Vitamin D is a fat–soluble vitamin that plays an important role in the human body. Vitamin D has two main chemical forms, vitamin D2 and vitamin D3. The basic chemical structure of vitamin D is determined by its chemical formulas. Vitamin D is synthesized from cholesterol, which is a derivative of 7–dehydrocholesterol. 7– Dehydrocholesterol is also called ergosterol. Vitamin D is biosynthesized in the skin, specifically in the Malpighian layer, when ultraviolet rays from sunlight interact with 7–dehydrocholesterol. Vitamin D3 is produced by ultraviolet radiation of 7–dehydrocholesterol. Vitamin D3 is synthesized from 7–dehydrocholesterol, while Vitamin D2 is synthesized from ergosterol. The chemical structure of vitamin D3 was defined in 1935. Vitamin D is a secosteroid, and its main form differs by only one carbon atom. Vitamin D3 is more active in the body than Vitamin D2. Vitamin D3 is not biologically active and must be processed by the body to form the final vitamin D hormone. Vitamin D is hydroxylated by at least two enzymes, a mitochondrial enzyme and a microsomal enzyme. The first step occurs in the liver, where vitamin D3 is hydroxylated to form 25–hydroxyvitamin D3. The second step occurs in the proximal convoluted tubule cells of the kidney, where a 1α–hydroxyl group is added to the molecule to produce the final vitamin D hormone, 1α,25–dihydroxyvitamin D3 (2D3). 25–OH–D3 is also biologically inactive at physiological levels and must be further modified before function. The most likely physiologically relevant microsomal enzyme is 25–hydroxylase. Vitamin D4, also known as 22–dihydroergocalciferol, has a basic chemical structure of C28H46O4.

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