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Biochemistry and Molecular Biology of Vitamin D and Its Analog

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Message from the Guest Editors

Previous studies have shown that vitamin D exerts vitamin D receptor (VDR)-mediated genomic and non-genomic actions, as well as VDR-independent effects. Recently VDR-independent effects of 25(OH)D3 on lipid metabolism by inducing degradation of SREBP/SCAP have been reported, as have ligand-independent effects of the VDR on the hair cycle. Thus, at least five types of effects of vitamin D and/or the VDR should be considered, namely: (1) VDR-dependent effects of 1,25D (VDR-1,25(OH)2D3), (2) VDR-independent effects of 1,25D (non VDR-1,25(OH)2D3), (3) VDR-dependent effects of 25D (VDR-25(OH)D3), (4) VDR-independent effects of 25D (non VDR-25(OH)D3), and (5) ligand-independent effects of VDR (VDR-no ligand).

Several thousand vitamin D analogues have been synthesized, and many have been studied in clinical trials, including for treating type I rickets, osteoporosis, psoriasis, and pancreatic cancers and so on. But in many cases, their precise molecular mechanisms are not fully understood. In this Special Issue, we focus on the molecular mechanisms of vitamin D, its analogues and/or VDR actions leading to drug discovery, and nutritional supplements for disease prevention in the future.

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