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Vitamin D is a group of liposoluble prohormones consisting of 5 different vitamins, the most important forms being vitamin D2 and vitamin D3. The ergocalciferol (vitamin D2) is less efficacious and derives from irradiated fungi, while colecalciferol (vitamin D3), derived from cholesterol, is synthesized via ultraviolet B rays in animal organisms.

Only the ultraviolet B rays (290 to 315 nm) portion of the solar ray photolyzes 7-dehydrocholesterol in the skin to previtamin D3, which is converted subsequently to vitamin D3. Moreover, the skin makes little vitamin D from the sun at latitudes above 37 degrees north or below 37 degrees south of the equator. Calcidiol [25(OH)D] is the more stable metabolite of vitamin D in serum and the best indicator of the vitamin D status.

Optimal values range are >30 ng/mL. Calcitriol [1,25(OH)2D] is the active hormone form of vitamin D. The 1,25(OH)2D binds to its nuclear receptor (vitamin D receptor), expressed in many tissues, regulating the expression of genes involved in calcium metabolism, cell differentiation, apoptosis, and immunity.

About immunity, calcitriol stimulates innate immune responses by enhancing the chemotactic and phagocytotic responses of macrophages as well as the production of antimicrobial peptides. 1,25(OH)2D strongly enhances production of interleukine-10 by stimulating T regulatory cells and inhibiting Th1 and Th17 cell differentiation.

Furthermore, several studies suggest that lower 25(OH)D serum levels are associated with an increased risk of respiratory infection at all ages in a dose-response manner.