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Hypercleanliness may be making us sick

A growing body of evidence suggests that all the antibacterial-wiping, germ-killing cleanliness of the developed world may actually be making us more prone to getting sick — and that a little more dirt might help us stay healthier in the long run.

The idea, known as the hygiene hypothesis, was first proposed in 1989 by epidemiologist David P. Strachen, who analyzed data from 17,414 British children and found that those who had grown up with more siblings (and presumably more germs) were less likely to have allergies and eczema. Since then, the theory has been cited as a possible explanation for everything from multiple sclerosis to hay fever and autism. But its particulars aren't so clean and clear.

Here's what researchers do know: Our immune systems need bugs. They rely on early encounters with germs to learn how to protect our bodies.

"Bacteria, fungi, lots of these things we think of as bad — they're all part of our environment, and we evolved to live with them," says Michael Zasloff, an immunologist and physician at Georgetown University Medical Center. Through exposure to these microbes early in life, your immune system learns what's harmful and what isn't, he says, and that readies the immune responses you'll have for the rest of your life.

"The body has got to know friend from foe," Zasloff says. If your body learns that a specific microbe or substance — any antigen, or visitor to the body — is a foe, it will send immune system cells to destroy it. If it recognizes the antigen as a friend, the immune system will leave it alone. "Exposure tells the immune system, 'These are the things you're going to run into all the time, so you don't need to worry about them.'"

According to the hygiene hypothesis, bad things can happen if this early exposure doesn't take place or if it doesn't include the right microbes. The immune system can become overly sensitive, overreacting to non-threats such as pollen or dander as if they're potentially harmful. When combined with certain genetic traits, this process can lead to conditions such as asthma and allergies, says Kathleen Barnes, an immunogeneticist at Johns Hopkins University who specializes in the genetics of asthma.

Barnes's work has revealed that although genes play a key role in the development of asthma, changing a population's exposure to microbes — by protecting them from parasitic diseases, for example — can make asthma rates rise. That suggests that hygiene may also play a role in asthma.

"It can't all be due to genes, because if we look at the prevalence of asthma or diseases of inflammation over the past 50 years, we see it's definitely on the rise," Barnes says. "It's some interaction between the genes and the environment that's causing these rates to skyrocket."

But researchers can't say which particular interactions with the environment help prevent disease later on. That's because exposures tend to come in combinations, and teasing apart their effects on the body is difficult.

Take farming, for instance. Several studies have suggested that growing up on a farm can protect children from allergies and other immune-system-related conditions, but it's hard to know which element of farm living does the trick.

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