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What impact does a day of roller derby have on our skin microbiome?

Study finds that skaters bring their unique team skin microbiome to a tournament, but that they get mixed during a single day of 'bouting'

The human skin is home to countless microorganisms that we can't see, but these microbes help define who we are. Our invisible passengers – known as the skin microbiome - contribute to our health in numerous ways including educating our immune system, protecting us from pathogens, and mediating skin disorders. In a new study, researchers investigated how the skin microbiome is transmitted between players in a contact sport, using roller derby as their model system.

The skin is the largest organ and an important barrier that regulates microbial entry into the human body. Despite the importance of the skin ecosystem to human health, we know very little about the forces that shape microbial structure and composition in the skin environment. The ways in which the skin microbiome is affected by external factors is a subject of renewed interest and so researchers hypothesized that contact sports could represent an ideal setting in which to study how human to human interactions influences microbial ecosystems. The researchers took their questions into the world of roller derby to explore how touching in a contact sport affects microbial transfer among athletes. DNA analysis revealed that bacterial communities predict team membership, with teammates sharing distinct microbial communities, and that when opposing teams competed in an hour-long bout their microbial communities became significantly more similar.

The study, titled *"Significant changes in the skin microbiome mediated by the sport of roller derby,"* was published today in PeerJ, a new peer-reviewed open access journal in which all articles are freely available to everyone (PeerJ.com). The research was led by James F. Meadow of the 'Biology and the Built Environment Center' (BioBE.uoregon.edu) at the University of Oregon, in a collaboration that included the Center's director Jessica Green, who is a former skater on the Emerald City Roller Girls in Eugene, Oregon, where the studied tournament was held. The idea of working with local athletes was sparked by co-author Keith Herkert while working on his undergraduate honors thesis project in the Green lab. Teams involved in this study were from Eugene, OR (Emerald City Roller Girls); Washington, DC (DC Roller Girls) and San Jose, CA (Silicon Valley Roller Girls) and thus represented geographically separate groups.

Differences among teams' unique skin microbiomes -- determined by pre- and post-game swabs taken from exposed upper arms -- were driven in part "by the presence of unique indicator taxa that are commonly associated with human skin, gut, mouth and respiratory tract." *Brevibacterium*, for example, was found to be the strongest indicator for the DC Roller Girls of Washington, D.C. Researchers found that microbial communities on the host team in Eugene, Oregon, more closely resembled surface samples taken from the local roller rink itself.

The mixing of bacterial communities during a bout, the researchers found, was likely the result of skin-to-skin contact. "Human to human contact is the most parsimonious interpretation for the significant changes in skin microbiome we observed," the researchers concluded. Scientists have long known that bacteria can spread among people due to contact. This study is the first to illustrate the promise of using contact sports to understand how human interactions can influence our microbiome.

Population growth is likely to increase the rate of person-to-person contact in expanding urban areas. Studying these skin ecosystems could have implications for health care, disease transmission and general understanding of urban environmental microbiology.

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Abstract (from the article)

Diverse bacterial communities live on and in human skin. These complex communities vary by skin location on the body, over time, between individuals, and between geographic regions. Culture-based studies have shown that human to human and human to surface contact mediates the dispersal of pathogens, yet little is currently known about the drivers of bacterial community assembly patterns on human skin. We hypothesized that participation in a sport involving skin to skin contact would result in detectable shifts in skin bacterial community composition. We conducted a study during a flat track roller derby tournament, and found that teammates shared distinct skin microbial communities before and after playing against another team, but that opposing teams' bacterial communities converged during the course of a roller derby bout. Our results are consistent with the hypothesis that the human skin microbiome shifts in composition during activities involving human to human contact, and that contact sports provide an ideal setting in which to evaluate dispersal of microorganisms between people.