Vitamin D Seminar

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Abstracts booklet

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Abstracts

When should Vitamin D Status be Assessed? Vitamin D and Improved Health Outcomes

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Interest in vitamin D status remains high amongst the public and medical profession alike stimulating a surge in requests for serum 25-hydroxyvitamin D levels for clinical laboratories. This interest is stimulated by reports that a low vitamin D status is common and of associations between increased incidence of a variety of diseases and low vitamin D status. The highest levels of evidence indicate that the elderly with a low vitamin D status benefit from vitamin D and dietary calcium supplementation with reduced risk of premature mortality, falls and fractures.

Confidence in the quality of serum 25-hydroxyvitamin D assays has been questioned. Currently progress is being made to standardize serum 25-hydroxyvitamin D assays which eventually will be adopted by the IVD industry. Interpretation of serum 25-hydroxyvitamin D levels remains highly controversial although considerable advances have been made elucidating the physiology of vitamin D metabolite homeostasis which is critical for interpretation of patient levels in the context of various diseases.

Critical Levels of Serum 25-Hydroxyvitamin D for Metabolic Bone Disease

Professor Howard Morris, School of Pharmacy and Medical Sciences, University of South Australia, and Chemical Pathology, SA Pathology, Adelaide, South Australia

The well characterised endocrine pathway of vitamin D metabolism and its activities are solely responsible for vitamin D regulation of plasma calcium and phosphate homeostasis under control of serum 1,25-dihydroxyvitamin D, the biologically active metabolite of vitamin D. This pathway protects against the metabolic bone disease of osteomalacia in adults or rickets in children. The critical level for serum 25-hydroxyvitamin D to maintain adequate serum 1,25-dihydroxyvitamin D is 20 nmol/L (8 ng/ml). In contrast a large body of data demonstrate that an adequate vitamin D status protects against osteoporosis, improving bone mineral density and reducing the risk of fracture. This evidence extends to the relationship between serum 25-hydroxyvitamin D and bone mineral density and reduction of fracture risk. Serum levels of 1,25-dihydroxyvitamin D do not relate to osteoporosis nor does administration of 1,25-dihydroxyvitamin D reduce the risk of fracture.

Bone cells metabolise 25-hydroxyvitamin D to 1,25-dihydroxyvitamin D to elicit biological responses including osteoblast maturation, reducing bone resorption, and enhancing mineral retention in bone. Such actions protect against bone loss and reduce the risk of fracture in the elderly. The critical level for serum 25-hydroxyvitamin D for optimising the health of the skeleton is approximately 75 nmol/L (30 ng/ml). This example from calcium and bone mineral homeostasis of two critical levels for serum 25-hydroxyvitamin D to protect against either osteomalacia or osteoporosis arises from the synthesis of 1,25-dihydroxyvitamin D in different organs, the kidney and skeleton respectively. These organs have different capacities to induce expression of the enzyme 25-hydroxyvitamin D-1-hydroxylase (CYP27B1) to different levels.

Primary Hyperparathyroidism

Dr. Panayiotis A. Economides, MD, PhD, FACE

Primary hyperparathyroidism (PHPT) has an incidence of approximately 1/1000 people and is one of the most common endocrine disorders. The clinician evaluating metabolic bone diseases should be vigilant and always investigate for hypercalcemia as 1-3% of postmenopausal women may be affected. The most common etiology is a benign parathyroid adenoma affecting a single gland (about 80% of cases) however, multigland disease or hyperplasia can also occur. Parathyroid carcinoma is extremely rare.

PHPT is defined by an elevated parathyroid hormone in the context of hypercalcemia and is often symptomatic. More recently, secondary to widespread measurement of calcium and PTH, elevated PTH levels with normal calcium levels (in the absence of vitamin D deficiency or renal pathology) led to the definition of a new emerging entity, "normocalcemic primary hyperparathyroidism". Although surgical resection is the only cure in PHPT, some asymptomatic patients with mild disease can be closely followed without intervention. Preoperative imaging techniques help in surgical approach planning and these include radionuclide scanning and parathyroid ultrasonography. High resolution ultrasonography is essential for localization and identification of parathyroid lesions.

Bone Markers and Their Use: 2014

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The incidence of metabolic bone disease is highest amongst the elderly and so with the ageing of the population, clinical interest in diagnosis and prognosis of osteoporosis and estimation of fracture risk has increased. Biochemical markers of bone turnover (BTM) offer a means for assessing two major clinical questions. Can baseline levels of BTM predict the rate of bone loss or future fracture risk? Can BTM be used to monitor the response to treatments for osteoporosis? Assays for numerous BTM are readily available on automated clinical chemistry analysers and point-of-care devices; however there is still considerable debate as to their clinical utility.

A position paper published by the IOF-IFCC-IOF Working Group on Bone Marker Standards for Osteoporosis concluded that there were insufficient high quality data to provide clinical guidelines for their use in individual patients because their clinical value is limited by inadequate appreciation of the sources of variability, by limited data for comparison of treatments using the same bone marker and inadequate quality control. This paper recommended that in future clinical trials serum β-CTx be used to assess bone resorption and serum PINP be used to assess bone formation. A consequence of these recommendations is the need to standardize or harmonize the assays for these BTMs as appropriate. A second working group was established (IOF-IFCC WG-Standardisation of Bone marker Assays) in January 2012 to undertake these projects.

Professor Howard Morris

Professor Howard Morris is Professor of Medical Sciences at the University of South Australia and a Chief Medical Scientist in Chemical Pathology at SA Pathology, Adelaide, South Australia.

He is currently Vice-President of the International Federation of Clinical Chemistry and Laboratory Medicine (IFCC) and Chair of the IFCC-International Osteoporosis Foundation Working Group on Standardization of Bone Marker Assays. He has over 30 years' experience in Clinical Biochemistry largely managing the Endocrinology laboratory of a large public pathology service. His research investigates the pathophysiology of osteoporosis and the effects of hormones including vitamin D and dietary calcium.

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Dr. Economides is a practicing clinical endocrinologist in Nicosia, Cyprus. Before moving to Cyprus he was on the faculty at Harvard Medical School, USA.

He is currently the President of the Cyprus Endocrine Society and a member of the European Society of Endocrinology and the American Association of Clinical Endocrinologists. His clinical and research interests are the use of ultrasound in evaluating thyroid and parathyroid lesions.