackerel. Amino acid and vitamin (A, E, B1, B2, B3 and B6) composition were determined in raw and cooked horse mackerel. Cooking did in general significantly increase the contents of essential, semi essential and other amino acid compared to raw fish species. Steamed horse mackerel had the lowest lysine concentration while grilled horse mackerel had the highest. The maximum methionine, threonine, tryptophan, isoleucine, leucine, phenylalanine and valine level was observed in grilled horse mackerel. Histidine, serine, arginine, cysteine and tyrosine contents of fried, grilled and steamed fishes were significantly higher ( $p < 0.05$ ) than those found in raw fishes. The maximum alanine, aspartic acid, glutamic acid, glycine and proline level was observed in grilled horse mackerel and minimum alanine, aspartic acid, glutamic acid, glycine and proline level in all steamed horse mackerel. The highest vitamin A and E values of cooked horse mackerels were determined in fried horse mackerel. Vitamin B1 of raw horse mackerel was found to be 0.210 mg/100g. Vitamin B1 of cooked horse mackerel was found between 0.042 mg/100g (fried) and 0.097 mg/100g (steamed). The minimum and maximum vitamin B2 content of cooked horse mackerel was found as 0.078 mg/100g (steamed) and 0.136 mg/100g (fried). The vitamin B6 content of raw - steamed horse mackerel and niacin content of fried- grilled horse mackerel was found similar. The amino acid and vitamin content of fried horse mackerel was found to be significantly ( $P < 0.05$ ) higher than the other samples.

#### **P88-03**

#### **NUTRITIONAL QUALITY OF FROG (RANA RIDIBUNDA) CAUGHT FROM TURKEY**

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Frog (*Rana ridibunda*) are popular delicacy to human. In this study, local variations in the fatty acid, amino acid, proximate compositions and colour of frog were studied. Protein, crude fat, moisture and ash contents were 16-20%, 0.50-0.90%, 79.00-82.40% and 0.8-1.00%, respectively. The fatty acids of C16:0, C20:5 n3 and C22:2 n6 were the important fatty acids, whereas

the major amino acids were glutamic acid (non-essential, NE), glycine (NE), aspartic acid (NE), lysine (essential, E) and arginine (NE). Fatty acids were rich in PUFA. The most important minerals were Fe, Zn, K and Na. However, Mg and P content was very high. The B1, B2, B3 and B6 vitamins of frog were 0.042-0.060 mg/100g, 0.100-0.170 mg/100g, 2.316-3.200 mg/100g and 0.045-0.075 mg/100g, respectively. It was concluded that frog are rich sources of unsaturated fatty acids, proteins and amino acids, which are the essential components of human nutrition.

**P88-04**  
**EFFECT OF PROCESSING ON CHEMICAL COMPOSITION OF SEA SNAIL (RAPANA VENOSA, VALENCIENNES, 1846)**

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Utilization of marine resources for human consumption has increased rapidly worldwide. Seafood is excellent low-fat sources of protein and provides many benefits, such as contributing to low blood cholesterol. Sea snail is (*Rapana venosa*, Valenciennes, 1846) very rich sources of amino acid, mineral and fatty acid components. The concentration of amino acid, minerals and fatty acids in seafood tissues depends on several endogenous factors, namely physiological condition, geographic habitat, fat content and processing methods. The objective of this study is to losses the proximate, amino acid, mineral and fatty acids composition of sea snail in processing line (pasteurization, canned, smoked and marination).

The fresh sea snail purchased from the Istanbul local fish market during the fishing season 2008. Samples were 1 days post-capture on arrival at the laboratory in porose sack (living). After the process period (pasteurization, canned, smoked and marination) is the edible muscle was minced for analyses procedure to amino acid (HPLC), mineral (ICP-MS and AAS) and fatty acids (GC-FID). The changes in amino acid, fatty acid and mineral composition of processed samples were found significantly than the raw samples in this study.

**P89: Nutrition Assessment**

**P89-01**  
**24-HOUR DIETARY RECALLS FOR CHILDREN -ADAPTING THE ASA24**

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Multiple 24-hour dietary recalls (24 hdr) are the preferred method for assessing dietary intake among both adults and children. However, widespread use of 24 hdr is limited due to the high cost of in-person, one-on-one recall sessions and expensive software. 24 hdr methods with children are also limited in that they rely on verbal descriptions of foods instead of pictures. Our goal is to adapt the Automated Self-Administered 24 hdr system (ASA24) to the needs and abilities children.

We have so far conducted 3 formative research studies. Formative study 2, hereby presented, explored which of two food search strategies (treeview or cover-flow) was preferred by a sample of 104 children. Our results showed that kids favored a treeview structure as well as widespread use of food

photography. Our formative study 3, currently under way, will explore the use of the ASA24 interface among children.

**P89-02**  
**ENERGY VALIDITY INCREASES WITH INCREASING NUMBERS OF DAYS OF DIETDAY: A SELF-ADMINISTERED WEB-BASED 24-HOUR RECALL**

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**RATIONALE AND OBJECTIVES:** To compare the cost and benefit of each additional day in 8 repeat web-based 24-hour recalls.

**MATERIALS AND METHODS:** The Energetics Study was conducted to validate caloric intake using a multi-pass, food image-based, computerized tool (DietDay) against total energy expenditure measured by doubly labeled water (DLW).

**RESULTS:** 263 Caucasians and African Americans conducted 8 repeat assessments on independent days. The Pearson's correlation between DLW and the mean of 3 DietDays was 0.34; for 7 days was 0.41. Total energy expenditure in this group averaged 2546 kcals (SD 550). This was within 9 kcals/d of the reported mean caloric intakes for two days (2555, SD 1303), 140 kcals of the six-day intake average (2406, SD 950) and 209 kcals of the eight-day average (2337, SD866). The correlation increased from 0.16 to 0.42 with increasing numbers of days of recall from 1 to 8.

**CONCLUSION:** As might be expected, increasing numbers of days increased the size of the correlation coefficient but decreased the closeness to the true energy intake. The latter may be indicative of reporting fatigue with increasing number of days reported.

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**P89-03**  
**PILOT TESTING AUTOMATIC MOBILE PHONE IMAGING COUPLED WITH 24-HOUR RECALLS: ImageDietDay**

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**RATIONALE:** Dietary recalls are subject to intrusions and omissions of foods due to imperfect memory. To remedy this we coupled automated imaging with a computer-assisted 24-hour recall for feasibility in 14 subjects.

**MATERIALS:** Mobile phones worn around the neck were programmed to autonomously capture and transmit images every 10 seconds. A website presented these the following day to subjects conducting a web-based 24-hour recall.

**RESULTS:** Logistic issues included IRB concerns, proper phone positioning, adequate energy reserves to continually transmit images, and development of user-friendly software to present a manageable number of images. Phone usage was monitored through transmitted images. Subjective responses to their experiences with the camera showed 79% of participants having no technical problems and 93% found the images to be helpful. Across these users, there were 110 distinct eating episodes and 11,090 images, with an average of 101 images per episode (1 to 775). Image-processing filters developed to pruned out under-exposed, over-exposed, and blurry images introduced only seconds of processing overhead.

**CONCLUSIONS:** The technology is ready and robust, and attractive for investigators. Miniaturization of cameras, adequate power supply and the human factor of self-consciousness still need to be addressed before it can be used in population studies. Supported by NIH R01CA105048

## P90: Nutrient Supplementation

### P90-01

#### IMPACT OF BALANCED PROTEIN-ENERGY SUPPLEMENTATION ON AND BIRTH WEIGHT AND PREGNANCY WEIGHT GAIN

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**BACKGROUND:** This review summarizes the evidences from Randomized Controlled Trials (RCT) conducted on the effects of prenatal balanced protein-energy supplementation (Protein Energy Ratio <25%) on birth weight and gestational weight gain. The Cochrane Review, conducted by Kramer et.al.(2006) also included this intervention, however the benefit of prenatal balanced protein-energy supplementation, which contained  $\geq$  700 kcal per day was not evaluated separately.

**OBJECTIVES:** The purpose of this review is to evaluate the impact of balanced protein-energy supplementation ( $\geq$ 700 kcal/day) to pregnant women on birth weight of the neonates and gestational weight gain.

**METHODS:** A search strategy was developed to retrieve RCTs related to balanced protein-energy supplementation from Pub Med and Cochrane databases. Meta-analyses were performed on the selected RCTs by using the RevMan software (version, 4.2, The Cochrane Collaboration, 2003) to evaluate the impact of supplementation on birth weight and gestational weight gain.

**RESULTS:** Balanced protein-energy supplementation during pregnancy showed significant increase in birth weight by 43.18 g (WMD= 43.18; 95% CI= 4.15, 82.22). On the other hand, analyses for women supplemented with  $>$ 700 kcal daily showed a 81.68 g increment in birth weight (WMD= 81.68; 95% CI= 41.69, 121.68). Sub-category analyses for undernourished and adequately nourished women with daily supplementation  $>$ 700 kcal showed WMD= 93.78; 95% CI= 54.52, 133.04, and WMD= 12.07; 95% CI= -92.39, 116.54 respectively for birth weight

Balanced protein-energy supplementation significantly increased gestational weight gain 32.27 g/week (WMD= 32.27; 95% CI= 7.01, 57.53), while daily supplementation of  $>$ 700 kcal showed 15.55 g/week more weight gain than control group (WMD= 15.55; 95% CI= -19.81, 50.91).

**CONCLUSION:** Supplementation with  $>$ 700 kcal significantly increases birth weight in undernourished pregnant women. However, evidence from South Asia is scarce, where the prevalence of Low Birth Weight is the highest in the world. Further research is also required to bridge the gap between technical and operational issues of supplementation.

### P90-02

#### A CASE STUDY OF FUcoxANTHIN UPTAKE KINETICS

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Fucoxanthin (FX), a carotenoid in seaweed, has been reported to increase lipid oxidation in adipose tissue leading to weight loss. Little is known about FX kinetics and biochemical activity. We initiated a case study examining the uptake of FX into the blood of an adult male. Objective: To monitor FX and metabolite concentrations in serum following FX consumption. Methods: Blood was collected at 0, 4, 8, 24, 48, 72, 96 hrs. FX was consumed as softgels post blood draw (0 hr) and on days 1-4. On day 0, 11 mg of trans-FX was consumed and 6.6 mg on each successive day. Serum was harvested each day of blood collection and frozen. On day 4, blood samples were analyzed by HPLC using a C30 gradient separation with DAD. Based upon the results, no additional blood was collected. Results: All of the major carotenoids reported in human blood plus FX and

a metabolite, Fucoxanthinol (FXOH), were measured. FXOH was observed in the blood at 4hr (2.6 ng/mL) and peaked at 8hr (9.6 ng/mL) and returned to 2.2 ng/mL by 24hr after the initial FX consumption. FXOH was measured in the serum on each day (0.8-1.1 ng/mL) but did not accumulate in the blood with each day of consumption. Blood and urine were also tested for conjugates of FX or FXOH. Discussion: FX was not measurable in the blood samples. FXOH appearance and decline in serum was more rapid than reported for less polar carotenoids and it does not appear to accumulate in its endogenous form in this tissue.

## P91: Lipids & Fatty Acids III

### P91-01

#### DROSOPHILA LACKS C20 AND C22 POLYUNSATURATED FATTY ACIDS

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*Drosophila melanogaster* has been considered an ideal model organism for biology, but whether it is suited to nutrigenomics, especially fatty acid metabolism, remains to be illustrated. This study aimed to examine the metabolism of C20 and C22 polyunsaturated fatty acids (PUFAs) in *Drosophila*. Four *Drosophila* stocks were fed diets supplemented with six types of PUFAs: 18:2n-6, 18:3n-3, 20:5n-3, 22:6n-3, 22:4n-6 and 20:4n-6at 50 mg/100g base diet. Fatty acid compositions of three developmental stages were measured using a standard GC method. The predominant fatty acids in adults fed with the base diet were C14:0 (16.7%), C16:0 (16.1%), 16:1n-7 (21.8%), 18:1n-9 (20.0%) and 18:2n-6 (14.0%). No C20 or C22 PUFAs were detected in larvae, pupae and adults fed the base diet, nor in flies supplemented with 18:2n-6 and 18:3n-3. In the 22:6n-3 supplemented group, the C22 PUFA was shortened to 20:5n-3. In the 22:4n-6 supplemented group, the C22 PUFA was shortened into 20:4n-6, but no other C20 or C22 PUFA was detected except 20:4n-6 and 20:5n-3 in the 20:4n-6 and 20:5n-3 supplemented groups. Based on bioinformatics analysis, the *Drosophila* genome has no gene encoding delta-5/delta-6 desaturase. These findings indicate that *Drosophila* lacks C20 and C22 PUFAs, whereas the long chain of 22:5n-3 and 22:4n-6 can be reduced into shorter chain fatty acids in *Drosophila*. This suggests that *Drosophila* likely possesses a specialized lipidomics distinct from mammals, which presents limitations to its use as a model for study of human lipid metabolism.

### P91-02

#### PC-DHA ENHANCED THE SKELETAL MUSCLE PROTEIN IN RATS WITH ISCHEMIA PRODUCED BY THE LEFT FEMORAL ARTERY AND NERVE LIGATION

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The effect of PC-DHA (2-docosahexaenoyl-sn-glycero-3-phosphocholine) on muscle protein metabolism was studied in rats with ischemia produced by the left femoral artery and nerve ligation. The ischemic rats were 5% casein diet for three weeks, then divided into the 4 groups fed 5% casein diet, 20% casein diet, and 20% casein diet with PC-DHA (0.3%, 1%, and 3% into 20% casein diet) for one week. The plasma albumin concentration was significantly reduced in rats fed 5% casein diet for three weeks, indicating the status

of protein malnourished. The food efficiency and the protein efficiency of rats fed 20% casein diet with 3%-PC-DHA was significantly higher than that of the rats fed 20% casein diet. The ischemic gastrocnemius weight was reduced in the rats fed 20% casein diet. The ischemic gastrocnemius muscle protein content was significantly increased in the rats fed 20% casein diets with PC-DHA (1 and 3%). The ischemic gastrocnemius TNF-alpha mRNA appearance of rats fed 20% casein diet was lower than that of rats fed 5% casein diet. And PC-DHA tended to more reduce the ischemic gastrocnemius TNF-alpha mRNA appearance. These results suggested that the PC-DHA would improve muscle protein metabolism and recovery from malnourished state.

#### **P91-03**

##### **EFFECT OF GRAPE SEED WITH RESVERATROL AMPLIFICATION ON LIPID METABOLISM AND HEPATIC MORPHOLOGY IN RATS FED HIGH CHOLESTEROL DIET**

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This study was conducted to examine the effect of dietary supplementation of grape seed with resveratrol amplification on lipid metabolism in rats fed high cholesterol diet. Male Sprague-Dawley rats were fed high cholesterol diet for 2 weeks. Rats were divided into 6 groups [control, control+5%grape seed without resveratrol amplification, control+5%grape seed with resveratrol amplification, 15%high cholesterol, 15%high cholesterol+5%grape seed without resveratrol amplification, 15%high cholesterol+5%grape seed with resveratrol amplification and fed on AIN-93 based experimental diets for 4 weeks. Serum levels of total cholesterol and LDL-cholesterol were decreased significantly in grape seed group with high cholesterol compared to control group with high cholesterol diet. HDL-cholesterol level of grape seed group with resveratrol amplification was higher than control group. The hepatic levels of total lipid and total cholesterol were decreased in grape seed group with high cholesterol compared to control group with high cholesterol. Triglyceride level was lower in grape seed group than control group. The fecal excretion of triglyceride was increased in grape seed group with high cholesterol than control group with high cholesterol. Optical-microscopical observation revealed fat accumulation of liver tissue in high cholesterol group, but dietary supplementation of grape seed tended to reduce such change. These results suggest that dietary supplementation of grape seed with resveratrol amplification may prevent the chronic diseases related to lipid metabolism through improvement of lipid metabolism.

#### **P91-04**

##### **EFFECT OF MEJU BY GERMINATED SOYBEAN ON LIPID PEROXIDE LEVEL AND ANTIOXIDATIVE SYSTEM IN RATS FED HIGH CHOLESTEROL DIET**

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The present study was conducted to investigate the effect of dietary supplementation of meju by germinated soybean on lipid peroxide and related enzyme activities of rats fed high cholesterol diet. The high cholesterol diet contained additional 0.5% cholesterol to AIN-93 based diet. Male Sprague-Dawley rats were fed experimental diets containing 20% meju (control meju; meju by soybean germinated in dark reaction; meju by soybean germinated in light reaction) powder for 4 weeks. Dietary supplementation of meju powder reduced microsomal concentration of lipid peroxide in rats fed high cholesterol diet.

Superoxide dismutase activity of meju powder group with high cholesterol diet was decreased significantly compared with high cholesterol diet group without meju powder. Catalase activity of rats fed high cholesterol was induced by feeding meju powder by soybean germinated in light reaction. Meju powder diet increased glutathione-S-transferase and glutathione peroxidase activities. Glutathione-6-phosphatase activity was higher significantly in meju group by soybean germinated in light reaction with high cholesterol diet than that of high cholesterol diet group. Glutathione concentration of meju powder diet group was less than control group and GSH/GSSG ratio was not different among experimental groups. These results suggest that dietary supplementation of meju by germinated soybean may alleviate lipid peroxidation in rats fed high cholesterol diet.

#### **P91-05**

##### **MATERNAL DOCOSAHEXAENOIC AND ARACHIDONIC ACID AT LOW PROTEIN ENHANCE BRAIN SPARING RATHER THAN GROWTH IN PUPS**

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**RATIONALE & OBJECTIVES:** Emerging evidence indicates, Docosahexaenoic(DHA) and Arachidonic acid(AA) are important for brain development and fetal growth. However their status is compromised in protein restriction, which may have important implications for fetal adaptations. Therefore we investigated the effect of maternal supplementation of DHA and AA at low protein level on brain sparing, growth and survival of pups.

**MATERIALS & METHODS:** Wistar female rats (9/group) were fed diets, control (C-18% protein), low protein without (LP-9% protein) or with (LPDHA+AA-9% protein) supplementation of DHA+AA single cell oils. Litter size, litter weight, organ weights, mortality and growth in pups were measured during lactation.

**RESULTS & FINDINGS:** Litter size and weights at birth were comparable between groups, but relative brain weight (%) of pups from supplemented group (5.10±0.77) was higher (p<0.05) compared to those from C (4.48±0.68) and LP (4.54±0.59). At day14, litter weights from supplemented group were lower than control (p<0.05) but relative brain weights (5.74±0.85) continued to be higher (p<0.05) than control (4.40±0.43) and LP (4.79±0.85) pups. In contrast supplemented group had the highest mortality during first week (18.08%) and continued to be highest(p<0.05) till weaning.

**CONCLUSION:** Maternal supplementation of DHA and AA at low protein supported brain sparing rather than growth.

#### **P91-06**

##### **THE EFFECT OF OMEGA-3/OMEGA-6 FATTY ACID RATIO ON A FEW RISK MARKERS FOR NON COMMUNICABLE DISEASES IN THE INDIAN POPULATION OF KZN**

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Unhealthy diets and physical inactivity are among the leading causes of the major NCDs. The key strategy of prevention of these diseases is targeting the major risk factors i.e. unhealthy diets and inactivity in an integrated manner. However, limited data is available on the dietary patterns of South African Indians. Dietary recommendations have been made recently that are both food- and fatty acid based. Although CHD and type 2 diabetes are common amongst South African Indians, to our knowledge, the n-3 fatty acid content of the Indian diet has not been investigated. The main aim of the study is to gather enough relevant information to design appropriate intervention actions and programs to address the underlying causes of non-communicable diseases (NCDs) in Indians in Kwa-Zulu Natal. **OBJECTIVES:** To establish whether a relationship exists

between current trends in food patterns and nutrient intakes, with special reference to n-3:n-6 fatty acids, and the prevalence of risk factors for NCDs; To suggest strategies for an integrated programme of prevention of NCDs in the target group.

**MATERIALS & METHODS:** This research was a cross-sectional, epidemiological study with a random sample of 250 apparently healthy Indian residents (35-55yrs) from Stanger, KZN. Habitual dietary intake, socio-demographic and medical health history data was interviewer administered. All respondents had to undergo anthropometric measurements and clinical tests. **RESULTS AND FINDINGS:** The mean intake of n-3 fatty acid was 0.45g/d and the mean intake of omega-6 fatty acid was 21.9g/d equating to a very low ratio of 45:1. Currently optimum ratio is matter of intense debate and this has to be borne in mind when making recommendations. **CONCLUSION:** Interventions need to focus on dietary risk factors that are culturally sensitive based on the indigenous food selections and acquired foods from adaptation to the South African environment.

#### P91-07

##### **DOCOSAHEXAENOIC (DHA) ACIDS INCREASE CELL DEATH OF HUMAN CANCER MAMMARY EPITHELIAL CELLS BY LIPID RAFTS ALTERATION**

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**RATIONALE & OBJECTIVES:** To investigate the effects of DHA and EPA on the cell death and lipid rafts of 3 different human mammary epithelial cell lines.

**METHODS:** The HB4a cell line was established from normal breast luminal cells and the C5.2 is transformed ErbB-2-over-expressing variant of the HB4a cell line. MDA is an invasive and metastatic cell line. These cells were treated for 72 hours with EPA at 100µM or DHA at 25, 50, 75 and 100µM and DHA + EPA (50µM+50µM) or ethanol. Cell death and apoptosis was studied by Flow Cytometry. To lipid raft visualization the Confocal Microscope Imaging was used. The cell membrane DHA incorporation was analyzed by Gas Chromatography.

**RESULTS:** DHA induced cell death and apoptosis with a higher percentage in C5.2 than HB4a and MDA (p<0.001). These results are associated with cell membrane DHA incorporation increase (p<0.001) and lipid rafts destructiveness in C5.2. When DHA was supplemented with EPA the observed effects decreased.

**CONCLUSION:** DHA increase cell death and induced apoptosis in C5.2. This effect might be related to incorporation of DHA increase and lipid rafts destructiveness.

#### P91-08

##### **CONJUGATED LINOLEIC ACID INCREASES TISSUES α-TOCOPHEROL LEVELS WITHOUT REDUCING LIVER α-CEHC PRODUCTION IN C57BL/6J MICE**

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Conjugated linoleic acid (CLA) diet caused a marked increase of α-tocopherol in mice liver was seen in our previous study. The mechanisms involved in the α-tocopherol accumulation by CLA feeding were further investigated in this study. C57BL/6J mice were divided into three groups which were fed a 5% soybean oil alone (C, control group), 50-fold vitamin E supplemented diet (VE group), or with 1% CLA (CLA group) separately for four weeks. α-Tocopherol concentration of liver, lung, adipose tissue, kidney, testis, spleen and heart were significantly higher in the CLA group than in the control group. Liver α-carboxyethyl hydroxychroman (α-CEHC) levels were significantly increased in the VE group, but didn't significantly differ between the CLA and C groups. In conclusion, the accumulation of α-tocopherol by CLA diet was widely existed in all measured tissues and this

result did not attribute to changing the α-tocopherol metabolism by reducing α-CEHC production.

#### P91-09

##### **ROLE OF MOROCCAN VEGETABLE ARGAN OIL ON ANDROGEN HORMONAL PROFILE**

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**BACKGROUND:** Argan oil is a typical Moroccan vegetable oil with specific fatty acids and minor components composition. Promotion of nutritional value and health impact of Argan oil would be enhanced through nutrition intervention.

**OBJECTIVE:** To study the effect of Argan oil consumption on androgen hormonal profile in men in order to further promote its nutritional value and encourage its consumption.

**METHODS:** 60 healthy male participated to the study which consisted of 2 weeks baseline diet period where all subjects consumed 25 g/day of butter, and 3 weeks intervention period during which subjects were randomized into two groups. Butter was substituted by 25 ml/d Argan oil and virgin olive oil for AO Group and VOO group respectively. Body weight, and total energy intake (TEI) were measured throughout the study period. Testosterone, DHEAS and LH was measured at the end of both periods.

**RESULTS:** 1- TEI was isocaloric during all the study. 2- BMI, remained unchanged. 3- Testosterone and LH serum concentrations significantly increased after the intervention period. The increase was of 20% and 17% for testosterone and 18% and 42 % for LH, for AOG and VOO respectively. No significant changes in DHEAS concentration were obtained.

**CONCLUSION:** These results first time provide scientific evidence on nutritional value of Argan oil through its beneficial action on androgen hormonal profile. Consumption of this local vegetable oil should be further encouraged.

#### P91-10

##### **STUDY OF THE EFFECT OF IRANIAN PRODUCED KERMANSHAHI ANIMAL OIL ON SERUM LIPID PROFILE AND HEPATIC ENZYMES IN HEALTHY MEN**

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**RATIONALE & OBJECTIVES:** Cardiovascular disease is the leading cause of death in Iran and world, for which the high consumption of saturated fat is considered as nutritional risk. Considering the high content of short and medium chain fatty acids and lower cholesterol and long chain fatty acids of traditionally produced Iranian Kermanshahi animal oil and popularity of its consumption among Iranians, the aim of this study was to investigate the effect of kermanshahi animal oil on serum lipid profile and hepatic enzymes in healthy men.

**MATERIALS & METHODS:** 25 men aged 37.48±6.32 years old and body mass index (BMI) of 23.095±1.57 Kg/m<sup>2</sup> with normal lipid profile and hepatic enzymes were taken part. After ten days wash out period, during which subjects did not consume Kermanshahi animal oil and amount of which was replaced with butter, 10 ml blood samples were obtained and serum lipid parameters (TC, TG, LDL-c, HDL-c) and hepatic enzymes (ALT, AST) were measured. Then subjects received 30g/day Kermanshahi animal oil for one month at lunch replacing for other fats, while abstaining Kermanshahi animal oil in other meals, amount of which was replaced by butter.

After this period, another 10 ml blood samples were withdrawn and the same serum lipid parameters and hepatic enzymes were measured as above. Three days 24 hours dietary recalls and International Physical Activity questionnaires, were obtained and completed. Data were analyzed using descriptive statistical methods and paired t-test.

**RESULTS & FINDINGS:** Following 30 days intake of Kermanshahi animal oil, there were a trend of change in TC(153.40±21.86mg/dl vs 153.92±24.64 mg/dl), LDL-c(89.08±19.73mg/dl vs 92.25±22.12mg/dl),AST(18.48±4.40mg/dl vs18.84±5.50mg/dl)and decrease in TG (112.84±22.33mg/dl vs107.76±25.46mg/dl),HDL-c(41.40±5.08mg/dl vs 40.76±6.39mg/dl),ALT(20.60±5.69mg/dl vs18.84±5.50mg/dl)compared to baseline values, but none of these differences were significant(P>0.05).

**CONCLUSIONS:** Present study showed that consumption of 30g/day Kermanshahi animal oil for one month has no effect on serum lipid parameters(TC,TG,LDL-c,HDL-c) and hepatic enzymes (ALT, AST) in healthy men, however more studies are recommended.

## P92: Protein & Amino-acids III

### P92-01

#### NUTRITIONAL AND IMMUNOMODULATORY PROPERTIES OF BOVINE MILK PROTEINS

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**RATIONALE & OBJECTIVES:** Milk proteins are nutritious and immunomodulatory, Their immunomodulations are dependent on fractionation and treatments. The objectives were comparing caseins and whey proteins from different preparations.

**MATERIALS & METHODS:** Except for the commercial product casein (CC) and a WPI (NZ), a case in micelles (CM) and four WPCs/WPI were prepared by microfiltration, ultrafiltration diafiltration. Immunomodulation (spleen-PFC/liver glutathione biosynthesis) determination used A/UNI mice. Nutritional indexes were determined using Wistar rats.

**RESULTS & FINDINGS:** Immunomodulation was higher for the experimental WPCs/WPI: Rn-France, Hm-Canada, s-WPC-Brazil than for NZ-New Zealand (p<0.05). No difference was found between the caseins which presented lower values than the wheys. No difference was found in nutritional value for CM (100%) s-WPC (100%) or CM/s-WPC (50:50%). Spray drying and  $\gamma$ -irradiation (3KG) did not affect immunomodulation.

**CONCLUSION:** Whey proteins expressed stronger immunomodulation than caseins. No nutritional differences were found among caseins and whey proteins. Method of fractionation and harsher physicochemical treatments affected immunomodulation of whey proteins. High correlation was found between spleen FPC and liver GSH.

### P92-02

#### GLUTAMINE IN VITRO SUPPLEMENTATION DECREASES GLUCOSE UTILIZATION BY THE GLYCOLYTIC PATHWAY IN LPS-ACTIVATED PERITONEAL MACROPHAGES

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**RATIONALE & OBJECTIVES:** Macrophages utilize glutamine at high rates to produce energy and intermediates to biosynthetic pathways. The study aimed to evaluate the effect of glutamine supplementation on glutamine and glucose consumption and on glutamate and lactate production

**MATERIALS & METHODS:** Peritoneal macrophages were obtained from adult BALB-C mice. Cells were cultivated in the presence of 0; 0,6; 2 e 10 mmol/L of glutamine during 24 hours. Then, cells were stimulated with 15  $\mu$  g/mL of LPS, for 30 minutes, to obtain the cell lysate, which was used for the determination of glutamine, glucose, glutamate and lactate

**RESULTS & FINDINGS:** Although different extracellular glutamine concentrations did not influence glucose consumption or glutamate production, the presence of 10 mM of glutamine significantly increased glutamine consumption and glucose/lactate ratio and decreased lactate production in LPS-activated macrophages (p<0,05)

**CONCLUSION:** The presence of 10 mM of extracellular glutamine increases its consumption by peritoneal macrophages and decreases glucose conversion to lactate, suggesting a decrease in the utilization of glucose by the glycolytic pathway.

### P92-03

#### REGULATORY MECHANISMS OF GASTRIC SECRETION BY LUMINAL GLUTAMATE IN PAVLOV'S-POUCHED DOG

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Among the other amino acids glutamate is the most effective stimulator of the gastric branch afferents from the vagus, capable to induce reflex responses in upper gastro-intestinal tract. The aim of the investigation was to evaluate a role of intra-gastrically applied glutamate in control of gastric secretion (acid, pepsinogen and fluid). In mongrel dogs with surgically prepared small gastric pouches according to Pavlov (innervated) or Heidenhain (vagally decentralized), secretion in a pouch was induced by infusion into the main stomach of an amino acid-rich diet lacking glutamate alone or supplemented with monosodium glutamate (MSG). Having no effect alone, MSG potentiated secretion induced by the amino acid diet both in Pavlov and Heidenhain models. In the Pavlov pouch, the effect of MSG was reduced by antagonist of 5-HT<sub>3</sub> receptors, granisetron. In the Heidenhain model, MSG enhanced the stimulatory effect of pentagastrin. We conclude that free glutamate at doses not exceeding its common concentrations within dietary foods enhances gastric secretion induced by intra-luminal amino acids infusion. This effect of free glutamate is achieved predominantly by the potentiation of vago-vagal reflexes, and did not depend on certain allosteric interaction with other dietary amino acids.

### P92-04

#### ALTERED GENE EXPRESSION IN ADULT BRAIN OF SERINE DEFICIENCY MODEL MOUSE

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D-3-Phosphoglycerate dehydrogenase (Phgdh) is an enzyme catalyzing the first step of de novo L-serine synthesis via the phosphorylated pathway. Mutations in the human PHGDH gene cause serine deficiency disorders (SDD) characterized by severe neurological symptoms such as congenital microcephaly and

psychomotor retardation. Our laboratory generated systemic Phgdh knockout (KO) mice to reveal the essentiality of Phgdh-dependent L-serine synthesis in embryonic development. However, these KO mice result in embryonic lethality, thereby precluding investigations of the pathobiology of diminished capacity to synthesize L-serine via Phgdh-dependent pathway in adult brain. To understand the brain pathogenesis of SDD at the molecular level, we generated mice with a brain-specific Phgdh deletion, and exploited this animal model to identify altered gene expression patterns using a microarray-based profiling technique with a computational network analysis. The present integrative study provides *in vivo* evidence that serine deficiency in adult brain alters transcriptional programs in several regulatory networks.

**P92-05**  
**EFFECTS OF ALKALI-EXTRACTED RICE PROTEIN ON PLASMA LEVELS OF GLUCOSE, INSULIN AND ADIPONECTIN IN NON-OBESE TYPE-2 DIABETIC GOTO-KAKIZAKI RATS**

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**RATIONALE & OBJECTIVES:** *In vitro* digestion and electron microscopic studies indicated the improvement in digestibility of alkali-extracted rice protein (AE-RP). *In vivo* study with rats proved clearly that AE-RP lowered total cholesterol and triglycerides in the plasma and liver (\*). The purpose of this study is to clarify the influences of AE-RP on diabetes-related markers such as plasma insulin and adiponectin levels in type-2 diabetic model rats.

**MATERIALS & METHODS:** The AE-RP from Koshihikari (KRP) was used. Male Goto-Kakizaki (GK) rats (7-wk-old) were fed diets by pair feeding for 10 wk with 20% casein (C) and KRP based on AIN-93G formula. Diabetes-related markers were determined with the plasma, urine, liver and kidney.

**RESULTS:** Fasting glucose level of KRP group was significantly lower than that of C group at 1 and 2 wk, and the lowering-effect tended to be observed over 10 wk. After 10 wk, basal insulin level did not differ in both groups, but plasma adiponectin level of KRP group was significantly higher than that of C group. Furthermore, we show the other data.

**CONCLUSION:** These results suggest that AE-RP is of benefit to type-2 diabetes.

**P92-06**  
**STUDY ON THE AGGREGATION BEHAVIOR OF ACID-SOLUBLE COLLAGEN FROM WALLEYE POLLOCK (Theragra Chalcogramma) SKIN USING THE FLUORESCENCE PROBE PYRENE**

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The aim of this paper is to investigate the aggregation behavior of acid-soluble collagen from walleye pollock (*Theragra chalcogramma*) skin using the fluorescence probe pyrene. Results showed that pyrene is fit for study on the aggregation behavior of the collagen in Na-phosphate buffer of pH7.2. When collagen concentration was increased to the critical aggregation concentration (CAC), determined to be 0.55mg/mL graphically, pyrene I1/I3 ratio had a catastrophe occurrence, and then leveled off with further increases in collagen concentration. This indicated that collagen could self-aggregate in Na-phosphate buffer of pH7.2. The subsequent dynamic fluorescence decaying study revealed that the aggregation number of collagen was not a constant, varying with different concentrations more or less. The structure of aggregates tended to be integrated, when

collagen concentration reaching 1.2mg/mL and above.

**P93: Carbohydrates I**

**P93-01**  
**PREBIOTIC EFFECTS OF NUTRIOSE®: A REVIEW**

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Soluble dietary fibers induce selective fermentations in the colon, altering favorably the composition of the colonic microbiota.

That's how NUTRIOSE® has been demonstrated to induce deep changes such as the production of Short Chain Fatty Acids (SCFAs) or a decrease in the colonic pH, thanks to modification of the microflora, described in a review of three clinical studies. These double blind, placebo-controlled trials were conducted and randomized in a parallel design. In each study, lasting 14 or 35 days, the feces of the groups receiving NUTRIOSE® (8 to 45 g/day depending on the studies) or PLACEBO (8 or 20 g/day of glucose or 22.5 g/day of maltodextrin) were sampled and analyzed either by plates or biomolecular method.

An increase in beneficial *Bacteroides* (from 8g/day NUTRIOSE®, 14 days, p<0.05) and *Lactobacilli* (45g/day NUTRIOSE®, 35 days, p<0.05) and a decrease in pathogenic *Clostridium perfringens* (from 8g/day NUTRIOSE®, 14 days, p<0.05) were observed.

Consumption of NUTRIOSE® induces prebiotic effects in the colonic environment, in line with the FAO's definition (2007): "a non-viable food component that confers a health benefit on the host associated with modulation of the microbiota".

**P93-02**  
**DIRECT COMPARISON OF DISACCHARIDASE ACTIVITY IN THE SMALL INTESTINE OF HUMANS AND RATS**

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Although the digestibility of newly developed saccharide materials with beneficial health effects is evaluated by the hydrolyzing activity of animal disaccharidase, it is not clear whether the evaluation using the animal disaccharidase is reflected of that of human. In this study, the disaccharidase activity in humans and rats was simultaneously measured by same method and investigated the detail difference of disaccharidase activity between humans and rats. The ratio of disaccharidase activity of rat versus human was between 1.1 and 1.8 for maltase, sucrase, palatinase, trehalase and lactase, and it was not so big difference. These results demonstrate that the disaccharidase activities were generally similar between humans and rats. When the ratio of activity of maltase, palatinase, lactase and trehalase versus sucrase was calculated, the relative activity of disaccharidases, except for lactase and trehalase which greatly vary in the species, was generally similar between humans and rats. These results suggest that the digestibility obtained from rat experiments for oligosaccharides is not greatly different from that in humans. Accordingly, it demonstrates that the evaluation of digestibility of newly developed saccharide materials using rat intestinal enzyme can substitute for the evaluation using human intestinal disaccharidase.

### P93-03

#### **BALANCED DIETS WITH HIGH GLYCEMIC INDEX, BUT NOT THOSE WITH SUGAR ALONE, ARE SUITABLE ENTRAINMENT SIGNALS FOR MOUSE LIVER CLOCK**

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**BACKGROUND:** The peripheral circadian clock in mice is known to be entrained not only by light-dark cycles but also by daily restricted feeding schedules. Behavioral and cell culture experiments have suggested that the increase in glucose may be one of the factors for such feeding-induced entrainment. For application of the results of feeding-induced entrainment to human life, the nutrient content and dietary variations should be considered.

**PRINCIPAL FINDING:** In order to elucidate the composition of food in such entrainment, we examined whether complete or partial substitution of dietary nutrients affects phase shifts in the liver clock. The carbohydrate composition was selected according to the glycemic index (GI) value—high and low GI carbohydrates. Administration of the standard mouse diet, i.e., AIN-93M formula [0.6–0.85 g/10 g mouse BW] (composition: 14% casein, 47% cornstarch, 15% gelatinized cornstarch 10% sugar, 4% soybean oil, and 10% others [fiber, vitamins, minerals, etc.]) for 2 d advanced the liver bioluminescence rhythm on the middle day in *Per2::luciferase* knock-in mice by 3–4 h as compared to fasting or ad libitum feeding mice. Moderate phase advancement was induced by 100% cornstarch and 100% soybean oil, but not by 100% casein; however, 100% glucose or 100% sucrose failed to induce phase advancement altogether. When cornstarch was substituted by glucose, sucrose, fructose, or polydextrose, it induced phase advancement in parallel with the respective GI values. When cornstarch was substituted by high-amylose cornstarch (low GI) or gelatinized cornstarch (high GI), the former caused weaker phase advancement than cornstarch or gelatinized cornstarch.

**CONCLUSIONS:** The present results strongly suggest that (1) balanced diets containing carbohydrates are good for restricted feeding-induced entrainment of the peripheral circadian clock and (2) foods with high GI, and not those with sugar alone, are suitable. These findings may aid in dietary recommendations for on-board meals served to air travelers and shift workers to reduce jet lag-like symptoms.

### P93-04

#### **CARBOHYDRATE INTAKE IN RELATION TO THE MYOPIA :**

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**OBJECTIVE:** The purpose of this study was to examine the association between carbohydrate intake and the prevalence of myopia.

**DESIGN:** The descriptive-analytic study was on 86 healthy staff – women (n=51), men (n=35) – aged 20-50 years from the eye center in Tehran-Iran in 2008. The information collected by 3 questionnaire :general information ,food-frequency questionnaire (FFQ) ,the 24 hour recall. Data was analysed with SPSS.

**RESULT:** The data showed that 53% of women and 46% of men had myopia. 98.9% of 86 person consumed complex and simple carbohydrate daily. 1.1% of these population consume weekly. 91% of these population had overtake of sugar and simple carbohydrate which 51% of 91% were myope.

75% of cases who were myope and had overtake of carbohydrate were aged 20-35 years and 25% were 35-55 years. 50% of population were mype and 44% of these persons didn't have any family history of myopia.

**CONCLUSION:** these data suggested the significant relation between overtake of carbohydrate – specially simple

carbohydrate – and myopia. The most percent of consumption were in aged 20-35 years.

### P93-05

#### **METFORMIN IMPROVES POSTPRANDIAL GLUCOSE HOMEOSTASIS IN RAINBOW TROUT (ONCORHYNCHUS MYKISS) FED HIGH LEVELS OF DIETARY CARBOHYDRATES: A POTENTIAL LINK WITH THE INDUCTION OF HEPATIC LIPOGENIC CAPACITIES?**

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Carnivorous fish are well known to be poor users of dietary carbohydrates and are considered to be glucose intolerant. In this context, we have tested in rainbow trout metformin - a common anti-diabetic drug - known to modify muscle and liver metabolism and to control hyperglycemia in mammals.

In the present study, juvenile trout were fed with very high levels of carbohydrates for this species during 10 days followed by feeding with pellets supplemented with metformin for 3 additional days.

Dietary metformin lead to a significant reduction in postprandial glycemia in trout demonstrating unambiguously the hypoglycemic effect of this drug. No effect of metformin was detected on gene expression levels for enzymes involved in the glycolysis, mitochondrial energy metabolism or on glycogen level in the white muscle. Expected inhibition of hepatic gluconeogenic gene expressions was not found showing rather a paradoxical induction by the drug treatment of these genes. Finally, metformin treatment was associated with higher levels of gene expression and activities for lipogenic enzymes.

Overall, this study suggests strongly that a limiting pathway for the efficient control of postprandial glycemia in carnivorous fish fed with carbohydrates could be a low potential of hepatic lipogenesis from dietary glucose.

### P93-06

#### **EFFECT OF TRIUMFETTA CORDIFOLIA ON BLOOD LIPIDS, GLYCAEMIA AND BODY WEIGHT IN RATS**

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**RATIONALE & OBJECTIVES:** This study investigated the effect of consumption of dietary fiber from *Triumfetta cordifolia* on blood lipids as well as glycemia in rats.

**MATERIALS & METHODS:** Leaf and stem bark extracts of *Triumfetta cordifolia* were administrated at a concentration of 500 mg/kg body weight.

**RESULTS & FINDINGS:** We have observed a weight loss in experimental animals. This weight loss was accompanied by a reduction of the level of total cholesterol (P<0.001) and LDL cholesterol (P<0.05) by stem extract and the reduction in total cholesterol (P<0.05) and CT/HDL ratio (P<0.01) by leaf extract. Both leaf and stem extract significantly (P<0.05) reduced fasting blood glucose as well as 30 min post-prandial glucose. These extracts increased feces weight and fecal excretion and did not affect plasma level of calcium and magnesium. These decreases of biochemical parameters could be due to the decrease of nutrient's absorption in intestine.

**CONCLUSION:** We have observed the decrease of blood glucose as well as lipidemia.

### P93-07

#### DIETARY FIBER IS AN ESSENTIAL NUTRIENT

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**RATIONALE & OBJECTIVE:** Dietary fiber (DF) is undefined, but an essential nutrient. Only after the intestine's essentiality of DF has been recognized, are these essential properties manifested into DF health promoting properties.

**MATERIALS & METHODS:** To achieve the health benefits ascribed to the DF hypothesis, individuals appear to need a minimum of 10-15 g DF/1,000 kcal/day. The minimum amount of DF necessary to achieve the quintessential properties of DF, which are: 1) its intestinal water holding-bulking capacity that aids laxation (L) and; 2) providing energy for the intestinal microbiota (M) through fermentation (FEM) are approximated to be 5 g DF/1,000 kcal/day. There are no controlled studies in humans fed diets without DF for extended periods. However, valuable information can be extrapolated from infants, children and adults maintained for extended periods by enteral nutrition.

**RESULTS & FINDINGS:** Among individuals maintained by enteral feeding, it is observed that: 1) intestinal atrophy occurs; 2) there is significant loss of bowel movement and dramatically reduced amounts of fecal waste; 3) colonic mass of intestinal microbiota and diversity of species are reduced and; 5) the body's immune capacity-system is compromised.

**CONCLUSION:** A minimum amount of DF is essential for normal intestinal function and health.

### P93-08

#### THE EFFECT OF UNRESTRICTED ORAL CARBOHYDRATE INTAKE ON LABOR PROGRESS

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**RATIONALE & OBJECTIVES:** Because of the importance of nutrition during last stages of the pregnancy, the policy of routinely withholding food during labor is now being questionable. Prolonged fasting may result in ketosis and prolonged labor. The purpose of this study was to assess the impact of unrestricted oral carbohydrate on labor progress & pregnancy outcome.

**MATERIALS & METHODS:** In a block randomized controlled clinical trial, 180 pregnant women in active stage of labor (cervical dilatation 3-4 cm) were assigned into two groups and received one of the following regimens: group A: three Dates with water, tea or 110 ml of artificial juice and group B: under fasting. Duration of labor, Oxy tocsin requirements, Mode of delivery, Apgar score, fetal heart rate and incidence vomiting was recorded in all groups.

**RESULTS & FINDINGS:** The mean intake of total calories was 44kcal/h in unrestricted group. There were no differences between two groups from the aspect of the duration of active labor, mode of delivery, frequency and volume of vomiting, fetal heart rate and Apgar score. The second stage labor was significantly shorter in the unrestricted group ( $p < 0/05$ ).

**CONCLUSION:** In this study, we found that simple oral carbohydrates like dates and orange juice can decrease the duration of second stage of labor. Unrestricted oral carbohydrates in second stage of labor had no negative impact on the incidence of vomiting, and adverse maternal and neonatal outcomes.

### P94: Micronutrients III

#### P94-01

##### SPECIATION OF IODINE IN BOVINE MILK BY CHEMICAL SEPARATION AND NEUTRON ACTIVATION

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Iodine is considered a micronutrient for human beings. Iodine deficiency disorder is fairly common in many countries of Africa and Asia. One of the main sources of iodine is milk. There is an interest in the determination of total as well as various species of iodine in milk. We have developed a pseudo-cyclic epithermal instrumental neutron activation analysis (PC-EI NAA) method in conjunction with anti-coincidence (PC-EI NAA-AC) gamma-ray spectrometry for the determination of ppb levels of iodine in bovine milk. We have applied chemical methods to separate various species of iodine prior to PC-EI NAA-AC. We have first used ion exchange chromatography to isolate inorganic iodine species from the organic ones followed by the separation and identification of various inorganic species. We have employed solvent extraction to isolate lipid-containing iodine followed by further fractionation using a silica gel column. We have applied ammonium sulfate precipitation to separate protein-bound iodine followed by the separation of proteins to casein and whey. We have found homogenized bovine milk (milk fat 3.25%) to contain about 73% iodide ions, 14% iodate ions, 3% iodine containing lipids, and 5.5% casein- and 1.5% whey-bound iodine. We have designed a quality assurance scheme and calculated the expanded uncertainties of both total and various species of iodine. We will present the details of various chemical separation methods and the PC-EINAA-AC method for the determination of iodine and its species with realistic expanded uncertainties in bovine milk.

#### P94-02

##### MICRONUTRIENTS STATUS OF ANEMIA AND NON ANEMIA OF UNDERFIVE CHILDREN IN BANTEN PROVINCE, INDONESIA

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**RATIONAL AND OBJECTIVES:** Micronutrients are essential for growth and development of individuals. The groups most susceptible to suffer from micronutrient deficiencies are children under five years. The aim of the study to assess micronutrient status of children under five years of anemia and non anemia.

**MATERIAL AND METHOD:** Design of study was cross sectional in Banten. 357 children age 6 month – 59 month were met the criteria and participated in this survey. Data collection include anthropometric measurement and blood sample. Hemoglobin levels analyze using HemoCue, Serum retinol by HPLC and serum zinc by AAS.

**RESULTS:** The proportion of under five years who suffer anemia was 30.1 %, suffer low serum zinc also quite high 27.5%, and 9.6% had serum retinol below 20 ug/dl. The mean serum retinol of non anemia children was significantly higher ( $25.96 \pm 5.69$ ) ug/dl compared to anemia children ( $29.0 \pm 7.06$ ) ug/dl. The serum zinc of non anemia children also higher ( $0.78 \pm 0.17$ ) ug/dl compared to anemia children ( $0.82 \pm 0.17$ ) ug/dl, however the different was not significantly different. Out of 104 under five children who considered as anemia 13.5 % had serum level 13.5 % had serum retinol less than 20 ug/dl and 31.7 % had serum zinc less than 0.70 ug/dl.

**CONCLUSION:** The proportion of children under five children who suffered anemia and low serum zinc was quite higher

#### P94-03

##### THE EFFECTS OF DIFFERENT ZINC SALTS ON CELL PROLIFERATION AND GENOMIC STABILITY IN WIL2NS CELL-LINES

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Limited information is reported reflecting cell proliferation rates and genomic stability events involving zinc in human lymphocytes. This study investigated the effects of zinc on cell proliferation and genomic stability in a WIL-2NS lymphoblastoid cell lines. Two different zinc salts were used, zinc carnosine and zinc sulfate at varying concentrations. WIL-2NS cells were cultured in zinc deficient medium (using chelex-100), normal culture medium (RPMI-1640) and zinc excess medium. Zinc carnosine and zinc sulfate both demonstrated a significant ( $p < 0.05$ ), dose dependent effect on cell death measured with MTT [3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide]. The necrotic effect of both zinc salts was noted as early as 4 hours, showing 50% of cell death at 135  $\mu\text{M}$  and 405  $\mu\text{M}$ . Zinc-deficient medium did not demonstrate any significant inhibition of cell proliferation following incubation for 72 hours. Genomic stability was measured via cytokinesis-block micronucleus cyto assay following 3 days incubation. Binucleated cells were harvested and scored for DNA damage biomarkers (micronuclei, nucleoplasmic bridges and nuclear buds), viability status (apoptotic and necrotic) and mitotic status (mononucleated, binucleated and multinucleated). Zinc sulfate at 45  $\mu\text{M}$  showed a significant increase in necrotic cells compared to zinc carnosine ( $p < 0.05$ ). There was little impact on DNA damage up to 45  $\mu\text{M}$  concentration for both zinc salts were observed. In conclusion, zinc carnosine was found to be less cytotoxic compared to zinc sulfate and this may provide useful information for future human clinical trials.

#### P94-04

##### IODINE STATUS AND COGNITIVE FUNCTION OF WOMEN AND THEIR FIVE-YEAR-OLD CHILDREN IN SIDAMA, SOUTHERN ETHIOPIA

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This cross-sectional study assessed iodine status and cognitive function of 100 women and their children in rural southern Ethiopia. Cognitive tests included Raven's CPM and selected tests from the Kaufman ABC-II (KABC-II). Goiter rate was 85% in women and 33% in children. Stunting (HAZ < -2) in children was 29% and underweight (WAZ < -2) was 10%. Only 2% used iodized salt. More than 95% had < 20  $\mu\text{g/L}$  urinary iodine excretion (UIE), indicating severe deficiency. Raven's CPM for mothers was significantly related to short-term memory, visual processing, and planning indices from KABC-II. Both short-term memory and visual processing were correlated for mothers and children. Children's goiter and UIE were related to short-term but not visual memory. Cognitive test scores were significantly higher in non-stunted than stunted and in normal-weight than under-weight children. High prevalence of goiter and low UIE demonstrate long- and short-term iodine deficiency. Improved iodine and protein-energy status have potential to improve children's cognitive performance.

#### P94-05

##### SEVERE IODINE DEFICIENCY IN SCHOOL GIRLS FROM NORTHERN ETHIOPIA

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A cross-sectional study was designed to assess knowledge of iodine deficiency as well as goiter prevalence in girls from Tigray, Northern Ethiopia. A total of 413 girls, aged 10 - 15 years, were randomly drawn from nine complete primary schools. Total goiter rate (TGR) measured by palpation was 45.3% with TGR varying from 0 to 80% in different schools. Only 16% of households used iodized salt. More than half (52%) of the girls did not know the cause of goiter. None of them mentioned the association between iodine deficiency and cognitive function. Drinking cold and dirty water and failure to massage head/hair with butter were mentioned as causes of goiter; tattooing, drinking warm water and surgery were suggested as corrective/preventive measures. Results substantiated IDD as a public health problem with potential to impede social and economic development. We suggest implementation of educational programs about IDD prevention in schools as well as quality control measures to ensure adequately iodized salt and appropriate utilization and storage.

#### P94-06

##### EFFECTS OF LOW FOLATE ON CELL GROWTH AND GENOME STABILITY IN HT29 CELL LINES

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Statistical data indicate that colon cancer incidence is increasing worldwide. Previous evidences have shown that folate is suspected of having a role in determining colorectal cancer risk. It is hypothesized that restriction of folate will induce DNA damage and prevent excessive proliferation of colon cancer cells. HT29 cell lines were cultured in three different low folate medium (4, 50 and 100 nM/L) and RPMI 1640 medium as control. We found that cell growth and viability were reduced significantly ( $p < 0.05$ ) when folate is limiting by both 3-[4,5-dimethylthiazol-2-yl]-2,5 diphenyltetrazolium bromide (MTT) and Crystal Violet colorimetric assay following 9 days incubation. To measure genome stability, cells were harvested after 7 days of culture and were scored for DNA damage indicators (micronuclei (MN), nucleoplasmic bridges (NPBs), and nuclear buds (NBUDs)). However, low folate medium did not cause any significant DNA damage measured by Cytokinesis Block Micronucleus (CBMN) assay. Further investigations will be conducted in order to understand the actual mechanism underlying cell death.

#### P94-07

##### VITAMIN B-12 STATUS IN A GENERAL ADULT POPULATION

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**RATIONALE & OBJECTIVES:** Severe vitamin B-12 deficiency causes anemia and in some cases neuropathy. In addition, low serum B-12 concentration (LSB12) has been associated with several chronic diseases such as cardiovascular diseases and dementia. When discussing folic acid food fortification, possible masking of vitamin B-12 deficiency is a matter of concern, i.e. remedying anemia without preventing

the neurological consequences. The aim of this study was to evaluate the B-12 status of Danish adults.

**MATERIALS & METHODS:** A random sample of 6,784 persons from a general population aged 30-60 years participated in a health examination in 1999-2001. Blood samples were analyzed for serum B12 concentration and several genetic polymorphisms relating to metabolism of B-vitamins. Information on lifestyle factors was obtained by questionnaires.

**RESULTS & FINDINGS:** The overall prevalence of LSB12 (<148pmol/l) was 4.7%. LSB12 was significantly associated with female sex, high coffee intake, and low folate status. In addition, an association between LSB12 and the MTHFR(C677T) polymorphism was found.

**CONCLUSION:** LSB12 was present in 4.7% of the adult population in this study and was more common among participants who had also low folate status.

#### P94-08

##### ASSOCIATION BETWEEN INTESTINAL CALCIUM ABSORPTION AND OXIDATIVE STRESS IN C57BL/6 MICE FED A HIGH-FAT DIET

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**OBJECTIVE:** The present study explored the effect of high-fat diet (HFD) on redox of duodenum and calcium absorption in C57B6/6 mice. Furthermore, the relation between both was analyzed.

**METHOD:** C57BL/6 mice were randomly assigned to five groups (n=10). The control group consumed an ordinary diet 0.6% Ca, w/w, and other four experimental groups were fed with an HFD (18% fat, 0.6% Ca, w/w), an HFD plus 0.1% lipid acid(LA), an HFD with calcium supplement(1.6%Ca, w/w) and an HFD with calcium supplement and additional 0.1%LA. Calcium apparent absorption was assessed by mineral balance studies in vivo last week before all mice fed for 8 week were sacrificed. To evaluate mice's antioxidant status, Serum and duodenum levels of ROS, SOD, CAT, MDA, GSH/GSSG, and T-AOC were measured. In additional, body bone mass density (BMD) of mice was detected by DEXA.

