

XXXI Congress of the Spanish Nutrition Society/Sociedad Española de Nutrición (SEÑ)

Cartagena, Spain, 15–17 September, 2022:
Abstracts

Guest Editors

Dr. Elvira Larque and the Scientific Committee of the Congress

Disclosure Statement

The abstracts included in this supplement were reviewed and selected by the Scientific Committee of the Spanish Nutrition Society. The committee has no conflicts of interest in connection with the congress and the selection of abstracts.

Sponsor Note

The congress organizers acknowledges the support provided by the sponsors of the Congress: ABBOTT, AMC NATURAL DRINKS GROUP, AMERICANPISTACHIO, ANGULASAGUINAGARESEARCHCENTER, CAMPUS MARE NOSTRUM, CEU INSTITUTO UNIVERSITARIO DE ALIMENTACIÓN Y SOCIEDAD, COLEGIO OFICIAL DE EDUCADORES FÍSICO DEPORTIVOS DE LA REGIÓN DE MURCIA, COLEGIO OFICIAL DE FARMACEUTICOS DE LA REGION DE MURCIA, COLEGIO OFICIAL DE VETERINARIOS DE LA REGIÓN DE MURCIA, DR HEALTHCARE ESPAÑA, EL POZO, EURECAT, FACULTAD DE BIOLOGÍA DE LA UNIVERSIDAD DE MURCIA, FINUT, FORO DE LA INVESTIGACIÓN PARA LA CERVEZA Y ESTILOS DE VIDA, FUNDACIÓN HEFAME, EL POZO SL, GRUPO FUERTES, HERO INSTITUTO DE NUTRICIÓN INFANTIL, INSTITUTO DANONE, IUNS, MARBYT, NATURCLIC, NESTLÉ HEALTHSCIENCE, ORDESA, PULEVA, UMUEMPRENDE, UNIVERSIDAD DE MURCIA

Contents

- 4 **Plenary Lectures**
- 12 **Oral Communications**
- 34 **Poster Communications**
- 61 **Author Index**

PLENARY LECTURES

Thursday 15th September 2022

PL01

Nutrigenetics and chronobiology in the obesity treatment

Aza, M. G.

Department of Animal Physiology, Faculty of Biology,
University of Murcia, Murcia, Spain

Classically, nutrition studies were based in the “what” the individual eats, i.e., energy intake and macronutrient composition. Nevertheless, now it is well known that the “When” is also important, because food intake, and its timing, is an external synchronizer of our biological clocks and plays a crucial role in obesity and weight loss treatment. In 2013, our study conducted in a Spanish population that followed a weight loss treatment based in the Mediterranean diet, showed that food timing was a predictive factor in weight loss. Almost at the same time, it was published a similar study of weight loss with a follow-up of 12 weeks which showed that those individuals who ate more (energy) during dinner, lost less weight and had less glucose tolerance, than those who ate more at breakfast, keeping the energy of the midday meal the same. These two studies opened a new line of research based on meal timing and its impact on obesity, weight loss, and glucose tolerance. New controlled laboratory studies are necessary to explain the mechanisms involved in the different response of late eaters and early eaters to treatment. The genetics of the subject could also be involved. Our study shows that only those subjects who present a genetic variant in the perilipin gene (*PLIN*), were affected by food timing in weight loss. Genetic influences appear to account for a significant proportion of the variability in food timing, particularly breakfast. Thus, interventions related to food timing may be more effective when targeting afternoon/evening traits, such as lunch or dinner times. We have shown that late dinner (within two hours before bedtime) decreases glucose tolerance specially in G carriers of the risk allele at the Melatonin Receptor 1B (*MTNR1B* rs10830963).

Conflict of Interest: Authors declare no conflict of interest.

PL02

From genetics to the epigenome of obesity and the metabolic syndrome

Aguilera, C. M.; Torres-Martos, A.; Ruiz-Ojeda, F. J.; Anguita-Ruiz, A.

Biochemistry and Molecular Biology II, Institute of Nutrition and Food Technology, Center for Biomedical Research, University of Granada, Granada, Spain. CIBEROBN, Biomedical Research Networking Center for Physiopathology of Obesity and Nutrition, Carlos III Health Institute, Madrid, Spain

Obesity is a prevalent health problem affecting modern societies. Family and twin studies have suggested that obesity is 40% to 70% heritable, yet genome-wide association studies (GWAS) for BMI have identified only a small fraction of the implied genetic substrate for human obesity. There is an increasing evidence for the role of epigenetic factors in the development of obesity. Epigenetics is defined as heritable modifications in the expression of genes that can not be explained by changes in the ADN sequence. Epigenetic changes are modulated by environmental exposure (including nutrition and physical activity), so that epigenetics is presented as a possible factor involved in the development of diseases such as obesity. Currently the epigenome-wide association studies (EWAS) are characterized by analyzing thousands or millions of CpGs in a certain number of individuals. The realization of EWAS in samples of children and its relationship with obesity is of great interest for the detection of epigenetic markers in childhood in order to make an early diagnosis of development of the disease and its metabolic complications. We present the most relevant results from our current study that aims to evaluate the association between whole-genome DNA methylation in children with obesity and insulin resistance (IR) undergoing pubertal development. A longitudinal study was conducted on 138 Spanish children. Blood whole-genome DNA methylation levels, were evaluated in all subjects before and after puberty entrance. Our analyses reported changes in the DNA methylation status of 3190 CpG sites across the genome associated with childhood obesity or IR. A thorough investigation of results revealed the implication of key metabolic genes previously associated with obesity and diabetes (*ABCG1*, *ADCY5*, *ADIPOQ*, *CPT1A*, *FTO*, *LEPR*, *HIF3A*), but also promising new genes as prognosis markers (*VASN* and *ESR1*). Further inter-omics validation approaches for these new loci could consolidate their utility as predictive risk markers.

Conflict of Interest: Authors declare no conflict of interest.

Keywords: Genetic, Epigenetic, ADN Methylation, Obesity, Adipose Tissue, Human.

PL03**Nutritional genetics and metagenomics for the treatment of chronic diseases***Martínez, J. A.^{1,2}; Cuevas-Sierra, A.¹; Milton-Laskibar, I.^{1,2}*

¹Precision Nutrition and Cardiometabolic Health, IMDEA-Food Institute (Madrid Institute for Advanced Studies), Campus of International Excellence (CEI) UAM+CSIC, Spanish National Research Council, 28049 Madrid, Spain; ²CIBER Fisiopatología de la Obesidad y Nutrición (CIBEROBN), Instituto de Salud Carlos III (ISCIII), 28222 Madrid, Spain

Obesity worldwide constitutes a major health burden with a pandemic prevalence accompanied by an increased risk to develop associated chronic metabolic diseases. Besides excessive energy intake and unbalanced food selection, a sedentary lifestyle, certain genotypical signatures and impaired gut microbiota composition have been identified as major contributing factors for obesity incidence. More than 600 single nucleotide polymorphisms (SNP) have been reported as associated with obesity traits such as fat mass and obesity-associated gene (FTO) or melanocortin 4 receptor (MC4R), while an impaired Firmicutes/Bacteroidetes ratio has been related with obesity onset. Sex also represents another determinant that should be considered as reported by several studies where differences in gut microbiota composition (most likely due to hormonal, adiposity or fat distribution differences) have been described between men and women. Therefore, obesity treatment cannot be tackled solely by means of hypocaloric diets, since not all subjects respond equally to the same diet. In this regard, the interactions between hosts genetics and gut microbiota, have a proven influence in the development of metabolic chronic diseases, being of major interest for the design of personalized nutrition interventions. Indeed, the relative abundance of specific bacterial taxa has been associated with gene variants leading to increased risk of chronic diseases such as obesity. In this scenario, personalized nutrition aims to integrate these data to design novel strategies for obesity patients based on both, genetic background and gut microbiome composition. Indeed, the use of genetic predisposition scores has emerged as a promising tool not only to increase the success of programmed weight-loss dietary treatments, but also to gain a better understanding on the metabolic factors mediating such processes.

Summing up, published research concerning personalized nutrition clearly demonstrate that decision algorithm models and score can help to prescribe the most adequate type of energy restricted diet according to microbiota and genetic data. Moreover, a potential interaction between host genetics and gut microbiota composition was also found, which in turn seem to be involved in obesity management, with sex differences. The interindividual variability in energy homeostasis involves age and sex, as well as the impact of genetics and metagenomics, which should be taken into account for precision nutrition.

The authors credit the CLIMB-OUT, EU-REACT and METAINFLAMACIÓN projects, as well as the Juan de la Cierva scheme (I.M.L.).

Conflict of Interest: Authors declare no conflict of interest.

PL04**Feeding patterns and nutrient intake in Spanish children aged 1 to 9 years: The ESNUPI study***Madrigal Arellano, C.; Hernández Ruiz, Á.; Soto Méndez, M. J.; Gil, Á. on behalf of the EsNUPI Group*

Iberomeric Nutrition Foundation (FINUT) and Department of Biochemistry and Molecular Biology, University of Granada, Granada, Spain

The aim of the Nutritional Study of the Spanish Child Population (EsNuPI) was to evaluate the energy intake (EI), nutrient intake, and food and dietary patterns (DP) of 1514 Spanish children aged 1 to 10 years. A representative sample (Spanish Reference [SRS] = 707) and an adapted milk consumer sample (Adapted Milk Consumers [AMS] = 741) were selected. A sociodemographic questionnaire, a food consumption frequency (FFQ) questionnaire, two 24-h recall questionnaires (R24 h) and a physical activity register were used.

Both groups of children reported adequate EI (SRS: 1503 kcal/day and AMS: 1404 kcal/day). The contribution of protein to EI was 16.5% (SRS) and 15.6% (AMS). The percentage of children with a protein intake >20% EI was 12% (SRS) and 6% (AMS) and that of children within the reference range for carbohydrates was >50%. Both groups showed high sugar intake. Both samples showed a high contribution of fat to EI (SRS: 36.5%; AMS: 35.9%). Low intake of essential fatty acids and polyunsaturated (omega-3) fatty acids, mainly docosahexaenoic acid (DHA), was observed (SRS: 20 mg/day; AMS: 90 mg/day).

The food groups that contributed most to protein intake were dairy products, cereals and meats; those to carbohydrates were cereals, dairy products and fruits, and in terms of fats were oils, dairy products and meats. Using principal component analysis (PCA) and cluster analysis, three DP were found in each age group: one for appetizing and hypercaloric foods and two of the Mediterranean type. The AMS children showed a DP related to the Mediterranean Diet and dairy. In the cluster analysis, children's age, physical activity level, parental education and family income were correlated with clusters of food groups more similar to the Mediterranean Diet and others to more hypercaloric foods.

Conflict of Interest: Authors declare no conflict of interest.

PL05

Effects of infant formula supplemented with Milk Fat Globule Membrane (MFGM), Long-Chain Polyunsaturated Fatty Acids (LC-PUFAs) and synbiotics on neurodevelopment and brain structure

Nieto-Ruiz, A.^{1,2,3}; García-Santos, J. A.^{1,2,3}; Verdejo-Román, J.⁴; Diéguez, E.^{1,2,3}; Sepúlveda-Valbuena, N.⁵; Herrmann, F.^{1,3}; De-Castellar, R.⁶; Jiménez, J.⁶; Bermúdez, M. G.^{1,2,3}; Catena, A.⁷; Campoy, C.^{1,2,3,8}

¹Department of Paediatrics, School of Medicine. University of Granada, Granada, Spain.; ²Instituto de Investigación Biosanitaria (ibs.GRANADA), Health Sciences Technological Park, Granada, Spain; ³EURISTIKOS Excellence Centre for Paediatric Research, Biomedical Research Centre, University of Granada. Granada, Spain; ⁴Department of Personality, Assessment & Psychological Treatment. School of Psychology. University of Granada, Granada, Spain; ⁵Nutrition and Biochemistry Department. Faculty of Sciences. Pontificia Universidad Javeriana, Bogotá, Colombia; ⁶Laboratorios Ordesa, S.L. Barcelona, Spain; ⁷Department of Experimental Psychology. School of Psychology. University of Granada, Granada, Spain; ⁸National Network of Research in Epidemiology and Public Health (CIBERESP). Institute of Health Carlos III (Granada's node), Madrid, Spain

Nutrition during early life is essential for brain development, establishing the basis for neurocognitive function later in life. Adequate nutrient intake during the first months of life plays a critical role on neurodevelopment. It is well established that breastfeeding, compared to formula feeding, it has been traditionally associated with increased neurodevelopmental scores up to early adulthood. Thus, research efforts have been focused on developing new infant formulas closely mimicking breast milk.

The COGNIS study, is a prospective double-blind, randomized controlled trial study, aimed to evaluate the effects of a new infant formula on children neurodevelopment, among other outcomes, up to 6 years of age. A total of 170 healthy term infants living in Granada (Spain) were randomized at 0-2 months of age to receive a standard infant formula (SF) (n=85) or an experimental infant formula (EF) (n=85) containing milk fat globule membrane (MFGM) components, synbiotics, long-chain polyunsaturated fatty acids (LC-PUFAs), gangliosides, nucleotides and sialic acid. As a control group, 50 exclusively breastfed infants (BF) were also included in the study. Children underwent different neurocognitive examinations at 3, 4, 6, 12, 18 months, 2.5, 4 and 6 years old. Results has shown that EF formula seems to be associated to better visual function during their first 12 months of life, less behavioral problems at 2.5 years, beneficial long-term effects in the child's language at 4 years old, and neurocognitive development and brain structure in children at 6 years old, in a similar way to breastfed infants.

The COGNIS study is providing important information about potential long-term beneficial effects of a new experimental infant formula. Additionally, this study will improve general knowledge

about mechanisms underlying early nutrition programming in humans during postnatal life and their long-term consequences.

Funding: This project has been funded by Ordesa Laboratories, S.L. and SMARTFOODS (CIEN Project), Spanish Centre for Technology and Industrial Development (CDTI); Contracts University of Granada General Foundation, No.3349 and 4003, Granada. Spain. Partially funded by EU Project DynaHEALTH (HORIZON 2020-GA No.633595).

PL06

Natural vitamin E during pregnancy increases RRR- α -Tocopherol stereoisomer proportion and fetal antioxidant capacity compared to synthetic vitamin E in rats

Gázquez, A.¹; Sánchez-Campillo, M.¹; Arnao, M. B.²; Barranco, A.³; Rueda, R.⁴; Jensen, S. K.⁵; Matthew, J. K.⁶; Larqué, E.¹

¹Department of Physiology, Biomedical Research Institute of Murcia (IMB), University of Murcia, Murcia, Spain; ²Department of Plant Biology (Plant Physiology), University of Murcia, Murcia, Spain; ³Department of Biochemistry and Molecular Biology II, School of Pharmacy, University of Granada, Campus Cartuja, Granada, Spain; ⁴Research and Development Department, Abbott Nutrition, Granada, Spain; ⁵Department of Animal Sciences, Aarhus University, Tjele, Denmark; ⁶Research and Development Department, Abbott Nutrition, Columbus, USA

Introduction: Low dietary intake of vitamin E is a global public health issue. RRR- α -tocopherol (RRR- α T) is the only naturally occurring vitamin E stereoisomer, but the racemic mixture of all eight stereoisomers, synthetic vitamin E (S- α T), is commonly consumed.

Objectives: The objective of this study was to evaluate bioavailability and antioxidant activity of RRR- α T vs. S- α T, in both mother and fetus, after maternal supplementation during pregnancy.

Methods: Twenty female rats per group (7 weeks of age) received a modified AIN-93G diet supplemented with 0.75 IU/kg of RRR- α T (NVE) or S- α T (SVE). At delivery, the levels of α T, stereoisomer distribution and antioxidant capacity were analyzed in maternal and fetal plasma.

Results: NVE administration significantly increased the proportion of RRR- α T stereoisomer in maternal and fetal plasma. The percentage of RRR- α T increased from 32.76% to 88.33% in maternal plasma, and 35.25% to 97.94% in fetal plasma, in the NVE group compared to SVE. Fetal plasma from the NVE group was found to have higher total antioxidant capacity compared to SVE. Lastly, fetal plasma RRR- α T stereoisomer percentage was positively associated with expression levels of scavenger receptor class B type 1 (SR-B1) in the placenta.

Conclusions: In conclusion, both natural and synthetic sources of vitamin E showed similar bioavailability. Still, NVE supplementation increased the proportion of RRR- α T and promoted higher antioxidant activity in fetal plasma at birth. Placental SR-B1 might be involved in the stereoselective transfer of RRR- α T stereoisomer across the placenta and may improve α T bioactivity in the fetus.

Conflict of Interest: R.R., M.J.K. and J.P.C. are Abbott employees. The rest of authors declare no conflict of interest.

Keywords: Oxidative stress. Pregnancy. A-tocopherol. Stereoisomers. Antioxidant.

PL07

The evolving microbiome from pregnancy to early infancy

Mesa, M. D.^{1,2}; On Behalf of the Excellence National Network on Materno-Infant Health SAMID III Study Group

¹Department of Biochemistry and Molecular Biology II, Institute of Nutrition and Food Technology "José Mataix", Biomedical Research Center, University of Granada; ²ibs.GRANADA, Instituto de Investigación Biosanitaria, Complejo Hospitalario Universitario de Granada, 18014 Granada, Spain. <http://www.redsamid.net/es/>

Pregnancy induces a number of immunological, hormonal, and metabolic changes that are necessary for the mother to adapt her body to this new physiological situation. The microbiome of the mother, the placenta and the fetus influence the fetus growth and undoubtedly plays a major role in the adequate development of the newborn infant. Hence, the microbiome modulates the inflammatory mechanisms related to physiological and pathological processes that are involved in the perinatal progress through different mechanisms. The present review summarizes the actual knowledge related to physiological changes in the microbiota occurring in the mother, the fetus, and the child, both during neonatal period and beyond. In addition, we approach some specific pathological situations during the perinatal periods, as well as the influence of the type of delivery and feeding.

PL08

Environmental exposure during pregnancy: Influence on prenatal development and early life

Gómez-Roig, M. D.^{1,2}; On Behalf Of The Excellence National Network on Materno-Infant Health SAMID III Study Group

¹BCNatal, Barcelona Centre for Maternal Foetal and Neonatal Medicine, Hospital Sant Joan de Déu and Hospital Clínic, Universitat de Barcelona, Barcelona, Spain; ²Institut de Recerca Sant Joan de Déu (IR-SJD), Barcelona, Spain. <http://www.redsamid.net/es/>

We summarize current evidence on the toxic effects of environment exposure during pregnancy, the neonatal period, and childhood. Alcohol use is related to foetal alcohol spectrum disorders, foetal alcohol syndrome being its most extreme form. Smoking is associated with placental abnormalities, preterm birth, stillbirth, or impaired growth and development, as well as with intellectual impairment, obesity, and cardiovascular diseases later in life. Negative birth outcomes have been linked to the use of drugs of

abuse. Pregnant and lactating women are exposed to endocrine-disrupting chemicals and heavy metals present in foodstuffs, which may alter hormones in the body. Prenatal exposure to these compounds has been associated with pre-eclampsia and intrauterine growth restriction, preterm birth, and thyroid function. Metals can accumulate in the placenta, causing foetal growth restriction. Evidence on the effects of air pollutants on pregnancy is constantly growing, for example, preterm birth, foetal growth restriction, increased uterine vascular resistance, impaired placental vascularization, increased gestational diabetes, and reduced telomere length. The advantages of breastfeeding outweigh any risks from contaminants. However, it is important to assess health outcomes of toxic exposures via breastfeeding. Initial studies suggest an association between pre-eclampsia and environmental noise, particularly with early-onset pre-eclampsia. There is rising evidence of the negative effects of environmental contaminants following exposure during pregnancy and breastfeeding, which should be considered a major public health issue.

Friday 16th September 2022

PL09

Scope of new regulation on in vitro diagnostic medical devices

Hernández, G. H.

Executive Manager for 0318 Notified Body Agencia Española de Medicamentos y Productos Sanitarios (AEMPS)

Medical devices for in vitro diagnostic are a wide and heterogeneous group of reagents and equipment's used for the in vitro study of samples from the human body, in order to provide information for clinical decisions making. These products been under directive in a year 1998, which has been repealed in May 2022 by Regulation 2017/746, of April 5, on in vitro diagnostic medical devices

Directive included all those products that are used to provide information concerning a physiological or pathological process or state, congenital physical or mental impairments, safety and compatibility with potential recipients and monitoring therapeutic measures.

In the scope of new regulation also has been included products to determinate the predisposition to a medical condition or a disease, predict treatment's response or reactions and establish therapeutic measures.

The qualification and classifications of these products requires an individualized analysis and a case-by-case study. The intended purpose of the device and any indications claimed by its manufacturer at the same time to put on market are crucial to determine if the product is covered by current European legislation on in vitro diagnostic medical devices or not. As a general rule, products used to carry out in vitro studies to provide nutritional advice to improve quality of life, there are not in vitro diagnostic medical devices, the purpose is not included in the legislation's definition of diagnostic medical device in vitro.

However, a product whose purpose is to identify risk's factors in order to put on a diet for the treatment of morbid obesity, them would be an in vitro diagnostic medical device.

Conflict of Interest: Authors declare no conflict of interest.

PL010**Impact of social networks on teenagers' eating habits eating habits of adolescents***Periago Castón et al., M. J.^{a,*}*

Catedrática de Nutrición y Bromatología de la Universidad de Murcia. *The other authors who participated in the report can be consulted at the following link: <https://www.triptolemos.org/wp-content/uploads/2022/03/IMPACTO-DE-LAS-REDES-SOCIALES-EN-LOS-HABITOS-ALIMENTARIOS-DE-LOS-ADOLESCENTES.pdf>

This report aims to analyze the impact of social networks on the eating habits of adolescents in a first qualitative stage. For this purpose, 3 working groups have been created approaching the subject from different perspectives. The dossier provides an exhaustive description of the situation of the problem in Spain, and the efforts being made at different levels.

The working group that analyzes social networks indicates that the generalized association of social networks and adolescents requires nuances, as the social networks and adolescents requires nuances, since not all of them are used equally and with the same intensity, and for this age there is a clear barrier in this difference. A segmentation is taking place in the consumption of these applications that clearly marks a profile in each one of them.

With the dual perspective of consumer of third-party content and producer of content for their peers as a context, the design and application of effective food and nutrition education and information throughout the compulsory, primary and secondary education, is an important measure to strengthen the critical awareness in the face of messages contrary to a healthy diet. In this way, it would be possible to avoid, on the one hand, the negative influence of unhealthy promotional content or claims about unhealthy promotional content or unsubstantiated food claims, on the one hand, the viral false information and unhealthy habits.

The working group, which analyzes the initiatives of the administration and civil society, summarizes the strategies of the AESAN (Spanish acronym for the Spanish Food and Nutrition Agency), as well as, some and various regional governments. The working group analyzing the curricular training programs has focused on the analysis of the regulations and the analysis of the situation in the Autonomous Regions of Andalusia, Catalonia, Castilla La Mancha, Ceuta and Melilla and Murcia,

PL011**GUT microbiota metabolites associated with polyphenols and their impact on health***Espín, J. C.*

Lab. Food & Health; Group on Quality, Safety, and Bioactivity of Plant Foods; CEBAS-CSIC, 30100 Campus de Espinardo (Murcia).
E-mail: jcespin@cebas.csic.es

Dietary (poly)phenols are plant foods. Its long-term intake has been associated with a lower incidence of chronic degenerative diseases. However, there is controversy because (poly)phenols do not

exert the same effects on everyone. High inter-individual variability results from the two-way interaction between (poly)phenols and the gut microbiota. Our gut microbiota catabolizes (poly)phenols, producing smaller metabolites with higher or lower bioactivity than their (poly)phenolic precursors, which, in turn, modulate the gut microbiota. As the microbiota is specific to each person, this process is individual and could be behind the different health effects after consuming (poly)phenols. The differential metabolism of (poly)phenols by specific gut microbial ecologies gives rise to different metabolic phenotypes, the so-called "metabotypes". In the metabolism of isoflavones, there are "producers and non-producers" of equol, the most active metabolite that explains why isoflavones are not equally beneficial for everyone, for example, for hot flashes after menopause. Another metabotype is related to the production of urolithins, bioactive metabolites (anti-inflammation and autophagy inducers), produced after the metabolism of ellagic acid (present in nuts, strawberries, pomegranate, etc.). There are three urolithin metabotypes: those individuals that do not produce urolithins ("metabotype-0"), those that produce only urolithin A ("metabotype-A"), and those that produce three urolithins (urolithin A + B + isourolithin A; "metabotype-B"). These urolithins differ in their activity. Besides, the three gut microbial ecologies associated with these metabotypes are also different and have been proposed as biomarkers of gut dysbiosis, predisposition to obesity, postpartum recovery, and severity stage of some pathologies. Overall, the effect of consuming certain foods can be different depending on the person's metabotype. In the context of precision nutrition, the administration of the gut bacteria involved in the formation of bioactive metabolites, which not all people produce, could personalize the beneficial effects of certain foods according to the person's needs.

Conflict of Interest: Authors declare no conflict of interest.

PL012**Do we know how diverse diets affect microbiota?***Marcos, A.*

Institute of Food Science, Technology and Nutrition (ICTAN).
Spanish National Research Council (CSIC). Madrid. Spain

The relevant role of breast-feeding in the composition of gut microbiota is due to its contribution of a large number of anti-inflammatory factors that are components promoting tolerance and maturation of the immune system, like nucleotides, PUFAs, beneficial bacteria, antimicrobial components, cytokines, hormones and bioactive peptides, all of them being capable to reduce the development of immune diseases both in the mother and in the newborn.

In addition to the type of lactation (breast- or bottle-feeding), there are more relevant factors affecting the intestinal bacterial colonization of the individual during the first two years of age, such as the type of birth, the place of residence (urban, rural), contact with pets or habitat on farms, the nutritional status of the mother (normal weight, overweight, obesity, non-communicable diseases) and the taking of medications by the mother or child. All these factors are within what is considered basal microbiota.

Therefore, to optimally interpret the results obtained in an intervention study, these extrinsic factors must be taken into account, in addition to the intrinsic factors (age, gender, genetics, intestinal microbiota axes with different organs and tissues [brain, lung, heart, kidney, skin, etc.]).

High-fat, low-carbohydrate diets result in a lower stool volume, and a reduced number of short-chain fatty acids (SCFA) and bifidobacteria. However, high-carbohydrate and fiber diets, but low in fat may cause the opposite effect, helping to maintain or reduce excessive weight and adipose tissue.

Diets high in protein and low in carbohydrates and fiber, frequently used to lose weight, reduce levels of SCFA and protective metabolites, and yet increase concentrations of risk metabolites, so these diets may be the basis for a risk of colon diseases.

In addition, FODMAP and ketogenic diets are frequently used in common pathologies (intestinal diseases, intolerances and allergies). Although they could be useful for some time to improve digestibility of certain food ingredients, or to reduce weight (intermittent diets), all of them can have side effects in the long run.

In conclusion, diet is a key factor in the composition of microbiota, and hence in health status and development of immune and inflammatory diseases.

Conflict of Interest: Authors declare no conflict of interest.

PL013

Probiotics and prebiotics in obesity and malnutrition

Requena, T.

Instituto de Investigación en Ciencias de la Alimentación, CIAL-CSIC

Diet has strong implications in the development of food-associated diseases, such as obesity and metabolic syndrome, malnutrition, and eating disorders. Increasing number of studies consistently confirm the relationship between the intestinal microbiota and the regulation of appetite and body mass. The decrease in the consumption of non-digestible polysaccharides and the increase in easily digestible fats and carbohydrates have produced a progressive loss of certain fiber-fermenting microbial species and a high prevalence of intestinal mucus-degrading species. In particular, fresh vegetables and fruits have been, since ancient times, the best source of dietary fiber that we have in our diets that contribute to the diversity and functionality of the intestinal microbiota. Furthermore, the microbiota of fermented foods can be considered as components of the transient gut microbial community, which regularly interacts with the indigenous gut microbiota. Probiotics, prebiotics and synbiotics have been evaluated especially in obesity and metabolic syndrome studies, representing valuable instruments to restore the diversity of beneficial microbial populations capable of promoting healthy states. On the other hand, the potential benefit of probiotics is especially relevant in developing countries with serious problems of child malnutrition where, on the other hand, their access is limited by the cost of the products.

Conflict of Interest: Authors declare no conflict of interest.

PL014

The microbiome as diagnosis and treatment in personalised nutrition

Alvarez-Calatayud, G.

Paediatric Gastroenterology and Nutrition Unit. Gregorio Marañón Hospital. Madrid

Introduction: Faster and cheaper sequencing of the human microbiome and omics technologies offer new hope for disease prevention and treatment. These techniques make it possible to examine the composition and function of the microbiota and open up the possibility of knowing whether a person has an altered microbiota (dysbiosis), a fact that has been linked to more than three hundred diseases, some with a high prevalence in the population, such as obesity, cardiovascular diseases or cancer.

The microbiome as a diagnosis: The study of the microbiome is probably one of the pillars on which Personalised Nutrition is based. Thus, we would have a simple diagnostic technique that can be used both as a biomarker of risk, diagnosis or disease progression and for the establishment of stratification strategies that allow patients to be classified according to the risk of evolution or aggravation of the health problem.

The microbiome as a treatment: The numerous research projects that have appeared in recent years dedicated to expanding knowledge of the microbiota open the door to future applications with its modulation with diet, probiotics and prebiotics supplementation, faecal transfer and synthetic microbiotas.

Conclusions: Although it is likely that microbiota can play an important role in Personalised Nutrition in the 21st century, caution should be exercised as there is currently no justification for their routine use in the clinic and they should only be used at the research level. However, the design of personalised therapeutic plans based on the microbiota will improve the health and quality of life of patients.

Conflict of interest: I have no conflict of interest.

Keywords: microbiota, probiotics, prebiotics, personalised nutrition.

PL015

Presentation of the integractiv project: In search of biomarkers of physical activity and health

Picó, C.^{1,2,3}; Keijzer, J.⁴; Kopecky, J.⁵; Landrier, J. F.⁶ and Lurbe, E.^{3,7}, on behalf of the INTEGRAActiv consortium

¹Laboratory of Molecular Biology, Nutrition and Biotechnology (Group of Nutrigenomics, Biomarkers and Risk Evaluation), University of the Balearic Islands (UIB), Palma, Spain; ²Health Research Institute of the Balearic Islands (IdISBa), Palma, Spain; ³CIBER de Fisiopatología de la Obesidad y Nutrición (CIBEROBN), Madrid, Spain; ⁴The Wageningen University Human and Animal Physiology, The Netherlands; ⁵Institute of Physiology of the Czech Academy of Sciences, Laboratory of Adipose Tissue Biology, Czech Republic; ⁶Aix-Marseille University, Center for CardioVascular and Nutrition research, France; ⁷Innovation in Paediatrics and Technologies group of Fundación de Investigación, Hospital General Universitario de Valencia, Spain

Physical activity (PA) provides important health benefits throughout life and improves many cardiovascular risk factors with a significant impact on mortality. However, it is not fully understood how PA is linked to different health parameters. Moreover, PA is generally determined from self-report questionnaires, potentially subject to response bias, or through more objective measures, but which require the usage of continuous reading instruments, such as accelerometers. Therefore, there is a need of reliable biomarkers to objectively distinguish people who perform low PA from those who do enough, and, more specifically, biomarkers allowing to relate the degree of PA with effects on health. Childhood and adolescence are critical periods, since the processes that underlie cardiovascular diseases and obesity usually have their origin at an early age. They represent important stages to intervene and the availability of biomarkers of PA and health status in these age groups would be very useful to make more personalized recommendations to improve health and prevent chronic diseases. To this aim, omics technologies, such as transcriptomics and metabolomics, are particularly valuable for the identification and characterisation of PA biomarkers. Peripheral blood cells are a relevant source of biomarkers, particularly transcriptomic-based biomarkers. They can be easily obtained and their gene expression profile may partly reflect that of other tissues, being indicative of physiological and pathological states of the organism; however, their potential usefulness in relation to PA in children/adolescents has hardly been explored so far. The European project INTEGRAActiv (<https://integractiv.uib.eu/>) addresses this challenge by focusing on the identification and first step validation of integrated markers of PA and health in children/adolescents. This will be achieved by combining measures of PA and cardiorespiratory and muscular fitness with anthropometric measures, cardiovascular risk factors and endocrine markers, cytokines, circulating miRNA, and gene expression profile in blood cells and metabolomics profile in plasma.

Acknowledgements: This project has received funding from the Spanish Instituto de Salud Carlos III (ISCIII) and the “European Union NextGenerationEU”, the Ministry of Education, Youth and

Sports of the Czech Republic, and the French National Research Agency in the joint funding activity HDHL-INTIMIC: Standardised measurement, monitoring and/or biomarkers to study food intake, physical activity and health (STAMIFY 2021).

Conflict of Interest: Authors declare no conflict of interest.

PL016

Dietary management of histamine intolerance

Vidal-Carou, M. C.^{1,2,3}; Latorre-Moratalla, M. L.^{1,2,3}; Sánchez-Pérez, S.^{1,2,3}; Costa-Catala, J.^{1,2,3}; Celorio-Sardà, R.^{1,2,3}; Iduriaga-Platero, I.^{1,2,3}; Comas-Basté, O.^{1,2,3}; Veciana-Nogués, M. T.^{1,2,3}

¹Departament de Nutrició, Ciències de l’Alimentació i Gastronomia, Campus de l’Alimentació de Torribera, Universitat de Barcelona (UB), Av. Prat de la Riba 171, 08921 Santa Coloma de Gramenet, Spain; ²Institut de Recerca en Nutrició i Seguretat Alimentària (INSA-UB), Universitat de Barcelona, Av. Prat de la Riba 171, 08921 Santa Coloma de Gramenet, Spain; ³Xarxa d’Innovació Alimentària (XIA), C/Baldiri Reixac 4, 08028 Barcelona, Spain

Histamine intolerance is defined as a non-toxic adverse reaction caused by a reduced capacity of the human body to degrade dietary histamine at intestinal level. Although some symptoms can be confusing, it is not an allergy, since it lacks immunological mediation, nor is it food intoxication, because it can occur after the consumption of foods with normal or even low amounts of histamine.

The most studied cause of histamine intolerance is a deficit in the intestinal enzyme activity Di-Amino-Oxidase (DAO). DAO deficiency may have a genetic origin, since polymorphisms have been linked with low activity, or it may be secondary to inflammatory bowel diseases, or by a temporary inhibition derived from certain drugs. Recently, it was proposed that there may be a relationship between intestinal dysbiosis and histamine intolerance.

Currently, the most recommended strategy to prevent the appearance of symptoms of this intolerance is the follow-up a low-histamine diet, based on the exclusion of those foods that patients associate with symptomatology. Among the foods that are excluded are those in which a high presence of histamine can be expected, but also some foods that, *a priori*, do not contain histamine. According to data from our research group, some of these foods may contain high levels of other diamines, which due to enzymatic competition for DAO would enhance the absorption of histamine and would explain the appearance of its adverse effects.

In 2017, the European Commission approved the commercialization of an enzyme supplement formulated with DAO from porcine kidney protein extract as a novel food, which would improve the degradation of histamine at the intestinal level, allowing a less restrictive diet to be followed. Currently, work is underway to obtain new sources of DAO from plant sources and in the form of probiotics.

In the framework of the congress, the main results of our research group that add scientific evidence to this new intolerance, especially regarding its dietary management, will be exposed.

Conflict of Interest: The authors declare no conflict of interest.

PL017**New horizons in nutritional solutions for cow's milk protein allergy**

Leis, R.

Paediatric Gastroenterology, Hepatology and Nutrition Unit, University Hospital Clinic of Santiago-USC, IDIS, CiberObn. 15706 Santiago de Compostela, Spain

The first thousand days of life are a window of opportunity for the child's metabolic programming. Human milk is the first symbiotic food and the main modulator of the intestinal microbiota in these first moments of life. It should be the model for searching nutritional solutions when breastfeeding is not possible. Cow's milk protein allergy (CMPA) is an immune-mediated disease. In the last years, new elements have been introduced in infant formulas for the treatment of CMPA, such as Human Milk Oligosaccharides (HMOs), that go beyond guaranteeing the reduction of symptoms and ensuring the growth by promoting a reinforcement of the immune system (IS). In healthy infants, the addition of HMOs has shown a positive effect on the microbiota and the IS of infants. In CMPA patients, the recent publication of 1 clinical trial comparing the effects of nutritional treatment with extensively hydrolyzed formula (eHF) with or without the addition of HMOs shows the same results in terms of growth, tolerance and safety in both groups and a 30-70% reduction in the relative risk of developing an infectious condition in the group with HMOs.

Lactose, main disaccharide in human milk, helps also maintain intestinal eubiosis, being able to be a conditional prebiotic. Several scientific societies recommend the use of eFH with lactose in the treatment of CMPA, if there are no symptoms associated with lactose intolerance. The lactose has several beneficial effects on the intestinal microbiota with a significant increase in Lactobacilli and Bifidobacteria, reduction of Bacteroides and Clostridia and fecal metabolism with increased concentrations of short-chain fatty acids (SCFA), as acetic and butyric acid. These prebiotic effects of lactose are believed to have positive effects on early immune development.

HMOs and lactose added to eHF are safe, well tolerated, and promote an adequate growth and a decrease in infectious conditions and drug use.

Conflict of Interest: I have received lecture fees and travel reimbursements from providers of nutritional products for infants.

Keywords: Cow's milk protein allergy, Human Milk Oligosaccharides, Lactose, Immune system.

