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Why is vitamin D genetically required for wellness and prevention in humans?

Before we discuss the evidence regarding vitamin D sufficiency and health and vitamin D deficiency and illness let's first look at the basic science regarding the importance of vitamin D for human immune function and health. A basic understanding of why vitamin D is a genetic human requirement for wellness and prevention will allow greater understanding of why vitamin D supplementation is required.

The innate immune system is the component of our immune system that is genetically programmed to respond to antigens (viruses, bacteria, fungi, and any other threatening non-self invaders). The innate immune system uses what are termed effectors that are genetically coded to respond to antigens or invaders. The most studied of these effectors are named antimicrobial peptides or AMPs. AMPs not only attack the invaders they also trigger tissue repair and activate the adaptive or acquired immune system (the branch of the immune system that creates antibodies to specific antigens after exposure).

Recent research has shown that vitamin D up-regulates the genetic expression of AMPs in immune cells. Vitamin D also plays an important role in controlling the inflammatory response initiated by specialized immune cells called macrophages. A deficiency of vitamin D means deficient control of inflammation. In the skin vitamin D also activates the immune system against antigens.

"Thus, vitamin D both enhances the local capacity of the epithelium to rapidly produce endogenous antibiotics and, at the same time, dampens certain arms of adaptive immunity, especially those responsible for the signs and symptoms of acute inflammation." Cannell et al. 2008 Cod Liver Oil, Vitamin A Toxicity, Frequent Respiratory Infections, and the Vitamin D Deficiency Epidemic. *Annals of Otolaryngology, Rhinology & Laryngology* 117 (11): 864-870