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Why Sneezing Is Good for You

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Allergies may have emerged to protect us from environmental toxins

Most experts consider allergies to be misdirected immune reactions to innocuous substances such as pollen or peanuts. A handful of researchers, however, now propose a fundamentally different theory of allergies: that runny noses, coughs and itchy rashes may have evolved to protect us from toxic chemicals, like snake venom, in our environment and in the food we eat.

Immunologists have long thought that allergy sufferers are the victims of a misdirected type 2 response, which is believed to have evolved to protect against parasites. The type 2 response works by strengthening the body's protective barriers and promoting pest expulsion.

The other way our bodies fight harmful substances is through the type 1 response, which directly kills pathogens such as viruses and bacteria and the human cells they infect. The idea is that smaller pathogens, like viruses, can be killed but that it is smarter to fight larger ones, like parasites, defensively.

But Ruslan Medzhitov, an immunobiologist at Yale University, has never accepted the idea of allergies as rogue soldiers from the body's parasite-fighting army. Parasites and the substances that trigger allergies, called allergens, "share nothing in common," he says. First, there are an almost unlimited number of allergens. Second, allergic responses can be extremely fast -- on the scale of seconds -- and "a response to parasites doesn't have to be that fast."

In a paper published in April in *Nature*, Medzhitov and his colleagues argue that allergies came about to protect us from potentially toxic substances in the environment or in food. In

other words, they have evolved for a reason and aren't just a misdirection. "How do you defend against something you inhale that you don't want? You make mucus. You make a runny nose, you sneeze, you cough. Or if it's on your skin, by inducing itching, you avoid it or you try to remove it by scratching it," he explains. Likewise, if you ingest something allergenic, your body might react with vomiting.

Among the evidence Medzhitov cites is a 2006 study in *Science* that reported that key cells involved in allergic responses degrade and detoxify snake and bee venom. And a 2010 study in the *Journal of Clinical Investigation* suggests that allergic responses to tick saliva prevent the pests from attaching and feeding. How does this jibe with the prevailing wisdom on allergies? A 2011 study published in the *New England Journal of Medicine* reported that children who grow up on farms, where they are exposed to many microorganisms, are less likely than other kids to develop asthma and allergies. This idea, known as the hygiene hypothesis, suggests that individuals who encounter a multitude of bacteria and viruses early in life invest more immune resources into type 1 responses at the cost of type 2 reactions. Medzhitov maintains that this theory can coexist with his own.

Ultimately Medzhitov's theory raises more questions than it answers, but many agree that the tenets are plausible. "It stimulates us as scientists to draw up some new hypotheses," says Kari Nadeau, an immunologist at the Stanford University School of Medicine.

PHOTO (COLOR)

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By Melinda Wenner Moyer

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