PL018**Society and food decision in Spain**

Varela-Moreiras, G.

Instituto Universitario CEU Alimentación y Sociedad. Facultad de Farmacia, Universidad San Pablo-CEU, CEU Universities, Urbanización Montepríncipe, 28925, Alcorcón, Madrid, Spain

Introduction: We are currently living in a time of important changes in society, accentuated by the current Covid-19 pandemic and its subsequent effects. To all this must be added the possible consequences of a growing food-nutritional vulnerability associated with economic crisis. Other sociocultural factors include the influence of other people on food choices, knowledge and perception of food and nutrition, educational level, advertising and marketing, and social status.

Objectives: To know the impact of lifestyles through their social and economic determinants, on food agency, to follow up on them, as well as on the knowledge and perception on food sustainability.

Methods: A cross-sectional survey of a nationally representative sample of adults (>18 years old) living in Spain (except Ceuta and Melilla), following previous surveys in 2015 and 2017. The survey was administered via computer-assisted telephone interviewing (CATI): a total of 1921 respondents (945 women and 976 men) participated.

Results: The majority of the population ate the three main meals, although has decreased. In 2022, time spent at each meal has grown, and more time spent on weekends. Eating alone is increasing whereas people who eat sitting down and conversing with someone is decreasing. Teleworking has impacted several aspects such as *with whom, how people eat* or even *what is eaten*. The majority of the population cooks (more comparatively with previous surveys), but mainly women. Of concern, for over 35%, their economic situation has worsened after the pandemic, modifying their food decision. Finally, sustainability is still considered of medium importance and willingness to pay more for sustainable food is low/moderate.

Conclusions: The results show important changes in the social aspects of food, accentuated by the Covid-19 pandemic and the economic crisis.

Conflict of Interest: This study was funded by Fundación MAPFRE (Madrid, Spain), a non-profit foundation committed to the development of people and social welfare.

Keywords: Spain, food decision cooking skills, food agency, sustainability, social vulnerability.

OC005

Thrombin receptor activating peptide-induced platelet reactivity is inhibited by omega-3 fatty acid-derived prostaglandin E3

Osete, J.¹; Iyú, D.¹; García, F.²; Marín, N.¹; García-Estañ, J.¹; Moraleda, J.²

¹Departamento de Fisiología. Facultad de Medicina, Universidad de Murcia, Murcia, Spain; ²Servicio de Hematología, Hospital Virgen de la Arrixaca, Murcia, Spain

Introduction: Thrombin is one of the most important factors that regulates platelet reactivity and coagulation. Clinical trials have consistently shown that omega-3 fatty acid supplementation lowers the risk for cardiovascular mortality and morbidity [7]. Since omega-3 fatty acids are the main precursors of prostaglandin E3 (PGE3) in vivo, it would be relevant to investigate the effects of PGE3 on Thrombin Receptor Activating Peptide (TRAP)-induced platelet reactivity to determine the receptors and possible mechanisms of action of these compounds.

Objectives: To investigate whether omega-3 fatty acid-derived PGE3 might inhibit TRAP-induced platelet reactivity, especially in the presence of an Gi-coupled EP3 receptor antagonist, where the effects of PGE3 at the Gs-coupled EP4 receptor would be potentiated.

Methods: Platelet aggregation (by platelet counting) and activation (by P-selectin expression) were measured by flow cytometry in whole blood in response to thrombin-receptor activating peptide (TRAP) and PGE3, in the absence or presence of the EP3 and EP4 receptor antagonists: DG-041 and ONO-AE3-208. Vasodilator-stimulated phosphoprotein (VASP) phosphorylation was determined using a cytometric bead (VASPFix) assay as a measure of cAMP.

Results: PGE3 inhibited TRAP-induced platelet aggregation and activation. This inhibition was enhanced in the presence of an Gi-coupled EP3 receptor antagonist and abolished in the presence of an Gs-coupled EP4 receptor antagonist (Table 1). The effects of PGE3 were directly related to changes in cAMP, assessed by VASP phosphorylation (Table 2).

Conclusions: The general effects of PGE3 on human platelet reactivity are the consequence of a balance between promotory and inhibitory effects at receptors that have contrary effects on adenylate cyclase. When the balance is shifted towards a major interaction of PGE3 with EP4 receptor its ability to inhibit platelet function increases. These results indicate a potential mechanism by which omega-3 fatty acids underlie cardioprotective effects.

Conflict of Interest: The authors declare that they have no conflict of interest to this work.

Keywords: PGE3. Adenosin. Fatty acids omega-3. Atherosclerosis. Platelet aggregation.

OC008

Comparative effects of a probiotic and a parabiatic administration in the prevention of diet-induced obesity and insulin resistance in rats

Arellano-García, L.¹; Milton-Laskibar, I.²; Martínez, J. A.²; Portillo, M. P.¹

¹Nutrition and Obesity Group. Department of Pharmacy and Food Sciences. Faculty of Pharmacy. University of the Basque Country (UPV/EHU). Vitoria-Gasteiz. Spain; ²CIBERobn. Instituto de Salud Carlos III (ISCIII). Madrid. Spain. Precision Nutrition and Cardiometabolic Health. IMDEA-Food Institute. Madrid. Spain

Introduction: Obesity is a major health issue, which is directly related to diabetes onset. Gut microbiota composition impairments have been related to obesity and/or diabetes incidence. Due to the still limited adherence of subjects to conventional treatments, scientific community is looking for therapeutic alternatives.

Objectives: This study aims to analyze whether the administration of a probiotic bacteria (viable or heat-inactivated) is effective in preventing obesity and insulin resistance in a dietary rodent model.

Methods: Thirty-six 8–9-week-old male Wistar rats were randomly distributed into 4 experimental groups (n=9). A group received a standard diet and the other 3 groups a high-fat high-fructose diet (40% saturated fat and 10% fructose) alone or supplemented with the probiotic or the parabiatic (*L. rhamnosus* GG, 10⁹ CFU/day, viable or heat-inactivated) for 6 weeks. Blood glucose, insulin, adiponectin and leptin levels were measured by spectrophotometric and ELISA methods, as appropriate.

Results: High-fat high-fructose diet induced increment in visceral fat content was effectively prevented by both probiotic and parabiatic administration. The blood glucose concentration increase, induced by the high-fat high-fructose feeding, was not prevented by neither probiotic or parabiatic administration. Both treatments reduced blood insulin levels, reaching statistical significance in the case of the parabiatic. Probiotic administration effectively prevented high-fat high-fructose diet induced decrease in circulating adiponectin levels and the increase induced in leptinemia. With regard to the parabiatic, in both cases non-significant changes were observed.

Conclusions: These results suggest that the probiotic and the parabiatic may elicit similar metabolic effects in adipose tissue accumulation in a rodent model fed a diet rich in fat and fructose. As far as glycaemic control improvement is concerned, the efficacy of the probiotic seems superior to that of the parabiatic. Further research is warranted to elucidate the underlying mechanisms of action improving insulin sensitivity.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Probiotic. Parabiatic. Obesity. Insulin-resistance. Rat.

OC009

The oral administration of bacteria isolated from the human GUT induces urolithins production in a urolithin-non-producing rat model

Iglesias, C. E.¹; González, A.¹; Cortés, A.¹; Cerón, J. J.²; Espín, J. C.¹; Selma, M. V.¹

¹Laboratory of Food & Health, Research Group on Quality, Safety, and Bioactivity of Plant Foods, CEBAS-CSIC, Murcia, Spain; ²Interdisciplinary Laboratory of Clinical Analysis, Interlab-UMU, University of Murcia, Murcia, Spain

Introduction: Urolithins (Uros) are one of the main drivers of the health effects related to the intake of ellagitannins (ETs) and ellagic acid (EA) rich foods (walnuts, pomegranate, etc.). Human gut microbiota converts these polyphenols into Uros, which show anti-inflammatory, anticarcinogenic, cardioprotective, and neuroprotective effects. However, Uros production capacity and, consequently, the health effects upon ETs consumption vary among individuals because not everyone has the gut bacteria necessary to produce Uros. The percentage of Uros non-producers (the so-called metabotype 0) in the healthy Spanish population rounds 10% and could be higher in other countries and some diseases. Recent studies demonstrated that the human gut bacterial genera *Gordonibacter* and *Ellagibacter* transformed EA into some Uros. However, the ability of these bacteria to reproduce human Uro profiles in Uros non-producing animals is still unknown.

Objectives: To assess the capacity of Uros-producing bacteria isolated from the human gut to produce Uros and their safety in a Uros non-producing rat model.

Methods: Uros-non-producing Wistar rats (9 males, 9 females) were oral-gavaged with *Gordonibacter urolithinifaciens* or *Ellagibacter isourolithinifaciens* five times per week for 4 weeks. Uros were analyzed by UPLC-ESI-QTOF-MS/MS and the gut microbiota by 16S rRNA gene sequencing and qPCR in the feces. Hematological and serum biochemical analyses were performed at different time points, and organs were collected at sacrifice.

Results: No adverse effects on growth, food intake, blood variables, and vital organs were observed after oral bacterial administration. Uros detection started in feces 2 days after first bacterial administration and increased during the study. Similarly, *Gordonibacter* levels increased from 5 to 9 log₁₀ bacteria/g feces, and *Ellagibacter* was only detected after its administration.

Conclusions: These results suggest that *Gordonibacter* and *Ellagibacter* strains are safe and could be potential probiotics for producing Uros in the non-producing population.

Conflict of Interest: We declare no conflicts of interest.

Keywords: Polyphenols. Metabolism. Gut microbiota. Interindividual variability. Urolithin-producing bacteria.

OC012

Changes in body composition after one year of lifestyle intervention in children at risk of obesity: Preliminary results. Melipop study

Larruy-García, A.¹; Flores, K.²; Vázquez-Cobela, R.³; Jurado-Castro, J. M.²; Moreno, L. A.⁴; Gil-Campos, M.⁵; Leis, R.³; De Miguel-Etayo, P.⁴

¹Growth, Exercise, Nutrition and Development (GENUD) Research Group, University of Zaragoza, Zaragoza, Spain; ²Metabolism Investigation Unit, Reina Sofia University Clinical Hospital, IMIBIC, University of Córdoba, Spain; ³Unit of Investigation in Nutrition, Growth and Human Development of Galicia, Pediatric Department (USC). IDIS, CIBEROBN, (CB15/00131). Santiago de Compostela, Spain; ⁴Growth, Exercise, Nutrition and Development (GENUD) Research Group, CIBEROBN, (CB15/00043) University of Zaragoza, Zaragoza, Spain; ⁵Metabolism Investigation Unit, Reina Sofia University Clinical Hospital, IMIBIC, CIBEROBN, (CB15/00131), University of Córdoba, Spain

Introduction: The prevalence of childhood obesity in Spain has stabilised in recent years. Maintaining this trend requires the implementation of preventive strategies, such as the adoption of a Mediterranean lifestyle.

Objectives: To assess the efficacy of an intervention based on the promotion of a Mediterranean dietary pattern and regular physical activity, compared to a control group, in improving body composition indices 12 months after baseline.

Methods: MELIPOP is a randomised clinical trial taking place in Cordoba, Santiago de Compostela and Zaragoza (NCT04597281). A total of 293 children aged 3 to 6 years were contacted. After a run-in period, baseline measurements were performed in 162 children, who were subsequently randomised. Sixty-six children in the control group and 57 in the Mediterranean lifestyle intervention group were followed up for 12 months. Body composition measurements were assessed according to standardised procedures. Standardised values for body mass and fat mass indices were calculated according to international references. Missing body composition measurements were imputed. T-tests were used for BMI and FMI z-score to assess changes in body composition indices, and Mann Whitney tests between BMI for control and intervention groups. All analyses were performed in SPSS.

Results: Those assigned to the intervention group showed a significant decrease in fat mass index z-score (-0.6; p≤0.001) after 12 months. In the control group, significant changes in body mass index z-score were observed (0.4, p=0.021), along with a decrease in normalised fat mass index (-0.4, p≤0.001). Regarding differences in changes between groups, these were marginally significant for body mass index (p=0.057).

Conclusions: Preliminary results of the intervention study based on a Mediterranean dietary pattern together with regular physical activity show a moderate effect on body composition of an early intervention in children and their families.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Obesity. Childhood. Body composition. Mediterranean diet. Physical activity.

OC014

Evaluation of the effects of the consumption of broccoli sprouts on the health parameters of overweight or obese menopausal women

Díaz, J. P.*; Albaladejo Otón, M. D.^a*; Moreno, D. A.**; Alemán, J. A.***

*Serv. Análisis Clínicos. Hosp. General Universitario Santa Lucía. Cartagena. 30202 Santa Lucía, Cartagena, Murcia; ** Laboratorio de Fitoquímica y Alimentos Saludables (LabFAS) CEBAS-CSIC, Dpto. Ciencia y Tecnología de Alimentos. Campus Universitario de Espinardo-25, 30100 Espinardo. Murcia; ***Cátedra de Riesgo Cardiovascular. Universidad Católica de Murcia San Antonio de Murcia (UCAM). Campus de los Jerónimos, 30107 Guadalupe, Murcia

Introduction: The overweight/obesity and menopause increase the risk for cardiovascular disease.

The broccoli sprouts (*Brassica oleracea* L. var. *Italica*) are rich sources of glucoraphanin/sulforaphane (GRA/SFN) which may affect the lipid metabolism inducing a positive activity against adiposity and chronic inflammation in obesity.

Objectives: To analyze the variation upon consumption of broccoli sprouts rich in GRA/SFN of the biomarkers of lipids and glucose metabolism, inflammation as well as the blood pressure and anthropometric measures.

Methods: Prospective study of dietary intervention with patients of the “C.S.Bº Peral (Cartagena, Murcia)”, to evaluate the effects of the daily consumption of one portion of broccoli sprouts (40 g of fresh sprouts/d) during 5 consecutive weeks in menopausal women with overweight/obesity (IMC ≥ 25 kg/m²), non-smokers, non-diabetic and without any previous history of cardiovascular disease. The inclusion criteria were being woman, with overweight/obesity (WHO criteria). The criteria for exclusion were the cardiovascular disease, smoking, diabetes or intolerance to cruciferous foods or ingredients.

The bioavailability of the GRA/SFN was studied analyzing also the biochemical parameters total cholesterol, HDL, LDL, Triglycerides, glucose, insulin, glycosylated hemoglobin, HOMA-IR index, C Reactive Protein, Interleukin IL-6 and TNF- α , blood pressure, waist circumference before and after the intervention.

Results: The bioavailability study confirmed that the metabolite resulting of the mercapturic acid pathway, the sulforaphane N-acetyl-cysteine (SFN-NAC) in urine samples can be used as a marker of intake during the dietary intervention.

There were not any statistically significant changes in the lipid and glucose parameters. There were significant reductions in the inflammation markers of C - reactive protein (CRP) and TNF- α , as well as in the systolic blood pressure. The reduction of body weight was significant but not in the waist circumference.

Conclusions: The consumption of broccoli sprouts did not modify the glucose and lipid profile in this population. We observed a positive effect on the biomarkers of low-grade chronic inflammation.

Conflict of Interest: Authors declare no conflict of interest.

Keywords: Broccoli, menopause, obesity, overweight, lipid profile, glucose profile, inflammation markers, blood pressure, BMI, waist circumference.

OC017

Assessment of anti-inflammatory effect of nicotinamide, a form of vitamin B3, in an in vitro model of intestinal barrier

Niño-Narvió, J.¹; Almahdi, Y.¹; Camacho, M.¹; Martín, R.²; Julve, J.¹

¹Instituto de investigación del Hospital Santa Creu y Sant Pau. Barcelona. España; ²Departament de Bioquímica i Fisiologia. Facultat de Farmàcia i Ciències de l’Alimentació, Universitat de Barcelona. Barcelona. España

Introduction: An increased gut inflammation and dysbiosis are common features of obesity and diabetes. Nicotinamide adenine dinucleotide (NAD⁺) deficiency has been linked to gastrointestinal inflammation and its supplementation prevents gastrointestinal inflammation and dysfunction. In this context, nicotinamide (NAM), an edible NAD⁺ precursor, favorably influence intestinal inflammation; however, neither its mechanism of action nor its impact on the gastrointestinal function has been yet addressed.

Objectives: Thus, we tested the hypothesis that NAM will protect the gastrointestinal barrier in conditions mimicking dysbiosis.

Methods: The impact of lipopolysaccharide (LPS) (1 μ g/mL) and NAM-mediated protection (0.3 mM) on differentiated (d) THP1 on inflammation and cell barrier properties in 21-day Caco-2 cell cocultures with LPS-induced dTHP1 were, respectively, addressed in vitro. The induction of cellular inflammation was analyzed by real time qPCR and specific ELISAs to different cytokines, whereas the 21-day Caco-2 cell barrier integrity was ensued by evaluating the Trans-Epithelial Electrical Resistance (TEER) and Lucifer Yellow (LY).

Results: LPS-mediated inflammation in dTHP-1 was reduced by NAM, as revealed by the reduced (2-fold) synthesis and/or secretion of IL6 and Ccl2. Notably, NAD⁺, at the same concentration as NAM, also protected dTHP1 from inflammation, even more efficiently. The paracellular transport of LY and TEER metrics were significantly distorted in 21-day Caco-2-cell and LPS-inflamed dTHP1 cell cocultures. Only the addition of NAD⁺ protected the 21-day Caco-2 cell barrier from leakage. Indeed, NAD⁺ reduced paracellular transport of LY and maintained TEER metrics close to those shown by intact Caco-2 cell barrier. Noteworthy, the addition of sirtinol, a specific sirtuin inhibitor, partly abolished the positive effect of NAD⁺, thus suggesting a favorable role for this signaling in inflammation.

Conclusions: Our data demonstrated for the first time to our knowledge the protective role of NAD⁺ in an in vitro model of gastrointestinal barrier.

Conflict of Interest: The authors declare no conflicts of interest.

Keywords: Vitamin. Nutritional supplement. Paracellular transport. Nicotinamide adenine dinucleotide.

OC018

Preliminary results of 1-year dietary assessment and follow-up of newly diagnosed celiac children

Perez-Junkera, G.¹; Vázquez-Polo, M.¹; Larretxi, I.¹; Navarro, V.¹; Txurruka, I.¹; Calvo, A. E.²; García, Z.²; Lasa, A.¹

¹Gluten3S Research Group, Department of Nutrition and Food Science. Faculty of Pharmacy, University of The Basque Country (UPV/EHU). Vitoria-Gasteiz. Basque Country; ²Section of Gastroenterology, Hepatology and Nutrition. Pediatric Services. University Hospital of Araba. Vitoria-Gasteiz. Basque Country

Introduction: The only effective treatment for celiac disease (CD) consists of strict adherence to a gluten-free diet (GFD) throughout life. GFD can lead to a lower consumption of carbohydrates, which is an added difficulty in following a balanced diet and, therefore, a risk factor for nutritional deficiencies. Besides, it has been proved that 30% of patients suffer from symptoms although they follow a GFD. Finally, this collective feels usually, misunderstood by the society due to the lack of knowledge of people and facilities for celiac people.

Objectives: Improve the quality of life of people suffering from CD in their first year on a GFD.

Methods: Newly diagnosed celiac children aged between 3 and 14 years old will be recruited in 6 hospitals of the Basque Country. Face-to-face, continuous and personalized dietary intervention has been designed, coordinated with nutritional education, to be given during their first year on a GFD. Factors that can be related to the symptoms and dietary transgressions will be analysed and GFD's balance improved.

Results: Until now, 4 participants have concluded the whole intervention. According to the intake of different food groups, cereal and dairy product's has been low and meat's high. Among nutrients, carbohydrates, calcium and D vitamin's intake has not reach the dairy recommendations; however, fibre intake has increased to adequate levels. A few symptoms have persisted after 12 months on a GFD. Their quality of life has improved but remains poor after the intervention.

Conclusions: Preliminary results indicate celiac children do not realize a balanced diet, which is necessary to prevent nutritional deficiencies. Moreover, the perception of the quality of life of them during the first year on a GFD is low, so it seems necessary to approach a multidisciplinary treatment, not only from the nutritional perspective, but also from the psychological one.

Conflict of Interest: Authors declare no conflict of interest.

Keywords: Celiac disease. Gluten-related disorders. Gluten free diet. Nutritional deficiency. Nutritional imbalance.

OC022

GUT microbiota and short-chain fatty acids profile characterisation in infants according to the type of feeding: The nela cohort

Suárez, C.¹; Yagüe, G.²; Santaella, M.¹; Morales, E.³; García-Marcos, L.⁴; Martínez, C.¹; NELA Study group⁵

¹Food Science and Nutrition Department, Veterinary Faculty, Regional Campus of International Excellence Campus Mare Nostrum, University of Murcia, 30100 Murcia, Spain; ²Microbiology Service, Virgen de La Arrixaca University Hospital, 30120 Murcia, Spain; ³Department of Public Health Sciences, University of Murcia, Murcia, Spain; ⁴Pediatric Allergy and Pulmonology Units, Virgen de La Arrixaca University Hospital, 30120 Murcia, Spain; ⁵Biomedical Research Institute of Murcia (IMIB-Arrixaca), 30120 Murcia, Spain

Introduction: The lactation stage, and specifically breast milk, is one of the main pathways of microbial colonization in infants due to the presence of beneficial bacteria in the milk itself or other bioactive compounds. It has been reported that breastfeeding promotes a correct colonization and growth of the infant gut microbiota (IGM), helping to a better development of the immune system and conferring greater protection against future diseases such as celiac disease, obesity or diabetes.

Objectives: The aim of this work was to study the effect of different types of feeding on the IGM and their short-chain fatty acid (SCFAs) profile in 196 infants at three months of age from NELA cohort. We compared exclusively breastfed (BFI), fed with mixed feeding (MXI) or with infant formula (IFI).

Methods: The IGM was analysed by q-PCR (Log genomic Eq. /g faeces) and SCFAs were determined by gas chromatography. A multifactorial analysis was performed adjusting models with other variables such as sex, weight, mode of delivery and mother's age.

Results: We observed statistical differences in *Bifidobacterium breve* (median (IQR)) (5.53 (3.56-7.14) vs. 3.04 (2.37-4.47) and 3.67 (2.22- 5.40); (BFI vs. IFI and MXI, respectively)), *Bifidobacterium longum* (6.45 (4.35- 8.14) vs. 4.90 (3.52-6.64); (BFI vs. MXI)), *Clostridium cluster XIVa* (5.06 (3.73-7.16) vs. 3.88 (2.80-4.88); (BFI vs. IFBI)) and *Lactobacillus spp.* (3.75 (2.45-4.88) vs. 2.64 (2.02-4.27) and 2.96 (2.03-3.27); (BFI vs. MXI and IFI respectively). Regarding SCFAs, higher proportions of acetic acid and lower of propionic and butyric were observed in the BFI group compared to the other groups. No statistically significant differences were observed between groups in both multivariate analyses when the profile of IGM and SCFAs was represented adjusting the model with confounding variables.

Conclusions: In general higher beneficial bacterial counts were observed in BFI compared to the other two groups.

Conflict of Interest: The authors declare no conflicts of interests.

Keywords: Gut microbiota. Breastmilk, SCFAS, Lactation.

OC024

Pterostilbene and resveratrol effects on brown adipose tissue thermogenic activation

Gómez-García, I.¹; Trepiana, J.²; Fernández-Quintela, A.²; Portillo, M. P.²

¹Nutrition and Obesity group, Department of Pharmacy and Food Sciences, Faculty of Pharmacy, University of the Basque Country (UPV/EHU), Vitoria-Gasteiz, Spain; ²Nutrition and Obesity group, Department of Pharmacy and Food Sciences, Faculty of Pharmacy, University of the Basque Country & CIBER Obesity and Nutrition, ISCIII, Vitoria, Spain

Introduction: Interscapular brown adipose tissue (iBAT) energy expenditure and substrate consumption can contribute to the treatment of obesity and its co-morbidities. Pterostilbene, a dimethoxy derivative of resveratrol has emerged as a useful tool for the prevention and treatment of obesity due to its higher bioavailability compared to resveratrol.

Objectives: The aim of this study was to analyse the effect of pterostilbene and resveratrol on the thermogenic capacity of iBAT from rats fed an obesogenic diet.

Methods: Rats were distributed into 5 experimental groups and fed either a standard or a high-fat high-fructose (HFHF) diet, supplemented or not with pterostilbene (15 or 30 mg/kg/day) or resveratrol (30 mg/kg/day) for 8 weeks. Triglyceride and protein expression of uncoupling protein-1 (UCP1), sirtuin-1 (SIRT1) and the phosphorylation of AMP-activated protein kinase (AMPK) were measured by immunoblotting.

Results: Though no changes were observed in iBAT weight, the HFHF diet caused a sharp rise in triglyceride levels in this tissue. Nevertheless, differences were not observed in p-AMPK, SIRT1 and UCP1 protein expression between the HFHF and the control groups. Regarding phenolic compounds, pterostilbene (both doses) and resveratrol prevented the increase in triglycerides caused by the obesogenic diet. Resveratrol group showed an increase in p-AMPK and UCP1 protein expression when treated rats were compared with rats fed a standard or a HFHF diet, respectively. Pterostilbene prompted a significant increase in UCP1 protein expression compared with the control group, though only a trend was observed in the case of p-AMPK. No changes in SIRT1 protein were found.

Conclusions: In iBAT, pterostilbene and resveratrol enhanced thermogenic capacity, and both were able to completely prevent the triglyceride raise induced by the HFHF diet. These facts show a mechanism by which these phenolic compounds could be useful in the management of obesity.

Conflict of Interest: Authors declare no conflict of interest.

Keywords: Brown adipose tissue. Thermogenesis. Resveratrol. Pterostilbene.

OC025

Vasorin expression is down-regulated in visceral adipose tissue in children with obesity

Ruiz, F. J.¹; Anguita, A.²; Gomez, C.¹; Cruz-Rico, M.¹; Gil, M.³; Tofe, I.³; Cañete, R.³; Gil, A.¹; Aguilera, C.¹

¹Department of Biochemistry and Molecular Biology II, School of Pharmacy, University of Granada, 18071, Granada, Spain; ²ISGlobal Barcelona Institute for Global Health. Barcelona, Spain; ³Instituto Maimónides de Investigación Biomédica de Córdoba; Department of Cell Biology, Physiology and Immunology, University of Córdoba

Introduction: Puberty is a time of metabolic and hormonal changes, and it is associated with a reduced insulin sensitivity that recovers at puberty completion in only some children, but not in all. Indeed, our group has demonstrated that IR represents the core of the pathophysiological development of metabolic syndrome in children with obesity. Metabolic disturbances are more strongly associated with visceral adipose tissue (VAT), being this area longitudinally associated with an increased risk of incident metabolic syndrome, probably because VAT is an 'ectopic fat' that originates from the 'overflow' of fat beyond the capacity of subcutaneous adipose tissue (SAT) to store extra energy. Studying the gene expression profile of VAT might be a useful tool for analyzing the mechanisms of weight regulation and understanding the development of obesity and its comorbidities in children. We previously identified, by using an epigenome-wide association study, that the gene encoding vasorin (VASN) is differentially methylated in blood leukocytes of children with obesity and insulin resistance along puberty.

Objectives: Our aim was to compare the VASN expression in visceral adipose tissue (VAT) between children with obesity and normal weight.

Methods: VAT biopsies were extracted and qRT-PCR analysis was carried out. VASN expression relative to HPRT1 as a reference gene was determined in the VAT.

Results: We observed a significant down-regulation of VASN mRNA levels in VAT of children with obesity compared with normal-weight children ($P=0.0107$).

Conclusions: These findings exhibit that VASN may play an important function in adipose tissue of children with obesity, and therefore, in the adipocyte metabolism. Further analysis is needed in order to understand the molecular mechanism of this protein in adipose tissue, as the main metabolic organ involved in obesity and insulin resistance.

Conflict of Interest: The authors declare no conflict of interests.

Keywords: Vasorin. Childhood obesity. Adipose tissue.

OC026**Artificial nutritional support in critically ill children**

de la Mata-Navazo, S.; Arévalo-Pérez, I.; Ramírez-Riascos, L.; Rodríguez-Moraño, A.; Valiente-Teixeira, I.; Rodríguez-Martínez, A.; López-Herce, J.; Solana-García, M. J. Unidad de Cuidados Intensivos Pediátricos. Hospital General Universitario Gregorio Marañón. Madrid, España

Introduction: a high number of critically ill children show malnutrition on admission to the Pediatric Intensive Care Unit (PICU), which worsens hospitalization outcomes. Although enteral nutrition is the preferred technique, it is unknown which is the ideal onset time, objective caloric and protein intake, or the best rhythm increase.

Objectives: to study artificial nutrition techniques and their complications in children hospitalized in the PICU of a tertiary hospital in Madrid, Spain.

Methods: retrospective study including 61 patients hospitalized in the PICU in a six-month-period, who had received enteral nutrition (EN) or parenteral nutrition (PN). We analyzed their nutritional status, caloric and protein intake, administration routes, used nutritional formulas and digestive and metabolic complications.

Results: fifty-eight patients received EN, and three patients received PN. The most common route of access for enteral nutrition administration was the nasogastric tube (61%) followed by transpyloric tube (27,1%). The average time until the onset of EN was $1 \pm 1,1$ days, with a positive correlation with PRISM-III score ($r = 0,464$; $p < 0,001$). Caloric and protein maximum administered amount was $67,8 \pm 28,9$ kcal/kg and $1,7 \pm 0,8$ g/kg respectively. In 52,5% of patients the EN was suspended, being the most frequent cause the performance of a technique (57,6%). 88,5% of all the patients had digestive complications being vomiting the most frequent one (77%). The most frequent metabolic complications were hyperglycemia (81,3%) and hypokalemia (58,3%).

Conclusions: EN is the most used feeding method in the PICU. EN is usually initiated early, but in severe patients the start of nutrition may be postponed. The number of interruptions in EN is high and causes a delay in the achievement of the maximum caloric intake. The frequency of digestive complications is high, more frequent in severe patients and those with mechanical ventilation.

Conflict of Interest: None.

Keywords: Enteral nutrition. Children. Proteins. Nasogastric feeding. Transpyloric feeding. Digestive complications.

OC027**Epigallocatechin gallate ameliorates the adverse effects produced by prenatal alcohol exposure on neurodevelopment and cardiac function in a mouse model**

Andreu-Fernández, V.¹; Serra-Delgado, M.²; Almeida, L.²; García-Meseguer, A.¹; García-Algar, O.³; Gómez-Roig, M. D.²

¹Institut d'Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS), Hospital Clinic de Barcelona, Barcelona, Spain;

²Institut de Recerca Sant Joan de Déu, Esplugues de Llobregat, Spain; ³Department of Neonatology, Hospital Clínic-Maternitat, ICGON, IDIBAPS, BCNatal, Barcelona, Spain

Introduction: Alcohol consumption during pregnancy can produce many adverse health effects on fetus, englobed on fetal alcohol spectrum disorders (FASD) characterized by growth restriction and central nervous system abnormalities. However, the dose and frequency of prenatal alcohol exposure (PAE) to produce some of these deleterious effects are still under study. Moreover, there is no treatment to improve the harmful effects produced by PAE.

Objectives: To analyze cardiac function and cardiac/neuronal biomarkers in young adult mice prenatally exposed to alcohol according to two human-like drinking patterns. We will study the effect of postnatal epigallocatechin-3-gallate (EGCG) treatment on these biomarkers and cardiac function.

Methods: We perform 5 intervention groups in a FASD-like mouse model, including EtOH or EtOH+EGCG for Binge and Mediterranean human-like patterns. We performed a functional echocardiography to evaluate different cardiac parameters including LV posterior wall thickening (PWT), E and A wave, and Tei Index. Analyses by Western blot evaluated cardiac and neuronal biomarkers in samples of heart, cerebellum and whole brain.

Results: Prenatal alcohol exposure (PAE) produced alterations in molecular pathways in heart and brain tissue. BNP and Troponin I increased in both PAE groups, Nrf2 was reduced and Hif1a was increased in heart samples of PAE mice. Alcohol produced cardiac dysfunction assessed by reduced LVPW thickness at diastole, increased Heart Rate in binge group and increased Tei index. We found altered levels of NeuN/Duoblecortin, GFAP, S100B and Dyrk1A in whole Brain and cerebellum samples. The treatment of EGCG postnatally partially improve cardiac dysfunction and partially restored cardiac and neuronal alterations.

Conclusions: Our results confirm the deleterious effect of PAE on offspring heart and brain. Moreover, there is an improvement of this parameters after the administration of EGCG to the offspring on both pattern of consume.

Conflict of Interest: The authors have no conflicts of interest relevant to this research to disclose.

Keywords: Epigallocatechin-3-gallate. Alcohol. Fetal alcohol spectrum disorders. Cardiac function. Neurodevelopment.

OC032

Declared data versus chemical analysis of menus served in public school lunchrooms of Madrid (2017-2019). "School Meals Programme"

de Tomás, I.¹; Rodríguez, P.²; Ávila, J. M.²; Leis, R.³

¹Spanish Nutrition Foundation (FEN). Madrid. Spain. Department of Nutrition and Food Science. Faculty of Pharmacy Complutense University of Madrid. Madrid. Spain; ²Spanish Nutrition Foundation (FEN). Madrid, Spain; ³Spanish Nutrition Foundation (FEN). Madrid. Spain. Pediatric Nutrition Research Group. Health Research Institute of Santiago de Compostela (IDIS). Santiago de Compostela. Spain

Introduction: The School Meals Program of Madrid evaluates school menus through chemical analysis (energy, macronutrients, fatty acids and salt) and the revision of menu's rotation (food frequency, food variety and nutritional information) since 2002.

Objectives: The aim of the project is to compare the data of scholar menus elaborated by the catering company (energy and caloric profile) with the results of chemical analysis of school meals collected during 2017-2019.

Methods: Unannounced visits to schools, conducted by the staff of the Spanish Nutrition Foundation, were carried out. It was collected a duplicate portion meal for chemical analysis and also a scholar monthly menu plan. The energy and caloric profile declared in menus was compared with the chemical analysis of the samples collected. Only the menus that included daily nutritional values were selected. Statistical analyses were performed by the statistical software package SPSS.PC version 22.

Results: 52 of 60 menus had daily nutritional values. Significant statistical differences were observed ($p < 0.05$) during the two academic years in all parameters, being energy content declared (686.4 ± 104.1 Kcal) higher than chemical data (532.3 ± 135.1 Kcal). Related to caloric profile, the percentage of declared proteins and carbohydrates (17.8 ± 3.5 %; 43.9 ± 9.7 % respectively) was lower than chemical data (20.6 ± 6.8 %; 53.6 ± 10.5 % respectively) and the percentage of declared lipids (35.4 ± 8.1 %) was higher than chemical data (25.7 ± 10.3 %).

Conclusions: There is no coincidence between declared data and chemical analysis, probably because the cooking staff does not follow the technical sheets provided by the Nutrition Department of the catering company. It is necessary to insist that both groups have to work together to ensure enough energy and nutrients contribution for children and a reliable information for the families.

Conflict of Interest: None.

Keywords: Schools meals. Child. Food analysis. Chemical analysis.

OC037

Chronobiological characterization of meal timing and overnight fasting

Gonzalez-Romero, P.¹; Bonmatí-Carrión, M.²; Martínez-Madrid, M. J.³; Rol, M. A.²; Campos, M.⁴; Madrid, J. A.²

¹Chronobiology Lab, University of Murcia (UM), Campus Mare Nostrum, Spain; ²Chronobiology Lab, University of Murcia (UM), Campus Mare Nostrum, Spain; Ciber Fragilidad y Envejecimiento Saludable (CIBERFES), Madrid; IMIB, Arrixaca, Murcia, Spain; ³Ciber Fragilidad y Envejecimiento Saludable (CIBERFES), Madrid, Spain; Kronohealth, S.L., Murcia, Spain. ⁴Ciber Fragilidad y Envejecimiento Saludable (CIBERFES), Madrid, Spain; Computer Science Faculty, University of Murcia (UM), Spain; IMIB, Arrixaca, Murcia, Spain; Kronohealth, S.L

Introduction: Nutrition research tends to focus mainly on what we eat rather than when we eat. However, a huge amount of evidences supports the crucial role of meal timing in human welfare. Measuring chronodisruption is an unresolved challenge and thus, it is necessary to implement new chronobiological parameters which integrate meal timing and sleep in relation with the internal temporal order.

Objectives: To implement new chronobiological indexes to assess the degree of synchronisation between sleep and overnight fasting and time lag on overnight fasting between working and non-working days.

Methods: Ambulatory circadian monitoring (ACM) was performed for one week in 28 healthy students (aged 20-28 years) using a Kronowise® device. Meal timing was registered through an event marker button. Three parameters were individually calculated: Environmental Desynchronisation [Absolute Value (Darkness Central time - Central time of overnight fasting) / 12]; Internal Desynchronisation [Absolute Value (Central time of maximum peripheral temperature - Central time of overnight fasting) / 12]; Fasting Jet Lag [Absolute Value (Working days overnight fasting - Non-working days overnight fasting)]. Mean waveforms for meal timing were also calculated.

Results: Participants showed both synchronised and desynchronised meal schedules. The event marker use of the ACM device allows objective recordings of meal timing. Environmental Desynchronization ranged from 0,02 to 0,21 (arbitrary units) and Internal Desynchronisation ranged from 0 to 0,24 (arbitrary units). Fasting Jet Lag varied from 0 to 2,64 hours. Composite mean waveforms turn out to be useful for detecting unhealthy habits such as late-night snacking.

