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Invited Speaker Plenary 2: Vitamin D & Bone Health

The significance of vitamin D to health in Australia
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Background - The main source of vitamin D is not derived from dietary sources, but from sunlight, however dietary supplements have been used to treat and prevent vitamin D deficiency for many years. The main effects of a vitamin D deficiency are seen on bone, characterized by rickets in infants and children and by osteomalacia in adults. Vitamin D deficiency in children was identified as a significant public health problem in industrialized nations in the northern hemisphere. When it was found in 1920s, that cod liver oil could cure rickets this led to widespread fortification of the milk supply, which was effective in eliminating rickets. There is now increasing evidence for possible benefits of living closer to the equator, increased sun exposure and/or maintaining higher levels of serum 25-dihydroxyvitamin D (25OHD) in prevention of a number of other diseases including breast, prostate and colorectal cancer, non-Hodgkin lymphoma, multiple sclerosis and Type 1 diabetes.

Review - In the Australian population there are a number of groups that are at high risk of developing vitamin D deficiency and these include the elderly, particularly in residential care, babies of vitamin D deficient mothers, those with skin conditions where avoidance or sunlight is advised, dark skinned people, particularly if veiled and patients with malabsorption. Mild vitamin D deficiency (serum 25OHD levels between 25-50nmol/L) are associated with increased parathyroid hormone secretion, and levels between 12.5-25 nmol/L is associated with reduced bone density, high bone turnover and increased risk of hip fracture in the elderly. We have recently found in elderly residential care residents, within the range mild deficiency to adequate vitamin D levels (range 25OHD 25 – 90 nmol/L), a reduction in the incidence of falls with vitamin D supplementation (10,000 IU weekly or 1,000 IU daily), together with calcium (600mg daily). Among those taking at least 50% of study medication, the incident rate ratio for falling was 0.63 (95% CI 0.48-0.82). In another Australian study conducted in men aged over 50 years with higher levels of serum vitamin D (mean serum 25OHD of 77 ± 23 nmol/L), daily supplementation with calcium-vitamin D fortified milk (1000 mg calcium and 800 IU of vitamin D3) over 2 years was effective in suppressing PTH and slowing bone loss (unpublished). A number of vitamin D supplementation studies have been performed overseas assessing the effect on fractures, and overall the data are consistent with a dose dependent reduction in fractures with vitamin D deficiency. However it there is little evidence that vitamin D supplementation has a role in fracture prevention in those with serum 25OHD levels above 50nmol/L.

Conclusions - A number of Australians, from specific groups, are at high risk of developing severe vitamin D deficiency. There is evidence that a number of people living in the community have circulating vitamin D levels in the range of mild vitamin D deficiency, but how this impacts on health is not known. The only group with mild deficiency to demonstrate a positive effect on a functional health index with vitamin D supplementation is the elderly in residential care, with a reduction in the rate of falls. Although mild vitamin D deficiency has been associated with biochemical abnormalities, we have no good evidence that increasing circulating 25OH levels improve health outcomes in other groups with mild vitamin D deficiency. We need more studies to determine the prevalence of vitamin D deficiency across all latitudes of Australia and intervention studies to assess the functional health outcomes of increasing vitamin D levels in those with mild deficiency.

References