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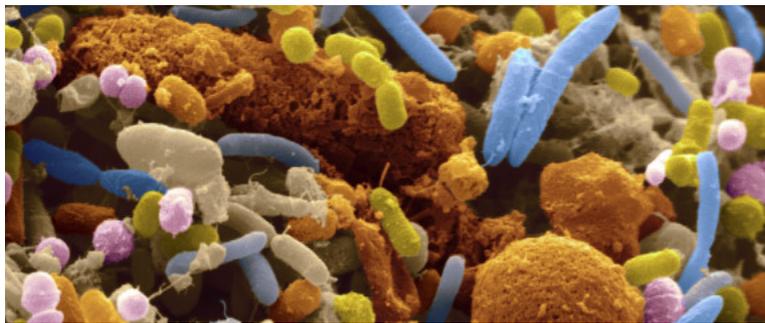
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The Stomach Bacteria That Could Prolong Your Life

Posted: 05/21/2014 6:02 pm EDT | Updated: 05/23/2014 7:59 am EDT



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The best predictor of our lifelong health may well be the bacteria that live within us.

Specifically, the trillions of microbes that colonize our bodies from childhood on, and **FOLLOW HUFFPOST**
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 on from birth to 100 cells 10-to-1. Autism, allergies, asthma, inflammatory bowel disease, diabetes and obesity are just a few of the conditions now thought to be at least partly tied to the health of our microbial partners, which are integral to human processes such as digestion, neural and hormonal signaling and guarding against toxic chemicals.

<http://www.pinterest.com/pin/create/button/?media=http%3A%2F%2Fi.huffpost.com%2Fen%2F09907%2Ffinal%2F647-BACTERIA-Researchers-swam-that-this-vast-ecosystem--our-so-called-microbiome--has-become-endangered--due-to-an-excessive-use-of-microbe-killing-antibiotics-and-toxic-chemicals-The-health-consequences-they-add-could-be-profound-for-our-current-generation-of-children-and-perhaps-for-generations-to-follow->
 Researchers swam that this vast ecosystem -- our so-called microbiome -- has become endangered, due to an excessive use of microbe-killing antibiotics and toxic chemicals. The health consequences, they add, could be profound for our current generation of children, and perhaps for generations to follow.

"The diversity of these microbes is really beneficial -- it's a preventative tool like no other," said Rodney Dietert, an expert in children's health at Cornell University's College of Veterinary Medicine. "Too narrow a set of microbes could set you on the path for problems."

The earliest microbiome communities established in our gut may be particularly pivotal in this programming.

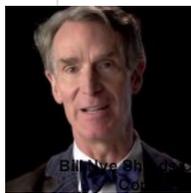
There's no denying that children today are facing an unprecedented risk of chronic disease, which may strike at any point in their lives. The number of 8-year-old children diagnosed with autism has surged in just two years from one in 88 to one in 68, according to data released by the U.S. Centers for Disease Control and Prevention in March. And while the cause of the disease remains unclear, new research, including a small study presented this week at a meeting of the American Society for Microbiology, suggests children with autism host a very different array of microbes in their gut. Rates of [diabetes in children](http://www.nytimes.com/2014/05/04/us/study-reveals-sizable-increase-in-diabetes-among-children.html?_r=0) (http://www.nytimes.com/2014/05/04/us/study-reveals-sizable-increase-in-diabetes-among-children.html?_r=0), too, have jumped by 20 to 30 percent between 2001 and 2009, according to a study published in May. Research has also hinted at the [role of the microbiome](http://www.ncbi.nlm.nih.gov/pubmed/21226616) (<http://www.ncbi.nlm.nih.gov/pubmed/21226616>) in development of the disorder.

