

# Unlocking the ‘gut microbiome’ – and its massive significance to our health

Abstracted from The Guardian, by Rebecca Seal

Scientists are only just discovering the enormous impact of our microbes on our gut health – and how it could hold the key to everything from tackling obesity to overcoming anxiety and boosting immunity

“The gut microbiome is the most important scientific discovery for human healthcare in recent decades,” says James Kinross, a microbiome scientist and surgeon at Imperial College London. “We discovered it – or rediscovered it – in the age of genetic sequencing less than 15 years ago. The only organ which is bigger is the liver.”

Your gut microbiome weighs about 2kg and is bigger than the average human brain. It’s a bustling community of trillions of bacteria, archaea, protozoa, fungi and viruses, containing at least 10,000 times more genes than the human genome. We are filled to the brim with microbes. Our microbes have co-evolved alongside us since the beginning of human history.

The digestive tract contains most of our microbes and has an enormous impact on our short- and long-term health. It is massively complex, and its residents vary enormously from person to person.

Studies suggest that having a diverse population of gut microbes is associated with better health. But when human populations move to urbane areas, microbial diversity declines. Professor Jack Gilbert, a microbiome scientist at the University of California San Diego says, “Over the past 80 years and since the dawn of antibiotics, there has been multi-generational loss of microbes that appear to be important for human health,” he says. “They’re passed from mother to child [during birth, via breastmilk and skin contact] throughout the generations, but at some point, in the last three or four generations, we have lost many. We’re not entirely sure if the cause was our lifestyle, our diet, cleanliness in our homes or the use of antibiotics. We’re also missing certain parts of the immune system that people in developing portions of the world have plenty of.”

What are the implications of this? “Those two things combined may be underlying a large proportion of the chronic diseases we experience – asthma, food allergies, atopic diseases and auto-immune disorders.

It’s difficult to prove epidemiologically – 100 years ago no one was concerned about allergic diseases because globally 50m people a year were dying of infectious diseases. But over the past 50 years of good scientific record keeping, we’ve seen a significant increase in those disorders alongside this loss of microbial diversity in our guts.”

Gut microbes do things our digest tract can’t do, liberating or synthesizing nutrients from food, especially from plants and their polyphenols, living off non-digestible substrates,

producing thousands of metabolites – useful chemicals –and making vital short-chain fatty acids that are involved with immunity, with keeping the gut and colon healthy, with moderating the body's inflammatory responses and with the metabolism of glucose.

To do this, microbes need about 35 grams of microbe accessible and fermentable fiber a day (for males and 25 grams a day for females), but studies from the United Kingdom show that the average is just 10-15 grams. Is this why modern, low fiber, ultra-processed, highly refined-sugar diets seem so problematic for human gut health?

It's very hard to know exactly what it is in junk food that is causing a problem. When nutrition experts talk about junk food, they are usually referring to most prepared and packaged foods – including things such as vegetarian lasagna. It's not the fat, carbs and protein, it's the extra chemicals. The data is probably best for artificial sweeteners that are derived from things like paraffin and the petrol industry, so our bodies and our microbes are not used to breaking them down. But it could be other stuff, like the enzymes that are not listed on the food label, or emulsifiers included in the preparation of the food.

There are only a few studies on emulsifiers, and nearly all in animals, but they show reduce diversity and increase inflammatory microbes. The idea is that they're doing the same as they are in cooking: sticking your microbes together, creating an emulsion. Or it could be the lack of fiber and the fact that everything is refined.

***The great opportunity*** – but also the great difficulty – of gut microbiome science is that poor gut health is associated with such a vast range of conditions, from obesity and degenerative brain diseases to depression, inflammatory bowel disease and chronic inflammation. “The microbiome is associated with everything,” “Pick a disease, it’s associated,” says James Kinross. The microbiome is like a convergent science – you have to be an ecologist, a geneticist, a bioinformatician, a clinician and an epidemiologist, to try to make sense of it.

If our microbes are so important, can’t we just package up the right ones and put them into a pill, pudding or drink? Professor John Cryan, chair of the department of anatomy and neuroscience at University College Cork in the United Kingdom says, “We will eventually get strains of bacteria that have beneficial effects,” but when asked about how he feels about current day probiotics he says, “That’s like asking me, ‘Do I like drugs?’ If I have a pain in my head, I want to take a drug that has efficacy for headaches. I wouldn’t just randomly pick one. But that’s what we’re doing with probiotics right now. The science needs to catch up. We’re lumping them all together as if they’re all the same thing, but, like drugs, they may do very different things. We need to get precision into probiotics, and then I can be excited about them. But most of what’s out there now is complete nonsense.”

Here are just a few recommendations that may help keep you and your microbes in balance:

**Eat more fermentable fiber.** Most of us eat only half the recommended 35g a day. But start slowly – our guts don't like rapid change which can result in abdominal bloating, distention, excess gas and pain.

**Eat the rainbow** Choose colorful fruits and vegetables and try to eat 30 different plants, nuts and seeds every week.

**Eat foods rich in polyphenols** These include green tea and dark chocolate—in moderation.

**Eat fermented foods** like kombucha, kefir, fresh sauerkraut, miso, tempeh, kimchi, as well as unpasteurized cheeses.

**Avoid processed foods** Cut back on salt and sugar, both of which seem to affect microbial diversity in the gut.

Precision medicine is the eventual goal. Someday our doctors may say, “Take these six microbes and call me in the morning.” That day, however, has not yet arrived.