

Seeing family for the holidays? Scientists discover how the stress might kill you

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If you ever thought the stress of seeing your extended family over the holidays was slowly killing you -- bad news: a new research report in the December 2009 print issue of the *Journal of Leukocyte Biology* shows that you might be right. Here's the good news: results from the same study might lead to entirely new treatments that help keep autoimmune diseases like lupus, arthritis, and eczema under control.

That's because researchers from the University of Connecticut Health Center have found that the same part of our [nervous system](#) that is responsible for the fight-or-flight response (called the sympathetic nervous system) also controls [regulatory T cells](#), which are used by the body to end an [immune response](#) once a foreign invader has been removed or destroyed.

"We show for the first time that the nervous system controls the central immune police cells, called regulatory T cells," said Robert E. Cone, Ph.D., a senior researcher in whose laboratory the work was done at the University of Connecticut Health Center. "This further shows that it is imperative to concentrate on the neuro-immune interactions and to understand how these two different systems, the immune and nervous systems, interact."

To make this discovery, Cone, Sourojit Bhowmick and colleagues injected some mice with a drug called 6-hydroxydopamine (6-OHDA) that selectively removes sympathetic nerves located in different organs, or a saline solution. Mice injected with 6-OHDA, which effectively

severed the link between the nervous system and the immune system had twice as many regulatory T cells as the control group in their spleens and [lymph nodes](#). Further analysis showed that the increase in regulatory T cells resulted from an increase in a protein called "TGF-beta," which directs the development and survival of regulatory T cells. With this information in hand, Cone and colleagues then sought to see if 6-OHDA would prevent autoimmune disorders from developing. To do this, they injected 6-OHDA or a saline solution into mice before subjecting them and a control group to conditions known to cause an autoimmune disease similar to multiple sclerosis in humans. Unlike the control group, the mice treated with 6-OHDA did not develop the autoimmune disease, showing that not only can the sympathetic nervous system negatively affect the immune system, but it also shows how it might be possible to prevent or stop [autoimmune disorders](#).

"Ever since Hans Selye's groundbreaking work on stress, scientists have been trying to understand why stressful situations often exacerbate autoimmune diseases and cause re-emergence of latent infections," said John Wherry, Ph.D., Deputy Editor of the [Journal of Leukocyte Biology](#). "In true fight or flight situations, stress can be a lifesaver, but understanding how the neurological response to the stress of everyday events such as seeing your family around the holidays impacts immune responses should provide opportunities for new therapies."

More information: Sourojit Bhowmick, Anurag Singh, Richard A. Flavell, Robert B. Clark, James O'Rourke, and Robert E. Cone. The [sympathetic nervous system](#) modulates CD4⁺FoxP3⁺ regulatory T cells via a TGF- β -dependent mechanism. *J Leukoc Biol* 2009 86: 1275. [doi:10.1189/jlb.0209107](https://doi.org/10.1189/jlb.0209107)

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