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How Does Ear Piercing Change Your Skin's Microbiome?

Analysis by Dr. Joseph Mercola | December 27, 2023

STORY AT-A-GLANCE

- Ear piercing represents a catastrophic environmental disturbance, one that drastically changes the microbial communities living there
- Microbial changes start when the skin is sterilized for the procedure, while piercing "reshapes the skin's physical topology" and the insertion of jewelry further alters the microbes' environment
- Skin piercings create "hospitable niches" where bacteria can thrive, including areas of increased moisture and nutrient retention
- Ultimately, piercings increased microbial diversity and ecological complexity
- Piercings may also cause a shift toward moist skin microbiomes, resembling those typically found in areas like the nose, armpit and groin

Piercings are an ancient form of human self-expression that are also sometimes used for religious and spiritual reasons.[1] 5,000-year-old Ötzi the Iceman was found with pierced earlobes, signaling the importance of piercings for ancient societies.[2] In the U.S., ear piercing is especially popular — about 84% of women and 64% of men have pierced earlobes.[3]

While the piercing itself takes only a moment, to the microbes on your skin it represents a catastrophic environmental disturbance, one that drastically changes the microbial communities living there.

In a study from McGill University, Canada, researchers observed 28 individuals with earlobe piercings to track shifts in skin microbiomes. Ultimately, they found even a seemingly simple ear piercing represents "ecosystem engineering on the human body." According to lead study author Charles Xu:[4]

> *"We know from anthropology and sociology that piercings are uniquely human symbols of expression, connection, and identity. With this study, we've shown that skin piercings also represent an unintentional act of ecosystem self-engineering of the ecological landscape that is the human skin."*

Ear Piercing Shifts Your Skin's Microbiome

The microbiome refers to all the microbes that live in and on your body. Your skin, as the largest organ, is home to many microbes that work in concert to keep your biological systems running smoothly. Writing in Experimental Dermatology, scientists with Hallym University explain:[5]

> *"Humans maintain a cooperative symbiotic relationship with their skin microbiota, a complex community of bacteria, fungi and viruses that live on the surface of the skin, and which act as a barrier to protect the body from the inside and outside. The skin is a 'habitat' and vast 'ecosystem' inhabited by countless microbes; as such, relationships have been forged through millions of years of coevolution.*
>
> *It is not surprising then that microbes are key participants in shaping and maintaining essential physiological processes. In addition to maintaining barrier function, the unique symbiotic microbiota that colonizes the skin increases the immune response and provides protection against pathogenic microbes."*

But this microbiome is vulnerable to its environment, such that punctures and the introduction of a piece of jewelry alter its inhabitants. The McGill University team swabbed the skin of people about to get ear piercings, then swabbed the skin again over the next two weeks to document changes.[6]

But the interference to skin microbiome starts even before the actual piercing, when skin is sterilized for the procedure. This alone is a "major environmental disturbance to the local skin microbiome," followed by piercing, which "reshapes the skin's physical topology."[7] The insertion of stainless-steel jewelry further alters the microbes' environment.

"This is expected to produce a novel ecological niche that differs from the previously unpierced skin in many ways such as surface area, temperature, acidity, humidity, and environmental exposure. This drastic environmental shift should fundamentally alter the ecological and evolutionary forces acting on the piercing microbiome," according to the study.[8]

Ear Piercing Increases Microbial Diversity and Ecological Complexity

In the two weeks following ear piercing, the team found a significant increase in the number of unique DNA sequences, known as amplicon sequence variants (ASV) richness, at the piercing site. In a control group of people who did not get piercings, ASV richness remained stable.

Skin piercings created "hospitable niches" where bacteria can thrive, including areas of increased moisture and nutrient retention. Skin pH increased along with moisture, supporting the growth and survival of bacteria. In addition, earring studs may act as physical traps where debris, such as sweat and sebum, can accumulate, acting as nutrient sources for microorganisms.[9]

The potentially dangerous bacteria Staphylococcus epidermidis and Cutibacterium acnes bacteria were particularly prevalent at the piercing site. While "they're both potentially dangerous," Science Alert reported, "… when they exist together in the same spot, they tend to keep each other in balance."[10] The interplay between these two forms of opportunistic pathogens may explain some of the changes observed in the skin following piercing. The study noted:[11]

"Both C. acnes and S. epidermidis are common members of skin microbiomes that help maintain skin homeostasis through competitive exclusion of potential pathogens, production of antibacterial bacteriocins, and priming of the skin's innate Toll-like receptor (TLR) immune system.

Against each other, however, they compete using a variety of methods including the production of antimicrobial short chain fatty acids, bacteriocins and polymorphic toxins, and electricity. The strong antagonism between C. acnes and S. epidermidis may help explain the observed change in the piercing microbiome."

The study also found piercings may cause a shift toward moist skin microbiomes, resembling those typically found in areas like the nose, armpit and groin.[12] Further, the researchers suggest piercings could act as a model for studying biological responses to environmental change:[13]

"We show that the piercing process — skin sterilization, piercing of the skin, and insertion of a metal stud — has a demonstrable impact on the ecology of the local skin microbiome.

Despite sterilization serving as a major environmental disturbance that kills many resident species, we found that, over time, the new piercing environment was significantly associated with greater biodiversity and ecological complexity, with fundamental differences in the nature of biotic interactions compared to exposed earlobe skin.

… By significantly altering the composition and ecology of the resident human microbiome, skin piercings could serve as a model for insights into the response of microbiomes to environmental disturbance as well as community assembly processes more generally."

It's even possible that the microbial changes that occur on human skin after piercing could shed light on how catastrophic environmental events shape larger ecosystems.

