

What is antibiotic resistance?

Antibiotic resistance is the ability of bacteria to resist the effects of an antibiotic.

Why are bacteria becoming resistant to antibiotics?

Antibiotics kill or inhibit the growth of susceptible bacteria. However, each time an antibiotic is used, there is a risk for some bacteria to survive because of their ability to neutralize or evade the effect of the antibiotic. Bacteria become resistant to antibiotics through several mechanisms. Through their ability to share genetic information, bacteria can transfer resistant genes to one another. Some bacteria develop the ability to neutralize an antibiotic before it can do them harm, others can rapidly pump the antibiotic out, and still others can change the antibiotic attack site so it cannot affect the function of the bacteria. In addition, bacteria that were at one time susceptible to an antibiotic can acquire resistance through mutation of their genetic material or by acquiring pieces of DNA that code for the resistance properties from other bacteria. The DNA that codes for resistance can be grouped in a single easily transferable package called a plasmid. Bacteria can become resistant to many antimicrobial agents because they can acquire multiple antibiotic resistant plasmids.

How do bacteria that are in food become resistant to antibiotics?

Many of the bacteria in food that cause disease are found in the intestinal tracts of animals or people. Use of antibiotics in food animals and people can select for resistant strains that end up in the food supply. Healthy food-producing animals commonly carry bacteria that can cause illness in humans, including Salmonella, Campylobacter, and Escherichia coli. Humans can also carry the source of infection for some food-borne bacteria, including Shigella and Salmonella typhi (the cause of typhoid fever), and resistance in these bacteria are predominately the consequence of antibiotic use in humans.

Why are antibiotics used in food-producing animals?

Antibiotics are used in food-producing animals for three major reasons. First, antibiotics are used to treat sick animals. Second, antibiotics are used in the absence of disease to prevent diseases during times when animals may be more susceptible to infections. This use affects a larger number of animals, because it usually involves treating a whole herd or flock, which increases the likelihood of selecting for organisms that are resistant to the antibiotic. In these two examples, high doses of antibiotics are used for short periods of time. Third, antibiotics are commonly given in the feed at low doses for long periods to promote the growth of cattle, poultry, and swine. In the 1950s studies showed that animals given low doses of antibiotics gained more weight for a given amount of feed than untreated animals. Exactly how this occurs is still greatly unknown.

How do resistant bacteria spread from animals to humans?

Resistant bacteria may be transferred to humans through the food supply or direct contact with animals. For example, Campylobacter lives in the intestines of chickens. People get Campylobacter associated diarrhea primarily from eating undercooked chicken. In 1989, none of the Campylobacter strains from ill persons that CDC tested were resistant to fluoroquinolone antibiotics. In 1995, the FDA approved the use of fluoroquinolones in poultry. Soon afterwards, doctors found Campylobacter strains from ill persons that were resistant to fluoroquinolone antibiotics.

What can be done to slow antibiotic resistance?

Decreasing unnecessary or inappropriate antibiotic use, in humans and animals, will decrease the resistance pressure on the treated organisms. Ongoing efforts in human and veterinary medicine are needed to decrease the misuse and overuse of antibiotics, so that the efficacy of antibiotics is preserved for as long as possible. For example, medical and veterinary professional organizations have issued recommendations to promote appropriate therapeutic use of antibiotics by physicians and veterinarians.

Additional information concerning food safety issues related to antimicrobial resistance can be found at the FDA's Center for Veterinary Medicine website.

Taken from FAQ section of CDC NARMS Web site: www.cdc.gov/narms