Conclusions: Meal and fasting timing monitoring jointly with non-parametric analysis allow objectively chronobiological characterization of feeding rhythms, providing a new tool for assessing circadian disruption in a personalized way. Further studies will validate these new indexes to develop individual chronobiological interventions including meal timing.

Conflict of Interest: The authors declare no competing interest.

Keywords: Circadian rhythms. Feeding time. Ambulatory circadian monitoring. Fasting.

OC041**Dietary pattern adherence and blood metabolomics: cross-sectional associations in a sample of UK biobank participants**

Piernas, C.¹; Torres-Martos, A.¹; Rangel-Huerta, O. D.²; Anguita, A.³; Aguilera, C.¹

¹Departamento de Bioquímica y Biología Molecular II, Facultad de Farmacia, Universidad de Granada; ²Norwegian Veterinary Institute, Noruega; ³IS Global, Barcelona Institute for Global Health

Introduction: An unhealthy dietary pattern (DP) previously identified in the UK Biobank population was characterised by high dietary energy density, saturated fat and free sugars, and low fibre intakes. This DP showed strong positive associations with incident cardiovascular disease, type 2 diabetes and mortality. Differences in blood metabolite and biomarker profiles may help identify novel pathways explaining the observed associations.

Objectives: To investigate associations between DP adherence and blood metabolomics.

Methods: We analysed n=28,108 UK Biobank participants that completed 2 or more 24h dietary assessments at baseline. Adherence to DP was categorised in quintiles (Q1 vs Q5 indicating lower vs higher adherence, respectively). Metabolomics was measured from randomly selected EDTA plasma samples collected at baseline using a high-throughput NMR-based metabolic biomarker profiling platform. Sex-adjusted mixed-effect linear models were used to identify differential metabolite and biomarkers between quintiles of DP adherence. A P<0.0001 was set to denote statistical significance.

Results: A large proportion of biomarkers from the lipid metabolism showed significantly lower serum concentrations among participants in the highest quintile of adherence Q5 compared to Q1, including: docosahexaenoic acid, omega-3 fatty acids, polyunsaturated fatty acids, total high density lipoprotein cholesterol (HDL) and most lipid fractions contained in HDL. However, comparing Q5 vs Q1, there were significantly higher concentrations of total fatty acids, monounsaturated fatty acids, saturated fatty acids, total triglycerides, low density lipoprotein cholesterol (LDL), Apolipoprotein B and most lipid fractions contained in LDL and very low density lipoprotein cholesterol (VLDL). Other smaller metabolites were increased in Q5 vs Q1, including acetate and glutamine; but reduced in Q5 vs Q1, including creatinine, lactate or pyruvate.

Conclusions: A higher adherence to an unhealthy dietary pattern is associated with a more atherogenic lipid profile, which may explain the observed risk with incident cardiovascular disease and mortality in this population.

Conflict of Interest: None.

Keywords: Dietary patterns. Metabolomics. Lipid profile. Cardiovascular disease.

OC042**Effectiveness of *Gracilaria vermiculophylla* in the treatment of obesity and insulin resistance, as well as the influence of sexual dimorphism**

Carr-Ugarte, H.; Ezeberri, L.; Aguirre, L.; Portillo, M. P.

Nutrition and Obesity Group. Department of Nutrition and Food Science, University of the Basque Country (UPV/EHU) and Lucio Lascaray Research Institute, Vitoria-Gasteiz, Spain

Introduction: Obesity is one of the biggest public health problem in the world, which is considered to be related to different non-transmissible illnesses. The clinical approach for obesity and insulin resistance is based on a multifactorial intervention, but its efficacy is limited. In this context, it has been observed that the intake of some bioactive compounds, like polyphenols or peptides, have significant beneficial effects on health, as in the prevention and treatment of obesity and some of its main co-morbidities. Algae are rich in these natural compounds; in addition, their consumption is increasing in recent decades. Thus, their use as an obesity-prevention tool seems to be of great interest.

Objectives: The hypothesis is that dietary supplementation with *Gracilaria vermiculophylla* will be able to prevent (at least partially) obesity and insulin resistance in a genetically obese male and female rats. Besides, we foresee a different response-pattern between males and females.

Methods: Twenty-seven 8-week-old male Zucker fa/fa rats will be distributed in three groups and will be fed a standard diet. Two different doses of *Gracilaria vermiculophylla* (5% -high dose - or 2.5% -low dose- of the diet) will be tested. Nine lean rats will be used as control. After the experimental period, rats will be sacrificed by exsanguination after cardiac puncture under anaesthesia, and blood, gastrocnemius muscle and adipose tissues from different anatomical locations will be obtained. The same experiment will be repeated with female Zucker fa/fa rats to analyze a potential sexual dimorphism. To analyse the effects of the alga, body weight and adipose tissue weights will be measured, as well as several serum parameters such as glucose, insulin or triglyceride levels. To study the potential mechanisms of action, gene and protein levels, and enzymes activities will be analysed in adipose tissue and gastrocnemius muscle.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Algae. *Gracilaria vermiculophylla*. Obesity. Insulin resistance. Rat.

OC044**Benefits of mediterranean diet supplemented with either extra virgin olive oil or red wine polyphenols in metabolic syndrome patients**

González-González, A.; Sánchez-Alcoholado, L.; Laborda-Illanes, A.; Castellano-Castillo, D.; Boutriq, S.; Plaza-Andrades, I.; Peralta-Linero, J.; Queipo-Ortuño, M. I.

Unidad de Gestión Clínica Intercentros de Oncología Médica. Hospitales Universitarios Regional y Virgen de la Victoria. Instituto de Investigación Biomédica de Málaga (IBIMA)-CIMES

Introduction: Gut microbiota is an important modulator of human metabolism and energy homeostasis. There are few studies that report the benefits of the Mediterranean diet (MedDiet) in changes in the composition of the microbiota. Extra virgin olive oil (EVOO) and red wine (RW) are rich in polyphenols, which have effects on the intestinal microbiota. Choline, which is a metabolite present in red meat, is metabolized to TMAO, causing atherosclerosis and cardiovascular disease. EVOO and RW contain DMB, which is structurally analogous to choline, prevents TMAO production.

Objectives: Investigate whether MedDiet supplemented with EVOO or RW alters the gut microbiome, as well as biomarkers of metabolic health and inflammation.

Methods: 10 healthy non-obese controls and 10 obese subjects with metabolic syndrome were included in randomized cross-over trial with two 4-week dietary intervention periods comprising two Mediterranean-style diets supplemented with EVOO or red wine, separated by a washout period of 15 days. Blood at fasting state and fecal samples were collected at 3 time points: baseline, after 4 weeks of every dietary intervention period. The response to the interventions on the gut microbiome composition as well as measures of anthropometrics and metabolic parameters, gut permeability, inflammatory markers and urine and serum metabolomics were assessed.

Results: MedDiet supplemented with EVOO or RW improved the metabolic status and reduced the low-grade inflammation. Furthermore, it induced major changes in gut microbiota taxa respect its composition and function as well as in a (Chao1 and Shannon index) and β -diversity (Bray-Curtis) between baseline and both intake periods. MedDiet supplemented with EVOO or RW reduced TMAO levels and gut permeability by decreasing zonulin levels.

Conclusions: MedDiet supplemented with EVOO or RW causes microbiota changes reducing TMAO levels, inflammation, and permeability. Thus, these phenolic compounds could constitute cardioprotective factors.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Gut microbiota. TMAO. Red wine. Extra virgin olive oil. Polyphenols.

OC046**Contribution of gluten free products to critical nutrient intakes in children and adolescents with celiac disease**

Alonso-Aperte, E.; González, M. P.; Ballestero, C.; Achón, M.; Fajardo, V.; García-González, A.; Martínez-Sáez, N.; Úbeda, N.

Food and Nutrition in Health Promotion. Departamento de Ciencias Farmacéuticas y de la Salud, Facultad de Farmacia, Universidad San Pablo-CEU, CEU Universities, Madrid, España

Introduction: Commercial gluten-free products (GFP) are helpful resources for individuals avoiding gluten, especially children and adolescents. However, people with coeliac disease (CD) have shown concern about the nutritional quality and the fat, sugar, and salt content of some GFP.

Objectives: The aim of the study is to assess the contribution of GFPs to the energy and macronutrient daily intake of children and adolescents with CD.

Methods: Volunteers, aged 4 to 17, had confirmed diagnosis of CD and were following a gluten free diet for over a year. Diets were assessed using three 24-h dietary records. Volunteers were asked to record name and brand of GFP. Data on GFP composition was recorded from package labels. Diets were analyzed using DIAL® software.

Results: Seventy children and adolescents (50% female; 80% children; 20% adolescent) participated. As compared to nutritional objectives, diet was energy balanced but low in carbohydrates and fiber, and high in fat, saturated fat, protein, and sugars. Eighty five percent declared consuming commercial GFPs regularly. GFPs contributed importantly (>25%) to energy, carbohydrate, fiber, and salt daily intake and, to a lesser extent (<20%), to fats (including SFA), sugars, and protein. Percentage contribution of GFPs was higher in boys than girls, although statistically significant only in the case of SFA. As for age, there were no significant differences, but the impact of GFPs on diet tended to be higher for the younger. Contribution of homemade gluten free products was minimal.

Conclusions: Consumption of processed GFPs is high in the Spanish pediatric population, and contributes to a significant part of the energy, salt, fat (including SFA), and sugars in their daily diet. Children and adolescents with CD could benefit from comprehensive nutrition education programs aimed at reducing processed food intake and/or reformulation practices on GFPs.

Conflict of Interest: The authors declare no conflicts of interest.

Keywords: Celiac. Gluten free. Diet, Children. Adolescents.

OC050

Effect on rat fetal brain of new lipid supplements during pregnancy

Origiuela, V.¹; Gázquez, A.²; López-Andreo, M. J.³; Larqué, E.²

¹Department of Physiology. University of Murcia. Murcia. Spain;

²Department of Physiology, Biomedical Research Institute of Murcia (IMIB). University of Murcia. Murcia. Spain; ³Molecular Biology Section, Scientific and Technical Research Area (ACTI). University of Murcia. Murcia. Spain

Introduction: Many women often consume insufficient amounts of docosahexaenoic acid (DHA) during pregnancy which may impair neurological function in the neonate. DHA is a highly oxidizable molecule with deep taste, and it is difficult to incorporate it in high amount in the supplements. Thus, new sources that could improve lipid availability in supplements are of major interest and its effect on fetal brain development should be evaluated.

Objectives: The main objective was to investigate the effect on fetal brain of new natural components that could improve lipid availability during pregnancy.

Methods: 53 female rats of 7 weeks of life were fed with different diets during pregnancy: Diet A (control with DHA), Diet B (DHA plus lipid matrix with phospholipids) and Diet C (DHA plus lipid matrix enriched in addition with more lipid structures).

Animals were sacrificed before delivery (day 20 of pregnancy) and different biological samples (maternal and fetal) were taken up. RNA from fetal brain samples was extracted and ss-cDNA was obtained using the GeneChip WT Plus Reagent Kit. 2,3 µg of that was hybridized to Rat Clariom S Arrays designed to provide extensive coverage of all known well-annotated genes by microarray technique.

Results: Both B and C diets upregulated in the fetal brain the expression of genes related to development process, response to stimuli, cell proliferation and multicellular organismal process, compared to control Diet A. In general, Diet B affected all of these processes to a greater extent than Diet C.

Conclusions: Gene expression in fetal brains was affected by the mother's lipid supplement, altering different biological processes. It is a key issue to investigate the effect of different lipid matrices that may eventually be added to maternal supplements during pregnancy.

Conflict of Interest: This study received funding from Abbott Nutrition S.L.

Keywords: DHA. Availability. Neurodevelopment. Supplements. Brain.

OC051

Characterization, bioaccessibility and biological activities of betalains and phenolic compounds from *Opuntia stricta* var. *Dillenii* fruits

Gómez-López, I.¹; Portillo, M. P.¹; Cano, M. P.²

¹Nutrition and Obesity Group, Department of Nutrition and Food Science; BIOARABA Health Research Institute; CIBEROBN, Carlos III Health Institute; ²Phytochemistry and Plant Foods Functionality Laboratory. Department of Biotechnology and Food Microbiology. Institute of Food Science Research (CIAL) (CSIC-UAM), Madrid, Spain

Introduction: *Opuntia stricta* var. *Dillenii*'s prickly pear is an underutilized fruit, which represents a great source of phytochemicals such as betalains (mainly betacyanins) and phenolic compounds (phenolic acids and flavonoids). Consequently, prickly pears could be useful for metabolic syndrome management.

Objectives: The aim of the present study was the full characterization, quantification and determination of the digestive stability and bioaccessibility of betalains and phenolic compounds from *Opuntia stricta* var. *Dillenii*'s prickly pear.

Methods: The bioactive compounds were identified and quantified by HPLC-DAD-ESI/MS and HPLC-DAD-MS/QTOF, and in vitro gastrointestinal digestion was performed by using INFOGEST® protocol. The antioxidant activity of the fruit extract was determined by radical absorbance activity (ORAC method) and the anti-inflammatory activity was measured by the hyaluronidase inhibition capacity.

Results: *O.Dillenii*'s whole fruit contained 20 betalains and numerous phenolic compounds (25 phenolic acids and 12 flavonoids). The most abundant betalain was betanin (87.28 ± 0.96 mg/100g fresh-weight), a purple color compound. Among the phenolic compounds, piscidic acid was the most abundant phenolic acid (56.21 ± 0.30 mg/100g fresh-weight) and isorhamnetin glucosyl-rhamnosyl-pentoside (IG2) the most abundant flavonoid (5.01 ± 0.001 mg/100g fresh-weight). The bioaccessibility of betanin was 22.42%, that of piscidic acid was 61.35% and that of IG2 was 20.02%. *O.dillenii*'s fruit showed a high antioxidant activity, 2998.64 ± 36.73 µmol Trolox eq/100g fresh-weight and a high hyaluronidase inhibition capacity, 22.51%.

Conclusions: In conclusion, *Opuntia stricta* var. *Dillenii*'s prickly pear bioactive compounds suffered a considerable degradation during gastrointestinal digestion, caused by the low gastric pH and the presence of enzymes. Piscidic acid shows the highest bioaccessibility. Taking into account that oxidative stress and inflammation are strongly related to metabolic syndrome, the high antioxidant and anti-inflammatory activities showed by Prickly pear suggest that it could be useful in the management of metabolic syndrome.

Conflict of Interest: No conflict of interest.

Keywords: *Opuntia stricta* var. *Dillenii*. Betalains. Phenolic compounds. Bioaccessibility. Biological activities.

OC053**Prediction of metabolic risk in childhood obesity using machine learning models with multi-omics data**

Torres-Martos, Á.¹; Anguita-Ruiz, A.²; Bustos-Aibar, M.¹; Alcalá, R.³; Alcalá-Fdez, J.³; Aguilera, C. M.¹

¹Department of Biochemistry and Molecular Biology II, Institute of Nutrition and Food Technology "José Mataix", Center of Biomedical Research, University of Granada, Granada, Spain; ² ISGlobal, Doctor Aiguader 88, 08003 Barcelona, Spain; ³ Department of Computer Science and Artificial Intelligence, Andalusian Research Institute in Data Science and Computational Intelligence, University of Granada, Granada, Spain

Introduction: Obesity and some altered metabolic component in children are important risk factors for a number of chronic cardiometabolic alterations during adulthood, which considerably increase population morbimortality. To address this problem effectively, it is an urgent need to implement novel predictive tools able to deal early, when there is still time for clinical actions. Insulin resistance is one of the metabolic comorbidities of obesity that shows the earliest appearance in life, and therefore, it has become a cornerstone in preventing obesity-associated comorbidities.

Objectives: The creation of a model to predict insulin resistance in children during pubertal development.

Methods: In the present work, we use several algorithms for the creation of machine learning models of pubertal insulin resistance in children with different metabolic health statuses. For that purpose, we employ information from the prepubertal stage of children (ages 4-12) consisting of three layers of data: Anthropometry, cardiometabolic and inflammatory biomarkers; genetics variants; and DNA methylation measures. To estimate the different classification metrics, we have used a repeated k fold cross validation (5x5) with nearmiss undersampling.

Results: The best model was provided by the algorithm Random Forest whose accuracy, sensibility, specificity and AUC coefficient was 0.70, 0.75, 0.68 and 0.71 respectively in a repeated k fold cross validation. Interestingly, it is pointed out that leptin could be a great biomarker to predict insulin resistance. Moreover, it has been found that methylation patterns in BRD1, CDC42BPB, CEMIP, CLASP1, FOXP3 and HDAC4 genes could be useful for the prediction of insulin resistance.

Conclusions: The use of these predictive models from early ages could improve the healthcare and knowledge of obesity children who have a high risk to develop cardiometabolic alterations during adulthood.

Conflict of Interest: None.

Keywords: Childhood obesity. Insulin resistance. Machine learning. Multi-omics data.

OC054**Might children born of gestational diabetic mothers have neurological problems in infancy?**

Saura-Garre, P.¹; Escudero-Marín, M.²; Hernández-Ayala, M.¹; Sánchez-Campillo, M.³; Nieto-Ruiz, A.⁴; López-Soler, C.¹; Campoy, C.⁴; Larqué, E.³

¹Department of Clinical Psychology, University of Murcia, Virgen de la Arrixaca Clinic University Hospital, Spain; ²Department of Pediatrics, University of Granada, Granada, Spain; ³Department of Physiology, University of Murcia, Biomedical Research Institute of Murcia (IMIB), Murcia, Spain; ⁴ Department of Pediatrics/EURISTIKOS Excellence Centre for Paediatric Research, University of Granada/Granada's Biosanitary Institute/Granada, Spain

Introduction: Nutritional factors may affect metabolic programming in early life. Gestational diabetes mellitus (GDM) during pregnancy has been linked to impaired fetal development and it is uncertain its long-term effects during childhood.

Objectives: To analyze the influence of maternal GDM on neuropsychological, temperamental and behavioral development in their children at 8.5 years old.

Methods: 156 children from the GD-Brain multicenter prospective cohort study were evaluated at 8.5 years (76 GDM offspring and 80 offspring from healthy control mothers). Of these subjects, 49 children were recruited at Murcia University, and 107 at the Granada University, with no gender differences between groups. To evaluate neurodevelopment, we used Children Behavioral Check list (CBCL) and PSQ tests for behavior and sleep measurements, K-BIT and BENCI neuropsychological battery tool for neurodevelopment, and EAS for temperament assay.

Results: GDM mothers had greater pregestational BMI than controls, and shorter breastfeeding which is often associated with fetal obesity programming. Logistic regression analyses showed that children of GDM group had higher attentional and/or hyperactivity problems (CBCL test) (OR: 1.224; 95 % CI: 1.041-1.437, $p = .014$). The BENCI test results were contradictory: GDM offspring had more intrusions on a 3rd verbal memory test (OR: 2.953; 1.076-8.104, $p = .035$), while less perseverative failures on a delayed trial of Verbal Memory (OR: 0.289, 0.098-0.850, $p = .024$) and need less time in alternate visual-motor coordination task (OR: 0.894, 0.289-0.958, $p = .002$). Center, Mother's IQ, BMI, and duration of breastfeeding were included in the model as covariables; further ANCOVAs analyses adjusting by them, confirmed more attention problems in the offspring born to GDM mothers as well as higher number of children showing internalizing and externalizing problems.

Conclusions: GDM during pregnancy has long-term consequences on children's behavior development at 8.5 years old.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Gestational diabetes. Children. Neuropsychological. Development.

OC056

Relationship between vitamin D receptor polymorphism RS7139166 and cardiovascular risk biomarkers at birth. The mérida study

Gesteiro, E.¹; Ortega-Azorín, C.²; Bastida, S.³; Corella, D.²; Sánchez-Muniz, F. J.³

¹ImFine Research Group. Departamento de Salud y Rendimiento Humano. Universidad Politécnica de Madrid, 28040 Madrid, Spain; ²Departamento de Medicina Preventiva y Salud Pública. Facultad de Medicina. Universidad de Valencia.46010 Valencia, Spain; ³Departamento de Nutrición y Ciencia de los Alimentos. Facultad de Farmacia. Universidad Complutense de Madrid. 28040 Madrid, Spain

Introduction: Vitamin D has a main role on calcium metabolism, nervous system, glucose homeostasis or immunity. Vitamin D receptor (VDR) gene is located in the long arm of chromosome 12 and the rs7139166 polymorphism is located in the promoter region of this gene. Plenty of polymorphisms in VDR are been studied for a better knowledge of its functions.

Objectives: To assess the relationship between VDR rs7139166 polymorphism and cardiovascular risk biomarkers in neonates.

Methods: Cord blood was obtained from 63 Caucasian, singleton neonates from the Mérida cohort, previously described. Serum samples were analysed for lipid profile (triglycerides (TG), total cholesterol (TC), HDLc, LDLc, apolipoprotein (Apo) A, Apo B and Lp(a)) and homocysteine (tHcy). Genomic DNA was isolated from whole blood. The VDR rs7139166 was determined using a 7900HT sequence detection system (Applied Biosystems by Life Technologies) with a fluorescent allelic discrimination TaqMan™ assay by standard procedures. ANOVA analysis were performed using Statistics SPSS v.25 software (IBM Corp., Armonk, NY, USA).

Results: Three genotype groups were established CC (n=19), CG (n=32) and GG (n=12). Significant differences were found for Apo B (p<0.01) and Lp(a) (p<0.05) between groups, being values higher in GG than in CG and CC. tHcy levels were significantly higher in CC than GG (p<0.05). No significant differences were found for TG, HDLc, LDLc or Apo A levels.

Conclusions: It seems that GG homozygous show the highest levels of Apo B and Lp(a), both linked to atherogenic mechanisms. However, tHcy levels were the lowest in this group, suggesting a lower cardiovascular risk. More research is needed to know how VDR rs7139166 polymorphism influences lipid metabolism and cardiovascular biomarkers both in neonates and later in life.

Conflict of Interest: None.

Keywords: Neonates. Apolipoproteins. Atherogenesis. SNP.

OC057

Melatonin decreases insulin sensitivity in human adipose tissue

Zambrano, C.¹; Picinato, M. C.²; Salmerón, D.³; Garitaonandia, M. T.⁴; Sánchez de Medina, F.⁵; Martínez-Augustin, O.⁶; Luján, J.⁷; Garaulet, M.⁸

¹Departamento de Fisiología. Universidad de Murcia. Murcia. España; ²Departamento de Fisiología. Universidad Federal Do Pará. Altamira. Brasil; ³Departamento de Ciencias Socio-sanitarias. Universidad de Murcia. Murcia. Spain; ⁴Departamento de Bioquímica y Biología Molecular II. Facultad de Farmacia. Universidad de Granada. Granada. España; ⁵Departamento de Farmacología. Centro de Investigación Biomédica en Red de Enfermedades Hepáticas y Digestivas (CIBERehd). Instituto de Investigación Biosanitaria. Granada. España; ⁶Department of Biochemistry and Molecular Biology II. School of Pharmacy. Centro de Investigación Biomédica en Red de Enfermedades Hepáticas y Digestivas (CIBERehd). Granada. Spain; ⁷Servicio de Cirugía Hospital Quirón Salud, Murcia, Spain; ⁸Departamento de Fisiología, Instituto de Investigación Biomédica de Murcia (IMIB)-Arrixaca. Universidad de Murcia. Murcia. España

Introduction: Melatonin is a potent antioxidant hormone and is responsible for many physiological processes. However, the role of melatonin in glucose metabolism remains unknown, and its action on human adipose tissue explants has not been demonstrated.

Objectives: To assess whether melatonin influences insulin sensitivity in adipose tissue. This will help to achieve a better understanding of the effect of late eating (in presence of endogenous melatonin) on glucose metabolism in human adipose tissue.

Methods: Abdominal TA (adipose tissue) biopsies were obtained from 19 severely obese participants (age: 43.45± 12.02 years; body mass index 42.43 ± 8.01 kg/m²) who underwent laparoscopic gastric bypass. Insulin signaling was analyzed from AT by western blotting, after being treated with different doses of melatonin (5000 and 100 pg) in two different conditions, morning and evening time.

Results: We found a significant interaction between the treatment dose and timing (P=0.016). As expected, insulin treatment increased the pAkt/tAkt ratio as compared with control (P<0.0005). More importantly, a significant difference was found between the treatment with insulin and with insulin plus melatonin towards a decrease in insulin signaling (i.e. pAkt/tAkt ratio) when melatonin (I+M) was added (P<0.0001), but this effect was significant only for high melatonin concentration (5000pg) and during the evening time (not in the morning).

Conclusions: Our results show that a melatonin is able to significantly reduce insulin sensitivity during the evening. These results may partly explain the decrease in glucose tolerance when having oral melatonin in the evening or when eating late and endogenous melatonin is present.

Conflict of Interest: There are no financial conflicts of interest.

Keywords: Insulin sensitivity. Melatonin. Obesity.

OC058

The probiotic *Lactobacillus plantarum* reduces fat accumulation and increases healthspan in *Caenorhabditis elegans*

Goyache, I.¹; Yavlov-Dayliev, D.¹; López-Yoldi, M.¹; Valdés-Varela, L.²; Fratebianchi, D.²; Vitro, R.²; Milagro, F.¹; Aranaz, P.¹

¹University of Navarra, Center for Nutrition Research, c/Irunlarrea 1, 31008 Pamplona, Spain; ²National Centre for Food Technology and Safety (CNTA), 31570 San Adrián, Navarra, Spain

Introduction: Probiotics are defined by the WHO as “live microorganisms which when administered in adequate amounts confer a health benefit on the host”. Due to the important role that intestinal microbiota disturbances play in the development of metabolic diseases such as obesity or insulin resistance, different bacterial taxa (i.e., species of the *Bifidobacterium* and *Lactobacillus* genera) have shown beneficial metabolic properties in different *in vivo* models. One of the most promising species, *Lactobacillus plantarum*, has already shown to increase human’s life quality by regulating intestinal flow, reducing recurrence of clinical symptoms in *Clostridium difficile*-associated diarrhea and significantly reducing LDL cholesterol and fibrinogen.

Objectives: The aim of this study was to evaluate the health-promoting activities of a *Lactobacillus plantarum* strain in *Caenorhabditis elegans*.

Methods: We have used the *in vivo* model *C. elegans* grown under a high-glucose condition to investigate the fat-reducing and the health-promoting effects of a probiotic strain of *Lactobacillus plantarum*.

Results: Treatment with *L. plantarum* significantly reduced the *C. elegans* fat content in comparison with untreated worms in both nematode-growth medium (NGM) and high-glucose NGM medium. Additionally, *L. plantarum* was able to significantly reduce the reactive oxygen species (ROS) production and the lipofuscin aging pigment when exposed to a glucose-loaded medium. These effects were independent of a possible effect on worm development and egg-lying.

Conclusions: Treatment with *L. plantarum* significantly improved *C. elegans* healthspan by reducing fat accumulation and ROS production. Taken together, our results suggest that the newly characterized *Lactobacillus plantarum* strain should be further taken into consideration as an appropriate probiotic candidate and further studied in order to expose its possible benefits for obesity-related diseases.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Obesity. Probiotics. *Caenorhabditis elegans*.

OC059

Pediococcus acidilactici CECT9879 (pA1c) counteracts the effect of a high-glucose exposure in *C. Elegans* through the insulin signaling pathway (IIS)

Yavorov-Dayliev, D.¹; Milagro, F. I.²; Ayo, J.¹; Oneca, M.¹; Aranaz, P.²

¹Genbioma Aplicaciones SL. Polígono Industrial Noain-Esquiroz, Calle S, Nave 4, Esquiroz, Pamplona, Navarra, Spain; ²University of Navarra, Center for Nutrition Research, c/Irunlarrea 1, 31008 Pamplona, Spain

Introduction: The increasing prevalence of metabolic syndrome-related diseases, including type-2 diabetes and obesity, makes it urgent to develop new alternative therapies, such as probiotics.

Objectives: The aim of this study was to evaluate the metabolic activities of *Pediococcus acidilactici* CECT9879 (pA1c) in *C. elegans* lipid accumulation, insulin/IGF-1 signaling (IIS), healthspan, oxidative stress, and aging, and its response to a high-glucose exposure. Different metabolic pathways were assessed in order to shed light on the molecular mechanisms of action of this probiotic.

Methods: We have used a high-glucose condition to induce fat accumulation in *C. elegans* and examine the potential probiotic activities of pA1c.

Results: The supplementation with pA1c significantly reduced *C. elegans* fat accumulation in a nematode growth medium (NGM) and in a high-glucose (10 mM) NGM medium. Moreover, treatment with pA1c counteracted the effect of the high glucose by reducing reactive oxygen species by 20%, retarding the aging process and extending the nematode median survival (>2 days in comparison with untreated control worms). Gene expression analyses demonstrated that the probiotic metabolic syndrome-alleviating activities were mediated by the modulation of the insulin/IGF-1 signaling pathway (IIS) through the reversion of the glucose nuclear-localization of daf-16 and the overexpression of *ins-6* and *daf-16* mediators, increased expression of fatty acid (FA) β -oxidation genes, and downregulation of FA biosynthesis key genes.

Conclusions: Taken together, our data suggest that pA1c could be considered a potential probiotic strain for the prevention of the metabolic syndrome-related disturbances and highlight the use of *C. elegans* as an appropriate *in vivo* model for the study of the mechanisms underlying these diseases.

Conflict of Interest: Josune Ayo is shareholder of the company Genbioma Aplicaciones S.L., Josune Ayo and María Oneca are co-authors of the patent [PCT/EP2020/087284]. The rest of the authors declare no conflict of interest.

Keywords: Probiotics. Diabetes. Obesity. *Caenorhabditis elegans*. Insulin-signaling-pathway.

OC064

Antioxidant and antiinflammatory capacity of frozen chicken nuggets enriched with phenolic compounds from food industrial by-products

Martínez-Zamora, L.¹; Peñalver, R.¹; Ros, G.¹; Nieto, G.¹

¹Departamento de Tecnología de los Alimentos, Nutrición y Bromatología, Facultad de Veterinaria Universidad de Murcia, Campus de Espinardo, 30100 Espinardo, Murcia, España

Introduction: Unless meat is an important nutritious source of proteins, minerals, vitamins and other micronutrients, processed meat products are usually perceived as less healthy than other kind of products, especially since 2015, when International Agency for Research on Cancer (IARC) classified processed meat as carcinogen (Group I) and red meat as probable carcinogen (Group 2A). In this sense, the synthetic additives are being reduced with the goal to produce Clean Label meat products healthier than conventional ones.

Objectives: The objective of the present study was to analyse the antioxidant and the anti-inflammatory activity of several meat samples elaborating as chicken nuggets enriched exogenously through the incorporation of natural extracts obtained from *Rosmarinus officinalis*, *Punica granatum*, and hydroxytyrosol (from *Olea europaea*).

Methods: The chicken nuggets were reformulated by the incorporation of 1g/kg of natural extracts from rosemary, pomegranate, and olive leaf as natural preservatives. The antioxidant capacity of the digested samples of chicken nuggets was assessed by ORAC, FRAP, DPPH, and ABTS, and the anti-inflammatory activity was analysed in vitro by measuring the ROS and NO generated in RAW cell culture after addition of such digested samples.

Results: Obtained results showed as a pro-inflammatory traditional product, as fried chicken nuggets, was converted into a healthier meat product by the addition of Mediterranean by-products as natural preservatives. In fact, the addition of pomegranate, rosemary, and hydroxytyrosol extracts improved the antioxidant (by twice) and anti-inflammatory activity (by 19%) of the digested chicken nuggets compared to control sample, which was elaborated with synthetic preservatives.

Conclusions: As main conclusions, the incorporation of natural preservatives from the Mediterranean Diet can reduce the pro-oxidant and pro-inflammatory activity of processed meat products, apart from maintaining the food quality of such products at the same level than traditional synthetic additives.

Conflict of Interest: None.

Keywords: Cleanlabel. Meat products. Oxidants. Inflammation. Rosemary.

OC065

Nutritional and ingredient composition of plant-based substitutive burgers. Are they comparable to meat equivalents?

Costa-Catala, J.¹; Comas-Basté, O.¹; Sánchez-Pérez, S.¹; Veciana-Nogués, M. T.¹; Latorre-Moratalla, M. L.¹; Castell-Garralda, M. V.²; Vidal-Carou, M. C.¹

¹Departament de Nutrició, Ciències de l'Alimentació i Gastronomia, Facultat de Farmàcia i Ciències de l'Alimentació, Campus Alimentació. Santa Coloma de Gramenet. España;

²Servei de Planificació, Auditoria i Avaluació del Risc, Subdirecció General de Seguretat Alimentària i Protecció de la Salut, Departament de Salut, Generalitat de Catalunya

Introduction: Nowadays, the popularity of vegan diets is increasing worldwide. According to recent data, plant-based diets have increased by 27% in the past years in Spain. This trend may be motivated by ethical reasons, the concern for animal welfare or environmental aspects, and health-related issues. Accordingly, the availability of plant-based products as meat substitutes has exponentially increased during the last years, although there is a knowledge gap about their nutritional and quality composition.

Objectives: To assess the nutritional information and ingredient composition from plant-based burgers and to make a comparison with their meat equivalents.

Methods: A database was created including the information provided in the label (brand, food name, ingredients, nutritional composition, shelf-life) of 24 different plant-based burgers and 24 meat equivalents retailed in Barcelona. All data were analysed and statically compared among products of the same group, as well as between different categories.

Results: Plant-based burgers are formulated with a high number of ingredients (mean of 14) using a high variability of the main plant ingredient, such as different type of vegetables, cereals (wheat and rice) and/or legumes (soybean and green pea). Energy values were very similar for plant-based burgers (185.38kcal/100g) and their meat equivalents (186.92kcal/100g). A similar trend was observed for salt content, without statistically significant differences between both food categories. Fat, saturated fat and protein contents were significantly higher in meat products than in their plant-based analogues. On the contrary, carbohydrates and sugars were found to be higher in plant-based burgers. Plant-based products are a high source of fibre.

Conclusions: Plant-based burgers available in the market seem to be a very similar product to their meat equivalent in terms of energy and salt content, although their lower content of saturated fat and higher in fibre may be considered an interesting added value.

Conflict of Interest: No conflict of interest.

Keywords: Plant-based. Burgers. Ingredients. Vegan diet.

OC074

The combined impact of mediterranean diet adherence and aging on GUT microbiota composition

Cuevas-Sierra, A.¹; Riezu-Boj, J. I.²; Cuervo, M.²; Martínez, J. A.¹; Milagro, F. I.²

¹Programa de Nutrición de Precisión y Salud Cardiometabólica, IMDEA Alimentación, Madrid, España; ²Centro de Investigación en Nutrición, Universidad de Navarra, Pamplona, España

Introduction: Emerging evidence shows that gut microbiota composition depends on multiple factors related to diet, health style, age and metabolic condition. It is important to understand how these factors interact between them and increase or decrease the risk to suffer gut microbiota-related metabolic diseases.

Objectives: To evaluate the interaction between age and Mediterranean diet (MD) adherence in relation to gut microbiota composition.

Methods: The analysis was conducted using 296 Spanish subjects with overweight and obesity from the Obekit study. DNA from fecal samples was sequenced with the Illumina 16S protocol. Nutritional data were collected with a food frequency questionnaire. Mediterranean diet adherence was assessed with a validated questionnaire. Population was divided into two groups according to age: younger than 35 (n=60) and older than 55 (n=61). Microbiota differences were evaluated using Shannon and Chao1 diversity indexes and the differences in taxa composition were analysed comparing groups of age with linear discriminant analysis (LDA) and edgeR.

Results: Older volunteers presented significant higher values of alpha diversity. LDA revealed that Proteobacteria abundance was significantly lower in oldest subjects. Specifically, Betaproteobacterias, Burkholderiales order and Sutterellaceae family (belonging to Proteobacteria phylum) were less abundant in the older group. EdgeR analysis showed that, at genus level, Parasutterella and Bifidobacterium were significantly increased in younger subjects. Correlation analysis showed that lower adherence to MD was associated with higher abundance of Parasutterella but only in younger people.

Conclusions: Both age and the adherence to MD have an impact on gut microbiota composition. The abundance of some taxa depends on an interaction between both factors. For example, Parasutterella genus was favored by lower adherence to MD specifically in younger individuals.

Conflict of Interest: Authors declare no conflicts of interest.

Keywords: Gut microbiota. Aging. Mediterranean diet. Parasutterella.

OC080

Is there a different intestinal microbial pattern for histamine intolerants?

Sánchez-Pérez, S.¹; Comas-Basté, O.¹; Duelo, A.¹; Costa-Catala, J.¹; Veciana-Teresa, M. T.¹; Berlanga, M.²; Latorre-Moratalla, M. L.¹; Vidal-Carou, M. C.¹

¹Departament de Nutrició, Ciències de l'Alimentació i Gastronomia, Facultat de Farmàcia i Ciències de l'Alimentació, Campus de l'Alimentació (UB), Santa Coloma de Gramanet, España; ²Departament de Biologia, Sanitat i Mediambient, Secció de Microbiologia, Facultat de Farmàcia i Ciències de l'Alimentació (UB), Barcelona, España

Introduction: An underlying cause of histamine intolerance (HIT) is diamine oxidase (DAO) deficiency, which leads to defective homeostasis of histamine and its higher systemic absorption. Impaired DAO activity may have a genetic, pharmacological or pathological origin. Recent research also suggests HIT can arise from an alteration in the gut microbiota, although only one study has explored this hypothesis to date.

