



Introduction to Vitamin D: current evidence and future directions

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In the past vitamin D has been considered to be a vitamin essential for bone homeostasis but in recent years vitamin D was “rediscovered,” being not just the “bone vitamin” but also “multitasking vitamin.” This is because vitamin D has been reported to play several extra- skeletal actions and to be involved in the homeostasis of many systems. Due to vitamin D pleiotropic effects and to the increasing prevalence of vitamin D deficiency in the general population, there was a growing interest in vitamin D research field by scientific community. Indeed, there is evidence that vitamin D deficiency is a predisposing risk factor for several acute and chronic illnesses such as musculoskeletal disorders, type 1 diabetes, type 2 diabetes, male hypogonadism, polycystic ovary syndrome, cancer, autism, dementia and cardiovascular diseases. Faced with to these findings, it has been hypothesized that vitamin D supplementation could also have a beneficial effect in the treatment of these diseases. Vitamin D is mainly produced by cutaneous synthesis (in the form of cholecalciferol (D₃)) and could be taken with diet and nutritional supplements.

The primary action of 1,25(OH)₂D occurs through its binding to the nuclear vitamin D receptor (VDR), which heterodimerizes with the retinoid X receptor and binds to vitamin D-responsive elements close to target genes. 1,25(OH)₂D promotes intestinal calcium absorption and to enhance osteoclast function thus aiming to preserve calcium and phosphorus homeostasis and bone health. However, the discovery that almost all tissues in the body express the VDR and that several tissues also express CYP27B1, thereby allowing for local production of 1,25(OH)₂D with a paracrine effect, pointed out important insights into the pleiotropic effects of vitamin D and its potential role in several extra-skeletal tissues. Currently there is no consensus on the 25(OH)D thresholds for defining

vitamin D adequacy in order to prevent and/or treat chronic diseases. The only recommendations are related to skeletal outcomes. Based on this evidence, this special issue was created with the aim to gather a selected international panel of key opinion leaders in order to develop a series of evidence-based reviews providing the current state of the art on vitamin D status suitable to prevent extra-skeletal diseases and that might be desirable in order to prevent and/or cure them.

With the prevalence of vitamin D deficiency reaching epidemic proportions, the first article of this special issue is dedicated to this topic. Professor Amrein et al. [1] provided an overview on the epidemiologic data regarding vitamin D deficiency worldwide. Grant and colleagues [2] reviewed the evidence for the need of measuring 25(OH)D concentrations as a way to both increase the awareness of vitamin D's significance in maintaining good health and to encourage vitamin D supplementation or increased solar ultraviolet-B exposure to sustain well-being throughout life by reducing disease incidence. Professor Vieth [3] highlighted the differences among cholecalciferol, calcifediol and calcitriol, mostly focusing on their nutritional properties. In addition, Kimball et al. [4] provided perspectives regarding various recommendations from the Institute of Medicine (IOM, United States) and Health Canada, the European Food Safety Authority, the Scientific Advisory Committee on Nutrition (SACN; 37 United Kingdom), the World Health Organization, the Endocrine Society and other expert groups by life stage as a guide intended for clinician use. Finally, Altieri et al. [5] performed a systematic review evaluating the advantages and limits of the current assays available for the measure of vitamin D status, i.e., circulating 25(OH)D and its metabolites, making suggestions that could be used in the clinical practice

Collectively, the manuscripts in this special issue critically evaluate aspects of vitamin D research that are important to clinical as well as public health nutrition. It is my hope that these special papers challenge current thinking and form the basis of future studies in this intriguing area.

Finally, I hope that this special issue will promote the knowledge on vitamin D and will represent the basis for future studies on this topic.

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Compliance with ethical standards

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