Vitamin D, a neuro-immunomodulator: implications for neurodegenerative and autoimmune diseases.


Source

Institut Jean Roche, NICN, CNRS UMR 6184, Faculté de Médecine, Université Aix-Marseille, France.

Abstract

It has been known for more than 20 years that vitamin D exerts marked effects on immune and neural cells. These non-classical actions of vitamin D have recently gained a renewed attention since it has been shown that diminished levels of vitamin D induce immune-mediated symptoms in animal models of autoimmune diseases and is a risk factor for various brain diseases. For example, it has been demonstrated that vitamin D (i) modulates the production of several neurotrophins, (ii) up-regulates Interleukin-4 and (iii) inhibits the differentiation and survival of dendritic cells, resulting in impaired allo-reactive T cell activation. Not surprisingly, vitamin D has been found to be a strong candidate risk-modifying factor for Multiple Sclerosis (MS), the most prevalent neurological and inflammatory disease in the young adult population. Vitamin D is a seco-steroid hormone, produced photochemically in the animal epidermis. The action of ultraviolet light (UVB) on 7-dehydrocholesterol results in the production of pre-vitamin D which, after thermo-conversion and two separate hydroxylations, gives rise to the active 1,25-dihydroxyvitamin D. Vitamin D acts through two types of receptors: (i) the vitamin D receptor (VDR), a member of the steroid/thyroid hormone superfamily of transcription factors, and (ii) the MARRS (membrane associated, rapid response steroid binding) receptor, also known as Erp57/Grp58. In this article, we review some of the mechanisms that may underlie the role of vitamin D in various brain diseases. We then assess how vitamin D imbalance may lay the foundation for a range of adult disorders, including brain pathologies (Parkinson's disease, epilepsy, depression) and immune-mediated disorders (rheumatoid arthritis, type I diabetes mellitus, systemic lupus erythematosus or inflammatory bowel diseases). Multidisciplinary scientific collaborations are now required to fully appreciate the complex role of vitamin D in mammal metabolism.

PMID:19545951