**RESULTS:** The HFD induced oxidative stress of mice's duodenum and decrease in intestine calcium absorption and body BMD. The calculated coefficients demonstrated positive correlations of calcium apparent absorption with GSH/GSSG (r=0.801, p<0.05) and T-AOC in duodenum of mice (r=0.777, p<0.05). A negative correlation between calcium apparent absorption and ROS (r=-0.716, p<0.05) duodenum of mice was found.

**CONCLUSION:** Oxidative stress of mice's duodenum induced by HFD can lead to reduce calcium apparent absorption.

#### P94-09

##### PROTECTIVE EFFECTS OF VITAMIN E ANALOGS AGAINST CARBON TETRACHLORIDE INDUCED FATTY LIVER IN RATS

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**OBJECTIVES:** It is reported that  $\alpha$ -tocopherol is effective for the improvement of the liver damage, recently. However, it is unknown whether the other vitamin E analogs are effective. In this study, we investigated the effects of  $\gamma$ -tocopherol and tocotrienols against rat fatty liver.

**MATERIALS AND METHOD:** Vitamin E deficient rats (fed a diet for 4wk) were divided into eight groups(Control, CCl<sub>4</sub>,  $\alpha$ -Toc,  $\alpha$ -Toc+CCl<sub>4</sub>,  $\gamma$ -Toc,  $\gamma$ -Toc+CCl<sub>4</sub>, Toc3, Toc3+CCl<sub>4</sub>). After all rats fasted for 24h, rats were administered 20mg of each vitamin E analogs. After 6h, carbon tetrachloride (0.5mL/kg B.W) was orally administered to rats. All rats were killed at 6h after oral administration. We measured activities of AST

and ALT in rat plasma and TG, T-Chol, vitamin E analogs and mRNA expression of inflammatory cytokines in rat liver.

**RESULTS AND DISCUSSION:** Liver TG content was significantly decreased in  $\gamma$ -Toc+CCl<sub>4</sub> group and Toc3+CCl<sub>4</sub> group compared with CCl<sub>4</sub> group. Also, ALT activity in Toc3+CCl<sub>4</sub> group was significantly lower than in CCl<sub>4</sub> group. Therefore, we suggested that  $\gamma$ -Toc and Toc3 are effective for improvement of fatty liver induced CCl<sub>4</sub>.

#### P94-10

##### SERUM 25-HYDROXYVITAMIN D CONCERNTRATION OF CHILDREN AGED 3-12 IN CHINA

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**OBJECTIVES:** Vitamin D plays an important role in health. Serum 25-hydroxyvitamin D is the best indicator of vitamin D status. This study was to measure serum 25-hydroxyvitamin D (25(OH)D) concentrations and to estimate the prevalence of hypovitaminosis D in children in China.

**METHODS:** A total of 3340 Subjects aged 3-12 years were selected from the National Nutrition and Health Status Survey 2002. Serum 25-hydroxyvitamin D was determined using a commercial radioimmunoassay kit.

**RESULTS:** Mean serum 25-hydroxyvitamin D concentrations were 37.25 nmol/L ((14.9ng/mL). The value of 25(OH)D lower than 12.5 nmol/L ( 5ng/mL ) were found in 8.3% (n=278) of Chinese children. 81.9% of participants had vitamin D insufficiency (<50 nmol/L, 20ng/mL) and 38.3% were deficient (<25 nmol/L, 10ng/mL).

**CONCLUSION:** The high prevalence of vitamin D insufficiency in China.

#### P94-11

##### EFFECT OF VITAMINS A, E, C AND OMEGA-3 FATTY ACIDS SUPPLEMENTATION DISTINCTLY ON THE LEVEL OF CATALASE AND SUPEROXIDE DISMUTASE ACTIVITY IN STREPTOZOTOCIN INDUCED DIABETIC RATS: INVESTIGATION OF HEART, LIVER AND ERYTHROCYTE

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**OBJECTIVE:** The present study was designed to assess the effect of supplementation with vitamins A, E and C and  $\omega$ -3 fatty acids on Catalase and Superoxide dismutase activity in streptozotocin (STZ) induced diabetic rats.

**MATERIALS AND METHODS:** 64 male Wistar rats weighing 250g were divided into four groups as normal control, diabetic control, diabetic with vitamin A, E and C supplementation and diabetic with  $\omega$ -3 fatty acids supplementation. After four weeks the rats were anesthetized and Catalase and Superoxide dismutase activity was investigated in blood samples, liver and heart homogenate.

**RESULTS:** In diabetic rats heart SOD (P<0.001) and heart and liver CAT (P<0.001) activity was significantly less than normal control rats. Vitamin A, E and C supplementation significantly increased heart CAT (P=0.05). No significant change was observed in diabetic rats with  $\omega$ -3 fatty acids supplementation.

**CONCLUSION:** Supplementation of Vitamin A, E and C and  $\omega$ -3 fatty acids was found to increase heart CAT activity in diabetic rats and they can be valuable candidates in the treatment of the complications of diabetes

#### P94-12

### MICRONUTRIENT DEFICIENCIES AND THEIR ASSOCIATION WITH DIETARY FACTORS AMONG PREGNANT AND LACTATING WOMEN OF DESERT AREAS OF WESTERN RAJASTHAN, INDIA

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**RATIONALE & OBJECTIVES:** Micronutrient deficiencies is burning problem in desert where rural population is exposed to high temperature, low rainfall & frequent drought situations affecting the agriculture, thereby, food intake. Undertook study to assess the distribution of three micronutrient deficiencies i.e. Iron, Vitamin A and Iodine along with the nature and type of nutritional deficiencies and their association with dietary factors

**MATERIALS & METHODS:** Using three stage sampling technique study conducted in 2006 in 28 villages of Jodhpur tehsil (subunit) of Jodhpur district of Rajasthan. A total of 1193 women were examined at household level for MDDs viz. Anemia (Hb estimation), Iodine (UIE and Iodine content in salt) and Vitamin A, nutritional deficiency signs and dietary pattern.

**RESULTS & FINDINGS:** Iron deficiency anemia was higher among pregnant and lactating women (80.7 %) than control group (71.6 %). Severe anemia observed 3 fold higher in pregnant and lactating women (10.5 to 14.0 %) in comparison to control group. Abortions, still births and premature births observed to be higher in anemic pregnant and lactating women in comparison to normal women. Vitamin A deficiency based on Night blindness observed higher in pregnant women (8.8 %) than controls (0.9 %). Overall high proportion of women (80.8%) consumed salt having inadequate iodine content i.e. less than 15 ppm. The median urinary iodine values were less in lactating women (85 mcg/l) than the WHO cut off points (100 mcg/l). Consumption of pulses and legumes was low i.e. 47 to 65% of Recommended Dietary Allowances (RDA) along with low consumption of leafy vegetables in pregnant and lactating women. Analysis of the Average intake of nutrients (per day in diet) showed deficiency of protein and calories in pregnant and lactating women along with deficiency of Iron and Folic Acid and Vitamin A deficiency. Anemia and IDD declined as education and income raised.

**CONCLUSION:** The anemia was found higher in comparison to national level studies, whereas, consumption of normal iodized salt, was low. It may be due to deficit of calories, proteins, iron, folic acid and vitamin A in their diet as well as illiteracy and income. The study suggests the development of nutritional packages utilizing local dietary aspects for introducing adequate bioavailability of iron, vitamin A, etc. in their usual diet besides iodization of salt.

#### P94-13

### EFFECTS OF DIETARY ZINC SUPPLY DURING PREGNANCY ON GLOBAL DNA METHYLATION

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There is evidence that maternal nutrition during pregnancy can affect offspring DNA-methylation patterns, leading to phenotypic consequences in adulthood. We hypothesized that zinc-restriction during pregnancy alters global DNA-methylation patterns in offspring by reducing the ability of zinc-dependent methyltransferase enzymes to methylate DNA.

Pregnant mice were fed zinc-restricted (15µg/g), zinc-adequate (50 µg/g) or zinc-supplemented (150 µg/g) diets for the first 16 days of pregnancy. Mice were killed and DNA extracted from fetal livers. Global DNA methylation was measured by LUMA analysis using a Pyrosequencer.

Significantly higher levels of methylation were measured in mice fed both the zinc-restricted and zinc-supplemented diets compared with mice fed zinc-adequate diets (2.34± 0.02 and

2.32± 0.02 respectively compared with 1.57± 0.04. P<0.001 by one-way ANOVA, followed by Bonferroni's Multiple Comparisons Test. Methylation levels expressed as a ratio of HpaII/MspI, normalized to ECoR I and stated as mean ±SEM, n=12 for ZnR and ZnA, n=9 for ZnS. Each analysis was run in duplicate).

Results indicate that zinc-restriction and zinc-supplementation in pregnancy cause a significant increase in global DNA-methylation.

#### P94-14

### SELW KNOCKDOWN IN VITRO BROKE THE HOEMOSTASIS OF CELLULAR ANTI-OXIDATIVE SYSTEM OF MUSCLE CELL AND RESULTED IN APOPTOSIS

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**OBJECTIVES:** Comparing the changes of the hemostasis of anti-oxidative system in skeletal muscle cell at the conditions of SelW existing or not is rare and critical to judge the importance of SelW to the system and benefits to reflect SelW function from the aspect of integrated reaction of muscle cell.

**METHODS:** RNAi for SelW depletion was performed by introducing synthesized siRNA into C2C12 cell line. Transfectant screening was done by real time PCR, western blot, Flow cytometry, fluorescent staining, DNA fragment detection, cell viability and GSH assay routinely. The activities of GPx, SOD, CAT and T-AOC were assayed to evaluate the changes of anti-oxidative system.

**RESULTS:** 62.1% and 72.4% down-regulation of SelW and its mRNA, serious cytotoxicity and 34.6%-37.5% apoptosis rate demonstrated that RNAi was success. The activities of GPx, SOD, CAT and the amount of GSH raised an extra 47.58%, 103%, 30.96 % and 29.76 % separately(p < 0.05); but the activity of T-AOC rose slightly(p > 0.05).

**CONCLUSION:** This illustrated that the homeostasis of anti-oxidative system had been broken seriously because of SelW depletion and SelW responsible for homeostasis sustaining of anti-oxidative system. T-AOC dropping slightly can be explained as compensation of upper enzymes; but apoptosis could not be prevented by compensation strongly illustrated the speciality and un-substitutability of SelW.

#### P95: Bioactive Ingredients in Foods III

#### P95-01

### GAMMA-ORYZANOL AND ITS HYPOCHOLESTEROLEMIC ACTIVITY - IN VITRO STUDY

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Gamma-oryzanol ( $\gamma$ -OR) is a unique phytosterols in rice bran and its oil. It is a mixture of 10 distinct triterpene derived compounds that are esterified to ferulic acid. Hypocholesterolemic activity of rice bran oil and  $\gamma$ -OR in animal and human studies has been reported. Therefore, this study aimed to investigate the proposed mechanism of  $\gamma$ -OR on hypocholesterolemic activity. The effect of  $\gamma$ -OR on the cholesterol micellarization, cholesterol uptake by Caco-2 intestinal cell, and HMG-CoA reductase activity were determined. The results showed that  $\gamma$ -OR incorporated efficiently into micelles during simulated digestion of rice meal mixed with high  $\gamma$ -OR oil. However, 10- and 20-fold molar ratio

of  $\gamma$ -OR to cholesterol did not inhibit the efficiency of cholesterol micellarization during simulated digestion. High concentration of  $\gamma$ -OR (500 and 1500  $\mu$ M) did not significantly decrease the efficiency of micellarization of cholesterol (0, 50, 100, 200 and 400  $\mu$ M) in synthesis micelles. Nevertheless,  $\gamma$ -OR at 20-fold molar ratio to cholesterol significantly decreased cholesterol uptake by Caco-2 cell. In addition,  $\gamma$ -OR showed the inhibitory effect on the HMG-CoA reductase activity as Simvastatin. These findings suggest that the hypocholesterolemic activity of  $\gamma$ -OR is supposed to due to the inhibition of cholesterol biosynthesis, instead of the inhibition of cholesterol micellarization.

#### **P95-02 THE STUDY OF ANTIOXIDANT FUNCTION FROM LOQUAT LEAF TEA**

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Loquat leaf tea made of the Totsukawa farm was extracted with a hot water and the extract was freeze-dried. The dry matter was divided into four fractions. Compared with the extract, the radical scavenging capacity of the extracted fraction in water, 30%, 70% methanol and 50% acetone was 9.5%, 116%, 163% and 29% respectively at 10 $\mu$ g/ml. 70% methanol extract exerted marked inhibition of growth of HL60 with induction of apoptotic cell bodies and nucleosomal DNA fragmentation.

Supplementation with the extract resulted in reducing the plasma total cholesterol and triglyceride. Male KK-Ay mice were fed on diets with or without the extract and were monitored a weekly blood glucose levels. At the end of the experiment period, the OGTT was carried out, and a reduction in blood glucose concentration from 30 to 90 minutes after the administration of glucose and the lowering the area under the curve during the 120 minutes were observed. Moreover, a significant reduction in the rate of the plasma Hb-A1c was observed. In chronic administration of the extract, the systolic blood pressure of SHR was significantly decreased against the control. These results indicate that the loquat leaf tea may be useful in prevention and improvement of diseases such as hyperlipidemia, hyperglycemia and hypertension.

#### **P95-03 IN VIVO METABOLISM OF NOBILETIN AND TANGERETIN IN RATS**

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Nobiletin (NBL) and tangeretin (TNG) are famous polymethoxy-flavonoids which are found abundantly in the peel of citrus fruits such as *Citrus depressa* Hayata and possesses anti-carcinogenic and anti-inflammatory activity. Our previous study showed that NBL was demethylated to form 3 monohydroxy (OH)- and 2 dihydroxy (diOH)-metabolites by animal liver microsomes and TNG was metabolized to 3 OH- and a diOH-metabolites. Here, we analyzed the metabolites in the urine and feces of male rats treated orally with NBL and TNG each at a dose of 250 mg/kg. Rat urine and feces were collected during 2 days after treatment. The metabolites extracted with ethyl acetate were analyzed by HPLC. In the urine of rats treated with NBL or TNG, 4'-OH-NBL and 4'-OH-TNG were major metabolites and comprised about 70% and 80% of total metabolites, respectively. In rat feces, about 20% of unchanged TNG given was detected, whereas less than 0.1% of unchanged NBL given was found. Major fecal metabolites were 4'-OH- and 3',4'-diOH-NBL in

NBL metabolism and 4'-OH-TNG in TNG metabolism. These results suggest that NBL is absorbed more effectively than TNG in rats, and also that in common to NBL and TNG, 4'-OH-metabolites are major in rat urine and feces.

#### **P95-04 DIFFERENCES IN COMPOSITION OF NUTRIENTS IN UNRIPE AND RIPE CARICA PAPAYA**

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Papaya (*Carica papaya*) is one of the popular fruits in the tropical and subtropical countries in the world. Several countries such as Brazil, Nigeria, Congo, Indonesia, Malaysia and India are among the major producers of papaya. The nutritional importance of papaya is due to its balanced sugar, protein and total fat content. Other biologically active compounds include flavanoids, alkaloids that contribute to the flavor, color. Identification of biochemical composition of papaya may vary depending on the method of extraction and solvents used. We have analyzed here the difference in protein, carbohydrate, fat, alkaloid and flavanoid contents of ripe and unripe *C. papaya* pulp using acetone and phosphate buffered saline as extraction solvents. Protein content, analyzed both by the Bradford method and SDS-PAGE, was found to be higher in ripe papaya pulp than that in unripe ones. Carbohydrate, flavanoid, steroid and lipid contents as well were generally higher in ripe papaya than in unripe ones. Different methods such as acid sulfuric method for the detection of carbohydrate and thin layer chromatography for the detection of other components were performed for the analyses.

#### **P95-05 YELLOW PULP OF *Parkia biglobosa* AS A SOURCE OF MINERALS, MICRONUTRIENTS, PHENOLIC AND ANTIOXIDANT COMPOUNDS**

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**RATIONALE AND OBJECTIVES:** Yellow pulp of *Parkia biglobosa* is frequently used in Burkina Faso. The health-related properties of this pulp claimed by folklore use could be partially attributed to the presence of bioactive compounds. However, variability in nutrient and bioactive compounds has not been reported.

The objective of this study was to give published information about use, role, nutritional, microbiological and functional properties of this pulp.

**MATERIALS AND METHODS:** A study conducted during 18 months along 4 areas has permit to understand traditional, culinary and therapeutic uses of this pulp. So, 20 samples for each area have been taken for analysis.

**RESULTS:** Carbohydrates content is about 53.05%  $\pm$  0.94. Sodium, potassium and Calcium contents in ppm were respectively 311.16  $\pm$  59; 16604  $\pm$  69, and 177  $\pm$  0.07. Significant difference was not found between samples of 4 areas when using Duncan test.

The main phenolic compound revealed by HPLC were total phenols (0.041%  $\pm$  0.02), flavonoids (0.13%  $\pm$  0.02) and proanthocyanosides (1.40%  $\pm$  0.05) while antioxidant capacity was positive with  $\beta$  carotene test and DPPH. Vitamin A and C are the natural antioxidant present into pulp.

The results leading us to suspect that this pulp could be an

alternative source of multiples vitamin besides other bioactive compounds.

**CONCLUSION:** This pulp creates a possibility of a staple food fortification or fortification of weaning and complementary foods and diets of children living in nutrition rehabilitation units.

#### P95-06

##### **EFFECTS OF THE ETHANOLIC EXTRACT OF THE FERMENTATION PRODUCT OF AGARICUS BLAZEI ON HEPATOCELLULAR CARCINOMA (HEP 3B CELLS)-IMPLANTED IN NUDE MICE**

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**RATIONALE & OBJECTIVES:** *Agaricus blazei* Murill has been reported to against a variety of diseases, including diabetes, hyperlipidemia, atherosclerosis and chronic hepatitis. However, the fruiting body of *A. blazei* is relatively expensive due to its low yield, and a cheap and stable source of *A. blazei* fermentation product is desirable for promotion in commercial products. In Taiwan, the incidence of liver diseases is high, such as chronic hepatitis, liver cirrhosis and hepatoma which are the leading causes of death in 2008. The effect of the fermentation product of *A. blazei* cultured in the medium containing soybean and black soybean on liver tumor of rat was investigated in this study.

**MATERIALS & METHODS:** The 8-week-old BALB/cAnNTac-Foxn1nu nude mice were purchased from National Laboratory Animal Center, Taipei, Taiwan and housed up to 5 groups. The experimental groups were PC (positive control, 5-FU), NC (negative control, tween 20), and three of sample groups, low, medium as well as high doses of the ethanolic extract of the fermentation product of *A. blazei* (ABE). After giving them the oral administration of ABE for another 2 weeks, we induced the tumor on right dorsal side of these five groups by injecting Hep 3B cells suspended in serum-free medium. About 3 weeks later, we started to measure the tumor size (Tumor Volume (cm<sup>3</sup>) = L (cm) × W2 (cm) × 0.52) and observe their survival status. The tumor size was analyzed by ANOVA and Duncan's new multiple range test compared with NC. The survival rate was used Kaplan-Meier method by log rank test compared with NC ( $p < 0.05$ ).

**RESULTS & FINDINGS:** In vitro assay, we found that ABE can inhibit Hep 3B cells with IC<sub>50</sub>, 138 µg/ml. In vivo assay with preventive goal, the nude mice received oral administration of ABE for two weeks prior to tumor-inducing. In terms of results in vivo, ABE has a potential to reduce the tumor volume as compared with negative control and the inhibition rate is 42% on day 51 after tumor-inducing. Moreover, ABE also prolongs the survival time of tumor-bearing mice and the survival rate is 56%.

**CONCLUSION:** ABE has a potential to reduce the tumor volume and may be possible to be a candidate for increasing the life span of patients who suffer liver cancer.

#### P95-07

##### **INTERACTION OF MILK PROTEIN AND FRUIT EXTRACTS IN A LIPOSOMAL SYSTEM**

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Food synergy has been defined as additive or more than additive effects of food constituents on human health and is becoming the basis for modern nutritional science. Food and food consumption patterns can act synergistically to influence the risk of several chronic diseases and is not surprising given their complexity. This research aims to develop added-value consumer foods that have functional properties derived from combining fruit phytochemicals (polyphenols), known for their antioxidant effects and health benefits associated with cardiovascular disease and cancer, with dairy.

The antioxidant activity of a fruit extract/milk complex may involve polyphenol/protein interactions that increase the basal antioxidant activity of the fruit extract. To study such effects the ability to inhibit lipid peroxidation by fruit extract /milk protein complexes was determined. Lecithin was used to make liposomes, with incorporated lipophilic fluorescent probe (C11-BODIPY) to monitor lipid peroxidation. Milk-protein concentrate and fruit extracts were either introduced as the liposomes were fabricated or mixed with preformed liposomes. Preliminary results show that in a liposomal system, fruit extracts, rich in polyphenols, and milk-protein concentrate act in a synergistic way to inhibit lipid peroxidation demonstrating a potential food synergy effect that could be utilized in a functional food.

#### P95-09

##### **DIETARY APPLE POLYPHENOL IMPROVES SURVIVAL OF HEART/MUSCLE-SPECIFIC MANGANESE-SUPEROXIDE DISMUTASE-DEFICIENT MICE**

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**RATIONALE & OBJECTIVES:** Apple polyphenol (AP) containing procyanidins as major components, has been reported to scavenge radicals in vitro, restrain lipid peroxidation, and activate antioxidant enzymes of rats fed high fat diet. We investigated whether AP is beneficial on ageing of organisms using heart/muscle-specific manganese-superoxide dismutase-deficient (H/M-Sod2<sup>-/-</sup>) mice.

**MATERIALS & METHODS:** We generated H/M-Sod2<sup>-/-</sup> mice as a model of dilated cardiomyopathy associated with fibrosis and increased oxidative DNA damage. Mean lifespan of the mice decreased to about 5 months. Drinking water containing 0.1% AP was administrated orally in the mice from birth to death. We measured the cardiac fibrotic area and the level of 8-oxo-2'-deoxyguanosine in nuclear DNA of the mice as a marker of oxidative DNA damage.

**RESULTS & FINDINGS:** Dietary AP suppressed the progression of cardiac dilatation (0.87-fold,  $P < 0.05$ ) and cardiac fibrosis (0.51-fold,  $P < 0.001$ ) in the H/M-Sod2<sup>-/-</sup> mice. Dietary AP also diminished oxidative DNA damage (0.75-fold,  $P < 0.05$ ). Finally, dietary AP increased survival of the mice ( $P < 0.0001$ ) and extended the mean lifespan by 29% in male and 72% in female.

**CONCLUSION:** These results show that dietary AP prevented ageing of short-lived mice exposed to excess oxidative stress.

#### P95-10

### EFFECT OF JAPANESE DIET, CATECHIN, HIGH CARBOHYDRATE AND DIETARY FIBER, ON BIOAVAILABILITY OF SOYBEAN ISOFLAVONE IN OVRIECTOMIZED MICE

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**OBJECTIVE:** Daidzein, a major isoflavone found in soybean, is metabolized to equol by gut microflora, and the metabolite exhibits a stronger estrogenic activity than daidzein. In epidemiological studies suggested that green tea, high carbohydrate (HC) diet and dietary fiber may stimulate equol production. In this study, we examined the effects of catechin, HC diet and resistant starch (RS), which are the characteristic of the Japanese dietary components, on equol production and on the effects of soy isoflavones on bone metabolism in ovariectomized (OVX) female mice.

**METHODS:** Some OVX mice received diet containing 0.1% daidzein or 0.2% isoflavones that combined with 1% catechin, HC diet or 12% RS for 4 or 6 weeks. The levels of equol in plasma and urine, and bone mineral density (BMD) of femur were assessed.

**RESULTS:** Catechin reduced plasma equol levels and inhibited the effect of daidzein on bone loss. HC diet did not affect equol production and BMD of the femur. RS stimulated equol production, thereby it advanced the inhibition of bone loss by daidzein.

**CONCLUSION:** These results suggest that RS, but not HC and catechin, increases the bioavailability of isoflavones in prevention of osteopenia in OVX mice.

#### P95-11

### INDUCTION OF PI CLASS OF GLUTATHIONE S-TRANSFERASE BY DIETARY SULFUR COMPOUNDS

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Sulfur compounds have been studied for the ability to inhibit experimental cancer in various animals models, primarily through modification of carcinogen detoxification enzymes, such as glutathione S-transferase (GST) enzyme. The study is to explore the modulatory effect of three sulfur compounds including  $\alpha$ -lipoic acid (LA), dihydrolipoic acid (DHLA) and sulforaphane (SFN) on the gene expression of the pi class of glutathione S-transferase (GSTP) in Clone 9 liver cells. Western and Real-time PCR showed that LA, DHLA and SFN induce GSTP enzyme activity, mRNA and protein expression. Luciferase activity assay revealed the induction of reporter activity was almost abolished when the -2713 to -2604 bp region of the GSTP promoter, which contains GSTP enhancer (GPE) I, is deleted. Deletion of GPE II, located -2604 to -2375 bp, however, did not affect the induction of reporter activity. In other isoenzymes, LA, DHLA and SFN could stimulate the GSTA and GSTM as well as GSTP. In conclusion, three sulfur compounds: LA, DHLA and SFN can up-regulate the GSTP mRNA and protein expression, and the GPE I is involved.

#### P95-12

### ANTIOXIDANT AND ANTIACETYLCHOLINESTERASE ACTIVITIES OF CHARD

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Plants have been used for years as a source of traditional medicine to treat various diseases and conditions. Many of these medicinal plants are also excellent sources for photochemicals, many of which contain potent antioxidant and antiacetylcholinesterase activities. Chard (*Beta vulgaris* L. var. *cicla*) is widely spread plant in Turkey and used as an antidiabetic in traditional medicine.

In the present study, we examined the antioxidant activity and acetylcholinesterase inhibitor capacity of chard. In addition, proline level of chard was determined. The antioxidant activity of water extract of chard was evaluated using different antioxidant tests. Antiacetylcholinesterase activity was determined, using an adaptation of the method described by Ingkaninan et al. Proline content of water extract was performed according to Bates.

The results indicate that chard is a potential source of natural antioxidant and antiacetylcholinesterase and proline.

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#### P95-13

### THE EFFECTS OF QUERCETIN METABOLITES ON CYTOTOXICITY INDUCED BY BENZO[A]PYRENE ALONE OR COMBINED WITH BETA-CAROTENE IN A549 CELLS

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Quercetin has been demonstrated to inhibit DNA damage induced by benzo[a]pyrene (Bap) or Bap+  $\beta$ -carotene. However, the metabolites of quercetin rather than itself are found in plasma in human. Thus, in the present study, we investigate the individual effects of quercetin metabolites, quercetin-3'-sulfate (Q3'S), quercetin-3-glucuronide (Q3G) and isohamnetin (I) on the DNA damage induced by Bap or Bap+  $\beta$ -carotene in A549 cells. In addition, we also investigate the protective effect of quercetin-enriched plasma (QP; 10%), which was obtained from gerbils with quercetin-feeding (100 mg/kg body wt/week) and contained total quercetin metabolites at about 2-5 m M. The A549 cells were preincubated with test compounds with or without 20 m M  $\beta$ -carotene for 4 h followed by incubation with 20 mM of Bap for 24 h. The results showed that Q3'S, Q3G, I and QP significantly decreased the cell death and the DNA damage induced by Bap or Bap+  $\beta$ -carotene in A549 cells. The effects of the individual metabolites or QP were similar to quercetin itself, suggesting that the metabolites of quercetin also protected A549 cells against Bap and Bap+  $\beta$ -carotene.

#### P95-14

##### PHENOLIC CONTENT AND ANTIOXIDANT ACTIVITIES OF AQUEOUS EXTRACTS OF SELECTED EDIBLE WILD MUSHROOMS

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Total phenolic content (TPC) and antioxidant activities (AOA) of aqueous extracts at optimum extraction time and temperature of selected edible wild mushrooms were evaluated. The antioxidant activities were studied in four different assays including DPPH and ABTS free radical scavenging, FRAP and  $\beta$ -carotene bleaching system. *Pleurotus* sp. showed significant higher ( $p < 0.05$ ) DPPH scavenging ability ( $90.78 \pm 0.30\%$ ) and FRAP ( $6.37 \pm 0.22$  mM FE/100g DW), whilst *Schizophyllum commune* showed significant higher ABTS•+ scavenging ability and  $\beta$ -carotene bleaching activity ( $94.96 \pm 0.70\%$  and  $94.18 \pm 0.17\%$ , respectively). The AOA of both species were found correlated positively with their TPC. When compared to butylated hydroxyanisole (BHA) and ascorbic acid, DPPH scavenging ability for *Pleurotus* sp. was significantly higher ( $p < 0.05$ ) compared to BHA at 2000  $\mu$ M and ascorbic acid at 1000  $\mu$ M. The aqueous extracts of edible wild mushrooms showed significant higher ( $p < 0.05$ ) reducing power as compared to BHA and ascorbic acid. The  $\beta$ -carotene bleaching activity for ascorbic acid at 2.5 mM showed significant lower than that of edible wild mushrooms and BHA. In conclusion, edible wild mushrooms possess antioxidant properties and can be of food and nutraceutical industry importance.

#### P95-15

##### ANTI-DIABETIC EFFECTS OF PUMPKIN COMPONENTS IN GOTO-KAKIZAKI RATS

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**RATIONALE & OBJECTIVES:** We previously reported that pumpkin extract improved the condition of diabetes in non-obese type 2 diabetic Goto-Kakizaki (GK) rats. In this study, anti-diabetic compounds were isolated, followed by an investigation of their action mechanism.

**MATERIALS & METHODS:** Two compounds were isolated and identified as Trigonelline (TRG) and nicotinic acid (NA) from their NMR spectra. The rats were divided into 3 groups; control group (basal diet), TRG group (0.056% TRG) and NA group (0.05% NA). In the 4th week, oral glucose tolerance test (OGTT) was performed. On the 43rd day, blood was collected for lipids analyses and diabetes makers. The TRG-fed rat liver was used for DNA microarray analysis.

**RESULTS:** In OGTT, blood glucose and serum insulin levels were significantly lower levels in the TRG group than the control group. Serum total cholesterol and triglyceride levels were lower in the TRG and NA groups. With the DNA microarray analysis, 369 genes were up expressed, 669 genes were down. Glucose-6-phosphatase and cytochrome P450 subfamily (Cyp51) were repressed.

**CONCLUSION:** From these results, it was shown TRG found in pumpkin was effective in mitigating diabetes. Regulation of gluconeogenesis and cholesterol synthetase by TRG is considered to be its action mechanism.

#### P95-16

##### ANTIOXIDANT CAPACITY AND ACE INHIBITORY ACTIVITY OF PROTEIN-FERMENTED FOODS

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In Japan, there is a fermented tofu product called Tofuyo. In this study, surimi was used as a protein source instead of tofu. Tofuyo is reported to have antioxidant activities. Fermented surimi or surimi products may express similar activities following the progress of fermentation. Additionally, acceptable sensory value is required as a fermented food. Thus, taste of the fermented surimi and surimi products was evaluated by sensory analysis and changes on the antioxidant capacity of the fermented foods were investigated.

The fish proteins as samples were steamed surimi and kamaboko (surimi product). They were fermented by fungal genus *Aspergillus* up to six months. In addition to sensory analysis, they were analyzed biochemical composition, ACE inhibitory activity, DPPH radical scavenging activity and copper ion reducing power. The fermented surimi and kamaboko expressed fine taste similar to cream cheese. DPPH radical and copper ion were significantly increased by fermentation. After six months fermentation, surimi and kamaboko showed significantly higher antioxidant capacity than Tofuyo. As a result, fish protein fermentation may produce tasty food with bioactive compounds.

#### P95-17

##### BARLEY $\beta$ -GLUCAN AND ITS CHOLESTEROL LOWERING CAPACITY: A META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS

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**OBJECTIVE:** To more precisely quantify the effect of barley beta-glucan on blood cholesterol concentrations in humans and to examine factors that could affect its efficacy.

**DESIGN:** Eleven eligible randomized clinical trials published from 1989 to 2008 were identified from nine databases. Weighted mean effect sizes were calculated for net differences in lipid profile using a random effect model (RevMan 4.2).

**RESULTS:** Overall, barley or  $\beta$ -glucan isolated from barley lowered total and LDL cholesterol concentrations by 0.30 mmol/L (95% CI, -0.39 to -0.21,  $P < 0.00001$ ) and 0.27 mmol/L (95% CI, -0.34 to -0.20,  $P < 0.00001$ ), respectively, compared with control. The pattern of cholesterol lowering action of barley in this analysis could not be viewed as a dose-dependent response. There were no significant subgroup differences by type of intervention and food matrix.

**CONCLUSIONS:** Increased consumption of barely products should be considered as a dietary approach to reduce LDL-cholesterol concentrations.

#### P95-18

##### S-CARBOXYETHYLCYSTEINE (A CONSTITUENT OF ACACIA SEED) NEGATIVELY AFFECTS CASEIN PROTEIN UTILIZATION BY RATS

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Acacia seed is known to be a seasonal food for the aborigines of Australia and is now being promoted in Australia as a health food. Some Acacia species have recently been introduced to West Africa to provide a food crop for the semi arid regions of Africa. Acacia, however, is known to contain a modified amino acid (S-carboxyethylcysteine, (CEC)), of unknown nutritional value. Two bioassay experiments were carried out. The first investigated the limiting amino acids in Acacia

colei by feeding Wister strain rats with *A. colei* supplemented with the three levels of methionine, cysteine and tryptophan. The second experiment investigates the effect of CEC on the protein utilization by rat. Tryptophan supplementation of *A. colei* had no significant effect on protein efficiency ratio (PER) but increased with increase in cysteine supplementation. Methionine supplementation resulted in a significant increase in PER making it, the first limiting amino acid. Interactions among amino acids were observed. The methionine-induced growth rate was suppressed by the incorporation of CEC, which also had a negative effect on plasma amino acid levels. The results indicated that methionine in the first limiting amino acid in *A. colei* and that CEC could affect the seed's protein utilization.

#### **P95-19** **HEMOGLOBIN F INDUCER EFFECT OF THE AERIAL PART OF *Curcuma comosa***

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$\beta$ -Thalassemia, which is caused by reduced or absent  $\beta$ -globin chain synthesis, is the most common hereditary disease in the world. The accumulation of unbound  $\alpha$ -globin chain in erythroid progenitor is the cause of the intramedullary destruction of immature red cells (ineffective erythropoiesis). Consequently, the patients have anemia, jaundice, hepatosplenomegaly, iron overload and many other pathological changes of various organs. Increased fetal hemoglobin (HbF) in  $\beta$ -thalassemia patients results in ameliorate disease severity as excess unbound  $\alpha$ -globin chain reduced by combines with to form HbF. Many HbF inducing agents have been studied for over two decades such as 5-azacytidine, hydroxyurea, and butyrate acid. However, many of these drugs have low efficacy and specificity, while some are potentially carcinogenic and associated with high toxicity. In this study, we screened the extract from the aerial part of *Curcuma Comosa*, the medicinal plant traditionally used to treat a number of diseases, using stable erythroid cell line reporter assays based on the green fluorescence protein (EGFP) gene under control of the  $\gamma$ -globin promoter in the intact human  $\beta$ -globin cluster. The results showed that *C. comosa* extract treated cells increase  $\gamma$ -globin gene expressing up to 2.5 folds.

#### **P95-20** **ANTI-OXIDATIVE EFFECT OF SOYBEAN ISOFLAVONE IN THE HUMAN BODY**

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**OBJECTIVE:** To study the anti-oxidative effect of soybean isoflavone (SI) in the human body.

**METHODS:** 116 healthy volunteers aged from 45 to 65 were randomly divided into two groups: the placebo-controlled groups and the SI-treated group in accordance with superoxide dismutase (superoxide dismutase, SOD), glutathione peroxidase (glutathione peroxidase, GSH-Px) activity and malondialdehyde (maleic dialdehyde, MDA) content. The SI capsule was administered to the SI-treated group 2 g/d orally for 3 months, while placebo was administered to the control group. Before and after the test, determination were carried for subjects on each relevant security indicators and SOD, GSH-Px, MDA.

**RESULTS:** Test results of the targets on food safety were within normal range before and after the trial, and obvious adverse reactions were not found. The SOD and GSH-Px levels

were significant higher in the SI-treated group than medication before, and respectively improve 11.5%, 5.2% after the trial, while the MDA level was significantly lower 15.6 % in the SI-treated group than medication before. Moreover, there were significant differences in the three indexes between the SI-treated group and the placebo-controlled group after the experiment.

**CONCLUSION:** For human, SI is safe and has a significant anti-oxidative effect in vivo.

#### **P95-21** **EFFECTS OF HIGH-DEVELOPED RICE BRAN ON PLASMA GLUCOSE AND LIPID LEVELS IN STREPTOZOTOCIN INDUCED DIABETIC RATS**

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High-developed rice varieties were produced by genetic engineering from the early 1990's in Korea. It has an enriched taste, texture, size, color and nutritional components. As a part of our ongoing studies of the biological activities, we investigated the effects on plasma glucose and lipid levels of ethanolic extracts of high-developed rice varieties, *Oryza sativa* cvs. Obongbyeon (Ob), Hyangmibyeon (Hy), and Aranghyanchalbyeon (Ar) bran normal and diabetic male rats. Experimental groups were induced diabetes mellitus by streptozotocin (STZ) injection (45 mg/kg body weight) into the tail vein. Control rats were injected with citrate buffer alone. In the present study, plasma glucose, total cholesterol, triglyceride (TG), free fatty acid (FFA), aminotransferase, and hematocrit levels were evaluated. As a result, plasma glucose levels after administration of high-developed rice bran extracts in diabetic rats have been decreased. The glycogen levels in liver were significantly lower than that of NC group. Plasma TG level were significantly lower in the D-Ob and D-Hy groups as compared to STZ-control group. Administration of Hy and Ar causes a significant decrease in FFA level of treated diabetic rats compared to the DC group.

#### **P95-22** **PHYTOCHEMICAL CONSTITUENTS OF SOME LOCAL SPICES – ONIONS (*ALLIUM CEPA*) AND GINGER (*ZINGIBER OFFICINALE*)**

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**RATIONALE & OBJECTIVES:** Phytochemicals are natural bioactive compounds found in plant foods that work with nutrients to protect human bodies against diseases. In Nigeria, onions (*Allium cepa*) and ginger (*Zingiber officinale*) are spices used locally in the treatment of cardiac problems along with other ailments. The objective of the study was to determine the phytochemical constituents of the spices and shed light on their therapeutic effect.

**MATERIALS & METHODS:** The spices were dried and milled into fine flour. Standard methods were used to determine the phytochemical constituents of the spices.

**RESULTS & FINDINGS:** The phytochemicals present in the spices were saponins, tannins, cardiac glycoside, terpenes, deoxy sugar, flavonoids, alkaloids, phlobatanins and anthraquinones. For onions cardiac glycoside was highly present while deoxy-sugar, flavonoids, alkaloids and anthraquinones were moderately present. For ginger, alkaloids were highly present while cardiac glycoside and saponins were moderately present.

**CONCLUSION:** The spices contained some phytochemicals, which have health benefits.

#### P95-23

##### **SPROUTING ENHANCES ISOFLAVONE CONTENT IN CHICKPEA SEEDS**

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**RATIONALE/ OBJECTIVES:** Effect of sprouting on Isoflavone content was studied in chickpea seeds.

**MATERIALS AND METHODS:** Dried, soaked, and sprouted (24 h and 48 h) seed extracts were hydrolyzed and analyzed by HPLC-DAD for isoflavone content. Among the four identified isoflavones; daidzein and genistein were quantified using standards. Two more isoflavones, biochannin A and formononetin, the methylated forms of genistein and daidzein respectively were quantified as equivalents of genistein and daidzein.

**RESULTS:** Total isoflavone contents were significantly increased ( $p < 0.001$ ) with 24 hours (h) and 48 h germination time ( $97.7 \pm 5.42 \mu\text{g/g}$ ,  $619.35 \pm 18.42 \mu\text{g/g}$ ) Biochannin A and formononetin are the predominant forms in germinated seeds, and the levels were significantly ( $p < 0.001$ ) higher in soaked as well as germinated for 24 h and 48 h time. Highest mean values of biochannin A ( $269.2 \pm 14.52 \mu\text{g/g}$ ) and formononetin ( $310.1 \pm 18.26 \mu\text{g/g}$ ) were observed for 48 h germination.

**CONCLUSION:** Results of the present study indicated that sprouted chickpea seeds could be a good source of isoflavones.

#### P95-24

##### **INHIBITORY EFFECT OF LEMONBALM (MELISSA OFFICINALIS) EXTRACT ON MELANOGENESIS IN B16 MURINE MELANOCYTE**

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Bioactive and antioxidant properties having Lemon balm (*Melissa officinalis*) has potentialities in hypopigmentation. To assess the inhibitory performance of wild (LBE) and mutant (mLBE) type lemon balm extracts on melanogenesis, in vitro studies were conducted on B16 murine melanocyte. Flavonoids content in extracts and the inhibitory effects of the extracts on the mushroom tyrosinase activity were measured. Cells were treated with the extracts to determine cellular tyrosinase activity, melanin content, cell viability followed by gene and protein expression level related to the melanogenesis. mLBE showed 11% higher flavonoid content than LBE. Cytotoxicity was not found for LBE and mBLE up to 200  $\mu\text{g/ml}$  which reduced the mushroom tyrosinase activity by 20% and 23%, respectively. LBE and mBLE treatments on cell reduced cellular tyrosinase by 27% and 45%; while melanin content by 34% and 51%, respectively. The gene expression level were inhibited in tyrosinase by 14% and 43% and in TRP-1 by 33% and 20% for LBE and mLBE, respectively. Protein expression level was reduced in tyrosinase by 70% for LBE and in TRP-1 by 71% for mLBE. We concluded that lemon balm extracts showed antagonistic effects on melanogenesis and could provide ingredients for functional cosmetics.

#### P95-25

##### **IN VITRO SCREENING OF THE SELECTED INDIGENEOUS FOOD OF BANGLADESH FOR ANTI-INFLAMMATORY**

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**RATIONALE & OBJECTIVES:** Food can modulate various functions in the body and the bioactive compounds of plant origin foods have reported for their potential health beneficial

role. Now a day, Bangladesh faces diet related chronic diseases. For the prevention and management, advanced research study is needed to identify the potential functionality of indigenous and commonly consumed foods of Bangladesh.

**MATERIALS & METHODS:** Therefore, the present study was undertaken to screen the 41 selected indigenous foods of Bangladesh, included vegetables, fruits, oil seeds, spices, legumes, tea and cereal. Freeze-dried samples were extracted by dimethyl sulfoxide (DMSO) and sequential extraction by hexane/dichloromethane (1:1) and AWA (acetone/water/acetic acid 70:29.5:0.5). Anti-oxidant activities were measured by hydrophilic oxygen radical absorbance capacities (H-ORAC) of AWA and lipophilic ORAC of hexane/dichloromethane fraction. Total phenol (TP) content were measured by modified Folin-Ciocalteu method. DMSO extracts were used to evaluate the anti-inflammatory (estimated by LPS-induced TNF- $\alpha$ , inflammatory cytokine produced in early phase of inflammation on J774A.1 cells) and anti-allergic (antigen-induced degranulation of RBL-2H3 cells) activities.

**RESULTS & FINDINGS:** Tea samples showed high H-ORAC values (1346 -2510  $\mu\text{mol}$  of Torolox equivalent (TE)/g). H-ORAC values of the fruits ranges from 0.45 to 168.9, with very low L-ORAC activity. Spices showed both higher H-ORAC and L-ORAC values. Among vegetables, fruits and tea samples, TP content was linearly correlated with the H-ORAC except Indian apple and Alma. Fourteen different samples inhibited TNF- $\alpha$  production at the concentration of 40  $\mu\text{g/ml}$  and activities of linseed, china, kheshari, radhuni, cabbage, black tea and sesame-black variety were potent. Dose response study revealed that 8 samples out of 14 have dose-response on inhibition of TNF- $\alpha$  production. On the other hand, some vegetables and fruits enhanced TNF- $\alpha$  production at the same concentration. Concerning anti-allergic activities, kalojeera, china, eggplant, cabbage, papaya, amla and four different type of tea inhibited the antigen-induced degranulation of RBL-2H3 cells at the same concentration and AWA fraction of kalojeera showed positive dose response.

**CONCLUSION:** In present study, we have investigated the beneficial effect of Bangladeshi foods. Further studies are needed for the identification of bioactive compounds.

#### P95-26

##### **PROTECTIVE EFFECTS OF WHEAT BRAN ON GASTRIC STRESS ULCER IN RATS**

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It is well known that the wheat bran has potential health benefits. However, knowledge to the properties of physical and chemical digested wheat bran is nothing. Effects of physical and chemical treatment of wheat bran were evaluated on, protective effects of that on gastric ulcer in the rat model were compared. Wheat bran was physical digested with autoclave (wheat bran A) and chemical digested with cellulase and pectinase (wheat bran B). Rats were fed standard and bran diet for 14 days. The  $\beta$ -1,3-1,4-glucan content of solublized wheat bran A and B were 1.0% and 3.3%, respectively. Protective rate to gastric ulcer of rats fed with wheat bran diet were higher than control. These results suggest that the  $\beta$ -1,3-1,4-glucan of wheat bran is an important part of the active principle for anti-ulcerogenesis.

## P96: Novel Approaches in Dietary Assessment II

### P96-01

#### DIETARY PATTERNS IN THE SCOTTISH DIET FROM THE EXPENDITURE AND FOOD SURVEY: THEIR RELATIONSHIP TO SOCIO-ECONOMIC STATUS, HOUSEHOLD INCOME, TOBACCO AND ALCOHOL PURCHASES

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**RATIONALE AND OBJECTIVES:** To describe dietary patterns among Scottish households, and to explore how these patterns varied according to socio-economic status, household income, alcohol and tobacco purchases.

**METHODS:** Food purchase data (household and eaten out) from 1750 Scottish households was taken from the UK Expenditure and Food Survey (EFS) 2001-2004. Dietary patterns were derived using Principal Component Analysis (PCA). The associations between the dietary patterns and socio-economic status, household income and household purchases of alcohol and tobacco were assessed using general linear models.

**RESULTS AND FINDINGS:** Four distinct dietary patterns were observed in the Scottish diet: 'takeaway/eaten out', 'healthy with fruit and vegetables', 'cakes, pastries, buns, scones, cereals and bread' and 'traditional' patterns. There was evidence of a significant relationship between socio-economic status, lifestyle factors and dietary patterns. A lower level of deprivation, higher household incomes and no smoking/tobacco purchases were associated with the 'healthy' dietary pattern.

**CONCLUSION:** Dietary patterns in the Scottish diet have been established from UK household EFS data and appear to be socially patterned. Their relationship to socio-economic status, household income and tobacco and alcohol purchases have been described.

This project was funded by the Food Standards Agency Scotland.

### P96-02

#### THE RELATIONSHIP BETWEEN DIETARY QUALITY, AGE AND SOCIAL STATUS IN THE SCOTTISH POPULATION

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**RATIONALE AND OBJECTIVES:** To develop and use a Dietary Quality Index (DQI) to assess the dietary quality of Scottish adults and children.

**METHODS:** Data from the 2003 Scottish Health Survey (Scottish Executive, 2005) was used to derive a dietary quality index for individuals (n=10,507, children<16 n=2391, adults n=8116), based on current dietary guidelines. The DQI score was expressed as a percentage of total score. Linear regression analysis was used to assess the association between the DQI and demographic factors.

**RESULTS AND FINDINGS:** The DQI was consistently higher in the adult groups particularly the older adult groups compared to the children. The 11-15 year old group had the lowest DQI of all groups. There was a consistent and significant relationship between social position and DQI for all age groups.

**CONCLUSION:** A dietary quality index based on current dietary guidelines is a useful way to assess the diet of population groups. Older people and adults have higher scores than children and socio-economic status is an important factor in determining

diet quality.

References:

Scottish Executive (2005) Scottish Health Survey 2003.

<http://www.scotland.gov.uk/Publications/2005/11/25145024/50251>.

This project was funded by the Food Standards Agency Scotland.

### P96-03

#### MEAL-Q - A NEW WEB-BASED DIETARY ASSESSMENT METHOD FOR CHILDREN, TEENAGERS AND ADULTS

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**RATIONALE & OBJECTIVE:** To develop a new set of questionnaires to assess dietary intake in children from the age of 9-months up to adults aged 65. The aim is to use the new method in a future prospective Swedish cohort study of children and adults (LifeGene).

**MATERIALS & METHODS:** The questionnaires are web-based and include features like hidden follow-up questions and automatic checks for missing answers. The food items are presented for different meals, i.e. starting with commonly eaten food items for breakfast, snacks in-between meals, and thereafter, different lunch and dinner dishes. In addition, we ask about drinks, dietary supplements, meal patterns and other dietary behaviors.

**RESULT & FINDINGS:** There are eight versions of the questionnaire, adapted to different ages. The selection of food items and dishes included in the questionnaires are based on interviews and surveys in population-based samples. The questionnaires are currently being validated, including doubly labeled water, biomarkers and 7-day weighted dietary records.

**CONCLUSIONS:** To our knowledge, this is the first time a set of dietary questionnaires have been developed to fit food habits at different ages, including 9-month old babies, pre-school children, schoolchildren, teenagers and adults.

### P96-04

#### DIETARY INTAKE ASSESSMENT: DIFFERENT METHOD COMPARISON

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Assessment of dietary intake offers considerable challenge. Over the course of a week, an individual can consume hundreds of foods, making it difficult for respondents to report their intake accurately. Food record provides a perfect snapshot of food consumed, but in practice there are considerable problems with this method. On the other hand, food frequency questionnaire major advantage is that attempts to assess the exposure of interest in many applications. A limitation is that close-ended form with a limited food list. The aim of this study was to establish the optimal cross-section dietary intake assessment method. 250 teenagers from Ljubljana underwent an anthropometric assessment, body composition evaluation by body composition analyzer, detailed dietetic survey with food frequency questionnaire and 5-day food record. Results were assessed by SPSS program. The principal component analysis with multiple questionnaires explained higher percentage of variance for different nutritional parameters than with the same methods separately. In conclusion the combination of methods with different questionnaires are potentially the most precise and, together with complementary introduction of biomarkers, the most trustworthy estimations of dietary intake at the population level.

#### P96-05

### PILOT TESTING A SELF-ADMINISTERED DIETARY ASSESSMENT WEBSITE WITH SCHOOL AGED CHILDREN

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**RATIONALE & OBJECTIVES:** The dietary assessment website, DietAdvice, has been successfully used in adult populations, but not with children. This study evaluated the usability of the website by children.

**MATERIALS & METHODS:** Usability examined by researcher observation of use, and post-use interviews. The children's behaviors were observed, times of completion were measured, and questions were asked on perceived ability to use computers, access to and frequency of computer use. Thematic analysis of transcribed data from observation / interview notes were completed. Chi-square analyses and independent samples t-tests compared responses and mean completion times respectively between age groups (primary school 9-12yrs; secondary school 13-16yrs), level of experience and frequency of computer use.

**RESULTS & FINDINGS:** Seventeen children (9-16yrs) were recruited. There were no significant differences between age groups and time taken to complete website sections and need for assistance (n=5 primary; n=6 secondary). 71% of children reported the website was easy to complete and understand, except for amount/frequency of food eaten (71%). Instructions were considered too long (53%). Frequent computers use was reported (5.29±2.31d). Suggested improvements included more pictures and spacing of instructions.

**CONCLUSIONS:** Children demonstrated ability to use the DietAdvice website; however modifications may further assist completion. Validity and reliability of the website as a dietary assessment tool in this population is required.

#### P96-06

### UNDER AND OVERREPORTING OF ENERGY IN A GROUP OF CANDIDATES FOR CABG SURGERY AND ITS ASSOCIATION WITH SOME ANTHROPOMETRIC AND SOCIODEMOGRAPHIC FACTORS, TEHRAN, IRAN

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**RATIONALE & OBJECTIVES:** Numerous studies have documented a high prevalence of misreporting energy intakes. This paper examines the prevalence of under and over reporting of energy intake in a group of candidates for CABG surgery and its association with BMI and some socio-demographic factors.

**MATERIALS & METHODS:** Dietary assessment (using a food frequency questionnaire) and demographic evaluation of 449 CABG surgery candidates was performed. Weight and height was also measured. McCrory equation was used to identify inaccurate records of energy intake. With this equation, reporting energy intake less than 78% and more than 122% of predicted energy expenditure was considered as under and over reporting respectively.

**RESULTS & FINDINGS:** Less than half of the participants reported energy intakes within the plausible limits. There were more over reporters than under reporters in this sample. The only significant association between misreporting and related factors was seen in BMI groups. As BMI increased the number of under reporters increased significantly. Expressed as a percentage of total energy, mean carbohydrate intake was significantly lower and mean fat and protein intake was significantly higher in under reporters compared to over reporters.

**CONCLUSION:** The high prevalence of misreporting suggests

more research to examine the characteristics of misreporters. Calibrating data, with these characteristics can help to improve intake estimates.

#### P96-08

### CRITICAL EVALUATION OF VALIDATION METHODS USED IN A RURAL AREA IN SOUTH AFRICA

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**RATIONALE:** The ratio and portion size photograph (rapp) dietary assessment tool was developed to obtain dietary information from rural populations. Different validation methods were used to determine the most effective method for future use.

**METHODS:** Sixty men and women participated. Mean dietary intake of four 24-hour recalls was compared with the rapp tool. Urinary biomarkers were measured; energy expenditure was calculated (schofield equations) and measured with physical activity questionnaires (paq). These were compared with the rapp tool.

**RESULTS:** the rapp tool compared well with the recalls. Spearman correlations between the two dietary assessment methods were between 0.01 (fat) - 0.45 (magnesium). Correlations between the urinary biomarkers and the rapp tool were poor (-0.31 to 0.15). Correlations for calculated ee were -0.35 and -0.23, while measured ee ranged between -0.01 and 0.20.

**CONCLUSION:** recalls were the best validation method. Measured ee from paq and urinary biomarkers failed. Selection of validation method is crucial when validating a dietary assessment method.

#### P96-09

### A CRITICAL APPRAISAL OF STATISTICAL METHODS USED IN THE VALIDATION OF A DIETARY ASSESSMENT TOOL

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**RATIONALE:** The Ratio and Portion size Photographic (RAPP) tool was developed and validated to determine nutrient intake of rural adults in South Africa.

**METHODS:** Sixty male and female participated. The tool was validated against four non-consecutive 24-hour recalls, including a week-end day, over three months.

**RESULTS:** Percentage differences indicated good agreement for eleven nutrients. Spearman correlations were poor for fat, riboflavin, vitamin a, vitamin b12, vitamin c and vitamin e. Tertile classifications were poor for all nutrients except carbohydrates, folate, thiamine, vitamin d and magnesium. Kappa statistics were poor for protein, fat, vitamin a, vitamin b12, vitamin c, vitamin e and selenium. Bland-altman data indicated good agreement (< 90% agreement) for all nutrients but showed the presence of reporting bias energy, protein, carbohydrate, folate, magnesium, sodium, selenium, and zinc.

**CONCLUSION:** Statistical methods used for validation provide conflicting results. This stresses the importance of using a variety of statistical methods to evaluate different aspects of a dietary assessment tool. Results should be interpreted based on the disease, target population (education levels, food choices and demographics of the population) as well as the type of nutrients.

## P96-10

### SIMPLE MODIFICATIONS IN CONVENTIONAL 24-HR RECALL OFFERS OBJECTIVE ESTIMATE OF MATERNAL DIETARY INTAKE IN FREE LIVING POPULATION – PUNE MATERNAL NUTRITION STUDY

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**RATIONALE & OBJECTIVE:** Recall of foods consumed and their portion sizes constitute major sources of error in estimating individual intake

**METHODS:** A modification of prior day visit by local community worker (CW) to list the foods cooked at each meal and record their average weights per serving was introduced in conventional 24-hr recall and was validated (n= 41 rural pregnant women) with reference method of weighed records.