Objectives: To study whether the HIT patients have a different intestinal microbial pattern compared to a group of healthy individuals.

Methods: The microbial pattern was studied in a group of 12 individuals with 2 or more symptoms compatibles with HIT, and it was compared with that of a control group of 14 healthy individuals. The analysis was performed by sequencing bacterial 16S rRNA genes (V3-V4 region) and the data treatment through EzBioCloud Database.

Results: According to alpha diversity, which is a measurement of the mean species diversity within the gut, no significant differences were observed between HIT and control groups, neither for the Shannon index (p=0.411) nor the Simpson index (p=0.681). However, a lower diversity in Bifidobacterium and Lactobacillus species was observed in HIT group, showing only 69% and 59% of the species found in the control group, respectively.

Beta diversity, which refers to the interindividual differences in the distribution pattern of genera and species, showed statistically significant differences between the two groups, both for genera (p=0.024) and species (p=0.029). While the microbial pattern of control subjects denoted certain homogeneity, higher dispersion and heterogeneity was observed among HIT patients.

Conclusions: An imbalance or dysbiosis in the gut microbiota was observed in HIT patients compared with healthy individuals. Concretely, HIT individuals showed lower species diversity for certain beneficial bacteria (Bifidobacterium and Lactobacillus), as well as a higher heterogeneity in the distribution of their microbial pattern.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Histamine intolerance. Gut microbiota. Intestinal dysbiosis. Intestinal microbial pattern.

OC081**Impact of rapid weight gain during the first months of life on gut gene expression studied by a non-invasive method**

Pastor-Fajardo, M. T.^{1,2}; Sánchez-Campillo, M.^{2,3}; López-Andreo, M. J.⁴; Gázquez, A.^{2,3}; García-Serna, A.²; Morales, E.^{2,5}; Larqué, E.^{2,3}

¹Department of Pediatrics. General University Hospital of Elche. Elche. Spain; ²Biomedical Research Institute of Murcia (IMIB-Arrixaca). Murcia. Spain; ³Department of Physiology. Faculty of Biology. University of Murcia. Murcia. Spain; ⁴Biology Molecular Section. University of Murcia. Murcia. Spain; ⁵Department of Public Health Sciences. University of Murcia. Murcia. Spain

Introduction: The first three months of life are a crucial stage for children growth and gut maturation. A rapid weight gain (RWG) in this period may influence in gut gene expression. However, non-invasive methods to study this process are scarce.

Objectives: To investigate the relationship between gut gene expression, analyzed by a non-invasive method, and RWG in children at 3 months of life.

Methods: 61 breastfed 3-month-old children participating in the Nutrition in Early Life and Asthma (NELA) cohort were included, 23 with RWG (Δ z-score weight >0.67) and 38 with normal weight gain (NWG). We analyzed human gut RNA isolated from stool exfoliated cells by microarray. We also examined the relationships with prenatal factors and anthropometric outcomes.

Results: The RWG-group had lower z-scores of weight and BMI at birth than the NWG-group but higher at 3 months. No differences in prenatal factors were observed. Principal component analysis showed a variability of 20.6% between groups. There were 16 differentially expressed genes between RWG and NWG. Among the 15 genes down-regulated, 5 were protein coding genes involved in the mitochondrial respiratory chain and oxidative phosphorylation, 10 were genes of ribosomes involved in the transcription to proteins and 1 was a RNA gene. The up-regulated gene was related to the heat shock protein HSP40. The most relevant biological processes sorted by Enrichment Score were: cellular component organization or biogenesis, pigmentation, cell proliferation and cell killing. The KEGG pathways with more percentage of genes implicated were: biotin metabolism, mismatch repair, biosynthesis of glycosaminoglycans, biosynthesis of glycosphingolipids, and glycine, serine and threonine metabolism.

Conclusions: Children with RWG at 3 months of age showed different gut gene expression patterns compared to NWG. These changes involved mainly genes related to mitochondrial respiratory chain and ribosomes while metabolic routes were revealed as the most disturbed pathways.

Conflict of Interest: All authors declare no competing interests.

Keywords: Rapid weight gain. Children. Gut. Gene expression.

OC085**Association between excess fat mass and adherence to the mediterranean diet and short chain fatty acids in healthy adults**

Díaz, L. E.¹; González-Zancada, N.¹; Redondo, N.¹; Gómez-Martínez, S.¹; Marcos, A.¹; Nova, E.¹

¹Immunonutrition Research Group. Department of Metabolism and Nutrition. Institute of Food Science and Technology and Nutrition (ICTAN)-CSIC. Madrid. Spain

Introduction: Fermentation of carbohydrates and proteins by anaerobic microorganisms generates short chain fatty acids (SCFA), this production is regulated by several factors (e.g., diet and gut microbiota composition). Objective: This work explores the associations between adherence to the Mediterranean diet (AMD), fat mass and SCFA profile in 261 healthy adults (25-45years; BMI, 18.5 - 35kg/m²).

Methods: Body fat mass percentages obtained by Tanita BC-601 were used for classification into two groups: normal (NBF; N=172) and excess body fat (EBF; N= 89) ($>32\%$ for women; $>20\%$ for men). The AMD was categorized as low, medium or high (L_AMD <5 , M_AMD 6-9 and H_AMD >10 ; N = 47, 180 and 34, respectively) from the 14-item MEDAS questionnaire. SCFA (acetic, propionic, butyric, isobutyric, valeric and isovaleric) were quantified in stool samples by CG-FID. Chi2 tests were used to analyze the factor's distribution and Student's t and Kruskal-Wallis tests to compare SCFA between groups. Finally, CATPCA analyzed the relationships between all variables.

Results: The prevalence of EBF increased as the AMD was lower (17.6% in H-AMD, 33.0% in M-AMD and 48.9% in L-AMD). In relation to SCFAs, the only difference between groups was a higher concentration of valeric acid in M-AMD (1.82 ± 1.22 $\mu\text{M/g}$) compared to H-AMD (1.31 ± 0.76 $\mu\text{M/g}$) ($p=0.012$), without differences versus L-AMD (1.75 ± 0.76 $\mu\text{M/g}$). If analyzed in BF split groups, the result was only significant in the NBF group. CATPCA showed that the relationships of the factors with SCFA are very weak. At 65.8% explained variance, the greatest contribution is from the inverse correlation between AMD and BF.

Conclusions: In the population of healthy young adults studied, the stool SCFA profile shows no significant relationship with AMD or excess body fat. Further investigation of the relationship of valeric acid with dietary pattern would be necessary.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Mediterranean-diet. Short-chain fatty acids. Microbiota. Body fat.

OC086**Nutritional evaluation and prebiotic effect of brewery bagasse as rich-dietary fiber ingredient**

Ferrando, O.; Clavel, C.; Baenas, N.; Santaella, M.; Nuñez, V.; Gonzalez, R.; Periago, M.

Department of Food Technology, Food Science and Nutrition. Faculty of Veterinary Sciences, University of Murcia. Murcia, Spain

Introduction: The agri-food by-products retain all or part of the intrinsic and nutritional values of their original vegetables, being a source of bioactive compounds, so their revalorization is one of the main challenges of the sustainable food industry.

Objectives: The aim of this research was to analyse the nutritional and functional properties of brewery bagasse by-product, to revalorize as a functional flour.

Methods: Wet bagasse was obtained from a brewery company and was drying for 48h at 80°C, and subsequent milling. The total dietary fibre (TDF) was analysed by AOAC method. Neutral sugars and uronic acids were determined as described Englyst et al., (1992). The content of phenolic compounds was quantified using the Folin-Ciocalteu reagent after the extraction of both fractions, extractable and non-extractable phenolic compounds (EPP and NEPP) (Baenas et al., 2020), as well as antioxidant capacity by FRAP. To evaluate the prebiotic effect, bagasse flour was subjected for 48 h to an in vitro fermentation with human faeces, obtained from healthy volunteers (González-Barrio et al., 2011), and the production of SCFAs (acetate, propionate and butyrate) were analysed by GLC (Anson et al., 2011).

Results: The TDF in the samples ranged from 45 to 52 g/100 g, with a 7% of soluble dietary fibre. Dietary fiber was mainly composed by insoluble hemicellulose rich in xylose (44%), followed by cellulose (30%) and pectin (25%). The content of EPP and NEPP varies 4.4-7.6 mg/g and 48-52 mg/g, respectively, and was positively correlated with FRAP. Total SCFAs production at 48h was 69,5 mM, with acetic acid as the major component, followed by propionic and butyric acid.

Conclusions: Bagasse flour is a rich-dietary fiber ingredient with a high content of TDF and NEPP, with a prebiotic effect. For this reason, can be used to design of rich-fiber functional foods.

Conflict of interes: Authors declare any conflict of interest.

Keywords: Bagasse, Flour, Prebiotic Effect, Fibre, Antioxidant Capacity.

OC087**Influence of children living at home in food consumption habits during COVID-19 lockdown. Corona cooking Survey-Spain.**

Gesteiro, E.¹; Pantoja-Arévalo, L.¹; Piccardi, A.¹; Cañada-López, D.¹; Calonge-Pascual, S.¹; García-Carro, A.¹; Ríos, Y.²; González-Gross, M.¹

¹ImFINE Research Group. Department of Health and Human Performance. Faculty of Physical Activity and Sport Sciences-INEF. Universidad Politécnica de Madrid. Madrid, Spain;

²New Foods Research Department. AZTI. Member of Basque Research & Technology Alliance. Bizkaia. Spain

Introduction: State of alarm was declared in Spain from March 14th to June 21st, 2020 due to COVID-19 pandemic, forcing population to home confinement. "Corona Cooking Survey" (CCS) is an international project led by the University of Antwerp involving 38 countries worldwide.

Objectives: To know the variations in the frequency of consumption of some foods in Spanish adult population during the COVID-19 lockdown according to their family composition.

Methods: A Cross-sectional study of 679 Spanish adults aged 18-83 years (75.9% women) completed the CCS from April 20th to June 16th, 2020. A survey designed by FOOMS research group of the University of Antwerp, Gent University and KU Leuven, was translated into Spanish and distributed electronically to a convenience sample. Only questions about food frequency consumption were considered for analysis. Data were adjusted by family composition, according to the presence (CH: n=259, 38.1%) or absence (NCH: n=420, 61.9%) of children at home. Statistical analysis was performed with SPSS Statistics software v. 25 (IBM Corp., Armonk, NY, USA).

Results: Fruits, vegetables, dairy, and non-sugared beverages, were the most frequently consumed (≥ 5 -6 times/week), followed by white bread, pasta and grains (≥ 2 -4 times/week). Both groups increased legumes/pulses, sweet snacks (both $p < 0.001$), and salty snacks (NCH $p < 0.05$; CH $p < 0.01$) intake, while consumption of processed foods ($p < 0.001$) decreased during the lockdown. Consumption of vegetables and unprocessed vegetarian alternatives decreased in NCH (both $p < 0.05$), while CH increased plant-based drinks ($p < 0.01$), dairy products and alcoholic beverages (both $p < 0.05$).

Conclusion: During the COVID-19 lockdown, presence of children at home influenced the frequency of vegetables, dairy, vegetarian alternatives, plant-based and alcoholic drinks consumption, but not the general trend of increasing legumes and decreasing processed foods intake.

Conflict of Interest: None.

Keywords: Covid-19, Family Composition, Food Frequency Consumption.

OC088**Nighttime dipping status and risk of cardiovascular events in children: Genobox study**

Pérez-Gimeno, G.¹; Ruperez, A.¹; Santaliestra-Pasías, A.¹; Samper, M.²; Leis, R.³; Aguilera, C.⁴; Moreno, L.¹; Bueno-Lozano, G.²

¹GENUD Research Group, Universidad de Zaragoza; Instituto Agroalimentario de Aragón (IA2); Instituto de Investigación Sanitaria (IIS) Aragón, 50009 Zaragoza, Spain; ²Pediatric Department, Lozano Blesa University Hospital, University of Zaragoza, Zaragoza, Spain; ³Paediatric Department, Clinic University Hospital of Santiago, University of Santiago de Compostela, Santiago de Compostela, Spain; ⁴Department of Biochemistry and Molecular Biology II, Institute of Nutrition and Food Technology, Centre for Biomedical Research, University of Granada, Granada, Spain

Introduction: Hypertension is a public health problem and its prevalence in children is on the rise, often continuing into adulthood and increasing the risk related cardiovascular complications. The 24-hour ambulatory blood pressure (24h-ABPM) allows blood pressure monitoring for a whole day cycle. Which makes it possible to record whether there is or not a nocturnal drop in blood pressure.

Objectives: For this reason the aim of the study is to evaluate the effect of dipping phenomenon and the risk of cardiovascular complications in children.

Methods: A total of 165 children between 5 and 18 years old were included in the GENOBOX cross-sectional and multicenter study. All children were underwent procedures including electrocardiogram and 24-h-ABPM. Moreover, nocturnal BP decrease was calculated using the formula: [(daytime BP mean - night-time BP mean) / daytime BP mean] x 100. Children were considered to show an abnormal BP dipping when the mean of either systolic or diastolic blood pressure (BP) did not decrease during sleep by at least 10% as compared to the awake BP value.

Results: The percentage of children with non-dipping phenomenon for systolic BP and diastolic BP were 42.4% and 18.2 %, respectively. In addition, E/A ratio was significantly reduced in children with systolic non-dipping as compared to their counterparts. When the analyses were divided by body mass index (BMI) status, those children with systolic non-dipping shown significant differences both in LVM and E/A ratio. Being children with overweight or obesity those with higher LVM and lower E/A ratio.

Conclusions: There are differences between non-dipping pattern and increased risk of left ventricular structural alterations. Both BP and BMI may have a key role in preventing subclinical cardiac damage associated to non-dipping pattern.

Conflict of Interest: None.

Keywords: Ambulatory Blood Pressure, Children, Cardiovascular.

OC094**Omega-3 and Omega-6 fatty acids intakes and dietary sources in the spanish population: Findings from the anibes study**

Redruello-Requejo, M.; Samaniego-Vaesken, M. L.; Puga, A. M.; Montero-Bravo, A.; Ruperto, M. M.; Rodríguez-Alonso, P.; Partearroyo, T; Varela-Moreiras, G.

Departamento de Ciencias Farmacéuticas y de la Salud, Facultad de Farmacia, Universidad San Pablo-CEU, Madrid, España

Introduction: The implication of polyunsaturated fatty acids in growth and overall health is well demonstrated, however available data on dietary intake in the Spanish population are scarce and do not account for gender or age variations.

Objectives: To assess dietary intake adequacy of omega-3 and omega-6 fatty acids and their major food sources among the ANIBES Study population.

Methods: Data were derived from the ANIBES study including a representative sample of the Spanish population (9–75 years; n=2009). Dietary assessment was performed by a three-day dietary record and intake adequacy was evaluated considering FAO/WHO dietary recommendations.

Results: Median dietary intake of omega-3 fatty acids was 0.81g/day (0.56–1.19), with α -linolenic acid (ALA) at 0.61g/day (0.45–0.85), eicosapentaenoic acid (EPA) at 0.03g/day (0.01–0.12) and docosahexaenoic acid (DHA) at 0.06g/day (0.0–0.20). 65% of the population showed low intakes for total omega-3; 87% for ALA and 83% for EPA+DHA; with inadequacy levels being significantly higher ($p \leq 0.05$) in children (9–12 yr) and adolescents (13–17 yr). Inadequacy due to high intakes was almost negligible. For omega-6, total intake was 10.07g/day (7.00–14.01), 10.00g/day (6.93–13.90) of linoleic acid (LA) and 0.08g/day (0.05–0.13) of arachidonic acid (AA). Regarding LA, inadequate intakes comprised around 5% of the sample both for insufficient and excessive intakes, with the elderly showing significantly insufficient intakes (10%; $p \leq 0.05$). Omega-6/omega-3 ratio stood at 12.13, being significantly higher in men ($p \leq 0.05$). Main omega-3 dietary sources were meat and meat products (22%), fish and shellfish (15%) and oils and fats (14%), the latter being the main contributor to omega-6 intake (34%), followed by meat and meat products (18%) and cereals and grains (13%).

Conclusions: The degree of inadequacy of omega-3 fatty acid intakes observed for the Spanish population makes it imperative to increase its consumption. This should also be the main strategy for the optimization of the omega-6/omega-3 ratio.

Conflict of Interest: Authors declare no conflicts of interest.

Keywords: PUFA. Omega 3. Omega 6. Dietary intake. ANIBES study.

OC095

Design and validity of the Spanish version of two questionnaires related to adverse reactions to foodstuffs

Pantoja-Arévalo, L.¹; Gesteiro, E.¹; Nehari, A.¹; Calonge-Pascual, S.¹; Pérez-Ruiz, M.¹; Matthias, T.²; Urrialde, R.³; González-Gross, M.

¹ImFINE Research Group. Department of Health and Human Performance. Faculty of Physical Activity and Sport Sciences-INEF. Universidad Politécnica de Madrid. Madrid. Spain;

²Research and Development Department. DST Diagnostische Systeme & Technologien-AESKU GROUP. Schwerin. Germany;

³Unidad Docente de Fisiología Vegetal. Departamento de Genética, Fisiología y Microbiología. Facultad de Ciencias Biológicas. Universidad Complutense de Madrid. Madrid. Spain

Introduction: Specific eating patterns, diseases and symptomatology have been associated to the pathogenesis of adverse reactions to foodstuffs (ARF) in the past decade. However, there is a lack of proper tools to identify specific food and beverage frequency consumption and specific diseases, signs and symptoms related to ARF in the Spanish population.

Objectives: a) To design two questionnaires related to ARF: Food and Beverage Frequency Consumption to identify Adverse Reactions to Food Questionnaire (CFC-RAA): and Pathologies and Symptomatology associated to Adverse Reactions to Food Questionnaire (PSIMP-RAA) and b) to validate the questionnaires by the expert method.

Methods: Questionnaires were designed, by researchers with extensive experience in Nutrition and Food Sciences, adapting previous tools to the particularities of ARF, using REDCap® (Research Electronic Data Capture, Vanderbilt University, Nashville TN, USA) tools hosted at Universidad Politécnica de Madrid. Experts received an online invitation's correspondence and evaluated each question on a 1–5 points Likert-type scale according to their field of expertise. Aiken's V coefficient values ≥ 0.75 were used to validate separately each questions' section using the software ICAiken.exe (Visual Basic 6.0, Lima, Perú).

Results: A total of 20 Spanish experts, 10 professionals related to nutrition (nutritionists, pharmacists, nurses and physicians) for 18-item-CFC-RAA and 10 (nurses and physicians) for 10-item-PSIMP-RAA, aged $55.6 \pm 11.37y$, $61.5 \pm 5.38y$, with 31.7 ± 13.45 and 38.5 ± 6.64 years of experience, respectively, evaluated the questionnaires. Final Aiken's V coefficient values were 0.90 (0.78–0.96CI) for CFC-RAA and 0.93 (0.81–0.98CI) for PSIMP-RAA.

Conclusions: Both questionnaires were validated. These tools could be used to analyze the association between certain food and beverage consumption with ARF such as food allergies and food intolerances; also, to investigate the link between some specific diseases, signs and symptoms with ARF.

Conflict of Interest: None.

Keywords: Food allergy. Practitioners. Disease management.

OC098

Longitudinal associations between food parenting practices and dietary intake in preschool children: The toybox-study

Iglesia-Altaba, I.¹; Flores-Barrantes, P.²; De Miguel-Etayo, P.²; Paw, M. J. M.³; Cardon, G.⁴; Androustos, O.⁵; Moreno, L. A.²; Gibson, E. L.⁶

¹Red de Salud Materno Infantil y del Desarrollo (SAMID), Instituto de Salud Carlos III, Madrid, Spain; ²Growth, Exercise, Nutrition and Development (GENUD) Research Group, University of Zaragoza, Zaragoza, Spain; ³Department of Public and Occupational Health, Amsterdam Public Health Research Institute, Amsterdam University Medical Center, Amsterdam, The Netherlands; ⁴Department of Movement and Sports Sciences, Ghent University. Ghent, Belgium; ⁵Department of Nutrition and Dietetics, School of Health Sciences & Education, Harokopio University, Athens, Greece; ⁶School of Psychology, University of Roehampton, London SW15 4JD, UK

Introduction: Food Parenting Practices (FPPs) include all the practices parents use in the act of feeding their children, and these may directly influence their health.

Objectives: The aim of this study was to assess associations between changes in FPPs over one year (permissiveness, food availability, encouragement, distractions during meals and the use of food as reward) and dietary intake at follow-up (water, fruits and vegetables, plain dairy, soft-drinks, sugar-sweetened beverages, desserts, sweets, and salty snacks) in 4-6-year-old preschool-aged children from 6 European countries.

Methods: The ToyBox-study was a preschool intervention with a cluster-randomized controlled design conducted between 2012-2013 in six European countries. Multilevel ordinal logistic regression analysis was conducted with country as a level and adjusted for children's age and Δz -BMI and parental education, gender, age, and BMI.

Results: A total of 964 non-intervention parent-child dyads (50.5% boys and 95.0% mothers) were included. In this sample, limited changes on the use of practices over time were observed. Nevertheless, in adjusted multilevel ordinal logistic regression models, results showed that the absence of soft-drinks at home at both time-points was associated with higher odds of consuming less than 1 serving of soft-drinks per week in girls [OR=2.72 (1.56; 4.75)]; also in girls often having fruits or vegetables at home and never being permissive for children to drink pre-packed juices was associated with higher odds of consuming at least 3 daily servings of fruits or vegetables. In boys, a low availability of sweet and salty snacks at home was associated with higher odds of consuming a at least 3 servings of fruits and vegetables per day.

Conclusions: This study suggests that using positive FPPs and avoiding the negative ones is prospectively associated with dietary intake, especially of fruit and vegetables, soft-drinks, desserts, and salty snacks.

Conflict of Interest: None.

Keywords: Prospective. Home food availability. Permissiveness. Mealtime. Screen use.

OC099**The school menu review program of Catalonia: Towards sustainability**

Manera, M.; Blanquer, M.; Vila, L.; Miranda, G.; Salvador, G.; Castell, C.; Cabezas, C.

Service for the Promotion of Healthy Living and Prevention of Chronic Non-communicable Diseases. Health Promotion Directorate. Public Health Agency of Catalonia (ASPCAT). Barcelona.

Introduction: The School Menu Review Program (PReME) from ASPCAT offers a free review of menu planning to all schools since 2006. Curbing food waste is both a goal in itself and a means of achieving United Nations Sustainable Development Goals.

Objectives: To improve the quality of the menu planning of the schools, and to know the barriers to acceptance of the meals served in order to initiate strategies to reduce food waste.

Methods: The PReME has evaluate 8001 menu plannings, has made 5967 initial reports (phase 1), 2034 follow-up reports (phase 2), and has carried out 2691 tests of sensory evaluation of lunch since 2018 in 92 schools (phase 3). Through territorial ASPCAT teams, the requests for reviews are received, the plannings are assessed and reports are sent to the centre. Sensory assessment is carried out in schools which have completed phases 1 and 2.

Results: From 2006 to 2022, the following trends are observed in compliance with the recommendations: salads (47%·75,7%), fresh fruits (46%·95,5%), fresh food (56.4%·100%), vegetables (73%·100%), pulses (86%·88,7%) and olive oil for dressing (87.2%·96.3%). In the sensory evaluation from a sample of 2297 children, the overall average rating (1-10 points) of the dining room was 5.72 (± 2.7), being the best valued aspects the attitude of the monitors (7.1 \pm 3.1), the time available to eat (7.4 \pm 2.9) and the lighting of the space (7.5 \pm 2.7), while the worst were the noise (4.6 \pm 3.5), the smell (5.2 \pm 3.2), the presentation (5.4 \pm 3) and the taste of certain dishes (5.5 \pm 2.8).

Conclusions: PReME has a wide scope and has contributed to the improvement of key aspects of the menu planning of the schools. The sensory evaluation contributes to obtaining information about the barriers to meals acceptance of the dinners that can help initiate strategies to reduce food waste in the school environment.

Conflict of Interest: None.

Keywords: School menus. Meal planning. Sustainability. Child nutrition.

OC102**Nutritional characterisation and prebiotic effect of orange peel fibre**

Núñez-Gómez, V.¹; Periago, M. J.¹; Baenas, N.¹; Ordoñez-Díaz, J. L.²; Pereira-Caro, G.²; Moreno-Rojas, J. M.²; González-Barrio, R.¹

¹Departamento de Tecnología de los Alimentos, Nutrición y Bromatología, Facultad de Veterinaria, Universidad de Murcia, Murcia, España; ²Área de Alimentación y Salud, Instituto de Investigación y Formación Agraria y Pesquera (IFAPA), Alameda del Obispo, Córdoba, España

Introduction: Citrus fruits are one of the most consumed fruits worldwide, providing vitamins, minerals, dietary fibre and bioactive compounds, which can provide benefits for human health derived from the antioxidant activity and the prebiotic effect.

Objectives: The aim of this work was to characterise orange peel fibre and evaluate its prebiotic effect by the production of SCFAs after an in vitro fermentation with human faeces.

Methods: Orange peel fibre was obtained by using a green extraction method. Nutritional composition of the samples was determined by official methods, (poly)phenols and carotenoid profile were analysed by HPLC-DAD. The sample was in vitro digested following the INFOGEST method, and then in vitro fermentation was carried out with pooled human faeces from nine healthy female volunteers during 48 h. After the fermentation, SCFAs were analysed by GLC-FID and the catabolites from the (poly)phenol metabolism by HPLC-HRMS.

Results: The results showed that the fibre fraction had 75.8% of dietary fibre, being 85% of insoluble dietary fibre and 15% of soluble dietary fibre. Moreover, it had 15.6% of carbohydrates, 5.3% of protein and 3.4% of ashes. The fibre showed 1632 mg (poly)phenols/100 g, being represented mainly by flavanones (95%) and hydroxycinnamic acids (5%). Total carotenoid content was 12 mg/100 g, being the violaxanthin the major one. After the in vitro fermentation, acetate, propionate and butyrate were produced as the main SCFAs, other minor SCFAs were also produced, the total SCFAs production at 48 h was 117 mM. This fibre fraction produced mainly phenylpropionic, followed by phenylacetic and benzoic acid derivatives from (poly)phenol metabolism.

Conclusions: Based on these findings the fibre fraction could be used as a potential ingredient to design and develop rich-fibre foods with functional properties, due to the bioavailability of compounds and the prebiotic effect after the fermentation.

Conflict of Interest: Authors declare no conflict of interest.

Keywords: Fibre. (Poly)phenols. Microbiota. SCFAS. Catabolites.

OC103**Reduction of the environmental impact through the evolution of the guidelines for school menus in Catalonia**

Manera, M.¹; Vila, L.¹; Blanquer, M.¹; Peláez, S.¹; Nafria, A.¹; Salvador, G.¹; Castell, C.¹; Cabezas C.¹

¹Promotion of Healthy Living and Prevention of Chronic Non-communicable Diseases. Health Promotion Directorate. Public Health Agency of Catalonia (ASPCAT). Barcelona. Spain

Introduction: The ‘Healthy eating at school’ guide created by the Public Health Agency of Catalonia (ASPCAT) is a referent in the promotion of healthy and sustainable food in Catalonia, which includes strategies to improve the sustainability of meals served in the school cafeterias. The ASPCAT School Menu Review Program (PReME) reviews school menus based on the guide’s recommendations and sends reports to schools. The guide has been updated several times in 2012, 2017 and 2020. It has progressively included proposals to improve the meals’ sustainability, which focus on reducing the size and frequency of animal source food (meat, fish, egg) and increasing vegetable protein (pulses).

Objectives: To evaluate the environmental impact of the school menus’ examples included in the different ASPCAT guides, period 2012-2020.

Methods: Through the calculator “The value of food” - www.elvalordelsaliments.cat/calculadora/ - (ENT Foundation and The Waste Agency of the Catalan Government) and based on the examples of school menu plannings for children aged 6 to 12 of the 2012 and 2020 guide comparison, the carbon footprint (kg of CO₂), the water footprint (l of H₂O) and the land use (m²) have been calculated. The calculations have been made based on the amounts of the main protein foods (pulses, meat, fish, eggs) on the 2012 menus versus those of 2020. Dairy products and nuts have been excluded due to the low presence in school menus.

Results: From 2012 to 2020, the carbon footprint in menu plannings shows a reduction from 12.55 to 5.64kg of CO₂ (-55.06%), from 301.97 to 178.88 l H₂O (-40.76%) in water footprint and from 68.67 to 35.53m² (-48.26%) in land use.

Conclusions: Strategies to reduce the amount and frequency of animal protein foods in school menus promoted by the ASPCAT could lead to a lower environmental impact.

Conflict of Interest: None.

Keywords: School menus. Meal planning. Sustainability. School cafeteria.

OC105**The amed certification eases to follow a healthy diet outside home in Catalonia, Spain**

Miranda, G.

Agencia de Salud Pública de Cataluña

Introduction: The Mediterranean Diet is known for being healthy and sustainable. Since 31% of the Catalan population eats out at least once a week (Monday to Friday), in 2007 the Public Health Agency of Catalonia designed and implemented the free Amed Identification (short for Alimentación Mediterránea) for Mediterranean Diet promoting food establishments such as restaurants, hotels, universities, food chains and canteens, especially in labour surroundings.

Objectives: To easily identify Mediterranean Diet promoting establishments for the population.

Methods: Food offer is collected with an online questionnaire through Amed’s website. Data is confirmed by a certified Dietitian-Nutritionist. If needed, suggestions on food offer improvements are made to comply with the Amed criteria (dressing and cooking with olive oil, prioritizing vegetables, pulses, lean meat and fish, presence of whole grain products, free drinking water, and desserts mainly of fresh fruit and sugar free yogurt). A descriptive analysis is applied to obtain the improvement percentage of the food offer within the applicants. A follow-up is established every two years.

Results: The main improvements in the food offer observed are an increase of 57% in the use of high-oleic-acid oil for frying, 21% of whole grain products, 22% of olive oil or high-oleic-acid oil for cooking, 14% of sugar free yogurt and 5% of fresh fruit for dessert, 4% of more vegetables and pulses in the first course, 1% of lean meat and fish in the second course, and 41% free drinking water. Olive oil is the main salad dressing used by all applicants. Up to date, 753 establishments have been certified, in 169 municipalities, reaching almost 115,000 people per day. During the follow-up, 13% of the food establishments are removed for not maintaining the Amed criteria.

Conclusions: The Amed identification helps to promote the healthy and sustainable Mediterranean Diet to the Catalan population.

Conflict of Interest: None.

Keywords: Mediterranean menus. Mediterranean canteens.

OC106**Children's behavioral problems at 3.5 years old and brain structure at 6 years old: An MRI study on preobe children**

Nieto-Ruiz, A.^{1,2,3,4}; Verdejo-Román, J.³; Torres-Espínola, F. J.^{1,2}; Escudero-Marín, M.^{1,2}; Catena, A.³; Campoy, C.^{1,2,5}

¹EURISTIKOS Excellence Centre for Paediatric Research, University of Granada, Spain; ²Department of Paediatrics, School of Medicine. University of Granada, Spain; ³Mind, Brain and Behavior International Centre, University of Granada, Spain.

⁴CIBERESP: National Network of Research in Epidemiology and Public Health. Institute Carlos III (Granadas' node), Spain

Introduction: Behavioral problems during childhood are related to altered brain structure over time and neuropsychiatric disorders later in life. We analyse the effect of children's behavioral problem at 3.5 years old in the brain structure at 6 years old on PREOBE children.

Methods: The PREOBE project is an observational cohort study including 331 pregnant women from Granada, Spain. The mothers were categorized into four groups according to BMI and their gestational diabetes (GD) status; overweight (n:56), obese (n:64), GD (n:79), and healthy normal weight controls (n:132). A total of 122 healthy children enrolled in the PREOBE project participated in this study. Mothers rated behavior problems using the Child Behavior Checklist (CBCL) when their children were 3,5 years of age and they were divided into 2 groups: normal (n:88) and borderline/pathological (n:34). All participants attended a Magnetic Resonance Imaging session in which children's anatomical brain image were obtained. Brain volumes and cortical thickness was calculated using Freesurfer version 6.0. ANCOVA (adjusted by pre-gestational BMI, maternal IQ and sex of children) was performed to compare children brain volumes and thickness between the 2 groups using SPSS version 22.0.

Results: Children classified as borderline/pathological in internalizing problems presented less suborbital thickness ($p=0.006$) and left pallidum volume ($p=0.016$) compared to normal children. Regarding total problems, children borderline/pathological showed less insula thickness ($p=0.013$) and volume ($p=0.008$) and suborbital thickness ($p=0.022$) than normal children.

Conclusions: Child's psycho behavior problems are related to smaller subcortical volumes and thickness, indicating anomalies in developmental brain trajectories.

Conflict of Interest: Partial support was received by Abbott Laboratories, Granada, Spain. *This study has been funded by the Andalusian Government, Economy, Science and Innovation Ministry (PREOBE Excellence Project Ref. P06-CTS-02341) (NCT01634464), the Spanish Ministry of Economy and Competitiveness. Ref.BFU2012-40254-C03-01 and DynaHEALTH H2020 EU Project, GA n°: 633595.

Keywords: Behavioral problems. Brain imaging.

OC108**Early nutrition and brain function: EEG/ERP study in cognis children aged 2.5 years**

Nieto-Ruiz, A.^{1,2}; Sepúlveda-Valbuena, N.^{2,3}; Herrmann, F.; Diéguez, E.^{1,2}; Jiménez, J.⁴; De Castellar, R.⁴; Catena, A.⁵; Campoy, C.^{1,2,6}

¹Department of Paediatrics, School of Medicine. University of Granada, Spain; ²EURISTIKOS Excellence Centre for Paediatric Research, University of Granada, Spain; ³Nutrition and Biochemistry Department. Faculty of Sciences. Pontificia Universidad Javeriana. Bogotá, Colombia; ⁴Ordesa Laboratories, S.L. Barcelona. Spain; ⁵Department of Experimental Psychology. School of Psychology. University of Granada, Spain.

⁶Epidemiology and Public Health Networking Biomedical Research Centre (CIBERESP), Institute of Health Carlos III (Granada's node), Spain

Introduction: Several human milk bioactive components such as long-chain polyunsaturated fatty acids (LC-PUFAs) or milk fat globule membrane (MFGM) added to infant formula, seems to be involved in better brain maturation and development, closer to that observed in breastfed infants.

Objectives: The aim of the present study was to determine the effects of infant formula enriched with bioactive components on brain function in healthy children at 2.5 years old.

Methods: 106 children participating in the COGNIS RCT study were evaluated at 2.5 years old; 32 children were fed with standard infant formula (SF), 39 received an infant formula enriched with bioactive nutrients (EF) (LC-PUFAs, MFGM, synbiotics, gangliosides, nucleotides and sialic acid), during their first 18 months of life; and 35 were exclusively breastfed (BF). Brain function was evaluated by continuous electroencephalogram/cognitive evoked related potentials (EEG/ERP) recordings using a 64-channel Active Two BioSemi EEG system (BioSemi; Amsterdam, Holland). We used a weighted Global Channel Connectivity (wGCC) measure to identify the brain's most globally connected regions. We measured a set of confounders (*sex, height, head circumference, familiar socio-economic status, BMI of the mother before and during the pregnancy, mother and father IQ, gestational age, type of delivery and time of maternal breastfeeding*). Non-parametric Spearman correlation was performed to evaluate its impacts on connectivity. Bonferroni correction was used after multiple comparisons.

Results: The t-maps for the three groups contrast. Significant differences were observed for the SF-BF and EF-BF, but not for the SF-EF. Differences found in wGCC were concentrated mainly in bilateral frontal hemisphere channels. In both cases, wGCC was lower for children fed with any of the infant formula (SF and EF) than for those breastfed.

Conflict of Interest: None.

OC110

Consumption of added sugars in the Spanish child population and foods that contribute to this consumption

Palma-Morales, M.^{1*}; Mesa-García, M. D.^{1,2,3,4} and Huertas, J. R.^{1,5}

¹Institute of Nutrition and Food Technology "José Mataix", Biomedical Research Center, University of Granada, Spain. University of Granada, Avda. del Conocimiento s/n. 18016, Armilla, Granada, Spain; ²Department of Biochemistry and Molecular Biology II, Pharmacy Faculty, Campus de Cartuja s/n, University of Granada, 18071, Granada, Spain; ³Institute for Biosanitary Research ibs. GRANADA, 18012 Granada, Spain; ⁴Primary care promotion of maternal, child and women's Health for prevention of adult chronic diseases Network (RD21/0012/0008); ⁵Department of Physiology, Pharmacy Faculty, Campus de Cartuja s/n, University of Granada, 18071, Granada, Spain

Introduction: Randomized trials show positive and causal relationships between added sugars intakes and the risk of metabolic diseases. A safe added sugars dietary intake level is not established, and EFSA concluded that it should be as low as possible.

Objectives: Our aim was to quantify the added sugars consumption by Spanish children, and to analyze which foods contribute to their intake.

Methods: Self-reported information on weekly food consumption was collected from parents of 1775 Spanish children (7-12y) using a phone application. A Daily Nutrient Intake Index (DNII) was constructed for products containing added sugars based on daily consumption, and calculated by adding the ratios of daily intake of each nutrient provided by each food divided by the reference values established by EFSA for the paediatric population: reference dietary intake (RDI) for macronutrients, and population reference intakes (PRI) or adequate intakes (AIs) for micronutrients.

