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How The Body Maintains A Healthy Balance Of 'Friendly' Gut Bacteria

The Huffington Post | By [Carolyn Gregoire](#) ([/carolyn-gregoire/](#)) ([/usestod/tw/twitter.com/carolyn_greg](#))

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Hippocrates once said (<http://physrev.physiology.org/content/90/3/859>), "Bad digestion is the root of all evil." Now, a growing body of research (https://www.facebook.com/sharer/sharer.php?u=http%3A%2F%2Fwww.huffingtonpost.com%2F2015%2F01%2F15%2Fgut-bacteria-health_n_6473196.html) (https://www.dms.ufsc.br/mip7013/arquivos/2550_Gut%20flora%20in%20health%20and%20disease.pdf) suggests that the ancient Greek physician was, if a bit hyperbolic, seriously onto it: Maintaining a healthy balance of "good" gut bacteria in the digestive tract (http://www.huffingtonpost.com/2015/01/04/gut-bacteria-mental-health_n_6391014.html), autoimmunity (<http://www.nih.gov/researchmatters/october2014/10062014autoinflammatory.htm>) (Crohn's (<http://www.webmd.com/ibd-crohns-disease/crohns-disease/news/20140312/gut-bacteria-may-play-role-in-crohns-disease>), Rheumatoid Arthritis (<http://www.theatlantic.com/health/archive/2015/01/joint-pain-from-the-gut/383772/>) and irritable bowel syndrome (<http://www.sciencedaily.com/releases/2012/05/120525103354.htm>), among others), schizophrenia (<http://www.nature.com/mp/journal/v19/n12/full/mp201493a.html>) and cancer (<https://www.sciencenews.org/article/carbs-and-gut-microbes-fuel-colon-cancer>).

Disturbances in the gut microbiome -- a collection of trillions of bacteria and other microbes -- are often present in patients for a number of seemingly unrelated diseases. For example, [some research shows](#) (<http://www.scientificamerican.com/article/gut-bacteria-may-play-a-role-in-autism/>) that up to nine out of 10 people with an autism spectrum disorder also have inflammatory bowel disease or another illness that directly relates to the gut. Other diseases with some connection to the microbiome include [anxiety](#) (http://www.huffingtonpost.com/2015/01/04/gut-bacteria-mental-health_n_6391014.html), [autoimmune diseases](#) (<http://www.nih.gov/researchmatters/october2014/10062014autoinflammatory.htm>) (Crohn's (<http://www.webmd.com/ibd-crohns-disease/crohns-disease/news/20140312/gut-bacteria-may-play-role-in-crohns-disease>), Rheumatoid Arthritis (<http://www.theatlantic.com/health/archive/2015/01/joint-pain-from-the-gut/383772/>) and irritable bowel syndrome (<http://www.sciencedaily.com/releases/2012/05/120525103354.htm>), among others), schizophrenia (<http://www.nature.com/mp/journal/v19/n12/full/mp201493a.html>) and cancer (<https://www.sciencenews.org/article/carbs-and-gut-microbes-fuel-colon-cancer>).

How imbalanced gut bacteria contributes to illness is not yet fully understood. But new research from Yale University may answer a related question: How is it that healthy people are able to maintain a stable balance of good bacteria, even in the face of [disruptive influences \(http://medicine.yale.edu/news/article.aspx?id=8571\)](http://medicine.yale.edu/news/article.aspx?id=8571), like toxicants, poor diet, antibiotics and immune response to infections?

According to this research, one major threat to stability in the microbiome is inflammatory immune system responses, which often target both good and bad bacteria indiscriminately.

"It has been a puzzle that many immune responses target all bacteria," [Dr. Andrew Goodman of the Yale Microbial Sciences Institute said in a statement \(http://medicine.yale.edu/news/article.aspx?id=8571\)](http://medicine.yale.edu/news/article.aspx?id=8571). "Yet healthy individuals maintain the same beneficial microbes for decades even when exposed to a host of environmental disturbances."

Goodman and his colleagues identified a strategy used by non-harmful bacteria to avoid the damaging effects of inflammation. They found that in both mice and humans, microbial stability is maintained through a single gene that allows bacteria to resist high levels of antimicrobial peptides caused by inflammation.

"We identified one factor that friendly bacteria use to withstand one type of environmental disturbance -- our own immune system," Goodman said in an email to The Huffington Post. "You could think of inflammation as a storm in the gut: the "rain" includes components such as antimicrobial peptides that recognize features found in all bacteria, whether they're friendly or not. What we learned in this study is that many of the friendly bacteria carry umbrellas that prevent these antimicrobial peptides from getting to them. We figured out how the umbrellas work, and showed that if you take them away, friendly bacteria are lost in the storm in the same manner as many disease-causing bacteria."

This ability to "weather the storm" of inflammation may be one key feature of many that are important to maintaining a healthy gut microbiome, the researchers explain. The findings may be used one day to help doctors cure disease by manipulating the massive microbiome -- which contains one hundred times more genes than the human genome.

"We don't think these umbrellas are the only factor that determines microbiome stability and we're working hard to explore this," Goodman said. "Hopefully these studies will help us predict how an individual's microbiome will respond to a disturbance, and perhaps teach us how we might alter these communities to enhance this stability."

The research was published in the journal *Science*.

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