**RESULTS:** The modified method helped to have the recall of more than 95% of foods consumed. Data on average serving weights for different foods was able to reduce significantly the errors in estimating portion sizes. The estimates of intake obtained from modified 24-hour recall method were comparable with those obtained from reference method for energy (1863±440 vs. 1820±436 Kcal respectively), protein (48.6±12.9 vs 45.3±12.6 g respectively) and fat (35.3±16.6 vs 36.0±14.2 g respectively). The modified method also showed >80% sensitivity and specificity for identifying inadequate maternal intakes.

**CONCLUSION:** Simple modifications to conventional methods are of immense importance in obtaining objective estimates of intakes of individuals in free-living populations. The approach would be adaptable in similar settings in other developing countries where illiteracy in women prevents the use of food diaries or self-weighing methods.

## P97: Recent Innovations in Body Composition Assessment

### P97-01

#### ASSESSMENT OF PERCENTAGE FAT MASS BY FOURIER TRANSFORM INFRARED SPECTROSCOPY IN ADOLESCENT GIRLS: IS THE USE OF STANDARD ANTHROPOMETRIC CUTOFFS APPROPRIATE FOR SRI LANKA?

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**RATIONALE:** No data exist on percentage body fat among 15–19 year old Sri Lankan adolescents.

**OBJECTIVES:** To determine percentage fat mass (%FM) by Fourier Transform Infrared Spectroscopy (FTIR) and compare with Bioelectrical Impedance Analysis (BIA) and selected anthropometric measures among adolescent girls.

**METHODS:** Weight, height, waist-circumference (WC) and skin-fold-thickness (SFT) was measured; %FM was obtained by FTIR and BIA in 160 urban and rural out-of-school adolescent girls (15-19 years). SFT-measurements were applied to six existing SFT-equations.

**RESULTS:** Percentage FM was similar in urban (25.9±7.4) and rural (23.8±5.6) girls (p>0.05). Overweight by FTIR or BIA was defined as %FM > 30%. Application of this cutoff indicated that overweight was 20.5% by FTIR and 61.4% by BIA. %FM (FTIR) significantly correlated (r = 0.624, p < 0.01) with %FM (BIA); the latter indicating an overestimation. Overweight by BMI (WHO cutoffs) was 7%; this differed from both FTIR and BIA. Mean WC of overweight girls [%FM (FTIR) >30%] was 71.2±9.5 cm, lower than the standard cutoff (>80 cm). Compared to %FM (FTIR), three SFT-equations gave significantly lower %FM (p < 0.01).

**CONCLUSION:** Simple modifications to conventional methods are of immense importance in obtaining objective estimates of intakes of individuals in free-living populations. The approach would be adaptable in similar settings in other developing countries where illiteracy in women prevents the use of food diaries or self-weighing methods.

### P97-02

#### DETERMINATION OF BODY COMPOSITION IN SYRIAN HAMSTERS BY NON-INVASIVE METHODS

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Body composition reveals the nutritional status and general well being of an individual. In the past, body composition of experimental animals was determined by carcass chemical method, necessitating the sacrifice of animals. But, in recent times alternative non-invasive measures like total body electrical conductivity (tobec) and dual energy x-ray absorptiometry (dexa) have emerged, which allow repeated individual measurements without sacrifice of animals. Syrian hamsters (*Mesocricetus auratus*), which are normally used in nutritional and toxicological experiments, are evaluated for body composition in the present study using tobec and dexa and were compared with carcass chemical method. Syrian hamsters aged 100 days were used for the study, and the body composition evaluation included parameters like lean body mass, fat, fat%, fat-free mass and the total body water. Between the methods, the values obtained by dexa positively correlated with chemical method, as compared to tobec, which showed negative values. Dexa is thus recommended as the method of choice, while analyzing body composition of experimental animals, especially species like hamsters.

### P97-03

#### DIETARY HABITS AND PERCEIVED HEALTH IN COLLEGE STUDENTS

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**OBJECTIVES:** This study investigated the dietary habits, physical activity, and perceived health in college students.

**METHODS:** A cross-sectional descriptive study was conducted with a convenience sample of 177 college students. The students were divided into three groups (underweight, normal weight, and overweight) using a BMI.

**RESULTS:** Of the 177 students, the rate of underweight and overweight were 12.4% and 10.1%, respectively. Students in underweight and overweight groups were eating instant foods more often than students in normal weight group.

The students in overweight group were eating more fast foods than in underweight group who were more likely to eat sweet foods. The students in overweight group perceived their body strength is weak and feel easily tired. In contrast, students in underweight group reported they had dizziness and they had a strong desire to lose weight.

**CONCLUSIONS:** The findings suggest that students must be better informed about the importance of balance diet and good health. Furthermore, efforts are needed to provide an environment for healthy food choices and physical activity.

#### P97-04

##### **BAYESIAN MODEL FOR BODY COMPOSITION ESTIMATES**

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Respective contribution of free fat mass (FFM) and fat mass (FM) to body weight appears as a key indicator for major public health issues but a general agreement for reliable assessments on large population is still needed. The objective was to investigate the potential interest of Bayesian networks to assess FFM and FM in a general adult population.

A network of interconnected variates (gender, age, height, weight, FFM, FM) was defined. Variates were defined by their marginal/ conditional distributions from experimental datasets. Distribution of (weight, height) was generated with a joint random selection from a French database of 24 673 subjects. Distribution of (FFM, FM) was then generated from a dataset of 8573 subjects (NHANES DXA data, 1999-2004). For model validation, entry variables were adjusted to experimental data and model outputs were compared with 1) DXA body composition on 1473 subjects, 2) a selection of published body composition estimates.

Model responses were statistically correlated to FFM and FM estimated by DXA (n=1416, r=0.93, p<0.001). Whatever BMI groups, accuracy of model response was below 2% and FFM distribution by age range showed excellent agreement with published results.

Bayesian approach provides a new reliable tool for body composition studies. Model predictive interest could echo many public health issues.

#### P97-05

##### **THE EUROPEAN NUTRITION AND HEALTH REPORT 2009 (ENHR II) - ENHR II NUTRITION AND HEALTH DATA QUESTIONNAIRE**

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**RATIONALE & OBJECTIVES:** The European Nutrition and Health Report 2009, funded by the European Commission, will provide a comprehensive documentation on the nutrition and health situation in Europe. Objective of the present study was to evaluate the availability of nutrition and health data in 25 European countries.

**MATERIALS & METHODS:** A nutrition and health data questionnaire was developed and circulated to the 25 project partners.

**RESULTS & FINDINGS:** Most partners have data on food consumption at individual level for different population groups. Half of the partners have data on some biochemical markers of nutritional status. For different age groups, 20 partners have data on health- and lifestyle indicators such as breastfeeding, anthropometry, physical activity, and smoking. Little data are available on health-related fitness. About 80% of the partners have data on morbidity, mortality, and prevalence of non-communicable diseases.

**CONCLUSION:** The information on available nutrition and health data will be used as a basis to decide upon the nutrition and health indicators to be collected and included in the final report.

#### P97-06

##### **EVALUATION OF SOME CARDIOVASCULAR RISK FACTORS AND DETERMINATION OF BETTER CENTRALLY OBESITY INDEX IN DIFFERENT AGES IN IRANIAN WOMEN**

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**BACKGROUND & OBJECTIVE:** It is unknown which of the waist circumference or waist- to-hip ratio is a better predictor of cardiovascular risk factors in different ages. The purpose of the current study was to test this and also the prevalence of some cardiovascular risk factors in different ages in overweight and obese adult women.

**METHODS:** In this clinical cross-sectional study, 714 overweight and obese women aged 20-70 y that were referred to two nutrition clinics in Sistan & Baluchestan province, Islamic Republic of Iran were studied. The subjects were classified to three groups (20-35, 35-50 and >or=50 years old). Anthropometric indices were measured according to the standard protocol. TC, TG, HDL-C and TC/HDL ratio levels were enzymatically determined.

**RESULTS:** The older subjects (>or=50 years old) showed significantly higher values of BMI, WC, TC, TG and LDL-C than middle (35-50 years old) and younger (20-35 years old) ones. The prevalence of obesity, high WC, WHR, TC, TG, LDL and high TC/HDL ratio levels were more in the older subjects. After adjustment for age and BMI, multiple linear regressions showed that WC was significantly related to total cholesterol and triglyceride in the 20-35 year old group and to triglyceride in the 35-50 year old one. In the older participants, WHR was significantly related to TG.

**CONCLUSIONS:** According to obtained results, the prevalence of cardiovascular risk factors increased with age. We concluded that in clinical practice WC is a better index for predicting some cardiovascular risk factors in younger and middle ages; however, for the older ones WHR is better.

#### P97-07

##### **RELATIONSHIP AMONG REGION OF DISTRIBUTING FATNESS AND DEGREE OF ECONOMY**

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**OBJECTIVE:** Study the relationship among the distributing fatness and the degree of the economy.

**METHODS:** Using the data published by <http://www.stats.gov.cn>, <http://www.moh.gov.cn> and The Study of Chinese Students Health in 2000 to find out the relationship.

**RESULTS:** The level of consumption is not related to BMI -body mass index- less than 0.5.

**CONCLUSION:** The fatness of youths and the development of economy are not relative.

#### P97-08

##### **IN ELITE ATHLETES COMPARISON OF DIFFERENT METHODS TO MEASURE BODY COMPOSITION**

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**RATIONALE & OBJECTIVES:** The aim of the study was to estimate the differences in the assess of body fat percentage (%FM) by four different methods (Dual-X-Ray Absorptiometry (DXA), skinfold thickness measurement technique, Bioelectrical impedance (BIA) and ultrasound) in Olympian athletes.

**MATERIALS & METHODS:** 30 Olympian athletes participated to different competition (aged 20-30 years) were measured by DXA, BIA, Skinfold (SK) and ultrasound. %FM

was assessed using DXA, four skinfolds (triceps, biceps, subscapular, suprailiac). To estimate body fat percentage (%FM) from anthropometric measurements, the equations of Jackson e Pollock, Durmin e Womersley, Lohaman e McArdle & Katch were used. Furthermore BIA and ultrasound were measured.

**RESULTS & FINDINGS:** Weight  $72.0 \text{ kg} \pm 16$ ; height  $171 \pm 8.9$ ; %FM  $11.7 \pm 5.9$  by DXA; form 10.9 to 30.9 by SK at different prediction formulas;  $14.1 \pm 5.7$  by BIA and  $12.6 \pm 5.4$  by ultrasound. The mean (SD) and the CV% of the differences among each pair of all four of the methods used showed a large variability in the %FM values obtained from the different techniques.

**CONCLUSIONS:** In this sample of Olympian athletes the estimated values for %FM appear to be highly dependent on method and caution should be shown when different techniques are used to calculate %FM in elite athletes.

#### **P97-09**

##### **ANALYSIS OF CORRELATIONS BETWEEN ANTHROPOMETRICS AND BLOOD LIPID AND LIVER RELATED PARAMETERS AND THE RATE OF RELATED DISEASE OF THE WHOLE MIDDLE SCHOOL STUDENTS IN ULSAN CITY, KOREA**

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This study investigates correlations between blood lipid parameter and antropometrics of the whole middle school students in Ulsan city, Korea.

The number of the students were 9,970 (male 5306, female 4664) and anthropometric, blood lipid parameters and the rate of related disease were researched. Mean value, T-Tests, and correlations were used to analyze results.

Averaged results of middle school student's anthropometry and blood parameters, including height and weight of males and females (male height : 163.8 cm, female height : 158.4 cm : male weight : 57.5 kg, female weight : 52.6 kg), body mass index (male : 21.3kg/m<sup>2</sup>, female : 21.1kg/m<sup>2</sup>), waist circumference (male : 69.0 cm, female : 63.7 cm), total triglyceride(male : 99.4 mg/dl, female : 110 mg/dl), total cholesterol(male : 144.8 mg/dl, female : 158.0 mg/dl), HDL (male : 59.0, female : 63.7 mg/dl), LDL (male : 65.6 mg/dl, female : 71.8 mg/dl), GOT (male 28.8 IU, female : 23.8 IU), and GPT (male : 29.2 IU, female : 24.4 IU). The rates of blood lipid parameter related disease were followed : Adolescent hyper-triglyceride rate(at and over 150mg/dL) was 15.1 % (male : 13.2 %, female : 17.2 %), hypercholesterolemia rate(at and over 200 mg/dL) was 3.9% (male : 2.3%, female : 5.6 %), high LDL rate(at and over 130 mg/dL) was 0.8 %(male : 0.7%, female : 1.1%), high GOT rate(over 50 IU) was 1.2 % (male : 1.8%, female : 0.4%), and high GPT rate(over 45 IU) was 2.2% (male : 3.5%, female : 0.7%). Correlations between blood lipid parameters, antropometrics, BMI and waist circumference were found. In result, the rates of hyper-triglyceride were over 15 % and blood lipid related disease rate of female students were higher than male and adversely, liver related disease rates of male were higher than female. Antropometrics, blood lipid parameters and liver related blood parameters were coefficiently correlated. Early onset of adolescent's blood lipid related disease was found. So nutrition education of middle school students is needed.

#### **P97-10**

##### **PREDICTIVE EQUATIONS FOR ESTIMATION OF STATURE IN JAVANESE ELDERLY PEOPLE BASED ON KNEE HEIGHT, ARM SPAN, AND SITTING HEIGHT**

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Height measurement in elderly may impose some difficulties and the reliability is doubtful. Equations estimating height from other anthropometric measurement have been developed for Caucasians i.e. Chumlea and Eleanor. However, these models cannot be applied for Indonesian elderly people due to inaccuracy compared to standing/actual height. The objective of this study was to develop statistical model using knee height, arm span, and sitting height. Healthy Javanese elderly people (295 males, and 517 females), aged 55 to 85 years old in the six places (Surabaya, Magetan, Yogyakarta, Gunung Kidul, Semarang, and Wonogiri) participated in this cross sectional study. Standing height, weight, knee height, arm span, and sitting height were measured. Standing height is an ideal technique for estimating the stature of elderly people, but in certain cases it cannot be measured. It can be estimated from proxy indicators of stature i.e. knee height, arm span, and sitting height. Linear regression analysis was carried out to derive predictive equations for estimation of stature in elderly. Chumlea and Eleanor equations have the higher difference mean of prediction height than knee height and sitting height when compared to standing height. Arm span showed the strongest correlation with standing height on male ( $r = 0.815$ ), and female ( $r = 0.754$ ). There were a significant difference of stature in urban and rural areas and across economic level ( $p < 0.05$ ). Advancing age was associated with decreased mean of height, weight, arm span, and sitting height both on elderly male and female, but not on knee height ( $p < 0.01$ ). In conclusions, arm span is more representative to predict height on healthy Javanese elderly people than knee height and sitting height. The correlation coefficient of arm span to actual height was larger in elderly male than female. It should be borne in mind that equation derived from taller stature populations (e.g. Chumlea and Eleanor from Caucasians ethnic) may be less accurate when applied to shorter stature populations (e.g. Indonesian elderly).

#### **P97-11**

##### **VALIDITY OF SIMPLE MEASURES OF GENERALIZED AND CENTRAL OBESITY IN YOUNG NORTH INDIAN WOMEN: WHICH ONE TO USE?**

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**RATIONALE AND OBJECTIVE:** The study examined the validity of simple measures of generalized obesity i.e. body mass index (BMI, kg/m<sup>2</sup>), fat mass index (FMI, kg/m<sup>2</sup>) and body fat percent (BF%) and simple measures of central obesity i.e. waist circumference (WC, cm), waist-hip ratio (WHR) and waist-to-height ratio (WC/ht ratio) against BF% and BMI as criteria in young healthy north Indian women.

**MATERIALS AND METHODS:** BF%, fat mass (FM) and fat-free mass (FFM) were measured using leg-to-leg bioelectrical impedance. Height, hip and waist circumferences, triceps skinfold measurement was taken using standard methods.

**RESULTS AND FINDINGS:** FMI, BMI, WC and WC/ht ratio were highly correlated with BF% ( $r = 0.978$ ;  $r = 0.939$ ;  $r = 0.894$ ;  $r = 0.890$  respectively,  $p < 0.01$ ) whereas WHR had the least correlation ( $r = 0.497$ ,  $p < 0.01$ ). FMI showed a higher positive predictive value in diagnosing generalized obesity compared to BMI with BF% as criterion and higher than BF% with BMI as criterion. Considering only the indices of central obesity, WC was the most predictive in identifying women with high BF% ( $\geq 30\%$  and  $\geq 35\%$ ), whereas WC/ht ratio proved to be a better index in identifying women with BMI greater than 23 and 25 kg/m<sup>2</sup>.

**CONCLUSION:** FMI was found to be a better predictor of generalized obesity compared to BMI and BF%. Considering abdominal obesity as an independent risk factor for insulin resistance, both WC and WC/ht ratio will be able to predict central obesity better than WHR.

### P98: Nutrition Monitoring & Evaluation III

#### P98-01

##### **NUTRITIONAL STATUS ASSESSMENT IN ELDERLY SUBJECTS RECEIVING LONG-TERM CARE FACILITIES IN TAIWAN**

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**OBJECTIVES:** The aim of the study was the assessment of the nutritional status of the elderly living in the chosen long-term care setting in Tainan city, Taiwan.

**METHODS:** A total 97 elderly persons (51.5% female, 49.5% male), 65 years old and older were included in the study, their nutritional status was assessed by mini nutritional assessment (MNA) and anthropometric measurements (height, weight, body mass index (BMI), mid-arm circumference (MAC), triceps skinfold (TSF), mid-arm muscle circumference (MAMC), calf circumference (CC), waist-hip ratio (WHR)).

**RESULTS:** The total elderly population was mean at age of 79.1 ± 6.8 (66-94), height 153.3 ± 8.1cm, weight 55.1 ± 10.1 kg, BMI 23.4 ± 3.5, MAC 27.8 ± 3.5cm, TSF 14.1 ± 5.5mm, MAMC 23.8 ± 5.2cm, CC 32.0 ± 3.5cm and WHR 0.9±0.1. Among the 97 subjects, 36.2% were overweight (BMI 24-26.9) and 12.8% were obese (BMI ≥ 27). According to the mini-nutritional assessment classification, 50.7%, 43.5%, 5.8% of the participants were assessed as well-nourished, at-risk of malnutrition, and malnourished, respectively.

**CONCLUSION:** The results of the present study showed about half of the long-term care facilities elderly were malnourished or were at risk of malnutrition, and forty-nine percent of the subjects had BMI values between 24 and 31.

#### P98-02

##### **VALIDITY OF DIETARY PATTERNS TO ASSESS NUTRIENT INTAKE ADEQUACY**

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**RATIONALE & OBJETIVES:** To conduct a systematic review on the value of the methods used to assess dietary patterns for measuring nutrient intake adequacy in the population.

**MATERIALS & METHODS:** Systematic review on Pubmed database up to April 2008, including specific key words and MeSH terms. Only studies comparing dietary patterns with nutrient intake adequacy or nutrient biomarkers were included.

**RESULTS:** The search resulted in 1504 articles. Applying the inclusion and exclusion criteria 30 articles were selected. Nineteen evaluated the usefulness of the dietary patterns, defined either a priori (13 studies), or by factor analysis (4) or by cluster analysis (2 studies), but only nine of them tested their validity. Diet indexes showed moderate to good validity results for measuring the adequacy of intakes for  $\alpha$ -carotene,  $\beta$ -carotene, vitamin C, vitamin B6, calcium, Folate, Iron, and Magnesium. The factor analysis approach showed moderate to good validity correlations with the adequacy of intake of  $\alpha$ -carotene,  $\beta$ -carotene, Lutein, lycopene, vitamin C, vitamin B6

and Folate. Vitamin B12 and vitamin E are the micronutrients with less probability of being adequately assessed with dietary patterns.

**CONCLUSION:** Diet indexes are tools with fair to moderate validity to assess micronutrient intake adequacy.

#### P98-03

##### **MONITORING OF NUTRITION AND HEALTH IN LITHUANIA**

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**RATIONALE & OBJECTIVES:** In Lithuania, numerous studies have collected dietary information. The aim of the study was to evaluate and systemize the nutrition and health indicators for European Nutrition and Health Report II (ENHR II).

**MATERIALS & METHODS:** Nutrition assessment data published in journals, reports, internet pages over the last five years were collected. Personal communications with persons leading the ongoing projects was employed for searching unpublished data. Some indicators were recalculated following the recommendations of the ENHR II project.

**RESULTS:** The majority of dietary surveys were carried out in adult population. Nutrient content of diet, data on height and weight as well as the trends of those indicators over the last decade are available at national level. High intake of fat (43.2 energy%), especially saturated (13.2 energy%), low consumption of vegetables and fruits (314 g/d), high prevalence of overweight (52.5%) are the main problems of Lithuanian diet. The lack of dietary data in children and adolescents was assessed.

**CONCLUSION:** The collected information on nutrition and health will be used in ENHR II and serve national disease prevention and health promotion.

#### P98-04

##### **ASSOCIATIONS OF SKIN CAROTENOID LEVELS ESTIMATED BY RAMAN SPECTROSCOPY AND INDIVIDUAL SERUM CAROTENOID CONCENTRATIONS**

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**RATIONALE AND OBJECTIVE:** Carotenoids are powerful antioxidants that play important roles as scavengers of singlet oxygen and peroxy radicals. Due to the difficulty of direct measurement, Raman spectroscopy (RS), the novel non-invasive technique for skin carotenoids detection has been introduced. A recent study showed a highly significant correlation between serum total carotenoids and RS; however, the correlations of RS with individual carotenoids are not well established. This study aims to determine these correlations.

**MATERIALS AND METHODS:** The cross-sectional study to measure 6 serum carotenoids by HPLC method and skin RS was performed in 80 volunteers. The correlations between RS and individual serum carotenoid concentrations were analyzed by Spearman's rho test.

**RESULTS:** RS was significantly correlated with lutein ( $r=0.25$ ,  $p=0.03$ ), zeaxanthin ( $r=0.30$ ,  $p<0.01$ ) and  $\beta$ -cryptoxanthin ( $r=0.31$ ,  $p<0.01$ ); however, it had no correlation with lycopene ( $r=0.1$ ,  $p=0.50$ ),  $\alpha$ -carotene ( $r=0.06$ ,  $p=0.60$ ) and  $\beta$ -carotene ( $r=0.21$ ,  $p=0.86$ ).

**CONCLUSIONS:** Among individual serum carotenoids, lutein, zeaxanthin and  $\beta$ -cryptoxanthin were moderately correlated with skin carotenoid levels estimated by Raman spectroscopy.

### P98-05

#### NUTRITIONAL INTAKE AND STATUS OF PREGNANT AUSTRIAN

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Optimal nutrition during pregnancy is very important for mother's health and the development of the child. Nutritional deficits during this period of time may abet the risk for chronic disease in adulthood.

Altogether 1580 pregnant women took part in a representative survey on nutritional and health behavior, 598 filled in a 24h-recall and within a subsample (n= 133) of child-bearing women blood samples were analyzed.

Data show evidence that the intake of folic acid, vitamin B1, B6, and D, as well as the minerals iron, calcium, and iodine is suboptimal. Laboratory investigations confirmed a poor supply with vitamin B6, and folic acid as iron. Furthermore status of beta-carotene, vitamin B2, B12 and zinc should be improved. Despite substitution with micronutrients (82% of the women took vitamins and minerals) in 40% of the estimated women low folic acid levels, very low iron concentrations as well as very low zinc values (in 90% of the pregnant) were observed. Expecting women should be better informed about the special needs during pregnancy to improve their health and nutritional status.

### P98-06

#### DIETETIC MANAGEMENT OF HIV ASSOCIATED DYSLIPIDAEMIA IN CHILDREN

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**RATIONALE & OBJECTIVES:** Highly active antiretroviral therapy (HAART) has improved survival in pediatric HIV but is associated with metabolic side effects (Tassiopulos, 2008). Lipid profiles in some infected children are similar to those with familial hyperlipidemia who usually develop premature atherosclerotic disease in adulthood (McComsey, 2004). The aim of this study was to identify published reports of interventions for management of pediatric HIV associated dyslipidemia.

**MATERIALS & METHODS:** A comprehensive literature search of MEDLINE and Embase was carried out for all articles, reports and guidelines published between January 2000 and June 2006. Search terms included descriptors of HIV, HIV therapy and dyslipidemia paired with child descriptors.

**RESULTS & FINDINGS:** No reports or guidelines specific to HIV related pediatric dyslipidemia were found. The American Heart Association recommended treatment for familial hyperlipidemia based on age and sex specific cut points from the National Cholesterol Education Programme (NCEP) (Table 1). Dietary and lifestyle intervention was recommended in children with persistently elevated LDL-C. Pharmacologic intervention could be considered in children  $\geq 10$  years either with severely elevated LDL-C  $> 190$  mg/dl (4.9mmol/l) or  $> 160$ mg/dl (4.15 mmol/l) with additional risk factors. A dyslipidemia treatment algorithm was developed in line with AHA guidelines.

Table 1. Cut Points for Total and LDL Cholesterol Concentration in Children and Adolescents.

Category	Percentile	Total Cholesterol mg/dl (mmol/l)	LDL Cholesterol mg/dl (mmol/l)
Acceptable	<75th	<170 (4.4)	<110 (2.85)
Borderline	75th-95th	170-199 (4.4-5.2)	110-129 (2.85-3.4)
Elevated	>95th	>200 (5.2)	>130 (3.4)

**CONCLUSIONS:** There are no evidence-based guidelines for management of pediatric HIV associated dyslipidemia. Further research is warranted before management guidelines can be produced.

### P98-07

#### PREVALENCE OF DYSLIPIDAEMIA IN HIV INFECTED CHILDREN, INFLUENCE OF ANTIRETROVIRAL DRUGS AND IMPLICATIONS FOR TREATMENT

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**RATIONALE & OBJECTIVE:** Highly active antiretroviral therapy (HAART) for treatment of pediatric HIV infection has improved survival. However, HAART is associated with metabolic complications and increased risk of cardiovascular disease (Tassiopoulos, 2008). This is important for children who may have long term exposure to HAART.

**MATERIALS & METHODS:** Routine lipid measurements were collected from children attending St Mary's and Great Ormond Street Hospitals between 1995 and 2007. Relationships with the most commonly prescribed NNRTI (Nevirapine [NVP] and Efavirenz [EFV]), and PI Nelfinavir [NFV] and Lopinavir [LPV]) were analyzed using mixed effects models with adjustments made for gender, ethnicity and age, calendar year, BMI and CD4%. Ethical approval was obtained.

**RESULTS & FINDINGS:** 449 children with a median of 4 years' follow-up were included. All lipid measurements are reported in mmol/L. 132 (29%) children had persistently raised LDL-C concentration. Initial exposure to NVP and EFV was associated with increased TC of 0.28 (95% CI:0.18, 0.37;  $p<0.0001$ ) and 0.27 TC (0.18,0.35; $p<0.001$ ) respectively. Levels declined but remained elevated over time. Exposure to NFV was associated with 0.41 (0.28, 0.54;  $p<0.0001$ ) initial increase in TC and a further increase of 0.13 (-0.01, 0.27;  $p=0.08$ ) after  $>1$  year's exposure. Initial LPV exposure was associated with 0.51 higher TC (0.43, 0.58;  $p<0.0001$ ), which declined by 0.13 (-0.23, -0.03;  $p=0.0009$ ) in year 1-2, before stabilizing. Initial NVP receipt was associated with 0.17 (0.13, 0.21;  $p<0.0001$ ) increase in HDL-C up to 3 years later. HDL-C levels were 0.13 (0.09,0.18;  $p<0.0001$ ) higher in children ever compared with those never treated with EFV. No significant increases in HDL-C were associated with PI.

**CONCLUSIONS:** Prevalence of dyslipidemia was similar to other populations (Farley, 2005). Longitudinal monitoring of lipids in HIV infected children receiving HAART identifies those in need of treatment for dyslipidemia. Dietary and lifestyle interventions are urgently required and should be scientifically evaluated.

### P98-08

#### TRENDS IN THE PREVALENCE OF ABDOMINAL ADIPOSITY IN CHINESE ADULTS, FROM 1993 TO 2006

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Abdominal adiposity is an important public health problem and is a component of cardiovascular risks. The objective of this paper is to describe the prevalence and the trends of abdominal adiposity in Chinese adults aged 20-65. It is based on the data collected in the China Health and Nutrition Survey in 1993, 1997, 2000, 2004 and 2006. Using LMS method to construct the 15th, 50th, and 85th percentile waist circumference percentile curves. Abdominal adiposity was defined as waist circumference  $\geq 102$ cm in men and  $\geq 88$  cm in women. There was a gradient of increasing waist circumference in both men and women. The mean waist circumferences increased from 77.1cm to 82.9cm in men and from 75.8cm to 78.9cm in women. A gradient of increasing prevalence of abdominal obesity was also observed in both men and women. Prevalence of abdominal adiposity was higher in women compared with

men, and the increasing in women was higher than in men. The prevalence of abdominal adiposity increased 2.3% in men and 5.8% in women. The difference of abdominal obesity prevalence between men and women increased from 8.4% to 11.9%. The increase in the prevalence of abdominal adiposity in Chinese adults has ominous public health implications. Primary prevention of abdominal adiposity should be a major public health priority in China.

#### P98-09

##### CHINESE “MUST” A NEW MULTIDISCIPLINARY APPROACH TO IMPROVE NUTRITION OF INFIRMARY PATIENTS

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**OBJECTIVES:** The “Malnutrition Universal Screening Tool” for Chinese Adult (C-MUST) has recently been validated in Hongkong. The study objective is to investigate the prevalence of malnutrition risk in infirmatory patients by C-MUST.

**METHODS:** It is a “5 Steps” malnutrition screening tool based on the BMI, % weight loss in the past 3-6 months and acute diseases effect. Patients are categorized into 3 groups according to the final scores (0-6): 0 = low, 1 = medium and > 2 = high risk of malnutrition. A multidisciplinary team assessment and intervention provide by doctors, nurses, speech therapist and dietitian will be initiated when the score is >1.

**RESULTS:** A total of 183 residents are screened. 61 (33%) are found to have malnutrition risk with C-MUST score >1. Among them, 27(44%) have C-MUST score > 2. The mean BMI of residents who have malnutrition risk compared with those who have no risk is 18.5 vs. 22.5 (P <0.001). Also, patients with malnutrition risk have more swallowing difficulties compared with their normal counterparts (32.8% vs. 14.2%, P=0.012). Residents with malnutrition risk also have high prevalence of hyperthyroidism (P=0.043), adrenal insufficiency (P=0.040), peripheral vascular disease (P= 0.044) and motor neuron disease (P=0.001).

**CONCLUSION:** A multidisciplinary approach using C-MUST to screen for risk of malnutrition in long-term care residents is a pioneer in Hong Kong hospitals. The implementation of an evidence-based screening tool with comprehensive interventions may help to improve the nutritional status of infirmatory patients.

#### P98-10

##### IMPACT OF PRICE HIKE ON NUTRITIONAL STATUS OF CHILDREN AND MOTHERS IN RURAL AND URBAN SLUMS OF BANGLADESH

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**RATIONALE AND OBJECTIVE:** To investigate the impact of recent food price hike in Bangladesh on nutritional status of children and mothers in 4 selected areas.

**MATERIALS & METHODS:** WHO 30 cluster sampling method was employed to survey a total of 3600 households from three rural areas (Two Cylone affected and 1 food insecure sub-districts) and urban slums from August to September 2008.

**RESULTS & FINDINGS:** Moderate to severe wasting was significantly higher while stunting and underweight were lower among children in study areas compared to past national surveys. In food insecure Chilmari sub-district, both wasting and underweight among children were significantly higher compared to other study areas and national surveys. Chilmari had a significantly higher proportion of chronic energy deficiency (BMI<18.5) among mothers. About 80% of the households in rural areas reported shortage of foods. To

cope with food shortage, large number of households’ members skipped meal, taken less or alternate food. Overall protein, fruits and vegetable consumption was low in all areas.

**CONCLUSION:** Malnutrition was more prevalent in food insecure area although most rural households were vulnerable to food quantity and quality. Wider social safety net programs are in need to improve nutritional status in chronically food insecure areas.

#### P98-11

##### MALNUTRITION LEVELS AMONG PRESCHOOL CHILDREN IN RURAL HOUSEHOLDS WITHIN BANANA GROWING AND CONSUMING REGIONS OF GITEGA-BURUNDI AND BUTEMBO-DR CONGO

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Whereas other developing countries have experienced a downward trend in levels of childhood and maternal malnutrition, Sub Saharan countries and particularly those of Central Africa have remained stagnant and in some countries have actually increased. This paper presents results of a cross-sectional survey carried out in Gitega health zone-Burundi and Butembo health zone-Democratic Republic of Congo (DRC) with the objective of establishing the nutrition status of preschool children from rural-banana dependent households. Three sites were purposively selected from each of the health zones, villages were randomly selected from each of the sites and after household listing, systematic random sampling used to come up with 263 households ( 126- Butembo-DRC, 137 Gitega-Burundi). Anthropometric measurements, height, weight and age were taken and EPI 2002 3.5.1 used to compute the nutrition indices and classify the results in accordance with WHO/NCHS cut off points. Stunting was the most prevalent form of malnutrition (71.4%), followed by underweight (38.8%) and lastly wasting (11.8%). The prevalence of stunting and wasting among the boys was 75.6% and 41.5% respectively. This was higher than that observed in the girls. The most malnourished group of preschool children were those aged 24-36 months, 53.2% and 41.7% of them were stunted and underweight respectively. But when it came to wasting the older preschool children were more affected. The levels of stunting were relatively higher in DR Congo (79.3%) compared to Burundi (63.7%), while underweight and wasting was more prevalent among preschool children in Burundi. These results confirm that malnutrition and especially stunting is still a major public health problem among rural households in both DR Congo and Burundi. It is therefore recommended that more research is done to establish the root cause of high levels of stunting and the cause of gender disparities in the malnutrition levels. It is also recommended that Government, NGOs, and other stakeholders establish an integrated participatory approach that will enhance access to basic needs by rural communities.

#### P98-12

##### AN ORIGINAL METHODOLOGY FOR CRITICAL ASSESSMENT OF LOCAL NUTRITIONAL AND DIETARY SITUATIONS

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Gausserès, Nicolas; Paineau, Damien

Danone, PALAISEAU, FRA

**RATIONALE & OBJECTIVES:** Nutritional status and dietary habits may vary widely according to countries, even within the same geographical area. Knowing local nutritional situation allows for developing food products with optimal nutrient profiles.

**MATERIALS & METHODS:** The NutriPack methodology was first developed by Danone Research in 2002 to analyze Recommended Daily Allowances, nutritional status and public health policy at the country scale. It relies on both critical

bibliographic analyses and meetings with local scientific experts. Since 2009, a special focus is also given to dietary behaviors.

**RESULTS & FINDINGS:** Twenty-five emerging and developed countries were analyzed in the last 7 years, leading to a detailed mapping of nutritional deficiencies and public health priorities in those countries. Analyses were carried out on the general population and/or on specific sub-populations such as babies, toddlers or elderly people. The NutriPack results were used to improve nutritional relevancy of food products through fortification, choice of optimal food matrix or development of new food forms. It also led to concrete actions to support local public health programs (education campaigns, scientific studies...). NutriPack analyses are regularly updated.

**CONCLUSIONS:** Preliminary assessment of local situations towards nutrition and dietary habits is useful to develop food products for optimal nutrition.

#### P98-13

##### A NEW DAIRY PRODUCT FOR KIDS BASED ON RESULTS FROM THE FIRST NATIONAL DIETARY SURVEY IN BRAZILIAN CHILDREN

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**RATIONALE & OBJECTIVES:** Local dietary surveys are required to assess nutritional status and to develop food products for optimal nutrition. No such studies were available in Brazilian children. It was thus decided to launch the first national dietary survey in Brazilian children.

**MATERIALS & METHODS:** 3111 preschool children aged 2 to 6 were recruited in 9 Brazilian metropolitan areas. Food intakes were assessed using 7-day diaries at home and food weighted records at school. Anthropometric parameters were measured and compared to WHO/CDC reference curves.

**RESULTS & FINDINGS:** Fifteen percent of children were overweight and 8% were obese. More than half of children aged 4 to 6 were under nutritional risk for vitamin D (62%) and calcium (57%). Intake of vitamin E was insufficient in 28% of children, whereas intake of sodium was above the upper limit in 74% of them. Only 3% had inadequate intake of vitamin A. Taking into account those findings, nutrient profile of a new dairy product was improved through fortification (calcium, vitamins E and D), discontinuation of vitamin A fortification and reduction in sodium content (12 mg/45 g).

**CONCLUSIONS:** Preliminary assessment of nutritional status using a science-based approach is useful to develop food products with higher nutritional relevancy.

#### P98-14

##### TIME TREND OF NUTRITIONAL STATUS OF UNDER-5 CHILDREN FROM 2004 TO 2007 IN BANGLADESH

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**RATIONALE & OBJECTIVES:** Impact of services of the National Nutrition Project (NNP) after the intervention period has not earlier been evaluated. The objectives was to examine the changes in the nutritional status of children aged less than 2 years in the 2004 NNP Baseline Survey after 3 years.

**MATERIALS & METHODS:** The Baseline Survey of the NNP in 2004. 9217 under-2 children of whom 2124 were randomly selected in the follow-up.

**RESULTS & FINDINGS:** The proportion of severe stunting did not increase in 2007 compared to 2004 (18.7% vs. 15.8%,  $p < 0.07$ ) in the intervention area and also severe underweight

children did not decrease in 2007 compared to 2004 (10.6 % vs. 11.8%,  $p < 0.23$ ). However, the proportion of severe wasted children decreased in 2007 compared to 2004 (1.6% vs. 3.4%,  $p < 0.001$ ) in intervention area.

**CONCLUSION:** Proportion of stunted and underweight of children didn't reduce in 2007 but their wasting was reduced.

#### P98-15

##### CHANGES OF NUTRITIONAL STATUS OF UNDER-2 CHILDREN BETWEEN 2004 WITH THEIR YOUNGER SIBLINGS IN 2007 BANGLADESH

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**RATIONALE & OBJECTIVES:** The impact of nutrition services in families has not been measured on siblings of recipient children in the National Nutrition Project (NNP) services in Bangladesh. Nutritional status of younger siblings in 2007 was compared with that of under-2 children surveyed in 2004.

**MATERIALS & METHODS:** The Baseline Survey of 2004 having under-2 children from 6 divisions. 9,217 children, 2,124 were randomly selected in 2007. Data were compared with index children and their younger siblings.

**RESULTS & FINDINGS:** 37% of the index children in 2004 was underweight in the intervention area compared to 40% in siblings ( $p < 0.01$ ) and 37% of the index children in 2004 was underweight in the control area compared to 34% of siblings ( $p < 0.02$ ). Stunting in index was 41% in the intervention area compared to 42% in the siblings ( $p > 0.05$ ). Wasting significantly increased in the siblings than their index in intervention area (18% vs 17%,  $p < 0.01$ ).

**CONCLUSION :** The siblings increased in underweight and wasting compared to their elders.

#### P98-16

##### SURVEILLANCE SYSTEM FOR "TRACKING PROGRESS TOWARDS THE SUSTAINABLE ELIMINATION OF IODINE DEFICIENCY DISORDERS IN THAILAND"

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**OBJECTIVES:** Surveillance, monitoring and evaluation project for progression of iodine deficiency disorders (IDD) control in Thailand has been started since 2000 to survey the prevalence, tendency, causes and severity of IDD including household coverage of iodized salt.

**METHODS:** By measuring urine iodine level in pregnant women and checking their household salt samples by I-kit, the study is cyclical monitoring to 15 provinces yearly ( without Bangkok ).

**RESULTS:** Median urine iodine levels during 2000-2004 and 2006-2007 are 153, 112, 107, 115, 102, 82.5, and 108.2  $\mu\text{g/l}$  respectively. Before year 2005 by WHO guideline, the proportion of pregnant women with iodine  $< 100 \mu\text{g/l}$  should not more than 50%, the proportions in the year 2000-2004 and 2006-2007 are 34.4%, 47.0%, 45.0%, 44.5%, 49.3%, 57.4% and 46.9% respectively. By WHO cut-off point 2005, the proportions of pregnant women with urine iodine  $< 150 \mu\text{g/l}$  are 71.8% and 61.2% in 2006 and 2007 respectively. The household coverage of qualified iodized salt ( $\geq 30 \text{ ppm}$ ) is 65.3%, 65.5%, 66.8%, 50.6%, 56.1%, 54.0% and 49.1% respectively.

**CONCLUSION:** Cyclical monitoring in pregnancy is needed to reflect an adequacy of iodine intake. Household coverage of qualified iodized salt is only one-third to half of samples. Quality control of iodized salt production with national regulations reinforcement, thoroughly distribution to consumers and social campaign for awareness raising in population should be done.

#### P98-17

### ASSESSMENT OF RELATIONSHIP BETWEEN SERUM LEPTIN AND ADIPONECTIN WITH METABOLIC SYNDROME IN 40-60 YEARS OLD POST

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**OBJECTIVE:** leptin and adiponectin are secretory hormones from adipose tissue, and closely correlate with cluster of metabolic syndrome (MetS) risk factor. The aim of this study is assessment of relationship between serum leptin and adiponectin with metabolic syndrome in 40-60 years old post menopausal women.

**MATERIALS AND METHODS:** The present cross-sectional study was done on 85 women 40-60 years old. MetS was identified with national cholesterol education program adult treatment panel III (NCEP ATP III) criteria. Serum leptin and adiponectin, blood pressure and other related factors were measured and data was analyzed by spss software.

**RESULTS:** Women with MetS had higher leptin levels and lower adiponectin levels ( $p < 0.0001$  for both variables) compared with women without MetS. Adiponectin was significantly correlated with waist size, triglycerides, high density lipoprotein (HDL) cholesterol ( $r = -0.33, -0.26, \text{ and } 0.451$  respectively,  $p < 0.0001$  for all variables). The relation between adiponectin and HDL cholesterol and triglycerides remained significant after adjustment for age and body mass index (BMI). Also leptin was strongly correlated with waist size ( $r = 0.63, p < 0.0001$ ); however, its relationship to the lipid profile was weak (for cholesterol  $r = 0.16, p < 0.05$  and for triglycerides  $r = 0.17, p < 0.05$ ) and disappeared after adjustment for BMI.

**CONCLUSION:** Our results show that leptin directly and adiponectin indirectly correlated with MetS in post menopausal women 40-60 years old.

#### P98-18

### NUTRITIONAL OUTCOMES OF BOLSA FAMILIA PROGRAM: A BASELINE STUDY IN UNDER FIVE YEAR OLD CHILDREN FROM VULNERABLE POPULATIONS IN BRAZIL

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**RATIONALE & OBJECTIVES:** Bolsa Familia (BF) is the largest conditional cash transfer program in the world, reaching 11.2 million families monthly. In Brazil Health and Nutrition Days (HND) are conducted employing the windows of opportunity offered by National Immunization Days in order to assess nutritional status of children from deprived areas. This article analyzed the effect of BF on anthropometric indicators based on data from HNDs.

**MATERIALS & METHODS:** The sample comprised 22,375 children under five from underprivileged populations: semi-arid region, agrarian reform settlements, the Amazon state and Quilombola communities (isolated rural communities of slave descendents). The variables under study: child birth weight, possession of birth certificate, family head education, family head gender, piped water, electricity, height/age, weight/age and weight/height were converted into binary variables for logistic regression analysis.

**RESULTS & FINDINGS:** There was low or moderate variability between the studied groups regarding most of the variables analyzed except for the education level of the family head. Concerning exposure to BF, coverage ranged from 39% to 50% among these population groups. Odds ratios indicated that children exposed to BF had 26% more chance to present appropriate height/age and weight/age when compared to non beneficiaries (height/age: Point estimate 1.260, CI 95% 1.156-1.377,  $p < 0.001$ ; weight/age: Point estimate 1.257, CI 95% 1.097-1.440,  $p = 0.001$ ). Besides BF, birth weight was the

only variable which increased the chance of anthropometric adequacy. There were no significant results regarding weight/height deficits.

**CONCLUSION:** Findings presented here suggest that the BF benefit interacts with the basic living conditions of beneficiary families, leading to improved nutritional status of children enrolled in the program, when compared to non-beneficiaries. Results also suggest the need to provide beneficiary families with greater access to the goods and services which interact with improved nutrition, to ensure a sustainable increase in health levels.

#### P98-19

### THE DEVELOPMENT OF HEALTH AND NUTRITION DAYS IN BRAZIL: RESULTS OF THE 2005-2007 SURVEYS

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It is essential to monitor child malnutrition in order to verify progress towards the first MDG: "end poverty and hunger". UN member nations agreed to halve, between 1990 and 2015, the proportion of people who suffer from hunger. The UN suggests, as an indicator, the "prevalence of underweight children under-five years of age". National household surveys are very costly, time consuming and only provide national or regional data. Information about poverty stricken areas or deprived populations is seldom obtained. In Brazil the windows of opportunity offered by National Immunization Days (NID) were used to overcome this difficulty. This study describes large-scale Health and Nutrition Days (HND) held simultaneously with Immunizations Days. HNDs were carried out among high-risk children under five yrs old during 2005-2007. Representative samples of children from the semi-arid region ( $n = 16,239$ ), agrarian reform settlements ( $n = 1,305$ ), isolated rural black communities, or Quilombolas ( $n = 2,723$ ) and the Amazon region ( $n = 15,249$ ) were studied. It was possible to get estimates for more than 4.3 million children from different subgroups of underprivileged populations, who had never before been studied in such detail. Data was collected about health and social welfare services; nutrition assessment was done with the WHO 2006 anthropometric standard. The highest prevalence of stunting (height for age below  $-2SD$ ) was found among children from Amazon region: 23.1%, followed closely by children from the rural settlements. Around 95% of children had a Child Health Card, but it was used for growth monitoring in only 65% of cases. More than five prenatal clinic visits varied from 60% to 80% of mothers. The education data confirmed very poor social conditions, as indicated by 30.3% to 81.4% heads of household with less than four years of schooling in the Amazon and rural settlements, respectively. The implementation of HNDs nested with NIDs proved feasible in Brazil and resulted in useful data for health policy-makers, obtained quickly and at a much lower cost than household based surveys. These windows of opportunity may be useful and are valid whenever NIDs are conducted on a regular basis and immunization coverage is very high.

### P98-20

#### DIETARY INTAKES AND ANTIOXIDANT STATUS IN PRE- AND POST-MENOPAUSAL MIND-BODY EXERCISING THAI WOMEN

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**RATIONALS AND OBJECTIVES:** Nutritional adequacy and moderate intensity physical activity are two aspects of a health-promoting lifestyle. The question of whether regular practice of mind-body exercises (yoga or tai chi) alters dietary intakes and antioxidant status, and balances the menopause-related increase in lipid peroxidation and cardiovascular risk, is addressed in this study.

**MATERIALS AND METHODS:** Ninety five pre- and post-menopausal (PreM; PostM) Thai women completed 4-d food and activity records. Each subject's blood was sampled on day 5. Factorial ANOVA tests were performed according to menopause status, exercise and hormone replacement therapy (HRT) groups.

**RESULTS AND FINDING:** 42%, 49% and 64% of women reached the 2/3 of Thai Dietary Reference Intakes for iron, calcium and vitamin C respectively. Yoga practitioners had low BMI, energy and fat intakes compared to other groups. Plasma total antioxidant status was significantly and independently lower and higher in yoga and PostM groups respectively. No difference was shown after adjusting for BMI. In PostM group, HRT users have higher erythrocyte glutathione peroxidase (GPx) activity. Regardless of menopausal status, plasma and erythrocyte GPx activities were higher in tai chi group compared with other groups. No effects were shown on plasma lipid peroxidation marker (TBARS) and total homocysteine concentrations.

**CONCLUSION:** Dietary behavior is altered by yoga practice while tai chi may improve endogenous antioxidant defenses in both pre- and post-menopausal women.

### P98-21

#### NUTRITIONAL STATUS AMONG RURAL PRIMARY SCHOOL CHILDREN IN HASHTROOD-TABRIZ-IRAN

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**OBJECTIVE:** The purpose of the present study was to assess the nutritional status of rural primary school children in Hashtroud-Tabriz.

**METHODS:** This cross sectional study was carried out by random systematic sampling, on 315 healthy primary school children in Hashtroud [age(A):7-12Yrs], and then height(H), weight(W), H/A, W/A and W/H were measured and calculated and finally, these results compared with (NCHS) standard.

**RESULTS:** The prevalence percentage of malnutrition according to W/A, H/A, W/H indicators were 6.6%, 8.4%, 6.1% respectively.

**CONCLUSION:** This finding showed that, malnutrition was a nutritional problem among rural primary school children in Hashtroud, and suggested that nutritional education must be under taken for prevention of this problem.

### P98-22

#### SOCIO-DEMOGRAPHIC DETERMINANTS OF STUNTING AMONG NIGERIAN SCHOOL CHILDREN

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**RATIONALE & OBJECTIVES:** Stunting is a form of chronic malnutrition and it affects the physical and mental output of its survivors. The aim of this study is to determine the prevalence

and the socio-demographic factors associated with stunting among urban Nigerian school children.

**MATERIALS & METHODS:** Children from seven schools in Abeokuta, a state capital in South west Nigeria were selected using the multi staged random sampling technique.

**RESULTS & FINDINGS:** Out of 570 children, 90 (17.4%) were stunted. Significant risk factors associated with stunting were attendance of public schools ( $p = 0.000$ ), polygamous family setting ( $p = 0.001$ ), low maternal education ( $p = 0.001$ ) and low social class ( $p = 0.000$ ). Following logistic regression analysis, polygamy (OR = 0.6; 95% CI = 0.38 to 0.95;  $p = 0.031$ ) and low maternal education (OR = 1.50; 95% CI = 1.00 to 2.22;  $p = 0.045$ ) were the major contributory factors to stunting.

**CONCLUSION:** Stunting remains a common phenomenon among school children in Nigeria. Improvement of women education may help reduce stunting and its consequences.

### P98-23

#### EATING AND PHYSICAL ACTIVITY BEHAVIOUR AMONG AFFLUENT ADOLESCENTS OF DELHI

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University of Delhi, Delhi, IND

**OBJECTIVE:** To study the eating and physical activity behavior among affluent adolescents of Delhi.

**METHODS:** Dietary and physical activity behavior of 155 affluent adolescents (11-14 years old) were assessed using questionnaire and 24 hour recall methods. Height and weight of the subjects were measured for BMI assessment. After suitably coding the data means, frequency charts, mean percent adequacy intakes of various food groups and nutrients as well as physical activity pattern were assessed.

**RESULTS:** Skipping of meals, snacking, increased popularity of fast foods and decreased physical activity were common behavior observed among adolescents. The percent adequacy intake ( $n=50$ ) of food groups was when compared to suggested intakes by ICMR 1989 was low for cereals(80%), pulses(69%), vegetables(52%) and fruits(71%), was adequate for milk and milk products(108%) and was high for sugar(168%) and visible fat/oils(163%). The percent adequacy intake of nutrient when compared to RDA ICMR 1989 was low for energy (87%), protein (78%), iron (73%), intake was adequate for calcium (110%), vitamin A (116%). According to BMI 7% adolescents were over weight, 48% under weight and 45% normal. On an average an adolescent spends 20-22 hours doing sedentary activity and only an hour is spent on moderate activity which further declines as age increases.

**CONCLUSION:** Inadequate eating behavior and inadequate physical activity among adolescent's calls for need to develop an intervention programmed for promoting healthy eating, active living and positive body image as part of their life.

### P98-24

#### CONTRIBUTION OF HIGHLY PROCESSED FOODS TO NUTRITIONAL PATTERNS IN EUROPEAN POPULATIONS: EPIDEMIOLOGICAL EVIDENCES AND NEW CHALLENGES

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**RATIONALE AND OBJECTIVES:** There is an increasing contribution of highly processed foods to diet but comparable data on their quantitative and qualitative contributions to dietary and nutrient patterns are still sparse.

**MATERIAL AND METHOD:** Single highly standardized 24-HDR obtained from 36,034 subjects from the EPIC international study. Foods were recoded as non-, moderately and highly industrially and commercially processed foods. Their respective contribution (%) to the centre dietary mean intakes and patterns of 26 standardized nutrients were calculated. The

use of biomarkers of (industrially) processed foods completes this analysis.

**RESULTS:** Only beta-carotene and vitamin C had a contribution from highly processed foods below 50% in Nordic and central countries (up to 100% for the others). In Mediterranean countries their contribution was lower and consisted largely of staple (processed) foods (e.g. milk, vegetable oils, pasta, bread) while more highly processed foods (e.g. crisp bread, breakfast cereals, margarine) contributed in Nordic and central European centers. High ecological correlation (0.72) between elaidic acid and margarines confirm this geographical gradient.

**CONCLUSION:** Highly industrially processed foods dominate diets in Nordic and central European countries, with greater variations in Mediterranean countries. A better understanding of these patterns is crucial for evaluating and interpreting diet-disease associations.

#### P98-25

##### ASSESSING THE NUTRITIONAL STATUS OF NURSING-HOME VETERANS WITH POPULATION-SPECIFIC MINI NUTRITIONAL ASSESSMENT (MNA) IN TAIWAN

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**RATIONALE & OBJECTIVES:** Elderly veterans of Taiwan have unique life experiences and nutritional problems. This study examined their nutritional status and the impacting factors.

**MATERIALS & METHODS:** One hundred sixty Veteran-Administration Hospital-managed nursing home residents were evaluated with two modified versions of the Mini Nutritional Assessment (MNA), CNAQ (Council on Nutrition Appetite Questionnaire), ADL (Activities of Daily Living) and biomarkers. The modified MNA version 1 (T1) adopted population-specific anthropometric cut-points while version 2 (T2) further replaced calf-circumference (CC) for BMI in the scale.

**RESULTS & FINDINGS:** T1 and T2 rated similar proportions (74.4 and 73.7%) of veterans undernutrition (malnourished + at risk of malnutrition), respectively, but T2 rated more malnourished and fewer at risk. Statistical analyses indicate that T2 had better predicting ability; ADL and CC were the major impacting factors; underweight and impaired ADL were common among older veterans; but relatively few had severe psychological stress.

**CONCLUSION:** The aging-associated nutritional problems are similar to that observed in non-veteran counterparts. Increasing food intake and encouraging routine physical exercise seem important.

#### P98-26

##### THE MINI NUTRITIONAL ASSESSMENT (MNA) CAN PREDICT LONG-TERM MORTALITY AND HEALTH STATUS OF ELDERLY TAIWANESE

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**RATIONALE & OBJECTIVES:** Nutritional assessment is important for identifying individuals for timely intervention to prevent serious nutritional problems. This study examined the long-term mortality and health status predicting ability of MNA.

**MATERIALS & METHODS:** We statistically analyzed 1999 and 2003 data sets of the "Survey of Health and Living Status of the Elderly in Taiwan", a population-representative longitudinal study in  $\geq 53$  y subjects (N=4266). Mortality and health indicators were analyzed according to nutritional status graded with MNA in 1999.

**RESULTS & FINDINGS:** Taiwanese-specific-MNA graded 1.2% malnourished, 10.7% at risk and 88.1% normal. The

proportion undernutrition (malnourished + at risk) increased from 5.6% for 53-64 y to 32.1% for  $>85$  y. Total mortality rates were 80.0, 43.4 & 13.8%, respectively, during a 56-month follow up ( $P<0.001$ ). MNA also effectively predicted falls, hospitalization, ADL (Activities of Daily Living) status and depression in 2003.

