Nephron 1990;55:235–236

0028–2766/90/0552–0235$2.75/0

Gastrointestinal Absorption of Aluminium

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Sir,

Aluminium (Al) is now recognised as an important toxin causing considerable morbidity and mortality, particularly in patients with chronic renal failure. Though Al toxicity tends to occur when the gastrointestinal barrier is circumvented, measurable amounts of Al are absorbed from the gut in healthy subjects [1] and intoxication has developed in patients with uraemia treated with Al-containing phosphate binding gels [2].

The mechanisms that affect gastrointestinal uptake of Al are poorly understood. Intestinal permeability is increased in the neonatal period in humans [3] and this may account for the increased susceptibility of infants to Al intoxication. In man and animals various factors have been shown to promote Al absorption including parathyroid hormone [4], dihydroxyvitamin D_3 [5], zinc deficiency [6] and citrate ingestion [7]. As Al-containing phosphate binders, used in chronic renal failure, have amphoteric properties gastric acid secretion may affect absorption. In vitro studies have shown that pH affects the ability of these substances to bind phosphate [8] and the gastric acid secretory status of the stomach may affect phosphate binding by these substances in vivo [9].

Ten stable and compliant patients with chronic renal failure, with no significant residual renal function, established on continuous ambulatory peritoneal dialysis for greater than 6 months underwent a standard pentagastrin stimulation test where basal and maximal stimulated acid secretion was measured. No patients were taking H^2 blockers. Fasting blood was drawn for serum Al estimation by atomic absorption spectrophotometry and the patients were then prescribed 20 ml of aluminium hydroxide (Aludrox) to be taken 3 times daily with meals for 2 weeks; the blood samples were then repeated.

Eight patients had normal gastric acid secretory profiles, 1 had high basal and maximal acid secretion and 1 had basal achlorhydria and low stimulated acid secretion. There was a significant rise in serum Al over 2 weeks in the group as a whole (fig. 1). In the 3 patients in whom serum Al rose to above 2 μmol/l (54 μg/l) gastric acid secretion was low, normal and high, respectively.

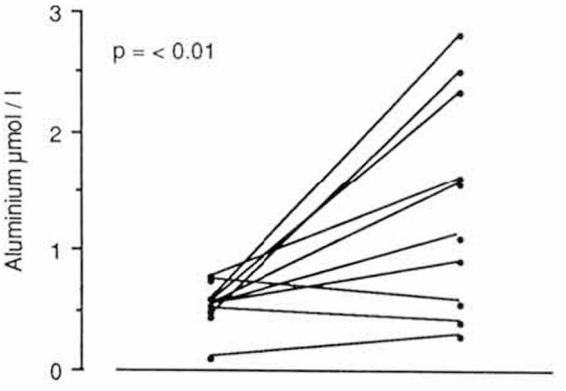

Fig. 1. Serum aluminium levels before and after oral ingestion of aluminium hydroxide.

Serum Al can only be used as an indirect measure of Al absorption due to deposition of the element in tissues. Bearing this caveat in mind our findings suggest that gastric acid secretion may not play a significant clinical role in modulating Al absorption in patients with chronic renal failure.

References

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Book Reviews

James E. Lingeman, Daniel M. Newman
Shock Wave Lithotripsy
State of the Art Plenum Press, New York, 1988
XIII + 417 pp.; US $ 85.00, ISBN 0-306-4311-2

This is an interesting book for the nephrologist. It deals with all possible uses of shock wave lithotripsy in a series of short papers as a result of a symposium held in the Methodist Hospital of Indiana on March 5th and 6th, 1988. The papers are ordered as follows: (1) ureteral stone management, (2) large stone management, (3) ESWL treatment results, (4) gallbladder stone, (5) second generation lithotripsy results and (6) a final group of research papers.

The papers are fascinating, giving a glimpse of the state of the art of stone therapy. The book is well edited, and printed very soon after the congress; recommended reading for nephrologists as well as urologists.

Norman M. Kaplan, Barry M. Brenner, John H. Laragh (eds)
New Therapeutic Strategies in Hypertension
Perspectives in Hypertension, vol. 3
Raven Press, New York 1989
X + 321 pp.; US$ 124.00
ISBN 0-88167-528-8

This volume is an up-to-date multiauthor collection of chapters, some dealing with recent developments in hypertension therapy and some dealing with information that is some years old. The overall impression is that the book makes an excellent synthesis of the practical and theoretical aspects of dealing with hypertension with several excellent review-like chapters. The chapter on new acute hypertensive drugs by D.G. Taylor and H. R. Kaplan is particularly informative.

This is a useful book for the clinical nephrologist who has to deal with the entire gamut of hypertension. It is well printed, with few errors. A wise buy if you treat hypertension.

G.R. D. Catto (ed.)
Multisystem Diseases
New Clinical Applications
Nephrology
Kluwer, Dordrecht 1989
VIII + 96 pp.; Dfl. 95.00/US$39.50/£22.50

This small volume is part of a series edited ably by Prof. Graeme Catto of the University of Aberdeen. It contains five chapters, covering the kidney in diabetes mellitus (J.J. Bending and H. Keen), multiple myeloma and renal function (S.M. Crawford), lupus nephritis (F.W. Ballardie), and Henoch-Schönlein disease (R.S. Trompeter). All the authors are from the United Kingdom. The papers are clearly written review articles, covering the subject satisfactorily, but without giving the reader mental indigestion. It would be an arduous task to pick out which is the best – they are all good. I personally learned most from Crawford's article. It is to be hoped that Prof. Catto will continue to produce other books equally readable and capable of bringing a practising nephrologist up to date. The volume is hard bound, well printed, and with excellent illustrations. It is highly recommended to buy it for your own use.