Results: The calculated mean consumption of added sugars in the Spanish children is 55,7±1,0g/day. Preliminary data indicate that foods that contribute most to added sugars intake are cookies, cocoa powder and dairy desserts. Sweetened yogurts also provide high amount of added sugars and have high nutritional and prebiotic values. Foods providing little added sugars per day and considered highly nutritious are: milk, fortified infant milks, breakfast cereals and packaged smoothies.

Conclusion: Added sugars intake in Spanish children is high and should be reduced, especially foods with low nutrient density and high added sugars content. However, occasional consumption (once or twice a week) of products with high nutrient density and moderate amount of added sugars, could be maintained. On the other hand, reformulation of products containing added sugars should be encouraged.

Conflict of Interest: Authors declare no conflict of interest.

Key words: added sugars, nutritional quality index, infant feeding.

POSTER COMMUNICATIONS

PC011

Hypoalbuminemia and inflammation in patients receiving hemodialysis WHO infected with COVID-19

Bersano, P.¹; Nieto, G.¹; García, A.²

¹Departamento tecnología de los alimentos, Universidad de Murcia, Murcia, España; ²Nefrología, Hospital de Manises, Valencia, España

Introduction: Dialysis hypoalbuminemia is a complex network of conditions such malnutrition, overhydration, infection and/or inflammation stand out, together with the elevation of c-reactive protein, further favor malnutrition by inducing protein catabolism, altering the immune response, favoring infections and even greater risks at the time of contagion by Covid-19. The uremia through mechanisms stimulated by the use of membranes and/or dialysis solutions, seem to trigger the inflammation process, associated with hypoalbuminemia.

Objectives: Show the importance of considering hypoalbuminuria in hemodialysis patients who become infected with COVID-19.

Methods: Literature review Pubmed, Google-Scholar, WOS, Scielo, National Kidney Foundation, Science-Direct, Dialnet.

Results: The clinical picture of infection and inflammation by COVID-19 is more severe, with fewer symptoms in patients on hemodialysis(HD), with neurological and gastrointestinal alterations, along with a worse evolution. The mortality rate related to pneumonia is 14-16 times higher than in the general population. Malnutrition in HD is it low caloric-protein intake due to the anorectic effect of uremic toxins, chronic inflammation, release of cytokines (IL-6) that can cause anorexia, muscle destruction and decreased hepatic synthesis of albumin. Hypoalbuminemia upon admission due to Covid-19 infection is more frequent in non-survivors than in survivors (65.6 vs. 38%), and is associated with the development of sepsis, macrophage activation syndrome, acute heart failure, syndrome of acute respiratory distress and acute renal failure, regardless of the Charlson-Age comorbidity index.

Conclusions: SARS-CoV-2 epidemic represents a special risk in HD by comorbidities, transfers and stay in collective rooms. Hypoalbuminemia is a predictor of morbidity and mortality in HD patients infected with COVID-19, attributed to malnutrition, comorbidities, infection, or inflammation. The determination of serum albumin at admission is even more relevant in HD patients, since they have a higher risk of developing life-threatening conditions and death.

Conflict of Interest: There are no conflicts of interest.

Keywords: Hypoalbuminemia. Covid-19. Inflammation. Hemodialysis.

PC013**Proteomic approaches for the identification of novel cardiovascular biomarkers: A proof of concept**

Noguera, C.¹; Orenes, E.²; Velasco, A.³; Montoro, S.¹

¹Laboratorio Juan Carlos Izpisua Belmonte. Universidad Católica San Antonio de Murcia. Murcia. España; ²Plataforma de Proteómica. Instituto Murciano de Investigación Biosanitaria. Murcia. España; ³Medicina Familiar y Comunitaria. Centro de Salud Murcia-San Andrés. Murcia. España

Introduction: Bioactive peptides have been defined as protein-derived short peptides that are released by hydrolysis processes such as dry-curing ham. Evidence suggests that bioactive peptides reduce hypertension and might affect other metabolic pathways which should be confirmed to validate its beneficial effects in humans.

Objectives: To identify novel biomarkers of the cardiovascular status with promising proteomic techniques.

Methods: Nine volunteers (49 ± 6 years old, 75% male) consumed dry-cured pork ham enriched in characterized antihypertensive peptides for 28 days. Protein quantification from all citrated plasma samples was performed using the Pierce BCA Protein Assay Kit followed by SDS-PAGE. The digested proteins were analysed with MS/MS using Sequest and X! Tandem Softwares. Peptide and protein identifications was validated through Scaffold Software. Then, immunohistochemical approaches (ELISA) were used to confirm these results.

Results: The extended proteomic study identified changes in proteins such as Akt, MMP-8, MAPK, ApoB, ApoA2 and ApoA1 which are all related to cardiovascular mechanisms of action. Then, these results were confirmed by immunohistochemical techniques (p<0.05). In addition, parameters such as total cholesterol, LDL-col and insulin were significantly decreased (p<0.01), and HDL-col significantly increased (p<0.005) after the dry-cured ham intake.

Conclusions: This study suggests the potential use of proteomic approaches for the identification of novel potential targets which could help in the prevention of cardiovascular diseases as well as other pathologies. In addition, hypocholesterolemic properties of bioactive peptides were significantly demonstrated although further research is still needed.

Conflict of Interest: The authors are not aware of any affiliations, memberships, funding, or financial holdings that might be perceived as affecting the objectivity of this abstract.

Keywords: Biopeptides, Cardiovascular. Proteomic.

PC016**Effects of opuntia stricta var. dillenii extracts on in vitro triglyceride accumulation prevention in mouse AML-12 hepatocytes**

Besn -Eseverri, I.¹; Trepiana, J.²; G mez-Garc a, I.¹; Portillo, M. P.²

¹Departamento de Farmacia y Ciencias de los alimentos. Facultad de Farmacia, Universidad del Pa s Vasco (UPV/EHU). Vitoria-Gasteiz. Espa a; ²Dpto. Farmacia y Ciencias de los alimentos. Facultad de Farmacia, Universidad del Pa s Vasco. CIBERObn de obesidad y nutrici n, Instituto de Salud Carlos III. Vitoria-Gasteiz. Esp

Introduction: Steatosis is characterized by excessive hepatic lipid accumulation as triglycerides. Opuntia stricta var. Dillenii, from the Cactacea family, shows in its chemical composition flavonoids, phenolic acids and betalains that could help in the prevention of steatosis.

Objectives: The aim of this study was to analyze whether Opuntia stricta var. Dillenii fresh fruits (peel, pulp or whole fruit) and the wastes of food industry (bagasse) were effective in reducing hepatocyte triglyceride accumulation.

Methods: An in vitro model mimicking the hepatocyte situation in fatty liver was developed by incubating mouse AML-12 hepatocytes with palmitic acid (PA). For cell treatments, hepatocytes were incubated with 10, 25, 50 or 100 µg/mg Opuntia stricta var. Dillenii extracts. Triglycerides and cell viability were assessed by using a commercial kit and crystal violet assay, respectively.

Results: We show, for the first time, that all the extracts partially or completely prevented lipid accumulation induced by the saturated fatty acid PA in AML-12 hepatocytes, with the exception of whole fruit at 50 µg/mg and bagasse at 50 µg/mg and 100 µg/mg, that did not show significant effects. The most effective extracts were the peel at 10 µg/mg and 50 µg/mg and the whole fruit at 100 µg/mg. None of the four extracts affected cell viability.

Conclusions: In view of the results, the peel is the most interesting extract because it shows a higher percentage of steatosis prevention and it is the most effective at a lowest dose.

Conflict of Interest: The authors declares no conflict of interest.

Keywords: Opuntia stricta var. dillenii. Steatosis. Hepatocytes. Extracts.

PC019

Potential anti-inflammatory effect of milk whey through simulated digestion using an in vitro model of induced inflammation

*Sánchez-Moya, T.*¹; *López-Nicolás, R.*¹; *Ydjedd, S.*²; *Planes-Muñoz, D.*¹; *Frontela-Saseta, C.*¹; *Ros-Berrueto, G.*¹

¹Department of Food Science and Human Nutrition. Faculty of Veterinary Sciences. Regional Campus of International Excellence "Campus Mare Nostrum". University of Murcia (Spain); ²Laboratoire de Biochimie appliquée, Faculté des Sciences de la Nature et de la Vie, Université de Bejaia, Bejaia 06000, Algeria

Introduction: Obesity has increased dramatically, and it has now reached epidemic proportions in both, developed and developing countries. The global importance of overweight and obesity is worrying, in part, due to their public health significance because they are associated with a higher risk of type 2 diabetes, coronary heart disease, etc. Obesity is closely linked to gut health and immune system. A low-grade of systemic inflammation, which may precede obesity, could have implications in the development of metabolic syndrome and insulin resistance.

Objectives: The aim of this study was to assay the anti-inflammatory potential of several types of whey (cow, sheep, goat and a mixture of them) by using an in vitro co-culture model of gut inflammation (Caco-2 and RAW 264.7) stimulated with LPS and TNF- α , after an in vitro digestion and fermentation.

Methods: Inflammatory markers, as IL-8 and TNF- α , were determined, as well the integrity of tight junction cell barrier by measuring the transepithelial electrical resistance (TEER).

Results: Results revealed that fermented whey samples produced the highest anti-inflammatory potential by reducing strongly the secretion of IL-8 and TNF- α , mainly, due to their protein breakdown products as peptides and amino acids, and short chain fatty acids (SCFA). However, fermented samples originated from goat whey did not show the same effect on TNF- α than other fermented, presumably because of its SCFA profile and absence of biopeptides. All digested and fermented samples showed a protective effect in cell barrier permeability, being lesser the effect in the case of fermented samples of goat and mixture whey.

Conclusions: The potential of digested and fermented whey from cow, sheep, goat and mixture to minimize an in vitro inflammation was demonstrated by reducing the secretion of IL-8 and TNF- α of inflamed cells.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Milk whey. Gastrointestinal digestion. Colonic fermentation. Anti-inflammatory effect. IL-8. TNF- α .

PC020

Satiating power of breakfast based on dairy protein

Sánchez-Moya, T.; *Martínez-Pina, P.*; *Planes-Muñoz, D.*; *Frontela-Saseta, C.*; *Ros-Berrueto, G.*; *Gómez-Gómez, V. P.*; *López-Nicolás, R.*

Department of Food Science and Human Nutrition. Faculty of Veterinary Sciences. Regional Campus of International Excellence "Campus Mare Nostrum". University of Murcia (Spain)

Introduction: Obesity has come to be an epidemic all over the world. The inclusion of breakfast and its composition play an important role in this disease. High-protein diets have been related to acute effect on satiety, sensation of fullness and reductions of hunger.

Objectives: The main objective of this study was to examine the effects on satiety, hunger and appetite after consuming four breakfasts based on dairy proteins through energy intake at ad libitum meal, subjective perceptions and physiological biomarkers.

Methods: The methodology employed consisted in a randomized crossover experimental study, in a sample of 10 volunteers with four conditions: breakfast A (high protein and high energy density), breakfast B (high protein and low energy density), breakfast C (low protein and high energy density) and breakfast D (low protein and low energy density).

Results: Main results demonstrated that breakfasts classified from most to least satiating in terms of ad libitum meal were B, A, C and D; with statistically significant differences ($p < 0.05$) between B and D. Regarding subjective measurements, breakfast causing minor sensations of hunger and appetite was A ($p < 0.05$). As for subjective measurements of satiety, differences were significant between breakfast A and B, A and D, C and D ($p < 0.05$). Satiety throughout the day was significant different between C and D; and hunger throughout the day between A and D, B and D ($p < 0.05$).

Conclusions: Conclusions revealed that dairy protein was the macronutrient that caused a greater sense of satiety. The regulating processes of hunger, appetite and satiety are very complex and do not depend exclusively on the main type of nutrient.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Satiety. Appetite. Hunger. High-protein.

PC021

Characterization of iron intake and iron status of pregnant women from nela cohort

Suárez, C.¹; Planes, D.¹; Santaella, M.¹; Yagüe, G.²; Morales, E.³; García-Marcos, L.⁴; Martínez, C.¹; NELA Study group⁵

¹Food Science and Nutrition Department, Veterinary Faculty, Regional Campus of International Excellence Campus Mare Nostrum, University of Murcia, 30100 Murcia, Spain; ²Microbiology Service, Virgen de La Arrixaca University Hospital, 30120 Murcia, Spain; ³Department of Public Health Sciences, University of Murcia, Murcia, Spain; ⁴Pediatric Allergy and Pulmonology Units, Virgen de La Arrixaca University Hospital, 30120 Murcia, Spain; ⁵Biomedical Research Institute of Murcia (IMIB-Arrixaca), 30120 Murcia, Spain

Introduction: Iron deficiency anemia in pregnancy is a common problem, even in high-income country settings. The adherence to a Mediterranean Diet during this period, should avoid inadequate levels of micronutrients, and therefore protect mothers and their offspring's from various health problems associated with a lack of iron.

Objectives: Our main objective was to characterize iron intake during the first trimester of pregnancy in women from NELA cohort (<https://nela.imib.es/>), and relate it to iron nutritional status. In addition, the relationship between adherence to the Mediterranean diet and the appearance of anemia or iron deficiency was studied.

Methods: A validated food frequency questionnaire was used to determine the iron intake and to estimate the Alternative Mediterranean Diet score. Supplements were also taken into account for calculations. Iron status was established measuring hemoglobin, hematocrit, serum ferritin and serum iron at 24 week of pregnancy in 739 women.

Results: The mean hemoglobin value was 11.6 g/dl (SD 0.919), which is 0.6 points above the critical limit established by the WHO for anemia. Values ranged between 8 and 14 g/dl. Regarding hematocrit, the mean value of the cohort was 34.0% (SD 2.54), median 34.0 [25.0, 43.0]. Serum iron mean resulted 79.4 ug/dl (SD 36.0). A great variability was found in serum ferritin, ranging between 2 and 246 ng/ml, with a median of 15.5, which generally indicates low reserves of the mineral.

Conclusions: We found a low incidence of anemia but a high percentage of iron deficiency. Interestingly, we found only a significantly positive correlation between iron intake and serum iron of pregnant women at week 24 of gestation, without being related to hemoglobin, hematocrit or serum ferritin.

Conflict of Interest: The authors declare no conflicts of interests.

Keywords: Iron. Pregnancy. Mediterranean diet. Iron deficiency. Anemia.

PC023

Development of a functional food product with therapeutic properties for elderly people with Parkinson's disease

García, P.¹; Espinoza, J. P.²; Diaz, W.³; Acuña, M. J.²; Nieto, G.¹

¹Programa de Doctorado en envejecimiento y fragilidad, Universidad de Campus Universitario de Espinardo, Murcia, Spain; ²Centro Integrativo de Biología y Química Aplicada (CIBQA), Universidad Bernardo O'Higgins, Santiago, Chile; ³Molecular Microbiology and Food Research Lab – MMFR. Escuela de Nutrición y Dietética, Facultad de Ciencias para el Cuidado de la Salud

Introduction: Nutritional therapy is part of the treatment of Parkinson's disease (PD), moreover, nutrition plays a critical role in the prevention of several diseases. Sarcopenia and intestinal dysbiosis are highly prevalent in patients with PD, thus increasing mortality and affecting the quality of life of people who suffer from PD. The decision has been made to create a food product that provides therapeutic properties that can modulate Intestinal Microbiota (IM) and improve muscle atrophy caused by sarcopenia.

Objectives: To develop a functional food product with therapeutic properties for elderly people with Parkinson's disease.

Methods: Three work lines have been conducted. A group of 5 volunteers over 60 years of age with PD were supplemented with prebiotic fiber, and IM was analyzed at the beginning of the intervention and after its completion. Additionally, an in vitro study has been performed, treating C2C12 cells previously differentiated to myotubes for 5 days. The treatment consists of applying Moringa Extract (ME) in dexamethasone-induced muscle atrophy models. Finally, inulin and Moringa have been added to a bakery product, while preserving their organoleptic properties.

Results: volunteers supplemented with prebiotic fiber showed changes in some anthropometric nutritional parameters, as well as changes in intestinal bacteria after 30 days of supplementation. Furthermore, it has been observed in the fiber diameter that ME prevents atrophy in the C2C12 myotubes.

Conclusions: Our preliminary results suggest that ME, as well as prebiotic fiber, have a preventive effect on muscle atrophy and intestinal dysbiosis. On the other hand, the addition of inulin and Moringa in a bakery product provides such food item with therapeutic properties, enhancing its nutritional value.

Conflict of Interest: We don't have conflict interest.

Keywords: Parkinson's disease. Functional food. Elderly.

PC028

A nutritional intervention among children aged 6-12 years-old is effective on improving dietary pattern and anthropometry: Randomized parallel controlled study

Andueza, N.¹; Cuervo, M.¹; Martin-Calvo, N.²; Navas-Carretero, S.¹

¹Departamento de Ciencias de la Alimentación y Fisiología/ Centro de Investigación en Nutrición. Universidad de Navarra. Pamplona. España; ²Departamento de Medicina Preventiva y Salud Pública. Universidad de Navarra. Pamplona. España

Introduction: Dietary habits, which are associated with the development of several chronic diseases, are formed in childhood and consolidated in adulthood. Despite that association is well-known, most children in western populations do not adhere to the dietary guidelines recommendations.

Objectives: The aim of this study was to evaluate the effect of the ALINFA (Healthy, accessible and affordable food for children) nutritional intervention on diet quality, anthropometry and body composition and biochemical on children.

Methods: An 8-week parallel, randomized and controlled nutritional intervention was carried out in 69 children aged 6 to 12 years. Children were randomly allocated (ratio 2:1) either to the ALINFA group (N=47), which received a nutritional strategy intervention consisting on a normocaloric diet based on healthy and food products and prepared dishes and recipes developed during the project, or to a control group (N=22), which received nutritional advised according to the SENC food pyramid, with special emphasis in portion size. Diet quality was assessed with the KIDMED index. Differences within groups as well as change between groups were statistically analyzed (t-test, paired t-test and non-parametric equivalents).

Results: 55 out of the 69 children who initiated the trial completed it (ALINFA: 44 / control: 11). Significant improvements in the ALINFA group were observed in the KIDMED index score, body mass index, waist circumference, fat mass, LDL-cholesterol and leptin. Whereas children in the control group did not show any change on diet quality, but they showed significant increases in weight, lean and muscular mass, as well as in insulin levels. However, regarding the change between groups, significant differences were only observed in KIDMED index score, weight, BMI, lean and muscular mass and insulin.

Conclusions: The present study shows the effectiveness of the ALINFA nutritional intervention to improve diet quality and anthropometry in children.

Conflict of Interest: The authors declare that they have no conflict of interest.

Keywords: Diet quality. Kidmed index. Anthropometry. Children. Nutritional intervention.

PC029

Newly diagnosed celiac people's fodmap consumption during the first year on a gluten-free diet and their relation with the symptomatology

Perez-Junkera, G.¹; Matías, S.¹; Esteban, B.²; Tutao, C.³; Eizaguirre, F. J.⁴; Benjumea, L.⁵; Lasa, A.¹; Larretxi, I.¹

¹Gluten Analysis Laboratory of the University of the Basque Country (UPV/EHU), Department of Nutrition and Food Science, University of the Basque Country, Vitoria-Gasteiz 01006, Spa;

²Asociación de Celiacos y Sensibles al Gluten de Madrid, 28028 Madrid, Spain; ³Department of Pediatric Gastroenterology, Hospital Universitario de Cruces, 48903 Barakaldo, Spain;

⁴Department of Pediatric Gastroenterology, Hospital Universitario Donostia, 20006 San Sebastián, Spain;

⁵Centro Integral de Atención a Mayores San Prudencio, 01006 Vitoria-Gasteiz, Spain

Introduction: A possible cause for symptom maintenance in celiac disease has been attributed to other molecules present in the diet, apart from gluten, such as fermentable oligo-, di- and mono-saccharides and polyols (FODMAPs), present in several foods derived from plants.

Objectives: To analyze the relationship between the symptomatology of celiac people and their FODMAP consumption.

Methods: 31 celiac pediatric patients and 27 adults were recruited in two hospitals of the Basque Country and in the Celiac Association of Madrid. Three-day 24-h food recalls and a structured Gastrointestinal Symptom Rating Scale questionnaire were collected in each visit to the medical office: at diagnosis and after 3 and 12 months on a gluten-free diet (GFD). FODMAP concentrations of general foods were obtained from the open-access Food Composition Database named Food Standards Australia New Zealand FODMAP and from our own determinations previously described. Data on FODMAP content were uploaded to the platform GlutenFreeDiet (www.ehu.es/dieta-singluten) for the calculation of daily consumption.

Results: Total FODMAP consumption increased after 3 months on a GFD among adult participants, probably due to increases in glucose, fructose and inulin. By contrast, the total FODMAPs consumption among children was not changed. Differences between adults and children were observed at the beginning but not at the end of the intervention. Symptom presence decreased after 3 and 12 months on a GFD but these changes only reached statistical significance in the case of children and between the visits vt0 and vt3 ($p = 0.059$).

Conclusions: Data obtained in celiac children indicated no changes of FODMAP ingestion during the intervention, and in adults an increased consumption after 3 months on a GFD. Therefore, the observed reduction in symptoms cannot be linked to a reduction in FODMAPs.

Conflict of Interest: Authors declare no conflict of interest.

Keywords: Celiac disease. Gluten-free diet. Fodmap.

PC030**Salt content of school meals served in public schools lunchrooms of Madrid (2017-2019). "School meals programme"**

de Tomás, I.¹; Rodríguez, P.²; Ávila, J. M.²; Leis, R.³

¹Spanish Nutrition Foundation (FEN). Madrid. Spain. Department of Nutrition and Food Science. Faculty of Pharmacy Complutense University of Madrid. Madrid. Spain; ²Spanish Nutrition Foundation (FEN). Madrid, Spain; ³Spanish Nutrition Foundation (FEN). Madrid. Spain. Pediatric Nutrition Research Group. Health Research Institute of Santiago de Compostela (IDIS). Santiago de Compostela. Spain

Introduction: The School Meals Program of Madrid evaluates school menus through chemical analysis (energy, macronutrients, fatty acids and salt) and the revision of menu's rotation (food frequency, food variety and nutritional information) since 2002.

Objectives: The aim of the study is to analyze the salt content of school meals served at public schools from the Autonomous Region of Madrid (Spain) visited during 2017-2019.

Methods: A total of 60 public running schools attending children aged 6-9 years old were visited in these two academic years. Blinded visits to schools, conducted by the staff of the Spanish Nutrition Foundation, were carried out. A duplicate portion meal was collected for nutritional and chemical analysis.

Results: The average salt content per meal was 3.9 ± 1.2 g, this represents the 78% of the daily maximum recommended by World Health Organization (WHO), 5g of salt per day for children and adult population. Moreover, only 8 of the 60 meals analyzed covered less than 50% of the WHO recommendations, whereas 12 showed salt values higher than 100% of the recommendations.

Conclusions: It is important to consider that these recommendations refer to the total of the day intakes and in this case only the midday meal intake has been analyzed. Therefore, in view of the results, it is necessary to continue insisting on reducing the amount of salt used in the school meals, trying to avoid offering foods with a high salt content (such as precooked foods, sauces and processed meats), increasing the amount of vegetables and fresh foods and using more spices during the cooking to reduce table salt while the same flavor is maintained in the recipe.

Conflict of Interest: The authors declare no conflicts of interest.

Keywords: Schools meals. Child. Salt intake. Salt reduction.

PC033**Impact of tomato juice on the lactobacillus and bifidobacterium strains viability during fermentation time, in vitro digestion and antibiotic resistance**

Zamora, S.¹; Valero-Cases, E.²; Frutos, M. J.²; Pérez-Llasmás, F.¹

¹ Physiology Department, University of Murcia, Murcia, Spain; ² Agro-Food Technology Department, CIAGRO-UMH, University of Miguel Hernández, Orihuela, Spain

Introduction: Currently, most fermented foods are dairy products and cannot be consumed by certain sectors of the population (people allergies to milk proteins, lactose intolerant and vegetarians). Therefore, the needs arise to explore new matrices as probiotic carriers to offer consumers an alternative to fermented dairy products. Nevertheless, the probiotics should ensure their viability in adequate level (106-108 CFU/mL) to resist the adverse digestion conditions and reach the intestine in sufficient amounts. Therefore, the choice of the food matrix is an essential factor in the development of fermented probiotic foods to ensure their viability in the adequate range.

Objectives: The aim of this study was to select a probiotic culture able to reach high level during the fermentation process, gastrointestinal conditions and antibiotic resistant in tomato juice.

Methods: Fermented tomato juices. Simulated gastrointestinal digestion. Microbiological analysis (growth during fermentation time and survival during all steps of in vitro gastrointestinal conditions). Antibiotic resistant during in vitro digestion. Statistical analysis.

Results: The results showed that the microorganism's viability was strongly influence by the fermentation time. *Lactobacillus acidophilus* reached the best viability at 24 hours (1.25x10⁹ CFU/mL). However, *L. plantarum* (LP), *Bifidobacterium bifidum* and *B. longum* showed the best viability at 48 hours. At 72 hours of fermentation, LP showed the best viability (5.94x10⁸ CFU/mL). After 3 hours of gastrointestinal in vitro digestion, although all microorganisms showed high viability ($\geq 10^7$ CFU/mL), the LP showed the best resistance to adverse digestion conditions. At the same time, all microorganisms showed a good antibiotic resistant during all in vitro digestion period.

Conclusions: Tomato juice is a good carrier to ensure the microorganism viability in a high concentration during fermentation time and in vitro digestion. Probiotic resistance to some antibiotics may help restore the gut microbiota during and after treatment with certain antibiotics.

Conflict of Interest: All authors declare that they have no conflicts of interest.

Keywords: Fermented foods. Probiotic. Tomato juice. Gastrointestinal in vitro digestion.

PC034**Antimicrobial properties of Saffron by-products (Crocus Sativus L.)**

Pérez-Llasmás, F.¹; Frutos, M. J.²; García-Conesa, M. T.³; Arnao, M. B.⁴; Requena, M. E.⁴; Candela, M. E.⁴

¹Physiology Department, University of Murcia, Murcia, Spain;

²Agro-Food Technology Department, CIAGRO-UMH, University of Miguel Hernández, Orihuela, Spain; ³Food Science and Technology Department. CEBAS-CSIC. Murcia, Spain; ⁴Plant Biology Department, University of Murcia, Murcia, Spain

Introduction: Crocus sativus L. is commonly known as saffron, although the common name is associated precisely with the flower's three pistils. Around 68 kg of flowers are needed to produce 1 kg of saffron spice, generating 63 of bio residue. Saffron by-products include tepals, stamen and styles. However, these contain interesting amounts of dietary fibre as well as proteins, lipids, sugar anions and organic acids, and even larger amounts of flavonols, anthocyanins and lutein diesters.

Objectives: This study seeks to assess the antifungal capacity of a C. sativus tepal extract, with a view to make use of the large number of bio-residues generated in the production of saffron from C. sativus flowers.

Methods: Lyophilised tepals were used (2.5 g), testing various mixes of lipophilic reagents and water. The mixed finally chosen was methanol: water (80:20) with final additions of ethyl acetate (30 ml) and Hexane (10 ml). The antimicrobial activity was determined in vitro, using the agar well plate procedure, by the evaluation of the minimum inhibitory concentration of different extracts of C. sativus petals, against the fungal strains Fusarium oxysporum, Aspergillus niger, Alternaria alternata, Colletotrichum sp., Botrytis cinérea, Rhizopus sp., Penicillium sp., Monilia fructicola and Cladosporium fulvum. The selected fungal strains are fruit pathogens and many of them can infect fruit even after harvest.

Results: The results obtained show activity against fungi used as test organisms.

Conclusions: The inhibitory effect of the tepal extract on the tested fungi may extend the shelf life of treated fruit, maintaining them healthy for a longer period.

This research has been carried out under the frame of the European Project "SAFFROMFOOD-PRIMA (Partnership for Research and Innovation in the Mediterranean Area). Financial support was provided by Miguel Hernández University and Murcia University (Spain).

Conflict of Interest: All authors declare that they have no conflicts of interest.

Keywords: Saffron. Antimicrobial properties. By-products. Antifungal properties. Saffron flowers.

PC035**Nutritional and chemical characterization of Saffron and its floral by-products**

Pérez-Llasmás, F.¹; Cerdá-Bernad, D.²; Valero-Cases, E.²; García-Conesa, M. T.³; Frutos, M. J.²

¹Physiology Department, University of Murcia, Murcia, Spain;

²Agro-Food Technology Department, CIAGRO-UMH, University of Miguel Hernández, Orihuela, Spain; ³Food Science and Technology Department. CEBAS-CSIC. Murcia, Spain

Introduction: Crocus sativus L. is employed as a spice due to its organoleptic characteristics. For its production, only flower stigmas are used, containing well-known bioactive compounds (carotenoids, terpenes, and flavonoids), while tepals are simply discarded. Indeed, around 350 kg of tepals (230.000 flowers) are necessary to produce 1 kg of saffron. Considering that several hundred kilograms of saffron arrive to the market each year, the current production system is generating several hundreds of tons of tepal wastes, representing an enormous lack of profitability and sustainability.

Objectives: The main aim of this research was to contribute to the valorization of saffron and its floral by-products through the analysis of their main components to develop innovative high added-value food ingredients with new applications in the food industry that could potentially increase saffron demand on the market.

Methods: The proximal and dietary fibre composition, minerals and organic acids, and sugar contents were determined in saffron stigmas and saffron flowers.

Results: The results showed that saffron and its floral by-products presented a high content of total dietary fibre (17-26%), and carbohydrates (65-76%) as the most abundant macronutrient, followed by proteins (8-13%) and the lowest content in fat (4-7%). Regarding soluble sugars and organic acids content, saffron and its floral by-products presented a high concentration of glucose, fructose, lactic and malic acids.

Conclusions: This research provides new information about the composition of saffron and its floral by-products, which could be considered as promising bioactive healthy ingredients for the development of functional food products.

This research has been carried out under the frame of the European Project "SAFFROMFOOD-PRIMA (Partnership for Research and Innovation in the Mediterranean Area). Financial support was provided by Miguel Hernández University and Murcia University (Spain).

Conflict of Interest: All authors declare that they have no conflicts of interest.

Keywords: Saffron. By-products. Saffron flowers. Nutritional characterization. Functional foods.

PC036**Fatty acid profile and bioactive compounds of Saffron by-products**

Pérez-Llasmás, F.¹; Vicente, J. J.²; Cano, A.²; Hernández-Ruiz, J.²; Cerdá-Bernad, D.³; Frutos, M. J.³; Candela, M. E.²; Arnao, M. B.²

¹Physiology Department, University of Murcia, Murcia, Spain;

²Plant Biology Department, University of Murcia, Murcia, Spain;

³Agro-Food Technology Department, CIAGRO-UMH, University of Miguel Hernández, Orihuela, Spain

Introduction: Saffron is an expensive spice that comes from the dehydrated stigmas of the pistil of the flower of *Crocus sativus* L., whereas petals along with other parts of the plant are discarded. This generates large amounts of floral bio-residues that are thrown away or used as fertilizer for crops, even though they may still contain bioactive compounds of great interest.

Objectives: Characterization of the by-products of saffron processing in terms of Fatty acid profile and content of bio-active compounds, and their possible use to obtain foodstuffs with high added value.

Methods: Fatty acid composition was analyzed by gas chromatograph. The bioactive capacity of by-products was determined measuring the content of total phenols, total flavonoids, and the hydrophilic and lipophilic antioxidant activities, through bi-phasic extractions with phosphate buffer and ethyl acetate.

Results: Saffron by-products showed a high content of polyunsaturated fatty acids (n-6 and n-3 fatty acids) and a lower content of saturated fatty acids, being linoleic acid (C18:2n6) the major one found. Saffron by-products have a higher content of phenols and flavonoids in the hydrophilic phase (pH 7.0) than in the lipophilic medium, so the greatest antioxidant activity is found in the hydrophilic medium, with less significant lipophilic antioxidant activity. Practically the total antioxidant activity observed is due to water-soluble compounds.

Conclusions: Saffron by-products still are an important source of bioactive compounds with mainly hydrophilic antioxidant activity, and with an acceptable Fatty acid composition, specialty essential fatty acids, so that could provide additional value in elaborated food or preserve their nutritional values.

Conflict of Interest: All authors declare that they have no conflicts of interest. This research has been carried out under the frame of the European Project "SAFFROMFOOD-PRIMA (Partnership for Research and Innovation in the Mediterranean Area). Financial support was provided by Miguel Hernández University and Murcia University (Spain).

Keywords: Fatty acids. Bioactive compounds. Saffron by-products. Saffron flowers. Functional foods.

PC038**Early life factors associated with lean body mass in Spanish children: The calina study**

Córdoba-Rodríguez, D. P.^{1,2}; Iglesia, I.¹; Guillén, C.¹; Gómez-Bruton, A.³; Álvarez-Sauras, M. L.¹; Miguel-Berges, M. L.³; Flores-Barrantes, P.³; Moreno, L. A.³; Rodríguez-Martínez, G.⁴

¹Instituto de Investigación Sanitaria de Aragón. Zaragoza.

España; ²Departamento de Nutrición y Bioquímica. Facultad de Ciencias. Pontificia Universidad Javeriana. Bogotá DC, Colombia;

³Exercise, Nutrition and Development (GENUD) Research Group, Universidad de Zaragoza, Instituto Agroalimentario de Aragón (IA2). Zaragoza. España; ⁴Departamento de Pediatría. Facultad de Medicina. Universidad de Zaragoza. Zaragoza. España

Introduction: Prenatal and early postnatal period are critical for the programming of later health and this includes body composition. Literature links perinatal factors with fat mass development and its future effects while less evidence exists with lean body mass (LBM).

Objectives: We investigated the association between early life factors with LBM and limb strength in a cohort of Spanish children.

Methods: 416 children participating in the CALINA study were evaluated at birth and at 6-8 years of follow-up. Parental origin/nutritional status, maternal smoking during pregnancy, gestational diabetes, gestational weight gain, gestational age, birth weight, early feeding, and rapid weight gain (RWG) were collected through Primary care records. Fat-free mass index (FFMI), total lean soft tissue mass index (TLSTMI), muscle cross-sectional area index (MCSAI) and limb strength, were assessed using bioimpedance analysis, dual-energy X-ray absorptiometry, peripheral quantitative computed tomography, handgrip/standing long jump test, respectively when children were 6-8 years.

Results: Positive associations were observed in girls between maternal smoking ($\beta=0.163$; $\beta=0.238$), gestational age ($\beta=0.162$; $\beta=0.230$), and birth weight ($\beta=0.170$; $\beta=0.276$) with FFMI/TLSTMI, respectively. In boys, maternal BMI ($\beta=0.175$) and RWG ($\beta=0.182$) were associated with FFMI; also paternal BMI ($\beta=0.185$) and birth weight ($\beta=0.226$) with MCSAI. Birth weight was associated with handgrip strength in both sexes. Maternal BMI in girls ($\beta=-0.169$) and RWG in boys ($\beta=-0.308$) were negatively associated with horizontal jump (all $p < .05$).

Conclusions: Early life programming effect variables have an important role in determining LBM and limb strength in childhood and subsequently in later life health. As there is few evidence in this respect, this topic requires higher research in future studies.

Conflict of Interest: Authors declare no conflict of interest.

Keywords: Perinatal factors. Lean mass. Children.

PC039

Glutlearn: Celiac disease on instagram

Vázquez-Polo, M.; Matías, S.; Perez-Junkera, G.; Lasa, A.; Larretxi, I.; Bustamante, M. A.; Navarro, V.; Txurruka, I.

GLUTEN3S Research Group, Department of Nutrition and Food Science, University of the Basque Country (UPV/EHU), Vitoria-Gasteiz 01006, Spain

Introduction: Celiac Disease (CD) is a common chronic intestinal pathology with an estimated prevalence of 1-2% and the only treatment is a strict, lifelong gluten-free diet (GFD). The GFD must be safe and balanced, but adherence to the diet is complicated because it greatly influences the patient's social life. Therefore, people with CD often seek information on social networks.

Objectives: Unfortunately, social networks provide information that is often outdated or scientifically questionable. For this reason, a nutritional education program about CD to share on Instagram (GLUTLEARN) was designed. The aim of this work was to study whether GLUTLEARN was able to increase knowledge about CD and GFD in celiac patients and in people close to them.

Methods: The GLUTLEARN program was performed through Instagram for a month. Each day a post was shared on Instagram and a Whatsapp message was sent to the participants to inform them. The content was divided into 5 blocks, selected on the basis of a previous survey on the needs of these patients and their families: general concepts about CD (block 1), nutritionally balanced gluten-free diet (block 2), food labels (block 3), cross-contamination (block 4), new research in CD and interesting resources (block 5). Participants were recruited by sharing some posts about GLUTLEARN in social networks, and they completed a questionnaire before starting the program and another one at the end of the program. More than 150 people agreed to participate in the program.

Results and Conclusions: GLUTLEARN program was able to respond to doubts and misunderstandings about CD in a rapid and effective way, gave the chance to share emotions and experiences about their daily life, and was useful for knowledge enhancement about CD and GFD. Participants thought that this kind of programs are necessary for a better adaptation to gluten-free life.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Celiac disease. Gluten-free diet. Nutrition education. Instagram. Social networks.

