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## What we know about vitamin D

Vitamin D is an essential nutrient that contributes to healthy, strong bones and helps to control the amount of calcium in the blood. Recent evidence suggests that it may also help in the prevention of many other diseases and adequate levels of vitamin D are also associated with other health benefits such as immunity and cardiac function. Low levels of vitamin D have been associated with a range of diseases including osteoporosis, cardiovascular disease, multiple sclerosis and mental health issues.<sup>1,2</sup> Most of this evidence has been demonstrated in adults. This position statement will focus on vitamin D and its role in bone health in children.

Sunshine (via skin photosynthesis) is the main natural source of vitamin D in humans.<sup>3</sup> In the UK, vitamin D can only be made in our skin by the action of sunlight during the summer-time, and only during the middle of the day when the sun is high in the sky. Vitamin D is found naturally in a few foods such as oily fish (sardines, salmon, mackerel, pilchards and tuna). A few foods are fortified with small amounts of vitamin D (margarine, infant formula milk, some breakfast cereals, and smaller amounts in red meat and egg yolks).<sup>1</sup> Breastmilk contains small amounts of vitamin D, and these levels are even lower in deficient mothers. Therefore, as approximately less than 10% is from our diet, the main source of dietary vitamin D today for most, to ensure adequate intake, is in the form of supplements.<sup>4</sup>

## Implications for children's bone health

Several factors can affect vitamin D status. These include genetic factors, adiposity and factors affecting the cutaneous synthesis of vitamin D such as skin pigmentation and ethnicity, age, season and latitude, clothing that results in lack of skin exposure to the sun and use of sunscreens.<sup>3</sup> Some studies have also shown a link between vitamin D deficiencies and strict vegetarian diets, lack of dietary fibre and prolonged breastfeeding without vitamin D supplements.<sup>5</sup> Deficiency is highly prevalent in children (infants, young children and adolescents) in the UK, and particularly at risk are black and ethnic minority groups, especially those of Afro Caribbean and South Asian origin and people with dark skin.<sup>1,4,6,7</sup> Other vulnerable paediatric patient groups include those with gastroenterological, neonatal and neurodisability problems.

There are many debates about the ideal vitamin D blood level. Vitamin D deficiency has been defined as a blood level of 25hydroxyVitaminD below 25nmol/L yet there is consensus that optimal levels lie above 50nmol/L.<sup>8</sup> Vitamin D toxicity is extremely rare.<sup>9</sup>

Vitamin D deficiency impairs the absorption of calcium and phosphorus and can thus lead to poor mineralization in the bones. Because this is an issue, deficiency can cause rickets and poor growth in children and cardiomyopathy and hypocalcaemic seizures in infants.<sup>2,7</sup> It can also cause muscle weakness at any age. Both osteomalacia and osteoporosis can increase the risk of bone fractures in adults. While deficient levels of vitamin D are usually asymptomatic, infants and young children may present with classic features of bow legs, swollen wrists and delayed walking; a positive Gower's sign can provide an early clue (representing proximal myopathy). Severe cases may exhibit bone pain or deformities and teenagers may present with aches and pains in legs.<sup>1</sup> The related bone health issues are currently being assessed in their relation to fractures, which are important in child protection issues.<sup>8</sup>

## What needs to happen?

In order to address the problems associated with vitamin D deficiency in children, the RCPCH makes the following recommendations. In taking action, we can prevent morbidities due to seizures and address poor bone health related to vitamin D deficiency. Paediatricians must work across the health profession as well as in the public domain, especially with patients and families. Additionally, various bodies – such as the food and pharmaceutical industries – must work together to both prevent and treat this problem.

1. The RCPCH calls for more scientific research into bone disease and bone health related to vitamin D because at present we do not know enough about the precise mechanisms of bone fracture in general and particularly in the presence of concurrent vitamin D deficiency. Primary research is needed to elucidate the contribution that incidental sun exposure has on Vitamin D production for different skin types in the UK.<sup>10</sup>
2. There are other gaps in vitamin D research about the definition, incidence and prevalence of deficiency and whether it is a growing problem. Further surveillance should be carried out in order to determine the extent of the problem and its health implications, particularly in children and young people. This could be achieved through extension of BPSU or other surveillance studies of rickets associated with vitamin D deficiency.
3. Healthcare professionals should implement the Chief Medical Officer's prevention recommendations for children up to five years of age. This is supported by the NICE recommendation that pregnant or breastfeeding women and their children from six months to four years take supplements.<sup>11,12</sup> There is further debate amongst paediatricians and scientists about whether this age range should be widened still.
4. Paediatricians must support other family members, in particular pregnant women, to enhance child health. For example, paediatricians must take advantage of opportunities such as education sessions, audit and research, to work closely with other health professionals in ensuring optimal nutritional health of the foetus, infant and child.
5. The RCPCH awaits with interest the recommendations of the Scientific Advisory Committee on Nutrition, in relation to dosages and timing of supplements and wider food fortification.<sup>1,13</sup>
6. We recommend further scoping into what action can be taken by the food industry in regards to the fortification of foods and milk with vitamin D (this is being done in several countries outside of the UK).
7. Most commercial multivitamin preparations contain vitamin D but are deemed unsuitable for pregnant women because of their vitamin A content. No licensed single component vitamin D supplement currently supplies the recommended dose of 10µg/day, although this dose is combined with calcium in some. Single food supplements containing 10µg of vitamin D are available. More research into a single vitamin D supplement should be conducted, and we encourage the pharmaceutical industry to produce a single vitamin D supplement with appropriate quality assurance.
8. The Government's 'Healthy Start' programme aims to prevent deficiency by providing vitamins free to people on income support, and at low cost to all others. However, currently 'Healthy Start' vitamins appear to be in short supply. Increased awareness of the programme should be made, especially to high risk groups, and we encourage Healthy Start uptake in supermarkets, in order to ensure availability of supplements at a low cost.
9. Practical signposting should be made to paediatricians about best guidance on treatment and prevention to-date and learning opportunities, specifically the RCPCH e-learning and teaching sessions on nutrition. The RCPCH is currently collating examples of existing guidance with the intention of producing its own guidance for members and others interested. Please see website for details.

This is one of a series of position statements developed by the health policy team at RCPCH. For more details about our work go to [www.rcpch.ac.uk](http://www.rcpch.ac.uk) or email [health.policy@rcpch.ac.uk](mailto:health.policy@rcpch.ac.uk)

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