

Malaria-infected cells produce odors attractive to mosquitoes

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Credit: CDC

The malaria parasite *Plasmodium falciparum* produces chemical compounds called terpenes that give off odors that attract mosquitoes, according to new research. The study, published this week in *mBio*, the online open-access journal of the American Society for Microbiology, might explain why the insects are more likely to bite humans or animals infected with the organism.

The work could lead to new diagnostic tests for [malaria](#), said senior study author Audrey R. Odom, MD, PhD, an assistant professor of pediatrics and of molecular microbiology at Washington University School of Medicine in St. Louis.

"We hope these kinds of parasite-produced compounds are the sort of thing that you might be able to find in the breath or sweat of children with malaria," Odom said. "We have studies ongoing to see if we can detect these compounds in children with malaria, because obviously a breathalyzer test would be a lot nicer than the blood-based tests that are currently used."

It also holds implications for [malaria control](#), she said: "Understanding the molecular basis of mosquito attraction and host choice is important for figuring out how you might prevent people from getting bitten in the first place."

Odom and colleagues have been studying [malaria parasite](#) cultures in human red blood cells, grown in airtight bags. For the current study, the researchers sampled the gas on top of the liquid culture in the bags and used a laboratory technique called gas chromatography-mass spectrometry to analyze the chemical components of the gas. They compared gas samples from bags containing malaria-infected red blood cells to gas samples taken from bags containing uninfected red [blood cells](#) and from empty bags.

The investigators found that, like plants, *P. falciparum* uses a chemical pathway called the MEP pathway to produce terpenes. They found four compounds specific to the parasite-infected samples, including two terpenes. Each malaria-infected sample studied had at least one type of terpene such as limonene (a substance that makes lemons smell like lemons) and pinanediol (related to the substance that makes pine trees smell like pine trees). Terpenes were not found in gas samples from bags

of uninfected cells or from empty bags.

Additional tests determined that terpenes emitted by malaria-infected [red blood cells](#) arose from the MEP pathway, and that the type of mosquitoes that transmit malaria have the ability to detect these terpenes.

"Together, our studies provide evidence that malaria parasites produce specific compounds that attract mosquitoes, and that the mosquitoes that transmit malaria contain the cellular machinery necessary for detecting and responding to these compounds," Odom said.

Provided by American Society for Microbiology

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