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How sunlight may reduce the severity of multiple sclerosis

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New research into the neurodegenerative disease, Multiple Sclerosis (MS) offers new insight into the link between sunlight, vitamin D3, and MS risk and severity. The research, published in the *European Journal of Immunology*, studies the relationship between the sunlight-dependent vitamin D3 hormone, immune cells, and the risk and severity of autoimmunity in an experimental model.

Expensive first-line treatments for MS modestly reduce the frequency of autoimmune attacks but do not slow disease progression, when the patient's immune system operates against the body's own tissues. More expensive second-line treatments slow disease progression but carry high risks.

The origin of MS attacks remains unknown. However, new research indicates that a patient's vitamin D3 supply (derived mainly from sunlight exposure) is strongly related to disease activity; the fewest attacks and slowest progression occurred in patients with the highest vitamin D3 supplies. This research suggests that increasing vitamin D3 supplies might be a safe, effective and inexpensive therapy for MS.

"MS is a genetically and immunologically complex disease," said lead author Dr. Colleen Hayes from the University of Wisconsin-Madison. "It is currently incurable, but environmental factors, such as vitamin D3, may hold the key to preventing MS and reducing the impact of the disease in MS patients."

Dr Hayes' team originally suggested that the sunlight dependent hormone D3 (1,25-dihydroxyvitamin D3) may restrain the autoimmune attacks that cause MS based on the strong negative correlation between sunlight exposure and MS prevalence, the need for UV light to catalyze vitamin D3 formation, and the presence of receptors for the vitamin D3 hormone in T lymphocytes. They proposed that the vitamin D3 hormone might act on these receptors to control the T lymphocytes responsible for autoimmunity.

"Our new study investigated the protective effects of the vitamin D3 hormone in an experimental model of MS when the hormone receptor was either present or absent in T lymphocytes. We found that the hormone's protective effects were only evident when these receptors were present in autoimmune T lymphocytes. Our new data suggest that an action of the vitamin D3 hormone directly on pathogenic T cells leads to elimination of these cells," said Hayes. Actions of the vitamin D3 hormone on other immune cells have not been ruled out, but such actions were not sufficient for protection from autoimmunity if the hormone could not act on the pathogenic T cells.

"This information is important because it provides a plausible biological explanation for the negative correlation between UV light exposure and MS disease risk and severity," concluded Hayes. "My research group and others around the world are building the scientific knowledge base needed to devise vitamin D-based strategies to prevent and treat MS" she adds. "There are many uncertainties and unanswered questions. However, understanding how sunlight and vitamin D3 may be working at the molecular level contributes greatly to our knowledge base and brings us closer to the goal of preventing this debilitating disease."

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