PC040

Delipidating effect of three algae extracts in cultured hepatocytes and the selection of the most effective for in vivo study

González-Arceo, M.¹; Gómez-Zorita, S.²; Aguirre, L.²; Trepiana, J.²; Portillo, M. P.²

¹Nutrition and Obesity Group, Department of Pharmacy and Food Science. Faculty of Pharmacy. UPV/EHU. Vitoria-Gasteiz. Spain; ²Nutrition and Obesity Group, Department of Pharmacy and Food Science, UPV/EHU, Vitoria-Gasteiz. Spain. Bioaraba Health Research Centre. Vitoria-Gasteiz. Spain. CIBERobn, ISCIII

Introduction: Liver steatosis is defined as an excessive intrahepatic fat accumulation. Algae, rich in bioactive compounds, may be potential candidates to develop new therapeutic approaches.

Objectives: The study aimed to assess the effect of *Chlorella vulgaris*, *Nannochloropsis gaditana* and *Gracilaria vermiculophylla* extracts on lipid accumulation in cultured hepatocytes and to select the best alga to study its effect in vivo.

Methods: For the in vitro experiments, AML12 hepatocytes were incubated with palmitic acid and co-incubated with the three algae extracts (10, 25, 50, 150 µg/mL) for 18 hours. Cell viability and triglyceride content were assessed spectrophotometrically. For the in vivo experiment, 36 male obese Zucker rats were assigned to 4 groups and fed a standard diet supplemented or not with 2.5% or 5% of the selected alga for 6 weeks, one group being a pair-fed. 9 lean Zucker rats were used as a healthy control. Serum parameters as well as hepatic triglyceride levels were determined using commercial kits.

Results: Based on the results obtained from in vitro experiments, *Gracilaria vermiculophylla* was selected to carry out the in vivo study. In the in vivo section, no changes were observed in food intake between the low-dose group and the obese control, however, the high-dose group reduced its intake; consequently, a pair-fed group was included. Serum triglyceride, ALT and NEFA were not modified by the alga supplementation, whereas AST increased in the low dose group and ALP in both algae groups. Regarding hepatic triglycerides, there were no differences between algae groups and their corresponding controls.

Conclusions: Although *Gracilaria vermiculophylla* was the most effective alga in preventing in vitro hepatocyte lipid accumulation with the majority of the doses analyzed, it did not avoid hepatic lipid accumulation in vivo. Nevertheless, additional determinations are needed to get more solid conclusions.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Algae. Steatosis. Hepatocytes. Zucker rat.

PC043**Dietary intakes and nutritional changes during the COVID-19 pandemic according to the household food consumption panel**

Rodríguez, P.¹; de Tomas, I.²; Ávila, J. M.¹; Leis, R.³

¹Spanish Nutrition Foundation (FEN). Madrid, Spain; ²Spanish Nutrition Foundation (FEN). Madrid, Spain. Department of Nutrition and Food Science. Faculty of Pharmacy. Complutense University of Madrid. Madrid. Spain; ³Spanish Nutrition Foundation (FEN). Madrid. Spain Pediatric Nutrition Research Group, Health Research Institute of Santiago de Compostela, (IDIS). Santiago de Compostela, Spain

Introduction: The Household Food Consumption Panel (HFCEP), carried out by the Spanish Ministry of Agriculture, Fisheries and Food, collects information on all food and beverages bought or acquired for the household. The project is focused on the food consumption carried out in households, being a useful tool to evaluate the diet. Also, it allows to know the nutritional status of the population and helps to identify dietary patterns, as well as their evolution.

Objectives: to analyze dietary patterns and nutrients intake in Spanish households, also to compare changes in purchases during 2019-2020.

Methods: This study is based on food consumption in Spanish households; the data sample consisted of consumption and distribution data, obtained from the HFCEP. Purchase data are transformed by VD-FEN2.3 software into energy and nutrients and are compared to Spanish Intake Recommendations.

Results: The main change that can be observed between 2019 and 2020 is an increased consumption of all food groups, the most significant being: sauces and condiments (+30.6%), alcoholic beverages (+26.8%) and appetizers (+18.9%), followed by eggs (+16.8%), pulses (+16.2%) and oils and fats (+14.1%). Energy intake was also increased (+229 kcal). Regarding minerals and vitamins an increase in all nutrients intake can be observed. However, intake of several nutrients does not reach 80% of the recommended dietary intakes for the Spanish population: iodine (67%-2019 and 73%-2020), zinc (57%-2019 and 63%-2020), folates (51%-2019 and 59%-2020) and vitamin D (51%-2019 and 59%-2020) (requirements: 20-39 year-old male/ moderate intensity of physical activity).

Conclusions: The results show that food purchase patterns changed during the pandemic year, we observed an improvement in some recommended intakes, but in others, such as iodine, zinc, folates and vitamin D, the recommended values were not reached. We must continue to improve the quality of the diet by promoting a healthy diet to get closer to the recommended intakes.

Conflict of Interest: None.

Keywords: Intake recommendations. Energy intake. Dietary patterns. Food consumption. Nutritional status.

PC045**Nutrition education: Balanced, safe and inclusive gluten-free diet**

Vázquez-Polo, M.; Pérez-Junkera, G.; Lasa, A.; Larretxi, I.; Simón, E.; Cantero, L.; Txurruka, I.; Navarro, V.

GLUTEN3S Research Group, Department of Nutrition and Food Science, University of the Basque Country (UPV/EHU), Vitoria-Gasteiz 01006, Spain

Introduction: The GLUTEN3S research group aims to improve the health and quality of life of the celiac community. The way to achieve it is the specific education of the general population, the patient and people around them.

Objectives: Therefore, the objective of this project is to develop Nutrition Education. It promotes: 1) the social inclusion of the celiac population by raising the awareness of the general population and 2) the improvement of the current diet of the general population and of people with celiac disease.

Methods: This is a complete knowledge transfer program, since the content of the interventions is based on GLUTEN3S research results. A series of activities have been designed to complete the program: a) workshops in schools based on Inquiry Based Learning (IBL) methodology, which includes an augmented reality application focused on an experimental point of view, b) cooking workshops in the family environment, c) workshops for future catering sector workers in the vocational training setting, d) workshops in the setting of scientific fairs, e) scientific dissemination through social networks.

Results: These activities are now being carried out. 150 persons participated in face to face activities, and more than 100 in social networks so far. The program is being evaluated through specific questionnaires, and the results obtained to date are promising, which encourages us to continue in this challenge.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Celiac disease. Balanced diet. Gluten-free diet. Nutrition education.

PC047**Nutritional composition of gluten-free bread and bread products. A spotlight on fat, sugars, and salt**

Alonso-Appete, E.; Rebollo, C.; Martínez-Rodríguez, M.; Fajardo, V.; González, M. P.; Samaniego-Vaesen, M.; Achón, M.; Úbeda, N.

Food and Nutrition in Health Promotion. Departamento de Ciencias Farmacéuticas y de la Salud, Facultad de Farmacia, Universidad San Pablo-CEU, CEU Universities, Madrid, España

Introduction: Gluten is an important constituent of foods made from cereal grains, which if removed, can negatively affect the unique viscoelastic integrity of staple foods such as bread. That is the reason why breads manufactured without gluten require the utilization of additional ingredients that may affect nutritional composition of the end products.

Objectives: The aim of this study is to compare nutritional composition of gluten-free (GF) bread and bread products with regular bread.

Methods: Nutritional information declared on packaging from a total of 152 GF bread and bread products was compared with a total of 49 products selected from food composition databases and a total of 138 matched analogue regular products.

Results: When comparing with data published in food composition databases, leavened GF breads contained 35% more fat than regular, and saturated fat content was also significantly higher. No differences were found for carbohydrates or sugars, but protein content was almost three-fold smaller. On the contrary, unleavened bread, crisp breads and rusks contained a significantly lower amount of fat. When comparing with matched analogue regular products, leavened GF breads contained more fat (46%), saturated fat, sugars, fiber, and salt, but less protein (9,3 g/100 g product vs 2,2 g/100 g product). Unleavened products contained similar content of fat, but more carbohydrates and fiber.

Conclusions: Because of a higher content of fat and saturated fat, sugars, and salt, commercial GF bread and bread products may contribute negatively to the adequacy of gluten free diets, especially when taken daily. Fat, sugar, and salt reduction are proposed as a reformulation challenge.

Conflict of Interest: The authors declare no conflicts of interest.

Keywords: Gluten free. Bread. Fat. Sugars. Salt.

PC048

Fortification of gluten free products in Spain. An opportunity for folic acid

Alonso-Aperte, E.¹; Benedito, C.¹; Martínez-Rodríguez, M.¹; Ballesteros, C.¹; de la Iglesia, R.¹; Fajardo, V.¹; Purificación-González, M.¹; Úbeda, N.¹

¹Food and Nutrition in Health Promotion. Departamento de Ciencias Farmacéuticas y de la Salud, Facultad de Farmacia, Universidad San Pablo-CEU, CEU Universities, Madrid, España

Introduction: Folate deficiency is frequently associated with celiac disease (CD), even after long term adherence to a gluten free diet. Commercial cereal-based gluten-free products (GFPs) are helpful resources for individuals avoiding gluten, especially children and adolescents. However, very little is known about their micronutrient content.

Objectives: The aim of the study is to assess current fortification practices on GFPs, and to estimate the contribution of a two-level (60 and 280 µg folic acid/100 g food) fortification strategy on folate intakes of children and adolescents with CD.

Methods: Fortified GFPs were identified using information on package labels (ingredient list, claims, and nutritional information). Data on dietary intake and GFP consumption, both commercial and homemade, was taken from a previous cross-sectional study on 70 children and adolescents (50% female; 80% children; 20% adolescent) with CD on a long-term gluten free diet. Diets were assessed using three 24-h dietary records.

Results: From a total of 630 GFPs marketed in Spain, only ten products (1.6%), namely breakfast cereals, declared the addition of

B vitamins, calcium, iron and/or vitamin D. As compared to age and gender matched controls, children and adolescents with CD had significantly lower daily folate intakes, which were also below 80% of recommended intakes, and especially low between adolescents. When applying a 60µg folic acid/100g food fortification to actual cereal based GFP intakes, median adequacy to recommended intakes reached 123%, and only 16% of children and adolescents reached upper levels. The high fortification level (280µg folic acid/100 g food) poses a high risk of surpassing upper levels.

Conclusions: Fortification of GFPs warrants further consideration. A 60 µg of folic acid /100 g of food level of fortification would increase intakes within dietary reference values in children and adolescents with CD.

Conflict of Interest: The authors declare no conflicts of interest.

Keywords: Fortification. Gluten free. Folate. Children. Adolescents.

PC049

Maternal serum fatty acid profile at delivery is affected by pre-pregnancy BMI. Results from NELA, a prospective mother-offspring cohort

Sánchez-Martínez, M.¹; Gázquez, A.²; Prieto-Sánchez, M. T.³; Martínez-Graciá, C.⁴; Ballesteros-Meseguer, C.³; Santaella-Pascual, M.⁴; García-Marcos, L.⁵; Larqué, E.² and The NELA Study Group

¹Department of Physiology, University of Murcia, 30100 Murcia, Spain; ²Department of Physiology, Biomedical Research Institute of Murcia (IMIB), University of Murcia, Murcia, Spain; ³Obstetrics & Gynaecology Service, "Virgen de la Arrixaca" University Clinical Hospital, Biomedical Research Institute of Murcia (IMIB), University of Murcia, Murcia, Spain; ⁴Food Science and Technology Department, Faculty of Veterinary, Biomedical Research Institute of Murcia (IMIB), University of Murcia, Murcia, Spain; ⁵Network of Asthma and Adverse and Allergic Reactions (ARADyAL), Madrid and Biomedical Research Institute of Murcia (IMIB), University of Murcia, Murcia, Spain

Introduction: Obesity may produce an altered blood lipid profile. Fatty acids (FA) transfer from maternal circulation to the fetus can be modified by structural changes in the placenta associated to maternal obesity. This process is of special importance in the case of essential n-3 long-chain polyunsaturated FA (LC-PUFA), which may influence fetal neurodevelopment. Nevertheless, studies on FA profile in obese pregnant women from a Mediterranean cohort are scarce.

Objectives: Our aim was to evaluate the effects of pre-pregnancy body mass index (BMI) on maternal serum FA composition at delivery in a Mediterranean population.

Methods: Serum samples were collected at delivery in 69 normal pre-pregnancy weight (BMI 20-25 kg/m²), 27 overweight (BMI 25-30 kg/m²) and 27 obese women (BMI >30 kg/m²) from the Nutrition in Early Life and Asthma cohort (NELA), a prospective population-based birth cohort set up in Murcia. FA were analyzed by gas chromatography.

Results: Obese women tended to lower docosahexaenoic acid (DHA, 22:6 n-3) percentage in serum than those in lean or overweight women before pregnancy. In contrast, n-6 polyunsaturated FA (PUFA), including arachidonic acid (20:4 n-6), and n-6/n-3 PUFA ratio were higher in obese pregnant women compared to normal weight and overweight ones.

Conclusions: Maternal serum fatty acid profile at delivery is modified by pre-pregnancy BMI, especially in the case of n-3 PUFA in obese women. The consequences of these alterations in fetal development or later offspring health need further study. An additional n-3 PUFA dietary intake in obese mothers might be appropriate to promote a healthier FA serum profile.

Conflict of Interest: All authors declare no conflicts of interest.

Keywords: Fatty acid. Docosahexaenoic acid. Pregnancy. Obesity.

PC052

Knowledge and perceptions of food sustainability and healthy dietary patterns in a sample of a university population

Celorio, R.¹; de Moraes, C.¹; Comas, O.¹; Latorre, M. L.¹; Aguilera, M. C.²; Puig, M.³; Vidal, M. C.¹

¹Departamento de Nutrición, Ciencias de la Alimentación y Gastronomía UB; ²Departamento de Cognición, Desarrollo y Psicología de la Educación UB; ³Departamento de Enfermería de Salud Pública, Salud Mental y Materno-infantil UB

Introduction: The UN's Sustainable Development Goals (SDGs) are an urgent call for action to all countries to improve the future of people and the planet. Besides tackling climate change and the fight to reduce inequality, the SDGs are also focused to develop strategies to foster a healthy diet and food sustainability. The University of Barcelona (UB), with approximately 70.000 members, is one of the largest universities in Spain and is strongly committed to the achievement of the SDGs.

Objectives: An online survey was conducted to analyse the knowledge and perceptions of the UB community in regard to food sustainability and healthy dietary patterns.

Methods: This was a cross-sectional study with convenience sampling based on a Google Forms online questionnaire. The survey included 28 items and was distributed among the whole UB community using institutional mailing lists. Each item was firstly validated by a pool of experts in sociology, nutrition, economy, anthropology and public health.

Results: A total of 1223 participants completed the survey; the majority were females (67%) and 20% were students. Almost all of them heard about the environmental impact of food, with more than 60% of the study population aware of the existence of the SDGs. The different aspects related to food and diet that concerned them the most were food waste, plastic usage and environmental impact. According to their opinion, a sustainable diet should be mainly based on local and seasonal products, respect for the ecosystem biodiversity and a low environmental impact as well as no or minimal food waste. 77% reported frequently following a

sustainable diet. 90% stated that a healthy diet corresponds to some extent to a sustainable diet.

Conclusions: Relevant knowledge in food sustainability was observed from the UB community. Nonetheless, further initiatives must be implemented to increase even more this knowledge as well as to raise awareness.

Conflict of Interest: None.

Keywords: Sustainability. University population. Food waste. SDGs. Perception.

PC055

The incorporation of environmental sustainability criteria in catalonia's food-based dietary guidelines

Manera, M.; Salvador, G.; Castell, C.; Cabezas, C.

Service for the Promotion of Healthy Living and Prevention of Chronic Non-communicable Diseases. Health Promotion Directorate. Public Health Agency of Catalonia (ASPCAT), Barcelona

Introduction: Diet is an important determinant of human health and environmental sustainability. Public administrations, in line with the United Nations Sustainable Development Goals (SDGs), have the responsibility to encourage, through food-based dietary guidelines, a sustainable food system that guarantees food security and nutrition for all people without putting at risk the economic, social and environmental basis for future generations.

Objectives: Present the environmental sustainability recommendations of the Catalan food-based dietary guidelines.

Methods: 1. Two people separately read the guidelines "Small changes to eat better" (2018) (A) and "Healthy eating in the school stage" (2020) (B) and selected the contents related to environment. 2. The selected topics were shared between the researchers. 3. A consent was reached.

Results: In the two guides a total of 85 references on environmental issues were found, with a 90% coincidence between the reviewers.

Food sustainability concepts included in the guides were:

- SDG (A,B) and report of the Advisory Council on Sustainable Development (B).
- More vegetables, less animals (A,B).
- More fresh seasonal and local food (A,B).
- Definitions of "sustainability" (B), "local food" (A,B), "seasonal food" (A,B), "unprocessed, processed and ultra-processed food" (A,B).
- Labeling and badges (A).
- Seasonal calendars (A,B).
- Examples of seasonal foods' menus (B).
- Less ultra-processed food (A,B).
- Food waste (A,B).
- Active displacements (A,B).
- Buy from producers, cooperatives, markets, neighborhood stores (A).
- Buy in bulk (A,B)).
- Recycling (A,B).
- Recyclable, reusable, recycled packaging (A,B).
- Reduction of single-use and individual packaging (B).

- Energy and water savings (A).
- Tap water (A,B).
- Organic food (A,B).
- Vegetarian diets (B).
- Sustainable fishing (B).

Conclusions: The latest catalan food-based guidelines include multiple concepts and recommendations in order to promote a healthy and sustainable diet among its population.

Conflict of Interest: We declare no conflict of interest.

Keywords: Dietary guidelines. Sustainability. One health. Dietary pattern.

PC060

Lifestyle and healthy habits in children in the city of madrid during the COVID-19 pandemic: The longitudinal asomad study

Portals-Riomañó, A.¹; López-Seoane, J.¹; Nehari, A.¹; Arévalo-Pantoja, L.²; Gesteiro, E.¹; Quesada-González, C.³; González-Gross, M.¹; Zapico, A. G.⁴

¹Grupo de Investigación ImFINE. Departamento de Salud y Rendimiento Humano. Universidad Politécnica de Madrid. Madrid. España; ² Universidad Politécnica de Madrid; ³Grupo de Investigación ImFINE. Departamento de Matemática Aplica a la Tecnologías de Información y las Comunicaciones. Universidad Politécnica de Madrid. Madrid. España; ⁴Grupo de Investigación ImFINE. Departamento de Didáctica de las Lenguas, Artes y Educación Física. Universidad Complutense de Madrid. Madrid. España

Introduction: COVID-19 has seriously affected the quality of life of children due to the restrictions imposed to control the pandemia.

Objectives: To analyse healthy lifestyle levels during the course of the pandemic in the city of Madrid in 20 schools with a representative sample of children aged 8 to 12.

Methods: Body composition was measured by BIA (TANITA DC-240MA, Japan). Diet quality, physical activity (PA), sleep measurements, and emotional well-being were measured by validated questionnaires (KIDMED Index, PAU-7S, BEARS9/SHSA8 and KIDSCREEN-10, respectively). Data were collected twice, 1 year apart, winter 2020/21 and winter 2021/22.

Results: Excess weight according to the International Obesity Task Force (IOTF) affected 32% (22.4% overweight and 9.6% obese) of children in 2021 and 35.3% (19.1% overweight and 16.2% obese) in 2022. Compliance with WHO PA recommendations for moderate/vigorous PA were 32.8% in 2021 and 31.6% in 2022. Children fulfilling recommendations for screen use were 36.2% and 31.4% during the week, for 2021 and 2022, respectively; however, screen use was higher at weekends (71.8% vs 67.7%, respectively) in 2022 than in 2021. While in 2021, 72% of school children met the recommended hours of sleep, there was a slight decrease (70.5%) in 2022. Adherence to the Mediterranean diet decreased between 2021 and 2022 periods both in those at medium and low adherence profile (48.2% vs 43.9% and 8.9% vs 5.7%, respectively). Emotional well-being and quality of life were within reference

values over the two years, although 49% reported feeling sad in 2021 compared to 52% in 2022.

Conclusions: A tendency to worsening was observed in all analysed parameters except for weekly screen use. Urgent public health measures are needed to reduce the impact of the pandemic on children's health.

Conflict of Interest: None. Funding: Agreement between UPM and Area Delegada de Deportes, Ayuntamiento de Madrid.

Keywords: Healthy habits. Childhood excess weight. Adherence. Screen time. Sleep time.

PC061

Characterization of honeys from the Sierra Nevada National Park. Optimization of variables that influence its quality and antimicrobial properties

Palma, M.¹; Abril, M.²; Rodríguez, C.¹; Huertas, J. R.¹

¹Instituto de Nutrición y Tecnología de Alimentos. Centro de Investigación Biomédica. Universidad de Granada. Granada. España; ²FEYSOL Nature. Escúzar, Granada. España

Introduction: Honeys have different biological activities within the organism including antimicrobial properties which have been associated with its content in phenolic compounds. This content, however, varies depending on the botanical origin and the region of collection, thus, influencing its antimicrobial effect.

Objectives: Our aims are to characterize the content of phenolic compounds and oligosaccharides to correlate them with the antimicrobial properties of different honeys from the Sierra Nevada National Park (Granada); and to identify and control the botanical origin variables and the external and process factors that might affect the quality of the honeys, thus influencing their beneficial properties.

Methods: Variables of botanical origin have been identified at the sites where the hives are installed. Currently, the hives and climatic conditions are being monitored. Physicochemical analyses of the honeys will be carried out, and the characterization of phenolic compounds will be performed by liquid chromatography quadrupole time-of-flight mass spectrometry (LC-QToF-MS). Moreover, a temperature-controlled stability study will be carried out at 10°C and 25°C.

Results: The phenolic compounds present in the different honeys will be characterized. Data generated by hive monitoring systems and factory staff will be analyzed and correlated with honey characterization data. This will allow the definition of the optimal botanical and process variables necessary to maximize the beneficial properties of the honeys. Optimal storage conditions for the product will also be determined.

Conclusions: Since the hives are located at about 2000 meters altitude, it is expected, on one hand, that the abiotic stress maximize the phenolic content and, on the other hand, it minimizes the possible content of endocrine disruptors such as pesticides, which are present at lower altitudes. Furthermore, the use of LC-QToF-MS will allow to perform a comprehensive characterization that might help in the characterization of bioactive compounds for the first time in honeys.

Conflict of Interest: The authors declare no conflicts of interest.

Keywords: Honey. Phenolic compounds. Antimicrobial properties. LC/MS Q-TOF.

PC062

Breakfast consumption and its relationship with different diet quality indices and adherence to mediterranean diet score in European adolescents. Helena-study

Gimenez-Legarre, N.¹; Santaliestra-Pasías, A. M.¹; de Henauw, E.²; González-Gross, M.³; Karaglani, E.⁴; Sjöström, M.⁵; Widhalm, K.⁶; Moreno, L. A.¹

¹GENUD (Growth, Exercise, Nutrition and Development) Research Group, Facultad de Ciencias de la Salud, Universidad de Zaragoza, Zaragoza (España); ²Department of Public Health, Ghent University, Ghent, Belgium; ³ImFine Research Group, Department of Health and Human Performance, Universidad Politécnica de Madrid; ⁴Department of Nutrition and Dietetics, School of Health Science and Education, Harokopio University, Athens, Greece; ⁵Unit for Preventive Nutrition, Department of Biosciences and Nutrition at NOVUM, Karolinska Institutet, Huddinge; Sweden; ⁶Division Gastroenterology and Hepatology, Dept. Med II, MedUniv Vienna

Introduction: Breakfast is considered as a key component of a healthy diet. The vast majority of the population consumes breakfast regularly, except during adolescence. However, adolescents who reported regular breakfast consumption had healthier lifestyle patterns in comparison to breakfast skippers.

Objectives: The aim of the current study is to analyze the associations between breakfast consumption and adherence to diet quality index (DQI) and Mediterranean Diet Score (MDS) in European adolescents.

Methods: A multinational cross-sectional study was carried out in 1804 adolescents aged 12.5-17.5 years. The Food Choices and Preferences questionnaire was used to ascertain breakfast consumption (consumers, occasional consumers and skippers), and two non-consecutive 24h dietary recalls were used to estimate the total daily intake and to calculate the subsequent Diet quality index (DQI) and Mediterranean Diet Score (MDS). Mixed linear regression models were used to examine the relationship between breakfast consumption and DQI-A and MDS. Age, maternal education, BMI, country and total energy intake were included as covariates.

Results: In both sexes, significant differences were observed among the breakfast consumption categories. In both boys and girls, breakfast consumers had significantly higher DQI indices than those adolescents who skipped breakfast regularly ($p < 0.001$). Regarding total MDS, in both boys and girls, breakfast consumers had a higher total MDS than breakfast skippers ($p < 0.001$), however, no associations were shown between occasional breakfast consumers and DQI indices and MDS.

Conclusions: Breakfast consumption has been linked with better dietary quality scores compared with those children who

usually skip breakfast. Promotion of regular breakfast consumption in adolescents could be an effective strategy to improve the overall diet quality.

Conflict of Interest: Authors declare no conflict of interest.

Keywords: Diet quality. Mediterranean diet. Diet. Adolescents. Breakfast.

PC066

Effect of carob fruit - extract metabolites on HEPG2 cell viability

Camporesi, G.¹; Macho-González, A.¹; Sánchez-Muniz, F.¹; Benedi, J.²; Garcimartin, A.²

¹Department of Nutrition and Bromatology. Complutense University of Madrid. Madrid. Spain; ²Department of Pharmacology, Pharmacognosy and Botany. Complutense University of Madrid. Madrid. Spain

Introduction: In previous works Carob fruit-extract (CFE) enriched meat was found to diminish hepatic steatosis in an animal model (Wistar rats) with induced T2DM. The activation of autophagy mechanisms may be a part of this effect. Four proanthocyanidins (3-HA, 3-Hydroxyphenylacetic acid; 3,4-HA, 3,4-Dihydroxyphenylacetic acid; 3-HP, 3-Phenylpropionic acid; 3,4-DC, 3,4-Dihydroxyhydrocinnamic acid) are among the metabolites of CFE produced in colon that reach the liver. These CFE metabolites may have an effect on autophagy activity.

Objectives: The objective of this work is to evaluate the effect on cell viability of these CFE metabolites in the presence of hydrogen peroxide and to determine the optimal concentration.

Methods: This in vitro study was made in HepG2 cells that were treated in RPMI 1%FBS with 5 μ M, 10 μ M, 50 μ M and 100 μ M of each metabolite only and with H₂O₂ 150 μ M only. A second treatment was made with metabolites at the same concentrations together with H₂O₂ 150 μ M. The experiments were conducted with a 4h and 24h treatment and cell viability was measured through an MTT assay.

Results: In the 24h treatment with metabolites and H₂O₂ all metabolites led to a significant increase in cell viability (ANOVA at least $p = 0.0004$), compared with H₂O₂ alone. Differences between metabolites concentrations were not significant for 3-HP and 3,4-HA while for 3-HA and 3,4-DC a significant difference between different concentrations was detected. On the other hand, the 4h treatment with metabolites and H₂O₂ did not result in a significant difference in cell viability compared with the treatment with H₂O₂ alone.

Conclusions: In conclusion, the treatment with CFE metabolites resulted in a significant increase of cell viability in the presence of H₂O₂. This result permits to justify further studies on the effects of CFE metabolites on autophagy activity in the liver.

Conflict of Interest: The Authors declare that there is no conflict of interest.

Keywords: Proanthocyanidins. Carob fruit. Functional food. Antioxidant. Autophagy.

PC067**Nutritional benefits of donkey milk**

Albertos, L.¹; López, M.²; Jiménez, J. M.²; Cao, M. J.²; Corell, A.³; Castro-Alija, M. J.²

¹Universidad Católica de Ávila (UCAV), Calle Canteros s/n, 05005, Ávila, España; ²Recognized Research Group: Assessment and Multidisciplinary Intervention in Health Care and Sustainable Lifestyles of the University of Valladolid; ³Immunology Department, Valladolid University, Spain

Introduction: The Zamorano-Leonese donkey is the local breed of the Castilla y León region of Spain and is a protected endangered species. The best way to preserve it is to explore viable alternatives such as milk production.

Objectives: The aim of this work is the nutritional characterization of donkey milk and its comparison with other milks.

Methods: Fat content was determined using Röse-Gottlieb method. The fatty profile of this extract was carried out by gas chromatography.

Protein fraction of defatted milk sample was characterized using polyacrylamide gel electrophoresis.

Results: The fat content of donkey milk is lower than other milks such as cow's milk, goat's milk, camel's milk, sheep milk or human milk. Zamorano-Leonese milk, despite its low-fat content, stands out for its richness in polyunsaturated fatty acids, mainly ω -3 fatty acids (alpha-linolenic acid (ALA), docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA). Donkey milk has lower concentration of saturated fatty acids than other milks. This fatty acid profile has health implications.

Regarding the protein fraction, β -lactoglobulin content in donkey milk is lower than found in cow's milk. This protein is considered the major allergen in cow's milk. Furthermore, donkey milk has higher lactoferrin and lysozyme concentration than other milks. These compounds have an important antibacterial function.

Conclusions: In conclusion, donkey milk has nutritional benefits in comparison with other milks. It can be consumed as functional food or ingredient for the formulation of new matrices.

Conflict of Interest: None.

Keywords: Donkey milk. Zamorano-Leonese Breed. Fatty acids. Protein.

PC068**Vacuum frying**

Albertos, L.¹; Castro, M. J.²

¹Universidad Católica de Ávila (UCAV), Calle Canteros s/n, 05005, Ávila, España; ²Recognized Research Group: Assessment and Multidisciplinary Intervention in Health Care and Sustainable Lifestyles of the University of Valladolid

Introduction: Vacuum frying is an alternative process to conventional frying, which is carried out under pressures below atmospheric level, preferably below 70 mbar. This pressure reduction allows diminishing the boiling point of the oil. The common

temperatures for frying at atmospheric pressure are 160-180 °C, while the optimum temperature for vacuum frying are between 100-110 °C.

Objectives: In this presentation, some developments with this technology will be present as vegetable chips (carrots, apples) or fish patties.

Methods: Vacuum fried carrots and apple snacks were prepared using vacuum frying process. Physicochemical, organoleptic and antioxidant parameters were evaluated in order to determine the effect of this technology on the final product and frying oil.

Furthermore, the effect of vacuum frying processing on proximate composition, fatty acid profile, oxidative status and sensorial properties of fish patties was evaluated as compared with conventional (atmospheric) frying.

Results: In vegetable chips, vacuum frying allows the design of new products with better nutritional and sensorial properties than atmospheric frying. The applicability of vacuum frying technology on fish patties prevented colour changes, improved juiciness and reduced oxidation. The vacuum frying protected from omega 3 (EPA and DHA) degradation.

Conclusions: This gastronomy technique allows the preservation of natural colour and flavour and nutritional compounds. Other advantages included the reduction of adverse effects on oil quality and negative compounds for health such as acrylamide formation.

Conflict of Interest: None.

Keywords: Vacuum frying. Deep frying. Oxidation. Nutritional compounds.

PC069**Development of gluten-free bread with sourdough enriched with encapsulated and unencapsulated microalgae**

Peñalver, R.¹; Martínez, L.¹; Ros, G.¹; Lorenzo, J.²; Nieto, G.¹

¹Departamento de Tecnología de los Alimentos, Nutrición y Bromatología. Facultad de Veterinaria. Universidad de Murcia. Murcia, España; ²Área de Desarrollo de Nuevos Productos, Procesos y Envasado de Alimentos. Fundación Centro Tecnológico da Carne. Ourense, España

Introduction: It is estimated that 1% of the world's population suffers from coeliac disease. Coeliac disease is a chronic autoimmune enteropathy that is triggered by the ingestion of gluten. Most gluten-free products are high in carbohydrates and (saturated) lipids, therefore high in calories and saturated fat, and deficient in minerals, vitamins and fibre. Coeliac patients have health repercussions, including a higher prevalence of overweight and obesity, deficiencies in minerals and vitamins.

Objectives: Develop two different breads with sourdough enriched with *Spirulina platensis* and encapsulated *Spirulina platensis*, thus increasing the nutritional value.

Methods: Quinoa sourdough developed. This sourdough has been used to make three breads: control bread without the microalgae, *Spirulina platensis* without encapsulation and encapsulated *Spirulina platensis*. In the gluten-free breads developed, chickpea flour, amaranth flour and buckwheat flour have been used for their

nutritional composition, including bioactive components, antioxidant capacity, protein quality and minerals such as iron. The antioxidant capacity of the different breads was analysed using FRAP, ABTS, ORAC and phenolic compounds. In addition, the following were identified Ph, acidity, colour, nutritional composition and folate content of the different breads.

Results: Differences were observed between the enriched breads and the control bread: the bread with the encapsulated microalgae obtained higher results in ABTS and phenolic compounds, but the opposite was true for ORAC and ORAC. The nutritional values and folate were higher in the bread enriched with the microalgae than in the control.

Conclusions: Taking into account this study and previous studies, these types of bread would be a great contribution for the coeliac population due to the properties of the algae, in addition to the sourdough made with a pseudocereal (quinoa) with a very good protein quality, highlighting the influence of the sourdough in facilitating the absorption of minerals and digestion.

Conflict of Interest: No conflict of interest exists.

Keywords: Gluten-free bread. Sourdough. *Spirulina platensis*. Quinoa.

PC070

Effects of angelica archangelica supplementation on overactive bladder in men and women: A randomized, double-blind, placebo-controlled trial

López-Seoane, J.¹; Gesteiro, E.¹; Pantoja-Arévalo, L.¹; Quesada-González, C.²; Rueda-Laorga, J.¹; Portals-Riomas, A.¹; Castro, M. J.³; González-Gross, M.¹

¹ImFINE Research Group, Department of Health and Human Performance, Universidad Politécnica de Madrid, 28040 Madrid, Spain; ²ImFINE Research Group, Department of Mathematics Applied to Information and Communication Technologies, Universidad Politécnica de Madrid, 28040 Madrid, Spain; ³Faculty of Nursing, University of Valladolid, 47005 Valladolid, Spain

Introduction: Overactive bladder (OAB) is a syndrome of high prevalence worldwide, which presents symptoms such as polyuria, nocturia and urgent incontinence. As pharmacological treatment has low adherence, nutritional alternatives have emerged in order to improve OAB symptoms.

Objectives: To determine the effects of natural supplementation with *Angelica archangelica* (AA) on OAB symptoms.

Methods: Participants were enrolled in a 6-week, double-blind randomized placebo-controlled trial (ClinicalTrials.gov NCT04357223). The lower urinary tract symptoms questionnaire (ICIQ-MLUTS), International Prostate Symptom Score (IPSS) and a 3-day voiding diary were filled twice (baseline and at 6 weeks) to analyze the OAB symptomatology. Body composition was measured by bioimpedance (MC-780MA, Tanita, Tokyo, Japan). Statistical analysis was performed with SPSS 25.0 (IBM Corporation, Armonk, NY, USA). Normality was checked using Shapiro-Wilk tests and paired Kruskal-Wallis tests were used to assess post-intervention differences.

Results: A total of 53 participants, 28 males (47.04 ± 14.03 years) and 25 females (50.84 ± 11.12 years), were included. BMI levels were higher in men (25.78 ± 3.47 kg/m²) than women (24.5 ± 5.27 kg/m²). Regarding OAB symptomatology, there was a statistically significant reduction in the supplement group in the number of daily voids observed in the IPSS, ICIQ-MLUTS and the 3-day voiding diary, which could not be observed in the placebo group ($p = 0.001$), while nocturia improved almost significantly ($p = 0.061$). No differences were found in urgent incontinence. In addition, the quality of life measured in the IPSS improved in those participants of the intervention group ($p < 0.05$).

Conclusions: Supplementation with AA improved significantly polyuria and showed a positive trend for nocturia. However, urgent incontinence did not differ between the placebo and intervention groups.

Conflict of Interest: None. Funding: Project P2011600132 funded by agreement between SagaNatura (Iceland) and the Universidad Politécnica de Madrid.

Keywords: Quality-of-life. Healthy-lifestyle. Lower-urinary-tract. Urinary-incontinence. Nocturia.

PC071

Changes in the intestinal microbiota in rats with steatosis after the intake of a rich-carotenoid diet

Rodríguez-Lavado, P.¹; Elvira-Torales, I.¹; González-Barrio, R.¹; García-Alonso, J.¹; Perriago-Castó, M. J.¹

¹Department of Food Technology. Food Science and Nutrition. Faculty of Veterinary Sciences, Regional Campus of International Excellence (Campus Mare Nostrum), IMIB-Arrixaca, Murcia, Spain

Introduction: Different studies have described that the intake of carotenoids is correlated with a low incidence of non-alcoholic fatty liver (NAFLD) or steatosis. In addition, they contribute as antioxidant to the dietary treatment and recuperation of steatosis (Elvira-Torales, 2019), through different mechanisms.

Objectives: The aim of this research was to analyse the changes in the microbiota of rats with steatosis after the intake of a diet supplemented with rich-carotenoids vegetables products.

Methods: Steatosis was induced in 24 adult male Sprague-Dawley (protocol no. A1320140701), which were classified into three experimental groups: control group (CD), group with the low-carotene diet (LCD) and group with the high-carotene diet (HCD), supplemented in a 12.75% and 25% with a mixture of spinach and tomato powder, respectively. Animals were feed during 5 weeks as dietary treatment against NAFLD, and then were sacrificed and the intestinal content was obtained to analyze the microbiota by the amplification of the 16S rRNA gen and the SCFAs were analysed by GLC (Anson et al., 2011).

