Vitamin D deficiency: more on diagnosis and management

Dr Peter J Lewis, Integrative physician 15 South Steyne, Manly, NSW 2095, Australia

Pearce and Cheetham's review of the diagnosis and management of vitamin D deficiency (BMJ 2010;340:b5664) is welcome in bringing to attention this important topic, though it barely scratches the surface of the diverse range of health problems associated with vitamin D deficiency. A more comprehensive list (based on a thorough review of the published scientific literature published over the past few years) is presented below:

- Increased inflammation (elevated CRP)
- Muscle weakness and pain (hypovitaminosis D myopathy)
- Rotator cuff muscle degeneration
- Poor physical performance
- Loss of muscle mass with ageing (sarcopenia)
- Falls in the elderly
- Aches and pains, non-specific musculoskeletal pain
- Fibromyalgia (vitamin D deficiency is often misdiagnosed as fibromyalgia)
- Fatigue
- Chronic low back pain
- Osteomalacia; bone pain; tenderness on pressing sternum, shinbone, or forearm bone
- Rickets
- Osteopaenia, osteoporosis
- Osteoarthritis
- 'Hurting hair' during childhood (pain in the scalp when hair is brushed or combed)
- Easily tired legs in children
- 'Growing pains' in childhood
- Sensitive, aching or 'throbbing' teeth
- Periodontal disease, gingivitis
- Dental caries
- Anxiety
- Depression
- Seasonal affective disorder
- Bipolar disorder
- Schizophrenia
- Insulin resistance
- Insulin deficiency
- Impaired glucose tolerance
- Diabetes (type 1 and type 2)
- Diabetic retinopathy
- Obesity
- Polycystic ovary syndrome
- Premenstrual syndrome
- Infertility (in men and women)
- Pre-eclampsia
- Low-birth weight
- Seizures in newborns
- Hypocalcaemia
- Auto-immune diseases, including multiple sclerosis, type 1 diabetes, rheumatoid arthritis, Sjogren's syndrome, lupus, Graves' disease, Hashimoto's disease, Crohn's disease, autoimmune prostatitis
- Increased susceptibility to infection (including influenza)
- HIV disease progression
- Psoriasis
- Rosacea
- Atopic dermatitis
- Alopecia
- Hypertension

• Peripheral arterial disease
• Myocardial infarction
• Left ventricular hypertrophy
• Congestive heart failure
• Cardiomyopathy
• Stroke
• Asthma
• Chronic obstructive pulmonary disease
• Cystic fibrosis
• Renal disease
• Multiple sclerosis
• Parkinson's disease
• Impaired cognitive function in elderly
• Alzheimer's disease
• Motor neurone disease
• Migraine
• Tension headache
• Retinitis pigmentosa, cataracts, myopia, keratoconus
• Age-related macular degeneration
• Hearing loss, otosclerosis, cochlear deafness
• Increased risk of 17 types of cancer, including breast, prostate, colon, ovarian, endometrial, oesophageal, Hodgkin's and non-Hodgkin's lymphoma, bladder, gallbladder, gastric, pancreatic, rectal, renal, testicular, vulvar and skin cancers

Vitamin D deficiency is endemic (even in sunny climes such as Australia, where sun avoidance and excessive use of sun screens is the order of the day), and it would thus be prudent for clinicians to maintain a high level of awareness of the likelihood that their patients may be vitamin D deficient, and that this will have adverse consequences on their health. Ideally, it is suggested that all patients should have their vitamin D levels routinely checked at least once or twice a year.

As a practical guide to diagnosis and management, I would suggest the following (25OHD levels in nmol/L):

• <100 = Deficient
• 100-200 = Optimal
• 135-225 = Normal in sunny countries
• 500+ = Potentially toxic (this would require a sustained daily intake >/= 40,000 IU)

[Note: To convert to nmol/L to ng/ml, divide by 2.5]

As far as treatment is concerned, a good rule of thumb (based on my personal experience of treating 100's of vitamin D deficient patients) is that a dose of 1,000 IU of cholecalciferol (vitamin D3) will raise 25OHD levels by approximately 10 nmol/L over 3 months (I would not agree with the quoted 1,000 IU raising 25OHD by 25 nmol/L). Thus, an appropriate individualised dosage can be easily calculated. Therefore, for a patient with an initial blood level of 50 nmol/L, a daily dose of 10,000 IU/day would be required to raise their 25OHD level to about 150 nmol/L (i.e. the middle of the optimal range) over 3 months. Note that ergocalciferol (vitamin D2) is not normally found in humans, and is less effective than cholecalciferol in raising 25OHD levels.

The maintenance dose of 1,000-2,000 IU daily that Pearce and Cheetham suggest is likely to be inadequate for most individuals. It is my experience that an ongoing dosage of 5,000-10,000 IU of cholecalciferol daily may frequently be required to maintain optimal 25OHD levels, especially in obese, elderly and darker skinned patients.

In Australia, whilst cholecalciferol 1,000 IU supplements are readily available over the counter, we are fortunate in that there are an increasing number of compounding chemists that can make up capsules of any strength that a doctor wishes to prescribe.

Competing interests: None declared

Published 21 January 2010