

## “Circadian Rhythms of the Microbiome” Excerpt Transcript

*Excerpt from [December 2, 2016](#) episode of Science Friday.*

**IRA FLATOW:** This is "Science Friday." I'm Ira Flatow. Almost every week, there is some discovery about the microbiome. What do you imagine a day in the life of one of your gut bacteria might look like?

Our microbes have a circadian rhythm. Our body's clock that keeps things internally on schedule has that rhythm. But it turns out, the microbiome has its own circadian rhythm too.

In research published this week in the journal *Cell*, scientists looked at this clock inside of our gut. And here to tell us why that is important and what they found is Eran Elinav. He's an author on that paper. He's also a senior researcher at the Department of Immunology at the Weizmann Institute of Science in Rehovot, Israel. Welcome to "Science Friday."

**ERAN ELINAV:** Hi there.

**FLATOW:** Dr. Elinav, you had a study out a few years ago that saw our circadian rhythm can affect microbiomes. And this recent paper was a mouse study. And you saw that it's a two-way street, that the microbiome has its own clock.

**ELINAV:** Absolutely. The scientific community has realized in the last few years that we have millions of different clocks in our body. Actually, we have a clock in every one of our cells in our body. And in a very interesting and fascinating way, they are coordinated in their functions. And since we regard our guts microbes as an integral part of our body, we wanted to test whether they too have a circadian activity. So we measured them at different times of the day using many different techniques. And we were amazed to find that our gut microbes in many different aspects behave differently at different times of the day.

**FLATOW:** Do they sync up with other clocks in our body? Or are they on their own clock?

**ELINAV:** Yeah, so they are actually very well coordinated with our own, our human, or mouse host circadian clocks. And in fact, what we were amazed to see that the two clocks behave like, if you may, like a tango, in which they greatly influence one another. For example, if we disrupt the microbes, our host clock goes crazy, and hundreds of different genes either lose or gain a circadian activity that was not present before.

**FLATOW:** And so do we disrupt them? Do we unknowingly in our daily lives by what we do and what we eat and things like that, do we disrupt the cycle of our microbiome and possibly cause ill effects on our bodies?

**ELINAV:** Absolutely. So an integral part of modern life involves many unintentional interventions that potentially could disturb the normal rhythmicity of our microbes. In our studies, both in mice and in humans, we induced a severe state of, if you may, jet lag or a state that imitates shift work, in which the day and night cycles are disrupted over a long period of time. And one of the first and most pronounced changes that we saw was a change in this normal microbial rhythmic activity.

And this resulted in a change of the microbe towards a configuration that predispose both the mice or the humans to develop obesity, diabetes, and their complications. And actually, if you look in the medical literature-- and now, I'm talking as a physician-- for the past 50 or 70 years, there has been a lot of literature pointing towards a possible connection between chronic disruption of normal sleep-wake cycles, such as the shift workers, and a propensity to develop obesity and diabetes. And our study suggests that at least one potential important, previously unknown explanation for this association lies in the normal cyclic behavior of our microbes, which is so easily disturbed when we disrupt our daily routines.

**FLATOW:** We have a lot more to talk about in the future. I want to thank you both for taking time to be with us today. Dr. Eran Elinav, senior researcher at the Department of Immunology at the Weizmann Institute of Science in Rehovot, Israel.