

# Antibiotic resistance: How it spreads & prevention

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## Abstract

Genetically, antibiotic resistance spreads through bacteria populations both "vertically," when new generations inherit antibiotic resistance genes, and "horizontally," when bacteria share or exchange sections of genetic material with other bacteria.

Bacteria can share genes with each other in a process called horizontal gene transfer. This can occur both between bacteria of the same species and between different species and by several different mechanisms, given the right conditions. Gene transfer results in genetic variation in bacteria and is a large problem when it comes to the spread of antibiotic resistance genes.

Ways for bacteria to share their genes:

- Conjugation: Two bacteria can pair up and connect through structures in the cell membranes and then transfer DNA from one bacterial cell to another.
- Transduction: There are viruses called bacteriophages that can infect bacteria. These viruses sometimes bring along genes that they picked up during infection of another bacterium. These genes may then be incorporated into the DNA of the new bacterial host.
- Transformation: Some bacteria can take up pieces of DNA directly from the environment around the cell.

Prevention and control

There are many ways that drug-resistant infections can be prevented: immunization, safe food preparation,

handwashing, and using antibiotics as directed and only when necessary. In addition, preventing infections also prevents the spread of resistant bacteria.

Antibiotic resistance is accelerated by the misuse and overuse of antibiotics, as well as poor infection prevention and control. Steps can be taken at all levels of society to reduce the impact and limit the spread of resistance.

Individuals:

- Prepare food hygienically, following the WHO Five Keys to Safer Food (keep clean, separate raw and cooked, cook thoroughly, keep food at safe temperatures, use safe water and raw materials) and choose foods that have been produced without the use of antibiotics for growth.

Healthcare industry:

To prevent and control the spread of antibiotic resistance, the health industry can:

- Invest in research and development of new antibiotics, vaccines, diagnostics and other tools.

## Biography

My name is Dr. Biswajit Batabyal working in Serum Analysis Center Pvt. Ltd., India.

