

BREATH-BASED TESTING FOR MALARIA

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Technology Description

Researchers in Prof. Audrey Odom John's laboratory have discovered a malaria "breathprint" that could be used for blood-free, rapid, field-stable, point-of-care testing and monitoring. In addition, certain molecules identified by the inventors could attract mosquitoes to traps for pest control applications.

In regions where malaria is endemic, diagnostics are crucial for public health campaigns and to determine the appropriate treatment strategy for patients with fever. However, current blood-based testing options are either poorly suited to low resource settings or are becoming less reliable: microscopy analysis is expensive and requires a specialist for analysis; and rapid diagnostic tests (RDTs) are becoming less reliable because they detect a protein that many malaria parasites no longer produce. This technology solves those problems with a simple, robust and global breath analysis that detects a characteristic set of compounds which are naturally found in patients infected with *Plasmodium* (the parasite that causes malaria). Ultimately, this molecular signature could be incorporated into a hand-held breathalyzer-type device for simple, low-cost screening, treatment monitoring and diagnosis in low resource areas.

EMBED YOUTUBE VIDEO - (<https://www.youtube.com/watch?v=7nh--C442b0>)

Stage of Research

Field studies - Through unbiased breathprinting of children in Malawi, the inventors have identified 6 volatile organic compounds (VOCs) that could be used to classify malaria infection status with 83% accuracy. In addition, they identified two terpenes (mosquito attractants) that are correlated with infection.

Validation – The inventors continue to validate the initial results in additional cohorts and are working to improve the reliability of the analysis

Applications

- **Malaria diagnostics** – breath-based analysis for:
 - identifying symptomatic patients that require malaria treatment
 - monitoring effects of therapy
 - screening at-risk individuals through public health campaigns
- **Mosquito traps** – certain molecules found in the malaria breathprint can attract mosquitoes, therefore these compounds could be used for odor-baited pest control

Key Advantages

- **Amenable to low-resource and rural settings:**

- could be adapted for rapid, field-stable, point-of-care testing with electronic nose technology
- easy, inexpensive breath collection
- simple interpretation of results does not require specialist
- **Blood-free testing – unlike current malaria diagnostics (microscopy and RDTs) that require a blood sample, breath-based analysis:**
 - is less invasive for patients
 - reduces risk to healthcare workers (e.g., transmission of pathogens through bodily fluids or needles)

Publications

- Schaber, C. L., Katta, N., Bollinger, L. B., Mwale, M., Mlotha-Mitole, R., Trehan, I., ... & Odom John, A. R. (2018). [Breathprinting reveals malaria-associated biomarkers and mosquito attractants.](#) *The Journal of infectious diseases*, 217(10), 1553-1560.

Patents

- [Methods for diagnosing malaria](#) (PCT Application Publication No. WO2019040937)

Website

- [Odom John Lab](#)