

Vitamin D Mechanism in Corticosteroid-Resistant Asthma Discovered

Findings Suggest New Therapeutic Targets for Patients Who Fail Corticosteroid Therapy

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DENVER, CO — Corticosteroids are the most widely used and effective controller medication for asthma. However, up to 40 percent of asthma patients do not respond to these medications, creating a major problem in asthma therapy.



Researchers at National Jewish Health reported in the January 2016 *Nature Communications* that Vitamin D inhibits the development of steroid resistance in cell cultures and a mouse model of asthma by preventing the conversion of an immune system cell to a pathogenic type associated with resistance to corticosteroids. The findings could help explain why clinical trials of vitamin D supplementation have shown no consistent benefit for asthmatics; vitamin D appears to affect only a specific subset of immune cells.

Previous studies showed that asthma patients resistant to corticosteroids have high levels of CD8+ T cells, also known as killer T cells. When vitamin D was evaluated in cell cultures and mice, it inhibited the conversion of CD8+ T cells to a pathogenic type that secretes IL-13, a cytokine associated with asthma and allergies.

“Our experiments showed that vitamin D may be effective as a preventive strategy in patients who do not respond to corticosteroids and who have increased numbers of CD8+ cells,” said lead author Michaela Schedel, PhD, an assistant professor at National Jewish Health.

Experimental results indicated that vitamin D interacts with the enzyme CYP11a1, a critical regulator of CD8+ T cell conversion driven by the cytokine IL-4. Vitamin D appears to inhibit expression of CYP11a1 and thus conversion of CD8+ T cells to the pathogenic IL-13 secreting form. Additional examination of genetic mutations in more than a thousand children with asthma supported a role for CYP11A1 and Vitamin D in the risk of developing childhood asthma. The Vitamin D/CYP11A1 mechanism represents a new pathway in asthma pathogenesis.

“Our expanding knowledge of molecular mechanisms continues to provide new targets and new therapeutic strategies in asthma,” said Erwin Gelfand, senior author and chair of pediatrics at National Jewish Health.

National Jewish Health is the leading respiratory hospital in the nation. Founded 124 years ago as a nonprofit hospital, National Jewish Health today is the only facility in the world dedicated exclusively to groundbreaking medical research and treatment of patients with respiratory, cardiac, immune and related disorders. Patients and families come to National Jewish Health from around the world to receive cutting-edge, comprehensive, coordinated care. To learn more, visit the media resources page.

Media Contacts

Our team is available to arrange interviews, discuss events and story ideas.

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