The trillions of bugs that live in our bodies are often the unsung heroes of our good health. Here’s why we shouldn’t disrupt their habitat.

By Sharon Begley | From The Saturday Evening Post

We are vastly, ridiculously, hopelessly, humblingly outnumbered: for every one human cell, there are an estimated ten single-cell microbes in us or on us, at least 100 trillion in all, nestled in our guts and in our urogenital tracts, lying on our skin and happily ensconced in our mouths and noses — entire civilisations of fungi, protozoa and (mostly) bacteria that eat, breathe, evolve, reproduce and die.
Don’t Destroy the Good Guys

Exactly how our bacterial companions affect our health is the subject of ongoing research, but one thing is clear: our decades-long war on germs is looking seriously wrongheaded. In an effort to obliterate disease-causing microbes, we are carpet bombing our microbiota – with the antibiotics we down for a cold (even though the pills are useless against a virus) and the antibiotic-treated meat we eat and the hand-sanitiser dispensers that are everywhere you look. And that war on germs takes a huge toll on beneficial bugs too.

One example: the bacterium Helicobacter pylori causes ulcers and has been linked to stomach cancers. Although it was once in almost everyone’s gut, it is now in just 6% of US children, Science magazine reported in 2011, probably due to widespread use of antibiotics and antimicrobials. That should mean fewer ulcers, but there’s a dark lining to that silver cloud: H. pylori may ward off asthma. Researchers led by Dr Martin Blaser, of New York University Langone Medical Centre, found that those without H. pylori are more likely to have had childhood asthma than those with it. Coincidence? In 2011, Swiss scientists infected half a colony of mice with the bacterium and left the rest germ-free. They showered all the mice with dust mites and other allergens. Mice with H. pylori were fine; those without it had airway inflammation, the hallmark of asthma.

Exactly how H. pylori might ward off asthma is still a mystery, but researchers have made progress in understanding the link between our microbiota and other diseases.

Feed Your Svelte Bacteria

A few years ago, scientists led by Dr Jeffrey Gordon, of Washington University in St Louis, noticed that fat mice and skinny mice have very different gut microbes. Could certain bugs cause obesity? To find out, Gordon transferred gut bacteria called Firmicutes from obese mice into thin ones. The thin mice ate no more than they used to, but they quickly started packing on weight. Firmicutes, it turns out, are really good at liberating kilojoules from food, much better than the common gut bugs called Bacteroidetes.

Having more Firmicutes in your gut may allow you to absorb more of, say, the 5013kJ in a Nando’s half-chicken and regular chips than if you had more Bacteroidetes. “Some microbes change how efficiently we metabolise food,” says biologist Rob Knight of the University of Chicago Medicine. Like mice, heavy people tend to have more Firmicutes and fewer Bacteroidetes than slim people.

Another example: certain gut bacteria produce a compound called PYY, which makes you feel full and reduces how much you eat. Absent those bacteria, your brain doesn’t get the “stop eating” signal. And H. pylori (of ulcer-causing fame) regulates the stomach’s production of ghrelin, an appetite-stimulating hormone. Several labs have found that people whose stomachs harbour more H. pylori have less ghrelin and thus less hunger; conversely, fewer H. pylori means more ghrelin and greater likelihood of overeating.

At this point, everyone asks, “How can I get my slim friend’s menagerie of gut microbes?” Scientists don’t know yet. But they have some clues. Bacteroidetes – the microbes linked to slimness – proliferate in the presence of fructans, compounds in asparagus, artichokes, garlic, and onions, notes microbiologist Andrew Gewirtz of Georgia State University. On the other hand, stress can decrease the abundance of Bacteroidetes, suggesting one more way stress may cause obesity.

Scientists are just starting to explore how to boost the growth of slimming gut bacteria using probiotic supplements and foods that fuel healthy bugs while zapping the fattening ones with other drugs. These ideas are in their earliest
stages, so don’t go looking on your pharmacy shelves for such products just yet.

