**The Invisible Universe**

 [00:00:02.50] [MUSIC PLAYING]

[00:00:04.99] SPEAKER: The next time you look in the mirror, think about this. In many ways, you're more microbe than human. There are 10 times more cells from microorganisms, bacteria, viruses, fungi, than human cells in and on our bodies. And our genes are outnumbered a hundred to one by microbial genes. Scientists even have a name for all these microbial genes, the human microbiome.

[00:00:31.09] Now, this might make a lot of people rush for the hand sanitizer. But it turns out most of these microorganisms aren't bad, germs that will make us sick. Most are good. And without these good microbes, our bodies don't seem to do as well. We don't seem to be as healthy, and we actually might get sick--

[00:00:48.94] [COUGHING]

[00:00:49.18] --more often.

[00:00:52.25] So one question is, where do our microbiomes come from in the first place? Well, like a lot of things, it starts with our mothers. As the infant passes through the birth canal, it gets coated with microbes from the mom. These microbes may kind of seed the baby with just the right mix. Combined with bacteria in breast milk and other microbes we encounter early on, they seem to slowly take shape in our first few years of life.

[00:01:19.49] The overall mix of our microbes becomes very personal, sort of like a fingerprint or maybe a blood type. But our microbes tend to resemble those of our parents and siblings, and may stay with us for much of our lives. They may also be doing all sorts of things, such as educating our immune cells, like this one, teaching them the difference between things they should fight off, bad bugs that might make us sick, and things that aren't a threat, like our good microbes.

[00:01:54.37] When we're adults, microbes become our first line of defense, fighting off germs that try to invade our bodies, protecting their turf, while protecting our health. Scientists have discovered they can even spew out their own antibiotics.

[00:02:15.96] The types of microbes in your body vary depending on exactly where they live, like different ecosystems in nature. There are wet places, like our mouths, noses, and armpits; oily places, like our scalps and backs; and dry places, like our forearms. Different species of microbes have adapted to each of these habitats.

[00:02:40.29] The biggest, most important microbial habitat seems to be in the gut. It's the most complex, the most diverse. And everything microbes are doing everywhere else in our bodies, fighting off infections, revving up and dampening down our immune systems, signaling cells, that's all happening in the gut in spades. They even seem to help regulate our metabolism, how much energy we burn, and how much fat we store. So if it's not functioning properly for some reason, because of what we eat, antibiotics we take, that may actually lead to all kinds of diseases, diseases like colon cancer, colitis, maybe even diabetes and obesity.

[00:03:25.08] Some scientists think one reason a lot of diseases are increasing is because we've lost key gut microbes. Our microbiomes look far less diverse compared to those of people in less developed countries and earlier generations. And remember how we get our microbiomes in the first place, from our mothers when we're born and from breast milk. Well, some scientists think that too many babies aren't getting that because of all the C-sections--

[00:03:50.45] [BABY CRIES]

[00:03:50.75] --and not enough breast feeding, plus all the antibiotics kids get these days and our obsession with cleanliness. All this may help explain why problems like asthma and allergies have been soaring, maybe because our microbiomes never taught our immune systems how to work the right way.

[00:04:12.03] Maybe swallowing good microbes, probiotics, could prevent and treat some diseases. So could taking prebiotics, essentially food that good microbes love.

[00:04:28.85] We end our story with a reminder. This research is really new. We still have a lot to learn about what many of our microbes are really doing. But scientists say that it's getting clearer and clearer that the tiny organisms all over our bodies are essential to our health and happiness.

[00:04:46.58] [MUSIC PLAYING]