**CONCLUSION:** At a population level, MNA predicts long-term follow-up total mortality of Taiwanese elderly or near elderly. MNA also predicts long-term fall, hospitalization and ADL. MNA should have value in health promotion at the population level.

#### P98-27

##### THE EUROPEAN NUTRITION AND HEALTH REPORT (ENHR) 2009: THE BELGIAN EXPERIENCE

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**RATIONALE AND OBJECTIVES:** The main objectives of this study were: (i) to construct an evidence-base of Belgian data on food and nutrient intake and health and (ii) to identify current challenges and gaps of these collected data. Both objectives were framed within the context of the ENHR 2009.

**MATERIALS AND METHODS:** Secondary data collection was done by consulting reports, articles, professionals and institutes in the three Belgian regions.

**RESULTS AND FINDINGS:** Even though a wide array of studies was retrieved, only few of them were nationally representative. In the studies conducted on national level not all requested data were available for each age category; particularly data on children and adolescents were lacking. Moreover if these requested data were present, they were often collected differently.

**CONCLUSIONS:** This Belgian experience shows the need for more national representative studies for all age categories and for a uniform definition of indicators and methodologies on national level. Therefore a consensus on country level is needed prior to the one on European level, especially within the ENHR 2009 framework.

#### P98-28

##### ASSESSMENT OF BODY COMPOSITION IN CHILDREN BY BIOELECTRICAL IMPEDANCE AND SKINFOLD ANTHROPOMETRY

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This study is part of an intervention program related to overweight and obesity in children. Skinfold anthropometry (SKF) and Bioelectrical impedance (BIA) were used to know the initial body fat mass (BF).

**AIM:** to determine the level of agreement for BF measurement by BIA and SKF, using Bland and Altman method. Subjects and methods: BF was calculated using Deurenberg for SKF and 7 different algorithms (Deurenberg A y B, Schaeffer, Rush y Schoeller A, B y C) for BIA in 145 children of both sex aged between 6-9 years.

**RESULTS:** BF % (SKF) :  $23.3 \pm 4.6$  and average BF % (BIA):  $21.89 \pm 2.63$ . Concordance analysis revealed that the average difference between SKF-BIA was variable (-5.5% to 0.2 %), and the standard deviation too wide (6.3 to 17.3). The algorithm Deurenberg A had the minor average difference of  $0.21 \pm 7.88$ .

**CONCLUSION:** Measurements of BF determined by these

algorithms for BIA gave poor agreement with SKF, thus the results suggest the need to develop validated equations for BIA using reference methodology as deuterium dilution method. This study is going on at present. Supported by UBACyT B098 and ARCAL RLA/6/059

### **P99: Nutritional Assessment: Others III**

#### **P99-01**

##### **HOW DIETARY INTAKE METHODOLOGY IS ADAPTED FOR USE IN EUROPEAN IMMIGRANT POPULATION GROUPS – A REVIEW**

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**RATIONALE & OBJETIVES:** The European Commission's EURRECA Network of Excellence aims to establish Europe-wide consensus on evidence for micronutrient recommendations, emphasizing nutritionally at-risk populations. A systematic literature search was conducted to identify currently used methods and adaptations required for measuring dietary intake in European immigrant groups.

**MATERIALS & METHODS:** A structured MEDLINE search, related references and key expert consultations were realized, targeting adults from non-EC (EC-15 countries) ethnic groups having the largest populations in Europe.

**RESULTS:** 46 articles were selected. Although Eastern Europeans, Turks, Africans, Asians and Latin Americans were the most numerous, intake data was not available for all. Interview-administered food-frequency questionnaires (FFQ) and repeated 24-hour recalls were the most frequently applied instruments. Including ethnic foods and quantifying specific portion sizes of traditional foods and dishes in assessment tools as well as food composition databases were commonly identified problems. For FFQs, food list elaboration needed to reflect key ethnic foods and relative contribution to nutrient intake. Extra efforts were observed to overcome cultural barriers to study participation.

**CONCLUSION:** Evaluating dietary intake requires special attention to various methodological aspects (sampling, recruiting, instruments used, method of administration, food composition database, acculturation, etc) to adequately address sociocultural factors inherent in immigrant populations.

#### **P99-02**

##### **ASSOCIATION BETWEEN KNOWLEDGE, ATTITUDE AND HIGH FAT FOODS INTAKE IN NUTRITION AND NON NUTRITION STUDENTS, AHWAZ JONDI-SHAPOUR UNIVERSITY OF MEDICAL SCIENCES, IRAN**

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**OBJECTIVES:** The aim of this study was to consider high-fat foods intake in nutrition and non-nutrition students associated with knowledge and attitude levels.

**MATERIALS AND METHODS:** In this cross-sectional study, nutritional knowledge, attitude and high fat foods intake was evaluated. 33 nutrition and 38 non-nutrition students entered to study, randomly. High fat foods intake assessment included intake of dairy products, meats, oils, fried and fast foods.

**RESULTS:** Nutrition students consumed 12% high fat dairy products, 3% high fat meats, 42% fried foods and 6% fast foods; whereas non nutrition students consumed 24% high fat dairy products, 8% high fat meats, 47% fried foods and 4% fast foods. There was significant difference in dairy products intake between the groups (P: 0.007). In spite of non-nutrition

students and in nutrition students, knowledge levels and fried food intake was related significantly (P: 0.048). It was observed significant differences between attitude and dairy products intake in nutrition student whereas there was no in other group. **CONCLUSION:** Nutritional knowledge and attitude related significantly with some high fat foods intake (fried and dairy products) in nutrition and non-nutrition students.

#### **P99-03**

##### **ERYTHROCYTE PHOSPHOLIPID FATTY ACID PROFILE REVEALS SIGNIFICANTLY LOW n-3 LCPUFA CONTENTS IN VEGETARIANS AND VEGANS**

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**OBJECTIVES:** The quantity and quality of fat consumption vary tremendously between different dietary-groups, and due to the strong relationship with chronic diseases, it's important to assess fatty acid biomarkers which closely reflect the fat intake of an individual.

**METHOD:** To assess the essential fatty acid status in omnivores (23), vegetarians (25), vegans (37), and semi-omnivores (13) the fatty acid pattern in erythrocyte phospholipid-fractions were carried out with GC. Additionally, 24h recalls were collected to estimate the dietary intakes.

**RESULTS:** The fatty acid analysis in the erythrocyte phospholipid-fractions showed that the four dietary-groups did not differ significantly in the sum of saturated, monounsaturated, and polyunsaturated fatty acid status. Vegans and vegetarians had significantly lower contents of C 20:5n-3, C 22:5n-3, and C 22:6n-3 in phosphatidylcholine, and phosphatidylethanolamine, although they consumed high amounts (1.7 – 2.6 g/d) of the parent  $\alpha$ -linolenic acid. Moderate ( $r > 0.35$ ) significant correlations between the intake and content of linoleic acid, eicosapentaenoic and docosahexaenoic acid in different phospholipid-fractions were observed.

**CONCLUSION:** To improve n-3 LCPUFA status in vegetarians more emphasis should be put on their diet quality.

#### **P99-04**

##### **VALIDITY OF DIETARY DATA FROM STREET CHILDREN IN SABAH, MALAYSIA**

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**RATIONALE & OBJECTIVE:** Accurate information about the quality and quantity of diet of street children is important in developing interventions to overcome their health problems. The objective is to investigate the validity of dietary data gathered from street children.

**MATERIALS & METHODS:** Randomly selected street children in Tawau town (n=24, 17 males & 7 females, aged 8 to 16y) completed a single 24-hour recall. Portion sizes were estimated as standard 'as bought'. BMR was calculated using sex-specific equations (Poh et al., 1999) for Malaysian adolescents. Under-reporters of energy intake (EI) were identified as EI/BMR < 1.2.

**RESULTS & FINDINGS:** Height-for-age, six (25%) were normal, eleven (29.2%) were underweight and seven (45.8%) were stunted (WHO chart, 2007) with their EI not significantly different: 1200±406, 1437±234, and 1200±350 kcal/d respectively. EI was 11.7±0.03% of the recommended level. All subjects under-reported their EI (mean EI/BMR=0.29±0.7). These findings could not be explained by under-estimation of portion sizes. It could possibly explain presentation of stunting but could not be confirmed without cohort studies.

**CONCLUSION:** Cross sectional diet recall method is not suitable for use in street children.

**P99-05****RISK FACTORS FOR OSTEOPOROSIS AMONG WOMEN OF HEALTHCARE PROVIDERS AND WHO ATTENDING HEALTH CENTERS IN TABRIZ, IRAN**

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**RATIONALE & OBJECTIVES:** Osteoporosis is a worldwide health concern. The purpose of this cross-sectional study was to assess risk factors, and delineate the situation of healthy behaviors associated with osteoporosis among women of health care providers and who attending health centers in Tabriz, Iran.

**MATERIALS & METHODS:** Subjects included randomly 399 childbearing age women and 200 healthcare providers. By interviewing to each subject questionnaires about general characteristics, and food habits (food frequency questionnaire), and physical activity were completed. Weight and height of them were measured and BMI was calculated.

**RESULTS:** Results indicated that, mean of the frequency of milk, cheese, and fruits consumption's in healthcare providers were significantly higher ( $.82 \pm .82$ ,  $p < 0.0001$ ), ( $1.38 \pm 1.02$ ,  $p < 0.01$ ), and ( $2.01 \pm 1.28$ ,  $p < 0.0001$ ), respectively) than that of women attending health centers ( $.58 \pm .72$ ,  $.84 \pm .32$ , and  $1.5 \pm .99$  respectively). Frequency of dark vegetables and some foodstuffs consumption's which have deteriorated effects on calcium status such as soft drinks and pickles were significantly higher ( $p < 0.05$ ) in women attending health centers comparing to healthcare providers. Majority of subjects in both studied groups had physical activity at low or moderate levels. Mean of BMI were in overweight range in two groups, however obesity was more prevalent in women attending health centers.

**CONCLUSION:** As a conclusion, healthcare providers had better food habits in relationship to osteoporosis than that of women attending health centers. Two groups of women were not practicing appropriate lifestyle to decrease their risk of osteoporosis such as inadequate physical activity. Obesity was a healthy problem especially among women attending health centers. Establishment of educational workshops to healthcare providers and obligate them to proper consultation with women attending health centers is suggested as a suitable approach for preventive of osteoporosis in studied community.

**P99-06****MICRONUTRIENT INTAKES IN CHILDREN WITH CEREBRAL PALSY**Schoendorfer, Niikee C.<sup>1</sup>; Tinggi, Ujang<sup>2</sup>; Boyd, Roslyn<sup>1</sup>; Vitetta, Luis<sup>1</sup>; Davies, Peter S.<sup>1</sup><sup>1</sup>The University of Queensland, Herston, Queensland, AUS; <sup>2</sup>Queensland Health Forensic and Scientific Services, Macgregor, Queensland, AUS

**RATIONALE & OBJECTIVES:** Cerebral palsy (CP) is associated with undernutrition and subsequent growth deficits. Much research has focused on subjective energy intakes and balancing expenditure with no information to date on actual micronutrient intakes.

**MATERIALS & METHODS:** As part of a larger study we are collecting three-day food replica intakes of children with severe CP and control children. These composite samples are being analysed for actual mineral, trace element and protein content.

**RESULTS & FINDINGS:** Preliminary analyses showed insufficient intakes of copper (77% AI) and manganese (78% AI), along with calcium (61% RDI) and potassium (54% AI) in both groups irrespective if they were enterally fed. One of the enterally fed children was also consuming less than the recommended daily intake of magnesium (64%), phosphate (39%) and iodine (73%) according to their dietary prescription. Remaining composite data will be collected, analysed and discussed.

**CONCLUSION:** Children with CP are documented to have issues with osteopenia and spontaneous fractures. Our data shows that insufficient intakes of calcium exist in this group despite being on enteral formulas and under dietetic supervision.

More emphasis needs to be placed on diets of children to avoid chronic health conditions in the future.

**P99-07****NUTRITIONAL STATUS OF WOMEN OF REPRODUCTIVE AGE AND ITS RELATION TO FOOD INSECURITY AND INFECTIONS IN RURAL TANZANIA**Temu, Alice G.<sup>1</sup>; Kinabo, Joyce<sup>2</sup>; Mamiro, Peter<sup>2</sup>; Prokop, Sylvana<sup>3</sup>; Msuya, John<sup>2</sup>; Hoffmann, Ingrid<sup>3</sup>; Krawinkel, Michael<sup>3</sup><sup>1</sup>Justus-Liebig-University Giessen, Giessen, DEU; <sup>2</sup>Sokoine University of Agriculture, Morogoro, TZA; <sup>3</sup>University of Giessen, Giessen, DEU

Poor maternal nutrition is known to be one of the major causes of poor maternal health, especially in developing countries. Maternal mortality rate in Tanzania stagnated at a high level (580/100,000) for about a decade. The ratio of a woman's risk of dying from treatable or preventable complications of pregnancy and childbirth is 1 in 24. This study assessed the nutritional and health status of 384 women aged 15-44 years in Iringa Rural District, Tanzania to develop suitable guidelines to improve their health and livelihoods.

A randomized cross-sectional survey was conducted between February and April 2008. Information on social-demographic, nutrition and health indicators were collected. The nutritional status was assessed by BMI, retinol-binding protein and hemoglobin concentration; health status by clinical signs, symptoms and plasma levels of C-reactive protein and acid glycoprotein.

Of all women, 51% were vitamin A deficient: 75% severe. The prevalence of anemia was 27%: 76% severe. Co-existence of micronutrient deficiencies and associations of deficiencies with food insecurity and infections were observed.

The findings indicate that there is a high prevalence of malnutrition among women of reproductive age. This highlights urgent-need of improving maternal nutrition and health in Tanzania if we are to attain the millennium development goal.

**P99-08****INTERRELATIONSHIP AMONG FAST FOOD, DIETARY HABITS AND NUTRITIONAL STATUS OF ADOLESCENTS 13-18 YEARS LIVING IN JEDDAH**Ageeb, Maha B.<sup>1</sup>; Washi, Sidiga A.<sup>2</sup><sup>1</sup>Saudi German Hospital Group, Jeddah, SAU; <sup>2</sup>United Arab Emirates University, AL-Ain, ARE

**RATIONALE & OBJECTIVES:** Dietary changes are fast occurring in Saudi Arabia with western fast food replacing the fruit and vegetable component of the traditional Arabia diet. The prevalence of over-weight and obesity increased among children and adolescents in Jeddah. The main purpose of this study is to assess the interrelationship among the above using anthropometric, biochemical and clinical measurements and tests.

**MATERIALS & METHODS:** The study was a prospective, descriptive and cross-sectional one. Demographic, anthropometric, dietary, biochemical and clinical data was collected from adolescents at the Saudi German Hospitals Group – Jeddah and recorded in a questionnaire.

**RESULTS & FINDINGS:** Positive statistical relationships were found between high carbohydrate intake, intake of snacks and more meals per day and increase in BMI. 52.3% of the participants' families were of low income. Macronutrient intake was more from carbohydrates and fat whereas micronutrient intakes were lower than the (DRIs). The percentages of energy derived from carbohydrates, fats and proteins, were (53.6%, 35.5%, and 10.9% respectively). Intakes of calcium, potassium, iron, zinc, and fiber were inadequate.

**CONCLUSION:** Dietary knowledge; dietary intake; promoting

healthier eating patterns and sedentary lifestyle changes are needed.

**P99-09**  
**ANTHROPOMETRIC CHARACTERISTICS OF THE ELDERLY PEOPLE IN LAKE VICTORIA BASIN OF EAST AFRICA**

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Malnutrition among the elderly in the developing countries is a public health concern. The study was to assess the nutritional status of elderly living around Lake Victoria. A cross-sectional study was carried out in Kisumu, Jinja and Mwanza. Anthropometric measurements were obtained from 227 men and 310 women aged 55-95 years. Selected anthropometric measurements were taken by trained personnel. Among the kyphotic respondents, arm span was used to estimate height using sex-specific regression equations derived from the non-kyphotic respondents. Body mass index and corrected arm muscle area were computed using standard equations. The results indicated that women had larger triceps skin folds and mid upper arm circumference than men but men were taller and heavier than women. Arm muscle area, which is important in relation to the ability to remain active and independent was not significantly different in all age groups ( $p < 0.05$ ). The prevalence of under nutrition (BMI  $< 18.5$  Kg/m<sup>2</sup>) was 29.5% in men and 24.2% in women. Overweight/obese (BMI  $\geq 25$  Kg/m<sup>2</sup>) was 9.7% and 19.3% in men and women respectively. In contrast, using MUAC, only 13.2% and 5.2% women were classified as undernourished. Both under nutrition and over nutrition exist in Lake Victoria Basin.

**P99-10**  
**COMPARATIVE USE OF MUAC AND WEIGHT FOR HEIGHT PERCENT MEDIAN AS DETERMINANTS OF NUTRITIONAL STATUS IN YOUNG CHILDREN IN THE TONJ SOUTH CMAM PROJECT**

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**RATIONALE / OBJECTIVE:** Extension workers, community based volunteers and beneficiaries have raised concerns about the complexity and insensitivity of using weight-for-height (WFH) in comparison to the mid-upper arm circumference (MUAC) for determining the nutritional status of children in South Sudan. A comparative study was conducted to compare the sensitivity of two nutrition indicators.

**MATERIALS, METHODS:** Between June 2007 and January 2008, 402 severely malnourished children greater than 6 months old were admitted using the criteria that combines both MUAC and WFH. The children with a MUAC  $< 11.0$ cms and/or the presence of edema were directly admitted into the Outpatient Therapeutic Program, regardless of their WFH percentage of the median. The children with a MUAC  $\geq 11.0$ cm and  $< 13.0$ cm and the absence of edema underwent further screening using a WFH percentage of the median. The children whose WFH percentage of the median was found to be  $< 70\%$  were also admitted to the Outpatient Therapeutic Programme.

**RESULTS AND FINDINGS:** The combination of the two different anthropometric measures revealed 63% (255) were identified as severely malnourished using MUAC, 33% (131) were identified based on WFH, 4% were admitted due to other cultural or clinical reasons and 0% (1 child) was admitted due to edema.

**CONCLUSION:** MUAC is a more sensitive nutritional status indicator than the WFH percentage of the median for the children of Southern Sudan.

**P99-11**  
**RELATIONSHIP BETWEEN OBESITY AND PARITY AMONG WOMEN IN ISFAHAN, IRAN**

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**RATIONALE & OBJECTIVES:** Since the prevalence of obesity is very high among women, searching possible contributory factors is strongly recommended. Aim of this study was to determine the relationship between obesity and parity among women in Isfahan, located at the central region of Iran.

**MATERIALS & METHODS:** A group of 121 women (age: 20 to 60 years) in Isfahan were randomly selected. A questionnaire compiled for collecting required data about parity history. Current anthropometric measurements were carried out according to World Health Organization's standard protocols. According to parity, participants were divided into three categories as follows: 1) nulliparity, 2) one or two parities, and 3) more than two parities. Chisquare was used to test the relationship between obesity and parity.

**RESULTS & FINDINGS:** Mean of body mass index was significantly lower in nulliparous women compared to the other two groups ( $p \leq 0.001$ ). A statistically significant relationship was found between obesity and parity ( $p \leq 0.001$ ). The highest risk of obesity was observed in the women with more than two parities.

**CONCLUSION:** Taking into account the parity as a risk factor for obesity providing suitable nutrition education to women is suggested.

**P99-12**  
**DOCUMENTATION OF COMPARABLE PHYSICAL ACTIVITY ASSESSMENT IN THE EUROPEAN UNION FOR THE EUROPEAN NUTRITION AND HEALTH REPORT 2009**

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**RATIONALE AND OBJECTIVE:** In the European Nutrition and Health report (ENHR 2004), data from eight European countries were considered. Data sets were not comparable among each other. The EC funded project ENHR II aims to merge the meanwhile available comparable data.

**MATERIALS AND METHODS:** By now, four studies have generated comparative data about physical activity in the EU. Chronologically ordered these are: the European Food Study, the EUPASS, the Eurobarometer 58.2, and the Eurobarometer 64.3. For instance, data about frequency and duration of moderate and vigorous physical activity of adults in each of the 24 collaborating countries were collected as part of the surveillance for the Eurobarometer 64.3.

**RESULTS AND FINDINGS:** Highest amounts of physical activity were reported in the Baltic countries and in the Netherlands. Lowest values were reported in Spain, Sweden, and Ireland. An overview about the activeness of European countries will be provided.

**CONCLUSION:** Obviously, it is not possible to compare findings from studies using different methods. Therefore, reliable and validated methods (questionnaires, measurements) are recommended to be used in future studies.

### P99-13

#### **KNOWLEDGE, ATTITUDES AND PRACTICES OF NUTRITION AMONG MOTHERS OF CHILDREN WITH SPECIAL NEEDS IN PRIMARY SCHOOLS UNDER SPECIAL EDUCATION PROGRAM AROUND GOMBAK, KUALA LUMPUR AREA**

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**RATIONALE AND OBJECTIVES:** Mother's nutritional knowledge may have an effect on the nutritional aspect of children with special needs because the food given to the children is always prepared by the mother. This study was conducted to assess the knowledge, attitudes and practices of nutrition among mothers of children with special needs in 2 primary schools under the special education program in Gombak, Kuala Lumpur area.

**MATERIAL AND METHOD:** This cross sectional study involved 29 mothers aged 28-56 years old. Anthropometric measurements including weight, height, waist circumference and body mass index were collected to evaluate their nutritional status. A questionnaire consisted of assessment on sociodemographic aspect and knowledge, attitudes and practices of nutrition were administered to determine the subjects' nutritional knowledge status.

**RESULTS AND FINDINGS:** The anthropometric assessments showed that 62.1% of the subjects were classified to be either overweight or obese according to their BMI. 72.4% of subject have waist circumference more than 80cm and 82.8% have unhealthy high level of body fat. The mean score for general nutrition knowledge was 60.0 + 14.7%, while the mean score of nutrition knowledge for children with special needs was 61.0 + 16.6%. Pearson coefficient correlation showed no significant correlation between BMI, waist circumference, levels of body fat and score of general nutrition knowledge. All subjects had positive attitudes towards food and nutrition. This study also found that 89.7% of subjects often had meals at home, 62.1% had breakfast everyday, 27.6% had snacks and 37.9% had taken fast food at least once a week

**CONCLUSION:** This study showed that the mothers' nutritional knowledge was moderately satisfactory and they have positive nutrition attitudes and practices. However, anthropometric measurements indicates that majority of them are overweight and obese and have high risk for chronic diseases.

### P99-14

#### **ESSENTIAL COMPONENTS OF ANTHROPOMETRY TRAINING**

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The anthropometric measurements of height and weight of preschool-age children often are included in a variety of data collection efforts since they are valuable tools for assessing health and nutritional status. Anthropometry has been used in settings where either individuals are visited in their homes or convene in groups for growth monitoring, cross-sectional household surveys, nutrition surveillance, screening and assessment in emergency situations such as refugee populations, hospitals and clinics.

Although great emphasis has been placed on anthropometry in these settings, the level of effort necessary to implement an anthropometric training program, data collection and appropriate quality control in the field often is underestimated in terms of time, technical inputs and logistics. Areas of quality control, such as anthropometric standardization testing and field supervision are often compromised as well as training exercises, qualitative and quantitative checks on anthropometric data in the field.

When anthropometry is a component of a national or regional household survey or smaller survey as part of program

evaluation or assessment before program implementation, the anthropometry component must be implemented under certain conditions and constraints as well as coordinated and integrated with the overall survey and its other components.

The purpose of this presentation is to illustrate the essential components of anthropometry training in a variety of settings; case studies of national and regional surveys over the past four decades will be cited.

### P99-15

#### **NUTRITION BEHAVIOUR AND FOOD CHOICE MOTIVES OF PRIMARY SCHOOL CHILDREN LIVING IN NUREMBERG, GERMANY WITH DIFFERENT SOCIOECONOMIC BACKGROUND RESULTS FROM THE STUDY "NUTRITIONAL AND HEALTH BEHAVIOUR OF CHILDREN IN LOW-INCOME FAMILIES"**

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**PURPOSE:** In health-related studies children from families with low socioeconomic status (SES) are often underrepresented. The study aims to analyze socioeconomic differences in nutrition behavior including food choice motives of fourth grade school children living in Nuremberg, Germany.

**METHODS:** In this cross-sectional study children completed a standardized questionnaire including a short food-frequency-questionnaire followed by questions on their food choice motives to assess their nutrition behavior. Families' socio-demographic indicators were derived by telephone interviews with parents. For statistical analyses SPSS was used.

**RESULTS:** Socioeconomic differences (low, middle, high) exist in children aged 10,4 ± 0,5 years (n=170) concerning their consumption of an inappropriate diet (p=0,01). However socioeconomic differences do not exist for the main food choice motives: Children of all SES-groups mainly choose the food they are offered it at home.

**CONCLUSION:** Low SES families need more external support from local networks to help them implementing healthier food choices leading to more appropriate nutrition behavior in their daily routines. All day schools could offer those chances for all families.

### P100: Nutrition Assessment of Hospitalized Patients III

#### **P100-01**

#### **SYSTEMIC ARTERIAL HYPERTENSION CAN BE INFLUENCED BY THE CHANGED BODY MASS?**

Bernardi, Julia Laura D.<sup>1</sup>; Portero-McLellan, Katia C.<sup>1</sup>; Frenhani, Patricia B.<sup>1</sup>; Leandro-Merhi, Vania A.<sup>1</sup>; Panigassi, Giseli<sup>2</sup>

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**RATIONALE & OBJECTIVES:** The objective was to determine the anthropometric status of patients, which presented systemic arterial hypertension, associated with both cardiovascular and renal diseases.

**MATERIALS & METHODS:** From February to April 2007 a cross-section survey was carried out with 74 inpatients from the Brazilian University Hospital, which presented isolated arterial hypertension or associated with both cardiovascular and renal diseases. The assessment was performed using the variables sex, age, Body Mass Index (BMI) and Mid Arm Circumference (MAC).

**RESULTS & FINDINGS:** 63.51% of the inpatients were female more than 60 years. The hypertension was associated with cardiovascular disease in 62.16%. The BMI showed overweight in 41.2% of male and 57.1% of female less than 60 years. Eutrophia was found in 69.23% of male and 56.6%

of elderly female. The MAC showed eutrophia for adults, both male and female and also a muscle deficit for elderly male.

**CONCLUSION:** The systemic arterial hypertension was influenced by anthropometric status in hypertensive inpatients, which showed overweight and obesity.

#### P100-02

##### **DETERMINANTS INFLUENCING THE DEGREE OF PATIENTS' SATISFACTION WITH MEALS IN A UNIVERSITY HOSPITAL**

Coloço, Renata B.<sup>1</sup>; Holanda, Livia B.<sup>1</sup>; Portero-McLellan, Katia C.<sup>1</sup>; Panigassi, Giseli<sup>2</sup>

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**RATIONALE & OBJECTIVES:** A hospital environment has a negative influence on patients' meal acceptance. The objective is to identify the degree of patients' satisfaction with meals offered in a hospital and its relation with the length of stay, gender, and age.

**MATERIALS & METHODS:** 206 patients were interviewed: aged 16 to 83 years, minimum length of stay of 2 days, and receiving oral feeding. A quantitative and qualitative questionnaire was used to evaluate four meals offered by the hospital focusing on the following five attributes: appearance, temperature, flavor, serving size and courtesy.

**RESULTS & FINDING:** Gender and age, as well as type of diet and length of stay, have influence on the degree of satisfaction with the diet. Low-sodium diet and partially liquefied diabetic low-sodium diet had the lowest degree of satisfaction for temperature, appearance and flavor.

**CONCLUSION:** The study supported that gender and age, as well as the temperature, the flavor, modified consistency and composition, are determinants of the degree of satisfaction of the meals offered in the hospital.

#### P100-03

##### **THE EFFECTIVENESS OF DIET WITH SPECIAL PRODUCT FOR PATIENT WITH OBESITY**

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**OBJECTIVES:** To study the efficacy of special product for patients with obesity.

**MATERIAL & METHODS:** There have been examined 50 patients with I-III-grade obesity and cardiovascular diseases. In 21 days 25 patients of control group (aged 56,5 ± 2,66) were given 1600 kcal energy value diet (D). 25 patients of other group (aged 58,5 ± 2,28) - diet with special product (D+SP) - yogurt cocktail, contains plant fats, covered with oat oil. We have estimate of clinical, anthropometric and bioimpedansometric data, subjective evaluation of hunger, using the anorectic scale and VAS.

**RESULTS:** One bottle of SP drunk during breakfast decreased the subjective evaluation of hunger after 14 days of study (p<0,05). Body mass index reduced under the influence of D and D+SP comprised from 35,1 ± 1,7 to 32,9 ± 1,4 kg/m<sup>2</sup> (p>0,05) and from 37,0 ± 1,2 to 35,2 ± 1,1 kg/m<sup>2</sup> (p<0,05). Fat mass quote reduced and fat free mass quote increased in all patients.

**CONCLUSION:** The special product, containing plant fats, covered with oat oil, help to eat less for patients with obesity.

#### P100-04

##### **CLINICAL AND DIETARY MANIFESTATIONS OF CARDIOVASCULAR PATIENTS WITH OSTEOPOROSIS**

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**OBJECTIVES:** To study dietary and clinical status in patients with cardiovascular diseases (CVD) and low bone mineral density (BMD).

**MATERIAL & METHODS:** 130 patients with overweight and CVD (aged 51-79) examined BMD, dietary intake for the last month, calcium urine excretion.

**RESULTS:** 10% of patients had low BMD (group I) and 90% - normal BMD (group II). Body mass index in patients from group I was 29.6, group II – 36.8. Patients of group I had osteoporosis or osteopenia and more serious clinical manifestations of CVD: combination with hypertension, hyperlipoproteinemia and higher frequency of different complaints. Energy consumption for group I was 2377 kcal, protein – 14% of energy, fat – 44%, carbohydrates – 42%, calcium intake was 1241 mg/day, phosphorus – 1433 mg/day. For group II: 2767 kcal, 15%, 46%, 39%, 1222 mg/day, 1651 mg/day accordingly. Calcium urine excretion for group I was higher (166 mg/day), than for group II (102 mg/day).

**CONCLUSIONS:** Manifestations of osteoporosis or osteopenia in patients with CVD and low BMD are associated with calcium utilization disorders and increased of its excretion, though sufficient level of calcium intake with food.

#### P100-05

##### **MICRONUTRIENT STATUS IN CHILDREN WITH CEREBRAL PALSY AND THE IMPACT OF A MAJOR ORTHOPAEDIC SURGICAL INTERVENTION**

Schoendorfer, Niikee C.<sup>1</sup>; Boyd, Roslyn<sup>1</sup>; Vitetta, Luis<sup>2</sup>;

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**RATIONALE & OBJECTIVES:** Cerebral palsy (CP) is associated with undernutrition and subsequent growth deficits. Much research has focused on anthropometric data and energy intakes with little information available on other parameters. Ensuring micronutrient adequacy may lead to improvements in immune function, inflammation, wound healing and catch up growth in children.

**MATERIALS & METHODS:** We are currently conducting an observatory study on levels of micronutrients, antioxidants, oxidation, inflammation and body composition in children 4-12 years with severe CP undergoing surgery (n=20) or not (n=20) and comparing with typically developing children (n=20). Data is being collected on 3 occasions at 6-week intervals.

**RESULTS & FINDINGS:** Preliminary data indicate differences exist in height, weight and BMI measures (p<0.0000) between subjects and controls. The lower bicarbonate (p=0.03) and raised anion gap (p=0.02) in CP may indicate metabolic acidosis and warrants further investigation. Data in relation to the surgery group is currently being collected and will be discussed along with the remaining data yet to be analysed.

**CONCLUSION:** Healing outcomes may be augmented via alleviating any deficiencies pre-surgery and supporting these processes during recovery. Detecting and correcting marginal depletions in both surgical patients and other populations may have significant public health implications.

#### P100-06

##### HOSPITAL-ACQUIRED MALNUTRITION IN CHILDREN WITH MILD CLINICAL CONDITIONS

Angelo Campanozzi<sup>1</sup>, Massimo Russo<sup>2</sup>, Alessandra Catucci<sup>1</sup>, Irene Rutigliano<sup>1</sup>, Gennaro Canestrino<sup>1</sup>, Ida Giardino<sup>3</sup>, Arturo Romondia<sup>4</sup>, and Massimo Pettoello-Mantovani<sup>1,5</sup>  
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**RATIONALE & OBJECTIVES:** Little is known about the incidence and risk factors of hospital-acquired malnutrition in children with mild illness (grade 1 clinical conditions) and its timing of occurrence. The aim of this study was to recognize any early stages of denutrition and possible risk factors leading to nutritional deterioration in children hospitalized due to mild clinical conditions.

**MATERIALS & METHODS:** 496 children (age: 1-192 months) with mild clinical conditions were studied. Weight and height were measured. Weight was assessed daily and Body-Mass-Index Z-score was calculated for all patients.

**RESULTS & FINDINGS:** Children with a Body-Mass-Index Z-score <-2SD on admission showed a mean Body-Mass-Index loss at the end of their hospital stay which was significantly higher than in children who showed a better nutritional condition at admission. Risk factors for hospital-acquired malnutrition were: age <24 months; duration of hospital stay >5 days; fever and nighttime abdominal pain.

**CONCLUSION:** Hospital stay has an impact on the nutritional status of children affected by mild clinical conditions. Children already malnourished on admission show to be at risk of further nutritional deterioration during their hospital stay and in all groups of children identified by their Body-Mass-Index Z-score at admission the nutritional status declined progressively.

#### P101: Novel Lipids

##### P101-01

##### ENZYMATIC PREPARATION OF DHA-CONTAINING PHOSPHATIDYLSERINE FROM PHOSPHOLIPIDS OF YELLOW TAIL ROE

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It has been reported that phosphatidylserine (PS) or docosahexaenoic acid (DHA) improved brain function for human. Both of them are commercialized as the functional foods in Japan. However, PS that contains DHA is not available from edible source. In the present study, enzymatic preparation of DHA-containing PS from phospholipids in fish roe was investigated.

The phospholipids in yellowtail roe were extracted with ethanol after extraction of neutral lipids with acetone. Major phospholipid in the roe was phosphatidylcholine (PC). The phospholipids were rich in DHA at sn-2 position. (55% in the total fatty acid at sn-2) The phospholipids were converted into PS by phospholipase D (PLD, *Actinomadula* sp.). The PC of yellowtail roe were more rapidly converted into PS compare to that of soybean. As for the yield of PS from PC, the PC from yellowtail roe gave the lower yield than soybean PC. Moreover, the higher molar ratio of L-serine to PC gave the higher yield of the PS. Under the optimum condition, the conversion ratio of the DHA-containing PS from yellowtail PC was more than 70%.

##### P101-02

##### SMALL DENSE LDL CONCENTRATION AND OXIDATIVE SUSCEPTIBILITY CHANGES AFTER CONSUMPTION OF SOYBEAN OIL, RICE BRAN OIL, PALM OIL, AND MIXED RICEBRAN/PALM OIL IN HYPERCHOLESTEROLEMIC WOMEN

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The effects of a diet containing soybean oil (SBO), rice bran oil (RBO), palm oil (PO) or a RBO/PO (3:1) mixture on the consumption and oxidation of small dense low-density lipoproteins (sdLDL) in 16 hypercholesterolemic women were investigated. During the 8-week control period, participants consumed a free-choice weight-maintaining diet comprising carbohydrate (55% E), protein (15% E) and fat (30% E) with < 300 mg/day of cholesterol. During each 10 week study period, participants consumed this same diet but with the addition of one of the three test oils or the RBO/PO mixture. Total cholesterol and LDL-cholesterol levels were significantly reduced during SBO, RBO and RBO/PO consumption, while high-density lipoprotein cholesterol was significantly decreased by SBO consumption. There was a significant reduction in sdLDL-cholesterol levels only after using SBO and it tended to be reduced in during RBO/PO consumption, whereas it was significantly increased following PO consumption. The sdLDL oxidation lag time was significantly increased during PO, RBO/PO and RBO consumption, but significantly reduced following SBO. The results for the RBO/PO mixture suggest that this oil mixture might further reduce the risk of atherosclerosis.

##### P101-03

##### THE RELATIONSHIP BETWEEN VISCERAL OBESITY IN PATIENTS WITH METABOLIC SYNDROME AND SERUM CONCENTRATIONS OF CRP, IL-6 and VISFATIN

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**OBJECTIVE:** To investigate the relationship between serum concentrations of C-reactive protein (CRP), Visfatin, and interleukin 6 (IL-6), with obesity and visceral adiposity in patients with metabolic syndrome (MetS).

**MATERIALS & METHODS:** A total of 37 patients with MetS and 37 age-matched controls were included (mean age 46.35 ± 1.6 years). Metabolic syndrome was defined by the criteria of the international diabetes federation 2005. Anthropometric and biochemical profiles, including high-sensitivity C-reactive protein (Hs-CRP), interleukin-6 and visfatin were measured. Data were compared between groups by using t-test. Pearson's correlation was used to evaluate the relationship between continuous variables. P values less than 0.05 was considered as statistically significant.

**RESULTS:** In patients with MetS, CRP and IL-6 were significantly correlated with BMI, waist circumference and waist-hip ratio. Visfatin level was significantly (P<0.05) lower in metabolic syndrome patients compared with controls (log visfatin: 1.74 ± 0.27ng/ml vs. 1.86 ± 0.13 ng/ml, MetS vs. control group respectively). There was no correlation between visfatin levels and any anthropometric parameters in patients with metabolic syndrome or control group.

**CONCLUSIONS:** Serum visfatin was decreased in patients with MetS. Therefore it seems that Visfatin cannot be considered as a new proinflammatory adipocytokine in metabolic syndrome. But the positive associations of obesity and visceral adiposity with elevated cytokine levels suggest the importance of reducing obesity and visceral adiposity to prevent the risk of coronary disease.

**P101-04**  
**DOCOSAHEXAENOIC ACID THROUGH CHILDHOOD: FUNCTIONAL ROLE, METABOLIC ASSOCIATIONS AND THERAPEUTIC EFFECTS**

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**BACKGROUND:** Docosahexaenoic acid (DHA, C22:6n-3 fatty acid) is a component of the nervous tissues that may have also metabolic effects. Its blood levels are mainly diet-related. **METHODS:** Description of published and unpublished trials and cohort studies from our Department exploring the functional role of DHA on neurocognitive function and visual performance and the associations and effects in disorders of the fat and lipid metabolism.

**RESULTS:** DHA supplementation of 20 mg per day through 12 months resulted in one week anticipation for sitting alone and three weeks anticipation for the first complete word in term healthy infants (Am J Clin Nutr 2009; 89:64). A poor DHA status is associated with the most unfavorable conditions of childhood obesity (Acta Paediatr 2006; 95:964; Pediatr Res 2006; 60:485-9; new data submitted, 2009). DHA supplementation in dietary treated dislipidemic children improved HDL-Chol while decreasing triglyceride levels (Abstract, ESPR Annual Meeting, 2007). LCPUFA supplementation improved DHA status and visual acuity in older dietary treated Phenylketonuric (PKU) children after one year supplementation (J Pediatr 2000; 137:504). The effects of DHA supplementation in dietary treated PKU infants will be investigated in next years within a multicentric EU project (Nutrimenthe).

**CONCLUSIONS:** DHA may have different functional, metabolic and therapeutic roles in childhood.

**P101-05**  
**SERUM VISFATIN CONCENTRATION IN PATIENTS WITH METABOLIC SYNDROME**

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**OBJECTIVE:** Visfatin is a newly identified adipocytokine and recent studies indicate that visfatin may have potential proinflammatory effects. Since, the relationship between serum visfatin levels and metabolic syndrome (MetS) has not been established; the aim of this study was to explore the association between serum visfatin levels and anthropometric and metabolic syndrome and parameters.

**MATERIALS AND METHODS:** A total of 37 patients with MetS and 37 age-matched controls were included (mean age 46.35 ± 1.6 years). Patients with Metabolic syndrome was defined by the criteria of the international diabetes federation 2005. Anthropometric and biochemical profiles were measured. Also, serum Visfatin was measured using an enzyme immunoassay (EIA) kit. Data were compared between groups by using t-test and Pearson's correlation coefficient was used to evaluate the relationship between continuous variables. P values less than 0.05 was considered as statistically significant. **RESULTS:** Serum visfatin level was significantly (P<0.05) lower in metabolic syndrome patients compared with controls (log visfatin: 1.74 ± 0.27ng/ml vs. 1.86 ± 0.13 ng/ml, MetS vs. control group respectively). There was no significant correlation between serum visfatin levels and any anthropometric or any metabolic parameters in patients with metabolic syndrome or control group.

**CONCLUSIONS:** The results of this study showed that serum visfatin level was decreased in patients with MetS. Therefore it seems that Visfatin cannot be considered as a new proinflammatory adipocytokine in metabolic syndrome

**P101-06**  
**ANTIOXIDATIVE ACTIVITY OF Harungana Madagascariensis BARK EXTRACT**

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**OBJECTIVE:** The oxidative stress is a main problem in our society due to many health problems, to the economic and moral poverty. The objective of this study is to assess the antioxidant activity of hydroethanolic bark extract of Harungana madagascariensis.

**METHODOLOGY:** The male albino rats were used. Carbon tetrachloride (CCL4) in olive oil (50% v / v) served as an oxidizing agent. The 8% Dimethyl sulfoxide was used as a diluent. Different doses of extract (0.016 g/kg, 0.032 g/kg and 0.064 g/kg) were administered over a period of 6 days followed by oxidizing agent (2 ml / kg / day) the day seven. The markers of oxidative attack such as CAT, SOD, MDA, Thiols, Carbonyls and Cholesterol membrane were measured.

**RESULTS:** Elevated values of carbonyl and declining values of thiols in animals receiving only CCL4 were noted. These results reveal the oxidation of proteins for those animals. The animals first treated with the extract showed no difference compared to animals receiving DMSO. Thus, it presented a significant correlation between the thiols and catalase (r = 0.76, p < 0.01) and between thiols and SOD (r = 0.74, p < 0.01). The treatment using extract helps lower values of MDA. The activity of the catalase (CAT) and superoxide dismutase (SOD) have lowered significantly (p < 0.05) in animals that received the CCL4 compared to other groups. A correlation was noted between these two enzymes (r = 0.72, p < 0.01).

**CONCLUSION:** At the end of these results, we can say that the hydroethanolic bark extract of Harungana madagascariensis is gifted with antioxydative activity. This gives it a benefit action for populations

**P101-07**  
**EFFECTS OF CONJUGATED LINOLEIC ACID (CLA) ON BODY COMPOSITION AND BONE MINERAL DENSITY IN POST-MENOPAUSAL WOMEN**

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**INTRODUCTION AND OBJECTIVES:** The effects of CLA on body composition and bone mineral density are controversial. The aim of this study was to investigate the effects of CLA on body composition and bone mineral density in post-menopausal women.

**SUBJECTS AND METHODS:** This was a randomized, double blind, placebo-controlled trial. Seventy-six healthy post-menopausal women aged 55±6.6 years with BMI 27.37±3.4 kg/m<sup>2</sup> participated in this study. Subjects were randomly allocated to 2 groups. CLA group received 3.2 gr CLAG80 (50/50 cis-9, trans-11: trans-10, cis-12) and control group had placebo (high oleic safflower) for 12 weeks on a daily basis. Dual-Energy X-Ray Absorptiometry was used to measure body composition and bone mineral density (week0 and week 12).

**RESULTS:** Lean body mass in CLA group significantly increased 874.87±702.44 grams after 12 weeks. However changes in total fat mass, weight, waist circumference, bone mineral density and content among two groups were not significantly different.

**CONCLUSION:** A daily 3.2 gr CLA for 12 weeks increased lean body mass in post-menopausal women.

## P102: Nutrition Management of Diabetes III

### P102-01

#### EFFECT OF DIETARY SUPPLEMENTATION OF MAESIL (PRUNUS MUME) CONCENTRATES ON THE IMPROVEMENT OF DIABETES IN RATS

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**RATIONALE & OBJECTIVES:** This study investigated effects of maesil concentrates supplementation on improving diabetic symptoms.

**MATERIALS & METHODS:** Thirty two Sprague-Dawley male rats aging 7 weeks were divided into four groups (nondiabetic - control diet, nondiabetic - maesil diet, diabetic - control diet, diabetic - maesil diet) and fed experimental diets for 4 weeks and sacrificed to obtain blood and liver.

**RESULTS & FEEDINGS:** Blood glucose, HbA1c and G-6-P activity were lower in diabetic - maesil diet group compared to diabetic - control diet group. Compared to nondiabetic groups, diabetic groups showed higher levels of serum triglyceride and total cholesterol, which were decreased by supplementation of maesil concentrates. Liver total lipid and TBARS levels were decreased by supplementation of maesil concentrates in both nondiabetic and diabetic groups respectively. Liver SOD activities were not significantly different among groups.

**CONCLUSIONS:** It is supposed the supplementation of maesil concentrates may improve symptoms of diabetic symptoms by reducing blood glucose indices, serum and liver lipid and lipid peroxide levels in diabetic rats.

### P102-02

#### COMPARISON OF DIET IN ELDERLY DIABETES ACCORDING TO HbA1c

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The aim of this study was to compare nutrient intakes in Korean elderly T2D patients according to their glycemic control. T2D elders (>65y, n=48) were recruited, and categorized by the concentration of glycated hemoglobin HbA1c; the good control group (GCG, HbA1c <7%) vs. the poor control group (PCG, HbA1c ≥8%). Anthropometric data, blood parameters and diet record were collected and compared. Anthropometric data including BMI (24.7 ± 2.9kg/m<sup>2</sup>) did not differ between groups. While significant abnormalities in lean body mass, blood glucose and albumin levels (P<0.01 for each) were found in the PCG. The PCG depended on carbohydrate as a major source of energy and had the lower nutritional quality index compared to the GCG. In conclusion, poor glycemic control in T2D elders is associated with imbalanced diet including excessive carbohydrates and deficient micronutrients.

### P102-03

#### EFFECT OF DAIRY PRODUCTS ON POSTPRANDIAL CHANGE IN BLOOD GLUCOSE IN JAPANESE HEALTHY FEMALE STUDENTS

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**AIM:** The effect of dairy products taken with rice on postprandial blood glucose level was examined in comparison with the baseline meal of rice only.

**METHODS:** The dairy products examined on six healthy

female students of age 21-22 years and BMI of 20.1 ± 2.4 kg/m<sup>2</sup> were 10g butter, 200ml low-fat milk, 120g yoghurt without sugar, 200, 400ml milk and 36, 72g cheese. The subjects were served white rice of 50g carbohydrate with or without dairy. The plasma glucose area under the curve above the base line (AUC) was determined and as a percentage of AUC for rice only.

**RESULTS:** In comparison with the rice-only meal, 1) added butter, low-fat milk, yoghurt did not show any significant difference in blood glucose level, but 2) milk (200, 400ml) and cheese (36, 72g) decreased AUC respectively to 74 ± 14, 57 ± 38% and 68 ± 30, 52±13%.

**DISCUSSION:** Because of result, a certain level of protein and fat is considered to be needed to suppress blood glucose level to a standardized oral glucose load.

### P102-04

#### EFFECTS OF KOREAN RED GINSENG, MULBERRY AND BANABA SUPPLEMENTATION ON THE BIOMARKERS OF GLUCOSE HOMEOSTASIS AND INFLAMMATION IN PATIENTS WITH IMPAIRED GLUCOSE TOLERANCE OR MILD TYPE 2 DIABETES

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The efficacy of anti-diabetic herbs was assessed. Subjects (n=94) with either impaired glucose tolerance or mild type 2 diabetes were randomly allocated to treatment or placebo group. Each participant received 6g (2g/meal) of herb mixture (mulberry leaf water extract/Korean red ginseng/banaba leaf water extract, 1:1:1) or placebo for 24 wks. The participants maintained their energy and nutrient intake throughout the intervention. Blood glucose homeostasis markers and inflammation markers related to vascular complication were measured. Sixty two subjects were included in the final analyses. Study results showed no significant difference in fasting blood glucose concentration. OGTT (75g) insulin response however, was significantly lowered in the herb supplementation group. The herb group showed significant reductions in the plasma levels of ICAM-1 and VCAM-1 compared to the placebo group. These results indicate 24 wks of herb supplementation may improve postprandial insulin response and reduce inflammatory mediators.

### P102-05

#### SOME COMMONLY CONSUMED FRUITS IN THE PHILIPPINES: ARE THEY GOOD AND SAFE FOR DIABETICS?

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**RATIONALE & OBJECTIVE:** The glycemic index (GI), is a classification of food based on the blood glucose response to a food relative to a standard glucose solution and has been proposed as a therapeutic principle for diabetes mellitus. The study aimed to determine the GI of some commonly consumed fruits in the Philippines.

**MATERIALS & METHODS:** Nine commonly consumed fruits: watermelon, cantaloupe, jackfruit, Chinese pears, banana, mango ripe, papaya, apple, and pineapple were used as test foods in the study. The fruits were fed to 10 non-diabetics containing 25 g available carbohydrates. Using the randomized crossover design, the control (glucose solution) and test foods were fed in random order on separate occasions after an overnight fast. Blood samples were collected at 0 and every 15 minutes after feeding for one hour and every 30 minutes for the next hour, and read for glucose in a Clinical Chemistry Analyzer.

**RESULTS & FINDINGS:** The GIs of the fruits tested ranged from 29-62. Chinese pear has the lowest GI of 29±5 while banana, the highest GI of 62±11.

**CONCLUSION:** All fruits studied were considered to be low GI fruits, except for banana and pineapple which are regarded as medium GI fruits. These fruits may be recommended for diabetics when taken in moderation, and may be included in their daily meals.

#### P102-06

##### **THE EFFECT OF ALPHA-LIPOIC ACID ON BLOOD PRESSURE OF DIABETIC**

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The majority of diabetic patients will develop hypertension. Alpha-lipoic acid for its antioxidative properties has an effective role in decrease of oxidative stress and prevention of endothelium dysfunction. The purpose of the present study was "to determine the effect of alpha-lipoic acid on blood pressure in type 2 diabetic patients".

Fifty-seven type 2 diabetic patients (14 male and 43 female) with the mean age of 53.5 years old were involved in this study. Upon arrival subjects were randomly divided into either experimental (n= 28) or control (n = 28) groups.

Experimental group received 300 mg alpha-lipoic acid daily for eight weeks where control group received placebo for eight weeks. Blood pressure and 24 hours diet recall were measured at the beginning of the study and every two weeks afterward.

The results of study showed a significant decrease in both systolic and diastolic in the alpha lipoic acid group. There was also a significant decrease in systolic blood pressure in experimental group when compared to control group.

This study suggests that alpha-lipoic acid supplement can be recommended in type 2 diabetic patients to prevention of high blood pressure.

#### P102-07

##### **THE IMPACT OF VITAMIN E ON GLYCEMIC CONTROL AND LIPID PROFILES IN TYPE 2 DIABETES PATIENTS**

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**RATIONALE & OBJECTIVES:** Diabetic complications have been related to hyperlipidemia and hyperglycemia. Alpha -tocopherol has antioxidant effects and can improve lipid profiles. We evaluated the effect of vitamin E supplementation on glucose, insulin and lipid profiles in type 2 diabetic patients.

**MATERIALS & METHODS:** In a randomized clinical trial, 31 patients included 14 men and 17 women (51.9±5.9 year) with type 2 diabetes were randomly divided into treatment with vitamin E (800 mg/day) and placebo groups for 2 months. Plasma glucose, Insulin and lipid profiles were measured at the beginning and at the end of 3 months supplementation. The Paired and independent-t -test was used for analyzing of data.

**RESULTS & FINDINGS:** Anthropometric indexes were stable throughout the study. Vitamin E administration lowered fasting plasma insulin concentrations (28.25± 2.37 and 27.8±2.56, P<0.016) plasma triglyceride concentration (279.41±194.99 and 212.48±85.18 P <0.03). The plasma glucose and the other lipid profiles did not change after vitamin E consumption for 2 months.

**CONCLUSION:** We need more research to establish beneficial effect of vitamin E intake in type 2 diabetic patients.

#### P102-08

##### **IMPACT OF MEDICAL NUTRITION THERAPY ON SELECTED GESTATIONAL DIABETICS**

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**RATIONALE :** A National Survey has shown that the prevalence of Gestational Diabetes Mellitus (GDM) in India is increasing. The prevalence of GDM was 2.1% in 1982, which increased to 7.62% in 1991 and further increased to 16.55% in 2002 . GDM is best managed by nutritional intervention. Hence, this study was ventured upon in Puducherry , India. This paper is based on six descriptive case studies.

**OBJECTIVES:** 1. To assess the nutritional status and obstetric history of the selected gestational diabetics. 2. To apprehend the importance of Medical Nutrition Therapy (MNT) through diet counseling and assess the impact of MNT on selected gestational diabetics

**METHODOLOGY:** Pregnant women attending the antenatal clinic with a gestation age of 26 to 28 weeks in high risk category were screened for GDM using 50g Glucose Challenge Test (GCT). A sample of six diagnosed to have GDM who consented for the intervention of MNT, were selected. Based on the nutritional status MNT was developed individually for each case. The impact of MNT was assessed by monitoring blood glucose, assessing urine ketones, monitoring modulation of weight and scrutinization of pregnancy outcome.

**MAJOR FINDINGS:** 1. The MNT was individualized based on the BMI and ideal pre-pregnancy weight (IPPW) of the subjects. An additional 300K.cal, were included for all the subjects, to meet the demands of pregnancy. 2. The percentage of calories contributed by the macronutrients was the same for all the subjects. The prescribed diet contributed 50% of calories from carbohydrates, 30% from fats and 20% of calories from proteins. The diet was also rich in minerals, vitamins, fluid (2 to 3 litres /day) and fibre (30 – 45g). 3. The MNT was designed with a motive to originate euglycemic diets so that the MNT will not lead to hyper or hypoglycemia in the subject. The weight gain in the mothers was controlled by MNT so that 100% of subjects had adequate favourable weight gain during pregnancy. 4. The fasting and postprandial blood glucose values of the six selected sample, monitored on weekly basis until delivery, published normal glucose values.

**CONCLUSION:** The individualized MNT plan based on BMI and ideal pre-pregnancy weight administered to the selected gestational diabetics resulted in euglycemia which in turn imparted positive pregnancy outcomes assessed with reference to blood glucose and weight of the mother and the child. The MNT that provided a low energy of 1400 K.cal also did not produce ketonemia indicating sufficiency of calories. Thus the research concludes that MNT, glucose and weight monitoring and compliance to the diet therapy will improve the health status of the mother and the new born.

#### P103: Clinical Nutrition: Others III

##### P103-01

##### **FOLATE AND VITAMIN B12 STATUS IN YOUNG NEPALESE CHILDREN**

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**BACKGROUND:** General malnutrition, vitamin and mineral deficiencies are common in Nepal. Objective: To assess vitamin B12 and folate status in children aged 6 to 35 months living in Bhaktapur, Nepal.

**METHODS:** We measured plasma concentrations of folate, vitamin B12, total homocysteine (tHcy) and methylmalonic acid (MMA) in 830 children who sought treatment for acute diarrhea.

**RESULTS:** The median [interquartile range (IQR)] plasma concentrations of the four biomarkers were as follows: Vitamin B12, 176 (115-265) pmol/L; folate, 48.7 (31.7-74.2) nmol/L; tHcy, 10.2 (7.6-13.7)  $\mu$ mol/L and MMA, 0.45 (0.26-0.83)  $\mu$ mol/L. The median folate concentration was 54.5 (40.0, 79.6) nmol/L in breastfed children and 21.0 (13.7, 38.3) nmol/L in non-breastfed children. The folate concentration declined with increasing age. Three children had folate <7.5 nmol/L. The median plasma B12 concentration was 169 (75, 250) pmol/L in breastfed and 234 (150, 334) pmol/L in those who were not. Vitamin B12 <150 pmol/L was seen in 44% of breastfed and in 24% of non-breastfed children. Plasma vitamin B12 concentration, but not folate, was negatively associated with plasma tHcy and MMA.