**DO ANTIBIOTICS MAKE US FAT?**

Our penchant for antibiotics has a downside beyond the well-known problem of breeding antibiotic-resistant bugs. A UK study of 11,532 children found that, on average, those exposed to antibiotics for usual ills, such as ear infections, before five months weighed more for their height than other kids. By 38 months, they were 22% more likely to be overweight. (For some ways to avoid unnecessary antibiotics, see box at right.)

“The rise of obesity around the world is coincident with widespread antibiotic use,” says Blaser. “Early exposure to antibiotics may prime children for obesity later in life.” That’s one reason farmers in some countries add antibiotics to animal feed: the drugs alter the gut bacteria in cattle, pigs, and other animals, substituting bacteria that are better at extracting maximum kilojoules from feed, which makes the animals plump up.

**WHERE GOOD GERMS BEGIN**

It’s worth taking a step back to cover the basics, which start with birth. The bacteria and other microbes you enter the world with come from your mum’s skin (if you were a caesarean baby) or birth canal. “At first, the microbiota all over your body resemble your mother’s,” says Knight. “We don’t know how fast the microbiota of the skin, gut, or nose change, but within two or three years, they’re like an adult’s,” having picked up microbes from air, water, clothing and diet.

This last part is vital: what we eat shapes what microbes our guts harbour. In 2010, a study found that Japanese people have bacteria that digest nori, the seaweed in sushi. Westerners don’t. Why? The Japanese consume lots of seaweed, which contains marine bacteria, which digest nori. Microbiologist Justin Sonnenburg of the US’s Stanford University School of Medicine, says, “What you eat [is] one of the major determinants” of your gut microbiota.

**CULTIVATE A HEALTHY GUT**

Where this leaves someone who wants to encourage a healthy microbiota isn’t yet clear. One obstacle: “Nobody knows what an ideal human microbiome is,” says anthropologist Jeff Leach. In 2012 he launched American Gut, a crowdsourced research project that invites Americans to purchase a kit, basically a superlong Q-tip that is used to swab used toilet paper and returned for analysis. A questionnaire asks about habits and lifestyle: what pets they have, when they last took antibiotics, what they ate over the past few days, and other behaviours thought to affect the gut microbiota. In return, they get back the list of their gut microbes and how they compare with other people.

Until scientists can give the recipe for healthy microbiota, it pays to heed the advice of mainstream medical groups, which advise restricting antibiotics to only must-have circumstances, not every cough and sniffle.

Consider the use of antibiotics in livestock. “The scorched-earth outcome of many broad-spectrum antibiotics is analogous to spraying poison all over your backyard and waiting to see what grows back,” says Leach. In both cases, “invasive and maybe not-so-good species” can move in, with harmful results.

Be wary of manufacturers making exaggerated claims about probiotics. While some are supported by clinical studies, others “greatly outstrip the scientific evidence,” says Knight. But just because commerce has galloped ahead of current research doesn’t mean there is no scientific basis for manipulating the microbiome to improve health. “We can’t change our first genome, the one we inherit from our parents,” says Knight. “But we can change the second, the microbiome. And that holds real promise.”

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**1 WATCH AND WAIT.** Updated guidelines from the American Academy of Paediatrics recommend patients with less-severe ear or sinus infections wait a few days before starting antibiotics. “Often the best course is pain relief, such as ear-numbing drops, and observation,” says Sears.

**2 DON’T ASSUME IT’S STREP THROAT.** Viral throat infections are far more common. If you have a cough and your throat is sore, but you don’t have white goop on your tonsils and a fever, it’s probably just a virus, which will improve on its own without medication.

**3 ASK THE SMART WAY.** Many patients come in demanding antibiotics, which can make doctors feel pressure to prescribe them. Instead, try saying, “I’m worried my cold might be a sinus infection, but I want antibiotics only if you think I really need them.”

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