According to study author Rowan Barrett, "Piercings represent a nice tractable model to gain better understanding of the general processes involved in community assembly following environmental change. If we understand these processes, we might be able to incorporate policies or engage in active management practices to aid the recovery of biological communities."[14]

Alterations to Skin Microbiome Can Lead to Skin Problems, Systemic Disease

Millions of bacteria fungi and viruses live on your skin. Similar to the microbiome in your gut, when these microorganisms aren't balanced it can result in skin problems, such as atomic dermatitis, acne, dandruff and chronic wound infections, and even systemic disease.[15]

"The cutaneous innate and adaptive immune responses can modulate the skin microbiota, but the microbiota also functions in educating the immune system," according to Nature Reviews Microbiology.[16] Many factors can influence the makeup of your skin microbiome — piercing is just one of them. Even the regular exfoliation of skin cells is a major player. As written in Microorganisms:[17]

> *"The outer layer of the epidermis continuously releases keratinized skin cells, leading to self-renewal of the skin every four weeks. Every hour between 500 to 3000 cells exfoliate from 1 cm2 of skin, which means that one adult releases between 600,000 and a million or more cells per hour. Since about 10% of exfoliated cells contain bacteria, this mechanism may significantly affect the microbiome composition."*

A Healthy Microbiome May Start In Utero

Other factors include the thickness of your skin and density of hair follicles. Sweat, aging, wrinkles, ethnicity and your living environment are also involved. Whether you live

in an urban or rural environment, interact with animals and get regular exposure to sunlight all influence the microbes on your skin.

Young children also tend to have greater diversity in fungal species than adolescents and adults, while healthy microbiome may be established in utero. The placenta has a metabolically rich microbiome, while further colonization occurs via vaginal delivery. In fact, the facial skin microbiome in 10-year-old children is influenced by their childbirth method — vaginal or cesarean section (C-section).[18]

C-section delivery is associated with an increased risk of immune system and metabolic disorders, possibly due to altered microbes. Research by Gloria Dominguez-Bello, president of The Microbiota Vault, and colleagues revealed, however, that "vaginal seeding" of C-section babies successfully restores maternal microbes in the infant when done immediately after birth, naturalizing their microbiota.[19]

While it's unknown if restoring the babies' microbiota after birth leads to long-term health outcomes, Dominguez-Bello intends to find out. She told People:[20]

> *"If a baby is born via elective C-section, with no water breaking, they are not exposed to the mother's microbiome in the vagina. But we have shown that if we normalize, at least partially, the microbiome of a baby that is born by elective C-section by rubbing them with gauze soaked in fluid with their mother's microbiome, we can normalize the mouth microbiome of the baby during the first year of life.*
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> *Are we protecting kids against asthma, against Type 1 diabetes, against celiac disease, allergies, obesity by doing this? We are doing a 5-year clinical trial to find out."*

As is the case with gut microbiota, exposure to antibiotics, as is the case with long-term acne therapy, also alters your skin microbiome, including leading to the appearance of antibiotic-resistant species. Transplanting skin microbiome from a healthy person to the skin of another is an increasingly popular option for improving skin conditions without antibiotics and their related risks, although more research is needed in this area.

You're a Microbial Being

In my interview with Rodney Dietert, Professor Emeritus of immunotoxicology at Cornell University, he explains that we're **microbial beings**, as "more than 99% of your genes are from microbes, not from your chromosomes."[21] You have approximately 3.3 million microbial genes, mainly bacterial. Across the entire population of humans, there are just under 10 million different microbial genes, so you won't necessarily have all of them.

You also have 22,000 to 25,000 chromosomal genes (these genes are what were analyzed through the Human Genome Project), which means you only have about 2,000 more chromosomal genes than an earthworm. As noted by Dietert, since we have about 3.3 million microbial genes, that means we're more than 99% microbial, genetically.

As such, protecting your microbiome is crucial for optimal health. Whether piercings have a large enough influence on your body's microorganisms to alter your health remains to be seen. There are, however, several ways you can protect your microbiome as much as possible. In addition to avoiding elective c-sections, this includes:

Do	Avoid
Eat plenty of fermented foods — Healthy choices include lassi, fermented grass fed kefir, natto (fermented soy) and fermented vegetables.	**Antibiotics**, unless absolutely necessary. If you do use them, make sure to reseed your gut with fermented foods and/or a high-quality probiotic supplement.
Take a probiotic supplement — If you don't eat fermented foods on a regular basis, a probiotic supplement can be useful.	**Conventionally-raised meats** and other animal products, as CAFO animals are routinely fed low-dose antibiotics.
Boost your soluble and insoluble fiber intake, focusing on vegetables and seeds, including sprouted seeds.	**Chlorinated and/or fluoridated water —** This includes during bathing or showering.

Do	Avoid
Get your hands dirty in the garden — Exposure to bacteria and viruses in soil can help strengthen your immune system and provide long-lasting immunity against disease.	**Processed foods —** Excessive sugars, along with otherwise "dead" nutrients, feed pathogenic bacteria. Food emulsifiers such as polysorbate 80, lecithin, carrageenan, polyglycerols, and xanthan gum may have an adverse effect on your gut flora.
Open your windows — Research shows opening a window and increasing natural airflow can improve the diversity and health of the microbes in your home, which in turn benefit you.[22]	**Agricultural chemicals**, glyphosate (Roundup) in particular is a known antibiotic and could potentially kill many of your beneficial gut microbes if you eat foods contaminated with it.
Wash your dishes by hand instead of in the dishwasher — Research has shown washing your dishes by hand leaves more bacteria on the dishes than dishwashers do. Eating off these less-than-sterile dishes may decrease your risk of allergies by stimulating your immune system.[23]	**Antibacterial soap**, as it kills off both good and bad bacteria and contributes to the development of antibiotic resistance.

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