People are superorganisms with microbiomes of thousands of species

Curious Cat Science and Engineering Blog

In a recent article in National Geographic Carl Zimmer has again done a good job of explaining the complex interaction between our bodies and the bacteria and microbes that make us sick, and keep us healthy.

The damage done by our indiscriminate use of antibiotics [1] is not just the long term resistance that we create in bacteria (making the future more dangerous for people) that I have written about numerous times but it also endangers the person taking the anti-biotics in the short term. Sometimes the other damage is a tradeoff that should be accepted. But far too often we ignore the damage taking antibiotics too often does.

When You Swallow A Grenade [2]
While antibiotics can discriminate between us and them, however, they can't discriminate between them and them–between the bacteria that are making us sick and then ones we carry when we're healthy. When we take a pill of vancomycin, it's like swallowing a grenade. It may kill our enemy, but it kills a lot of bystanders, too.
…
If you think of the human genome as all the genes it takes to run a human body, the 20,000 protein-coding genes found in our own DNA are not enough. We are a superorganism that deploys as many as 20 million genes.
…
Before he started taking antibiotics, the scientists identified 41 species in a stool sample. By day 11, they only found 13. Six weeks after the antibiotics, the man was back up to 38 species. But the species he carried six weeks after the antibiotics did not represent that same kind of diversity he had before he took them. A number of major groups of bacteria were still missing.
…
They found that children who took antibiotics were at greater risk of developing inflammatory bowel disease later in life. The more antibiotics they took, the greater the risk. Similar studies have found a potential link to asthma as well.

The human body contains trillions of microorganisms — outnumbering human cells by 10 to 1. Because of their small size, however, microorganisms make up only about 1% to 3% of the body's mass, but play a vital role in human health.

Where doctors had previously isolated only a few hundred bacterial species from the body, Human Microbiome Project (HMP) [3] researchers now calculate that more than 10,000 microbial species occupy the human ecosystem. Moreover, researchers calculate that they have identified between 81% and 99% of all microorganismal genera in healthy adults.

“Humans don’t have all the enzymes we need to digest our own diet,” said Lita Proctor, Ph.D., NHGRI’s HMP program manager. “Microbes in the gut break down many of the proteins, lipids and carbohydrates in our diet into nutrients that we can then absorb. Moreover, the microbes produce beneficial compounds, like vitamins and anti-inflammatories that our genome cannot produce.” Anti-inflammatories are compounds that regulate some of the immune system’s response to disease, such as swelling.

“Enabling disease-specific studies is the whole point of the Human Microbiome Project,” said Barbara Methé, Ph.D., of the J. Craig Venter Institute, Rockville, MD, and lead co-author of the Nature paper on the framework for current and future human microbiome research. “Now that we understand what the normal human microbiome looks like, we should be able to understand how changes in the microbiome are associated with, or even cause, illnesses.”

Read the full NIH press release [4] on the normal bacterial makeup of the body

Related: Tracking the Ecosystem Within Us [5] – What Happens If the Overuse of Antibiotics Leads to Them No Longer Working? [6] – Antibacterial Products May Do More Harm Than Good [7] – Antibiotics Too Often Prescribed for Sinus Woes [8]

Links:
[1] http://engineering.curiouscatblog.net/2012/07/12/our-dangerous-antibiotic-practices-carry-great-risks/
[2] http://phenomena.nationalgeographic.com/2012/12/18/when-you-swallow-a-grenade/
[3] http://commonfund.nih.gov/hmp/
[4] http://www.nih.gov/news/health/jun2012/nhgri-13.htm
[5] http://engineering.curiouscatblog.net/2007/06/25/tracking-the-ecosystem-within-us/
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