Results: Alpha-diversity showed that after inducing steatosis there was not significant differences among the three experimental groups for Shannon and Chao index, however the supplementation of the diet with rich-carotenoids plant foods led to a modification of microbiota with significant differences in alpha-diversity, increasing significantly the production of SCFA. The main changes were observed in some families belonging to the Firmicutes (Bacillaceae, Clostridiaceae, Eubacteriaceae, Lactobacillaceae,

Peptococcaceae, Streptococcaceae) and Bacteroidetes (Bacteroidaceae, Flammeovirgaceae, Flavobacteriaceae, Porphyromonadaceae, Sphingobacteriaceae) phylum and, to a lesser extent, in Gammaproteobacteria.

Conclusions: The consumption of carotenoids increased SCFA and modified the microbiota, so can ameliorate the dysbiosis associated with NAFLD in rats. However, more studies are needed to confirm these results in order to make an intake recommendation.

Conflict of Interest: Authors declare any conflict of interest.

Keywords: NAFLD. Microbiota. SCFA. Carotenoids.

PC072

Cold plasma (dielectric barrier discharge) for food decontamination

Albertos, L.¹; Figueroa-Pinochet, M. F.¹; Pastor, R.¹; Castro-Alija, M. J.²

¹Universidad Católica de Ávila (UCAV), Calle Canteros s/n, 05005, Ávila, España; ²GIR VIMAS+: Recognized Research Group: Assessment and Multidisciplinary Intervention in Health Care and Sustainable Lifestyles of the University of Valladolid. Faculty of Nursing

Introduction: According to the World Health Organization, the foodborne illness of microbiological origin is a serious public health problem around the world. Furthermore, microbial growth is the main cause of food spoilage. Traditionally, heat treatments have been applied for food preservation and food safety. However, this kind of processing impairs chemical and organoleptic product properties. Consumers are increasingly demanding more natural, minimally processed products. Minimally processed food has gained interest in industrialised countries. This concept describes approaches to food safety and preservation that are designed to retain the natural and fresh-like properties of food.

Objectives: The aim of this study is to determine the effectiveness of cold plasma in different food groups.

Methods: Dielectric barrier discharges (DBD) are generated when high voltage is applied across the electrodes. These discharges generate energetic electrons that dissociate oxygen molecules by direct impact. This single O atom combines with oxygen molecules (O₂) to form ozone gas.

Results: Cold plasma is a novel technology. It has recently drawn considerable attention for food decontamination. Species such as hydroxyl radicals, hydrogen peroxide, ozone, singlet oxygen, superperoxide or nitrogen oxide are produced during treatment with nonthermal plasma. These molecules act on the microorganisms, affecting macromolecules like DNA, proteins and lipopolysaccharides.

In all the studies, a significant logarithmic reduction of inoculated bacteria and/or altering flora of the food in question was achieved. However, the results are different depending on type of food. For instance, in cereals is effective and its quality is maintained. However in fish or meat products quality parameters such as lipid oxidation or colour are affected.

Conclusions: In conclusion, DBD is a potential technology for inactivating microorganisms or extending the shelf-life of food products. However, in some kind of food impaired quality properties.

Conflict of Interest: None.

Keywords: Cold plasma. Food. Microorganism. Novel technology. Shel life.

PC073

Stability and shelf life of a yogurt with addition of encapsulated polyphenol-rich extract from *vaccinium meridionale swartz*

Ramos, A. R.¹; Nieto, G.¹; Maldonado, M. E.²; Ros, G.¹

¹Departamento de Nutrición y Bromatología, Facultad de Veterinaria, Universidad de Murcia, Campus de Espinardo, 30100, Espinardo, Murcia, España; ²Escuela de Nutrición y Dietética, Universidad de Antioquia, Medellín-Colombia

Introduction: The addition of functional ingredients to food matrices as a vehicle for their consumption is a topic of growing interest in recent years. However, in order to guarantee their functionality, it is necessary to study the stability of the compounds of interest during the shelf life of the products in order to make health claims.

The agraz (*Vaccinium meridionale SWARTZ*), a berry native to Colombia, has a high content of phenolic compounds and anthocyanins with antioxidant activity comparable or higher than other berries of the same genus *Vaccinium*, thus being a fruit with potential positive health effects.

Objectives: The objective of the present study was to characterize the stability of the aqueous extract of agraz encapsulated and added to a natural yogurt with respect to its physicochemical characteristics and antioxidant capacity.

Methods: On days 1, 7, 14, 21 and 30, physicochemical failure parameters such as pH change, acidity, microbial count, syneresis and measurement of total phenol content by the Folin-ciocalteu method and antioxidant activity by the ORAC method were evaluated. Failure was determined by the probabilistic method and shelf life by the multivariate kinetic model.

Results: According to the physicochemical parameters performed on the samples stored at 4 °C, the pH showed a slight decrease and the acidity and total phenol content increased during the time of the study with respect to the initial values. As for the antioxidant capacity measured as ORAC, a significant decrease was observed from day 15 of evaluation.

Conclusions: The shelf life stability at 4°C with failure criteria was determined for 31 days, being greater than the shelf life of natural yogurt of 21 days, as well as for the indicator variables of phenol content and antioxidant activity, a shelf life of 21 days was determined.

Conflict of Interest: None.

Keywords: Shelf life. Antioxidant activity. Total phenol content. Bioactive compounds.

PC075**Emotions role and adherence to the Mediterranean diet in children from Lorca, Murcia**

Aragon, A.¹; Peñalver, R.¹; Ros, G.¹; Parra, M. D.²; Nieto, G.¹

¹Department of Food Technology, Nutrition and Bromatology. Faculty of Veterinary Medicine. University of Murcia, Spain;

²Department of Social and Health Sciences, Preventive Medicine and Public Health, University of Murcia, Spain

Introduction: The worldwide prevalence of childhood obesity has dramatically increased, thus school health promotion is imperative to improve the health of children. Specific emotions have been considered as determinants of affective responses to foods and food-related behaviour including food choice. However, there are few implementation activities on local level within schools considering emotions.

Objectives: To describe emotions elicited by certain foods in children and to assess their adherence to the Mediterranean diet (MD).

Methods: Cross-sectional descriptive study of 367 children aged 9-12 years from primary schools in Lorca, Murcia (Spain). A questionnaire with emotional images was developed to assess the associations between four basic emotions (happiness, anger, disgust and sadness) and 11 of the foods most consumed by children. Adherence to the Mediterranean diet was analysed using the KIDMED test.

Results: Joy was the emotion most selected by the children. The food whose consumption gave them the most joy was water (81.7% associated water and joy), followed by fruit and pizza. Chips, lentils and fizzy drinks produced anger, while lentils and industrial pastries produced disgust. Sadness was associated firstly with the consumption of pastries and secondly with carbonated beverages. 57.3% showed high adherence to DM, 34.3% medium and 8.4% low. No significant differences were found for age and sex.

Conclusions: The foods elicited different emotions in the children, mostly positive, but more studies are needed to further investigate the relationship between emotions and food and to use this knowledge to promote healthier eating habits.

Adherence to DM was similar, even higher than previously described for the same age range, but there is still a high percentage of children who need to improve their diet.

Prevention programmes in childhood to reduce the increasing prevalence of obesity should take emotions into account.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: Emotional child nutrition. Mediterranean diet.

PC076**Development of an emotional nutrition education programme for school children in Lorca**

Aragon, A.¹; Peñalver, R.¹; Ros, G.¹; Parra, M. D.²; Nieto, G.¹

¹Department of Food Technology, Nutrition and Bromatology. Faculty of Veterinary Medicine. University of Murcia, Spain;

²Department of Social and Health Sciences, Preventive Medicine and Public Health, University of Murcia, Spain

Introduction: Promoting healthy habits during school age is fundamental to promote a healthy life in the medium and long term, with emotional nutrition, sleep, and family and advertising influences becoming increasingly important.

Objectives: To implement an ongoing emotional nutrition education programme in a school in Lorca, Murcia, where school-children receive different workshops each year on health, physical education, emotional education and nutrition, sleep and rest and care for the environment.

Methods: A guide to the activities and the courses to which each activity corresponded was drawn up. Everything was developed by health professionals specialising in the subject, and was presented to the teaching staff.

A continuous training plan was established through a healthy week in which the same workshops could be repeated every year in the same courses, thus ensuring that the children would receive continuous annual training. The programme includes activities for all 700 children in the school according to year group and age.

Results: The result of the present study shows how the healthy week programme has been perfectly implemented in the school, being this year 2022 the VIII edition, being awaited by both pupils and teachers.

The children of the school showed an increasing adherence to the Mediterranean diet, participating in most of the local and regional sports activities, being considered one of the most active schools in the city.

Conclusions: There is a need to invest in ongoing training programmes established with health specialists within the schools in order to achieve improvements in children's health.

Conflict of Interest: The authors declare that there is no conflict of interest in the writing of the manuscript.

Keywords: Emotional nutrition. School programmes.

PC077**Influence of the mother on emotional nutrition at school age**

Aragon, A.¹; Peñalver, R.¹; Ros, G.¹; Parra, M. D.²; Nieto, G.¹

¹Department of Food Technology, Nutrition and Bromatology. Faculty of Veterinary Medicine. University of Murcia, Spain;

²Department of Social and Health Sciences, Preventive Medicine and Public Health, University of Murcia, Spain

Introduction: The current family model has been changing and both parents and grandparents are now involved in meal preparation. The shared emotional environment has a significant

impact on eating patterns, eating behaviour and childhood obesity.

Objectives: To determine which family member is more likely to have an emotional influence on children's eating, and which of them is more involved in meal preparation.

Methods: A test was developed with questions about who did the cooking at home, with the possibility of answering multiple variables: mother, father, mother and father, grandmother, mother and grandmother... among other questions related to emotions, sleep schedules and adherence to the Mediterranean diet, among others.

Results: The sample consisted of 205 boys and 162 girls aged between 9 and 12 years from 5 schools in Lorca, Murcia.

The largest number of children 179 (48.8%) indicated that their mother did the cooking, followed by the grandmother 68 children (18.5%) and in third position mom and dad was indicated by 38 (10.4%) of the children, and only 13 children (3.5%) indicated that their father did the cooking at home.

Conclusions: There is evidence to indicate how the mother's dietary and emotional pattern can influence the feeding of her children. We observe that the mother continues to be the one who cooks the most at home and therefore her emotional state could influence the diet of the whole family. It would be necessary to propose emotional nutritional education workshops for mothers and family members as this is a modifiable factor in the prevention of childhood obesity.

Conflict of Interest: The authors declare that there is no conflict of interest in the writing of the manuscript.

Keywords: Emotional influences. Family nutrition.

PC078

Obesity increases inflammation and post-operative atrial fibrillation in patients undergoing cardiac surgery

Mandaglio-Collados, D.¹; López-Gálvez, R.¹; Rivera-Caravaca, J. M.¹; Lahoz, A.²; Hernández-Romero, D.³; Arribas, J. M.²; López-García, C.⁷; Marín, F.¹

¹Department of Cardiology. Hospital Clínico Universitario Virgen de la Arrixaca, University of Murcia, Instituto Murciano de Investigación Biosanitaria, CIBERCV. Murcia. Spain;

²Cardiovascular Surgery Service. Instituto Murciano de Investigación Biosanitaria (IMIB-Arrixaca), Hospital Virgen de la Arrixaca. Murcia. Spain; ³Legal and Forensic Medicine, Faculty of Medicine, Regional Campus of Int. Excellence "Campus Mare Nostrum", Biomedical Research Institute(IMIB), University of Murcia. Murcia. Spain

Introduction: Atrial fibrillation (AF) is the most common cardiac arrhythmia affecting 1-4% of the total population and it is associated with an increased risk of stroke and death. Post-operative atrial fibrillation (POAF) occurs in 25-40% of patients after cardiac surgery. Obesity is a risk factor for the development of AF but its association with POAF requires further investigation.

Objectives: Our aim was to assess whether obese patients had an increased inflammatory profile and a higher predisposition to develop POAF than patients with normal body mass index (BMI).

Methods: We studied prospective patients who underwent CABG or cardiac valve surgery without previous documented AF. We categorized them into two groups according the BMI over or under 30 kg/m². Plasma samples were collected at baseline and 24 hours after surgery, to assess the effect of the surgical aggression and the pro-inflammatory state induced by obesity. Interleukin-6 (IL-6) was evaluated by immunological assays, before and after surgery.

Results: We included 117 patients (88% males, median age 65 [IQR 59-73] years), of which 45 had BMI ≥30 kg/m² (Group 1) and 72 had a BMI <30 kg/m² (Group 2). There was a positive correlation between the BMI and IL-6 levels (p=0.048), and total cholesterol (TC) (p=0.010) at baseline. Of note, obese patients showed significantly higher incidence of POAF in comparison to Group 2 (39.5% vs. 19.4%; p=0.028).

Conclusions: Elevated levels of TC and IL-6 at baseline, a primary cytokine of the inflammatory cascade, confirmed a higher systemic inflammation in patients with obesity. The increased incidence of POAF in obese patients demonstrated that obesity is a risk factor of new-onset POAF.

Conflict of Interest: The authors have no conflicts of interest to declare.

Keywords: Obesity. Inflammation. Atrial fibrillation.

PC079

Caffeine intake is inversely associated with polycystic ovary syndrome. A case-control study

Meliani, A.¹; Cutillas-Tolín, A.¹; Mendiola, J.¹; Sánchez-Ferrer, M. L.²; Prieto-Sánchez, M. T.²; Vioque, J.³; Torres-Cantero, A. M.⁴

¹Division of Preventive Medicine and Public Health, Department of Public Health Sciences, University of Murcia School of Medicine, 30100 Espinardo Murcia, Spain; ²Institute for Biomedical Research of Murcia, IMIB-Arrixaca, 30120 El Palmar Murcia, Spain; ³Consortium for Biomedical Research in Epidemiology and Public Health (CIBER Epidemiología y Salud Pública, CIBERESP), Instituto de Salud Carlos III, 28029 Madrid, Spain; ⁴Department of Preventive Medicine, University Clinical Hospital Virgen de la Arrixaca, 30120 El Palmar Murcia, Spain

Introduction: Polycystic ovary syndrome (PCOS) is a highly prevalent reproductive condition (5-20%) that involves many associated endocrine and metabolic disorders such as hyperinsulinemia. Some studies suggest that caffeine intake has a protective role against PCOS. In addition, individuals' lifestyles such as smoking, or alcohol consumption may also influence development of PCOS.

Objectives: In this case-control study, we explored associations between caffeine, alcohol and tobacco consumption and PCOS

Methods: The study enrolled 126 women diagnosed with PCOS and 159 healthy women living in Murcia (Spain) from September 2014 to May 2016. The diagnostic of PCOS was

established following the Rotterdam criteria (hyperandrogenism, oligoanovulation and polycystic ovaries morphology).

For data collection, we used a validated food frequency questionnaire to determine alcohol and caffeine intake. We applied a tobacco and alcohol consumption questionnaire to evaluate these habits. We estimated adjusted odds ratios and 95% confidence intervals using multivariable logistic regression.

Results: In the multivariable analysis, caffeine intake was inversely associated with PCOS (ORQ4 vs. Q1 = 0.29; 95% CI: (0.13; 0.64); P for trend = 0.01). We did not find any statistically significant association between alcohol and tobacco habits and total, anovulatory or ovulatory PCOS.

Conclusions: We found coffee consumption may be a protective factor for PCOS. Few studies have explored the impact of this association. These results are consistent with a previous study. This relationship may be due to caffeine increasing sex hormone-binding globulin hormones levels, which are found at lower concentrations in women with PCOS.

Conflict of Interest: The authors have no competing interests to declare.

Keywords: Polycystic ovary syndrome. Coffee intake. Hyperandrogenism. Oligoanovulation. Hyperinsulinemia.

PC082

Satiety effect of common mediterranean foods: A randomised crossover study in adult humans

Planes-Muñoz, D.¹; López-Nicolás, R.¹; Sánchez-Moya, T.¹; Ros-Berruazo, G.¹; Frontela-Saseta, C.¹

¹Departamento de Tecnología de los Alimentos, Nutrición y Bromatología. Universidad de Murcia. Murcia. España

Introduction: The study of the satiety effect of foods and ingredients is an interesting strategy to help in the weight management. Moreover, it is also important that the food used for this purpose can be included as part of a healthy diet. It is well known that the Mediterranean Diet (MD) is a feeding pattern that helps us to maintain good health.

Objectives: The aim of this study was to identify MD foods with a high satiating capacity in human volunteers, with the aim to provide more information in this field and of identifying the most satiating ones for the subsequent development of new foods that included in the diet can help in the hunger control.

Methods: For this purpose, seven foods that fit the Mediterranean pattern were selected: Almond, egg, oat, potato, tiger nut, walnut and white bread, as reference food. After a standard breakfast, the subjective sensation of hunger and satiety for each food was assessed by visual analogue scales (VASs) during three hours. In addition, the volunteers filled in surveys about food intake (food frequency questionnaire – FFQ), eating behaviour (three factor eating questionnaire). And their anthropometric parameters were measured as well.

Results: Oat had the highest satiating scores, following by potato. No significant differences were found between the rest of the foods tested. Principal analysis component showed an relation among poor quality food intake, loss of control of intake and a higher proportion of body fat.

Conclusions: Oat is the best candidate to be included in the development of new satiating foods. New studies should be carried out to clarify the relationship between nutrient deficiency and hunger.

Conflict of Interest: The authors declare no conflict of interest.

Keywords: OAT. FFQ. Body fat.

PC084

How is the adherence to the mediterranean diet in children during the COVID-19 pandemic? The asomad study

Nehari, A.¹; Portals-Rioma, A.²; Aparicio-Ugarriza, R.²; Chiesa, I.¹; López-Seoane, J.²; Quesada-González, C.³; Zapico, A. G.⁴; Gesteiro, E.²

¹ImFINE Research Group, Department of Health and Human Performance, Universidad Politécnica de Madrid, 28040 Madrid, Spain; ²ImFINE Research Group. Department of Health and Human Performance. Universidad Politécnica de Madrid. Spain. Physical Exercise and Health Research Network, EXERNET. Madrid, Spain; ³ImFINE Research Group. Department of Health and Human Performance. UPM. Madrid. Department of Mathematics Applied to Information and Communication Technologies. UPM. Madrid, Spain; ⁴ImFINE Research Group. Department of Health and Human Performance. UPM. Madrid. Physical Exercise and Health Research Network. EXERNET. Madrid. Faculty of Education. UCM. Madrid, Spain

Introduction: The COVID-19 pandemic has brought major changes in children's lifestyle and nutrition. In this sense, children have resulted as the most vulnerable group.

Objectives: To analyze the adherence to the Mediterranean Diet (MD) in a representative sample of children during the COVID-19 pandemic in the City of Madrid.

Methods: This is a cross-sectional study conducted in 20 schools of Madrid which completed evaluations during COVID-19 pandemic between November 2021 and February 2022. The Mediterranean Diet Quality Index for children and adolescents (KIDMED) was performed to measure the adherence to MD. Low, medium, and high adherence groups were established.

Results: Participants were 471 children (48.4% girls; mean age 9.36±1.19 years). Our results showed that mean KIDMED score was 7.51±2.14 and 7.21±2.46 in girls and boys, respectively. Furthermore, low, medium and high adherence to MD was 3.9%, 42.5% and 53.5% in girls, respectively vs. 7.4%, 45.3% and 47.3% in boys, respectively. Regarding breakfast, 89.2% consumed dairy products, 69.4% ate cereals and 35.2% consumed industrial pastries. Furthermore, 22% consumed fast food weekly and 19.7% had sweets >1/day. The percentage of children who ate fruits and vegetables was 81.1% and 70.3%, respectively, while those having them >1/day decreased until 66.0% and 39.3%, respectively. More than 70% ate legumes >1/week and fish regularly, and the intake of pasta or rice ≥5/week and nuts 2-3/week was lower than 50%.

Conclusions: Our results suggest that adherence to MD is high during the COVID-19 pandemic, especially in girls; however,

consumption of fast food could be reduced. The acquisition of healthy habits during childhood is essential for adulthood and to prevent chronic diseases.

Conflict of Interest: None. Funding: Agreement between UPM and Area Delegada de Deportes, Ayuntamiento de Madrid. Madrid, Spain.

Keywords: Kidmed. Adherence. Mediterranean diet. Children. Healthy eating.

PC089

Serum vitamins A and E at mid pregnancy are related with maternal and cord blood antioxidant status and perinatal conditions

Sánchez-Campillo, M.^{1,2}; Gázquez, A.^{1,2}; Serrano-Munuera, A.²; Avilés-Plaza, F.^{2,3}; García-Serna, A.^{2,4}; Martínez-Gracia, C.^{2,5}; García-Marcos, L.^{2,6}; Larqué, E.^{1,2*} and the Nela Study group

¹ Department of Animal Physiology, Faculty of Biology, University of Murcia; ² Biomedical Research Institute of Murcia (IMIB-Arrixaca); ³ Molecular Therapy and Biomarkers Research Group, Clinical Analysis Service, Virgen de la Arrixaca University Clinical Hospital, University of Murcia; ⁴ Department of Public Health Sciences, Faculty of Medicine, University of Murcia; ⁵ Department of Food Science and Technology, Faculty of Veterinary, University of Murcia; ⁶ Pediatric Allergy and Pulmonology Units, Virgen de la Arrixaca University Children's Hospital, University of Murcia, 30120 Murcia, Spain; and ARADyAL Allergy Network, Madrid, Spain

Introduction: Most of pregnant women do not achieve the recommended dietary intake of both vitamins A and E. These vitamins may counteract oxidative stress involved in some adverse perinatal outcomes.

Objectives: We aimed to identify possible early biomarkers during pregnancy to predict and prevent oxidative stress in the offspring. We assessed the associations between maternal serum vitamins A and E during the second trimester of pregnancy with maternal and fetal outcomes, including oxidative stress parameters.

Methods: Data on dietary and serum levels of vitamins A and E were collected from 544 pregnant women from the Nutrition in Early Life and Asthma (NELA) a prospective mother-child cohort in Spain. Only participants who were not supplemented were included in regression analyses.

Results: There were large discrepancies between low diet vitamin E (77% of the mothers) and low serum vitamin E levels (3%) at 24 weeks of gestation. Maternal serum vitamins A and E at half pregnancy were associated with higher antioxidant status not only in the mother at this time point (lower isoprostanes and hydroperoxides) but also with the newborn at birth (higher total antioxidant activity). Gestational diabetes mellitus (GDM) was negatively associated with both maternal serum vitamin A (OR: 0.93 CI 0.89-0.98, P=0.005) and vitamin E (OR: 0.99 CI 0.99-1.00 P=0.009) at mid-pregnancy (24 weeks). Nevertheless, no association between GDM and oxidative stress parameters was detected. Finally,

preterm birth (less than 37 weeks of gestation) was not associated to cord serum vitamins A or E.

Conclusions: In conclusion, maternal vitamin A and E serum levels may be used as an early potential biomarker of antioxidant status of the neonate at birth. Control of these vitamins during pregnancy could help to avoid morbid conditions in the newborn caused by oxidative stress in GDM pregnancies.

Conflict of Interest: None.

Keywords: Vitamin A, Vitamin E, Biomarker, Pregnancy, Antioxidant, Neonate.

PC090

Glycophosphopeptical AM3 food immune-supplement: A potential adjuvant in the treatment of early-stage SARS-CoV-2 infection. A randomized, controlled pilot study

Fernández-Lázaro, D.¹; Fernández Lázaro, C. I.²; Juan Mielgo Ayuso, J.³; Garrosa-García, M.⁴; González Bernal, J. J.³; Seco Calvo, J.⁵; Domínguez Ortega, C.⁶; González Gross, M.⁷

¹ Department of Cell Biology, Histology and Pharmacology, Universidad de Valladolid, Campus de Soria, Soria, Spain; ² Department of Preventive Medicine and Public Health, School of Medicine, University of Navarra, Pamplona, Spain; ³ Department of Health Sciences, Faculty of Health Sciences, University of Burgos, Burgos, Spain; ⁴ Department of Cell Biology, Histology and Pharmacology, University of Valladolid, Valladolid, Spain; ⁵ Department of Physiotherapy, Institute of Biomedicine (IBIOMED), University of León, León, Spain; ⁶ Servicio de Hematología, Hospital Santa Bárbara de Soria, Soria, Spain; ⁷ ImFINE Research Group. Department of Health and Human Performance. Faculty of Physical Activity and Sport Sciences-INEF. Universidad Politécnica de Madrid. Madrid. Spain.

Introduction: COVID-19 disease pandemic continues two years after it started; the development of effective therapies is critical to the success of the COVID-19 endemic life. Drug availability to treat COVID-19 remains limited to supportive treatments but acting on the immune-inflammatory cascade is key to preventing disease progression and even death of the patient.

Objective: To investigate whether treatment in early-stage SARS-CoV-2 infection with AM3, a natural glycophosphopeptide, with immunomodulatory properties and no side effects could prevent the progression of COVID-19.

Method: Single-center, randomized, controlled trial of 24 adults (≥18 years) from Soria Health Care Management (Spain) with confirmed SARS-CoV-2 infection and medium/high prognosis of progression (CALL score), 48 hours after diagnosis, were randomized (1:1) to receive AM3 (Imunoforon®) 3 g/day plus standard treatment (AM3 group, n=12) or standard treatment (control group n=12) for 30 days. Cytokines were evaluated: IL-1, IL-6, IL-10, IL12, TNF-α, INF-γ; biomarkers: hs-CRP, LDH, CK, FER, AST, ALT; SARS-CoV-2 infection was determined by RT-PCR assay in nasopharyngeal samples. The trial was registered ClinicalTrials.gov NCT04987554 and approved by ECRmp Burgos-Soria Hospital (Spain) (2021/2306).

Results: AM3 showed no effect on inflammatory (IL-1, IL-6, TNF- α) or anti-inflammatory (IL-10, IL12) cytokines, only a non-significant trend (p -value >0.05), downward for LDH, and hs-CRP and upward for INF- γ was observed. A longer median time from initial positive PCR to the first negative result was observed in the control group concerning the AM3 group (20 days vs. 16 days, p -value >0.05).

Conclusions: Supplementation of 3g/day AM3 in the early stages of SARS-CoV-2 infection increases INF- γ , which could impair the interaction between SARS-CoV-2 and host cells; furthermore, INF- γ could stimulate NK cytotoxicity, favoring the SARS-CoV-2 PCR negativization. AM3 supplementation may prevent progression to severe stages and modulate inflammation. AM3 treatment appears to be safe without change in AST/ALT.

Conflicts of Interest: None.

Funding: FONDO-COVID19-FEDER-Carlos III.

Keywords: Covid-19; Am3; Immunonutrition; Cytokines; Inflammation.

PC091

Food literacy changes before and during confinement of the COVID-19 pandemic in Spain

Pantoja-Arévalo, L.¹; Gesteiro, E.¹; Piccardi, A.¹; Aparicio-Ugarriza, R.¹; López-Torres, O.¹; Pedrero-Chamizo, R.¹; Rios, Y.¹; González-Gross, M.¹

¹ImFINE Research Group. Department of Health and Human Performance. Faculty of Physical Activity and Sport Sciences-INEF. Universidad Politécnica de Madrid. Madrid. Spain;

²New Foods Research Department. AZTI Member of Basque Research & Technology Alliance. Bizkaia, Spain

Introduction: During the COVID-19 pandemic, lockdown measures were applied worldwide.

Objectives: a) To analyze shopping and cooking behavior before and during confinement in Spain. b) To examine changes according to 3 age-ranges: young adults (YA:18–35y), adults (AD:36–55y) and older adults (OA:56–83y).

Methods: A cross-sectional online “Corona-Cooking-Survey” (CCS) was performed in Spain during the strictest days of lockdown, from April 17th to June 25th, 2020. CCS tool was designed by FOOMS research group of the University of Antwerp, Gent University and KU Leuven, and was translated into Spanish language and nationally distributed, using Qualtrics® software Version-XM (Provo, UT, USA). Statistical analysis was performed with SPSS Statistics software version 25 (IBM Corp., Armonk, NY, USA). Statistical significance was set at 0.05. All participants accepted an informed consent. The study protocol was approved by the Ethics Committee at the University of Antwerp, Belgium (Ref No: SHW_19_44).

Results: A total of 679 (18–83y; YA: $n=187(27.5\%)$, AD: $n=360(53.01\%)$ and OA: $n=132(19.44\%)$) volunteers fulfilled the CCS-Spain version. Significant increases were found in items such as: planning meals ahead of time, making a list before shopping, thinking about healthy choices, using healthy ingredients to cook and trying a new recipe (all $p<0.001$). No significant differences

were observed for cooking with leftover food in the YA and OA groups (all $p>0.05$). YA group manifested an increased eggs’ supply during the confinement ($p<0.001$). Similarly, OA group, an increased supply of eggs, milk and dairy ($p<0.001$); meanwhile, AD group, a supply of significantly less non-alcoholic and alcoholic beverages ($p<0.001$).

Conclusions: Sustainable shopping and cooking habits improved during the confinement of the COVID-19 pandemic in the Spanish sample. In young adults no changes regarding shopping for healthy food were observed while in older adults there were no changes regarding cooking with healthy food and ingredients.

Conflict of Interest: None

Keywords: COVID-19; Food Behavior; Sustainable Diets.

PC092

Does the mediterranean diet improve humoral responses to the SARS-COV-2 BNT162B2 vaccine in elderly institutionalized patients?

Fernández-Lázaro, D.¹; González-Gross, M.²; Seco-Calvo, J.³; García-Gómez, B.⁴; Mielgo-Ayuso, J.⁵; Sánchez-Serrano, N.⁶; Jiménez-Callejo, E.⁷; Fernández-Lázaro, C. I.⁸

¹Department of Cell Biology, Histology and Pharmacology, Universidad de Valladolid, Campus de Soria, Soria, Spain;

²ImFINE Research Group. Department of Health and Human Performance. Faculty of Physical Activity and Sport Sciences-INEF. Universidad Politécnica de Madrid. Madrid. Spain;

³Department of Physiotherapy, Institute of Biomedicine (IBIOMED), University of León, León, Spain; ⁴Department of Business Organization and Marketing and Market Research, Faculty of Business and Labor Sciences, University of Valladolid, Campus of Soria; ⁵Department of Health Sciences, Faculty of Health Sciences, University of Burgos, Burgos, Spain;

⁶Microbiology Medical Service, Hospital Santa Bárbara, Soria, Spain; ⁷Preventive Medicine Service, Hospital Santa Bárbara, Soria, Spain; ⁸Department of Preventive Medicine and Public Health, School of Medicine, University of Navarra, Pamplona, Spain

Introduction: Age, chronic diseases, and body mass index (BMI) are associated with differences in immune responses to vaccines and are significant suppressors of COVID-19 vaccine immunogenicity. However, knowledge of the relationship between healthy dietary patterns, such as the Mediterranean diet (MD), and the humoral response to COVID-19 vaccine is still scarce.

Objectives: Given the biological capacity supporting the beneficial effects of the MD on the immune system, we longitudinally evaluated the association between immune activity, after two doses of BNT162b2 vaccine, on age, BMI, and chronic conditions, in Spanish elderly.

Methods: Immunogenicity was analyzed in a convenience sample of 106 institutionalized elderly volunteers (65.1% females, 84.3 ± 7.6 years, 27.2 ± 5.2 kg/m²). Subjects received the first dose of BNT162b2 vaccine and a booster dose 21 days later. Blood and nasopharyngeal swab samples were taken at baseline and 20 days after

each vaccine dose. Quantitative measurements S1 SARS-CoV-2 spike protein were determined by a chemiluminescent immunoassay. The presence of SARS-CoV-2 was determined by RT-PCR assay. Adherence to the MD was assessed by Trichopoulou's score, chronic diseases by medical records. The study was approved by ECRmp the University Hospital Valladolid (Spain) No.21-2413.

Results: Trichopoulou's score was 10.1 ± 1.8 . The correlation coefficient between total anti-SARS-CoV-2 IgG antibody titer and BMI (Spearman $\rho = 0.05$, p -value = 0.64), age (Spearman $\rho = -0.10$, p -value = 0.31), both were extremely weak. The comparison between the number of chronic conditions was not significant for both antibody titer after the 1st dose (p -value Kruskal Wallis test = 0.63) and antibody titer after the 2nd dose (p -value Kruskal Wallis test = 0.51). No volunteer showed a PCR+.

Conclusions: SARS-CoV-2 antispike IgG antibodies titer was independent of the characteristics (age, BMI, chronic diseases) of the elderly. Better adherence to the MD (≥ 8) may be associated with enhanced immunogenicity.

Conflict of Interest: none.

Keywords: Elderly. BNT162B2. SARS-COV-2. Mediterranean diet. Humoral response.

PC093

Compliance with the recommended intakes of micronutrients in the Murcian University population of the Lorca Campus (Spain)

Martínez-Bebíá, M.¹; Latorre-Rodríguez, J. A.¹; Giménez-Blasi, N.²; Jiménez-Monreal, A. M.³; Olea-Serrano, F.⁴; Mariscal-Arcas, M.⁴

¹Department of Food Technology, Nutrition, and Food Science. School of Health Science. University of Murcia. Lorca, Murcia. Spain; ²Nutrition Area. School of Health Sciences. Avila Catholic University. Avila, Spain; ³Department of Food Technology, Nutrition, and Food Science. Veterinary school. University of Murcia. Espinardo, Murcia. Spain; ⁴Department of Nutrition and Food Science. School of Pharmacy. University of Granada. Granada, Spain

Introduction: For the study of the nutritional transition from the Mediterranean Diet to the Western Diet, one of the reference groups is that of university students.

Objectives: To determine the degree of compliance by the population of the Lorca Campus (Murcia, Spain) with the micronutrient intakes, (AESAN, 2019).

Methods: The population is made up of 662 individuals who are members of the School of Health Sciences of Lorca, divided into three main groups, namely, undergraduate students in Human Nutrition and Dietetics, undergraduate students in Nursing, professors, master's students, doctorate and administration and services staff. The participants completed an informed consent form, the only condition to be included in the study. All participants completed three R24h, two working days and one holiday. The Dial Diet© program (ALCE INGENIERÍA) was used to convert food data into nutrients and the SPSS 23© package (IBM C.O.) for statistical analysis. The percentages of compliance with the DRI and their differences between sexes were calculated.

Results: The intakes were lower than the recommendations for Vit. A, and less than 2/3 of the DRI for Folic Acid, Vit. D and E and among the minerals for Ca, Mg, K and in the case of women, for iron. They are below 2/3 DRI in the case of Ca for those under 20 years of age, in Fe for women between 20 and 50 years old and for the K in women. Compliance percentages showed statistically significant differences ($p < 0.05$) between genders for Vit. B1, B3, B9, B12, Ca, Fe and K.

Conclusions: The population must improve the intake of Ca (<20 years), Fe in women of childbearing age, potassium in all women, vitamins B9, E and D in both sexes, although the latter is synthesized in the skin by the action of the sun.

Conflict of Interest: The authors have declared that no competing interest exist.

Keywords: Nutritional transition. DRI. Micronutrients. University students. Spain.

PC096

Hearing function and nutritional status in aviation workers from Spain exposed to noise pollution in the workplace

Morais-Moreno, C.¹; Marco-Mendez, R.¹; Rodríguez-Estévez, V.²; Urbano-Toledo, V.²; Puga, A. M.¹; Samaniego-Vaesen, M.¹; Varela-Moreiras, G.¹; Partearroyo, T.¹

¹Grupo USP-CEU de Excelencia "Nutrición para la vida (Nutrition for life)", ref: E02/0720, Departamento de Ciencias Farmacéuticas y de la Salud, Facultad de Farmacia, Universidad San Pablo-CEU; ²Centro de Instrucción de Medicina Aeroespacial (CIMA). Madrid. Spain

Introduction: Noise-induced hearing loss (NIHL) is the most frequent and preventable occupational disease. Approximately, 11% of the world's adult population works in a noisy environment with the involved risk. Different studies suggest that diet could play key role in the prevention of this pathology. Thus, there is evidence of a possible protective effect of several micronutrients against hearing loss (HL).

Objectives: To study the relationship among auditory function, dietary intake, and serum levels in aviation workers, who are exposed to noise pollution in the work environment.

Methods: A sample of 235 aviation workers (22-66 years), that undergo a periodic medical examination at the Centro de Instrucción de Medicina Aeroespacial (Madrid, SPAIN) was evaluated. Auditory function was assessed by tonal audiometry. Energy and nutrient intakes were estimated by 24-hour recall using the DIALTM program. Serum homocysteine (Hcy) was determined in a Cobas 6000TM multianalyzer while folate was analyzed by chemiluminescence in a Cobas e 411TM. Statistical analysis was performed by SPSS v.27 program.

Results: Overall HL percentage in the sample was 68%. Considering the sample by age groups, 40% of the volunteers under 40 years of age exhibited some degree of HL while this percentage increases up to 80% in volunteers over the age of 40. HL was positively correlated with age ($r = 0.588$; $p \leq 0.001$), flight hours ($r = 0.283$; $p \leq 0.001$), Hcy serum levels ($r = 0.335$; $p \leq 0.001$) and

alcohol intake ($r=0.153$; $p\leq 0.050$) whereas negative correlations with folate ($r=-0.267$; $p\leq 0.001$) and vitamin B12 serum levels ($r=-0.192$; $p\leq 0.005$) were obtained. Furthermore, folate ($r=-0.118$; $p\leq 0.050$), vitamin B6 ($r=-0.161$; $p\leq 0.050$), biotin ($r=-0.143$; $p\leq 0.050$), selenium ($r=-0.129$; $p\leq 0.050$) and magnesium ($r=-0.182$; $p\leq 0.005$) intakes were negatively correlated to HL.

