

Antibiotic resistance

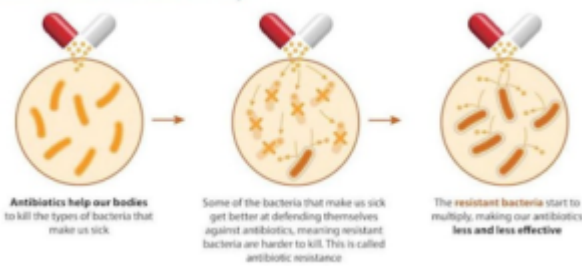
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In news— A study in 2019 found more than 1 million people a year died from infections linked to microbes that are resistant to antibiotics – more than those who died due to malaria or with HIV/AIDS.

About Antibiotic resistance-

- **Antibiotic resistance occurs when bacteria evolve to evade antibiotics. Overuse and misuse** of antibiotics are the biggest drivers of resistance. That means that the more we use antibiotics, the worse the problem of antibiotic resistance becomes.
- **Antibiotics work by binding to a specific target protein on a bacteria**, then entering to kill it from the inside.
- Penicillin, for example, weakens the bacterial cell wall, causing the cell to disintegrate.
- **The most common ways bacteria evade antibiotics come from mutations that allow them to stop drugs from binding to bacteria.**
- It's like the bacteria changed the locks so the antibiotic key no longer opens the cell door.
- **Bacteria can also achieve resistance by producing proteins that inactivate or modify the antibiotic**, so it no longer binds to the bacteria. Or the target protein is mutated so the antibiotic can no longer bind to it.
- **But worst of all is when bacteria evolve many of these mechanisms in backup**, so even if you overcome one, other resistances might fill the gap.
- Experts describe antibiotic resistance as one of the greatest challenges facing humanity. They predict that if the problem remains unsolved, 10 million people could die as a result by 2050.

How antibiotic resistance develops



How to Solve the problem of antibiotic resistance?

- Antibiotic resistance will always be with us. **It's the nature of evolution by natural selection that means bacteria will always find ways to evade antibiotics.**
- But experts are optimistic we can find ways to limit antibiotic resistance in the next decades, at least enough to stop the issue from spiraling into a bigger crisis.
- Unfortunately, it isn't as simple as developing a drug that will permanently overcome antibiotic resistance.
- It's incredibly complex science, even more so than finding a vaccine for a virus such as COVID-19.
- For one, there's huge diversity among bacteria – not all drugs work on a given organism, and not all organisms are killed by a given drug.
- Scientists have been working on the issue from many different angles. **One approach is to modify old antibiotics so they overcome resistance.**
- **Another strategy is to make brand-new drugs, but this approach hasn't been very successful in recent decades.**