**CONCLUSIONS:** Low cobalamin status is common in Nepali children with acute diarrhea. Folate and B12 status differs markedly according to breastfeeding status in these children.

#### P103-02

##### **HEMOGLOBIN STATUS IS THE BEST NUTRITIONAL VARIABLE THAT PREDICTS ACHIEVEMENT AMONG SCHOOLCHILDREN IN RURAL UGANDA**

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**BACKGROUND:** A study was undertaken to assess the micronutrient status of schoolchildren in rural Uganda and related with their academic achievement.

**OBJECTIVE:** To find out the association between micronutrient status and academic achievement among these children.

**DESIGN:** A cross sectional design was used for the bigger part of the study, from which a sub sample of 145 children was randomly sampled for micronutrient assessments (iron, iodine and vitamin A). Data for this group was also collected on anthropometry (height and weight), malaria status, demographic and socio-economic status, child personal characteristics and educational achievement.

**RESULTS:** Holding all other factors constant, a hierarchical multiple regressions with achievement revealed that, of all the nutritional variables, hemoglobin status was the best predictor of achievement. The other significant variable was access by the household to a working radio.

**CONCLUSION:** Based on these results, iron supplementation for schoolchildren is suggested. In view of the advantages of iron, such a strategy would, coupled with of course improvement of socio-economic situation of the population, promote learning which is a driving force for any development process.

#### P103-03

##### **USING A DYNAMIC ENERGY BALANCE MODEL AS A GUIDE TO CONSTRUCT WEIGHT LOSS STRATEGIES AND MONITOR PROGRESS IN RESEARCH AND CLINICAL PRACTICE**

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**RATIONALE AND OBJECTIVES:** The fundamental theory of weight loss is to induce a negative energy balance. While simple energy balance model is useful to depict the causes of overweight, it is too simplistic for research and clinical practice. The aim of this paper is to propose a dynamic energy balance model that not only informs current and potential weight loss strategies, but also highlights the need to review treatment plans to address physiological adaptations during the weight loss period.

**MATERIAL AND METHODS:** This model was based on research observations using whole room calorimetry and dietary

interventions as well as evidence from the literature. Factors found to be promoting and inhibiting weight loss were grouped and opposed on a balance.

**RESULTS AND FINDINGS:** Factors that promoted weight loss were found to be mainly intervention related. Within each promotional factor, a number of current and potential strategies supporting weight loss were identified. Inhibitory factors on the other hand were identified as physiological adaptations to energy restriction that may slow the progress of the weight loss. We found the model useful in understanding and explaining weight changes observed in our trials.

**CONCLUSION:** This proposed model provides a more comprehensive framework to research planning and clinical practice in diet and weight management.

#### P103-04

##### **THE EFFECT OF STINGING NETTLE (*Urtica dioica*) SEED OIL ON EXPERIMENTAL COLITIS IN RATS**

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*Urtica dioica* (UD) which is member of the Urticaceae family, is considered therapeutically interchangeable. This study investigates the effect of *Urtica dioica* (UD) seed oil, known as stinging nettle, treatment on colon tissue and blood parameters of trinitrobenzene sulphonic acid (TNBS)-induced colitis in rats. Rats were grouped into as control (n=5), colitis (n=6) and UD treated colitis (n=6). UD seed oil, containing 83% unsaturated fatty acids and 16% saturated fatty acids, was given orally (2 mL/kg/day) 5 min after induction of colitis and the treatment was continued for 3 days. Three days after the induction of colitis, all rats were decapitated. The distal colon was weighed and the mucosal lesions were scored at both macroscopical at microscopic levels. Tissue factor activity (TFa), glutathione (GSH), Malonaldehyde (MDA), total sialic acid (SA) levels and myeloperoxidase (MPO), superoxide dismutase (SOD) activity and collagen content were assessed in tissue samples. In addition SDS polyacrylamid gel electrophoresis was carried out on tissue samples. TNF-  $\alpha$ , IL-1  $\beta$  and IL-6 and LDH levels were also assessed in blood samples. UD treatment ameliorated the TNBS-induced disturbances except MDA.

#### P103-05

##### **THE EFFECT OF BLACK CUMIN (*Nigella sativa*) SEED OIL ON EXPERIMENTAL COLITIS IN RATS**

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The black cummin (*Nigella sativa*), the member of Ranunculaceae family, is a plant widely used as a spice in our country. Its seed oil contains 21% protein, 35 % carbohydrate, and 35-38 % lipid. In this study, the effect of black cummin (*Nigella sativa*) seed oil on trinitrobenzene sulphonic acid induced colitis in rats was investigated. In treatment group, the rats were treated with black cummin seed oil (ORIGO '100 % natural Black Cummin Seed Oil', 2.5 ml/kg; orally). It was given 5 minutes later than the induction of colitis and the treatment was continued for 3 days. Three days later than the induction of colitis, all rats were decapitated. The distal colon was weighed and the mucosal lesions were scored both at macroscopical and microscopic levels. Tissue factor activity (TFa), glutathione (GSH), Malonaldehyde (MDA), total sialic acid (SA) levels and myeloperoxidase (MPO), superoxide dismutase (SOD) activity and collagen content were assessed in tissue samples. In addition SDS polyacrylamid gel electrophoresis was carried out on tissue samples. Serum TNF-  $\alpha$ , IL-1  $\beta$  and IL-6 and LDH levels were also assessed in blood. Black cummin seed oil has treated inflammation seen in

experimental colitis in examined dose but this treatment has not reflected to the collagen, sialic acid, TFA and oxidant system parameters.

#### **P103-06**

##### **THE PREVALENCE AND NUTRITIONAL CAUSES OF HYPOGLYCAEMIA IN PATIENTS WITH END-STAGE RENAL FAILURE (ESRF) ON MAINTENANCE HAEMODIALYSIS (MHD) AT KENYATTA NATIONAL HOSPITAL'S RENAL-UNIT, KENYA**

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**RATIONALE:** Although hypoglycemia is a known complication of hemodialysis, there is little information about its prevalence among patients on maintenance hemodialysis.

**OBJECTIVES:** To determine the prevalence of hypoglycemia in patients on maintenance hemodialysis in Kenyatta National Hospital (Nairobi, Kenya) and to identify potential nutrition related causes of hypoglycemia.

**SUBJECTS AND METHODS:** A cross-sectional, descriptive and observational study design was followed. Patients who had been on chronic maintenance hemodialysis for 3 months or longer were included in the study which was carried out from May 8 through to June 30, 2006. Random blood glucose levels were determined at baseline, 15 minutes, 30 minutes and 45 minutes, and at hourly intervals thereafter until the end of the dialysis session. The prevalence of hypoglycemia (a blood glucose level less than 3.9 mmol/L) was then determined for the duration of hemodialysis. The relationship between minimum blood glucose levels and dietary intake, anthropometric status, primary diagnosis, co-morbid and socio-demographic factors, prescribed medication and dialysis related factors were determined.

**RESULTS:** Among the 51 hemodialysis patients who participated in the study, the prevalence of hypoglycemia was 16% (n=8). Eight percent (n=4) of these patients were however already hypoglycemic on initiation of dialysis. Dietary intake of niacin ( $r=0.31$ ;  $p=0.02$ ), riboflavin ( $r=0.30$ ;  $p=0.03$ ) and vitamin B6 ( $r=0.30$ ;  $p=0.03$ ) showed a significant relationship with blood glucose levels. The relationships between hypoglycemic episodes and insulin administration ( $p=0.06$ ), and between blood glucose levels and BMI ( $r=0.25$ ;  $p=0.08$ ) and protein intake ( $r=0.26$ ;  $p=0.07$ ) approached significance. There was no significant relationship between blood glucose levels and the duration of hemodialysis ( $p=0.942$ ), hours of hemodialysis ( $p=0.27$ ) and the dialysate solution used ( $p=0.12$ ).

**CONCLUSIONS:** Hypoglycemia was present in 16% of patients on maintenance hemodialysis. Potential nutritional parameters which may have contributed to lower blood glucose levels in this study include a lower dietary intake of niacin, riboflavin, and vitamin B6. Lower protein intake and lower BMI was marginally associated with low blood glucose levels.

#### **P103-07**

##### **NUTRITIONAL AND ANTHROPOMETRIC PROFILE OF MILD NON-PROLIFERATIVE DIABETIC RETINOPATHY PATIENTS IN NORTHERN INDIA**

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**RATIONALE & OBJECTIVES:** Improper nutrition in mild non-proliferative diabetic retinopathy (NPDR) patients is a predisposing factor in the development of proliferative diabetic retinopathy (PDR) leading to blindness. In the present study we evaluated the nutritional and anthropometric profile of mild NPDR patients.

**MATERIALS AND METHODS:** 100 mild NPDR were randomly selected for assessment of dietary intake using 24-hour recall method. Body mass index (BMI) and waist-hip ratio (WHR) and biochemical profile included fasting and 2

hour post-prandial (PP) glucose, total cholesterol (TC), serum triglyceride (TG), high density lipoprotein (HDL) and low-density lipoprotein (LDL).

**RESULTS & FINDINGS:** The intake of total calories (1901+345 kcal), carbohydrates (61.15+ 5.6%, total fat (32.44+ 1.1%), saturated fatty acids (SFA), 10.7% and trans-fatty acids (t-FAs) and of mono-unsaturated fatty acids (MUFA) was 5.2%. The mean BMI, 22.1+ 2.7 kg/m<sup>2</sup> and WHR, 0.81+ 0.07 and fasting glucose- 141+ 32.4, PP-201+ 35.8, TC- 179 + 24.7, TG-122 + 22.4, HDL 46+ 2.4 and LDL 102 + 18.4.

**CONCLUSION:** Elevated levels of blood glucose and TC and a high intake of total fat, SFA, t-FAs and low intake of MUFA and fiber may be related to progression of mild NPDR to PDR.

#### **P104: Infant and Young Child Nutrition III**

##### **P104-01**

##### **DETERMINANTS OF INFANT FEEDING PRACTICES IN INDIA: ANALYSES OF 2005 - 06 NATIONAL FAMILY HEALTH SURVEY DATA**

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**RATIONALE AND OBJECTIVE:** In India, poor feeding practices in early childhood contribute to malnutrition, and infant and child mortality. We aimed to estimate IYCF indicators and determinants of poor feeding practices.

**MATERIALS AND METHODS:** The sample included 20,108 children aged 0-23 months from the 2005/06 India National Family Health Survey. Selected indicators were examined against a set of variables using multivariate analyses.

**RESULTS AND FINDINGS:** Only 23.5% initiated BF within one hour of birth; 46.4% of infants <6 months were exclusively BF; 13.8% bottle-fed; and 56.7% received timely complementary foods. Risk factors for not exclusively BF were wealthier households, delivery in health facility and living in the Northern region. More ANC was associated with increased exclusive BF. Women who were better educated, working, made more ANC visits and/or were exposed to media had better early initiation of BF. Risk factors for bottle-feeding included infants born by caesarean section, mothers from wealthier households, who were working, more educated, from urban areas and with no post-natal examinations. Timely complementary feeding rates increased with more ANC and if women watched television.

**CONCLUSION:** Targeted community interventions should be planned for groups at risk of poor IYCF practices, and 'Baby Friendly Hospital Initiative' needs revitalization and strengthening.

##### **P104-02**

##### **IRON DEFICIENCY ANEMIA IS ASSOCIATED WITH FOOD CONSUMPTION IN THE FIRST YEAR OF LIFE**

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**RATIONALE & OBJECTIVES:** Assess the influence of diet on anemia in infants.

**MATERIALS & METHODS:** Prospective cohort study conducted in Brazil. At birth, 355 children were selected and followed up to 1 year. Relative risk and confidence intervals were used to estimate anemia risk.

**RESULTS & FINDINGS:** Orange consumption protected

against anemia among breastfeeding children, and among infants that did not drink cow's milk. Children consuming industrialized flour-based foods were more likely not to be anemic. Low meat and liver consumptions were not associated with anemia. Cow's milk or breast milk consumption were not associated with anemia, at one year of age, as well as with the consumption of low nutrient density foods.

**CONCLUSION:** Orange consumption protected against anemia but only infants who were breastfed or not consuming cow's milk. Foods prepared with iron-enriched flour may be protecting the child against anemia regardless of the type of milk consumed.

#### **P104-03**

##### **CURRENT INFANT FEEDING PRACTICES IN UKEHE AND EDE-OBALLA RURAL COMMUNITIES IN NIGERIA**

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Infant feeding practices of hundred (100) mothers each in Ukehe and Ede-Oballa communities in, Nigeria were assessed. Focus group discussions, questionnaire and anthropometric measurements were used for data collection. The study revealed that over 90% of mothers started breastfeeding within 24 hours of delivery. However, exclusive breastfeeding was not popular in the area as none of the mothers interviewed practiced exclusive breastfeeding at any point. Pap (corn gruel) was a very important complementary food in the area and was introduced by over 20% of the mothers earlier than the recommended 6 months of age. Complementary foods were mostly based on locally available staples which were of plant origin with little or no fortification to improve the nutrient density of the foods. Consequently, 23% and 18% of the children in Ukehe and Ede-Oballa, respectively were wasted; 13% and 35%, respectively were underweight while 37% and 11% were stunted. The peak age for cessation of breastfeeding ranged between 17 and 18 months in the two communities. Income level and inadequate nutrition knowledge were major factors affecting the infant feeding practices of mothers. Improved income and nutrition education would encourage better practices and improve the health of children in the area.

#### **P104-04**

##### **VALIDITY OF MATERNAL PERCEPTION OF ONSET OF LACTATION AS A MARKER OF LACTOGENESIS II IN GHANAIAN WOMEN**

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**RATIONALE & OBJECTIVE:** Promotion of optimal breastfeeding practices is a proven intervention for the reduction of childhood undernutrition. Early onset of lactation (OL) is necessary for successful exclusive breastfeeding. This can be accurately assessed by test weighing which is impractical for field surveys. The objective of this study was to assess maternal perception of OL as a valid marker for lactogenesis II.

**MATERIALS & METHODS:** Forty women were recruited within 24 hours following uncomplicated singleton delivery. OL was assessed using both maternal perception and test weighing. The mothers were categorized based on whether or not they reported OL at the first postpartum visit, for the analyses.

**RESULTS & FINDINGS:** Mothers who reported that OL had occurred were significantly older ( $p=0.049$ ); transferred significantly higher amounts of breast milk per breastfeeding episode ( $p=0.006$ ); and also reported significantly more symptoms associated with OL such as; full or heavy feeling in the breast, milk leaking from the breast and tingling when the

baby was nursing.

**CONCLUSION:** Maternal perception of OL is a valid indicator of Lactogenesis II. This is a useful tool that can be employed to identify mothers at risk for delayed OL and target these to receive lactation support.

#### **P104-05**

##### **FATTY ACID COMPOSITION AND SUITABILITY OF GOAT MILK FORMULA FOR INFANTS**

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**RATIONALE AND OBJECTIVES:** Most infant formula use vegetable oils to supply fatty acids. This reduces the proportion of saturated fatty acids in the sn-2 position of triglycerides. This study examined the nutritional attributes of goat infant formula made by retaining milk fat and presents growth data on infants fed the formula.

**MATERIALS AND METHODS:** Infant formula was made by combining whole goat milk, lactose, vegetable oils, and micronutrients and then spray-dried. The protein, amino acid and fatty acid content were assessed by SDS-page, HPLC and GC-MS respectively. The nucleotides from goat milk were measured by HPLC. Saturated fatty acids in the sn-2 position of triglycerides were measured using TMS-derivatives of monoacylglycerides following separation by TLC. Growth data from 30 infants are presented.

**RESULTS:** Goat infant formula has 4 mg/100ml nucleotides, similar to human milk. Goat milk proteins provided essential and semi-essential amino acids. Mixing goat milk fat with vegetable oils provided fatty acids essential for infant nutrition while increasing the proportion of saturated fats in the sn-2 position 1.6 fold compared to vegetable oils only.

**CONCLUSIONS:** Goat infant formula has an amino acid and fatty acid composition suitable for infants and maintains infant growth rates similar to breast fed infants.

#### **P104-06**

##### **BELIEFS OF REVERSE CAUSALITY OF EXCLUSIVE BREASTFEEDING AND INFANT ILLNESS AMONG ECUADORIAN COMMUNITY NUTRITION PROMOTERS**

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**RATIONALE & OBJECTIVES:** WHO recommends exclusive breastfeeding for the first six months for optimal infant nutrition and health. To support designing community-based infant feeding interventions in Ecuador; knowledge, attitudes and beliefs of nutrition promoters with respect to exclusive breastfeeding and infant health were assessed.

**METHODS:** Knowledge, attitudes and beliefs around exclusive breastfeeding and infant health among community nutrition promoters were assessed in 2 focus groups, each with ten community nutrition promoters from the Ecuadorian highlands. Key-informant interviews were conducted with 10 selected participants from focus groups. Content analysis of transcripts identified key themes and beliefs.

**FINDINGS:** Participants' knowledge was consistent with exclusive breastfeeding recommendations. Promoters believed early introduction of liquids before six months age resulted from infant illness or colic. In contrast, beliefs suggested introducing food before six months age caused infant illness.

**CONCLUSION:** Although Ecuadorian nutrition promoters knew of WHO recommendations for exclusive breastfeeding and risks of introducing food early, beliefs of reverse causality with respect to early introduction of liquids and infant illness need to be addressed in capacity building.

**P104-07****EFFECT OF FEEDING PRACTICES ON ENERGY AND MICRONUTRIENTS INTAKE OF THAI INFANTS**

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**RATIONALE:** Inappropriate feeding practices are a major cause of the onset of malnutrition in young children. Poor nutrition can have an impact on their intellectual and social development.

**OBJECTIVES:** To examine the energy and selected micronutrients intake of infants aged 6 – 23 months who received different feeding practices.

**MATERIALS & METHODS:** Data from the first Thailand National Food Consumption Survey were used. Information on food and nutrient intake of infants aged between 6-23 months was collected using 24-hour dietary recall.

**RESULTS & FINDINGS:** Among all 3 age groups (6-9, 9-11, 12-23 months), their total energy intake (from either breast milk or formula and complementary foods) were lower than WHO 1998 recommendation. In each age group, energy intake from complementary foods was also lower than recommended energy value for both infants who received breast milk and those who received formula milk. Inadequate zinc intake was observed for all age groups. In addition, inadequate iron intake was also demonstrated in infants aged 6-8 months. Two third of key vitamins and trace elements was contributed from formula milk for all infants in 3 age groups.

**CONCLUSION:** Effective policy program and campaign should be established to ensure better understanding among Thai mothers on the importance of proper complementary feeding

**P104-08****WORKING MOTHERS AND CHILD FOOD INTAKE: THE IMPORTANCE OF MATERNAL ENGAGEMENT IN DETERMINING THE QUALITY AND AVAILABILITY OF CHILD FOOD INTAKE AMONG URBAN INDONESIAN HOUSEHOLDS**

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**RATIONALE AND OBJECTIVES:** Working mothers in urban areas of Indonesia are frequently compelled to employ domestic paid caregivers (DPC) to take care of their children. This research compares the child care practices in families of middle class working mothers in which children are cared for by a DPC with those in which care is provided by extended family members (EFM).

**MATERIALS AND METHODS:** The research was qualitative and designed as a case study involving ten families with children of various nutritional statuses. In-depth interviews with mothers and caregivers and observations on childcare practices were employed using a grounded theory approach. The weights and heights of the children were measured.

**RESULTS AND FINDINGS:** Mothers were generally less involved in determining the child's menu and preparing his/her food when the caregiver was a particularly trusted person, such as an EFM or a long-standing DPC. Variety in protein-dense food and vegetables was less in families using EFM as caregivers, than in those using DPC.

**CONCLUSION:** Although working mothers generally have knowledge of food and nutrition and greater financial authority than non-working mothers, their ability to determine child food quality/intake was limited in families using trusted caregivers.

**P104-09****COMMUNITY-BASED INTERVENTION BY REVISED RECOMMENDATIONS IN INFANT NUTRITION – PROSPECTIVE CROSS-NATIONAL COHORTS**

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**RATIONALE & OBJECTIVES:** A study on infant nutrition 1995-1997 showed low iron status in 12-month-olds. Revised recommendations on infant nutrition advise new iron-fortified follow-on milk and more emphasis on breastfeeding. The effects of the new recommendations were investigated.

**MATERIALS AND METHODS:** Healthy term infants (n=140) were followed from birth to 1 year of age. Dietary data were collected by dietary-history (0-5-month-olds) and monthly registrations (5-12-month-olds). Anthropometric measures were regularly registered, and blood samples collected at 12 months. Results of the present and previous studies were compared.

**RESULTS & FINDINGS:** The iron status of 12-month-olds in the present study showed no iron-deficient anemic children and 5.8% iron-depleted infants (previously 2.7% and 41%, respectively). The infants studied 2005-2006, compared with those 1995-1997, got on average less cow's milk which was replaced by the iron-fortified follow-on milk and breastfeeding. Growth 2005-2007 was slightly slower from 6-10 months, compared with 1995-1997, but growth was, as earlier, associated with lower SF values.

**CONCLUSION:** The diet in infancy changed in accordance with the new recommendations. The improved iron status could be explained by changed diet and nutrient intake following new recommendations. The study showed strong impact of the public health recommendations on infant nutrition.

**P104-10****BREASTFEEDING STATUS OF INFANTS BORN TO URBAN MOTHERS FROM HIGHER SOCIOECONOMIC STRATA**

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**RATIONALE AND OBJECTIVES:** Breastfeeding is common in India but exclusive breastfeeding rates are low. The study was conducted to assess breastfeeding patterns of women belonging to the upper socioeconomic strata and gain insights into reasons for low rates of exclusive breastfeeding.

**MATERIALS & METHODS:** The study was carried out in two phases. In Phase I, fifty mother-infant pairs were enrolled from private hospitals in Delhi and followed up monthly for 16 weeks. In Phase II, focus group discussions with mothers were carried out to gain insights into knowledge and reasons for non-exclusive breastfeeding.

**RESULTS & FINDINGS:** Most infants (94%) were breastfed. Exclusive breastfeeding rates at birth, week 4, 8, 12 and 16 were 34%, 78%, 62%, 52% and 36%, respectively. Exclusive breastfeeding rates were higher in working (47.4%) and educated mothers (58%) compared to less educated mothers (16.7%) and housewives (28.9%). Birth order, sex, type of family did not affect breastfeeding patterns. 38% of the infants received colostrums.

Lack of education and awareness, family traditions, and beliefs were reasons for not exclusively breastfeeding.

**CONCLUSION:** Exclusive breastfeeding rates are low due to lack of knowledge on the benefits of exclusive breastfeeding.

**P104-11**  
**DIETARY PRACTICES AND CONSTIPATION IN CHILDREN**

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**RATIONALE & OBJECTIVES:** The aims of the present study were to clarify the etiology and to evaluate the prevalence of functional intestinal constipation in children at four years of age and to identify possible dietary risk factors associated to this gastrointestinal symptom.

**MATERIALS & METHODS:** Longitudinal study of children recruited at birth and submitted a nutritional intervention after a randomized trial.

**RESULTS & FINDINGS:** Overall prevalence of constipation was 28.5%. Children who had received exclusive breastfeeding for less than four months had twice as many chances of developing constipation, (CI 95% 1.25-2.90). Having more than two bottles feeding of milk per day (CI 95% 1.05-2.09) and more than 10 meals per day (CI 95% 1.19-3.65) were dietary practices associated with the problem. The quantity of water and fiber intake presented a tendency to differ between the children with and without constipation (CI 95% 0.99-1.96, CI 95% 0.94-2.34), respectively.

**CONCLUSION:** The results of the present study conclude that the prevalence of functional constipation at 4 years of age is highly prevalent and dietary practices play an important role in this problem.

**P104-12**  
**NUTRITION PROGRAM REDUCES DIARRHEA IN CHILDREN**

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**OBJECTIVES** -To evaluate the impact on a Brazilian health policy in the occurrence of diarrhea and the determining factors in children twelve and sixteen months of age.

**METHODS** - A randomized field trial was conducted with five hundred pairs mother-child divided in two groups. The intervention group received dietary advice during the child's first year of life. The control and intervention groups received visits at six and twelve months.

**FINDINGS** - Of the 397 children examined, 36.7% had occurrence of episodes of diarrhea, 42.3% in the control group and 28.8% of the intervention. Children with diarrhea had a higher incidence of hospitalization, fever (RP 1.61 CI95% 1.18 - 2.01) and infections (RP 1.61 CI95% 1.24 - 2.10). Of the variables analyzed, the intervention group (p=0.00; RP 0.66 CI95% 0.49 - 0.89) and more education of father (RP 0.73 CI95% 0.55 - 0.98) have been associated with lower incidence of diarrhea.

**CONCLUSION** - A nutritional education program during the first year of life reduced occurrence of diarrhea by 34% in infants. Moreover, father's higher education was associated with lower diarrhea rates by 27%.

**P104-13**  
**A NUTRITIONAL INTERVENTION REDUCES EARLY CONSUMPTION OF HIGH DENSITY ENERGY FOODS IN CHILDREN AGED 12 TO 16 MONTHS**

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**OBJECTIVE:** The aim was to evaluate the impact of a nutritional intervention on reducing high energy density foods.

**METHODS:** Children were randomized at birth into intervention and control groups. The intervention group

received dietary counseling related to ten steps of health feeding for children lower than two years. At 12 months it was evaluated the consumption of high energy density food, categorized into high sugar density foods (HSD) and high lipid density foods (HDL).

**RESULTS:** The intervention was associated with lower consumption of drops (RR 0.85 95% CI 0.74-0.98), soft drinks (RR 0.88 95% CI 0.79-0.99), honey (RR 0.65 95% CI 0.50-0.84), cookies (RR 0.79 95% CI 0.71-0.89), chocolate (RR 0.72 95% CI 0.60-0.86) and snacks (RR 0.86 95% CI 0.76-0.97). The adjusted analyses showed that exclusive breastfeeding for less than 6 months and placement in the control group were associated with lower HSD and HLD food consumption.

**CONCLUSION:** A dietary counseling during the first year of life improves feeding practices at 12-16 months of age.

**P104-14**  
**THE ACCEPTANCE OF SPRINCLE TABURIN IN BANGGAI DISTRICT, INDONESIA**

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One way to overcome iron deficiency anemia in infants is to give them sprinckle which contains micronutrients. A number of efficacy studies have shown that the intervention of complementary feeding (CF) which contains adequate micronutrients is capable to decrease anemia prevalence. Taburin is sprinckle-containing micronutrients suitable for infants, inexpensive and easy to consume. Taburin is produced by MOH.

This report is part of the efficacy study of Taburin, conducted in Banggai District, Central Sulawesi Province, Indonesia from June to November 2008 to 76 infants' mothers as the respondents. Data was collected through interviews and observation.

The results show consistent consumption of Taburin is 91.4%. All respondents (100%) liked Taburin's textures and color, easy access to get, to keep, and to serve taburin. 24.3% of the respondents admitted that the colour of the food has changed because of taburin sprinkle, 21,6% said there was a change of taste. All respondents (100%) reported the increase of appetite, 89.2% of the infants were actively moved, 51.4% infants became actively talking. About 2,7% infants suffered from diarrheae, 1,4% constipated, and 4,1 % infants' tinja became greenish.

**CONCLUSION:** Taburin can be consumed because of its easy access and practical serve, and that there was no any complaint influencing the consistency of consuming taburin.

**P104-15**  
**PREDOMINANT BREAST FEEDING: RISKS AND POTENTIAL IN PAKISTAN**

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**RATIONALE:** In Pakistan the rate of exclusive breastfeeding (EBF) is low, being 37% up to 6months of age. If the rate of predominant feeding (giving water with breastfeeding) is added, the rate increases to 55.7%. However, predominate BF is associated with increased infant morbidity and mortality relative to EBF.

**OBJECTIVE:** To determine the factors associated with predominant breastfeeding in child 0 to 6 months in Pakistan.

**MATERIAL AND METHODS:** The Pakistan Demographic

and Health Survey 2006-07 data was obtained by interviewing 10,223 mothers. Data related to exclusive, predominant breastfeeding was analyzed for children <6 months of age. The factors associated with predominant breastfeeding were determined.

**RESULTS:** Of the 955 infants aged <6 months, 179 [18.7% (CI 15.8, 22.1)] were predominantly BF. The significant factors associated with predominant BF were delivery at home ( $p=0.002$ ), delivery by traditional birth attendants ( $p=0.002$ ), rural residence ( $p=0.022$ ), no postnatal checkup ( $p=0.023$ ), lower socio-economic status ( $p=0.002$ ), and lack of maternal education ( $p=0.016$ ).

**CONCLUSION:** As indicated by our findings, counseling should focus on rural uneducated women, especially in low-socio economic families. Counseling can be very successful in eliminating water supplementation resulting in increased EBF and therefore reducing morbidity in infants.

#### **P104-16 IMPROVING COMPLEMENTARY FEEDING PRACTICES: EVIDENCE FROM SOUTH ASIA**

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**OBJECTIVES:** USAID's Vistaar Project, led by IntraHealth International, facilitated an evidence review to make recommendations to the Government of India on complementary feeding for improved child nutrition.

**METHODS:** A team of recognized national experts conducted the review. The team identified existing evidence from India and the South Asia region through a literature review and direct requests for information from experts in the field. They short-listed 13 interventions based on the criteria that the approaches have documented results at the outcome or impact level.

**FINDINGS:** The experts felt that further application and review of several models showing some successes would be useful (e.g., Positive Deviance, Mainstreaming BCC for Improving Infant Feeding Practices, Appropriate CF Practices)

They felt that the positive deviance approach has potential and should be further applied and evaluated.

The experts felt it would be quite challenging for the Government to adopt donor or NGO-supported pilots since they are often very intensive and context-specific, but they recommended the Government review and consider lessons from these pilot efforts.

**CONCLUSION:** The evidence review process is a useful approach for building consensus among technical experts and program leaders, informing program planning, and assisting with decision-making.

#### **P104-17 EFFECT OF BREASTFEEDING COUNSELING ON EXCLUSIVE BREASTFEEDING PRACTICE**

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The objective of this study was to analyze the effect of breastfeeding counseling (BC) on the length and the rate of exclusive breastfeeding practice of mothers in Bogor, Indonesia. For this purpose a randomized control trial was applied among 68 pregnant women (PW) of poor families, 34 PW for BC group and 34 PW for control group. The BC was given seven times by trained field workers to each mother of intervention group through a home visit counseling on 32nd and 36th weeks of pregnancy, and on 2nd, 5th, 14th, 30th and 120th days after delivering baby.

The results show that the level of nutrition knowledge, attitude

and practice of mothers was significantly higher compared to control group. The length of exclusive breastfeeding among BC group (99.1±60.3 days) was significantly higher than control group (18.9.1±44.6 days). The rate of exclusive breastfeeding using prospective method was 25.8% and 3.4% among BC group and control group respectively; while using cross-sectional method was 70.8% and 10% among BC group and control group respectively.

Exclusive breastfeeding practice was effected by BC with Odd Ratio (OR) 9.7, which indicates mothers given BC 10 times are more likely practice exclusive breastfeeding until 6 months. This implies that the breastfeeding counseling - starting from the third trimester of pregnancy - plays an important role in increasing the length and the rate of exclusive breastfeeding.

#### **P104-18 BREASTFEEDING AND WEANING PRACTICES IN UAE**

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**OBJECTIVES:** The present study aimed at investigating the different breastfeeding and weaning practices of Emirati mothers.

**METHODS:** A total of 593 mothers with infants up to 2 years of age were interviewed in the MCH centers in UAE.

**RESULTS:** Almost all the mothers in the study had initiated breastfeeding (98.3%). The average mean duration of breastfeeding was 8.6 months. The initiation and duration of breastfeeding rates were influenced by mother's age and education, parity, rooming in, nipple problem and use of contraception. Exclusive breastfeeding and almost exclusive breastfeeding rates were highest at 4 months of the infant's age (7.4% and 18% respectively) then the rate declined to 1.9% for exclusive and 6.6% for almost exclusive breastfed infants at 6 months of age. Among infants, 30% were given nonmilk fluids such as: Anis seed drink (Yansun), gripe water and tea before 3 months of age. The majority of the infants (83.5%) received solid food before the age of 6 months. The most reported reasons for terminating breastfeeding were: new pregnancy (32.5%), insufficient milk supply (23.9%), and infant weaned itself (23.9%).

**CONCLUSIONS:** These results indicate that the majority of the infants in the study were breastfed. However, the exclusive breastfeeding rate was very low due to early supplementation of fluid and solid food. The findings suggest that strategies should focus on promoting and encouraging exclusive breastfeeding and breastfeeding continuity for longer periods.

#### **P104-19 EFFECTS OF EDUCATION LEVEL OF FATHER AND MOTHER ON PERCEPTIONS OF BREASTFEEDING**

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**OBJECTIVES:** The specific objectives of the study were, to examine the effects of parent's education on breastfeeding, to assess the pattern of breast feeding for children 0-2 year's age and to assess awareness, belief of father and mother about

breastfeeding.

**METHODS:** The study was conducted in northern area of Dhaka city. It was a descriptive cross-sectional study; sample size was 101. Data collection method was face to face interview by questionnaire.

**RESULTS:** This study examined the effects of education of parents on the breastfeeding practice. Lower education had a significant association ( $p < 0.5$ ) with low breast feeding practice, especially knowledge about breast milk, colostrum, exclusive breast feeding (EBF) and breast feeding. In this study the most important findings was a significant association between knowledge about breastfeeding and education of father and mother. About 86% graduate fathers had knowledge on EBF where as only 23% literate fathers knew about EBF. Though many illiterate mothers were found to practice breastfeeding without knowing the advantages of breast milk. A positive association was found between breastfeeding practice and education of parents.

**CONCLUSION:** The breastfeeding promotion program should be expanded more widely in whole country to let all mothers have the same chance to access the new information and benefits from the program, especially for less educated mothers in our country.

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#### P104-20

##### **FACTORS ASSOCIATED WITH ANEMIA AMONG BRAZILIAN INFANTS UNDER 6 MONTHS OLD**

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**RATIONALE & OBJECTIVES:** Infant iron deficiency is a serious problem in and delayed umbilical cord clamping can boost the child's iron reserves. This study objective was to examine this and other associations.

**METHODS:** Prospective study of 513 infants selected at birth and followed until 150 days. Infant's blood was collected at birth and at 150 days.

**RESULTS & FINDINGS:** 16.9% of mothers experienced anemia during pregnancy. Only 2.1% infant had hemoglobin below 11g/dl at birth, however 49% were anemic at 150 days. The average time of cord clamping was 18.5 seconds and only 3.7% of cords were clamped after 60 seconds. Prevalence of any or exclusively breastfeeding were 72.9% and 1.6% at 150 days, respectively. Multivariate analysis identified significant associations ( $p < 0.05$ ) between anemia and lack of exclusive breastfeeding, low birth weight and prematurity.

**CONCLUSION:** Adequate prenatal care and breastfeeding promotion are likely to protect infants against anemia.

#### P104-21

##### **ESSENTIAL INTERVENTIONS FOR REDUCING MALNUTRITION IN INFANTS AND YOUNG CHILDREN IN INDIA**

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**OBJECTIVE:** As part of its Leadership Agenda for Action to improve India's nutrition security, the Coalition for Sustainable Nutrition Security in India, chaired by Professor M S Swaminathan, focuses on the nutrition situation of Indian children. USAID's Vistaar Project serves as Secretariat.

**METHODS:** The Coalition requested an Expert Task Force to identify the most important evidence-based, cost-effective interventions to reduce malnutrition among India's infants and young children.

**FINDINGS:** The Task Force recommended the following proven interventions:

- Initiation of breastfeeding within one hour of birth
- Exclusive breastfeeding during first six months
- Introduction of complementary foods at six months
- Age-appropriate complementary feeding, adequate in quality, quantity and frequency for children 6-24 months
- Safe handling of complementary foods and hygienic complementary feeding practices
- Full immunization and bi-annual vitamin A supplementation with deworming
- Frequent, appropriate, active feeding for children during/after illness, including oral rehydration with zinc supplementation during diarrhea
- Timely and quality therapeutic feeding and care for all children with severe
- acute malnutrition
- Improved food and nutrient intake for adolescent girls (particularly to prevent anemia) and adult women (including during pregnancy and lactation).

**CONCLUSION:** The Coalition is working with stakeholders to influence policies and programs to implement essential nutrition interventions.

#### P104-22

##### **THE EFFECT OF SPRINCLE TABURIN ON HAEMOGLOBIN CONCENTRATION AND ANEMIA PREVALENCE OF CHILDREN 6-12 MONTHS OLD**

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**BACKGROUND:** Anemia deficiency in infants has reached 64,8% (SKRT 2001). One way to overcome anemia deficiency is to supplement micro nutrition. The objective of the research is to test the efficacy of Taburin sprinkle to Hb concentration and anemia prevalence in infants of 6-12 months of age.

**Method:** The research was conducted in 2008 using double blinded pre-post test controlled design. The number of sample is 152 infants,  $\sigma$  Hb = 1,03 (Sunawang, 2007), reliability 95% (1,96), power test 80% (0,842). Before and after research, Hb concentration was tested. Taburin is given for as long as 90 days.

**RESULTS:** There was no significant difference in Hb concentration before and after the intervention in each group and the increase of Hb concentration between the two groups. However, there was a significant difference of Hb concentration between the two groups after intervention ( $p=0,038$ ). Velocity Hb concentration in the intervention group was 0.21 or four times higher than the controlled group (-0,0069). The intervention of Group Proportion whose Hb concentration did not increase is smaller (0,269) as compared to the controlled

group (0,346). The proportion of anemic infants was normal in the intervention group (42,5%) and controlled group 17,4%. Normal infants suffered from anemia in the intervention group is 39,2%, controlled group 53,9%. Cure rate in the intervention group is 23,39%, controlled -13,23%. Taburin is protective to anemia (RR is -0,76). In the controlled group, anemia risk is 1,31 (RR 1,31).

**CONCLUSION:** Taburin consumed in 90 days can increase Hb concentration, prevent anemia and decrease anemia prevalence. To obtain more significant results it is advisable to consume Taburin more than 90 days. Further study is required to determine the exact time to consume taburin.

#### P104-23

##### THE EFFECT OF SPRINKLE TABURIN ON GROWTH AND MOTORIC DEVELOPMENT OF INDOENSIA CHILDREN 6-12 MONTHS

Zescamelya Uno<sup>1</sup>, Hariadi<sup>2</sup>, Suryani Army<sup>1</sup>, Noldy Tampi<sup>2</sup>, Widjianto<sup>2</sup>, Abdul Razak Thaha<sup>1</sup>

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**BACKGROUND:** Sprinkle Taburin is a multivitamin-mineral containing 15 kinds of vitamin and mineral in a powder form. The objectives of this research is to assess the effect of Taburin to the growth and development of children aged 6-12 bulan. The study was carried out using double blind pre-post test control group design. Taburin was consumed for as long as 90 days.

**RESULTS:** The growth line of intervention group is slightly under the WHO normal growth line, while controlled group is lower than the intervention group. Development mean of all indicator Z-score decreased in both groups and statistically not significant. Decrease in intervention group is as follows: WAZ (male  $-0,20 \pm 0,38$ ; female  $-0,24 \pm 0,40$ ), HAZ (male  $-0,45 \pm 0,41$ ; female  $-0,47 \pm 0,48$ ). Development Mean HAZ (male  $-0,43 \pm 0,49$ ; female  $-0,35 \pm 0,36$ ) and WHZ ((male  $-0,07 \pm 0,57$ ; female  $-0,1 \pm 0,49$ ); compared with controlled group: WAZ (male  $-0,36 \pm 0,37$ ; female  $-0,38 \pm 0,39$ ), HAZ (male  $-0,43 \pm 0,49$ ; female  $-0,35 \pm 0,36$ ), and WHZ (male  $-0,32 \pm 0,62$ ; female  $-0,4 \pm 0,53$ ).

The effect of Taburin was not optimal to the growth for a reason: macronutrient intake was not optimum (when compared to the child's RDA) both in intervention group (74.4% energy and 91.6% protein) and controlled group (74.9% energy and 84.5% protein).

The motoric development is better significantly in intervention group ( $22,8 \pm 16,0\%$ ) than in controlled group ( $1,3 \pm 14,5\%$ ) (p value = 0,000).

**CONCLUSION:** Taburin has no significant effect to child growth when the macronutrient intake is not optimal. In the same condition, Taburin has significant effect to child motoric development.

**SUGGESTION:** Taburin should be consumed together with CF that contains optimal macronutrient.

#### P104-24

##### CESAREAN SECTIONS PREVENT THE TIMELY INITIATION OF BREASTFEEDING IN BRAZIL

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**OBJECTIVES:** Examine the association between newborn's delivery mode and the timely initiation of breastfeeding (TIBF), i.e., within one hour after delivery.

**MATERIAL & METHODS:** Analytical sample included 5793 women with children < 5 y participating in the 2006 Brazilian Demographic and Health Survey (DHS). Univariate and bivariate analyses adjusted for sampling design effects.

**RESULTS & FINDINGS:** The TIBF rate was 42.9%. A total of 57.3% of infants were delivered vaginally, 19.5% through an elective- and 23.2% through an emergency- cesarean section. The corresponding TIBF rate across delivery modes was 51%, 31%, and 33%, respectively (p<0.001).

**CONCLUSIONS:** Planned or unplanned cesarean section deliveries represent a major barrier for TIBF. Preventing unnecessary cesarean sections and offering breastfeeding initiation support to women delivering their newborns through this surgical procedure is likely to improve early breastfeeding outcomes in.

#### P104-25

##### EFFECTS OF FERMENTATION AND GERMINATION ON FORMULATED SWEET POTATO-COWPEA COMPLEMENTARY FOOD

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**RATIONALE AND OBJECTIVES:** Poor weaning practices and high cost of complementary foods aggravate childhood malnutrition and mortality. Thus complementary foods were prepared from blends of raw (untreated) and fermented sweet potato along with germinated, fermented and raw cowpea flours that could be acceptable and nutritionally adequate.

**METHODS:** Chemical, physical and sensory properties of sweet potato cowpea weaning foods were determined using standard methods.

**RESULTS AND DISCUSSION:** The protein content of the various formulations ranged between 16.3% and 24.50%. Germination decreased the protein and fat contents, but slightly increased the crude fiber and carbohydrate contents of cowpea flour. The caloric content of sweet potato- cowpea weaning food ranged between 352 and 359 kcal/100g. Fermentation and germination decreased the water absorption capacity of cowpea while fermentation increased that of sweet potato flour. Physicochemical properties were also determined.

**CONCLUSION:** The results showed that acceptable complementary foods could be prepared from sweet potato and cowpea blends.

#### P104-26

##### EFFECTIVENESS OF LOCALLY PRODUCED PLUMPYNUT AND NEWLY DEVELOPED READY-TO-USE FOODS (RUF) FOR WASTED CHILDREN IN NIAS, INDONESIA

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Pangaribuan, Rosnani V.; Purwestri, Ratna C.;

Qaim, Matin; Scherbaum, Veronika; Suryantan, Julia;

Wirawan, Nia N.

University of Hohenheim, Germany

**OBJECTIVES:** In daily program for moderately/mildly wasted children, to study the effectiveness of locally produced PlumpyNut and RUF-biscuits on weight gain.

**METHODS:** Wasted children (weight-for-height z-score:  $\geq -3$  to  $< -1.5$ ) aged  $\geq 6$  to  $< 60$  months were recruited in the Church World Service project area in Nias Island from October 2007 to June 2008. Feeding centres were randomly selected; all eligible children in the respective centre received one appointed food-based intervention in a daily program. Discharge criteria was  $WHZ \geq -1.5$  SD.

**PRELIMINARY RESULTS:** So far, 63 out of 101 moderately/mildly wasted children recovered successfully. Best weight gain (3.7g/kg/BW/d) was achieved by RUF-biscuits, followed by locally produced PlumpyNut (3.5g/kg/BW/d) in daily intervention programs.

The average length of stay was approximately 3-5 weeks. Although the price of locally produced PlumpyNut (0.30-0.39 € per 100g) was higher than of RUF (0.16 – 0.17 € per 100g), slightly better weight gain was achieved with RUF biscuits.  
**CONCLUSION:** Moderately/mildly wasted children receiving locally produced RUF-biscuits and PlumpyNut in daily programs gained sufficient weight and recovered quickly.

**P104-27**  
**PROTECTING THE RIGHT OF CHILDREN AND WOMEN FOR BREASTFEEDING –THE PHILIPPINE EXPERIENCE**

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**RATIONALE AND OBJECTIVES:** The Philippines is one of the countries with the lowest breastfeeding prevalence rates with only 33% of infants below six months are exclusively breastfeeding. Many factors contribute to the diminished breastfeeding culture including inadequate promotion of breastfeeding and lax enforcement of breastfeeding laws and policies.

**MATERIALS AND METHODOLOGY:** The presentation will describe the turn-about of country efforts to promote, protect and support breastfeeding. Data is derived from review of policies, programs and guidelines related to breastfeeding.

**RESULTS AND FINDINGS:** A National Policy and Plan of Action on infant and young child feeding (IYCF) were approved in 2005 which aims to protect breastfeeding in various settings. The implementing rules and regulations of the Milk Code was revised in 2006. A policy to revive the MBFHI was adopted in 2007. Massive training on IYCF and nationwide and local breastfeeding promotion is being done. Exclusive breastfeeding rates continue to increase from 44% in March, 49% in June and 50% in September 2008.

**CONCLUSION:** Protecting breastfeeding requires strong political will, enactment of laws and provision of support for massive promotion.

**P104-28**  
**EXCLUSIVE BREASTFEEDING RESULTED IN BETTER GROWTH OF INFANTS 0-6 MONTHS: EVIDENCE FROM A LONGITUDINAL STUDY IN RURAL BANGLADESH**

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**RATIONALE & OBJECTIVES:** WHO promotes exclusive breastfeeding (EBF) for the first 6 months. We investigated the effects of EBF on growth of infants to this age in rural Bangladesh.

**MATERIALS & METHODS:** We measured feeding, weight, length, and morbidity of 2,886 infants monthly from 1-6 months. Infant feeding trajectories were constructed based on EBF, intermittent mixed, and committed mixed feeding. We used linear regression to examine associations between feeding and growth adjusting for potential confounders.

**RESULTS & FINDINGS:** Median duration of EBF was 118 days, with 11% EBF at 6 months. EBF was associated ( $P<0.001$ ) with greater attained weight (0.090 and 0.052 kg at 2 and 4 months, respectively) and length (0.2 and 0.1 cm at 2 and 4 months, respectively) of infants. Underweight (1.7-2.2 times) and stunting (1.4-1.7 times) were lower ( $P<0.05$ ) among EBF infants compared with other infants.

**CONCLUSION:** Promotion of EBF should be reinforced for better infant growth to prevent undernutrition in low-income

countries.

**P104-29**  
**INFANTS WELL-NOURISHED DESPITE POVERTY: WHAT MAKES THEM DIFFERENT?**

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**RATIONALE & OBJECTIVES:** Positive deviant (PD) infants are poor yet well nourished. We studied factors that contributed to this difference. In 2004, in three villages of 0 21 MicrosoftInternetExplorer4

Besides genetic predispositions, environmental factors have an important impact on the development of non-infection diseases. The main goal of PP400T was focused on epidemiological situation concerning risk factors for cardiovascular diseases among inhabitants of Polish small towns and villages.

The aim of the project was to evaluate frequency of overweight and obesity occurrence among children and adolescents in small towns and villages as well as their knowledge on health-related behavior.

**MATERIALS AND METHODS:** The study included 1515 subjects, age 6 to 18, from small towns and villages. Overweight was diagnosed when BMI exceeded 90 centiles, whereas obesity over 95 centiles. The data collected in the survey was analyzed with the SAS System for Windows Release 8.02.

**RESULTS:** Overweight was determined in 9.0% and obesity in 5.1% of the population in the study. In the girls 14-18 years old, an excess of body mass was more frequently detected as compare to boys ( $p = 0.005$ ). In younger children, no sex-related difference was found out.

In the poll, the subjects unanimously considered the following products as healthy: fruits and vegetables, milk and diary products and wholegrain bread. Girls' knowledge was significantly higher than the boys', especially in the older age groups.

The alarming problem in this study was that nearly 40 % of responders (children and adolescents) did not consider tobacco smoking, alcohol drinking and drugs intake as health deteriorating factors. The study showed that responders used to spend about 3.5 hours daily watching TV or computer. At the same time, it was observed in older age groups that physical activity decreased as a result of longer TV or computer hours. In subjective assessment 37% respondents claimed to be very active physically, 53% perceived themselves as averagely active and 10% as less active. Boys were more physically active than girls in all age groups.

**CONCLUSIONS:** The study shows that intervention concerning healthy life-style should be applied very early and education should be continued during all life span.

**P104-30**  
**LEARNING AND UTILIZING LOCAL WISDOM FOR BREASTFEEDING PROMOTION**

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**RATIONALE & OBJECTIVES:** Behaviour promotion programs often struggle to ensure sustained adoption of recommended messages. We used wisdom of mothers/families practicing optimal behaviours to develop breastfeeding (BF) promotion messages/strategy.

**MATERIALS & METHODS:** All mothers of infants < 6 months in seven villages in Agra(India) were interviewed. Those practicing positive BF behaviours were probed to identify reasons for doing so.

**RESULTS & FINDINGS:** Reasons that emerged were – i) family especially grandmother (mother-in-law/older women of household) strongly perceiving positive benefit of the behaviour and advised/supported mother to follow it, ii) mother's

self-perception of the benefit either through observation in community or past experience, iii) benefit of practicing the behaviour centred around child and easing household chores, iv) tradition(s) favoured behaviour adoption and v) reinforcements by a government doctor/nurse and T.V. programs.

**CONCLUSION:** Utilizing reported reasons, messages were contextualized for promotion in a follow-on program. These messages included technical benefit as well as benefit perceived by these mothers. This approach also helped identify strategies to promote BF. One being, promoting messages through people who promote positive behaviours in their families.

### **P105: Food Fortification for Optimal Nutrition III**

#### **P105-01 THE NATIONAL SURVEY OF SODIUM CHLORIDE INTAKE AMONG THAIS**

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The first national survey of sodium chloride intake was conducted during 2007-2008. The purpose of this survey was to determine the amount of sodium chloride consumed by Thai people from all sources. The data obtained can be used for the development of salt iodization strategy in the National Iodine Deficiency Disorders Control Program.

The survey was conducted using stratified multistage sampling from the level of region, province, district, sub-district, village and household. 2,733 households from 10 provinces were included in this survey. Seven days food list recall was used to collect the information regarding the frequency consumption of salt containing food and 3 days weight inventory method was employed to find out the amount of food composed of sodium chloride from all sources. The exact amount of sodium chloride was determined from nutrition labeling, known sodium chloride level for common foods and also from laboratory analysis.

The survey result showed that average amount of sodium chloride intake from all sources of food was 10.88 gm/person/day (S.D.± 2.60g) of which was direct household use and 0.88 gm received from outside cooked food. The household sodium chloride consisted of 3.0 gm from salt, 2.6 gm from fish sauce and the rest was from various sources of salt containing condiments.

The finding of this survey can be used for the adjustment of the iodine level to fortify to salt and consideration to fortify iodine in other food condiments.

#### **P105-02 EVALUATION OF LEGISLATED FORTIFICATION OF STAPLE FOODS IN A SENTINEL SITE (SOUTH AFRICA)**

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**RATIONALE AND OBJECTIVES:** Food fortification is a universally accepted intervention to improve micronutrient intake. The primary objective of this study was to evaluate the nutritional status of children pre- and post-legislation of fortification of staple foods.

**MATERIALS & METHODS:** This unmatched case-control study compared anthropometric and biochemical micronutrient status of Grade 1 school children pre-fortification and one and three years after fortification. 200 schoolchildren were randomly selected each year with proportionate representation from the six primary schools in the sentinel site. Following ethical approval and written informed consent (response rate 54%) data collection was done by trained fieldworkers using standardized and trace element free procedures.

**RESULTS & FINDINGS:** Only mean weight-for-age was statistically significantly higher compared to baseline. The

prevalence of underweight, stunting and wasting did not change significantly. Mean serum zinc, ferritin, and serum vitamin A status improved statistically significantly whilst the dietary intake (corrected for fortification effect) remained the same.

**CONCLUSION:** The findings from this sentinel site suggest that legislated fortification of food did have a significant impact on biochemical micronutrient status of 7-year old learners.

#### **P105-03 IMPACT OF A MULTIPLE MICRONUTRIENT FORTIFIED SALT ON THE NUTRITIONAL STATUS AND COGNITION OF SCHOOL CHILDREN**

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**RATIONALE & OBJECTIVE:** This study was conducted to test the efficacy of a multiple micronutrient fortified cooking salt in combating micronutrient deficiencies and its effect on cognition in children.

**METHODS:** A pre and posttest design was used to study children 5 to 18 years of age, with an experimental and a control group. The experimental group (n=213) and the control group (n = 189) consisted of children from 3 residential schools in each group. The experimental group received a fortified salt containing vitamin A, B1, B2, B6, B12, folic acid, niacin, iron, iodine and zinc. The control group received iodized salt. Intervention period was 9 months when the given salt was used in cooking in all the meals. Biochemical measurements (hemoglobin, serum ferritin, serum transferrin receptor, CRP, serum retinol, serum B12, serum folic acid, serum zinc and urinary iodine) were measured at baseline and at endpoint. Children who were older than 11 years were given cognitive tests for memory and attention.

**RESULTS:** There was a significant improvement (P<0.05), ANOVA, in all the biochemical measurements and memory scores in the experimental group when compared with the control.

**CONCLUSIONS:** The micronutrients are bioavailable from the fortified salt used in this study and efficacious.

#### **P105-04 DOES IRON FORTIFICATION HAVE AN IMPACT ON THE OXIDATIVE STRESS STATUS AMONG NON- ANEMIC MEN?**

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**RATIONALE & OBJECTIVES:** This study is designed to assess the effect of flour fortification program with Iron on oxidative stress biomarkers and Iron status among non-anemic 40-65 year old men.

**MATERIALS & METHODS:** This was a field trial study and had control group. 189 volunteers recruited in a multi-stage stratified method. Anthropometrics, measuring blood pressure, FFQ (with 110 items), 3 times 24hour recall, physical activities (short version of IPAQ) are the main data that will be gathered. The plasma level of Malondialdehyde (MDA), Total Antioxidant capacity (TAC), Super Oxide Dismutase (SOD), Protein carbonyl, and Oxidized LDL are the oxidative stress biomarkers in our study. After base line data gathering flour fortification program was started with 30 PPM Iron as ferrous sulfate and all participants were followed for 8 months.

**RESULT & FINDING:** The data is under process and will be presented at the congress time.

#### P105-05

##### EFFECT OF HELICOBACTER PYLORI INFECTION ON IRON ABSORPTION IN ASYMPTOMATIC ADULTS CONSUMING IRON AND ZINC FORTIFIED WHEAT

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The objective of the study was to determine the effect of Helicobacter pylori infection (HP) on Fe absorption in asymptomatic adults consuming Fe and Zn fortified wheat. HP was assessed using the C13-urea breath-test. Day 1: subjects received for breakfast bread fortified, per Kg flour, with either 55 mg Fe, as sulfate (FeS), + 60 mg Zn, as sulfate (ZnS), labeled with <sup>59</sup>FeS, or same amounts of Fe, as fumarate (FeF), + Zn, as oxide (ZnO), labeled with <sup>55</sup>FeF. Day 3: they received the other type of bread. Day 17: blood was drawn to assess circulating radioactivity. Fe absorption was determined using Eakins and Brown's double-isotopic technique. Prevalence of HP was 78%. 14 HP-negative and 16 HP-positive individuals completed absorption studies. There were no significant differences in Fe absorption of either FeS or FeF by infection status. HP has no effect on iron absorption in asymptomatic adults consuming Fe and Zn fortified wheat. FONDECYT grant 1080032

#### P105-06

##### YOUNG FDA PARTICIPATION IN IODINE DEFICIENCY DISORDERS PREVENTION AND CONTROL PROGRAM

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**OBJECTIVES:** Major measure to control IDD in is salt iodization. The Public Health Notification stipulates that iodine in edible salt should not less than 30 ppm. It is vital that iodized salt quality be monitored regularly.

