

VITAMIN D METABOLISM AND IMMUNE MODULATION

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Introduction. Vitamin D (vit. D) is a lipid soluble micronutrient. It influences various physiological functions including growth, bone strengthening, calcium and phosphate homeostasis, along with PTH, and immune modulations.

The purpose of work. To elucidate the mechanisms by which vit. D regulates immunity, in order to improve diagnosis and to develop effective treatment methods.

Material and methods. A literature review was conducted using databases from the last 5 years, using 5 sources, including those from the electronic libraries such as PubMed, Medline, Medscape, Hinari, and Biomed Central. **Results.** Various experimental studies explained that airway epithelium and alveolar macrophages, which are part of the innate immune system, contain the enzyme CYP27B1, which converts vit. D into its active metabolite – calcitriol (1,25(OH)₂D₃). Calcitriol strengthens the immune system's defenses against bacterial and viral illnesses. In adaptive immune system the

circulating form of vit. D is bound with vit. D-binding protein (DBP), which carries and is presented to the immune cells where the vit. D binds to the vit. D receptor (VDR) on the cell surface, inducing the vit. D signaling and inhibits dendritic cells (DCs) maturation, which lessens their capacity to expose T lymphocytes to antigens. The deficiency of vitamin D increases the risk of autoimmune diseases.

Conclusions. The equilibrium of both innate and adaptive immunity is preserved by vitamin D. Although the mechanism of pathogenesis remains incompletely understood, studies have demonstrated that disruption of vitamin D metabolism, change in DBP and VDR, and vitamin D deprivation may increase the risk of autoimmune disorder developing. Further thorough research is required to elucidate the precise molecular process and underlying mechanisms.

Keywords: Vitamin D, calcitriol, innate immunity, adaptive immunity, DBP, VDR, autoimmune diseases.