A GUT CHECK FOR BETTER AGING

How the gut changes with age could affect not only our susceptibility to digestive diseases, but also the aging process itself  

By Sandeep Ravindran

Whether it’s a few more gray hairs or a wrinkle or two, the outward signs of aging are hard to miss. But the changes taking place inside our bodies are just as significant—not least to our gut. How the gut ages doesn’t just affect gastrointestinal health and disease, but also has broader ramifications for overall wellness.

The human body tends to slow down and become less efficient as it ages, and that includes the digestive system. “Older people will often report constipation or diarrhea or bloating, and the motility of their guts”—that is, how quickly food moves through the body—“can often be a little bit slower,” says Dawn Bowdish, a professor of medicine at McMaster University in Canada.

Aging is complex, and there’s still a lot scientists don’t know about how and why getting older affects a person’s gut or their susceptibility to particular digestive diseases. Some, such as colorectal cancer, occur mainly in people over 50. But others, including Crohn’s disease and other types of inflammatory bowel disease (IBD), do not seem to be associated with older age. “People get it fairly consistently throughout their life,” says Bowdish.

What’s clear is that many of the factors typically brought on by aging—such as a weaker immune system, increased medication use, poorer diet and reduced physical activity—can adversely affect gut health. “There’s a lot happening all at the same time,” says Bowdish.

But aging-related changes to the immune system and gut microbiota, the 100 trillion or so microbes that live in the gut, appear to powerfully affect gut health and disease—and may even hold the key to healthier aging overall. Understanding these changes also opens up the possibility of using diet or other methods to improve both gut health and aging.

How aging changes the gut

One of the key characteristics of aging is an increase in chronic inflammation. Inflammation isn’t a bad thing in itself; inflammatory responses can help protect against pathogens. But if these responses are not appropriately regulated and extinguished, they can play a role in causing autoimmune diseases such as multiple sclerosis or IBD. “Aging is associated with low-grade inflammation, and this low-grade inflammation is one of the strongest predictors of adverse health outcomes,” says Thomas Buford, associate professor of medicine at the University of Alabama at Birmingham.
Inflammation happens more frequently as people get older, and a main reason is what goes on in their gut. A healthy gut microbiota is diverse, housing a mix of microbes that help strengthen the gut mucosal barrier to keep harmful microbes and toxins from entering the blood. Over time, though, this microbial community becomes less diverse, and a less-diverse gut produces lower levels of short-chain fatty acids. “Short-chain fatty acids play a large role in maintaining health in our immune system and have an important impact on gut integrity,” says Buford. These changes can result in a gut barrier that’s more “leaky.”

In some older adults, a leaky gut that allows in bacteria that the immune system sees as infectious can kick-start an inflammatory response, says Bowdish. This leakiness can also result in more gastrointestinal infections that can cause fever, diarrhea, and abdominal pain. One way that scientists explore how the microbiota affects the aging gut is to use germ-free mice lacking any microbiota. “One of the things that’s really fascinating is that our old germ-free mice don’t ever develop inflammation; their organs look young, and most of their inside and outside functions—like very, very young for their age,” says Bowdish.

“This was the first hint that the microbiome might play a causal role in inducing some age-associated inflammation, which is a feature of just about every aspect of unhealthy aging,” says Wilmanski. “There are also signs that the gut microbiota might play a role in the development of age-associated brain disorders such as Parkinson’s disease, Alzheimer’s disease, and those in long-term-care facilities tend to be less diverse and contain fewer beneficial microbes. Along with chronic inflammation, a less-diverse microbiome is associated with increased frailty, gastrointestinal disease and systemic diseases such as IBD, autoimmune diseases and Type 2 diabetes.

However, when researchers examined the microbiomes of centenarians—people over 100 years old—they found that they contained more beneficial microbes than those of the average elderly population. “There have been studies done on extremely long-lived individuals, including centenarians in Italy, China and Korea, and their gut microbiomes do not look anything like adult microbiomes, but they also don’t look like microbiomes of older frail individuals,” says Tomasz Wil­manski, a research scientist at the Institute for Systems Biology in Seattle. This suggests that the gut microbiome might be important for health with some patterns associated with a healthier and longer life and others with age-associated frailty.

In a recent study published in February, researchers manipulated the gut microbiome composition in just the right way could potentially change how healthfully people age.

How to influence aging through the gut
“Many of the things that we already know are good for health are also good for the microbiome,” says Buford. That includes physical activity and nutrition, which are associated with increased life expectancy and a reduced risk of chronic diseases and cognitive decline as we age. “Eating a healthy diet provides the right gut microbiome and by reducing inflammation, we can improve the health of our gut microbiome,” says Bowdish. A healthy diet provides a foundation for making them great for the gut and for the aging process.

Fibrous foods may help diversify the microbiome and help keep it healthy, says Wilmanski. Probiotics research is still in its infancy, but scientists are trying to develop next-generation versions to help make the gut less leaky, fight off harmful bacteria, enhance the immune system and eventually improve aging. Researchers must first figure out not just which microbes are present in the guts of healthy older adults, but also what they’re doing there. That’s what Wilmanski is working on, by sequencing gut microbial DNA in greater detail. He hopes what he learns will let researchers manipulate the gut microbiome to promote a more robust gut and healthier aging.

What’s clear right now is that the age-old advice—eat healthy and exercise—can benefit both a person’s gut and their journey through life. “Effectively, all the things you need to do to take care of your gut are also things you need to do to take care of your microbes,” says Bowdish.