**METHOD:** Young FDA have been established by FDA to monitor toxic substances: borax, formalin, sodium hydrosulfide, and salicylic acid in processed food. They are school children trained to use simple kits in their communities and schools on voluntary basis. Since I-kit has been developed and young FDA are capable of using test kits, Department of Health has requested FDA for young FDA participation in checking iodine content in edible salt by I-kit. Iodine quality control by young FDA under supervision of Bureau of Inspection and Evaluation, Public Health Ministry has been implemented since 2006. After being trained, young FDA has monitored iodized salt quality ever since twice a year (Dec-Jan and May-Jun) in their households, schools, fresh markets in communities. Young FDA disseminate IDD knowledge to their parents and friends as well.

**RESULTS:** From Bureau of Inspection and Evaluation report nationwide household coverage of qualified iodized salt was 82.6% in 2007 and 85.4% in 2008 higher than the target indicator of 70% and 85% in 2007 and 2008, respectively.

**CONCLUSION:** Young FDA participation in IDD control program has strengthened iodized salt quality control greatly, as a role model not only in household iodized salt monitoring but also awareness raising in their communities.

#### P105-07

##### EXPLORING THE POTENTIAL OF USING FLAXSEED IN PAN BREAD

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This study is to improve the nutritional quality of pan bread by utilizing varying levels of flaxseed as a source of omega-3 fatty acid.

Whole wheat flour (WWF) and white flour (WF) were used as control flour, while varying levels with 2, 4, 6, 8% of whole or crushed flaxseed in replacement of control flour, on 14% moisture basis, optimized formulations were developed using only 4, 8% flaxseed and 0.5% DATEM. Fatty acid A-MTH method was utilized for determining content of omega-3 fatty acid using HP Gas Chromatograph, Flame Ionization Detector and column CP-Sil-88 Tailor Made FAME, 50MX0.25mm (Chrompack 7488).

The content of omega -3 in WF pan bread with 4% crushed flaxseed was 13.9%, WF pan bread with 8% crushed flaxseed was 20%, and WF pan bread with 4, 8% whole flaxseed levels were 13.65%, 21.65% respectively compared to only 2.4% with WF bread control. The content of omega -3 in WWF pan bread with 4% crushed flaxseed was 11.75% and WWF pan bread with 8% crushed flaxseed was 17.95% and WWF pan bread with 4, 8% whole flaxseed levels were 13.75%, 23.05% respectively compared to only 3.55% with WWF bread control.

Flaxseed can be successfully used for producing bread, rich in omega-3 fatty acids providing healthy food products.

#### P105-08

##### PHYSICO-CHEMICAL COMPOSITION AND SENSORY ACCEPTABILITY OF COWPEA-FORTIFIED BISCUITS

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Cowpea is an inexpensive source of vegetable proteins. Although, its use as substitution improves the nutritional values of foods, it may influence the acceptability of finished products. This study evaluated the effects of cowpea varieties and dehulling methods on nutritional quality and acceptability of cowpea-fortified biscuits. White, maroon and mottled cowpeas were dry dehulled and wet dehulled prior to milling into flours. Dehulled cowpea flours were substituted with wheat flour at 10, 20, 30 and 40% (w/w) levels for the preparation of cowpea-fortified biscuits. Physico-chemical analyses and sensory acceptability test were conducted on processed biscuits. There was no significant variation (p<.05) in studied parameters among cowpea varieties. Density of biscuits was affected by dehulling methods and cowpea proportion in biscuits. Cowpea addition at 30% and 40% levels increased the protein contents of biscuits by approximately 17% and 30% respectively. Fat contents were not significantly different (12.5%). Up to 30% cowpea in biscuits was acceptable for colour, texture and taste. Biscuits containing 40% cowpea was less desirable and unacceptable due to the perception of beany flavour. Flour mix consisting of 70% Wheat and 30% cowpea could be recommended for the production of acceptable cowpea-fortified biscuits.

### P105-09

#### IMPLEMENTING AN EFFECTIVE COMMUNICATIONS PROGRAMME FOR SUCCESSFUL FOOD FORTIFICATION IN GHANA

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Anemia and Vitamin A deficiency are highly prevalent in Ghana. While over 70% of preschool children are affected by both deficiencies, about 65% of pregnant women and 41% of women of child-bearing age are anemic.

A social marketing and communications campaign being implemented as part of the GAIN –supported National Food Fortification Programme in collaboration with UNICEF aims at creating awareness and improving knowledge on the control of these deficiencies through the consumption of fortified wheat flour products and fortified vegetable oil as part of a nutritionally adequate diet.

The campaign was developed based on findings of consumer research

Materials developed which comprised radio spot and jingle, posters, print advertisement, leaflets, stickers and aprons were branded with a logo

Other aspects of the campaign included community-level communication activities.

The campaign is expected to increase awareness about micronutrient deficiencies and improve knowledge on benefits of consuming fortified foods. Due to the high cost of mass media activities, prominence should be given to community level communication activities

### P105-10

#### DAILY CONSUMPTION OF ENRICHED MILK IN HEALTHY CHILDREN: SERUM MICRONUTRIENT LEVELS

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**RATIONALE & OBJECTIVES:** Serum micronutrient assessment after daily consumption of enriched milk during 5mo in healthy children (8-14y).

**MATERIALS & METHODS:** 107 children (both sexes, randomized-double-blind-placebo study) were assigned into two groups: 1) Supplemented group (n=53, SG) who consumed 0.6 L/day of enriched milk (Puleva Max®) containing fish oil, oleic acid, carbohydrates, vitamins and minerals, 2) Control group (n=54, CG) who consumed 0.6 L/day of standard whole milk. Serum iron, transferrin, ferritin, calcium, vitamins D and E levels, and transferrin saturation index were measured in both groups at 0 and 5mo.

**RESULTS & FINDINGS:** Serum calcium and vitamin E levels increased in SG. Transferrin saturation index increased and serum ferritin levels diminished in CG.

**CONCLUSION:** The consumption of enriched milk with fish oil, oleic acid, minerals and vitamins enhanced serum calcium and vitamin E levels, and iron status.

### P105-11

#### LYSINE-FORTIFICATION OF ICED-KENKEY, AN INDIGENOUS FERMENTED MAIZE-DRINK

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**RATIONALE AND OBJECTIVES:** Iced-kenkey is an indigenous maize-based food beverage in Ghana. Nutritionally, it is limited in lysine and was therefore considered for lysine-fortification. The objective of this study was to investigate the acceptability and nutritional value of lysine-fortified iced-kenkey.

**MATERIALS AND METHODS:** A Box-Benken design was used to produce lysine-fortified iced-kenkey samples using an improved traditional process. The samples were analyzed for amino acids, protein, fat, ash, sugars, iron and energy contents. They were also subjected to sensory analysis as well as a consumer survey.

**RESULTS AND FINDINGS:** Lysine fortification up to 0.5% yielded a product that was acceptable organoleptically. The lysine-fortified iced kenkey was highly acceptable to beverage consumers.

**CONCLUSION:** The study showed that Iced-kenkey could be a suitable vehicle for lysine administration in Ghana.

### P105-12

#### ON-FIELD TEST FOR IRON-FORTIFIED WHEAT FLOUR

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This special kit has been designed to identify the amount of iron added to wheat flour. The added iron is mostly in ferrous form, but there may be a little amount of ferric iron present in the medium; this latter is also identified by the specified test, due to the ingredients that convert ferric iron to ferrous one.

This kit can also be employed for quantitative measurement of iron in fortified flour, and this is accomplished by means of a calibrated color-chart specially prepared for this purpose.

The test is done through solely one drop of the reagent and needs about 30 to 60 seconds in order to identify the added iron in a fortified wheat flour sample.

### P105-13

#### FERRIC SODIUM EDTA: SAFE, EFFECTIVE AND RECOMMENDED

Wreesmann, Carel AkzoNobel, Arnhem, NLD

**RATIONALE & OBJECTIVES:** In order to fight iron deficiency anemia (IDA) food fortification is promoted. For iron a multitude of number of fortificants are available. Although an increasingly number of countries fortifies staple food e.g. wheat flour with iron, the worldwide battle against IDA has not been very successful so far. Ferric sodium EDTA (FeNa-EDTA) is a safe and effective iron fortificant that holds a promise to change this situation.

**MATERIALS & METHODS:** An overview based on data from scientific literature will be presented to support above-mentioned statement and the implications regarding recommendations for use.

**RESULTS & FINDINGS:** Numerous studies have confirmed both the safety and the effectiveness of FeNa-EDTA. This iron fortificant has been shown to be an excellent source of iron in wheat and maize flour, in soy and fish sauce and in powdered beverages.

**CONCLUSION:** As FeNa-EDTA has now been declared GRAS by US FDA (2006) and fully suitable for human use by JECFA (2007), the new “guidelines on food fortification with micronutrients” of FAO/WHO (2006) recommends solely this

iron compound for “the mass fortification of high-phytate cereal flours and for sauces with a high peptide content (e.g. fish sauce, soy sauce)”.

A technical workshop on wheat flour fortification organized by the US CDC in, USA in April 2008 that was attended by over 100 experts from all over the world reached a consensus agreement that “the preferred order of iron fortificants for wheat and maize flour are NaFe-EDTA, ferrous sulfate and ferrous fumarate”.

These new developments should stimulate a broader use of FeNa-EDTA, which can be expected to lower the incidence of IDA worldwide significantly at affordable costs.

### **P106: School Nutrition III**

#### **P106-01**

##### **FACTORS PREDICTING COWPEA CONSUMPTION AMONG SCHOOL PUPILS IN NORTHERN REGION OF GHANA**

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**RATIONALE AND OBJECTIVE:** Cowpea is a legume with huge potential for meeting the protein and iron requirements of poor populations. The aim of this work was to identify factors predicting the intention to consume cowpea by school pupils in Ghana

**SUBJECTS AND METHODS:** A sample of 120 mother-pupil pairs was selected from two schools participating in a school feeding program to participate in the cross-sectional survey. The combined model of Theory of Planned Behaviour and Health Belief Model was used. Analysis done included test for scale reliability, Spearman Correlations and multiple linear regression.

**RESULTS:** Intention was significantly correlated with cowpea consumption ( $rs=0.695$ ,  $p=0.000$ ). Attitude towards behavior (stand.  $\beta = 0.307$ ;  $p=0.009$ ) and cues to action (stand.  $\beta = 0.181$ ;  $p=0.071$ ) contributed significantly to the prediction of intention to consume cowpea. Health behavior identity was significantly correlated with attitude towards behavior ( $rs=0.415$ ,  $p=0.000$ ) and perceived barriers ( $rs=-0.262$ ,  $p=0.002$ ). Health value (stand.  $\beta = 0.470$ ;  $p=0.000$ ) contributed significantly towards the prediction of health behavior identity.

**CONCLUSION:** This study showed that attitudes and cues associated with cowpea consumption are factors predicting the intention to consume cowpeas amongst school pupils. Barriers were poor predictors of intention and behavior.

#### **P106-02**

##### **CONTRIBUTION OF SCHOOL LUNCH TO IMPROVEMENT IN MICRONUTRIENT (IRON) STATUS OF SCHOOL PUPILS IN TOLON-KUMBUNGU DISTRICT OF NORTHERN GHANA**

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**RATIONALE AND OBJECTIVE:** School Feeding Programs are common in both developing and industrialized countries. Little has been demonstrated of their ability to improve micronutrient status of pupils. The present study aims at assessing the contribution of the Ghana School Feeding Programme (GSFP) to improve iron status of pupils in lower

primary.

**SUBJECTS AND METHODS:** 382 lower primary pupils from four schools participated in the cross-sectional study. Two communities are beneficiaries of the GSFP and two communities were selected as controls. A trained phlebotomist took venous blood from the upper arm of pupils. Samples were stored in heparinised tubes while on field. The cyanmethemoglobin method was used to measure the level of hemoglobin in samples.

**RESULTS:** Blood hemoglobin (Hb) concentrations were available for 377 (98.7%) pupils of the 382 pupils who participated and ranged from 4.7g/dl to 14.2g/dl. Overall, about 82% of pupils were anemic. Mean hemoglobin concentration was significantly higher among participating schools (10.4g/dl) than non-participating schools (9.6g/dl).

**CONCLUSIONS:** Anemia prevalence is very high among pupils irrespective of participation status. Participation in the school feeding program appears to improve iron status.

#### **P106-03**

##### **NUTRIENT DENSE PORRIDGES TO CONTROL NUTRITIONAL DEFICIENCIES IN SCHOOLCHILDREN: A STUDY IN UNDERPRIVILEGED DISTRICTS OF ANTANANARIVO**

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Gret - Access To Essential Services  
Campus Du Jardin Tropical, FRN

**RATIONALE & OBJECTIVES:** To test the usefulness of an energy and micronutrient-dense porridge consumed as a snack in public primary schools of Antananarivo.

**METHODOLOGY:** A quantitative 24-hour recall dietary survey was carried out on 145 schoolchildren having consumed the snack the day before and 200 having not. Intakes of usual foods and snacks were converted into energy and micronutrient intakes using food composition tables. These intakes were compared between the two groups using analysis of variance.

**RESULTS:** The consumption of the snack had no impact on intakes of usual foods which in average met only 68% of the energy requirements and less than 60% of the RDA for most micronutrients. A strong increase of energy (+26%), lipid (+60%) and micronutrient intakes was observed for children who consumed the fortified snacks, thus allowing them to meet the corresponding RDA.

**CONCLUSION:** Use of a nutrient dense porridge within the frame of a School Feeding Program can be an effective way to improve energy intakes and to control micronutrient deficiencies amongst schoolchildren.

#### **P106-04**

##### **FRIENDLY COMPUTER PROGRAM FOR SCHOOL TO SELF-EVALUATING LUNCH NUTRIENTS QUALITY THROUGH THE SIMPLE TEN POINT SCORES**

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**OBJECTIVES:** To improve school meals which energy and important nutrients are inadequate, a computer program for supporting self-evaluating menus plan at school level was developed.

**METHODS:** The 40% Thai DRI were nutrients goal. Ten point scores were replaced scientific units of nutrients. Recommended recipes of popular menus were developed. The nutrients quality of each recipe was present in score system. The mathematical model for self-matching menus set was designed.

**RESULTS:** The “School Lunch Menus and Recipes Management” program for self-cycle menu planning was developed and post on Thai Research Fund’s website. It supports

calculating the raw materials and estimated budget according to number of consumers. User able to choose prepared weekly menus or self-design. Sixty menu sets which average score of weekly menu were met all nutrients goal within the budget were demonstrated. Recalculating the budget for the same menu sets cause of food price crisis in 2008 indicated that need increasing 30% budget.

**CONCLUSION:** The program was put on trial in the pilot schools of Progressive School Nutrition Project. Government approved increasing school lunch budget.

#### **P106-05**

##### **SCHOOL FEEDING: OUTCOMES AND COSTS**

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<sup>4</sup>World Food Programme, ITA; <sup>5</sup>World Food Programme, PAN;

<sup>6</sup>World Bank, USA

**RATIONALE AND OBJECTIVES:** School-feeding programs are popular in developing countries but have previously had few sound, empirical analyses of their costs and outcomes. The objectives of this study were to provide realistic estimates of the costs and combine these estimates with outcomes for school feeding.

**METHODS:** Cost analyses were conducted in four African countries by reviewing school-feeding costs provided by the World Food Programme, interviewing stakeholders in ministries of education and in the community, and/or reviewing independent cost studies. To obtain cost per outcome data, outcomes were obtained from a review of school-feeding studies.

**RESULTS & FINDINGS:** The cost of school feeding ranged from US\$28 to US\$63 per child per year (weighted mean cost of US\$40 per child per year). The cost for an extra day of attendance was less than US\$10 per student, while the cost per extra kilogram of weight ranged from US\$38 to US\$252. Costs for cognitive outcomes were similarly variable.

**CONCLUSION:** This analysis estimates a higher average cost but a narrower range of costs when compared with previous estimates. The cost per outcome was high, but this analysis does not capture the full range of outcomes (e.g., social protection) potentially derived from school feeding.

#### **P106-06**

##### **ADHERENCE TO FOOD GUIDE PYRAMID RECOMMENDATIONS OF SCHOOLCHILDREN IN COLOMBO, SRI LANKA**

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This study was conducted to investigate the dietary intake of the major food groups by the schoolchildren in the City of Colombo. Children aged 10-12 y (n=373) were studied for intake of foods from six different food groups and compared with the food pyramid recommendations of United States of Department of Agriculture (USDA). Except for the 'grain and starchy food group', average number of daily servings of all other food groups were below the recommendations. None of the children had met USDA recommendations for all food groups. Among the children 98% achieved the recommendations for 'grains and starchy foods'. The achievement of 'fruits', 'vegetables', 'milk and milk products' and 'meat and beans' recommendations were 18%, 11%, 1% and 13%, respectively. About 53% of the children consumed fast foods/bakery products as the breakfast at least once in three days. Confectioneries were the main snack consumed by 24% of the children followed by biscuits (16%) and fast foods (14%) at least once per three days. In conclusion, the dietary intake of the school children does not comply with the USDA My Pyramid recommendations.

#### **P106-07**

##### **TEENAGERS' EDUCATIONAL COORDINATES REGARDING HEALTH**

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**INTRODUCTION:** In 2008, the "Francisc I. Rainer" Anthropological Institute together with the Institute of Public Health, Bucharest, initiated a research theme on an urban adolescent population regarding eating behaviors, weight control and health state. In this paper we intend to investigate the BMI (Body Mass Index), subjects' risk behaviors and health state.

**METHODS:** As part of a larger study a test sample of 169 subjects between 15 and 19 years old was recruited among civilian population and a questionnaire with 26 items was applied. Anthropometric features collected and analyzed in this paper were subjects' height and weight. Data was analyzed with SPSS 16.

**RESULTS:** The analyzed sample is characterized by a medium BMI (Body Mass Index) of 20.18, so 92.3% of our subjects are normoponderals according to WHO classification. The distribution of those three anthropometric markers (height, weight, and BMI) is an approximately normal one. We found a mean height of 1.66 m in women and 1.78 m in men, together with a medium weight of 54kg in women and 67kg in men. Pearson's  $\chi^2$  test indicates a direct significant correlation between subjects' sex and the regular physical activity, adolescent boys being more active than girls ( $p < 0.005$ ). On the other hand, girls are significantly paying more attention to weight control than boys ( $p < 0.005$ ). An encouraging fact discovered was that both girls and boys gave a correct description of their own weight (perceived corporeality). The overweighted subjects were found exclusively in the girls' group (5.4% of total). We must point out an alarming fact - we found no significant statistical differences on sexes regarding smoking and alcohol drinking. We found no correlation between subjects' physical daily activities and their BMI or acknowledged diagnosed diseases, but this could be due to the lack of medical investigations.

**CONCLUSIONS:** It is really encouraging that the subjects, regardless age and sex, are aware of their weight and that most of them are trying to improve it by changing their alimentary habits and increasing physical activities and not by drug consumption (only 0.6% of the subjects uses only drugs in order to loose weight).

#### **P106-08**

##### **INTEGRATED NUTRITION PROGRAM IN PRIMARY SCHOOLS UNDER OFFICE OF THE BASIC EDUCATION COMMISSION**

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Nowadays nutrition intervention programs have not been integrated with other school programs. Aim of this study was to identify effective integrated nutrition program.

**METHODS:** Emphasizing on involvement of all sectors, capacity development for school personnel on four nutrition on core contents including :- 1) development of quality and food standard provided in school 2) integration nutrition into school curriculum 3) management school environment suitable for nutrition 4) development of school nutrition surveillance system. Knowledge management has been operated to pinpoint success factors for program continuation. The integrated nutrition program has been operated on a trial basis since May - October 2008 in 12 schools in Nondaburi province.

**RESULTS:** It has been founded that 83.3% of schools lower sugar in food preparation, 41.6% able to lower sale of fatty food. Level of satisfaction of nutrition integration curriculum into health and physical education curriculum was good and best

respectively in all schools. Moreover it found that key success factors are executive advocacy and effectively management including participation of parents, school food vendors and local administration.

**CONCLUSION:** It is possible to implement integrated nutrition program to be successfully operated it need more time to implement the program.

#### **P106-09**

##### **CHANGES IN BONE MINERAL CONTENT AND BONE MINERAL DENSITY IN CHILDREN FED WITH MILK (IAEA RAS 6/041)**

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**RATIONALE & OBJECTIVE:** Rational approaches in the prevention of osteoporosis can be started during childhood and adolescence, and calcium (Ca) intake may be an important modifiable factor to attain peak bone mass. The study aimed to evaluate the effectiveness of a school-based milk-feeding program among children.

**MATERIALS & METHODS:** Ninety-nine children, 52 boys and 47 girls, aged 6-8 years participated in the study: milk group (MG) and control group (CG). Different measurements were determined: height, weight, and bone mineral content (BMC) and bone mineral density (BMD) using DXA. Three-day 24-hour food recall was collected to determine Ca intake.

**RESULTS & FINDINGS:** Ninety children completed the study. The Ca intake of both groups did not meet the RENI for Ca of 700 mg/day. The MG consumed an additional 278 mg Ca/day while the CG, 40 mg Ca/day. The MG had greater increases in BMC (21% vs. 18%) and BMD (31% vs. 30%). Increases in height and weight were also observed in both groups.

**CONCLUSION:** Milk consumption among children may present an important strategy in the prevention for risk of osteoporosis in the later life through increase in bone mineral content.

#### **P106-10**

##### **FOOD SERVED AT DAYCARE CENTERS IN TAIPEI**

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Dietary environment has great influence on both nutrient intake and children eating habit establishment. The purpose of this study was to evaluate the nutritional quality of meal served in daycare centers in. Twenty daycare centers completed the questionnaire, in addition, they are each provided one lunch sample and one monthly menu. The results indicated that only one-fourth of the daycare centers had registered dietician to participate in their menu planning. Using one-third of Taiwanese Food Guide Recommendation for preschoolers as the standard of our evaluation, daycare centers served too much meat but not enough grain and fruit for lunch. Only 5% daycare centers served milk everyday. As for snacks, caffeine-containing drinks, high fat and high sugar snacks were served frequently by some centers. To ensure the nutritional quality of food served in the daycare center, meal-planning personnel should have nutrition training.

#### **P106-11**

##### **THE SCHOOL FEEDING PROGRAMME IN NIGERIA: POLICY AND NUTRITIONAL ISSUES: THE EXPERIENCE OF PRIMARY SCHOOL IN ILE-IFE, OSUN STATE, NIGERIA**

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About 7.3 million children are estimated to be out of school in Nigeria, majority of which are girls. The school feeding is a Federal Government program launched to provide one meal per day during school days to all primary school pupils in Nigeria with the objectives of improving the health of school-age children, increase their enrollment, retention and completion rate in primary school. The nutritional status of 160 pupils (80 boys and 80 girls) of a selected public primary school in Ile-Ife, Osun State, Nigeria was assessed using anthropometric parameters. Meals were collected and analyzed for nutrient composition and compared to the requirement for their age group. The mid-arm circumference (MAC) which ranged between 15 and 21 mm and the body mass index, (BMI) are within the WHO reference standard. The crude protein (CP) content of the served foods varied between 4.7 and 17.8%. The average intake of amino acids per meal ranged between 12 and 83mg/g protein. The protein digestibility corrected amino acid score varied between 51 and 79. These results show that the feeding program had greatly improved the nutrition status of these children. The continuation of the program would go along way to preventing protein-energy deficiency and problem of underweight among the public schoolchildren.

#### **P106-12**

##### **PREVALENCE OF HYPERTENSION IN SCHOOL GOING CHILDREN AND ITS ASSOCIATED FACTORS**

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**OBJECTIVES:** To define the prevalence of high blood pressure in a representative sample of adolescents from Aligarh city, and to investigate the association of high blood pressure with age, sex and nutritional status.

**METHODS:** This cross-sectional study was carried out from May 2005 to September 2006. 701 school-going children between 12 and 16 years of age were selected among all the 4500 children from selected four government and private schools. The size of the sample was defined based on the expected prevalence of hypertension for the age group. Data were collected through a questionnaire and Blood pressure, height and weight were also measured through standardized equipments. High blood pressure was defined as systolic and/or diastolic blood pressure over the 95th percentile in one or in both measures.

**RESULTS:** Out of 363 boys, 34(9.36%) and out of 338 girls 32(9.46%) had high blood pressure. Risks of being overweight and excess weight were identified, respectively, in 6.41% and 2.13% of the students. These variables were significantly associated with high blood pressure.

**CONCLUSIONS:** The overall prevalence of high blood pressure was 9.4%. High blood pressure was significantly more frequent among overweight students (26.66%) and among obese students (60%).

### P106-13

#### THE HEALTH AND NUTRITIONAL STATUS OF SCHOOL-AGE CHILDREN IN MALAWI

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**RATIONALE AND OBJECTIVES:** A national survey was conducted to determine the health and nutritional status of school-age children in Malawi to provide baseline information for the design and implementation of a nutritional School health and Nutrition (SHN) program.

**METHOD:** This was a nationally representative, cross-sectional household survey with cluster sampling stratified by three major environmental zones. A total of 2,935 children 5-10 years of age were weighed measured and assessed for anemia, iodine deficiency and parasitic infestations.

**RESULTS & FINDINGS:** Stunting, and underweight, prevalence was 30% and 18% with stunting higher in boys (34%) than girls (25%) and in highland areas (34%). Anemia (Hb<115 g/l) was in 54% with 66% in 5 year olds and 59% from coastal areas. Only 9% consumed 3 meals a day and 30% consumed breakfast regularly. Low urinary iodine levels were in 50% of children and 55% consumed adequately iodized salt. For parasites, 20% had malaria with 25% in midland areas, 19% had bilharzias with 23% in 8-10 years olds, 22% coastal areas and 9% had intestinal helminthes.

**CONCLUSION:** These results show that school-age children are a vulnerable group deserving attention to improve their health and nutritional status for learning, performance and achievement.

### P106-14

#### ASSESSMENT OF NUTRITIONAL STATUS OF RESIDENT AND NON-RESIDENT BOYS (13-15 YR) IN RESIDENTIAL SCHOOLS OF SONIPAT

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**RATIONALE & OBJECTIVES:** Adolescence is period marked by growth spurt and maturation. Habits acquired in adolescence persist into adult life and can have long-term consequences on health. Therefore, the study was conducted among Resident and Non-resident Boys (13-15 yr) in schools of Sonipat to assess their nutritional status and to understand factors influencing food choices.

**MATERIALS & METHODS:** Questionnaire was used to collect general information and factors influencing food choices. Nutritional status was assessed using food frequency questionnaire, 24 hour recall, anthropometric measurements and biochemical parameters.

**RESULTS & FINDINGS:** Parent's advice, peer pressure and mass media were key factors influencing food choices. Overall nutritional status of residents was better off than non-residents. Percentage adequacy of energy and protein was higher among residents. However, nutrient intake of iron and Vitamin-A wasn't adequate. About 18.4% subjects were underweight, 5.8% overweight and 1.6% obese. 52% study group was anemic and 89% fell under pre-hypertensive stage indicating serious health concern.

**CONCLUSION:** Schools should focus on nutrition education and promote active life-style practices to develop good habits among children.

### P106-15

#### PROGREENS - PROMOTION OF FRUIT AND VEGETABLE INTAKE IN SCHOOL CHILDREN ACROSS EUROPE

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The Pro Children project showed that in, children's consumption of fruit and vegetables (F&V) is far below the current recommendations. There is a concern that both the amount and variation of F&V may be on the decline. Thus, the main objective of the Pro Greens project is to assess the intake and to develop effective strategies to promote consumption of F&V in school children across Europe. The target group is 11-year old children.

**MATERIAL AND METHODS:** Intake will be assessed using the validated ProChildren questionnaire. Information about school policy and other supporting or limiting factors for F&V intake at the school will be provided using a school questionnaire. A multi component intervention will be developed based on the Intervention Mapping method and implemented during autumn 2009 – spring 2010. Twelve partners from eleven countries collaborate in this project, which is a follow up of ProChildren. In PROGREENS, five partners from the ProChildren project are twinned and act as mentors for representatives from five other member states. The involvement of two partners from the commercial sector will have a particularly important role in regards to lobbying power and providing knowledge on collaboration between public health and industry as well as the design and distribution of intervention materials and messages.

**RESULTS AND FINDINGS:** The expected results are:

- Estimates of the F&V consumption and its determinants in ten European countries;
- A set of intervention strategies tailored to be appropriate and effective in promoting F&V consumption among school children;
- An increased consumption of F&V among the participating target group;
- A set of recommendations for national and international authorities, commercial and professional groups on best-practices for promotion of F&V consumption

**CONCLUSIONS:** The PROGREENS project will provide recommendations on best-practices for assessment and promotion of fruit and vegetable consumption in school children. The project is supported by the European Commission, Directorate Health and Consumers.

## **P107: Elderly Nutrition I**

### **P107-01 STUDIES FOOD CONSUMPTION BEHAVIOR AND LONG LIVING OF THAI ELDERLY**

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The purposes of this research were to study the relationship of food consumption behaviors and longevity of Thai elderly people aged 70 years old and older in 4 regions of Thailand; to study local Thai food set menu and recipes; and to compare food consumption behaviors that could link to longevity of Thai elderly on a geographical basis. The data were selectively collected from a focus group of community leaders and those who were concerned with information and contributing factors to health and longevity. An in-depth interview was employed to gather crucial information on food consumption behaviors of Thai elderly, with the qualitative findings showing the longevity of Thai elderly was due to the following common food consumption behaviors: 1) Simple homemade and cooked meals with emphasis on food safety and use of local resources; 2) Three meals a day with balanced nutrition as an important key to their health benefit; and 3) Dining mostly with family members on a daily basis. These consumption behaviors contribute to the mental and physical well being of the elderly. In conclusion, Thai food and local consumption behaviors are as important factors as those of the Health Quotient (HQ) in contributing to health benefits and conditions for long life.

\*Tipvimon Kittivarapon, Phanupong Panomwan, Nartlada Onvimol, Natchanok Nukit, Piyawan Youdee, Karnchanasak Charupan, Haruthai Hemadulin, Att Khunsee, Nontawan Anantathanachai, Nualradda Praprew, Yupa Pattarakacha, Lukana Aungatipat.

### **P107-02 A STUDY ON THE EATING OUT HABITS AMONG THE ELDERLY WHO LIVE ALONE OR WITH ANOTHER ELDER IN Hong Kong**

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A cross-sectional study of a convenient sample of elders, who live alone or with another elder, was conducted in 2005 using the 24-hour dietary recall method and food frequency questionnaire. About one-third of the 401 subjects (n=145, 36.2%) interviewed reported eating out daily. The most common meal eaten out and food premises visited were breakfast at restaurants (n=94, 64.8%), followed by lunch at social centers (n=27, 18.6%). Dim sums were the most popular choice for breakfast at restaurants. The most common items selected were steamed but contained high-fat ingredients. The survey shows that meat intake was higher in elders who ate out daily than those who did not (Mean  $\pm$  SD: 212.4  $\pm$  vs. 169.2  $\pm$  116gm; P<0.001, by two-sample t-test). The fatty meat in dim sums could help to explain the significantly higher caloric and fat intake in elders who ate out daily as compared with elders who did not (Mean  $\pm$  SD: 1524  $\pm$  429 kcal and 47.1  $\pm$  20.8gm vs. 1335  $\pm$  439 kcal and 34.4  $\pm$  20gm; P<0.001, by two-sample t-test). It is therefore important to design health educational programs to help the elders to make healthy food selections that are low in saturated fat.

### **P107-03 LIFESTYLE AND BODY COMPOSITION OF THE ELDERLY IN URBAN COMMUNITIES IN ACCRA – TEMA METROPOLIS**

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**RATIONALE AND OBJECTIVE:** Lifestyle is a socially conditioned behavioral pattern involves in physiological changes and may affect the body composition of the elderly. The objective of the study was to determine the association between lifestyle and body composition of the elderly.

**MATERIALS AND METHODS:** This was a cross - sectional study adopting a purposive sampling technique to select 200 elderly from one elderly people's home and two religious organizations. Relevant information was collected using structured questionnaires and anthropometric measurements. Analysis was done using SPSS 10.0.

**RESULTS AND FINDINGS:** Majority of the respondents were females (53%) and the mean age was 69 + 5. About 18.5% smoked cigarettes whilst 54.5% took alcohol. The average BMI in kg/m<sup>3</sup> for the males was 26.12 + 5.40 and that of females was 27.98 + 5.74. There was an association between BMI and smoking, BMI and alcohol intake, BMI and medication taken and BMI and nutrient supplements taken at p<0.001. The lifestyle of the respondents had significant effect on the body composition of the elderly.

**CONCLUSION:** Lifestyle may affect the body composition of the elderly at an appreciable significant level.

### **P107-04 LEVELS OF OBESITY IN ELDERLY PEOPLE IN KWAZULU-NATAL, SOUTH AFRICA**

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**RATIONALE & OBJECTIVES:** The objective of the study was to determine the nutritional status, dietary intake and health status of the elderly on state pension, living in Umlazi, KwaZulu-Natal South Africa. The sample comprised of 270 randomly selected non-institutionalised elderly (224 women and 46 men) age 65+ (Mean age 70).

**MATERIALS AND METHODS:** The methods used for the assessment of the nutritional status included a dietary survey to determine the dietary intake, anthropometry to determine the BMI, blood pressure measurement and waist circumference to indicate level of hypertension and risk of disease. A socio-demographic questionnaire was also completed to determine the socio-demographic status of the elderly.

**RESULTS AND FINDINGS:** The anthropometric indices indicated that 20% of the elderly were of moderate weight (BMI 18.5- 24.9) and 4% were underweight (BMI  $\leq$  18.5) the rest showed an increased rate of overweight and obesity, 24% were overweight (BMI 25-29.9), 19% were obese level I (BMI 30-34.9) according to the World health organisation cut-off points for BMI, 20% obese level II (35-39.9) and 13% obese level III ( $\geq$ 40). The Waist-to-height-ratio (WHTR) indicated that 77% of subjects were at risk of developing metabolic syndrome exceeding the 0.5 WHTR index corresponding with the levels of obesity at 52% (BMI > 30).

**CONCLUSION:** The results from this study are in line with other studies that indicated that KwaZulu-Natal has the leading rate of hypertension in South Africa with 62% of the elderly population at stage II Hypertension. This community is at risk of lifestyle diseases unless urgent interventions are planned to assist.

#### P107-05

### THE CHANGED ROLE OF THE ELDERLY IN THE WORLD OF HIV/AIDS INCREASED THEIR RISK OF MALNUTRITION

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**RATIONALE AND OBJECTIVES:** The aim of this study was to describe the nutrition status of the older person infected with and/or affected by HIV/AIDS with the intention of providing research evidence to conceptualize a framework for community-based collaboration to support the older person in the world of HIV/AIDS

**MATERIALS AND METHODS:** A group of 135 volunteers (men n=59 women n=76) randomly selected from a rural community and 198 (men n=75 women n=123) from an urban community was included after giving informed consent. Extensive information on socio-economic, nutrition and health status, serum and plasma blood samples and anthropometric measurements were collected.

**RESULTS AND FINDINGS:** The elderly in the rural areas care for more people than those in the urban areas (37% > 6 people/ 22%). The nutrient intake (less of RDA for elderly) in the rural area was significantly lower than the urban group for total protein (43.03g/68.02g), Zinc (8.2mg/12.1mg), Vit A (545.4ugRE/1001.2ugRE), Vit D (2.0ug/3.1ug), Vit E (8.4mg/12.8mg). Rural elderly had significant lower serum iron and total protein levels than the urban.

**CONCLUSION:** Results indicated that the HIV/AIDS epidemic gave new meaning to the successful aging of the older population in and indirectly worsen their nutrition status putting them in need of urgent support.

#### P107-06

### STRESS REDUCES SALT TASTE ACUITY IN OLDER EUROPEANS

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**RATIONAL AND OBJECTIVES:** There is very little research on the relationship between psychological factors and taste perception. Taste acuity appears to decline with age. It is possible that this decreased taste acuity in older people is associated with psychological well-being. This study aimed to investigate the relationship between stress and taste acuity in apparently healthy 55-70 year olds (N=38) recruited in Northern Ireland as part of the Zenith study.

**MATERIALS AND METHODS:** Stress was assessed using the Perceived Stress Scale (PSS). Detection thresholds for sour, salt, sweet and bitter were assessed using a signal detection approach. Data were analyzed using SPSS Version 11.5 for Windows.

**RESULTS AND FINDINGS:** Linear regression analysis found that as perceived stress increased, salt taste acuity decreased (p=0.040).

**CONCLUSIONS:** That stress is associated with sensitivity to salt taste could suggest that preference and consumption of salty foods is a consequence of reduced psychological well-being in older people. This hypothesis requires further study of more controlled design including dietary assessment on larger samples.

#### P107-07

### EFFECT OF MONOSODIUM GLUTAMATE INTERVENTION ON NUTRITIONAL STATUS FOR NURSING HOME ELDERLY

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<sup>2</sup>Kagawa Nutrition University, Saitama, USA; <sup>3</sup>Ajinomoto Co., Inc., Kawasaki, JPN

**AIM:** Glutamate (Glu) has been clarified to improve gastric protein digestion by stimulating visceral umami receptors. The purpose of this study was to verify the effect of glutamate on improvement of nutrition status of nursing home elderly.

**METHODS:** Monosodium glutamate (MSG) was added to the staple diets (0.5%, W/W) for 63 subjects (average age 85.9±8.2 years) in 16 weeks. Measurements of anthropometry (weight and BMI), mini-mental test, and blood biochemical parameters were measured at both the beginning and the end of the MSG-intervention. Dietary food survey was carried out during continuous four days within no fortification period and experimental period.

**RESULTS:** No significant changes were detected in nutritional intake and body weight. But particular significant changes were observed as follows: 1) serum albumin concentrations (Alb) in subjects (N=17) with Protein-Energy Malnutrition (PEM, Alb<3.5g/dl) showed a positive increasing tendency and 2) Alb increased from 3.03g/dl to 3.28g/dl (\*p<0.05) in subjects with severe PEM (Alb< 3.3g/dl, N=9) after 16-week MSG intervention.

**CONCLUSIONS:** The efficacies of MSG for elderlies may improve the nutritional status when their serum albumin concentrations were less than 3.3g/dl. We will continue to investigate the further effectiveness of MSG for nutritional management in elderly.

#### P107-08

### NURTITIONAL STATUS USING MULTIDIMENSIONAL ASSESSMENT IN ELDELY IRANIAN

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**RATIONALE & OBJECTIVES:** Nutrition is an important determinant of health in elderly and nutritional assessment is necessary for development of treatment protocols.

**MATERIALS & METHODS:** A multidimensional assessment using Mini-Nutritional Assessment (MNA), anthropometry, bioelectric impedance, biochemistry, dietary intake, and clinical aspects was carried out on 140 older people (76 men and 64 women) from the only state elderly nursing house in Kermanshah Western Iran.

**RESULTS & FINDINGS:** The results showed that energy intake for men (1531 +/- 346kcal/d) and women (1312 +/- 343kcal/d) were below the RDA. Dairy products, fruits and vegetable consumption were less than recommended. 46.4% had normal nutritional status while 28.7% have been classified as mild to moderate malnutrition according to the MN A. 38.3% had high blood pressure, 29.6% and 25.4% suffered from psychological and dental problems. Malnutrition using different cut-offs were: body mass index 16.4%, hemoglobin 19%, albumin (with normal CRP level) 9.8%, ferritin 9.4% (<20 µg/l). Lean body mass and percent of body fat was lower than normal in 23% and 21% respectively.

**CONCLUSION:** The study confirmed that MNA score was significantly associated with anthropometric, bioelectric and biochemical findings. It is concluded that an appropriate nutrition intervention program is needed to improve nutritional status of elderly Iranians.

### P107-09

#### BARRIERS TO SUCCESSFUL WEIGHT LOSS INITIATIVES IN THE ELDERLY

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**RATIONALE AND OBJECTIVES:** The purpose of this qualitative descriptive study was to determine the barriers to initiating a weight reduction program in a Canadian community setting in a population over 60 years of age.

**MATERIALS AND METHODS:** A total of 21 elderly participants with body mass indexes (BMI) exceeding the WHO guidelines for a healthy weight participated in individual, in-depth interviews. Data collection and analyses used grounded theory methodologies.

**RESULTS AND FINDINGS:** All participants (mean age = 72 yr; mean BMI = 30.3 kg/m<sup>2</sup>) indicated that it was very difficult to lose weight. The majority (67%) had been successful at weight loss at some point in their life but all of these participants regained the weight. Perceived barriers to weight loss were the high cost of healthy foods (50%), laziness (50%), inclement weather making it difficult to participate in physical activity for a significant portion of the year (33%), comfort eating due to loneliness or boredom, and illness or injuries limiting physical activity (17%). Conclusions: Weight management programs may need to offer more support for maintaining a weight loss once it has been achieved.

### P107-10

#### RICE-CAKE STYLE CAKES MADE OF WAXY WHEAT AS A SUBSTITUTE FOR RICE-CAKES ARE SAFER FOR ELDERLY PEOPLE TO EAT

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**OBJECTIVES:** In 1995 waxy\* wheat was initially produced in Japan and consists of waxy starch and proteins which form gluten. By analyzing several properties we found that rice-cake style cakes (mochi) made of waxy wheat are easier for elderly people to swallow than mochi of waxy rice. Waxy wheat rarely sticks to the throat although it is glutinous. In this study, we aimed to investigate whether mochi made of waxy wheat would be both safe and palatable for elderly persons.

**MATERIALS AND METHODS:** Two kinds of mochi were prepared: waxy wheat and waxy rice. Approximately 120 elderly persons evaluated the two samples on softness, stickiness and ease of eating.

**RESULTS:** Almost all participants indicated that mochi made of waxy wheat were more easily swallowed than those made of waxy rice, and compared with waxy rice they hardly ever become stuck in the throat or to the teeth. Therefore, we conclude that mochi made of waxy wheat is a safer alternative for elderly people to traditional mochi made of waxy rice.

\*waxy: genetics term meaning that the starch is mostly composed of amylopectin.

### P107-11

#### ANALYSIS ON MIDDLE-AGED AND OLD RESIDENTS OF STRUCTURAL CHANGES IN DIETARY FROM 1991 TO 2006 IN HUBEI PROVINCE

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**OBJECTIVE:** To grasp the dynamics of changes in food intake, provide the basis for health intervention and the formulation of relevant policies.

**METHODS:** From 1991 to 2006, applying a stratified multi-

stage cluster random sampling method, a continuous dietary survey was carried out 6 times in the household selected.

**RESULTS:** From 1991 to 2006, food consumption major changes in diet of middle-aged and old residents in Hubei province improved. The consumption of plant food tends to reduce, while animal food consumption increased. Magnitude of changes in different regions there are some differences.

**CONCLUSION:** According to the actual and reasonable goal of food consumption of Hubei Province, encourage the development and consumption of fruit and dairy industries, and launch targeted health education, guide reasonable meal in and improve health for different populations.

### P107-12

#### IMPACT OF ADDITIONAL OAT-FLAKE-INTAKE ON THIAMINE-STATUS IN GERIATRIC-PATIENTS

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**RATIONALE & OBJECTIVE:** Geriatric-patients are at high risk of thiamine-deficiency. Improvement might be achieved through higher food-intake considering the thiamine-content of oat-flakes (1.2mg/100g). We investigated whether addition of oat-flakes to standard oral diet improves thiamine-status.

**MATERIALS & METHODS:** Subjects: 30 frail nursing-home inhabitants (57-98 years)

Design: controlled parallel intervention-study

2 groups (n=15 intervention/control, both consuming ward's habitual diet) were formed. Intervention-group additionally received oat-flakes for 12 weeks. Blood-samples and thiamine-intake (weight-records) were taken at day 1, 42 and 84. Thiamine-plasma-levels were measured by HPLC-methods.

**RESULTS& FINDINGS:** Mean (SD) thiamine-plasma-levels (nmol/l) at day 1 and 84:

Intervention: 40.5 (30.4) and 21.87 (11.5) nmol/l (-29%); Control: 23.7 (15.9) and 14.2 (4.1) nmol/l (-40%); Mean (SD) thiamine-intake [density] (mg/d) [mg/MJ/d] at day 1 and 84: Intervention: 0.65 (0.3) [0.12 (0.03)] and 0.85 (0.4) [0.18 (0.05)] mg/d [mg/MJ/d] (+24%, B1-density +50%); Control: 0.91 (0.3) [0.14 (0.05)] and 0.49 (0.2) [0.1 (0.039)] mg/d [mg/MJ/d] (-46%, B1-density -40%)

**CONCLUSION:** With higher thiamine-intake/density (+24% and + 50% respectively) plasma-thiamine-decrease in intervention-group was more stable than control.

### P107-13

#### IMPACT OF NUTRITIONAL THERAPY ON ANTHROPOMETRIC CHANGES IN ELDERLY PORTUGUESE PATIENTS

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Overweight and obesity related medical problems are among the most serious health problems in Portugal.

Our goal was to study the impact of nutritional therapy and counseling on anthropometric changes in elderly patients.

Seventy four patients (71,6% female and 28,4% male), mean age 70.49±3.93 years, mean initial weight 88.42±13.35Kg, mean height 159±7.55cm, older 65 years were followed between August 2006 and April of the current year. The patients were evaluated between the first and the last appointments. The following parameters were evaluated: body weight, body mass index (IMC), waist circumference (WC), physical activity (PA), dependence level (DL), type of nutritional intervention (NI) and comorbidities. Statistical analysis was performed using SPSS v.16.0. Kolmogorov-Smirnov test was used to ascertain normal distribution. Paired sample t-test was used to analyze statistical differences between the first and the last assessment. There was a significant decrease in weight 2.62±3.75Kg (p<0.0001), waist

circumference 3.18±3.36cm (p<0.0001) and body mass index 1.03±1.48kg/m<sup>2</sup> (p<0.0001).

We conclude that the nutritional intervention in primary healthcare is effective in promoting weight loss and visceral fat that is showed in waist circumference in the elderly patients

#### P107-14

##### IMPACT OF FOOD AND NUTRIENT ON THE HEALTHY AGING OF ELDERLY POPULATION OF RAJASTHAN (INDIA)

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**BACKGROUND:** Food is the chief source of essential materials, which the body needs for its well being. Each stage of the life cycle has specific nutrient needs. As the population of elderly increase in number and greater age, nutritional needs must be met to minimize certain disease states and assure the quality of life. Nutrition associated health risks have been identified for coronary heart disease, cancer and diabetes mellitus.

**RATIONALE & OBJECTIVE:** To describe, by intake assessment, nutritional status and life style habits of Rajasthani elderly and to compare the data to other studies findings. This study is regarding the main constituent of diet taken by aged person of Rajasthan along with the effect thereof.

**MATERIALS and METHODS:** Dietary intake was assessed in 143 (83 males, 60 females, average age 78.6 years) elderly according to data collected by using structured food frequency questionnaires.

**RESULTS:** Daily energy intake was 2.43 0.48 Mcal and energy density was 5.67 kcal/g. Energy derived from protein and fat was 13.6% and 39.8%, respectively. Dietary fiber consumption was very low, 3.92 g/Mcal. Calcium intake of all of the subjects, and magnesium, zinc and copper intakes of most of them were low. In this study 45.83 percent were protein deficient Out of which 54.67 percent were female and 45.33 percent were male.

**CONCLUSION:** 8.02% have been below BMI and 28.7% were obese. Fiber and water intake were decreases with age and accompany with constipation. Females are more deficient of micronutrient than male and significant p<0.01. One of the main reasons is their traditional behavior.

#### P108: Nutrition in Emergencies

##### P108-01

##### DEVELOPMENT OF CULTURALLY APPROPRIATE NUTRITION EDUCATION MATERIALS TO PROMOTE OPTIMAL INFANT FEEDING METHODS AMONG LIBERIAN REFUGEES

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**RATIONALE & OBJECTIVES:** Buduburam Refugee Settlement in Ghana has hosted Liberian refugees for almost 20 years. A nutrition program was established in 2005 to identify and offer nutrition rehabilitation to malnourished children. Poor complementary feeding practices, low exclusive breastfeeding rates, and cultural beliefs associated with food and nutrition were documented as influencing factors for malnutrition. The need of cultural appropriate nutrition education was seen as a priority for action.

**MATERIALS & METHODS:** A training workshop was conducted with program staff where a set of culturally-appropriate nutrition counseling cards was developed. Subsequently, a Child Nutrition Booklet was designed, and pretested prior to publication and dissemination.

**RESULTS & FINDINGS:** Nutrition Counseling Cards are used

by program staff to educate the refugee community about basic nutrition, exclusive breastfeeding and adequate complementary feeding. The Child Nutrition Booklet is distributed at antenatal, vaccination, and growth monitoring visits, and through community outreach.

**CONCLUSION:** The development of cultural appropriate educative materials is a vital component to promote optimal infant feeding practices within refugee settings.

##### P108-02

##### ASSESSMENT OF INFANT FEEDING POLICIES AND PRACTICES IN DEYANG CITY (SICHUAN PROVINCE) IMMEDIATELY AFTER THE EARTHQUAKE (MAY-JULY 2008)

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**OBJECTIVES:** The objectives of this study were to investigate the immediate consequences of the earthquake on women during the perinatal period and infant feeding practices in the obstetric department of two baby-friendly hospitals in City.

**METHODS:** Observation and semi-structured interviews with pregnant women, post-partum mothers, relatives, medical staff and doctors as well as sales assistants in shops selling breast milk substitutes (BMS).

**FINDINGS:** At hospital level there was an urgent need to provide emergency treatment for large numbers of additional patients. Consequently, antenatal care and other preventive programs were greatly reduced. Cesarean Section rates increased for a variety of reasons from about 60% (before earthquake) to 87%. Furthermore, no attention was paid to promotion of breastfeeding in the emergency context, and there was no effort made to control the distribution of BMS.

**CONCLUSION:** Perinatal care and infant feeding policies need strengthening and more effective promotion even in baby-friendly hospitals to ensure that they are perceived as essential norms rather than luxuries that can be dispensed with during natural disasters. Firm policies also need to be in place to ensure that the distribution of BMS during an emergency is limited to those few infants who really need it.

##### P108-03

##### DISTRIBUTION OF SPRINKLES DURING EMERGENCY RESPONSE AND TRANSITION PROGRAMMING EXPERIENCES IN INDONESIA

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**BACKGROUND:** Micronutrient deficiencies are common among children after natural disasters.

**OBJECTIVE:** To describe the feasibility of distributing multivitamin-mineral "sprinkles" to children after natural disasters and to highlight the lessons learned from such interventions after the 2004 tsunami in Indonesia.

**METHOD:** Trained NGO staffs, community volunteers and health workers were used to distribute "sprinkles" to children, as part of emergency relief operations after the 2004 tsunami in Indonesia. Monthly supply of sprinkles was given to caretakers of children (6months-12 years) in Aceh, Nias, Jakarta and Tangerang. However, in Yogyakarta and Central Java caretakers of children (0-59 months) were provided with a one-time supply of sprinkles. Sprinkles were taken by children every day or every other day (that is 1 sachet every 2 days) depending on the composition. HKJ trained the staff, developed distribution guidelines and promotion materials before the distribution. Feasibility of the distribution was assessed by the coverage of the intervention.

**RESULTS:** Coverage was more than 90% (over 30 million

sachets of sprinkles were distributed to more than 400,000 children). About 8,500 staffs were trained to achieve such coverage.

**CONCLUSION:** The distribution of Sprinkles during emergency is feasible. However, appropriate information and training is required to achieve wider coverage.

#### **P108-04**

##### **EFFECTS OF A 3-MONTH DISTRIBUTION OF READY-TO-USE THERAPEUTIC FOOD (RUTF) "PARMAPAP" IN MODERATELY MALNURISHED CHILDREN (MMC) IN SIERRA LEONE**

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A low cost RUTF, called "Parmapap", for MMC in Sierra Leone, was formulated using peanuts, palm oil, sugar, milk powder, multivitamins. We report the preliminary effects on nutritional status of children aged 6 to 60 months, with  $-2 < \text{DS WHZ} < -3$  DS, followed at Goderich Emergency Hospital during the first 6 month of "Parmapap distribution". Twenty-six children received a weekly distribution of 200 Kcal/Kg per day of "Parmapap" in addition to Food from Feeding Program (FFP), and these were compared with 58 children treated with only FFP. After two weeks of treatment 35.7% of "Parmapap" children achieved  $\text{WHZ} > -1$  DS vs. 2.3% ( $p < 0.0001$ ) of FFP children. During 3 months follow-up a total of 40% of "Parmapap" children achieved  $\text{WHZ} > -1$  DS vs. 32.57% ( $p < 0.04$ ) of FFP. There was no case of death among "Parmapap" children vs. 2.2% cases among FFP children. In conclusion, short-term supplementation of MMC with "Pamapap" improved promptly WHZ and reduced significantly the incidence of wasting over 3 months

#### **P108-05**

##### **FOOD HABITS OF SENEGALESE FAMILIES RECEIVING HUMANITARIAN FOOD ASSISTANCE**

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**RATIONALE & OBJECTIVES:** There is limited information on how food aid is used and integrated into the lives of families. This study's objective was to systematically collect information on the food habits of families who received food aid to determine how rations are used within the sociocultural setting of their households.

**MATERIALS & METHODS:** Eighty home visits were made in Northern Senegal between November 2008 and February 2009. Families received either a corn-soy or a dehydrated potato-soy protein (DPSP) blend as part of a monthly ration. Home visits consisted of interviews using a semi-structured questionnaire with the children's mothers and observations of household habits.

**RESULTS & FINDINGS:** Most families followed instructions on how to prepare porridge with the rations. Mothers reported less fuel was used with the DPSP. Some people prepared porridge with cold water. Some mothers used the blends as a savory food with a sauce and meat when available. Some people would eat handfuls of the ration in their original powder form as a snack. Several other uses of the ration were also identified.

**CONCLUSION:** Food aid programs need to use knowledge about household behaviors to optimize the safety and nutritional value of food rations.

#### **P108-06**

##### **EXCHANGE OF DIETARY PRACTICES AMONG LOCAL GHANAIS AND LIBERIAN REFUGEES**

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**RATIONALE & OBJECTIVES:** We assessed the exchange of dietary practices among female Liberian refugees ( $n=240$ ) and Ghanaians living in Buduburam Refugee Settlement ( $n=120$ ) and an adjacent Ghanaian village ( $n=120$ ). Liberian refugees lived in all 12 camp zones while Ghanaians predominately lived in camp zones 11 and 12.

**MATERIALS & METHODS:** In this cross-sectional study, dietary intake was assessed using a 131 food item FFQ.

**RESULTS & FINDINGS:** Liberian refugees were younger than Ghanaians (28 vs. 29 y), and had lived in the camp 8.2 y. A significantly higher percentage of Liberians in zones 11-12 consumed Ghanaian dishes, western foods, and neutral foods (i.e. foods common to Liberians and Ghanaians) compared to Liberians in zones 1-10. A significantly higher percentage of Ghanaians from zones 11-12 consumed Liberian foods, and western foods compared to Ghanaians in the adjacent village.