Why do today's children's microbiomes differ? Several modern practices, already under increased scrutiny due to the [proliferation of antibiotic-resistant superbugs](http://www.huffingtonpost.com/2012/05/09/antibiotic-resistance-environment-) (<http://www.huffingtonpost.com/2012/05/09/antibiotic-resistance-environment->

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[livestock_n_1502749.html](#)), are the likely culprits: cesarean sections, formula feeding, antibiotics taken during pregnancy, antibiotics prescribed to young children, antibiotics fed to the animals we eat, antimicrobial products and the widespread use of industrial chemicals.

Dr. Martin Blaser, director of the Human Microbiome Program at New York University and author of the new book *Missing Microbes*. (<http://martinblaser.com/>) described the dynamic and delicate choreography of a child's bacterial inhabitants during development. Any untimely hit to this bacteria, he said, could permanently alter the maturing microbiome and derail the proper development of everything from the immune system to the brain.

He drew a parallel to modern practices caring for livestock that are used primarily for human food.

"Ten years ago, a light bulb went off," Blaser told The Huffington Post. "If farmers are purposefully feeding antibiotics to livestock to fatten them up, is it possible that the antibiotics we're giving to our kids are doing the same thing? It is quite plausible."

ENDANGERED ECOSYSTEM

One in three U.S. babies are born by cesarean section. While many of these surgeries are medically necessary, Blaser and others experts warn that a number are not, and are therefore unnecessarily denying newborns exposure to the rich microbial flora in the vaginal canal. The newly establishing microbiome also misses out when a mother only feeds formula to her baby.

"Doctors don't discuss this risk with their patients," Blaser said.

Still, even babies that are birthed naturally and breast-fed may be deprived of optimal maternal microbes due to antibiotics commonly prescribed during pregnancy and labor, as well as a woman's exposure to antibiotic residues in the environment, including milk and meat.

Contact with antimicrobial products, consumption of antibiotic-contaminated foods and drinks, and yet more antibiotic prescriptions for ear infections and other illnesses, can further degrade a child's microbiota during the first years of life. By the age of 20, the average American kid has taken about 17 courses of antibiotics. Many of the drugs are broad-spectrum, meaning they kill bacterial friend and foe alike.

Antibiotics do save lives, of course. Experts are simply urging more judicious use. A study published on Wednesday reports that the rate at which doctors prescribe antibiotics for acute bronchitis (http://www.eurekalert.org/emb_releases/2014-05/tjnj-act051514.php), despite clear evidence that it is ineffective, has risen to 70 percent.

In the last month, the [World Health Organization](http://www.who.int/mediacentre/news/releases/2014/amr-report/en/) (<http://www.who.int/mediacentre/news/releases/2014/amr-report/en/>), the U.S. and the European Union (<http://thehill.com/policy/healthcare/205986-us-eu-vow-action-against-antibiotic-resistance>) released reports underscoring the dire threat of antibiotic resistance. Action is urgently needed to restrict use of the drugs, they say, in order to avoid a post-antibiotic era in which minor infections could once again become deadly.

But as frightening as that prospect might sound, evidence continues to pile up that the rampant use of antimicrobials may pose an even more pernicious problem.

Dr. Corinne Keet, a pediatric allergist at Johns Hopkins Children's Center, published a study in May that found children delivered by cesarean section and those given antibiotics as infants were more likely to develop an [emerging allergic disease of the esophagus](http://www.hopkinschildrens.org/Birth-by-C-Section-Early-Antibiotic-Use-Put-Kids-at-Risk-for-Allergic-Esophagitis/) (<http://www.hopkinschildrens.org/Birth-by-C-Section-Early-Antibiotic-Use-Put-Kids-at-Risk-for-Allergic-Esophagitis/>) that can persist in adulthood. Earlier work by her team linked greater sensitivity to allergens with higher urine levels of triclosan (<http://www.huffingtonpost.com/tag/triclosan/>) -- an antimicrobial found in many personal-care products.

"There's still a lot of research to be done," Keet said. "But this is another reason to be concerned about our indiscriminate use of antibiotics, and another reason to use them only when necessary."

