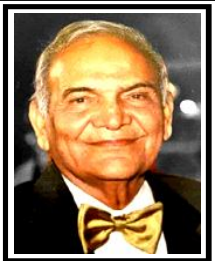

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ANTIBIOTICS FIGHT BACTERIA BUT AT WHAT COST?

P. D. GUPTA

We have about 10^{13-14} cells in our body and every cell of the body has role to play. For the play, they get energy from the food which we eat; just about every part of the human body microbes also inhabit along with cells, living on the skin, in the gut, and up the nose. Some times they cause sickness, but most of the time, microorganisms live in harmony with their human hosts, providing vital functions essential for human survival. The gut bacteria according to one estimate are ten times more than that of the number of cells present in our body, these all put together contribute for the wellbeing of our body.

Bacterial infection: The Micro world has millions of organisms some are friendly, who help humans in many vital processes and others infect and them make sick. Thank to Alexander Fleming (1928) who discovered penicillin, the first true antibiotic, which indiscriminately kills both types of bacteria, Though, antibiotics, keeping us safe from serious health complications. But these drugs have a dark side too. Antibiotics can cause significant damage to the gut microbes. However, friends are friends, the gut microbiome eventually recovers, But not before going through some major changes. It takes for good bacteria to restore after antibiotics depends on factors like diet and whether or not you take a probiotic during and after antibiotic use.

Phase 1: Gut bacteria under attack: Antibiotics don't distinguish between good and bad microbes. That's why when one takes an antibiotic, the amount of bacteria and the different types of bacteria in the gut —that is, the richness and diversity of the gut microbiota decrease significantly. Some species may even disappear, either for a short or long period of time. The drop in richness and diversity depends on different factors. For example, broad-spectrum antibiotics (e.g. ciprofloxacin, cefadroxil) target a wide range of bacteria and have a big impact. Whereas, narrow-spectrum antibiotics (e.g. metronidazole, erythromycin) target only a few types of bacteria. Another important factor is the gut microbiome itself. As it turns out, the gut microbiome varies considerably among people. Some of us are more resilient to antibiotics than others. One study found that with a 5-day course of antibiotics, most people lost around 10 species, while a few lost around 24. This is also observed that this drop in bacterial numbers is not permanent for most people

Phase 2: Resistance: When it comes to the gut microbiome, balance is key. Beneficial bacteria make sure that these should not take up much space. But as we saw in phase 1, antibiotics cause a major drop in the levels of gut microbes, disrupting this healthy balance. During this phase, there is one specific group of microbes that takes advantage of the decrease in protective bacteria and grows unchecked for a while: drug-resistant bacteria. Studies have shown that after antibiotics, the number of drug-resistant bacteria and the amount of antibiotic resistance genes increase.

Phase 3: Going back to baseline: Some weeks after an antibiotic course, beneficial bacteria start to repopulate in the gut, putting unfriendly bugs in check. But this can be a slow process, but varies from person to person. For most people, the composition of the gut microbiome returns almost completely to baseline in one to two months. But for a few, things may not go back to the way they were for quite a long period of time. One study found that 6 months after antibiotics, some individuals only recovered about 63% of the bacterial species they had before the antibiotic treatment. In another study, friendly species such as *Bifidobacterium, Coprococcus*, and *Eubacterium* disappeared with antibiotic use and continued to be undetected from all participants at 6 months post-treatment. Scientists are still not entirely sure why each person responds to antibiotics differently. Some things to consider that may be important factors:

The initial composition of the gut microbiome, which varies plenty among individuals.

- An adult gut microbiome with low diversity.
- A history of antibiotic use, from which the gut didn't fully recover
- Is there anything you can do to help restore good bacteria after antibiotics?
- Fortunately, you can help to restore good bacteria after antibiotics.
- Eating the right foods can promote gut diversity, which is what we want to see. It can also boost the growth of beneficial bacteria

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To support the gut microbiota, try the following

- Take probiotics and antibiotics at the same time:
- Eat more foods high in fiber and/or polyphenols, such as fruits, vegetables, nuts, legumes, and whole grains
- Add more fermented foods to your diet. These include yogurt, kefir, sauerkraut, kombucha, and kimchi
- Try to avoid saturated fats, artificial sweeteners, and processed meats