**CONCLUSION:** These preliminary findings imply that encounters between local and refugee populations influence and foster the exchange of dietary patterns. Funding: Postdoctoral Fellowship.

#### **P108-07**

##### **NATURAL DISASTERS AND CHALLENGES TO ACHIEVE NUTRITIONAL AND HEALTH SECURITY: ROLE OF WOMEN**

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Natural disaster is the consequence of a natural hazard which affects human activities. A natural hazard is a threat of an event that will have a negative effect on people or the environment. Earthquakes, volcanic eruptions, landslides, tsunamis, tropical cyclones and other severe storms, tornadoes and high winds, river floods and coastal flooding, wildfires and associated haze, drought, sand/dust storms, and insect infestations cause widespread loss of human lives and livelihoods, destroy economic and social infrastructure and damage environment and ecology. Various studies have indicated that loss of lives and livelihoods due to natural disasters have been proportionately much higher in developing countries. In fact more than 90 percent of disaster deaths take place in developing countries and over seventy percent of them in Asia alone. Although economic losses in absolute terms have been higher in the developed world, GDP losses have been much higher in developing countries.

**OBJECTIVE:** i) Understanding various natural disasters with its regional dimension.

ii) Identification of the problems of women and children. iii) Options available to meet food and nutrition need. iv) Other possibilities to reduce the impact on them.

**RESULTS:** The will make recommendation to various developmental departments about the timely action, health and nutrition of women and children apart from understanding the role of women. This will also help NGO's to fine tune their efforts and resources to assist the women effectively to meet the challenges posed by natural disasters

## P109: Food Processing for Improved Nutrition III

### P109-01

#### WELL BALANCED HIGH PROTEIN COATED FORTIFIED SNACKS FOR SCHOOL CHILDREN

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In Egypt malnutrition could be considered as one of the problems facing community. Most of the school children suffered from retard growth. Vegetable protein presents about 85% of total protein children intake. Therefore, it is highly important to prepare a complementary diet throughout blending some legumes and cereal in a suitable form as extrudates. Four blends were formulated and extruded by a single extruder from grits of yellow corn (55-70%), rice (20%) and defatted soybean (10-25%). The extrudates were dried at 165-167°C for 3 minutes and coated by oil-cheese and chocolate cream flavors with vitamins and minerals mix (1200mg/100g finish product). Technical aspects, physical properties, chemical composition and anti-nutritional factors of extrudates were determined. The extrusion destroyed 99% of TIA, 50% of phytic and tannic acids. Fortification with vitamins (A, B, folacin, niacin) and minerals (iron, Zinc, Calcium) of 25 gm of the snacks were covered 13 to 37% of vitamins and 13 to 30% of minerals of the RDA for school children. The blends were able to increase the protein contents balancing amino acids. Both vitamins and minerals were satisfactory and the sensory properties were highly improved.

### P109-02

#### AMOUNT OF TOTAL PHENOLIC COMPOUNDS AND ANTIOXIDANT ACTIVITY OF FRESH AND PRESERVED *Elaeocarpus hygrophilus* Kurz. FRUITS

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<sup>3</sup>Silpakorn University, Pharmaceutical Technology, Nakhon-Pathom, THA

**OBJECTIVE:** The amount of total phenolic compounds and antioxidant activity were determined for the fresh Spanish plum fruits (*Elaeocarpus hygrophilus* Kurz., family Elaeocarpaceae.) in various ages and of preserved fruits, by chilling and pickle.

**METHODS:** Fresh and chilled Spanish plum fruits at different temperature conditions were squeezed and subsequently the pH and sugar content (%brix) of the juices were examined. The methanolic extracts of the fruits that were chilled and pickled were also measured their total phenolic content by using Folin-Ciocalteu reagent. The antioxidant activity of all prepared extracts was determined by Trolox Equivalent Antioxidant Capacity Assay (TEAC).

**RESULTS:** The period and temperature of chilling showed no significant effect on pH of the fruit juice. The various period of chilling showed no significant different effect on %brix of the fruits, but the temperature of chilling enhanced the %brix. The young fruit contained the higher amount of total phenols in the crude extracts and the juice than that of the elder. The period of chilling showed no effect on total phenols of the fruits. The longer period and higher temperature during storage of fruits before juice squeezing gave the significant decreasing effect on the amount of total phenols of their juices. The antioxidant activity of the fruits in all age was low. The period, temperature of chilling and pickle time of fruits gave no significant effect on antioxidant activities.

**CONCLUSION:** The preserved conditions could be considered for storage the Spanish plum fruits since they could affect the %brix, amount of total phenolic compounds and antioxidant activity of the fruit.

### P109-03

#### A STUDY ON EXTRACTION METHODS OF BARBERRY PIGMENTS

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Most of the colors which are used in food industries are chemicals. As a result of the harmful effect of the usage of chemical substances nowadays, there is a tendency toward the natural colors. Towards this goal, production of color from rich sources of natural color such as Barberry has been surveyed. Different anthocyanins are the main pigments of Barberry. In this study, the extraction of Barberries' anthocyanins is carried out by Reflux System. Then, the concentration of the main anthocyanin in Barberry, that is, Cyanidin-3-glycoside was measured through pH differential method. The Results showed that the maximum amount of anthocyanin was extractable at 50°C using a mixture of ethanol and methanol as the solvent.

### P109-04

#### APPLICATION OF FERMENTED CHEESE WHEY IN THE FORMULATION OF MAYONNAISE SAUCE

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Mayonnaise is the most popular sauce all over the world. The characteristic quality of mayonnaise is because of its taste, aroma, and consistency which depend directly on the proportion of the ingredients used in its formulation. The nutrition value of mayonnaise may be enhanced through using fermented cheese whey (FCW) in its formulation. Moreover, FCW can improve viscosity and consistency of mayonnaise and its shelf life. In this study, cheese whey having been fermented some chemical examinations before and after fermentation were performed in order to determine the pH, acidity, lactose and protein percentage in the whey. The obtained FWC then, was mixed with acid acetic with five proportions of 0, 25, 50, 75, 100. These mixtures were then used in the formulation of mayonnaise. The five formulations underwent some chemical sampling to determine the pH, acidity, lactose, dry matter and protein percentages. Finally, Sensory Evaluation was used to select the best formulation. The formulation with 25% FCW was the best one in terms of taste, aroma, consistency and color.

### P109-05

#### THE IDENTIFICATION OF THE BACTERIA STRAINS FOR CULTURING FERMENT SOYBEAN WITH TRADITIONAL BABAO DOUCHI FLAVORS

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Babao Douchi is one of famous traditional ferment soybean products fermented with natural bacterial. But which bacterial strains used and whether these strains are safe for human have been unclear until now. Our study is to isolate and identify the beneficial strains from natural ferment douchi for producing high quality products with traditional flavors. All bacterial strains in Babao Douchi were isolated and purified by standard microbiological methods and grouped by colonial morphology. These strains were preliminary screened based on the proteinase activity. Then the strains with the highest proteinase activity in each group were identified by morphological, physiological and biochemical characters combined with analysis of 16S rDNA sequences. Six strains including four *Bacillus subtilis*

strains and one *B. licheniformis* strains were determined. The proteinase activities of *B. subtilis* strains were much higher than that of *B. licheniformis* strain. *B. subtilis* may play major roles in proteolysis during fermentation. Two *B. subtilis* strains, BBDC 3 and BBDC 5 were chosen as industry strains. The ferment soybean products cultured with the two *B. subtilis* have typical traditional Babao Douchi flavor. The result will offer a new route for producing ferment soybean with both Babao Douchi flavors and food safety in future.

#### **P109-06** **SPME-GC/MS VS. SENSORY ANALYSIS IN** **MONITORING BAKERY FOOD AUTOXIDATION**

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**RATIONALE & OBJECTIVES:** Lipid oxidation is undoubtedly one of the most important processes occurring in food systems and has strong effects on the undesirable flavor of food. The aim of this study was (1) to evaluate usefulness of the volatile compounds and sensory analysis for monitoring the oxidation process occurring in the biscuits, (2) to investigate the effect of green tea extracts on biscuits lipid fraction oxidative stability, (3) to compare results obtained by SPME-GC/MS and sensory studies to that of chemical analysis.

**MATERIALS & METHODS:** Biscuits were prepared in three variations. Control samples were prepared without addition of antioxidants. The other variations were prepared by adding synthetic antioxidant (BHA 0.02%) and green tea extract at three different levels: 0.02; 0.1 and 1 %. All samples were subjected to storage test for 20 days at 60 °C.

**RESULTS:** Several volatile components that contribute to the aroma profile of fresh biscuits represented groups of characteristic volatiles produced through lipid peroxidation, Maillard reaction and caramelization. As oxidation proceeded, the volatile compounds characteristic for baking process, sharply decreased. The significant correlation of 0.948 between changes in the sum of Maillard reaction products and reduction of insensitivity of brown flavor was found. After 16 days of storage increase of carbonyl compounds amount and appearance of other markers of lipid oxidation was found. However, for biscuits with addition of antioxidants the rate of formation of secondary oxidation products was smaller.

**CONCLUSION:** Examples shown indicate that using SPME-GC/MS and sensory analysis it is possible to monitor the oxidation process occurring in the biscuits.

#### **P109-07** **PHENOLIC COMPOUNDS AND ANTIOXIDANT** **ACTIVITY FROM WINE-MAKING WASTES**

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**RATIONALE & OBJECTIVES:** Agricultural and industrial residues are attractive sources of natural antioxidants. By-products, which remain after processing of fruit and vegetable in food processing industry, still contain a huge amount of phenolic compounds. The main objective of this work was to investigate the effects of extraction time, temperature and solvent on concentration and antioxidant activity of red grape mark polyphenols obtained from Polish wine-making factory.

**MATERIALS & METHODS:** Dried and milled mark was extracted with the solvent (ethanol 90 and 70%) for different ranges of temperature (40, 50 and 60 °C) and different maceration time (4 and 5h). The antioxidant activity of extracts was investigated by DPPH methods. Moreover total polyphenol and anthocyanins content, and HPLC identification of the phenolic compounds were performed.

**RESULTS:** Both temperature and time were statistically

influenced and the amount of polyphenols and anthocyanins were the highest at 60 °C for 5 h. Addition of water to ethanol statistically improved rate of phenols extraction. HPLC analysis of the extracts showed that gallic acid, p-coumaric acid, caffeic acid, (-)-catechin, procyanidin B2, quercetin-3-beta-D-glucoside and quercetin were the major phenolic compounds in winery waste. Sinapic acid,  $\alpha$ -dihydroxybenzoic acid, isovanillic acid, p-coumaric acid, trans-ferulic acid, myricetin, kaempferol, tyrosol and procyanidin B1 were also identified.

**CONCLUSION:** As a result, the grape mark is the good source of polyphenols and could be used as natural antioxidants of food.

#### **P109-08** **THE IMPACT OF PROCESSING ON THE ANTIOXIDANT** **PHENOLICS IN WHEAT BRAN**

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**RATIONALE & OBJECTIVES:** The beneficial effects associated with whole grain consumption are in part due to the existence of the unique antioxidant phenolics which mainly present in the bran and are esterified to hemicellulose of the cell walls. The purpose of this work was to investigate the release of phenolics in wheat bran through different processing.

**MATERIALS & METHODS:** Wheat bran samples in two different particle sizes were processed by soaking with different concentration of NaOH aqueous solution followed by homogenization. The processed samples were analyzed for the release of 12 phenolic acids in soluble free, conjugated and bound forms by HPLC.

**RESULTS & FINDINGS:** It was also found that treatment with NaOH was the main contribution to the remarkable increasing release of free phenolics, and 0.5-1.0N NaOH were suitable for the treatment of wheat bran.

**CONCLUSION:** Processing is very important for improving the functionality of the bran and bioavailability of phytochemicals.

#### **P109-09** **CHEMICAL PROPERTIES AND SHELF LIFE OF** **FRESH FRUIT FLAVOURED SOYMILK YOGHURT** **AND COW MILK YOGHURT**

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**RATIONALE & OBJECTIVES:** Yoghurt high in protein consumption is restricted to the few affluence of the community. Soybean has successfully been introduced into traditional diet to alleviate the prevalence of protein energy malnutrition. This study looks into the chemical properties shelf life of yoghurt enrich with fresh fruits processed at household level.

**MATERIALS & METHODS:** Cow milk and soybean milk were processed into yoghurt using cereal steep water as fermentation medium and fortified with orange, pineapple, grape or banana. Samples were stored at ambient, refrigerator and freezing temperature for 17 days and chemical, microbial and sensory analysis done.

**RESULTS & FINDINGS:** The result shows a significant ( $p < 0.05$ ) high protein and crude fiber in soy yoghurt flavored with pineapple while total dry matter and vitamin C significantly higher in plain cow milk yoghurt. Vitamin C was significantly lowered in all yoghurt samples by the 17 day of storage. Total aerobic count ranged between  $2.2 \pm 0.5$  in soy yoghurt flavored with pineapple to  $90.2 \pm 0.7$  in yoghurt processed from cow milk flavored with orange. *Staphylococcus* was present on day 0 of storage in 1 yoghurt samples but reduced to 0 by the end of storage in the refrigerator and freezer. The cost of production for soymilk yoghurt was significantly lower than yoghurt sample from cow milk. There were no significant difference

when compare to commercial dairy yoghurt sample,  
**CONCLUSION:** Soymilk yoghurt can be processed at home level using readily available local material as fermentation medium

#### **P109-10 VITAMIN A STABILITY AND SENSORY EVALUATION OF EXTRUDED RICE GRAINS FORTIFIED WITH IRON, ZINC AND VITAMIN A**

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Multi-micronutrient fortified rice could be an effective and sustainable approach to combat micronutrient deficiencies in developing countries where rice is the staple food. Our objective was to produce extruded rice grains triple fortified with iron, zinc and vitamin A with acceptable vitamin A stability and good sensory properties.

Extruded rice grains to be mixed 1:100 with natural rice were prepared containing retinyl palmitate, ferric pyrophosphate (10 mg Fe/1g) and 3 different zinc compounds (5mgZn/ 1g). Stability of vitamin A was measured after hot extrusion, drying, cooking and storage under tropical conditions. Color was measured with a colorimeter and by visual inspection.

Vitamin A was relatively stable to extrusion (~3% loss) and drying (~ 0.5% loss) but more susceptible to losses during cooking (~15 %) and storage for 4 mo. at 30o C and 80% RH (~ 60% in transparent plastic bags and ~ 45% in light protected foil bags). Mean total losses of storage and cooked rice approached 70%. No color changes were observed.

Vitamin A storage losses may be considerable and must be taken into account when setting the fortification level.

#### **P109-11 SHELF LIFE CHARACTERISTICS AND TOTAL MIGRATION OF TORBANGUN SOUP (*Coleus amboinicus* Lour) IN CANNED CONTAINING buthylated hidroxy toluen**

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Torbangun soup is a traditional cuisine consumed by Batakese lactating women in North Sumatera Indonesia in order to stimulate their breast milk production. Currently, the soup is prepared using fresh leaves and once cooked it should be consumed immediately. Efforts to prolong shelf life of the soup should be made in attempt soup preparation more efficiently. The present study aimed to analyze shelf life characteristic of soup in canned which was added buthylated hidroxy toluen in its preparations. Total plate account and thiobarbituric acid for microbiology and rancidity assessments were analyzed. Results of the study showed that the soup shelf life in cool temperature (5-8°C and 10-12°C) is longer than in room temperature (22 vs. 14 days). Total residual migration from packaging material into the soup is lower than 10 mg/dm<sup>2</sup> allowing by the Directive 90/128/EEC for aqueous food simulat. In conclusion, addition of BHT in soup preparation can prolong the shelf life of Torbangun soup.

#### **P109-12 EFFECTS OF ADDITION OF KATUK (*Sauropus androgynus* Merr) IN FEED ON MICE REPRODUCTION AND MILK PRODUCTION**

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Katuk leaves (*Sauropus androgynus* Merr) are commonly consumed as diet for lactating women in Indonesia. This study aimed to study the effect of addition of Katuk leaves in feed on mice reproduction and milk production. The study design was completely random factorial (2x3) with factors: percentage of Katuk leaves added in feed (0, 5 and 10%) and given time of feed (Day-14 during pregnancy and day of giving birth). The study results showed that addition of Katuk in feed had significant effects (P<0.01) on feed consumption of mice. The addition of Katuk did not affect litter size and birth weight, and daily body weight gain. Interaction between the addition level of Katuk and given-time of feed, had significant effect (P<0.01) on feed consumption and milk production and daily gain weight of mice (P<0.05). Addition of 10% Katuk on feed and given time on day 14th during pregnancy had greatest effects on breast milk production and daily weight gain of the newborn.

#### **P109-13 EFFECTS OF ADDITION OF TORBANGUN LEAVES (*Coleus amboinicus* Lour) IN FEED ON MICE REPRODUCTION AND MILK PRODUCTION**

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Torbangun plant (*Coleus amboinicus* Lour) is used as herb among Batakese people in North Sumatera, Indonesia. In Batakese tradition, Torbangun leaves are consumed with the beliefs it can stimulate breast milk production of lactating mothers. The aim of this study was to compare effects of addition of Torbangun (either in fresh or cooked form) in feed on mice reproduction performance and milk production. The study design was complete random with two factors: percentage of addition of Torbangun cooked (0 vs. 2.5% vs. 5%) and Torbangun leaves (5%). The effects of these factors on feed consumption, milk production, birth litter size, birth and weaning weight, and daily weight gain of mice were studied. The results showed that addition of Torbangun (fresh or cooked) in feed had significant effects (P< 0.05) on feed consumption and weaning weight of mice. Levels of addition of Torbangun did not have significant effect on birth litter size and daily weight gain.

#### **P110: Food Composition and Biodiversity II**

##### **P110-01 SELENIUM, ZINC AND COPPER CONTENTS IN NORTHEAST THAI VEGETABLES** Boonsiri, Patcharee I; Hongsprabhas, Pranithi<sup>2</sup>; Daduang, Jureerut<sup>3</sup>; Yongvanit, Puangrat<sup>1</sup>

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**RATIONALE & OBJECTIVES:** Selenium, zinc and copper are trace elements which act as cofactors of antioxidant enzymes in human. Northeast Thais usually consume vegetables

accompanied with their meal. Therefore, we aim to determine selenium, zinc and copper contents in 23 edible vegetables in northeast.

**MATERIALS & METHODS:** The fresh vegetables were purchased from local markets in Khon Kaen during April – September 2008. The concentrations of selenium, zinc and copper were determined by inductive coupled plasma-optical emission spectroscopy (ICP-OES).

**RESULTS & FINDINGS:** The studied vegetables exhibited varied selenium, zinc and copper contents. Selenium was found in very low amounts (98.00-0.00 microgram/100g wet wt), whereas zinc and copper concentrations were in the range 2.69-0.01 milligram/100g wet wt. *Careya Sphaerica* Roxb.C., *Barringtonia acutangula* Gaertn., *Leucaena leucocephala* (Lam).

**CONCLUSION:** A number of northeast vegetables could be a rich source of essential minerals.

#### P110-02

##### **IRON, ZINC AND PHYTIC ACID LEVELS OF GRAIN AMARANTH COMMONLY USED IN KENYA**

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**RATIONALE AND OBJECTIVE:** Grain amaranth is a widely accepted pseudo-cereal. Nutrient composition of the grain amaranth flour in the Kenyan market is lacking. The objective of this study was to evaluate the proximate and inorganic composition of grain amaranth commonly used in making porridge flours in Kenya.

**MATERIALS AND METHODS:** Ten samples collected either as grain or flour were analyzed. Proximate, iron, zinc and phytate analysis was done in duplicate.

**RESULTS:** Protein content of the samples ranged between 10.8 and 13.8g/100g DM. The grain samples had higher content of dietary fiber compared to flour samples. The iron and zinc values of the grain ranged between 12.5-72mg/100g and 3-8mg/100gDM respectively. Fermented grain amaranth flour had the highest amount of iron among all the samples. The molar ratios of phytate to minerals were above the critical values except the phytate/iron molar ratio of fermented amaranth flour.

**CONCLUSION:** Whereas the number of samples analyzed in the present study were relatively few, it is evident that grain amaranth has high iron content and its bioavailability can be explored further. Though the phytate/iron ratios of amaranth are relatively low, this was mainly due to high iron values rather than low phytate level.

#### P110-03

##### **FRACTIONATION AND ISOLATION OF POLYSACCHARIDE FROM MALVA NUT SEEDS**

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Malva nut fruit (*Scaphium scaphigerum*) has been cultivated in the East of Thailand. The mucilage of the seeds was used to reduce the body weight, thus increased attention has been given to the development of the method of extraction and purification of this polysaccharide. The first objective of the present study was to investigate the proximate composition of the seeds. The seeds were separated into three fractions (seed coat, middle part, and inner part). The proportion of three fractions was 40%, 5-10%, 50-55% (w/w), respectively. The results showed that seed coat contained the highest amount of polysaccharide (75%, w/w) compared to other fractions, while the inner part was a source of protein (24%, w/w). The second objective of this study was to develop a method of isolation of malva nut gum. The gum was extracted from seed coat fraction by stirring with 50 volumes of chemical solutions (e.g. NaOH, KOH, H<sub>2</sub>O<sub>2</sub>).

No delipidation or deproteinization procedures were required in the experiment. NaOH provided the highest yield of the gum compared to other chemicals. The results suggested that the seed coat fraction should be used as a starting material for the isolation of Malva nut gum.

#### P110-04

##### **NUTRITIONAL QUALITY OF DATE PALM SEEDS OIL**

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The pits from date palm fruits (*dactylifera* L.) are nutrient dense but the nutrient composition across varieties has not been extensively studied. In the present study 18 leading varieties of date pits from date fruits cultivated in the UAE (Khalas, Barhe, Lulu, Shikat alkahlas, Sokkery, Bomaan, Sagay, Shishi, Maghool, Sultana, Fard, Maktoomi, Naptit Saif, Jabri, Kodary, Dabbas, Raziz and Shabebe) were analyzed and compared for their fatty acid profil. Oils extracted from the seeds were compared in terms of fatty acid profile by gas chromatography. Fat content ranged from 5.71% - 8.77%. Twenty-three fatty acids were found, and the unsaturated fatty acid oleic was the major fatty acid which ranged 43 – 55.7 g/100g fat. Myristic, palmitic, stearic and linoleic were also found, average values being 10.2 -18 g/100g fat, 11.5 – 14.4 g/100g fat, 2.74 – 6.37 g/100g fat and 7.7 – 13.7 g/100g fat, respectively. Due to the there is no serious attempts have been made to exploit the seeds as potential by-products of the date industry this investigation may stimulate interest in date seed oil for use as sources of healthy edible oils, cosmetic and pharmaceuticals.

#### P110-05

##### **EFFECT OF ENZYMATIC HYDROLYSIS FOR NUCLEIC ACID ANALYSIS IN HOT WATER EXTRACT OF CHLORELLA VULGARIS USING HIGH PERFORMANCE LIQUID CHROMATOGRAPHY**

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**RATIONALE & OBJECTIVES:** Although many studies have shown various functional effects of hot water extracts of *Chlorella vulgaris* (CVE), very little is known about the biological composition analysis of hot water extract of *Chlorella*. In this study, nucleic acid with immune function is analyzed mainly component by enzymatic hydrolysis and non-enzymatic hydrolysis.

**MATERIALS & METHODS:** CVE was extracted with hot distilled water (1:50, w/v %) at 90°C for 1hour. CVE was hydrolyzed by Enzyme RP-1G and then used for HPLC analysis. Separation condition consisted of reversed-phase column (2×150 mm, 3 μm) maintained at 40°C, gradient elution system of Solvent A (water: methanol=95:5 with 20mM DMHA, pH 7.0) and Solvent B (water: methanol=20:80 with 20mM DMHA). UV detection was carried out at 250 nm.

**RESULTS & FINDINGS:** By enzymatic hydrolysis method, nucleoside and nucleotide was separated in CVE: cytidine, uridine, guanosine, adenosine, CMP, UMP, AMP, GDP, CDP, UDP, ADP, GDP. But, non-enzymatic hydrolysis was not almost separated. Results of quantitative analysis of total nucleosides and nucleotides in CVE were showed about 2.82mg per g CVE. Among others, level of CMP was highest.

**CONCLUSIONS:** In conclusion, optimal analysis condition for nucleic acid with immune function from CVE was established and determined nucleic acid level.

**P110-06**  
**CHANGES IN THE TOTAL GLUCOSINOLATES LEVELS OF KOREAN CHINESE CABBAGE DURING KIMCHI STORAGE**

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**RATIONALE & OBJECTIVES:** Kimchi is a traditional pickled food using Korean Chinese cabbage (*Brassica campestris* var. *pekinensis*) and also containing phytochemicals, glucosinolates. This study was carried out to investigate the changes in the total glucosinolates levels of Kimchi during different storage condition.

**MATERIALS & METHODS:** Kimchi was prepared according to the standard recipe of the Korean Rural Development Administration and storage at 20°C and 4°C. They were also analyzed chemical properties: pH, titratable acidity, soluble sugar, organic acid and salt content. For determination of glucosinolates, 50g of Kimchi was used for analytical sample preparation provided with an anion exchange column and measured by UV-visible Spectrophotometer.

**RESULTS & FINDINGS:** As the storage time increased, the titratable acidity levels in the midrib parts and leaves increased rapidly after initial storage time but the pH values decreased after initial storage time at both temperatures. The salt content was higher in the leaves than midrib parts after storage time at 20°C and 4°C. Total glucosinolates levels were comparatively higher in the midrib parts than leaves during storage at both temperatures. But total glucosinolates levels of both parts decreased slightly according to extend storage time.

**CONCLUSIONS:** The changes in these levels of both parts in Korean Chinese cabbage depended on the storage conditions.

**P110-07**  
**RECONCILING NUTRITION AND CONSERVATION IN GABON**

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**RATIONALE:** Protected areas have a role to play in ensuring environmental sustainability and helping at reducing hunger. Access to natural resources such as bushmeat is limited in protected areas. Yet, bushmeat is a source of food and thus, of nutrient for peoples. To help reconciling nutritional and conservation needs, it is essential to assess bushmeat intake and its contribution to nutritional requirements in protected areas. To our knowledge, no study has investigated these aspects before.

**OBJECTIVE:** To assess bushmeat intake and its contribution to nutritional requirements among a population of a protected area.

**MATERIALS AND METHODS:** Four villages were selected to represent rural population. In each of the two major seasons, a 7-day nutrition survey was carried out using the weighing method in some 600 individuals. Assessment of sustainability of harvest was based on data collected during wildlife survey and a socioeconomic survey.

**RESULTS:** Around 30 g of bushmeat was eaten daily per capita but it went up to 48 g in some villages. Bushmeat contributed to up to 3%, 26% and 10% to the satisfaction of energy, protein, and of iron requirements. Harvest was sustainable for most species.

**CONCLUSION:** Our results underline the need for a thorough assessment of bushmeat intake and its contribution to the satisfaction of nutrient requirements within a protected area. This will help ensuring the conservation of wildlife, and well being of people. It is time to reconcile nutrition and conservation to ensure that restricted access to bushmeat is not a barrier for achieving the Millennium Development Goals.

**P110-08**  
**NUTRITIVE VALUES OF FONIO AND FONIO PRODUCTS**

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Fonio (*Digitaria exilis*) is cultivated in a vast area in West Africa and is known to be used as staple food harvested 2 to 3 month before the main crops mature, providing nutrients in the hungry season. Fonio is consumed after a long and strong processing scheme which could affect iron and zinc content of fonio as the major part inside the grain is removed by cleaning, decortications and washing. The objective of the research is to study the nutritional value of different fonio varieties and fonio products such as fonio paddy and mid wet fonio, especially with respect to macronutrients, iron, zinc, and inhibitors of iron and zinc uptake (phytate). Twelve different fonio varieties collected from 34 farmers in 2 regions (Sikasso and Segou) were selected based on the sample frame described in WP5 of the INCO-FONIO project. Composite samples were made from farmers varieties. Fonio paddy was cleaned, milled, washed and drained to get mid-wet fonio. Processed fonio was made according to standardized local procedures. Nutrient analysis (Zn, Fe, proximates, and phytate) was performed in the paddy and the mid-wet fonio. The new data from this study will be used to update the food composition database. Fe concentration of fonio varieties and products ranged from 1.7 to 54.9 mg/100g dry matter in paddy while 0.8 to 1.8 mg/100g in mid wet with an average values of 30.9 mg/100g in paddy and 1.6 mg/100g in mid wet. Values for Zn ranged from 2.4 to 3.6 in paddy while 1.9 to 2.5 mg/100g in mid wet with an average of 3.1 mg/100g in paddy and 2.2 mg/100g in mid wet. The phytate concentration ranged from 410 to 700 mg/100g in paddy and 30 to 210 mg/100g in mid wet fonio with mean values of 519 mg/100g in paddy and 130 in mid wet fonio. Fe and Zn content of the fully processed fonio varieties is around 2mg per 100g of dry matter which is very low. Molar ratio of phytate to Fe of paddy and mid wet fonio is respectively 0.6 for paddy and 5.2 for mid wet which is above the critical value indicating a poor absorption of Fe. To achieve adequate Fe bioavailability, molar ratio of phytate to Fe should be ideally decreased to less than 0.4. Molar ratios of phytate to Zn of fonio paddy, mid wet fonio are respectively 6.8 for paddy and 5.5 for mid wet. Fe and Zn molar ratios of phytate are lower than those reported in other cereals such as sorghum and maize. Cleaning, decortications and washing of fonio removes iron contamination from soils and other sources. Phytate content of fonio predict poor Fe and Zn bioavailability and a negative impact of the micronutrient status of individuals with fonio-based diets. Appropriate strategies such as food preparation methods could be suitable to improve the bioavailability of Fe and Zn in fonio.

**P110-09**  
**STUDY ON WILD PLANTS WITH WHITENING EFFECT AND ITS BIOACTIVE COMPONENTS**

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From thousands years ago, wild plants have been used for the treatment of diseases as a folk medicine in Asia. As a part of our ongoing study for the identification of biological activity from natural products, we investigated the whitening effects of wild plants. Dried inner parts of *Betula schmidtii* were extracted with 80% ethyl alcohol to give dark yellow extracts. Dried ethanolic extracts were fractionated with n-hexane, chloroform, ethylacetate and n-butanol, respectively to yield solvent-soluble fractions. Each fraction was assayed for the cytotoxicity,

antioxidant and tyrosinase activity in vitro. As a result, all fractions showed no cytotoxicity in human normal melanocyte cell line, SK-MEL-31. The chloroform and ethylacetate-soluble fractions showed 32.1% and 36.7% of inhibition of tyrosinase activity, respectively. It suggests *Betula schmidtii* might be used for the natural sources with whitening effects.

#### **P110-10 INFLUENCE OF CULTIVATION SYSTEM ON THE VITAMIN C CONTENT OF KIWI**

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**RATIONALE & OBJECTIVES:** To know the influence of the cultivation system (conventional, organic and integrated) of kiwi on the content of vitamin C.

**MATERIALS & METHODS:** Kiwis from the cultivation systems were collected in the same production area (NW Spain). Once collected, they were analyzed throughout the period of commercialization. The determination of vitamin C is performed by HPLC.

**RESULTS & FINDINGS:** The values of vitamin C are between 63.73 and 104.27 mg/100 g fresh weight. With the data obtained, an ANOVA for 2 factors (crop type and storage time) with interaction was applied. The content of vitamin C in kiwi from organic farming is significantly higher than the rest and the evolution over time is similar in all three types of kiwi.

**CONCLUSION:** The organic kiwis have a higher content of vitamin C and, therefore, a higher antioxidant power.

#### **P110-11 MAJOR NUTRITIONAL CHARACTERISTICS OF DOMESTIC VEGETABLES IN COMPARISON WITH THOSE OF IMPORTED VEGETABLES**

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This study was conducted to determine the major nutritional characteristics of domestic potato and carrot in comparison with those of imported potato and carrot and presented by food composition data for several Asian countries (neighboring and imported country). And we also investigated how to changed nutritional value by storage. Domestic vegetable samples were collected from rural area, while import vegetable samples (potato and carrot) from the UB city's food market. Domestic potato and carrot had similar levels of protein and carbohydrate (for example, domestic potato's protein 2.01%, and Chinese potato's protein 1.78%) and higher levels of fat (domestic potato's fat 0.75%, and Chinese potato's fat 0.37%) compared with potato and carrot which were imported from China, respectively. Domestic carrot had much higher levels of  $\beta$ -carotene (domestic carrot's  $\beta$ -carotene 11.42 mg%, and Chinese carrot's  $\beta$ -carotene 3.25 mg %) than compared samples.

The studied patterns were stored for 8-9 months in basement under suitable temperature and humidity. During the preservation, all sample's protein changed no more, rather carbohydrate of the domestic potato decreased 3-3.4 times, fat of Chinese carrot also decreased about 3 times. After the storage, amount of  $\beta$ -carotene decreased 1.2-1.5 times on the all samples.

Domestic vegetables, which Mongolians consumed has good source of major nutrient, especially  $\beta$ -carotene.

#### **P110-12 MALNUTRITION PREVALENCE IN MADAGASCAR: "NUTRITIONAL AND SENSORY POTENTIALITIES OF CULTIVATED YAMS**

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The malnutrition prevalence is around 45% and affects Malagasy populations. Yams are widely grown in Eastern and Southern region and constitute an important source of calories for indigenous populations. This study aims at targeting the most nourishing yam cultivars, accepted by the largest number of consumers. Two approaches were used in parallel: the chemical composition of dry yam (AACC, 2000) and a determination of relevant sensory properties. Preference tests were realized in three regions: a producer region, an urban community and a rural community. In parallel, a descriptive test was realized with trained panellists. *D. esculenta* is characterized by higher contents in proteins (6,7 g/100g-ldb), in carbohydrates (90,6 g/100g-ldb) and is less fibrous (7,4 g/100g-ldb). For all consumers, *D. esculenta* and in a lesser extent *D. alata* ovilalaina obtained the best liking scores. A descriptive test showed these two varieties differed significantly as regards to the regularity of shape and color, the color itself, the intensity of the sweet flavour, the adhesion and the firmness of the cooked samples. In conclusion, *D. esculenta* having higher contents in nutritional component and higher liking scores seems to have the highest potential to fight against malnutrition prevalence.

#### **P110-13 MINERAL AND HEAVY METAL CONTENT OF NIGERIAN DISHES**

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The purpose of the study was to determine the mineral and heavy metal composition of twenty standardized dishes commonly consumed in Nigeria. Twenty standardized dishes more frequently consumed were cooked in triplicate and their major elements (Ca, Mg, Na, K, P), and trace elements (Se, Mn, Pb, Cd) content were analyzed using atomic absorption spectrophotometry by standard methods of the AOAC (2005). Dry weights varied from  $18.33 \pm 0.20$  to  $63.77 \pm 0.30\%$  fresh matter. Calcium, phosphorus, magnesium, selenium and potassium contents expressed in mg/100 g ranged from  $45.96 \pm 0.33$  to  $421.94 \pm 0.56$ ,  $20.56 \pm 0.64$  to  $309.77 \pm 2.89$ ,  $38.34 \pm 0.81$  to  $270.32 \pm 4.21$ ,  $0.01 \pm 0.01$  to  $0.45 \pm 0.01$  and  $413.17 \pm 0.63$  to  $654.21 \pm 4.87$  mg/100 g, respectively. Their sodium, manganese, lead and cadmium contents were between  $16.86 \pm 0.28$  and  $67.54 \pm 2.10$  mg/100 g,  $0.03 \pm 0.01$  and  $0.22 \pm 0.02$  mg/100 g,  $0.03 \pm 0.01$  and  $0.65 \pm 0.05$ , and  $0.01 \pm 0.01$  and  $0.28 \pm 0.01$  mg/100 g, respectively. There were statistically significant ( $p \leq 0.5$ ) differences in the mean values of all the parameters determined. Most of these recipes could adequately contribute to dietary minerals intake in most of the recipes.

#### **P110-14 CULTIVAR DIFFERENCES AND THE EFFECT OF PROCESSING ON THE NUTRIENT COMPOSITION OF RICE**

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Rice is cultivated in more than 100 countries around the world and is a staple for about half the world's population. Rice provides 27% dietary energy supply, 20% of dietary protein and 3% dietary fat besides significant amount of B - vitamins and minerals. In the past generic food composition data was considered sufficient for most purposes but today the importance of cultivar specific composition data is being increasingly recognized specially to combat malnutrition. Therefore this

study was initiated to obtain cultivar specific nutrient data of Indian rice that are grown in different ecological zones and to study the effect of processing on the nutrient composition. Proximate composition, minerals (Fe, Zn, Cu, Mn, Mg, Ca, P) vitamins (B1, B3) and phytate content in 250 rice cultivars comprising of 750 samples in the form of brown rice, 5% polished and 10% polished rice was studied. Except moisture content all the nutrient parameters studied showed significant reduction due to polishing. The mean  $\pm$  SD protein content (n=250) was  $10.2 \pm 1.33$  g/100g in brown rice. Fat content ranged from 1.9 to 4.3g/100g with a mean  $\pm$  SD of  $2.39 \pm 0.55$  g/100g in brown rice which decreased considerably to  $1.08 \pm 0.39$ g/100g at 10% polishing due to the removal of the bran. Fat content in rice bran ranged from 11.57 to 18.44g/100g. The mean  $\pm$  SD Ash content in brown rice was  $1.4 \pm 0.15$ g/100g. Decrease in the ash content due to polishing at 5% and 10% level saw a concomitant decrease in all the minerals studied. Mean  $\pm$  SD iron content was  $1.19 \pm 0.54$  mg/100g with 10 cultivars showing high iron content ( $>3 - 3.75$  mg/100g). Zinc content ranged from 1.01 to 4.15 mg/100g with 26 cultivars showing high zinc content ( $>3 - 4.15$  mg/100g). Significant correlation was observed among the macro and micronutrients studied. The data on the amino acid composition and fatty acid composition of representative samples of rice is also presented. The results clearly showed that macro and micronutrient content of rice was clearly different among cultivars providing opportunity to selectively breed cultivars for higher nutrient content.

#### **P110-15 SAFETY ASSESSMENT OF SHELL OF PINCTADA MARGARITIFERA AS A FOOD SUPPLEMENT**

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It is reasonable to hypothesize that the calcium carbonate-rich shell of *P. margaritifera* (black pearl oyster) may be a source of calcium for human consumption.

We used Inductively Coupled Plasma- Atomic Emission Spectrometry (ICP-AES) to measure element concentrations in shell of *Pinctada margaritifera* from Manihi, French Polynesia. We selected 18 key elements, including heavy metals, based on regulatory standards issued by major regulatory agencies.

We then normalized detected element concentrations and compared to the safety standards for human consumption determined by regulatory agencies of UN, EU and the US. Element concentrations detected in this study were all lower than the safety standards promulgated by regulatory agencies. These findings suggest that shells of *P. margaritifera* from Manihi, French Polynesia, potentially represent a natural source for calcium-fortified foods, calcium supplement, and even for potential osteogenesis applications.

#### **P110-16 SIMULTANEOUS DETERMINATION OF NUCLEIC ACIDS IN AGARICUS BISPORUS EXTRACTS BY HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY**

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**RATIONALE & OBJECTIVES:** *Agaricus bisporus* is popular food source in Korea and it has been reported as a therapeutic food, useful in preventing various diseases. These functional characteristics are mainly due to their chemical composition such as nucleic acids. We researched HPLC condition to be developed and validated for simultaneous determination of nucleic acids in *Agaricus bisporus* extracts (ABE).

**MATERIALS & METHODS:** A method for nucleic acids analysis in ABE was developed using HPLC with UV detector. To determine the nucleic acids, *Agaricus bisporus* was extracted

with hot water at 90°C by reflux extraction for 1hr. And than, ABE was hydrolyzed with enzyme RP-1G and 50000G. The operating conditions for the HPLC analysis were: nova-pak C18 column (4.6x150mm, 4 $\mu$ m), 65mM KH<sub>2</sub>PO<sub>4</sub> TBA 1.6ml pH 3.2 with H<sub>3</sub>PO<sub>4</sub> as the mobile phase at a flow rate of 0.5 mL/min. The UV detector was operated at a wavelength of 254nm.

**RESULTS & FINDINGS:** HPLC condition is simple, rapid and sensitive, and it could be applicable for analysis of 4 nucleosides (cytidine, uridine, guanosine and inosine) and 4 mono-nucleotides (CMP, UMP, AMP and GMP) in ABE. Inosine and cytidine levels were shown 5.73 and 5.67 mg/g ABE, respectively and these compounds are higher than other nucleic acids in ABE. Content of total nucleic acids was found to be 26.06 mg/g ABE.

**CONCLUSIONS:** This method was successfully used for qualitative and quantitative analysis of nucleic acids in *Agaricus bisporus*.

#### **P110-17 FUNCTIONAL PROPERTIES AND NUTRITIONAL PERFORMANCE OF DEFATTED WHEAT GERM AND WHEAT FLOUR BLENDS IN COOKIES**

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**RATIONALE & OBJECTIVES:** Blending of wheat flour (WF) and defatted wheat germ (DFWG) at levels of 0–25% was investigated for the effect of DFWG on nutritional and functional properties of cookies.

**MATERIALS & METHODS:** After the extraction of oil from wheat germ DFWG was used in different concentrations to prepare the flour blends for further studies. Flour blends after analyzing their functional properties were utilized to prepare cookies which were analyzed for different physico-chemical, sensory and nutritional parameters by feeding male albino rats.

**RESULTS & FINDINGS:** The crude protein content of DFWG was as high as 27.80% with highly valuable amino acid profile, rich in essential amino acids especially lysine (2.324 g/100g). The water and oil absorption capacities, foaming and emulsifying properties of the DFWG/WF blends improved with increased amount of DFWG in the blends. The physico-chemical and sensory evaluation of cookies revealed that up to 15% substitution of wheat flour with DFWG produced acceptable cookies. The protein quality of the cookies was assessed through weanling albino rats by feeding a diet of cookies for 10 days, which was formulated to supply 10% protein, with a casein diet as a control. The cookies containing 15% DFWG were best regarding protein bioavailability in rats. The protein efficiency ratio, net protein utilization, biological value and true digestibility differed significantly among diets containing cookies with 0–10% DFWG, and casein diet when fed to rats.

**CONCLUSIONS:** Diets containing 15% DFWG have values, of these parameters, similar to the casein diet.

#### **P110-18 VITAMIN PROFILE OF SOME STANDARDIZED NIGERIAN COMPOSITE DISHES**

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Representative samples of Twenty Nigerian dishes were analyzed for fat-soluble (A, D, E, and K) and water-soluble (C and B- Complexes) vitamins. The foods analyzed included those based on cereals, starchy tubers and roots, legumes and vegetables. The results have revealed the following concentrations (mg/100 g): vitamin C, not detected to 2.69 mg/100 g; thiamine, 0.01 – 1.09 mg/100 g; riboflavin, 0.01 – 0.82 mg/100 g; pyridoxine, not detected to 0.41mg/100 g; niacin, 0.07 – 0.97 mg/100g; pantothenic, 0.06 – 1.19 mg/100

g; biotin, not detected to 2.09 mg/100 g; B12, 0.05 – 2.42 µg/100 g; foliate, 7.82 – 101.76 µg/100 g; total vitamin A, not detected to 121.44 µg RE/100 g; vitamin D, not detected to 2.45 IU/100 g; vitamin E, not detected to 2.63 IU/100 g; and vitamin K, 0.27 – 13.09 µg/100 g. The results suggest that these dishes are good sources of fat-soluble and water-soluble vitamins.

#### **P110-19 ZINC AND IRON LEVELS OF COMMONLY CONSUMED FOODS IN IRAN**

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Iranian food composition table was published in 1975 and it has not been updated, therefore errors are expected especially for minerals and vitamins. The purpose of this study was to measure iron and zinc contents of fifty commonly consumed food items in Iranian diet and comparison with the old food composition table values. The purpose of this study was to Rational and objectives: Food composition tables are the most important tools for accurately estimation of daily nutrient intake in nutritional public health surveys. The estimate iron and zinc intakes and their major food sources based on chemical analysis of fifty commonly consumed food items in Iranian diet.

**MATERIAL AND METHODS:** Fifty key foods in Iranian diet were selected based on National Comprehensive Study on Household Food Consumption Pattern and Nutritional Status, Iran, 2001-2003. Hawteiz procedure (2002) was used to identify the key foods. Samples were purchased in local stores in Tehran city and iron and zinc were measured by atomic absorption, after wet ashing. Iron and zinc intakes were estimated based on mean daily per capita intake of foods in Iranian households.

**RESULTS:** The averages iron and zinc contents of major foods and food groups were; Iranian flat breads (2.49, 1.65 mg/100g), rice (0.95, 1.9 mg/100g), Legumes (10.26, 3.8 mg/100g), red meat (1.41, 5.07 mg/100g), chicken (1.2, 0.6 mg/100g), fish (0.53, 1.16 mg/100g), fruits (0.38, 0.11 mg/100g), and vegetables (0.33, 0.67 mg/100g) respectively. Comparison with old values of iron content of foods showed 13, 4, 0.6, 0.1 and 1 mg/100g difference for flat breads, rice, meat, fruits, and vegetables respectively. Mean daily per capita intakes of iron and zinc based on recent data were 15 mg/d and 14 mg/d respectively.

**CONCLUSION:** We can conclude that the effect of changes in the Iranian food composition data in assessing estimates of iron intake, especially from breads as a major source of iron was marked. This change has important implications for the fifth development program of Iranian food and nutrition policy.

#### **P111: Agriculture & Food Systems: Others**

##### **P111-01 INFLUENCE OF DIFFERENT CROP MANAGEMENT PRACTICES (ORGANIC vs. CONVENTIONAL) ON THE NUTRITIONAL PROPERTIES AND BENEFITS OF TOMATO**

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Tomato (*Lycopersicon esculentum*) has been indicated as an important functional food for its possible role in the prevention of chronic diseases and so for its beneficial effects on human health. The aim of this study was to evaluate the influence of different crop management practices (organic vs. conventional) on the nutritional properties and benefits of tomato during two years of cultivation. We have investigated: 1) antioxidant properties and bioactive molecules levels 2) the cellular

damage induced by polyphenolic extracts from tomato in Caco-2 cell models by trans Epithelial Electrical Resistance (TEER) evaluation. Our results have shown that the nutritional composition and in particular bioactive compounds content could be affected by agronomic practices, year of cultivation, environmental and pedoclimatic factors. Moreover interesting results on cell models have demonstrated that tomato bioactive molecules show high cell permeability and antioxidant activity, even if at concentrations higher than 17 µM these bioactive compounds could have a pro-oxidant effect as demonstrated from histological analysis. In this way, we tried to understand and to explain the role of tomato as “functional food” in the protection of human health.

This work was done within the research project SIMBIOVEG financed by MIUR (Italian Ministry for University and Research)

##### **P111-02 GENETICALLY MODIFIED FOOD- THE PRESENT SITUATION IN POLAND**

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In recent years many trials to create common attitude towards genetically modified food have been undertaken in Poland. The latest governmental document was stated in 2003. The new document that is presently being prepared. Government gives the only possibility of introducing GMO to the environment but not to the food.

The skeptical attitude of Polish Government is in agreement with Polish society opinion about it. The examinations of Polish adult people showed negative attitude towards this kind of food. More than 60% of people declared that they would never buy these products. There were mostly women, people 18-35 year old living in cities with medium or high education level.

The common lack of acceptance is caused mainly by the worries about own health, the health of future generations and about the condition of natural environment. The light point for Poland is the fact that less chemicals are used in agriculture than in other Western European countries and it is advantageous for traditional food production system. The products with quality certificates have the chance for strong position in food market. It may help the family agriculture business to survive in the situation of global competition.

#### **P112: Right to Food and Adequate Nutrition I**

##### **P112-01 UNDERNUTRITION: A CONSEQUENCE OF DECISIONS BY UN ORGANISATIONS?**

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**RATIONALE:** Refugees from have lived in refugee camps in Southwestern Algeria for more than 30 years. They are totally depended on food aid. From 2006 UNHCR/WFP reduced the beneficiaries receiving food aid from 158000 to 90000, and back to 125000 refugees in 2008. The objective of this study was to assess the nutrition status of children and women in reproductive age.

**METHODS:** In March 2008 a cross-sectional nutrition survey was executed among 791 randomly selected refugee women aged 15-49 years and 871 children <5 years. Height and weight, hemoglobin level and individual food intake was measured.

**RESULTS:** In children, prevalence of global acute malnutrition was 18%, stunting 32% and anemia 62%. In non-pregnant women prevalence of anemia was 54% and in pregnant 66%. Of the children 42% ate from ≤4 of 11 food groups and 45% of the women ate from ≤5.

**CONCLUSION:** Undernutrition was rife among the women and children, beyond expectations. Since it was worse than earlier studies have shown one cannot rule out that this is a consequence of the reduced rations. One must ask if this is an example of food used as pressure against a defenseless population by UN organizations.

#### P112-02

##### **AUSTRALIAN COMMUNITY FOOD SECURITY: GAPS IN SURVEILLANCE AND MONITORING**

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**RATIONALE:** Prevalence of food insecurity in is between 6% and 16%, depending on the methodology used and the vulnerability of the targeted population. Effectively addressing food insecurity requires assessment at the local level. This paper describes the gaps in monitoring and surveillance while undertaking community food security (CFS) assessments in Queensland, Australia.

**MATERIALS AND METHOD:** CFS assessments were undertaken by nutritionists in three local areas in southeast Queensland. The data collection was based on the United States CFS toolkit. This relies on analyzing a combination of national/state data and locally collected data relating to socio-demographics, food availability and accessibility.

**RESULTS:** Data from national and state sources were limited for use within the local context. Gaps included: household food security, food costs, food outlets, food production, land use and household food expenditure. Local data collection occurred where feasible although this was challenging in some areas due to systemic constraints.

**CONCLUSION:** Work remains to be done in developing intersectoral collection and sharing of data to ensure effective use of resources. Without the ability to comprehensively map food security at the local level, there will be little evidence to support policy and program development that can bring about change.

#### P112-03

##### **LAND REFORM IN SOUTH AFRICA: MOVING TOWARDS THE RIGHT TO ADEQUATE FOOD FOR ALL?**

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**OBJECTIVES:** Half of the South African population does not have access to adequate food, due to extreme income and structural inequality. We investigate the impact of land reform on farm workers' livelihoods and their access to food.

**METHODS:** Research was carried out from 2004 to 2008 on four commercial farms, Province, investigating the micro-, meso- and macro-level. Farm owners, farm workers, experts on land reform and key informants were interviewed.

**FINDINGS:** Legislation aimed at shifting unequal power relations on farms resulted in farm workers having even fewer resources than before. Subsistence farming hardly exists in this region and food prices steadily increased over the past years. Due to a lack of alternative structures farm owners represent the only social security for farm workers, besides family networks. Farm workers very seldom benefit from land reform and remain vulnerable and dependent, moving even further away from

achieving the right to food.

**CONCLUSION:** The lack of effective and sustainable implementation of land reform and lack of support for emerging and established farmers might in future impact negatively on agricultural production and food security. Follow-up research should investigate the effect of land reform on rural livelihoods and nutrition security, applying a rights-based approach.

#### P112-04

##### **FOOD POVERTY AND FOOD INSECURITY IN SUMBA ISLAND, EAST NUSATENGGARA PROVINCE, INDONESIA**

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**BACKGROUND:** Food insecurity and poor nutritional status are almost inevitable the result of poverty. The objective of the study was to examine whether the resultant food poverty status of mothers demonstrated the nutrition status of their and their children as well as their household food security status.

**METHODS:** A cross sectional in design in two districts in East Nusa Tenggara province namely West and East Sumba districts, which covered a total of 25 villages. Assessment of food poverty line, food intake of mothers and children by using modified 24-hour recall, energy intake, household food security and nutritional status of mothers and children were done in this study.

**RESULTS:** The majority of the mothers were in the food poor groups either in the moderately (35%) or severely poor groups (58.6%). The mean food expenditure equivalency was significantly lower between severely poor group to moderately poor group and non-poor group. Ninety percent of households in both districts were food insecure with hunger. The prevalence of underweight mother was 23.6% in East Sumba and 29.4% in West Sumba. The prevalence of stunting and underweight cases among preschoolers was very high in both districts. Data revealed the serious condition in that particular area.

#### P112-05

##### **MANAGEMENT OF FOOD INSECURITY AMONG ELDERLY IN URBAN POOR FAMILY IN THAILAND**

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Food insecurity is recognized as an increasing problem worldwide. In, food insecurity is prevalent and has been discussed as a public health concern in relation to social and economic transitions. Until now data concerning food insecurity in Thai elderly has been scarce. The body of knowledge on food insecurity among Thai elderly particularly in urban population is still small.

The purpose of this qualitative study was to understand how elderly in urban poor family deal with food insecurity. In depth interviews were conducted among 30 Thai older adults aged 60 years and over who lived in urban poor family in Bangkok. Each interview lasted approximately one hour. Content analysis revealed that the elderly used self management including four themes: managing food, managing health, managing work, managing family life and payment. The results suggest a need for welfare reform to meet sufficient social assistance.

#### P112-06

##### **FOOD INSECURITY AND FAMILY FOOD DECISION MAKING**

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**OBJECTIVE:** The purpose of the study is to increase the understanding of the role of food insecurity in family food

decision-making.

**METHODS:** Through ethnographic interviews, 30 urban and 15 rural poor families representing the diverse living conditions of Filipino families shared their daily experiences of food insecurity. Selection parameters included families with irregular source of income and having dependent children.

**RESULTS:** There are two types of food management strategies of food insecure families – anticipatory strategies in preparation for a food crisis and coping actions in response to actual food crisis. Anticipatory strategies such as accumulation of stocks, income diversification and inter-household transfer are undertaken to preserve the household's long-term income generating capacity rather than avoid hunger. Coping actions include dietary changes, rationing strategies, altering family composition, and disposal of assets through mortgage or sale.

**CONCLUSION:** Families do not respond arbitrarily to food insecurity but have developed strategies to cope with fluctuations of food supply. Families cope differently depending on their existing assets and their access to entitlements.

#### P112-07

##### **DOES MIGRATION IMPACT ON BREASTFEEDING BELIEFS AND PRACTICES AMONGST AFRICAN WOMEN IN AUSTRALIA**

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**RATIONALE & OBJECTIVES:** Cultural beliefs and practices are known to influence a mother's decision regarding breastfeeding. Few studies however, have investigated the impact of migration of current African diasporas on infant feeding. This paper explores the factors that influence the breastfeeding decisions and practices of these African women.

**MATERIALS & METHODS:** Semi-structured interviews and focus groups were undertaken with thirty-nine Sudanese, Congolese, Burundian, Ethiopian, Sierra Leonean and Liberian women living in Brisbane, Australia. Breastfeeding beliefs, practices and perceived differences in Africa and Australia were explored. The qualitative data collected were analyzed for convergent themes.

**RESULTS & FINDINGS:** All women reported initiating breastfeeding, although duration ranged from two to 24 months. Women tended to report less favorable breastfeeding beliefs, practices and support upon migration to Australia. Acculturation was a global theme throughout the study with five central themes identified as impacting on breastfeeding practices: (1) cultural beliefs; (2) cultural practices; (3) stigma and shame about breastfeeding in public; (4) financial capacity and (5) breastfeeding support.

**CONCLUSION:** Development of culturally specific strategies and appropriate public policy for constructing cultural norms supporting breastfeeding in Australia is needed to safeguard the right of migrant populations to continue health promoting breastfeeding practices.

