

Antibiotic overuse might be why so many people have allergies

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Various pills. Credit: Wikipedia

Scientists have warned for decades that the overuse of antibiotics leads to the development of drug-resistant bacteria, making it harder to fight infectious disease. The Centers for Disease Control and Prevention [estimates](#) that drug resistant bacteria cause 23,000 deaths and two million illnesses each year.

But when we think of [antibiotic overuse](#), we don't generally think of allergies. Research is beginning to suggest that maybe we should.

Allergies are getting more and more common

In the last [two to three decades](#), immunologists and allergists have noted a dramatic increase in the prevalence of allergies. The American Academy of Asthma, Allergy and Immunology reports that some [40%-50%](#) of schoolchildren worldwide are sensitized to one or more allergens. The most common of these are skin allergies such as eczema (10%-17%), respiratory allergies such as asthma and rhinitis (~10%), and food allergies such as those to peanuts (~8%).

This isn't just happening in the US. Other industrialized countries have seen [increases as well](#).

This rise has mirrored the increased use of antibiotics, particularly in children for common viral infections such as colds and sore throats. Recent [studies show](#) that they may be [connected](#).

Antibiotics can disrupt the gut microbiome

Why would antibiotics, which we use to fight harmful bacteria, wind up making someone more susceptible to an allergy? While antibiotics fight infections, they also reduce the normal bacteria in our gastrointestinal system, the so-called gut microbiome.

Because of the interplay between gut bacteria and the normal equilibrium of cells of the immune system, the gut microbiome plays an important role in the maturation of the immune response. When this interaction between bacteria and immune cells does not happen, the immune system responds inappropriately to innocuous substances such as food or components of dust. This can result in the development of potentially fatal allergies.

Exposure to the microbes at an early age is important for full maturation of our immune systems. Reducing those microbes may make us feel cleaner, but our immune systems may suffer.

Do more microbes means fewer allergies?

Research done in Europe has shown that children who grow up on farms have a wider diversity of microbes in their gut, and have up to 70% reduced prevalence of allergies and asthma compared to children [who did not grow up on farms](#). This is because exposure to such a wide range of microbes allows our immune systems to undergo balanced maturation, thus providing protection against inappropriate immune responses.

In our attempts to prevent infections, we may be setting the stage for our children to developing life-threatening allergies and asthma.

For instance, a study from 2005 found that infants exposed to antibiotics in the first 4-6 months have a 1.3- to 5-fold [higher risk](#) of developing [allergy](#). And infants with reduced bacterial diversity, which can occur with antibiotic use, have [increased risk](#) of developing eczema.

And it's not the just the antibiotics kids take that can make a difference. It's also the antibiotics their mothers take. The [Copenhagen Prospective Study on Asthma in Childhood Cohort](#), a major longitudinal study of infants born to asthmatic mothers in Denmark, reported that children whose mothers took antibiotics during pregnancy were [almost twice as likely](#) to develop asthma compared to children whose mothers did not take antibiotics during pregnancy.

Finally, in mice studies, offspring of mice treated with antibiotics were shown to have [an increased likelihood](#) of developing allergies and asthma.

Why are antibiotics overused?

Physicians and patients know that overusing antibiotics can cause big

problems. It seems that a relatively small number of physicians are driving overprescription of antibiotics. A recent study of physician prescribing practices reported that 10% of physicians prescribed antibiotics [to 95% of their patients](#) with upper respiratory tract infections.

Health care professionals should not only be concerned about the development of antibiotic resistance, but also the fact that we may be creating another health problem in our patients, and possibly in their children too.

Parents should think carefully about asking physicians for antibiotics in an attempt to treat their children's common colds and sore throats (or their own), which are often caused by viral infections that don't respond to them anyway. And doctors should think twice about prescribing antibiotics to treat these illnesses, too.

As we develop new antibiotics, we need to address overuse

As resistant bacteria become a greater problem, we desperately need to develop new antibiotics. The development process for a new antibiotic takes a considerable amount of time (up to 10 years), and drug companies have previously neglected this area of drug development.

Congress has recognized that antibiotic overuse is a major problem and recently passed the [21st Century Cures bill](#). This bill includes provisions that would create payment incentives from Medicare for hospitals that use new antibiotics.

But this approach would have the perverse effect of *increasing* the use of any new antibiotics in our arsenal without regard for whether bacterial

resistance has developed. This would not only exacerbate the problem of resistance, but potentially lead to more people developing allergies.

Congress should consider more than just supporting increased development of new [antibiotics](#), but also address the core problem of overuse.

This may stave off the further development of antibiotic resistant bacteria and reduce the trend of increasing development of allergies.

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