Microbe swapping at the roller derby

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What happens in a day at the roller derby? For one thing, scientists have discovered and reported last month in the journal *PeerJ*, a lot of bacteria get swapped around.

Researchers at the University of Oregon's Biology and Built Environment Center, a collaboration of architects and biologists who study how design affects the kinds of microbes that live among us, and how it influences our health, recently examined the microbiomes - the ecosystems of thousands of microorganisms - on the skin of three roller derby teams before and after a competition.

To learn why they did so and what they discovered, the Los Angeles Times spoke with research leader James F. Meadow and center director Jessica Green, who used to compete in the roller derby as "Thumper Biscuit."

Q: Why study the microbiome?

Jessica Green: People really don't know where we get our microbes from. We don't know if they're predetermined from genetics. We don't know if we get them from our mothers when we're born. We don't know if we pick them up from everything we touch in a building, or from the people we spend time with.

Q: How does roller derby fit into this?

Green: I skated for three years on the Emerald City Roller Girls. I was

on a team in the league called the Flat Track Furies. During that time I really was thinking a lot about the way that being in community with a group of people affected your health and well-being. I wondered about the things we were sharing that you couldn't see. I started envisioning a link between what I was doing with my free time and what we were doing with the center.

Q: How did you do this study?

James Meadow: We looked at three teams - one from Washington, D.C., one from the Bay Area and one from Eugene, Ore. - and we swabbed their upper arms to collect samples. Then we took the DNA, sequenced the bacteria that were in there, and tried to find out how similar those communities were before and after the bout, which lasted about an hour.

One of the interesting things is that teams from different geographic locations in the country started out looking quite different.

Q: Was that surprising?

Meadow: We did expect to see something there, but we didn't expect it to be so clear-cut. We could have taken one player at random before they played against each other, and I could have told you which team she'd played for with pretty good confidence, just by looking at bacteria on the upper arm.

But then after they had played against one another that became a lot more difficult, because there was a lot more in common.

Q: What were the bacteria that you saw?

Meadow: There were thousands. We used the DNA to get a census of who was in there. We didn't really find anything in these samples that

was all that surprising. There were a lot of bacteria associated with the skin and with our mouths. But there were also environmental bacteria from soils and plants and things that you find floating around in the air. It was sort of a mix of all these things, and it helps us to understand where some of them might come from.

Q: What do these bacteria do on the human skin?

Meadow: We were really looking at who was there - not necessarily what they do. But many of the bacteria we found were associated with functions. For example, we found one that has been studied for its role in foot odor. It's something that we all carry around.

You wrote in the PeerJ study that you think the bacteria moved between the roller derby competitors through direct contact.

Meadow: All the lines of evidence we have in this paper point toward contact. Microbes became more in common between teams that played against one another. But we're not able to rule out a lot of other things. It might be the women were all falling on the track and they just picked up what was there. Or it might be that the crowd was moving a lot and a lot of things became airborne and they picked that up.

Q: From a research perspective, what's next?

Meadow: One thing that we weren't able to do is to find out just how long these sorts of changes last. If you and I were to shake hands, some things would come off of my hands and onto yours, and some things would come off of your hands onto mine. But we don't know how long those things stick around and we don't know whether they have an impact on our health. When we share microbes between people or between people and a pet or between people and a surface in the environment, how long can you detect that change? Learning that would

help us find out whether that change matters for a microbiome, or whether it's a lot of transients getting passed from person to person.

We're also focused on looking at architectural choices. How do our architectural choices and our behavioral choices in buildings affect what we come into contact with? One of the things we keep trying to figure out is what influence our choices have on the microbes we come into contact with.

Green: We're also trying to understand what we're calling the human microbial cloud, or the microbial aura. We all play a role in moving microbes around indoors. We're doing experiments to quantify that in a detailed way. If somebody comes into a room and sheds their microbes, does the next person that comes into the room pick those up in a detectable way?

That has a link to the roller derby study: Although we think that most of the microbes that were exchanged were due to skin-to-skin contact, some of what we saw could have been because the women were landing on the floor.

Q: Some of these microbes could be harmful and some could be beneficial, right?

Meadow: Yes, and a lot of that is an open question. There's a lot of variability in the microbiome, between people and between body sites on a single person. A vast majority of the microbes either don't have a role or do things that are good for us.

To give you an example, there's a bacterium called Staphylococcus epidermidis that you and I probably both have on our skin right now. It's a commensal member of the skin microbiome, which means that we both benefit from it. It turns out that this bacterium trains our immune

system to help fight off infection. Without it, we might be more vulnerable.

But a lot of the research into the skin microbiome in particular has been focused on sick people sharing what we call germs in hospital. This study is more of a way to look at healthy people sharing communities of bacteria - bacteria that do a lot of the things that we think of as making us human.