#### P112-08

##### **NUTRITIONAL STATUS OF INDIGENOUS PEOPLE (ORANG ASLI) IN KRAU WILDLIFE RESERVE, PAHANG, MALAYSIA**

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**OBJECTIVE:** This was a cross-sectional study on the nutritional status of Orang Asli adults ( $\geq 18$  years old) in Krau Wildlife Reserve.

**METHOD:** Two hundred households were purposively selected; compromise 149 men and 211 women. Jahut (81.7%) was the main ethnic group as compared of Che Wong (8.6%)

and Temuan (9.7%). The mean ages of respondents were 35.5 $\pm$  12.3 years. Weight, height, waist circumference, and skinfold thickness were measured using standard instruments.

**RESULTS:** According to Body Mass Index, 59.2% of respondents were normal, 11.9% underweight, 29% were overweight or obese. More females were overweight and obese (33.2%) as compared to men (22.8%). About 10.7% males ( $\geq 90$ cm) and 31.3% ( $\geq 80$ cm) of females revealed abdominal obesity, respectively. Body fat percentage revealed 13.4% ( $\geq 25\%$ ) and 20.9% ( $\geq 32\%$ ) of men and women were at risk for diseases associated with obesity. Mean blood pressure systolic was 118.9 $\pm$ 17.3mm/Hg and diastolic was 79.9 $\pm$ 11.5 mm/Hg with 13.1% (systolic:  $\geq 140$ mm/Hg) of them had high blood pressure.

**CONCLUSION:** This research indicated that indigenous people are at risk of non-communicable diseases. Thus, multivariate analysis will be carried out to determine the relationship between nutritional status and dietary diversity.

#### P112-09

##### **DEVELOPMENT AND VALIDATION OF FOOD SECURITY MEASURE IN SOUTH KOREA**

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**OBJECTIVE:** This study aims to develop an index of food security in order to assess food security status in Korea and to evaluate reliability and validity of the index.

**METHODS:** The index of food security was developed based on the US Household Food Security Survey Module (US-HFSS). After the US-HFSS was translated and back-translated, it was evaluated and modified by a focus interview for experts. The developed the Korean Household Food Security Survey Module (K-HFSS) was tested by cognitive interviews and a pretest test for general community population to assess its application for Korean population. For the reliability and validity of K-HFSS, the survey was conducted with 300 residents in rural community and 212 residents in urban community. The reliability was assessed by Cronbach's alpha and the validity was evaluated by content validity, construct validity, and criterion-related validity.

**RESULTS:** The questionnaire items of K-HFSS were partly modified, accounting for Korean social and culture background and adapted by general community population. The reliability was relatively high, showing Cronbach's alpha coefficients ranged from 0.80(for rural residents) to 0.87(for urban residents). The content and construct validity were all acceptable. The result of criterion-related validity showed that food security status was significantly related to the household income level.

**CONCLUSIONS:** The K-HFSS was a reliable and valid instrument to assess food security status in Korean population.

#### P112-10

##### **MOTHERS' RIGHT TO FOOD AND BREASTFEEDING CHALLENGES: CASE OF RURAL KENYA**

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**BACKGROUND/ OBJECTIVES:** Breast milk is first child food and breastfeeding child's right. Mothers are the primary duty bearers to their infants. Exclusive breastfeeding practice in Kenya and other parts of the world still remains at sub optimal levels. The study investigated how mother's realization of right to food influences breastfeeding.

**METHODOLOGY:** A cross-sectional survey conducted among 125 rural farming and pastoral women. Proportionate and systematic sampling used to select households. Data collected using semi-structure household and rights questionnaires and focus group discussions.

**RESULTS:** Mother's right to food influenced by marital status, livelihood source, access to resources and cultural food practices. 68.6% were food insecure. Farming mothers were significantly better ( $p < 0.05$ ) in access to food, equitable food distribution, owning property and not relying on male spouses for food provision. 44.6% did not perceive exclusive breastfeeding up to six months a right.

**CONCLUSIONS:** Meeting maternal rights to food, work, health and education are crucial in effective breastfeeding and maternal

#### P112-12

##### **FOOD INSECURITY IN FAMILIES WITH CHILDREN BELONG 5 YEARS. BRASILIA, FEDERAL DISTRICT, BRAZIL**

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**RATIONALE & OBJECTIVES:** The impact of food insecurity on families with children is an important research issue. However, at this point research is only beginning to evaluate community-level determinants of food insecurity. The objective of this study was to identify the prevalence of household food security in families with children and examine its association with the social, demographic and economic profile of these families.

**MATERIALS & METHODS:** A cross-sectional study comprising 1,151 families was performed at national Immunization Day, at Federal District, Brazil. A questionnaire was used to assess the socio-demographic characteristics together with the Brazilian Food Insecurity Scale. The prevalence were calculated and the association between the studied variables was verified by the chi-square test.

**RESULTS & FINDINGS:** The prevalence of food insecurity was 3,9% for severe, 9% for moderate and 27,7% for mild. Food security was found in 59,3% of the families. The situation of food insecurity was worse when the supporters of the families were women or had low educational level. Insufficient money to buy food was the main reason reported for the food insecurity status.

**CONCLUSION:** The prevalence of food insecurity was high. The methodology used proved to be an important assessment tool of food security status and useful to monitor public policies and social programs of the Federal Government.

#### P112-13

##### **THE RIGHT TO FOOD IN VULNERABILITY: ROLES AND CAPACITY OF UGANDA'S STATE ACTORS**

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**RATIONALE:** The right to food recognized under international law provides a foundation for freedom from hunger. This study assessed roles and capacity of State actors in realizing the right to adequate food.

**METHODS:** Purposive sampling and structured interviews applied to duty bearers selected from 11 Ugandan districts, while focus group discussions were held with rights holders identified using key informants. Relevant policies, budgets, and legislation were reviewed.

**RESULTS:** Only 20% duty bearers had knowledge of the definition of the human right to food (GC 12) and the Right to Food Guidelines; documents elaborating this right. Although this right is expressly recognized in the Uganda Food and Nutrition Policy, supportive legislation are lacking while relevant institutional frameworks have limited financial capacity.

**CONCLUSION:** Although Uganda ratified international agreements pledging to end hunger, legislation and budget investments are inadequate partly due to limited awareness

of the right to food and its content. There is need to promote civic education and human rights based approach to food and nutrition planning.

#### P112-14

##### **PERCEPTION OF RIGHT TO ADEQUATE FOOD AMONG RURAL HOUSEHOLDS IN KENYA**

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**RATIONALE/OBJECTIVE:** Increased poverty, malnutrition and hunger depict violation of human rights and denial of basic entitlements. Recent studies on rights to food focused on the context of national food security. Study investigated perception of human rights, right to food in the cultural context and duty bearers and claimants of right to food at household level.

**METHOD:** A cross-sectional survey was conducted among 249 rural households. Multi-stage, proportionate and systematic random sampling used to select households. Data collected using structured household questionnaire, Leikert rating scale and focus group discussions.

**RESULTS:** Both study groups had fair knowledge on human rights and perception of right to food. There were significant differences ( $p < 0.05$ ,  $p < 0.001$ ) in cultural perceptions to right to food. Perception of right to food was influenced by respondent characteristics and realization of other rights. The State and Men perceived to be main duty bearers.

**CONCLUSION:** Perceptions of right to food influenced by culture and realization of other rights.

#### P112-15

##### **HOMELESS CHILDREN OF DELHI, INDIA-DON'T THEY HAVE A CLAIM TO FOOD AND NUTRITION SECURITY?**

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**RATIONALE AND OBJECTIVES:** Every child has a right to food and nutrition security including homeless children. The aim of this study was to assess their food and nutrition security in India for recommendation of suitable policy decisions.

**MATERIALS AND METHODS:** A cross-sectional study was undertaken among 1000 runaway and homeless children (849 boys and 151 girls) aged 6 – 16 years. Socio-demographic profile, access to food, and dietary pattern was obtained using interviews. Vitamin A status by dark adaptometry, hemoglobin by cyanmethemoglobin method, diet-related information by 24-hour recall method was assessed.

**RESULTS AND FINDINGS:** Girls/older children had more difficulty than boys/younger children for accessing food. Energy and protein intake could not be met by any of the subjects. Stunting (24.5%), underweight (21%), anemia and vitamin A deficiency were seen among the subjects.

**CONCLUSION:** The meal delivery programs targeting school children should be expanded to include homeless children also.

#### P112-16

##### **FOOD AVAILABILITY, CONSUMPTION, HUNGER AND NUTRITIONAL STATUS OF POOR HOUSEHOLDS DURING FOOD SHORTAGE**

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Malnutrition becomes a serious problem in Indonesia after economic crisis and disasters which reduce food production in community level and food availability in household level. The research was aimed to analyze food availability, consumption, hunger status, and nutritional status of vulnerable groups in poor households during food shortage. This observational analytic research was done in Kediri, East-Java, involving 50

poor households.

Household food expenditure was more than 60% of the income. The availability of staple food (tuber and maize) was still enough, yet rice and animal source protein was decreased. Carbohydrate source food in rural poor households more varied compared to the urban. The main protein source food was soybean and egg, and main fat source was coconut. Food frequency was decreased into 1-2 times daily; with 42% only consume staple food and vegetables. The energy intake of 50% households was severe-deficient (hunger), and mild PEM prevalence of children under-five was increase 20%.

Market intervention and local food supplementary was essentials in the peak of food shortage

### **P113: Nutritional Benefit-Risk Assessment of Foods and Food Consumption Patterns I**

#### **P113-01 THE PREVALENCE OF HEAVY DRINKING AMONG ADULTS IN CHINA**

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**RATIONALE & OBJECTIVES:** To investigate the prevalence of heavy drinking among adults in China, and provide basis for the development of intervention strategy.

**MATERIAL AND METHODS:** Data of 53 073 subjects aged 18 years and over from 2002 China National Nutrition and Health Survey were used to estimate the prevalence of heavy drinking.

**RESULTS:** The overall heavy drinking rate of adults in China was 4.7%, 8.4% for male and 0.8% for female, respectively. The proportion of heavy drinkers in urban residents was 4.1%, which was lower than that in their rural counterparts (4.9%). The 45 to 59 years age group reached the highest. Of those who drank, 49.1% were heavy drinkers (51.5% for male, 32.1% for female and the 45 to 59 years age group reached the highest). The heavy drinking rate of alcohol consumers was 39.6% for urban and 54.7% for rural, respectively.

**CONCLUSION:** Heavy drinking is common among alcohol consumers in China, especially young and middle-aged adults in rural areas. Health education program should be developed and conducted.

#### **P113-02 SUGAR AND FAT INTAKE IN CHILDREN IN SCOTLAND: WHAT IS NEEDED TO REACH THE DIETARY TARGETS?**

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A survey of 1,721 children across Scotland aged 3-16y was carried out in 2006 to assess whether the intake of non-milk extrinsic sugars (NMES), total fat and saturated fatty acids (SFA) met current recommendations for health. Dietary intake of NMES, total fat and SFA was estimated using a food frequency questionnaire which showed good agreement with 4-day diet diaries for the same nutrients in a sub-sample of the study population. Socio-economic status was assessed using the Scottish Index of Multiple Deprivation, based on post-code location and population census data. The mean intake of NMES was 17.4 (95% CI 17.0, 17.8) % of food energy, considerably higher than the recommended level of 11% food energy. Total fat intake was on average 32.9 (95% CI 32.7, 33.2) % food energy, which was within the recommended level of 35% food

energy, but SFA intake was 13.8 (95% CI 13.7, 14.0) % food energy, which was also higher than the recommended level of 11% food energy. Despite clear socio-economic gradients in the consumption of many 'healthy' and 'unhealthy' foods, socio-economic difference in NMES as % food energy were limited and there were no socio-economic differences in the intake of total fat or SFA as % food energy. Calculations of the impact of removing sugar-sweetened soft drinks and increasing fruit and vegetable intake by 50% showed that these changes would not restore the intake of NMES or SFA to recommended levels: further changes in intake of other foods will also be needed.

#### **P113-03 A COMPARISON OF NUTRIENT DENSITY SCORES FOR DARK GREEN VEGETABLES: A CALL FOR INTER- AND INTRA-GROUP VARIETY WHEN RECOMMENDING VEGETABLE INTAKE**

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**RATIONALE AND OBJECTIVES:** The objective of this study was to compare inter- and intra-group nutrient density (ND) scores of dark green vegetables based on type and preparation.

**MATERIALS AND METHODS:** ND scores of bok choy, broccoli, dark green leafy lettuce, spinach, watercress, and three types of greens (collard, kale, and mustard) were calculated using 6 methods. Nutrient profiles/100 g of food were calculated for each vegetable for different preparations. Nutrient analyses were from the Nutrition Data System. ND scores were calculated using: 1) Naturally Nutrient Rich, 2) Calorie for nutrient, 3) Ratio of Recommended to Restricted nutrient, 4) Fulgoni nutrient for calorie, and two ad hoc nutrient for calorie (5 & 6) methods.

**RESULTS:** Inter-group comparisons between vegetables were based on the mean ND scores for each of the six methods, whereas intra-group differences were based on the ND scores by preparation. Cooked kale ranked highest with 1, 5, and 6. Watercress ranked highest with methods 2 and 4. Turnip greens ranked highest using method 3. Broccoli and lettuce consistently ranked lowest among the vegetables regardless of preparation. Greens cooked from frozen had a higher ND score with method 1 and 6 and a lower ND score with the other methods when cooked from fresh.

**CONCLUSION:** Results illustrate the complexity of calculating ND scores and highlight the need to consider inter- and intra-group differences when recommending vegetable intake.

#### **P113-04 DUTCH NATIONAL FOOD CONSUMPTION SURVEY-YOUNG CHILDREN 2005/2006**

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**OBJECTIVE:** Which proportion of Dutch young children adheres to the recommendations of a healthy diet?

**METHODS:** A Dutch National Food Consumption Survey was conducted in 2005/2006. Dietary records of two non-consecutive days using pre-structured diaries were obtained for 1,279 children (2-6yrs). Trained dieticians entered the data into EPIC-Soft software. Habitual dietary intake was assessed using statistical modeling.

**RESULTS:** About one in 10 children met the recommended vegetable consumption and one in four the recommendation for fruit. Furthermore, only 9% of the children met the recommendation for fish. Consumption of fiber-rich foods was probably too low in most of the children. The contribution of saturated fatty acids is too high for the majority of 4-6 year-old children. Intake of trans fatty acid intake of about 10% of the

children aged 4-6 years exceeded the upper limit. Finally, the diets of Dutch young children were adequate in most vitamins and minerals. However, the intake of vitamin D and folate was low.

**CONCLUSION:** Policy measures need to focus on achieving optimal body weight, increasing intakes of vegetables, fruit, fish and fiber, and improving the fatty acid composition in the diet of young children.

#### P113-05

##### THE DUTCH DIETARY MONITORING SYSTEM

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For effective formulation and evaluation of health and food safety policy, data are required on the food consumption and nutritional status of the Dutch population. The Dutch dietary monitoring system was redesigned in 2003 in order to meet changing policy needs such as more food safety issues, and to reflect socio-demographic developments, trends in food habits as well as developments in dietary assessment methods.

The current Dutch dietary monitoring system consists of five modules. The core of the system comprises a (semi-) continuous collection of data pertaining to the general population aged from 7 to 69 years (1). The dietary assessment method consists of two non-consecutive 24-h dietary recalls in combination with a self-administered questionnaire among subjects recruited from consumer panels. Separate surveys are advised for the various components made up of specific target groups (such as children, ethnic groups, pregnant and lactating women) (2) or specific foods that are consumed by relatively few people (3). Bottlenecks in nutrition signaled in the surveys may induce follow-up studies on nutritional status (4) or on determinants of dietary behavior (5).

#### P113-06

##### DIETARY HABITS AND ORAL HEALTH OF CHILDREN

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**OBJECTIVES:** Dental caries is one of the most common disease in children. The aim of this study was to assess dietary habits and dental and periodontal status of children.

**MATERIALS AND METHODS:** A total of 129 children (73 girls, 56 boys, mean age 7.9±2.4) were examined according to WHO guidelines. Demographic data, nutrition and brushing habits were collected via a questionnaire. Caries prevalence including decayed missing filled teeth of primary (dft) and permanent teeth (DMF-T) and plaque index (PI) were determined. Body mass index (BMI) was also calculated.

**RESULTS:** The ratio of children having 2 snacks in-between-meal was found to be 62.8%. While 59.7% of children consumed sugar-sweetened beverages once a day, only 12.7% of children presented no consumption. Children brushing their teeth 1, 2, 3 and 4 times/day were 38.8, 35.7, 20.1 and 5.4% respectively. Mean number of dft was 5.8±3.1, DMF-T 2.1±1.5, PI 1.1±0.5. BMI was found to be within normal limits.

**CONCLUSION:** Regarding high prevalence of caries in children, health education should point out to the significance of proper nutrition and regular oral hygiene.

#### P113-07

##### PROTECTION AGAINST DENTAL EROSION AFFORDED BY FERMENTED SHRIMP PASTE IN ACIDIC FOOD

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**RATIONALE & OBJECTIVES:** Fermented shrimp paste is very important for sauces and dishes throughout Southeast Asia;

it is rich in calcium. The aims of this study were to determine the erosive potential of tamarind juice containing fermented shrimp paste.

**MATERIALS & METHODS:** Four groups of tooth enamel specimens were exposed in tamarind juice or tamarind juice containing three varied shrimp pastes for 15 minutes per day for a total of 29 days. The enamel loss and the percentage of surface hardness change (% of SMHC) were investigated using a profilometer and a Vickers microhardness tester respectively.

**RESULTS & FINDINGS:** The results showed that the addition of fermented shrimp paste to tamarind juice can significantly reduce the erosive potential of tamarind juice. The higher content of shrimp paste in tamarind juice can significantly reduce the enamel loss, more than a smaller content of shrimp paste. However, the % of SMHC of all treatment groups was not significantly different during the experimental period.

**CONCLUSION:** Addition of shrimp paste in tamarind juice can reduce the erosive potential of tamarind juice on enamel.

#### P113-08

##### DIETARY PATTERNS ARE PREDICTORS OF PROBLEM BEHAVIORS IN CHILDREN

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Prevailing dietary patterns and their association with behavioral outcomes are poorly understood for children in Korea. This study identified major dietary patterns and examined their associations with problem behaviors in children. As part of the CHEER (Children's Health and Environmental Research), usual diet of ~2,200 children aged 7-8 years was assessed by a food frequency questionnaire, from which 45 food groups were created and entered into a factor analysis. Based on relative intake frequencies of foods, we identified five dietary patterns such as Vegetables, Meat & Fish, Fruit & Dairy, Flour & Fast food, and Sweets. DuPaul's Attention-Deficit Hyperactivity Disorder (ADHD) rating scale was used to assess problem behaviors. Dietary patterns of the Flour & Fast food and Sweet showed positive relationships with both AD and HD measures in multivariate logistic regressions. The Vegetable pattern was negatively associated with AD. These findings suggest that major dietary patterns are predictors of problem behaviors in school-aged children. (Supported by the Ministry of Environment, ROK)

#### P113-09

##### DIETARY PATTERN AND DIETARY INTAKE OF TRIBAL WOMEN OF NAUGARH BLOCK CHANDAULI DISTRICT U P INDIA

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**RATIONALE:** In, Dietary habits, dietary pattern and dietary intakes of tribal women are far from satisfactory.

Objectives-

1. To know prevalent dietary habits and dietary pattern of the tribal females.

2. To assess dietary intakes of study subjects in terms of quantity and quality.

**MATERIALS AND METHODS:** This was the cross sectional study. Sample size of the study was 402 females. The tool for this study was a pre-designed and pre-tested interview schedule. Dietary intake was assessed by 24-hour recall method.

**RESULTS:** The dietary pattern of the study subjects was cereals, roots and tuber based. Consumption of other food items viz. GLV, fruit, milk & milk product, and flesh items was almost negligible (< 10% of

RDA). The mean energy intake was found 1643.0 Kcal per women per day. Daily intake of all other nutrients was much lower than corresponding estimated mean RDA.

**CONCLUSION:** It was evident from the study that the dietary habits, dietary pattern and dietary intakes of tribal women were extremely poor.

**P113-10**  
**DIETARY EXPOSURE ASSESSMENT OF CHINESE ADULTS AND NURSING INFANTS TO TETRABROMOBISPHENOL-A AND HEXABROMOCYCLODODECANES: OCCURRENCE MEASUREMENTS IN FOODS AND HUMAN MILK**

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Tetrabromobisphenol A (TBBPA) and hexabromocyclododecane diastereoisomers ( $\alpha$ ,  $\beta$  and  $\gamma$ -HBCD) were determined in 24 pooled human milk samples and 48 Chinese Total Diet Study (TDS) samples collected in 2007. Based on ultra performance liquid chromatography-mass spectrometry (UPLC-MS/MS) analysis, levels of TBBPA ranged from <LOD to 5123 pg/g lipid weight (lw) in human milk and from <LOD to 2044 pg/g lw in TDS samples.  $\alpha$ -HBCD diastereoisomer, which ranged from <LOD to 2776 pg/g lw in human milk and from <LOD to 2224 pg/g lw in TDS samples, was generally the most abundant comparing with  $\beta$  and  $\gamma$ -HBCD. The average Estimated Daily Intake (EDI) of TBBPA via human milk for nursing infants with a range of 320-3724 pg/kg bw/day was 5094 pg/kg bodyweight (bw)/day, while that of  $\Sigma$ HBCD was 5837 pg/kg bw/day with a range of 670-1732 pg/kg bw/day. The medium bound (<LOD=1/2LOD) EDI TBBPA for a "reference" man via animal origin foods was 256 pg/kg bw/day and EDI  $\Sigma$ HBCD was 432 pg/kg bw/day. Meat and meat product was the main source in the total dietary intake of TBBPA and  $\Sigma$ HBCD. Overall, our research on the estimated daily intake of TBBPA and  $\Sigma$ HBCD by the Chinese population, with large variations between provinces in BFR levels, was lower than similar study in Europe.

**P114: Nutrition & HIV/AIDS III**

**P114-01**  
**EARLY BREASTFEEDING PATTERNS IN A HIV-AFFECTED COMMUNITY OF GHANA: THE RIING STUDY**

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**RATIONALE & OBJECTIVES:** Exclusive breastfeeding (EBF) is key to improving infant health and reducing the risk of HIV transmission. The RIING project examined infant feeding practices and other determinants of child health in a HIV-affected Ghanaian district.

**MATERIALS & METHODS:** A cohort study of 152 HIV-infected and 177 HIV-uninfected mothers and infants were visited twice-weekly 0 to 12 mo to document feeding behaviors and health outcomes. Dietary intakes, including breast milk, were measured at 3, 6, and 9 months.

**RESULTS & FINDINGS:** Infants of HIV-infected compared to HIV-uninfected mothers were more likely to not EBF early in life ( $p < 0.05$ ); however, many women then reverted to EBF. At 3 mos, there was no difference in 24-hr feeding frequency ( $12 \pm 4$  vs.  $13 \pm 3$ ) or breast milk intake ( $730 \pm 249$  vs.  $800 \pm 228$  g) between infants of HIV infected and uninfected mothers.

**CONCLUSION:** Breastfeeding is dynamic. Additional counseling is needed for HIV-infected mothers to EBF and

decrease HIV transmission risk for their infants.

**P114-02**  
**APPLICATION OF THE FOOD MULTIMIX CONCEPT IN NUTRITIONAL SUPPORT FOR HIV/AIDS PATIENTS' NEW STRATEGIES IN HIV/AIDS MANAGEMENT IN DEVELOPING COUNTRIES**

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**RATIONALE & OBJECTIVES:** Nutritional support in HIV and wasting syndromes aims at replenishing energy and nutrient losses, weight gain and quality of life. The focus of this study was to test the Food Multimix concept that traditional foods can be combined to meet nutrient needs of HIV/AIDS patients in food-insecure environments utilizing 'nutrient strengths' of candidate foods without external fortification.

**METHODS:** The "food-to-food" approach was employed in formulating recipes targeting ingredients from foods commonly consumed in Ghana. Recipes were subjected to proximate and micronutrient analyses and optimized to meet at least 40% of recommended daily intakes.

**RESULTS:** Mean ( $\pm$ SEM) showed high energy density (kJ/g product) of 16.35 ( $\pm 0.17$ ) and energy distribution of protein, carbohydrate, fat of 24.5%, 45.2%, 30.4%, respectively. Selected minerals expressed as % of the RNI and index of nutritional quality (INQ) were for iron, 223.10% (INQ=4.26); calcium, 109.50% (INQ=2.09); zinc, 112.80 (INQ=2.16) and copper, 104.6 (INQ=2.00). Similarly for vitamins B1, B2 and B3, INQ were: B1= 136.90% (INQ=2.61); B2=79.92% (INQ=1.53); and B3= 92.33% (INQ=1.76).

**CONCLUSION:** The effective combination of local foods have benefits and implications for clinical and public health intervention programs of HIV/AIDS and its attendant opportunistic infections.

**P114-03**  
**DIETARY INTAKE AND NUTRITION STATUS IN PLWHA; CASE STUDY AT THAI RED CROSS ANONYMOUS CLINIC**

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People living with HIV/AIDS (PLWHA) usually confront with the nutrition problems. The objective was to determine dietary intake and nutritional parameters in PLWHA at Thai Red Cross Anonymous Clinic between January-February 2009. This study was a cross-sectional study. Forty HIV-infected patients age older than 18 years, all stages of disease were participated. Anthropometric measurements, immunological parameters, blood pressure and dietary intake data using 3-day food records were collected. Nutritional status was assessed by nutritional risk for PLWHA developed by Department of Health: Ministry of Public Health, Thailand.

The results showed that the energy intake was 1,787 + 554 kcal/day or 90.6% Thai DRI. Energy distributions (%) of carbohydrate, protein, fat were 52.73 + 8.00, 15.67 + 4.09 and 31.59 + 5.68 respectively. The averages CD4 were 346.02 + 76.19 cell/mm<sup>3</sup>. Weight and BMI were 58.66 + 11.37 kg and 22.19 + 3.9 kg/m<sup>2</sup>. Nutritional status revealed that the numbers of PLWHA were in low 19 (47.5%), mild 17 (42.5%) and moderate risk 4 (10%). Sodium intake was 3,017.77 + 1,915.73 mg/day which higher than recommendation (2,400 mg/day). However the study found no correlation between sodium intake and blood pressure. Body weight was significantly correlated with MAC ( $r = 0.804$ ) and MAMC ( $r = 0.838$ ) same as body fat and TSF ( $r = 0.739$ ).

In conclusion, dietary intake of PLWHA was acceptable. However malnutrition risk was observed.

#### P114-04

##### A MODULE OF HIV NUTRITION TRAINING AND EDUCATION FOR PLHIV IN THAILAND

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**RATIONALE:** Nutrition knowledge and skills are crucial for PLHIV at all disease stages. Effective and practical ways to encourage PLHIV to integrate nutrition interventions into their routine life are needed.

**PROJECT:** HIV Nutrition Training and Educations for PLHIV adults were held by middle-sized hospitals in the Northern, Eastern, and Central parts of Thailand. The training module included interactive didactic sessions and nutrition game stations held within a 3-day/2-night family-style camp with the purposes to empower participants in identifying nutrition problems and responding effectively to the issues. Each camp was tailored to provide core HIV nutrition knowledge and skills that fit regional culture.

**RESULTS:** A total of 145 participants, 52 men and 93 women with mean age of 38 years (32-43) showed significant improvement in HIV nutrition knowledge after the camps ( $P=0.00$ ). Most (97%) indicated that the "Nutrition Game Station" was the most effective learning way and 95% indicated the ability to apply knowledge gained into their lives.

**CONCLUSION:** The family-style HIV nutrition camp with the "nutrition game stations" as its component was an effective and fun nutrition training and education module for HIV-affected families in Thailand and may well be applicable to other Asian countries. Factors for the success included great involvement of local people in the planning, excellent teamwork, and tailored nutrition messages for each region.

#### P114-05

##### HIV/AIDS AND CULTURE: A GHANAIAN CASE STUDY

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**RATIONALE AND OBJECTIVES:** "DIPO" is a puberty rite performed for females averagely 18yrs and above in the Yilo-Krobo (Somanya) District of the Eastern Region of Ghana. The goal is to keep the virginity of the females intact till they are of age and ready for marriage.

**OBJECTIVE:** To investigate the role of culture in the fight against the HIV/AIDS menace in Ghana with DIPO as a case study.

**METHODS:** Key informant interviews, and questionnaires were used for the data collection.

**RESULTS AND FINDINGS:** In total, 146 key informants and correspondents were interviewed. "DIPO" is now performed at a very early age, 100% of females interviewed went through the rite when they were below 14 years of age. Most females in the district start sexual intercourse very early as they go through the puberty rite at very early ages. This makes them more vulnerable to the HIV infection and more importantly at their youthful age.

**CONCLUSION:** There is the need to go back to the key principles of the DIPO puberty rite especially the age at which it is performed for women.

#### P114-06

##### ASSESSING HIV LIPODYSTROPHY SYNDROME: A COMPARISON OF DIFFERENT METHODS TO AN OBJECTIVE CASE DEFINITION

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**RATIONALE & OBJECTIVES:** The assessment of HIV LDS varies among researchers making it difficult to compare incidence and prevalence among clinics in South Africa. The objectives were to firstly assess the agreement between methods routinely used in the clinical setup to a case definition using diagnostic testing and secondly to develop and cross-validate a classification instrument for HIV LDS.

**MATERIALS & METHODS:** 1421 HIV positive adult patients (69% female) enrolled on HAART were purposeful sampled to divide them into a case- and control group according to a screening process.

**RESULTS & FINDINGS:** The diagnostic properties (sensitivity, specificity) of the test methods were as follows: NCEP, (45%, 83%); subjective self-reporting, (74%, 59%); Kotler-anthropometry, (71%, 52%); routine-anthropometry, (62%, 54%); and Dong & Hendricks-anthropometry, (10%, 88%). The new classification instruments' diagnostic properties had a sensitivity 81%, specificity 79%, AUC 0.88.

**CONCLUSION:** In a resource limited setting the NCEP appears to be the "best" among the methods tested for identifying HIV LDS. The new instrument showed even better diagnostic properties. This might lead to accurate, consistent detection of HIV LDS in the SA setting.

#### P114-07

##### FOOD SECURITY, POVERTY, AND PROSTITUTION DRIVE THE HIV EPIDEMIC: A CASE STUDY FROM RURAL KISUMU KENYA

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**BACKGROUND:** In SSA focus has been on sexual behavior as the main driving factor of HIV transmission in Africa (UNAIDS, 2006). The positive correlation between infection and socio-economic status remains unexplained in many communities affected by the epidemic. The effects of poverty in urban areas are a mirror image of what happens to rural communities yet very few studies have communicated the reality and rural perception of the epidemic. This paper is aimed at identifying factors driving the HIV epidemic and identifying strategies for intervention with a focus on the Luo community of Kisumu rural Kenya.

**METHODOLOGY:** A triangulated methodological approach was applied. Both survey questionnaires and in-depth interviews were conducted in 2004 and 2005. Men and women aged 14-49 years, from three locations: Kisian, Nyahera and Chulaimbo in rural Kisumu Kenya, (356 participated in the survey and 33 in-depth interviews). The theoretical framework and SPSS package were adapted in the analysis of this data. The results presented in this paper are from the in-depth interviews.

**RESULTS:** Economic, socio-cultural and structural factors were reported to drive the epidemic. Food insecurity and poverty was the main identified force behind the epidemic. It was reported to fuel behavioral factors like alcoholism and prostitution, which was also on the rise (24.0%) among widows. Young women, orphans and young men who were targeted by the infection. Most reported engaging in unprotected, cheap sex for provision of basic needs such as food, clothing and income. Food security reduced risk assessment and given more priority than HIV, affected many families and made women and orphans very vulnerable to HIV infection. Orphans who live in poverty were reported to be a further potential risk. Education, increase in awareness, social care support scheme for widows and orphans, and tackling food insecurity, were proposed immediate interventions by participants.

**CONCLUSION:** Food insecurity is a concern in populations that have the highest infection and who don't have access to medication. For a community that depends on agriculture, HIV has not only reduced food productivity but also had increased vulnerability. Poverty was associated with increase in prostitution and the emergency of the practice in the rural environment clearly indicates how behavior and life has changed over the years. In rural setting, it has been linked to widowhood, unemployment, poverty, lack of food and high numbers of orphans. An integral approach to intervention is important and tackling poverty will have positive impact on reducing HIV prevalence in rural areas. Community perceived intervention should be evaluated and adopted.

**P114-08  
NUTRITIONAL STATUS AMONG HIV NON-INFECTED CHILDREN BORN TO HIV INFECTED MOTHERS IN RWANDA**

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**RATIONALE AND OBJECTIVES:** To determine the nutritional status and factors of malnutrition in non-infected children born to HIV-infected mothers in Rwanda.

**METHODOLOGY:** A retrospective and cross-sectional study in Rwanda assessed the nutritional status of HIV non-infected children from 7 to 24 months of age born to HIV infected mothers. Anthropometric measurements were performed. Data about the child's nutritional history, medical history, and the socio-economic situation of the family, was filled using patient information available from the patient chart.

**RESULTS:** Fifty-eight percent of the children sampled were stunted, 29% were underweight, and 8% were wasted. This is higher than the general population of Rwanda, where 45% of children are stunted, 22% are underweight, and 4% are wasted (DHS, 2005). Statistically significant factors were the number of children per family ( $p = 0.002$ ), occupation of caregivers ( $p = 0.005$ ), and the educational status of caregivers ( $p = 0.006$ ). The results of this study shows that specific counseling and demonstrations need to be done for HIV infected mothers whether or not their child has HIV. Funds should target nutritional support during the weaning of breastfeeding, family planning education, and raising the socio-economic and educational status of these women.

**P115: Nutrition & Infection , Immunity, Inflammation II**

**P115-01  
THE STUDY ON THE INHIBITION OF LPS-INDUCED PROSTAGLANDIN E2 PRODUCTION IN RAW264.7 MACROPHAGES BY CAPRIC ACID**

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It has been shown that capric acid inhibited PGE2 production in LPS-stimulated RAW264.7 macrophage cell line. This study aimed at examining the possible mechanism(s) of the inhibition. While capric acid inhibited PGE2 production in a dose-dependent manner, the COX-2 protein expression was not changed as detected by Western Blot Analysis. The inhibition could be observed when capric acid was added simultaneously with or after, but not before, the LPS treatment. The inhibition of PGE2 production could be eliminated to a great extent by the supplementation of arachidonic acid, implying capric acid might inhibit LPS-stimulated PGE2 production by limiting the substrate availability. Kinetic study suggested a competitive inhibition of capric acid on PGE2 production from arachidonic acid by LPS-stimulated macrophage cells. The effect of capric acid on the activity of purified COX-2 enzyme was further

examined. The results showed that capric acid significantly inhibited COX-2 enzyme activity at a concentration of 0.5, 1 and 5  $\mu\text{M}$  ( $p < 0.05$ ). Capric acid also slightly inhibited the peroxidase activity of the purified COX-2 enzyme. In conclusion, the present study suggests that capric acid decreases PGE2 production by the inhibition of enzymatic conversion and by the reduction of substrate availability for COX-2.

**P115-02  
INFLAMMATORY MEDIATORS AND IMMUNE RESPONSES IN MEXICAN ADOLESCENTS**

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**RATIONALE & OBJECTIVES:** Low-grade inflammation and increased immunity related to cardiovascular diseases have been described in children and adults, however studies in adolescents are uncommon. We evaluated cross-sectionally inflammatory proteins and indicators of immunity in adolescents by gender and body mass index (BMI).

**MATERIALS & METHODS:** 115 adolescents, 12-18 years old (36 boys, 79 girls) from Toluca, México, were divided into normal, risk-of-overweight or overweight by CDC pediatric criteria. C-reactive protein, ceruloplasmin and complement factors C3 and C4 were quantified by nephelometry; interleukin-6 and tumor necrosis factor  $\alpha$  from stimulated supernatants were analyzed with Human Th1/Th2 cytokine CBA II kit (BD Biosciences Pharmingen, San Diego, CA), and detected by flow cytometry. Data was analyzed by Mann Whitney-U.

**RESULTS & FINDINGS:** Gender differences were found in C3 (male: median 132.2, average rank 41.0, female: median: 153.1, average rank 65.7;  $p=0.001$ ) and Ceruloplasmin (male: median: 0.30, 27.5 average rank, female: median: 0.32, average rank 41.3;  $p=0.010$ ). Differences by BMI were found in C3 (non-overweight: median: 143.9, 53.6 average rank, risk-of-overweight and overweight: median: 167.1, 78.7 average rank;  $p=0.002$ ) and C4 (non-overweight: median: 27.8, 53.4 average rank, risk-of-overweight and overweight: median: 34.2, 78.7 average rank;  $p=0.001$ ).

**CONCLUSION:** Inflammatory proteins appear to be increased in adolescents with risk-of-overweight and overweight, particularly in females.

**P115-03  
ASSOCIATION OF GLUTATHIONE-S-TRANSFERASE (GST) POLYMORPHISMS WITH DNA OXIDATIVE DAMAGE AMONG CHILDREN WITH ATOPIC DERMATITIS (AD)**

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GST enzymes are critical for detoxifying reactive oxygen species and their products, which have been implicated in the pathology of inflammatory diseases such as AD. We examined whether GST polymorphisms affect the levels of oxidative stress biomarkers in children with AD and without AD. Fifty-three children with AD and 110 healthy children were genotyped for GSTP1 Ile105Val and GSTT1 +/-null polymorphisms. Serum malondialdehyde (MDA) and urinary 8-hydroxy-2'-deoxyguanosine (8-OHdG) were measured by colorimetric assay and by ELISA, respectively. The frequency of GSTP1 Val105 allele carrier and GSTT1 null genotype was 37.0% and 54.3%, respectively. Urinary 8-OHdG levels were significantly lower in AD children with at least one risk allele (GSTP1 Val105 or GSTT1 null), relative to patients with GSTP1 Ile/Ile and GSTT1 + genotypes. No difference was found in

serum MDA concentrations according to GST genotypes in AD children and in healthy controls. Our study results suggest that AD children with GST variant alleles are vulnerable to DNA oxidative damage.

#### **P115-04 INDUCTION OF APOPTOSIS ON JURKAT CELL BY THAI CURRY SOUPS, PASTE AND DISHES**

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**RATIONALE & OBJECTIVES:** Thai food is highly beneficial to health due to its ingredients of local vegetables, herbs and spices. These ingredients are blended into a mixed form of “Curry Soup”, without coconut milk; or “Curry Paste” cooked with coconut milk go together with rice or Thai Spaghetti into dishes. The apoptotic induction activity (an anti-cancer indicator) of Thai curry soup and Thai curry pastes dishes (curry with rice; curry with Thai spaghetti) on Jurkat cell culture is determined.

**MATERIALS & METHODS:** Four types of curry paste mixtures were made from red, green, panang or mussaman curry paste cooked with coconut milk serve with Jasmine rice or Thai spaghetti (Kanom-jeen) in a regular serving dish. The mixtures were digested with the simulated gastrointestinal digestive solution and the supernatant of the digestive content tested for apoptosis induction on Jurkat cells after 24 hours exposure, stained with Annexin-V-FITC and popodium iodide. The apoptotic cells were detected by flow cytometer. Five curry soups: Kang-par, Kang-som, Kang-leung, Kang-leang and Tom-yam were water extracted and the supernatant used for detection.

**RESULTS & FINDINGS:** The simulated digest products of four coconut-cooked curry paste mixed with Jasmine rice/Thai spaghetti showed apoptosis induction activity on Jurkat cell. The most potent was mussaman curry with rice. Kang-leang curry soup showed highest apoptotic induction up to 45% of total cell count.

**CONCLUSION:** The study showed benefits of these Thai dishes as potential anti-cancer food.

#### **P115-05 EXTRACT OF FERMENTED BARLEY ATTENUATES LPS INDUCED INFLAMMATION IN RAT**

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**RATIONALE & OBJECTIVES:** Consumption of fruits, vegetables and grains is widely known to prevent metabolic syndrome diseases which were recently shown to correlate with chronic inflammation. Here we tested extract of fermented barley (FBE), known to be beneficial for livers, on lipopolysaccharide (LPS) induced inflammation in rat.

**MATERIALS & METHODS:** We fed male Wistar rats with FBE supplemented diet for ten days then IP injection of 0.5 mg/kg bw. LPS (E.coli O111:B4) and 18 hours fasting before sacrifice. Plasma was collected and liver was excised for mRNA isolation. Levels of inflammatory markers in plasma and its hepatic mRNA expressions were determined by EIA and quantitative RT-PCR, respectively.

**RESULTS:** We observed significantly decreased circulating inflammatory markers IL-6, IL-1b, TNF-a in FBE supplemented group manifesting in suppression of liver injury marked by plasma ALT and AST activities. Further examinations showed down regulation of its corresponding mRNA expressions along with primary macrophage chemoattractant CCL2 and selectin 1.

**CONCLUSION:** We conclude that FBE acts as a potent anti-inflammation compound.

#### **P115-06 THE HEPATIC IMMUNOGLOBULIN RECEPTOR IS DOWN-REGULATED IN MICE FED DIET CONTAINING DEEP FRYING OIL**

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Hepatic polymeric immunoglobulin receptor (pIgR) is responsible for the transport of blood dimeric and polymeric IgA into gut lumen by way of bile. Our previous results show that deep frying oil increases serum IgA concentration but decreases fecal IgA concentration in mice. We hypothesize that this phenomenon may be contributed by the low expression of hepatic pIgR in mice fed diet containing deep frying oil. The objective of this study was to investigate the effect of deep-frying soybean oil on the gene expression of hepatic pIgR in mice. Five-week-old female C57BL/6J mice were fed C (7% fresh oil), O (7% deep frying oil), HC (15% fresh oil) and HO (15% deep frying oil) diet for 6 weeks. The serum and fecal IgA concentrations were determined by the ELISA. The hepatic pIgR mRNA was measured by the real-time PCR. The high serum IgA level in concomitant with low fecal IgA concentration was also found in HO group. The hepatic pIgR mRNA was significantly reduced by 40% and 58% in O and HO groups, respectively. These results suggest that the high serum IgA and low fecal IgA concentration may attribute to the low gene expression of hepatic pIgR in HO group.

#### **P115-07 EFFECTS OF MATERNAL MICRONUTRIENT SUPPLEMENTATION WITH ZINC AND BETA-CAROTENE ON MORBIDITY AND IMMUNE FUNCTION OF INFANTS DURING THE FIRST 6 MO OF LIFE IN A RANDOMIZED CONTROLLED TRIAL IN INDONESIA**

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**RATIONALE & OBJECTIVES:** Micronutrient deficiencies are a major cause of child death worldwide. Deficiencies of vitamin A and zinc result in >1 million child-deaths each year. Therefore, interventions which could improve vitamin A and zinc status of children are of high priority. Multiple-micronutrient supplementation of pregnant women might be an attractive tool to improve micronutrient status of infants during the first months of life, thereby reducing infant morbidity and death. Moreover, maternal supplementation could benefit the newborn's immune development already in-utero. This study investigated the effects of maternal micronutrient supplementation with zinc and/or beta-carotene on morbidity and indicators of immune function in newborns during the first 6 mo of life.

**MATERIALS & METHODS:** Mothers were supplemented during pregnancy with beta-carotene and/or zinc, in addition to standard iron and folic acid, in a randomised, double-blind controlled trial. Newborn infants (n=170) were followed-up for six months. Main outcomes were morbidity and immune responses of the infant at 6 mo of age.

**RESULTS & FINDINGS:** Infants born from mothers receiving zinc during pregnancy had significantly less episodes of diarrhea than infants born from mothers not receiving zinc (0.5 and 1.0 respectively) but more episodes of cough (2.8 and 1.9 respectively) during the first 6 mo. Maternal beta-

carotene supplementation had no effect on infants' morbidity. Furthermore, cytokine production of infants at 6 mo of age was significantly affected by maternal zinc and beta-carotene supplementation, with zinc supplementation giving 16% higher IL-6 production, and beta-carotene supplementation leading to 36% lower IFN-gamma production.

**CONCLUSION:** Maternal supplementation with zinc and beta-carotene, in addition to iron and folic acid, affected the newborn's immune development in distinct ways, but only maternal zinc supplementation significantly affected morbidity in the infants. Addition of zinc to standard iron and folic acid supplements for pregnant women could be an effective way to reduce diarrheal disease during the first 6 mo of life albeit at the expense of more episodes of cough. An enhanced pro-inflammatory immune response is a likely explanation. Larger studies are needed to confirm these results, and investigate effects on infant mortality, and in-depth studies are needed on the immune-modifying effects of zinc and beta-carotene, both in-utero and in infancy.

#### **P115-08 DIETARY FACTORS AND HELICOBACTER PYLORI INFECTION**

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*Helicobacter pylori* infection is very common in Poland. It may be at least partly related to improper lifestyle, especially diet. The aim of the study was to examine if some dietary factors contribute to *H. pylori* infection.

Studied patients were referred for endoscopic examination of the upper digestive tract in 2002-2007. In some patients *H. pylori* infection was diagnosed for the first time, in others re-infection occurred after successful treatment in the past. Patients who have not been infected or re-infected were included into the control group. The respondents were interviewed retrospectively on their dietary habits.

A lower frequency of fermented dairy products, vegetables and fruit consumption was noted among persons with *H. pylori* infection as compared to the control group. In the examined group 43-47% declared to eat fermented dairy products frequently (at least five times a week) whilst in the control group – 95-96%; in the case of vegetables consumption these percentages were 74% and 77-87% and in the case of fruit consumption – 51-58% and 70-76%, respectively.

Obtained results indicate that high dietary intake of probiotic bacteria, mainly *Lactobacillus*, and antioxidants, mainly vitamin C contained in vegetables and fruit, may decrease the risk of *H. pylori* infection.

#### **P115-09 EVALUATION OF ANTI-INFLAMMATORY ACTIVITIES FOR DIFFERENT SUBCLASS FLAVONOIDS**

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We investigated the effects of different subclass flavonoids, abundant natural plant materials, on potential anti-inflammation in vitro.

Flavones, flavonols, flavanones, isoflavone, and flavan-3-ols were determined by antioxidant assay, hyaluronidase and collagenase inhibition, nitric oxide production from LPS-induced macrophage cell, and lipoxygenase (LOX) and COX inhibitor screening assay.

Antioxidant activities were decreased in the order of flavonols>flavanones>flavones. Kaempferol, quercetin, myricetin, and rutin in flavonols inhibited hyaluronidase reaction, while apigenin, luteolin, baicalin, and baicalein in flavones showed specific inhibition to collagenase reaction.

In addition, flavonoids potently inhibited LPS-induced nitrite production in a dose-dependent manner, and except baicalin and catechin, was might be mainly due to the suppression of inducible nitric oxide synthase. Quercetin and luteolin showed the strongest inhibitory activities to 15-LOX, and quercetin showed relatively potent inhibition of COX-1 reaction. Otherwise, most flavonoids possessed the inhibitory activity to COX-2 reaction. Luteolin, kaempferol, hesperetin, and naringin showed potent inhibition of COX-2 reaction.

This study suggests that each anti-inflammatory assay of flavonoids might be dependant on subclass structure clearly.

#### **P115-10 ACUTE CYSTEAMINE ADMINISTRATION ATTENUATES SUPPRESSION OF LYMPHOCYTIC PROLIFERATION INDUCED BY DUODENAL OPERATION IN GOATS FED DIFFERENT LEVELS OF DIET**

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**RATIONALE & OBJECTIVES:** Surgical stress suppresses immune activity. Long-term Cys supplement attenuated the suppression of IL-2 and lymphocytic proliferation induced by surgery stress (Shen and Xie, 2004). This study investigates the effects of acute Cys administration on lymphocytic proliferation and its possible mechanisms in post-operative goats.

**MATERIALS & METHODS:** 12 goats fed with hay were allocated into 4 groups (n=3): A and B groups supplied concentrate 300 g · d<sup>-1</sup>, C and D supplied 50 g · d<sup>-1</sup>. Additional Cys 15 mg · kg<sup>-1</sup> · BW · d<sup>-1</sup> added to A and C on d1 of post-operation. Blood was sampled on pre-operation and d1, d2, d3, d4 and d8 of post-operation to examine the lymphocytic transformation rate (SI). And, lymphocytes were cultured in RPMI-1640 added with Cys (0, 0.25, 0.5, 1.0, 2.0 or 4.0 mM) to determine its direct effect on SI.

**RESULTS & FINDINGS:** SI fluctuated with time course in post-operative period. It decreased severely by 85-90% on d1 and d2 in all groups (p < 0.05) and recovered partly from d3 to d8 with distinct characters between groups. Since d3 through d8 SI increased progressively in A (p < 0.05), up to the recovery rate by 52%. In B it recovered on d3 and d4 by about 32% (p < 0.05), in C by 40% only on d3 (p < 0.05). In D SI stayed at its low level until d8, with recovered by 36%. The recovery differences between groups at the time points, indicate the positive effects of Cys and feeding. In vitro Cys stimulated lymphocytic proliferation with dose-dependent manner.

**CONCLUSION:** Acute cysteamine administration attenuates suppression of lymphocytic proliferation induced by surgery stress is associated with its direct stimulating effect on lymphocytes. Fed diet with adequate nutrition level should benefits to immune activity both for normal and surgical animals.

#### **P115-11 ANTIOXIDANT ACTIVITY OF VARIOUS PART OF SONNERATIA CASEOLARIS (L.) DETERMINING BY TEAC ASSAY**

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**OBJECTIVE:** To determine the antioxidant activities of various plant parts of Cork tree, (*Sonneratia caseolaris* (L.) family Sonneratiaceae, extracts and to examine the influence of extraction methods on the antioxidant activities.

**METHODS:** The methanolic and soxhlet extracts of Cork tree were measured their antioxidant activities by Trolox Equivalent Antioxidant Capacity Assay (TEAC).

**RESULTS:** The antioxidant activities of stamen, calyxes

of flower, persistent calyxes of fruit, fruit meat, seed, leaf and pneumatophores of Cork tree extracts by maceration and soxhlet methods showed linear regression correlation to their concentrations with  $r^2$  in range of 0.9452 - 0.9993, except the  $r^2$  of CH<sub>2</sub>Cl<sub>2</sub> Soxhlet extract that was 0.4978. For methanolic extracts by maceration, the extract of calyxes of flower presented the highest antioxidant activities with TEAC = 0.69. For the soxhlet extraction with methanol, ethyl acetate and dichlorometane, the methanolic and ethyl acetate extracts indicated higher antioxidant activities than the dichlorometane extracts. The methanolic extract of seed by soxhlet extraction gave the highest TEAC value (=0.96) when comparing with other plant part extracts in this method and the ethyl acetate extract of stamen soxhlet extraction exhibited the highest TEAC value (= 1.05) of all extracts in this experiment. However, when compared each part of Cork tree extracts from different methods, the maceration with methanol gave quite better antioxidant activities than soxhlet.

**CONCLUSION:** The maceration with methanol was good method for extraction the antioxidative compounds from various part of Cork tree. The antioxidative compounds in Cork tree may quite hydrophilic, since they were not extracted by dichlorometane.

#### **P115-12 ANTI HYPERTENSIVE EFFECTS FROM RED SEAWEED (EUCHEUMA COTTONII)**

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This study was conducted to determine the efficacy of ethanolic extracts *Eucheuma cottonii* (EEEC) on hypertensive rats induced by chronic inhibition of nitric oxide synthase by NG-nitro-L-arginine methyl ester (L-NAME). Six groups of treatment were assigned and the study was conducted in 4 weeks. Three doses of (EEEC) were used in this study: 40, 250, 500 mg/kg. The co-administration of (EEEC) was significantly reduced the development of increased blood pressure in dose independently manner. Catalase was significantly reduced ( $p < 0.05$  vs. L-NAME group) in all groups of rats that received (ECEE). In the group of rats that received 500mg/kg (EEEC), the level of malondialdehyde, the lipid peroxidation biomarkers were significantly decreased ( $p < 0.05$  vs. L-NAME) and there were significant increase of reduced glutathione and superoxide dismutase. In the group of rats that received 250mg/kg (EEEC), reduced glutathione is significantly increased ( $p < 0.05$  vs. L-NAME group). Histological sections showed that the administration of (EEEC) has protective effects on organs. As conclusion, *E. cottonii* can be used as a functional food to help in preventing hypertension.

#### **P115-13 HONEY AND TRIPLE "T" OF WOUNDS**

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Honey is complex heterogeneous mixtures of flower nectar sugars, proteins, and glandular secretions from bees. Honey has potent antibacterial activity and is effective in preventing and clearing wound infections. Topical honey was shown to be effective in treating postoperative skin wounds in neonates that had failed to respond to antibiotic therapy. It has been demonstrated in many studies that the antibacterial effects of honey are attributed to its high osmolarity, low pH, hydrogen peroxide content, and presence of other uncharacterized compounds. Although honey offers broad-spectrum antimicrobial properties and promotes rapid wound healing, the mechanisms by which these effects are achieved have not been fully elucidated. With increasing interest in the use of alternative therapies and as the development of antibiotic-resistant bacteria

spreads, honey may receive renewed recognition as burn-wound healers.

The study suggests that the wound healing effect of honey may in part be related to the release of inflammatory cytokines from surrounding tissue cells, mainly monocytes and macrophages. Immunomodulatory effects were demonstrated in vitro by cytokine release from the monocytic cell line Mono Mac 6 (MM6) and human peripheral monocytes after incubation with honey. The findings show that natural honeys can induce interleukin-6 (IL-6), interleukin-1b (IL-1b), and tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ) release. Artificial honey only induces release of these cytokines to a negligible extent. These seem to be widely accepted as indicative of the presence of an unidentified immunomodulatory substance in natural honeys, which improves wound healing by actively inducing cytokine release from macrophages. Honey has been shown to have mitogenic activity on human B and T lymphocytes and a human myeloid cell line. Proteins present in honey will be highly glycosylated because of high sugar content. Glycosylated proteins have been shown to activate a number of cell types including monocytic cells.

With the increased availability of licensed medical products containing honey, clinical use is expected to increase and further evidence will become available. Honey seems to have the potential to clear infection as well as to be an effective prophylactic agent that may contribute to reducing the risks of cross-infection. Its use in professional care centers should be limited to those which are safe and with certified healing potential.

#### **P115-14 PRENATAL DOCOSAHEXAENOIC ACID SUPPLEMENTATION AND INFANT RESPONSE TO HEPATITIS B AND TETANUS VACCINATION: A DOUBLE-BLIND RANDOMIZED, CONTROLLED TRIAL IN MEXICO**

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**OBJECTIVE:** Omega-3 PUFAs, including docosahexaenoic acid (DHA), modulate immune function and inflammation; however, their role in the development of infant immune function is yet unknown. Infants are born with immature immune systems and perinatal nutrition may influence immune maturation and response. We examined the influence of DHA in pregnancy on infant response to hepatitis B (HepB) and tetanus vaccination.

**METHODS:** In a double-blind randomized, controlled trial in Mexico, pregnant women (n=1040) were supplemented daily with 400mg DHA or placebo from 18-22 weeks' gestation through delivery. We measured IgM and IgG concentrations, expressed as relative fluorescent intensity (RFI), in response to hepatitis B and tetanus vaccinations in infant plasma at 3 months of age (n=562).

**RESULTS:** Maternal characteristics at randomization and infant outcomes at birth (n=973) were similar between treatment groups. Concentrations of anti-tetanus IgM and IgG and anti-HepB IgM antibodies were similar between groups. The concentration of anti-HepB IgG antibody was 12% lower (95% CI: 1.5, 21.4) in the DHA group (465 RFI), compared to the placebo group (525 RFI).

**CONCLUSION:** DHA supplementation in pregnancy influenced infant humoral response to HepB vaccination. The implications of these findings for overall infant immune function merit further investigation.