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## **Earwax: A New Frontier of Human Odor Information** *Odor-producing chemicals in earwax differ according to ethnic origin*

Philadelphia (February 12, 2014) – Scientists from the Monell Center have used analytical organic chemistry to identify the presence of odor-producing chemical compounds in human earwax. Further, they found that the amounts of these compounds differ between individuals of East Asian origin and Caucasians. The findings suggest that human earwax, an easily obtained bodily secretion, could be an overlooked source of personal information.

“Our previous research has shown that underarm odors can convey a great deal of information about an individual, including personal identity, gender, sexual orientation, and health status,” said study senior author George Preti, PhD, an organic chemist at Monell. “We think it possible that earwax may contain similar information.”

Earwax, scientifically known as cerumen, is a mixture of secretions from specialized sweat glands with fatty materials secreted from sebaceous glands. It can have one of two physical types: a wet yellow-brown wax or a dry white wax.

Preti’s interest in earwax was piqued by the finding that a small change in a gene known as *ABCC11* is related both to underarm odor production and also to whether a person has wet or dry earwax.

Individuals of East Asian (e.g., Chinese, Korean and Japanese) and Native American descent have a form of the *ABCC11* gene that codes both for dry-type earwax and also for reduced underarm body odor relative to individuals of other ethnicities, who typically produce a wet-type ear wax and greater body odor.

To explore whether earwax has a characteristic odor, the researchers collected earwax from 16 healthy men: eight Caucasian and eight of East Asian descent. Each sample was placed into a vial, which was gently heated for 30 minutes to promote release of airborne molecules known as volatile organic compounds (VOCs), many of which are odorous.

An absorbent device was then inserted through the vial’s cap to collect VOCs from the closed containers, and gas chromatography-mass spectrometry techniques used to analyze the chemical compounds.

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The analysis revealed 12 VOCs were consistently present in the earwax of all the men. However, the amount of VOCs varied as a function of the subject's ethnic background, with Caucasians having greater amounts of 11 of the 12 VOCs than East Asians.

"In essence, we could obtain information about a person's ethnicity simply by looking in his ears. While the types of odorants were similar, the amounts were very different," said study lead author Katharine Prokop-Prigge, a Monell chemist.

The researchers suspect that the fatty nature of earwax makes it a likely repository for lipid-soluble odorants produced by certain diseases and the environment.

Prokop-Prigge points out that at least two odor-producing metabolic diseases (maple syrup urine disease and alkaptonuria) can be identified in earwax before they can be diagnosed using traditional techniques such as blood and urine analysis.

"Odors in earwax may be able to tell us what a person has eaten and where they have been," said Preti. "Earwax is a neglected body secretion whose potential as an information source has yet to be explored."

Future studies will examine these possibilities.

Also contributing to the study, which is published online ahead of print in the *Journal of Chromatography B*, were Charles J. Wysocki of Monell and Erica Thaler from the University of Pennsylvania School of Medicine. Research reported in the publication was supported in part by The National Institute on Deafness and Other Communication Disorders of the National Institutes of Health under award number 2T32DC00014-32A1. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. Additional funding was provided by the Army Research Office.

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