REDEFINING TOXICITY

Hundreds of industrial chemicals and heavy metals -- bisphenol A, PCBs, flame retardants and the like -- have been found to [course through a child's blood](http://www.huffingtonpost.com/2012/07/23/chemistry-lessons-living-n_1677912.html) (http://www.huffingtonpost.com/2012/07/23/chemistry-lessons-living-n_1677912.html), even before the child is born. Studies now show that many of these toxins pose significant harm even at small doses, and particularly during critical windows of a child's development.

That's plenty enough for a parent to worry about. But research on toxic chemicals has generally only looked at effects on mammalian cells, such as the cells of a mouse or rat used as a proxy for a human's cells. The damage such chemicals inflict on microbial

cells, said Cornell's Dietert, may be even greater.

Take, for example, pesticides. Researchers have found that low-dose exposures to the insecticide [chlorpyrifos \(http://link.springer.com/article/10.1007/s11356-012-1283-4\)](http://link.springer.com/article/10.1007/s11356-012-1283-4) can alter the gut microbiome. [Glyphosate \(http://www.ncbi.nlm.nih.gov/pubmed/23224412\)](http://www.ncbi.nlm.nih.gov/pubmed/23224412), the main ingredient in the popular "Roundup" herbicide, has also been shown to disrupt microbes. There are even hints that the pesticide preferentially targets beneficial bacteria.

"Chemical companies are not going to want to talk about pesticides and the microbiota because bacteria are likely to be more vulnerable," Dietert said. "That might explain some of the apparent effects even when we don't see effects in a culture of mammalian cells."

Diminished diversity of bacterial flora, in turn, further limits the microbiome's ability to act as a gatekeeper for environmental toxins, including the [degradation of pesticides \(http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3597131/\)](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3597131/) and the metabolizing of metals.

What's more, toxic chemicals may even speed up the emergence of infections that resist multiple antibiotics. "As with antibiotics, things like mercury kill susceptible organisms and select for antibiotic resistance," said NYU's Blaser.

A person with a weakened microbiome, he adds in his book, may be more susceptible to antibiotic-resistant superbugs.

REGROWING OUR GARDENS

Gregor Reid, a microbiologist at the University of Western Ontario, acknowledges that exposures to toxic chemicals in our modern world may be unavoidable.

"It's really the government and industry that is responsible for monitoring the environment and trying to reduce toxic levels in the environment," said Reid, also chair of human microbiology and probiotics at the Lawson Health Research Institute. "But I'm not sure we can trust that to happen."

He and his team are now on the hunt for a means to bolster gut bacteria against heavy metals and other environmental toxins. Preliminary data from their efforts in Africa, which awaits publication in a scientific journal, Reid said, hints at the possibility of using natural foods to protect people from toxic exposures.

This same idea of bringing back beneficial bacteria is behind the growing popularity of probiotics, live microorganisms sold as pills and naturally present in fermented foods and yogurt. Despite the gut-churning premise, it is also spurring interest in [fecal transplants \(http://mosaicscience.com/story/medicine%E2%80%99s-dirty-secret\)](http://mosaicscience.com/story/medicine%E2%80%99s-dirty-secret), swapping the stool in someone's colon with stool harvested from a donor's healthy gut.

But again, knowing how critical microbiome diversity during infancy is to lifelong health, researchers are also looking into ways to specifically manipulate the microbial flora early in infants and pregnant women. This strategy might include transferring a swab from a mother's vagina to babies born by cesarean section.

Meanwhile, experts and advocates around the world continue to push for stricter regulations on the use of both antibiotics and [toxic chemicals \(http://www.huffingtonpost.com/2014/05/02/toxic-chemical-reform-congress-children-health_n_5247283.html\)](http://www.huffingtonpost.com/2014/05/02/toxic-chemical-reform-congress-children-health_n_5247283.html).

"The incidences of disease in children is so worrisome," said Reid. "Clearly we're not doing something right."

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