Novel Vitamin D Compounds to Treat Autoimmune Diseases

Technical Field

Therapeutic: Autoimmune diseases, such as Rheumatoid Arthritis, Multiple sclerosis, Scleroderma, Psoriasis, Inflammatory Bowel Disease, Type 1 diabetes

The Technology

Vitamin D is well known to have anti-tumor, anti-autoimmune and anti-fibrotic activities in addition to promoting bone health, but its hypercalcemic activity makes it unsuitable for use as a drug.
To overcome this hurdle, researchers at the University of Tennessee Health Science Center have designed, synthesized, and tested novel Vitamin D analogs that retain biological activity without the harmful hypercalcemic side effects. These compounds were first discovered as enzymatic and UV-induced conversion products of Vitamin D, but chemical synthesis routes are also known. In particular, the researchers have demonstrated safety and efficacy in preclinical models of rheumatoid arthritis.

Lead compound 20-Hydroxyvitamin D3, (20(OH)D3), a product of Vitamin D3 hydroxylation by cytochrome P450scc (20(OH)D3):

- Suppresses autoimmunity to Type II collagen and arthritis in a mouse model of Rheumatoid Arthritis
- Does not show toxicity to major organs in mice when administrated consecutively for three weeks (30 μg/kg)
- Is not hypercalcemic when administrated consecutively for three weeks (30 μg/kg)
- Prevents bleomycin induced scleroderma in mice (3μg/kg)
- Inhibits Cell Proliferation and colony formation and Stimulates Keratinocyte Differentiation
- Inhibits NFkB activity
- Is potent against immune/inflammation markers *in vitro*

Related publications:

Am J Physiol Cell Physiol **2011,** *300* , C526
Brit J Cancer **2011**, *105*, 1874–1884
Journal of Investigative Dermatology **2011,** *131***,** 1167
Steroids **2010**, *75*, 926
(and references cited within)

Patents

- US Patent 7,253,293
- US Patent Application 12/807178

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