

Why hay fever may be a good sign

Yale UniversityYale University

If you're one of the millions of people coughing, sneezing, sputtering, and cursing your body's hypersensitivity to ragweed, trees, and grass this spring, researchers at Yale have what could be considered positive news: Seasonal allergies may be a sign that your immune system is doing what nature intended it to do — protect you against environmental toxins that are far more harmful than pollen. The paper appears in *Nature*.

The body's defense arsenal consists of different types of immune responses to deal with various classes of pathogens. Type 1 immunity — which battles viruses, bacteria, fungi, and protozoa — relies primarily on directly killing pathogens or infected host cells.

Type 2 immunity, the focus of this Perspectives piece, protects against external environmental challenges by spurring the body's T cells and antibodies into action to fight the irritant. The problem is, type 2 immunity can go into overdrive when inadvertently activated by environmental antigens such as pollen. Hay fever sufferers know the consequences all too well: The allergens such as pollen trigger an over-production of histamine, resulting in the coughing, sneezing, runny noses, and all-round misery that afflict them most severely in the spring and fall.

Nonetheless, the Yale authors argue that, despite the occasional misfiring, type 2 immunity is beneficial to humans. They write that this particular response of the host defense system evolved over time to protect us from at least four different classes of environmental challenges: helminthes (parasites), noxious chemicals, animal venoms, and environmental irritants.

But if type 2 immunity evolved over time to protect us, what is the purpose of sensing such small amounts of allergen when the levels are far too low to really harm us, and when a misfiring can cause such suffering?

Lead author Ruslan Medzhitov, professor of immunobiology at Yale School of Medicine and a Howard Hughes Medical Institute investigator, said, "We believe that allergic hypersensitivity evolved to survey the environment for the presence of noxious substances. After the first exposure, the immune system gains a memory, and subsequent exposure to even minute amounts will induce an anticipatory response that helps minimize potentially harmful effects." He added that such responses also encourage avoidance of the environment that contains the noxious substance. "According to this view, hypersensitivity to allergens triggers avoidance of a sub-optimal environment," Medzhitov explained.

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