Here comes the sun: good news for bone health!

In Europe and North America, debate about vitamin D is ongoing. The US Institute of Medicine (IOM) is currently reviewing evidence on indicators of both adequacy of vitamin D intake and the risk of adverse effects from supplementation. Using information from systematic evidence-based reviews, the IOM will target indicators of adequacy at various ages, including older people. The overall aim of the IOM project is to update Dietary Reference Intake values for the USA and Canada, using a risk assessment approach and the report is scheduled to be issued before the end of 2010 [1]. In the UK, the Scientific Advisory Committee on Nutrition (SACN) has also started a review of its position statement on vitamin D, which was last updated in 2007 [2]. In its draft scope, SACN recognises that ‘low vitamin D status’ is common in the UK, with the greatest concern over the risk to individuals during pregnancy and breastfeeding, for young children, black and ethnic minority groups and people aged 65 years and over [3]. SACN recognise the need for the standardisation of laboratory methodologies to measure vitamin D and improved understanding of the impact of body fat on vitamin D status. They also highlight the desirability of developing functional markers of vitamin D status and the need to balance the risks and benefits of sunlight exposure.

Both IOM and SACN are primarily working at a Public Health level. However, the challenges of evaluating vitamin D status and treating vitamin D deficiency are major clinical concerns for Geriatric Medicine. Vitamin D insufficiency is common in older people and has an important role in bone health. Poor vitamin D status may lead to secondary hyperparathyroidism, increased bone resorption, bone loss, impaired muscle function and an increased risk of falls and fractures [4–7]. However, the results of interventional trials of dietary vitamin D supplementation, with and without calcium, on falls and fracture risk have yielded conflicting results and it is unclear what the optimal plasma 25OHD level is for skeletal health. Moreover, the evaluation and treatment with vitamin D supplementation of older people is complicated by variations in the amounts of vitamin D synthesised in the skin, which is influenced by sunlight exposure [8]. During winter months, the wavelength of sunlight, particularly at Northern latitudes, has no effect on cutaneous vitamin D synthesis, resulting in dietary intake or supplementation being the only source of vitamin D. For older people living in residential and nursing homes, plasma 25OHD levels are low with significant rates of deficiency seen throughout the year, including the summer months [9, 10].

We therefore welcome two clinically relevant papers in this edition of the journal. Romero-Ortuno et al. present data offering insight into plasma 25OHD levels achieved in an Irish population, whose mean age was 73 years. In 363 subjects not receiving any vitamin D supplement, the mean plasma 25OHD level was 40.3 nmol/l, but there was a significant effect of season on vitamin D levels. In 183 subjects receiving oral vitamin D supplementation, the mean plasma 25OHD level was 64.1 nmol/l and the seasonal effect was abolished. The researchers were innovative, using data on global solar radiation and solar elevation angle to include the effects of seasonal sunlight exposure on plasma 25OHD synthesis. The results convincingly show that supplementation with oral cholecalciferol is effective in raising plasma 25OHD levels and that the detrimental effects of winter on plasma 25OHD levels are not seen in those receiving supplementation. However, the study has to be interpreted with some caution. First, this intervention was neither randomised nor blinded, resulting in only one-third of subjects taking vitamin D supplements and (for the women at least) the supplemented group had worse renal function, lower body mass index, lower grip strength and more fractures related to falls. This constellation of characteristics may reflect confounding factors influencing the use of vitamin D supplements. Moreover, although it is said that the subjects were taking 800 IU/day of cholecalciferol, more than 10% were taking other preparations, probably including ergocalciferol (a common over-the-counter (OTC) preparation from plant origin) but available in a number of doses OTC; so we cannot assume that they are all taking the equivalent of 800 IU/day cholecalciferol. For those taking alfalcacidol, plasma 25OHD levels would not be affected by this potent vitamin D analogue. The study also lacks data on dietary vitamin D intakes.

The second study by Chel et al. looks at the impact of UVB exposure on vitamin D status in eight psycho-geriatric nursing home residents. This small study population had a poor vitamin D status at baseline, with a mean plasma 25OHD level of 28.5 nmol/l (compared with 40.3 nmol/l in the unsupplemented Irish study population). However, in just 8 weeks, this increased significantly to 46.5 nmol/l and the rise in vitamin D was associated with a 20% decrease in PTH, suggesting that some degree of secondary hyperparathyroidism was effectively treated. As with Romero-Ortuno’s study, this is not a randomised controlled trial but is described by the authors as a pilot study. The effects are impressive but warrant longer-term follow-up. In fact, the study is similar to that of Chuck et al., almost...
10 years ago, which used UVB lamps for the subliminal treatment of a similarly small number of nursing home residents in County Durham, UK. Seven subjects in the UK study were found with 25OHD levels <25 nmol/l and, in this vitamin D deficient group, the mean plasma 25OHD level rose from a baseline of 14.4 ± 5.1 to 25.1 ± 6.7 nmol/l at 12–24 weeks and to 36.5 ± 5.0 nmol/l after more than a year [11].

These studies present a welcome reminder that cutaneous synthesis is an important source of vitamin D worldwide. However, in Northern latitudes (and for certain groups who tend to avoid direct sun exposure to sunlight) this valuable source of vitamin D is potentially lost. While Romero-Ortuno et al. show that there are higher levels of plasma 25OHD in those who receive oral supplementation, the mean plasma 25OHD level achieved is not particularly high at 40.3 nmol/l, considering that this will have been quite a motivated population, already volunteering to take vitamin D supplements. Indeed, one of the crucial issues that need resolution is an agreement on what constitutes adequate vitamin D status. Even for those taking vitamin D supplements in Ireland, more than 70% had plasma levels <75 nmol/l, which is recommended by some as the target plasma level [12]. The Dutch study highlights how little progress has been made in practical photobiology to optimise vitamin D status. There are understandable concerns about sun exposure and skin-cancer risk, but it is time that we moved beyond feasibility and pilot studies in older people, particularly the frail, housebound and those living in institutions. The risk of skin cancer must be balanced against the actual facts of poor vitamin D status in these populations and the challenge of ensuring adherence to treatment with oral vitamin D supplements. Parenteral vitamin D therapy has also been disappointing [13–15]. Perhaps we should move this study area out of the shade and into the sunshine! Encouraging older people to go outdoors in summer months may improve bone health, not only by enhancing the cutaneous production of vitamin D, but also by increasing physical activity [16].

Conflicts of interest

None declared.

References