**Role of Vitamin D to keep healthy immune system**

A large body of scientific evidence shows that vitamin D impacts the immune system and helps support systemic health. Vitamin D functions as an immune booster and vitamin D deficiency is linked to immune disorders and increased risk of infections. Vitamin D is not just a nutrient; it’s a hormone with receptors in nearly every cell and tissue of the body. Research has correlated vitamin D levels with over 53 different disease states including Alzheimer’s, cancer, MS, osteoporosis, diabetes, depression, and COVID-19. It is estimated that about 3% of the human genome is regulated by the vitamin D endocrine system and over 1000 genes in the human body are impacted.

How vitamin D boosts the immune system

Vitamin D is involved in immunity through several mechanisms and plays a role in regulating both the innate and adaptive immune response in the body. Vitamin D impacts immune health by interacting with vitamin D receptors on innate immune cells throughout the body. The innate immune is the body’s non- specific, first line of defense against foreign pathogens.

Vitamin D builds immunity and helps fight off infection by regulating the activity of immune cells which elicit antiviral responses. Vitamin D binds to receptors on immune cells such as neutrophiles, macrophages and natural killer cells. Vitamin D stimulates these cells to produce peptides with antiviral properties that defend the body against foreign pathogens. Cathelicidins and defensins are peptides that have anti-microbial and immune modulating capabilities and act as anti-viral agents as part of the innate immune system. Multiple studies have shown that vitamin D metabolites play a role in enhancing production of the human form of cathelicidins and defensins, thus enhancing innate immune response. Studies have shown that vitamin D plays a role in both the activation of these cells for helping the body fight off infections, and also in suppressing immune response in cases of over inflammation.

Vitamin D acts as an immune system modulator by suppressing inflammation associated with both the innate and adaptive immune response. In response to foreign pathogens, the immune system releases small proteins called cytokines, which trigger an immune response to help fight off the virus. Sometimes this response to infection goes into overdrive and excessive amounts of cytokines are released. This is known as a cytokine storm and can cause hyperinflammation. This inflammation can damage organs throughout the body, leading to pulmonary infiltrates, lung injury, acute respiratory distress syndrome, disseminated intravascular coagulant, renal failure, and eventually death.