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The differences in the sexes: odor

Researchers in Switzerland have finally discovered the difference between the sexes. Apparently, men smell of cheese and women smell like onion. Sweat samples were taken from the armpits of men and women following a bit of aerobic exercise. When analyzed, scientists found that women produced a sulphurous compound while men excreted a fatty acid.

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Men Smell of Cheese and Women of Onions

Swiss Study Picks Out Gender Differences in Body Odor

By ANDY COGHLAN

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Little girls may be made of sugar and spice and all things nice, but their armpits smell of onions. And while free of slug or snail odours, men's armpits pack a powerful cheesy whiff.

That's the conclusion of research in Switzerland that involved taking armpit sweat samples from 24 men and 25 women after they had spent time in a sauna or ridden an exercise bike for 15 minutes.

The researchers found marked differences in the sweat from men and women. "Men smell of cheese, and women of grapefruit or onion," says Christian Starkenmann of Firmenich, a company in Geneva that researches flavours and perfumes for food and cosmetics companies.

The team found that the women's armpit sweat contained relatively high levels of an odourless sulphur-containing compound -- 5 milligrams per millilitre of sweat versus 0.5 milligrams in men. When the researchers mixed this compound in the lab with bacteria commonly found in the armpit, the bugs turned it into a thiol - a previously discovered odour from armpits that is akin to onion.

"The more sulphur precursor we added, the more intense was the malodour," says Starkenmann, whose team's results appear in Chemical Senses. Bacterial enzymes turn the otherwise odourless precursor into the malodour.

The men, meanwhile, had relatively high levels of an odourless fatty acid which turned into a cheesy odour when exposed to the same types of bacteria.

The balance of oniony to cheesy precursors in women's sweat made it smell worse than men's as rated by independent smell assessors.

Next, the team hope to develop new ingredients for deodorants that fight the smells. "We could make inhibitors that neutralise the precursors, or block the bacterial enzymes that do the conversion," says Starkenmann.

Some researchers are sceptical that gender is the main deciding factor, arguing that the patterns found in Swiss volunteers might not apply to other populations with different diets and genetic backgrounds. "Other factors include what you eat, what you wash with, what you wear and what genes you inherit," says Tim Jacob of Cardiff University in the UK.

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Primary Article Abstract

Gender-specific differences between the concentrations of nonvolatile (R)/(S)-3-methyl-3-sulfanylhexan-1-ol and (R)/(S)-3-hydroxy-3-methyl-hexanoic acid odor precursors in axillary secretions.

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The volatile fatty acid, (R)/(S)-3-hydroxy-3-methylhexanoic acid ((R)/(S)-HMHA), and the human specific volatile thiol, (R)/(S)-3-methyl-3-sulfanylhexan-1-ol ((R)/(S)-MSH), were recently identified as major components of human sweat malodor. Their 2 corresponding precursors were subsequently isolated from sterile and odorless axillary secretions. The purpose of this work was to analyze these 2 odor precursors in 49 male and female volunteers over a period of 3 years to elucidate to which extent they are implicated in the gender-specific character of body odor. Surprisingly, the ratio between the acid precursor 1, a glutamine conjugate, and the "sulfur" precursor 2, a cysteinylglycine-S-conjugate, was 3 times higher in men than in women with no correlation with either the sweat volume or the protein concentration. Indeed, women have the potential to liberate significantly more (R)/(S)-MSH, which has a tropical fruit- and onion-like odor than (R)/(S)-HMHA (possibly transformed into (E)/(Z)-3-methyl-2-hexenoic acid) that has a cheesy, rancid odor. Parallel to this work, sensory analysis on sweat incubated with isolated skin bacteria (*Staphylococcus epidermidis* Ax3, *Corynebacterium jeikeium* American Type Culture Collection 43217, or *Staphylococcus haemolyticus* Ax4) confirmed that intrinsic composition of sweat is important for the development of body odors and may be modulated by gender differences in bacterial compositions. Sweat samples having the highest sulfur intensity were also found to be the most intense and the most unpleasant.

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