Conclusions: Several nutrient insufficient intakes may be related to NIHL. Nutritional interventions would be of great interest to monitor and slowdown the HL progression in populations exposed to noise pollution in their workplace.

Conflict of Interest: No conflicts of interest.

Keywords: Folate. Homocysteine. Hearing loss. Noise. Aviation. Nutrients.

PC097

Post-cardiac surgery artificial nutritional support in critically ill children

de la Mata-Navazo, S.; Sánchez-Berenguer, A.; Toledano-Revenga, J.; Zapata-Martínez, C.; Paul-López de Viñaspre, M.; Rodríguez-Martínez, A.; López-Herce Cid, J.; Solana-García, M. J.

Unidad de Cuidados Intensivos Pediátricos. Hospital General Universitario Gregorio Marañón. Madrid. España

Introduction: Many critically ill children show malnutrition on admission to the Pediatric Intensive Care Unit (PICU), which affects up to 50% of children with congenital cardiac disease. At the immediate post-cardiac surgery period, patient's metabolism increases, which increments protein and energetic demands. Enteral nutrition is the best artificial nutrition technique for ensuring an adequate nutritional support, which correlates with better outcomes and less post-surgical complications.

Objectives: to study artificial nutrition characteristics and their correlation with outcomes in children post-cardiac surgery hospitalized in a PICU.

Methods: retrospective study including children following cardiac surgery hospitalized in the PICU in a six-month-period, who had received artificial nutrition during the first 7 days. We analyzed their nutritional status, caloric and protein intake, administration routes, used nutritional formulas and complications, on admission and on post-operative days 3 and 7.

Results: forty-three patients were included (35% cyanogen and 65% non-cyanogen cardiac disease). Median weigh z-score were -1,3 and -0,89 related to age and heigh, respectively, and median IMC z-score was -1,05. Forty patients (93%) received initial enteral nutrition, started on first day of admission on 63%. Transpyloric tube was the most common nutritional route (65%). Complete hypercaloric formulas were the most used (35%), followed by polymeric formulas (27%). Abdominal distension (60%) was the most frequent digestive complication, and we observed no necrotizing colitis. Only 32,6% achieved calculated intake on 7th day of admission. Regarding surgical risk according to RACHS classification, higher operative risk surgeries and cardiac transplant were associated with less achieved intake on day 7 ($p=0,007$), less oral feeding on discharge ($p=0,01$) and more vomiting ($p=0,03$).

Conclusions: children following cardiac surgery are frequently malnourished on PICU admission. EN is usually initiated early in

the post-cardiac surgery period, and it is a safe nutritional route. Patients with higher operative risk surgeries and cardiac transplant achieve less enteral intake on day and receive less oral feeding on discharge.

Conflict of Interest: None.

Keywords: Children. Cardiac surgery. Enteral nutrition. PICU.

PC100

Effect of the dietary supplementation with (poly) phenol-rich foods on modulation of lipid profile and oxidative stress biomarkers in postmenopausal women

Sánchez, L.; Periago, M.; González, R.; García, J.

Departamento de Tecnología de Alimentos, Ciencia de los Alimentos y Nutrición. Facultad de Ciencias Veterinarias, Universidad de Murcia. Murcia. España

Introduction: During menopause, estrogen levels decrease and endocrine and physiological alterations appear, which are associated with an increased risk of cardiovascular disease (CVD). However, these alterations may be moderated by polyphenols present in plant foods, due to their antioxidant and anti-inflammatory effects, as well as modulatory properties of cardiometabolic risk associated biomarkers.

Objectives: The aim of this research was to evaluate the effect of daily consumption of (poly)phenol-rich foods for two months on the reduction of cardiometabolic risk of postmenopausal women by modulating lipid metabolism and biomarkers of oxidative stress.

Methods: To achieve this goal, a parallel clinical trial was conducted in which the diet of 25 postmenopausal women was supplemented daily with dark chocolate, green tea and a berry, pomegranate and orange juice, for 2 months (NCT05255367). Urine and blood samples were collected at the beginning and at the end of the control and intervention periods to analyzed the Lipid profile (total cholesterol, LDL-C, HDL-C, HDL-C, VLDL and triglycerides) and malondialdehyde as a biomarkers of oxidative stress.

Results: The results will provide information about the potential beneficial effects of (poly)phenols as natural antioxidants of food on the modulation of the lipid profile and oxidative stress in postmenopausal women, evaluating the reduction of cardiometabolic risk. To date, there is a wide variability in the reported studies in the scientific literature, showing both positive and negative effects. Furthermore, with respect to biomarkers of oxidative stress, there are very few studies that evaluate these parameters in postmenopausal women, and in those that have been carried out, in general, there is no consistent changes in the levels of these biomarkers.

Conclusions: This intervention study provides consistent data about some biomarkers that will allow us to determine the effect of polyphenols to reduce de cardiometabolic risk in menopause women.

Conflict of Interest: No conflict of interest.

Keywords: Bioactivecompounds. Antioxidants. Cardiovascular disease. Cholesterol. Malondialdehyde.

PC101

It is possible to modify inflammation and oxidative stress biomarkers in postmenopausal women by supplementing their diets with (poly)phenols?

Sánchez, L.¹; González, R.¹; Periago, M.¹; García, J.¹; Conesa, M.²

¹Departamento de Tecnología de Alimentos, Ciencia de los Alimentos y Nutrición. Facultad de Ciencias Veterinarias, Universidad de Murcia. Murcia. España; ²Departamento de Calidad, Seguridad y Bioactividad de Alimentos Vegetales. CEBAS-CSIC. Murcia. España

Introduction: During menopause due to a decrease in the levels of estrogens, women develop inflammatory and oxidative processes that increase the risk of cardiovascular disease (CVR). Therefore, some studies have investigated the possible moderation of CVR in postmenopausal women through dietary supplementation with (poly)phenols. These bioactive compounds are able to modulate the biomarkers of CVR due to their antioxidant, anti-inflammatory and vasodilator activity.

Objectives: The aim of this study was to conduct a systematic review to evaluate the current level of evidence regarding the health benefits of dietary supplementation with (poly)phenol-rich products on inflammation and oxidative stress biomarkers related to the prevention of CVR in postmenopausal women.

Methods: The study protocol was executed according to PRISMA recommendations and was registered in PROSPERO (CRD42021285214). A literature search of the last 20 years was conducted in PubMed, Web of Science and Google Scholar databases, and the inclusion criteria for the selection of studies were: clinical trials in postmenopausal women whose diet was supplemented with (poly)phenols and evaluated inflammatory biomarkers (TNF- α , IL-6, CRP and adiponectin), endothelial cell adhesion molecules (sVCAM-1, sICAM-1 and selectin) and biomarkers of oxidative stress (ox-LDL, isoprostanes, 8-OHdG, TBARS, LPO, SOD, GSR, GPx).

Results: Only twelve articles assessing changes in biomarkers of inflammation and endothelial function, and four articles evaluating changes in oxidative stress biomarkers were identified. Overall, there was a large variability in the reported data and a lack of clear effect, because the studies evaluated reported both increased and decreased levels of the selected biomarkers. Furthermore, the statistical significance of these results was very limited and inconsistent.

Conclusions: The lack of consistent and significant results, together with the small number of articles found, shows the importance of further investigating the effect size of (poly)phenols on the modulation of RECV biomarkers through the development of further human intervention studies.

Conflict of Interest: No conflict of interest.

Keywords: Bioactive compounds. TBARS. VCAM. TNF. Antioxidant.

PC104

Evaluation of the prebiotic effect of water-soluble orange peel extract obtained from citrus by-products

Núñez-Gómez, V.¹; González-Barrio, R.¹; Gómez-Gallego, C.²; Periago, M. J.¹

¹Departamento de Tecnología de los Alimentos, Nutrición y Bromatología, Facultad de Veterinaria, Universidad de Murcia, Murcia, España; ²Institute of Public Health and Clinical Nutrition, University of Eastern Finland, Kuopio, Finland

Introduction: By-products from agro-industrial activity can be used to obtain ingredients with health benefits associated with the nutritional composition and the bioactive compounds of the raw materials.

Objectives: The aim of the present work was to obtain a water soluble ingredient from orange peel with high content in (poly)phenols and fibre, and evaluate the chemical composition and its potential prebiotic effect by in vitro fermentation in a semi-dynamic bioreactor.

Methods: A water-soluble extract (WSE) from orange peel was obtained by using a green extraction method. Characterisation, chemical composition of fibre and physicochemical properties were analysed by GLC-FID, and (poly)phenols profile was analysed by HPLC-DAD. The sample was in vitro fermented in a semi-dynamic fermentation model, which simulates the distal colon conditions, with pooled human faeces from six healthy female volunteers during 24 h. After the fermentation, samples were plated for microbial colony counting to assess changes in microbiota and to determine its metabolic activity by analysing SCFAs by GLC-FID.

Results: The WSE showed 24% of fibre being 70% insoluble dietary fibre and 30% soluble dietary fibre. This sample showed a high content of pectin and soluble hemicellulose, and exhibits good hydration properties and fat absorption capacity. The (poly)phenol profile was represented mainly by flavanones and hydroxycinnamic acids, with 48 mg/g of total extractable (poly)phenol and 13 mg/g of non-extractable (poly)phenols. After the in vitro fermentation, the sum of the individual SCFAs reached 101 mM at 24 h of fermentation. The main SCFA was acetate followed by propionate, butyrate and other minor SCFAs. Regarding the microbial communities, after 8 h of fermentation, Lactobacillus and Bifidobacterium increased significantly, whereas Enterobacteriaceae decreased.

Conclusions: Based on this background the WSE could be used as a potential ingredient to develop functional foods with prebiotic effects improving the beneficial gut microbiota of the host.

Conflict of Interest: Authors declare no conflict of interest.

Keywords: Prebiotic. Fibre. Microbiota. SCFA. (Poly)phenol.

PC107

Timing of complementary feeding introduction and quality index of dietary intake in healthy infants up to 18 months of life: The cognis study

Sepúlveda-Valbuena, N.^{1,2}; Nieto-Ruiz, A.^{2,3}; Herrmann, F.^{2,3}; Diéguez, E.^{2,3}; Jiménez, J.⁴; De Castellar, R.⁴; Campoy, C.^{1,2,5}

¹Nutrition and Biochemistry Department. Faculty of Sciences. Pontificia Universidad Javeriana. Bogotá, Colombia; ²EURISTIKOS Excellence Centre for Paediatric Research, University of Granada, Spain; ³Department of Paediatrics, School of Medicine. University of Granada, Spain; ⁴Ordesa Laboratories, S.L. Barcelona. Spain; ⁵Epidemiology and Public Health Networking Biomedical Research Centre (CIBERESP), Carlos III Institute of Health (Granada's node), Spain

Introduction: The first 2 years of life constitute a critical window for infant growth and development. Complementary feeding (CF) must cover nutritional needs and provide essential nutrients. We analyze CF timing introduction and quality index (QI) of dietary intake (DI) in infants fed standard formula (SF) vs. bioactive nutrients-enriched formula (EF), and breastfed infants (BF) to check adequacy to recommendations.

Methods: The current study involved 141 infants participating in the COGNIS study [SF (n=48), EF (n=56), and BF (n= 37)] up to 18 months of age. Timing of CF introduction and DI composition were assessed using a three-days dietary record. Nutrient Adequacy Ratio and Mean Adequacy Ratio were calculated to identify the QI of DI and CF.

Results: Results showed an excessive energy intake from CF, and higher energy from proteins and carbohydrates, as well as an earlier CF introduction, in SF and EF compared to BF group at 6 months. In general, up to 18 months of age, excess micronutrients intake (vitamins and minerals) was reported. Regarding QI of fatty acids intake, infants fed with EF were closer to adequate intake recommendations.

Conclusion: Our results indicate that type of diet (infant formula or BF) received may be responsible for the differences in the timing of introduction of CF and nutrients intake up to 18 months of life. The QI resulted closer to the recommendations in the EF group than in the SF, especially regarding fatty acids intake.

Conflict of Interest: None. *This project has been funded by Ordesa Laboratories, S.L. and SMARTFOODS (CIEN Project), Spanish Centre for Technology and Industrial Development (CDTI); Contracts University of Granada General Foundation, No.3349 and 4003, Granada, Spain. Partially funded by EU Project DynaHEALTH (HORIZON 2020-GA No.633595).*

PC111

Plant-derived vesicles as carriers of exogenous functional biomolecules

Kilasoniya, A.¹; Garaeva, L.²; Spitsyna, A.²; Putevich, E.²; Konevega, A.²; Shtam, T.²

¹Doctorado en Ciencias de la Salud. Universidad Católica de Murcia (UCAM), Spain; ²Petersburg Nuclear Physics Institute named by B.P. Konstantinov of National Research Centre "Kurchatov Institute". Gatchina, Russian Federation

Introduction: Plant edible derived vesicles (PEVs) are nano-sized particles with lipid bilayer, transferring proteins, nucleic acids, that potentially making them a promising player in the delivery of therapeutic molecules. To date, there is insufficient data on their characterization and the possibility of their loading and uptake by mammalian cells.

Objective: The aim of this work was to investigate the physical properties of PEVs from and to evaluate delivery efficiency of exogenous biomolecules to human cells *in vitro*.

Methods: We have isolated extracellular vesicles from grapefruit, tomato, chlorella and cucumber juice by differential centrifugation and characterized them in size, quantity, and morphology by nanoparticle tracking analysis, dynamic light scattering, atomic force microscopy, and cryo-electron microscopy. The efficiency of PEV loading with exogenous protein was assessed by fluorimetry, and the efficiency of fluorescently labelled protein delivery by PEVs to human cells *in vitro* was assessed by flow cytometry.

Results: In our work in the first time, high-quality images of intact plant vesicles were obtained using cryo-electron microscopy. Most of obtained vesicles have a spherical shape between 30 and 300 nm with a bilipid layer. In our study we demonstrated, that chlorella PEVs were most efficiently loaded with exogenous protein (2.2% of the amount of protein in the initial mixture). In the course of the work, a comparative efficiency of exogenous protein delivery by PEVs to human cells *in vitro* was carried out for the first time. It was shown that the fluorescent protein was most efficiently delivered to human cells by chlorella and grapefruit nanoparticles. It was found that the lowest amount of juice for equivalent exogenous protein delivery to human cells is required for grapefruit fruit (2 ml/1 unit).

Conclusions: The data obtained in our study demonstrated, that the most prospect PEVs for using ones for drug delivery system are grapefruit-derived vesicles.

Conflicts of Interest: The authors declare no conflict of interest. The study was supported by the Russian Science Foundation under Grant №19-74-20146.

PC112**Antioxidant effect of silicon-enriched meat in a rat model of late stage T2DM**

Redondo-Castillejo, R.¹; Hernández-Martín, M.²; Parfenova, A.³; Bocanegra, A.¹; López-Oliva, M. E.²; Mateos-Vega, C.⁴; Bastida, S.³; Sánchez-Muniz, F. J.³

¹Department of Pharmacology, Pharmacognosy and Botany. Faculty of Pharmacy. Complutense University of Madrid. Madrid. Spain; ²Departmental section of Physiology. Faculty of Pharmacy. Complutense University of Madrid; ³Department of Nutrition and Food Science. Faculty of Pharmacy. Complutense University of Madrid; ⁴Department of Biomedical Sciences. Faculty of Pharmacy. University of Alcalá. Madrid. Spain

Introduction: Hyperglycaemia, a characteristic of type 2 diabetes mellitus (T2DM), substantially leads to the generation of reactive oxygen species. Silicon, an essential microelement, has been previously included in meat matrices showing antioxidant, antiapoptotic and antidiabetic capacities. However, the antioxidant capacity on late stage T2DM of silicon as a functional ingredient of meat products, has not been tested.

Objectives: To evaluate plasma antioxidant status after silicon-enriched functional meat consumption in a late stage T2DM rat model.

Methods: Sixteen young male Wistar rats were fed a high-saturated fat-high cholesterol diet containing 20% of restructured meat (HSFHCD-RM) for three weeks. A low dose of streptozotocin plus nicotinamide was used to induce the late stage of T2DM.

After one week of injection, rats were divided into two groups (n=8): The control-group fed the HSFHCD-RM for five extra weeks; and the Silicon (Si)-group that received silicon as functional ingredient included in the meat matrix (HSFHCD-Si-RM) for five weeks. Both plasma antioxidant enzymes activities and total antioxidant capacity by oxygen radical absorbance capacity assay were tested. Insulin and glucose concentrations were measured.

Results: Low plasma insulin and high glucose levels indicative of late T2DM were found. The Si-group in comparison to control-group showed significantly higher total antioxidant capacity (21.12 ± 1.39 vs 18.58 ± 0.94 ; $P=0.002$) and higher catalase activity (5.82 ± 1.52 vs. 3.36 ± 0.56 ; $P=0.003$), and lower glutathione reductase activity (0.62 ± 0.13 vs. 0.87 ± 0.19 ; $P=0.023$). Superoxide dismutase and glutathione peroxidase activities were not significantly affected.

Conclusions: The consumption of silicon-enriched meat appears as a useful nutritional strategy to improve the antioxidant status largely compromised on late stage T2DM. Studies are demanded to assure the functionality of this meat type in humans affected by T2DM

Conflict of Interest: None. R. Redondo-Castillejo's predoctoral fellowship award (FPU20/02920) and the competitive project PID2019-103872RB-I00.

Keywords: silicon, functional meat, plasma antioxidant status, late stage T2DM.

Author Index

Annals of Nutrition and Metabolism

Numbers refer to abstract numbers

- Abril, M. PC061
Achón, M. OC046, PC047
Acuña, M. J. PC023
Aguilera, C. M. OC053, PL02
Aguilera, C. [OC025](#), OC041, OC088
Aguilera, M. C. PC052
Aguirre, L. OC042, PC040
Albaladejo Otón, M. D. OC014
Albertos, I. [PC067](#), [PC068](#), [PC072](#)
Alcalá, R. OC053
Alcalá-Fdez, J. OC053
Alemán, J. A. OC014
Almahdi, Y. OC017
Almeida, L. OC027
Alonso-Aperte, E. OC046, PC047, [PC048](#)
Alvarez-Calatayud, G. PL014
Álvarez-Sauras, M. L. PC038
Andreu-Fernández, V. [OC027](#)
Androutsos, O. OC098
Andueza, N. [PC028](#)
Anguita, A. OC025, OC041
Anguita-Ruiz, A. OC053, PL02
Aparicio-Ugarriza, R. PC084, PC091
Aragon, A. [PC075](#), PC076, [PC077](#)
Aranaz, P. OC058, OC059
Arellano-García, L. [OC008](#)
Arévalo-Pantoja, L. PC060
Arévalo-Pérez, I. OC026
Arnao, M. B. PC034, PC036
Arnao, M. B. PL06
Arribas, J. M. PC078
Ávila, J. M. [OC032](#), [PC030](#), PC043
Avilés-Plaza, F. PC089
Ayo, J. OC059
Aza, M. G. PL01
Baenas, N. [OC086](#), OC102
Ballesteros, C. OC046, [PC048](#)
Ballesteros-Meseguer, C. PC049
Barranco, A. PL06
Bastida, S. OC056, PC112
Benedi, J. PC066
Benedito, C. [PC048](#)
Benjumea, L. [PC029](#)
Berlanga, M. OC080
Bermúdez, M. G. PL05
Bersano, P. [PC011](#)
Besné-Eseverri, I. [PC016](#)
Blanquer, M. OC099, OC103
Bocanegra, PC112
Bonmati-Carrión, M. OC037
Boutriqu, S. OC044
Bueno-Lozano, G. OC088
Bustamante, M. A. PC039
Bustos-Aibar, M. OC053
Cabezas, C. OC099, OC103, PC055
Calonge-Pascual, S. OC087, OC095
Calvo, A. E. OC018
Camacho, M. OC017
Camporesi, G. [PC066](#)
Campos, M. OC037
Campoy, C. OC054, OC106, OC108, PC107, PL05
Candela, M. E. PC034, PC036
Cano, A. PC036
Cano, M. P. [OC051](#)
Cantero, L. PC045
Cañada-López, D. OC087
Cañete, R. [OC025](#)
Cao, M. J. PC067
Cardon, G. OC098
Carr-Ugarte, H. OC042
Castell, C. OC099, OC103, PC055
Castellano-Castillo, D. OC044
Castell-Garralda, M. V. OC065
Castro, M. J. PC070, PC068
Castro-Alija, M. J. PC067, PC072
Catena, A. OC106, OC108, PL05
Celorio, R. [PC052](#)
Celorio-Sardà, R. PL016
Cerdá-Bernad, D. PC035, PC036
Cerón, J. J. OC009
Chiesa, I. PC084
Clavel, C. [OC086](#)
Comas, O. PC052
Comas-Basté, O. OC065, OC080, PL016
Conesa, M. PC101
Córdoba-Rodríguez, D. P. PC038
Corell, A. PC067
Corella, D. OC056
Cortés, A. OC009
Costa-Catala, J. [OC065](#), OC080, PL016
Cruz-Rico, M. OC025
Cuervo, M. OC074, PC028
Cuevas-Sierra, A. [OC074](#), PL03
Cutillas-Tolín, A. PC079
De Castellar, R. OC108, PC107
de Henauf, E. PC062
de la Iglesia, R. [PC048](#)
de la Mata-Navazo, S. [OC026](#), PC097
De Miguel-Etayo, P. OC012, OC098
de Moraes, C. PC052
de Tomás, I. [OC032](#), [PC030](#), PC043
De-Castellar, R. PL05
Díaz, J. P. OC014
Díaz, L. E. OC085
Díaz, W. PC023
Diéguez, E. OC108, PC107, PL05
Domínguez, Ortega, C. PC090
Duelo, A. OC080
Eizaguirre, F. J. [PC029](#)
Elvira-Torales, I. PC071
Escudero-Marín, M. OC054, OC106
Eseberri, I. OC042
Espín, J. C. OC009, PL011
Espinoza, J. P. PC023
Esteban, B. [PC029](#)
Fajardo, V. OC046, PC047, [PC048](#)
Fernández Lázaro, C. I. PC090, PC092
Fernández-Lázaro, D. PC090, PC092
Fernández-Quintela, A. OC024
Ferrando, O. [OC086](#)
Figueroa-Pinochet, M. F. PC072
Flores, K. OC012
Flores-Barrantes, P. OC098, PC038
Fratebianchi, D. OC058
Frontela-Saseta, C. PC019, PC020, PC082
Frutos, M. J. [PC033](#), [PC034](#), PC035, PC036
Garaeva, L. PC111
Garulet, M. OC057
García, A. PC011
García, F. OC005
García, J. PC100, PC101
García, P. [PC023](#)
García, Z. [OC018](#)
García-Algar, O. OC027
García-Alonso, J. PC071
García-Carro, A. OC087
García-Conesa, M. T. PC034, PC035
García-Estañ, J. OC005
García-Gómez, B. PC092
García-González, Á. OC046
García-Marcos, L. OC022, PC021, PC049, PC089
García-Meseguer, A. OC027
García-Santos, J. A. PL05
García-Serna, A. OC081, PC089
Garcimartin, A. PC066
Garitaonandia, M. T. OC057
Garrosa-García, M. PC090
Gázquez, A. OC050, OC081, [PC049](#), PC089, PL06
Gesteiro, E. [OC056](#), OC087, OC095, PC060, PC070, PC084, PC091
Gibson, E. L. OC098
Gil, A. [OC025](#)
Gil, Á. PL04
Gil, M. OC025
Gil-Campos, M. OC012

- Giménez-Blasi, N. [PC093](#)
Gimenez-Legarre, N. [PC062](#)
Gomez, C. [OC025](#)
Gómez-Bruton, A. [PC038](#)
Gómez-Gallego, C. [PC104](#)
Gómez-García, I. [OC024](#),
[PC016](#)
Gómez-Gómez, V. P. [PC020](#)
Gómez-López, I. [OC051](#)
Gómez-Martínez, S. [OC085](#)
Gómez-Roig, M. D. [OC027](#),
[PL08](#)
Gómez-Zorita, S. [PC040](#)
González, A. [OC009](#)
González, Bernal, J. J. [PC090](#)
González, Gross, M. [PC090](#)
González, M. P. [OC046](#),
[PC047](#)
Gonzalez, R. [OC086](#), [PC100](#),
[PC101](#)
González-Arceo, M. [PC040](#)
González-Barrío, R. [OC102](#),
[PC071](#), [PC104](#)
González-González, A. [OC044](#)
González-Gross, M. [OC087](#),
[OC095](#), [PC060](#), [PC062](#),
[PC070](#), [PC091](#), [PC092](#)
Gonzalez-Romero, P. [OC037](#)
González-Zancada, N.
[OC085](#)
Goyache, I. [OC058](#)
Guillén, C. [PC038](#)
- Hernández Ruiz, Á. [PL04](#)
Hernández, G. H. [PL09](#)
Hernández-Ayala, M.
[OC054](#)
Hernández-Martín, [PC112](#)
Hernández-Romero, D.
[PC078](#)
Hernández-Ruiz, J. [PC036](#)
Herrmann, F. [OC108](#), [PC107](#),
[PL05](#)
Huertas, J. R. [OC110](#), [PC061](#)
- Iduriaga-Platero, I. [PL016](#)
Iglesia, I. [PC038](#)
Iglesia-Altaba, I. [OC098](#)
Iglesias, C. E. [OC009](#)
Iyú, D. [OC005](#)
- Jensen, S. K. [PL06](#)
Jiménez, J. M. [PC067](#)
Jiménez, J. [OC108](#), [PC107](#),
[PL05](#)
Jiménez-Callejo, E. [PC092](#)
Jiménez-Monreal, A. M.
[PC093](#)
Juan Mielgo Ayuso, J. [PC090](#)
Julve, J. [OC017](#)
- Jurado-Castro, J. M. [OC012](#)
- Karaglanı, E. [PC062](#)
Keijer, J. [PL015](#)
Kilasoniya, A. [PC111](#)
Konevega, A. [PC111](#)
Kopecky, J. [PL015](#)
- Laborda-Illanes, A. [OC044](#)
Lahoz, A. [PC078](#)
Landrier, J. F. [PL015](#)
Larqué, E. [OC050](#), [OC054](#),
[OC081](#), [PC049](#), [PC089](#),
[PL06](#)
Larretxi, I. [OC018](#), [PC029](#),
[PC039](#), [PC045](#)
Larruy-García, A. [OC012](#)
Lasa, A. [OC018](#), [PC029](#),
[PC039](#), [PC045](#)
Latorre, M. L. [PC052](#)
Latorre-Moratalla, M. L.
[OC065](#), [OC080](#), [PL016](#)
Latorre-Rodríguez, J. A.
[PC093](#)
Leis, R. [OC012](#), [OC032](#),
[OC088](#), [PC030](#), [PC043](#),
[PL017](#)
López, M. [PC067](#)
López-Andreo, M. J. [OC050](#),
[OC081](#)
López-Gálvez, R. [PC078](#)
López-García, C. [PC078](#)
López-Herce Cid, J. [PC097](#)
López-Herce, J. [OC026](#)
López-Nicolás, R. [PC019](#),
[PC020](#), [PC082](#)
López-Oliva, M. E. [PC112](#)
López-Seoane, J. [PC060](#),
[PC070](#), [PC084](#)
López-Soler, C. [OC054](#)
López-Torres, O. [PC091](#)
López-Yoldi, M. [OC058](#)
Lorenzo, J. [PC069](#)
Luján, J. [OC057](#)
Lurbe, E. [PL015](#)
- Macho-González, A. [PC066](#)
Madrid, J. A. [OC037](#)
Madrigal Arellano, C. [PL04](#)
Maldonado, M. E. [PC073](#)
Mandaglio-Collados, D. [PC078](#)
Manera, M. [OC099](#), [OC103](#),
[PC055](#)
Marco-Mendez, R. [PC096](#)
Marcos, A. [OC085](#), [PL012](#)
Marín, F. [PC078](#)
Marín, N. [OC005](#)
Mariscal-Arcas, M. [PC093](#)
Martín, R. [OC017](#)
Martin-Calvo, N. [PC028](#)
- Martínez, C. [OC022](#), [PC021](#)
Martínez, J. A. [OC008](#),
[OC074](#), [PL03](#)
Martínez, L. [PC069](#)
Martínez-Augustin, O.
[OC057](#)
Martínez-Bebía, M. [PC093](#)
Martínez-Graciá, C. [PC049](#),
[PC089](#)
Martínez-Madrid, M. J. [OC037](#)
Martínez-Pina, P. [PC020](#)
Martínez-Rodríguez, M.
[PC047](#), [PC048](#)
Martínez-Sáez, N. [OC046](#)
Martínez-Zamora, L. [OC064](#)
Mateos-Vega, [PC112](#)
Matías, S. [PC029](#), [PC039](#)
Matthew, J. K. [PL06](#)
Matthias, T. [OC095](#)
Meliani, A. [PC079](#)
Mendiola, J. [PC079](#)
Mesa, M. [PL07](#)
Mesa-García, M. D. [OC110](#)
Mielgo-Ayuso, J. [PC092](#)
Miguel-Berges, M. L. [PC038](#)
Milagro, F. I. [OC059](#), [OC074](#)
Milagro, F. [OC058](#)
Milton-Laskibar, I. [OC008](#),
[PL03](#)
Miranda, G. [OC099](#), [OC105](#)
Montero-Bravo, A. [OC094](#)
Montoro, S. [PC013](#)
Morais-Moreno, C. [PC096](#)
Moraleda, J. [OC005](#)
Morales, E. [OC022](#)
Morales, E. [OC081](#), [PC021](#)
Moreno, D. A. [OC014](#)
Moreno, L. A. [OC012](#),
[OC098](#), [PC038](#), [PC062](#)
Moreno, L. [OC088](#)
Moreno-Rojas, J. M. [OC102](#)
- Nafría, A. [OC103](#)
Navarro, V. [OC018](#), [PC039](#),
[PC045](#)
Navas-Carretero, S. [PC028](#)
Nehari, A. [OC095](#), [PC060](#),
[PC084](#)
Nieto, G. [OC064](#), [PC011](#),
[PC023](#), [PC069](#), [PC073](#),
[PC075](#), [PC076](#), [PC077](#)
Nieto-Ruiz, A. [OC054](#),
[OC106](#), [OC108](#), [PC107](#),
[PL05](#)
Niño-Narvión, J. [OC017](#)
Noguera, C. [PC013](#)
Nova, E. [OC085](#)
Nuñez, V. [OC086](#)
Núñez-Gómez, V. [OC102](#),
[PC104](#)
- Olea-Serrano, F. [PC093](#)
Oneca, M. [OC059](#)
Ordoñez-Díaz, J. L. [OC102](#)
Orenes, E. [PC013](#)
Origiuela, V. [OC050](#)
Ortega-Azorín, C. [OC056](#)
Osete, J. [OC005](#)
- Palma, M. [PC061](#)
Palma-Morales, M. [OC110](#)
Pantoja-Arévalo, L. [OC087](#),
[OC095](#), [PC070](#), [PC091](#)
Parfenova, [PC112](#)
Parra, M. D. [PC075](#), [PC076](#),
[PC077](#)
Partearroyo, T. [OC094](#),
[PC096](#)
Pastor, R. [PC072](#)
Pastor-Fajardo, M. T. [OC081](#)
Paül-López de Viñaspre, M.
[PC097](#)
Paw, M. J. M. [OC098](#)
Pedrero-Chamizo, R. [PC091](#)
Peláez, S. [OC103](#)
Peñalver, R. [OC064](#), [PC069](#),
[PC075](#), [PC076](#), [PC077](#)
Peralta-Linero, J. [OC044](#)
Pereira-Caro, G. [OC102](#)
Pérez-Gimeno, G. [OC088](#),
[OC018](#), [PC029](#), [PC039](#),
[PC045](#)
Pérez-Llasmás, F. [PC033](#),
[PC034](#), [PC035](#), [PC036](#)
Pérez-Ruiz, M. [OC095](#)
Periago Castón, M. J. [PL010](#)
Periago, M. J. [OC102](#),
[PC104](#)
Periago, M. [OC086](#), [PC100](#),
[PC101](#)
Periago-Castó, M. J. [PC071](#)
Piccardi, A. [OC087](#), [PC091](#)
Picinato, M. C. [OC057](#)
Picó, C. [PL015](#)
Piernas, C. [OC041](#)
Planes, D. [PC021](#)
Planes-Muñoz, D. [PC019](#),
[PC020](#), [PC082](#)
Plaza-Andrades, I. [OC044](#)
Portals-Riomao, A. [PC060](#),
[PC070](#), [PC084](#)
Portillo, M. P. [OC008](#),
[OC024](#), [OC042](#), [OC051](#),
[PC016](#), [PC040](#)
Prieto-Sánchez, M. T. [PC049](#),
[PC079](#)
Puga, A. M. [OC094](#), [PC096](#)
Puig, M. [PC052](#)
Purificación-González, M.
[PC048](#)
Putevich, E. [PC111](#)

- Queipo-Ortuño, M. I. OC044
 Quesada-González, C. PC060, PC070, PC084
- Ramírez-Riascos, L. OC026
 Ramos, A. R. [PC073](#)
 Rangel-Huerta, O. D. OC041
 Rebollo, C. PC047
 Redondo, N. OC085
 Redondo-Castillejo, R. PC112
 Redruello-Requejo, M. OC094
 Requena, M. E. PC034
 Requena, T. PL013
 Riezu-Boj, J. I. OC074
 Ríos, Y. OC087, PC091
 Rivera-Caravaca, J. M. PC078
 Rodríguez, C. PC061
 Rodríguez, P. OC032, PC030, PC043
 Rodríguez-Alonso, P. OC094
 Rodríguez-Estévez, V. PC096
 Rodríguez-Lavado, P. [PC071](#)
 Rodríguez-Martínez, A. OC026, PC097
 Rodríguez-Martínez, G. PC038
 Rodríguez-Moraño, A. OC026
 Rol, M. A. OC037
 Ros, G. OC064, PC069, PC073, PC075, PC076, PC077
 Ros-Berruezo, G. PC019, PC020, PC082
 Rueda, R. PL06
- Rueda-Laorga, J. PC070
 Ruiz, F. J. [OC025](#)
 Ruiz-Ojeda, F. J. PL02
 Ruperez, A. OC088
 Ruperto, M. M. OC094
- Salmerón, D. OC057
 Salvador, G. OC099, OC103, PC055
 Samaniego-Vaesken, M. L. OC094
 Samaniego-Vaesken, M. PC047, PC096
 Samper, M. OC088
 Sánchez de Medina, F. OC057
 Sánchez, L. [PC100](#), [PC101](#)
 Sánchez-Alcoholado, L. OC044
 Sánchez-Berenguer, A. PC097
 Sánchez-Campillo, M. OC054, OC081, PC089, PL06
 Sánchez-Ferrer, M. L. PC079
 Sánchez-Martínez, M. [PC049](#)
 Sánchez-Moya, T. [PC019](#), [PC020](#), PC082
 Sánchez-Muniz, F. J. OC056, PC112
 Sánchez-Muniz, F. PC066
 Sánchez-Pérez, S. OC065, [OC080](#), PL016
 Sánchez-Serrano, N. PC092
 Santaella, M. OC022, [OC086](#), PC021
 Santaella-Pascual, M. PC049
- Santaliestra-Pasías, A. M. PC062
 Santaliestra-Pasías, A. OC088
 Saura-Garre, P. [OC054](#)
 Seco, Calvo, J. PC090, PC092
 Selma, M. V. OC009
 Sepúlveda-Valbuena, N. OC108, PC107, PL05
 Serra-Delgado, M. OC027
 Serrano-Munuera, A. PC089
 Shtam, T. PC111
 Simón, E. PC045
 Sjöström, M. PC062
 Solana-García, M. J. OC026, PC097, PL04
 Spitsyna, A. PC111
 Suárez, C. [OC022](#), [PC021](#)
- Tofe, I. [OC025](#)
 Toledano-Revenga, J. PC097
 Torres-Cantero, A. M. PC079
 Torres-Espínola, F. J. OC106
 Torres-Martos, A. OC041, [OC053](#), PL02
 Trepiana, J. OC024, PC016, PC040
 Tutao, C. PC029
 Txurruka, I. OC018, PC039, PC045
- Úbeda, N. OC046, PC047, [PC048](#)
 Urbano-Toledo, V. PC096
 Urrialde, R. OC095
- Valdés-Varela, L. OC058
 Valero-Cases, E. PC033, PC035
 Valiente-Teixeira, I. OC026
 Varela-Moreiras, G. OC094, PC096, PL018
 Vázquez-Cobela, R. [OC012](#)
 Vázquez-Polo, M. OC018, PC039, PC045
 Veciana-Nogués, M. T. OC065, PL016
 Veciana-Teresa, M. T. OC080
 Velasco, A. PC013
 Verdejo-Román, J. OC106, PL05
 Vicente, J. J. PC036
 Vidal, M. C. PC052
 Vidal-Carou, M. C. OC065, OC080, [PL016](#)
 Vila, L. OC099, OC103
 Vioque, J. PC079
 Vitro, R. OC058
- Widhalm, K. PC062
- Yagüe, G. OC022, PC021
 Yavlov-Dayliev, D. OC058, [OC059](#)
 Ydjedd, S. PC019
- Zambrano, C. [OC057](#)
 Zamora, S. [PC033](#)
 Zapata-Martínez, C. PC097
 Zapico, A. G. PC060
 Zapico, A. G. PC084