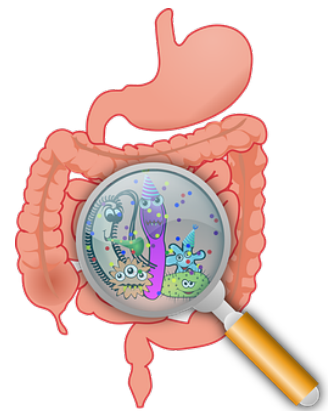


Superbugs: The Super Villains of Modern Medicine



Have you ever had an infection? Maybe you scraped your elbow, and the cut became red, swollen, and itchy. Or maybe your throat was very sore, and you lost your voice—perhaps it was strep throat. Maybe you had some bad sushi and the next day you were throwing up—turns out you had food poisoning. If you went to your doctor, it's possible you were given some antibiotics. So, what exactly are antibiotics, and how did your doctor know to give them to you? In short, an **antibiotic** is a medication designed to kill bacteria, which could be what's making you sick. **Bacteria** are tiny microscopic organisms, and though it's difficult to say exactly, scientists suggest there are almost 150,000 kinds of bacteria—and they are *literally everywhere*: from extremely hot deep-sea vents to the icy arctic to the soil in your backyard. One of the most important places that they can be found, though, is in you.



Bacteria are everywhere, even in you.

Bacteria: “bad” and “good”

Are you grossed out? For the most part, you shouldn't be. Scientists recently estimated that your body is host to as many bacterial cells as human cells. You have bacteria on your skin, in your mouth, in your gut, on your hands. These bacteria can be extremely helpful in keeping you healthy.

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each is effective at killing different types of bacteria. It's important to remember that antibiotics cannot kill viruses—even smaller microbes that cause diseases like the flu, meningitis, and chicken pox. So, how do antibiotics kill bacteria?

Antibiotics kill bacterial cells by preventing them from reproducing. If the bacteria aren't reproducing, there will be fewer of them—and your body can attack and conquer them. Another way antibiotics can kill bacterial cells is by destroying their **cell wall**—a strong structure that surrounds a bacterial cell, but not human cells. Without a cell wall, the bacterial cell will disintegrate and can no longer hurt you. Doctors must be very careful when prescribing antibiotics because they can also kill your “good” bacteria, and that can be very bad for your health.

Unfortunately, despite the importance of antibiotics to modern medicine, they can become dangerous: while we use antibiotics to fight bacteria, the bacteria are fighting back.

Combating antibiotics

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When a few bacteria become antibiotic resistant through mutation, they adapt to their environment and are able to thrive under the once harsh conditions. These lucky winners eventually take the places of their unlucky cousins who are killed by the antibiotic, and grow a whole new population of their newly resistant progeny. There is selective pressure, then, to have resistance to the antibiotic, as only those with the mutation will be able to survive.



Bacteria can share their DNA with neighboring bacteria.

To “lend a helping hand,” these antibiotic resistant bacteria can share their DNA with other microbes to make their once struggling neighbors resistant as well. Bacteria are actually pretty good at sharing genetic information, and can easily take it up from the environment. Over the course of a couple of days, all the bacteria will be indestructible by one or multiple types of antibiotic.

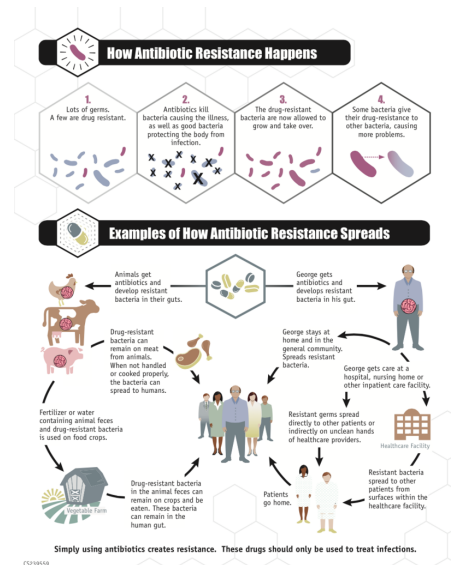
Superbugs

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It is through this cascade of events that superbugs are born. To bacteria, they are the superheroes of their species. To us, they are the super villains. According to the CDC (Centers for Disease Control and Prevention), every year in the U.S. two million people become infected with superbugs and at least 23,000 of them die. Besides being immune to conventional antibiotics, superbugs pose another threat. It takes days or weeks to diagnose the cause of an infection. In the meantime, doctors make their best educated guesses as to proper treatment. This often allows irreversible progression of the disease, and puts the patient in a race against time.



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What do we do about superbugs?

Scientists have been trying to develop faster diagnostic tests to detect superbugs. One microbiologist, Hosam Zowawi, is getting close. He is establishing a test that could help doctors determine the type of bug within three to four hours, as opposed to the current time frame. This new development can help to end the trial and error method that doctors have often employed when having to make rapid decisions in emergency situations.

As for the rest of us, we can make significant contributions to the prevention of spreading superbugs by being hygienic. Wash your hands frequently with soap and water, and do not share personal items such as towels. In addition, be conscientious when using antibiotics, and use them only when directed.



Good hygiene is key to preventing the spread of superbugs.

Reading Comprehension Questions

1. What are bacteria, and where are they found?
2. What
3. What have scientists found that helps us combat bacteria? Name one example.
4. Name two
5. How do bacteria obtain antibiotic resistance? Name two ways.
6. What
7. Why are
8. What can we do to help stop the spread of superbugs?

Extension Questions

9. If you are a doctor treating a patient infected with a superbug, what is your first step?
10. How do

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