Field evaluation of breath biomarkers for malaria diagnosis in Western Kenya

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Malaria is caused by a parasite called Plasmodium. There is currently no ideal diagnostic technique for malaria, as all currently available options have limitations and they are all based on blood test. We used state-of-the-art mass spectrometric techniques to identify volatile organic compounds produced by cultured *Plasmodium falciparum*. These compounds are known mosquito attractants, called terpenes. In a recent pilot study in Lilongwe, Malawi, we found that similar compounds, including terpenes, are present in the exhaled breath of children with uncomplicated falciparum malaria. Using just six breath biomarkers, we can classify children with or without malaria with over 82% accuracy. Based on our key proof-of-concept pilot study, we hypothesize that candidate biomarkers characterize the exhaled breath of malaria-infected children. To advance this approach, our immediate objectives are to determine the reproducible changes in breath composition in response to malaria infection, parasite loads, and parasite developmental stages. These compounds can then be explored as novel biomarkers of malaria infection and could then form the basis of future non-invasive malaria diagnostic devices. Diagnostic testing for malaria is crucial for acute fever management in the clinic. There is an urgent need for rapid, accurate, field-deployable and low-cost malaria diagnostic methods that do not rely on HRP2. This study will advance the development of novel malaria diagnostics based on detection of malaria-specific compounds from exhaled breath, this information will have utility in malaria elimination efforts, to reduce human reservoirs of malaria transmission through “test-and-treat” public health interventions.

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At KEMRI, Mr Otieno contributes to strengthening health system resilience through rigorous research on disease prevention, diagnostics and treatment strategies, helping communities to better withstand health crises. He also focuses on climate and environmental health, examining the impacts of ecological factors on human health and promoting sustainable practices.

His work is driven by a strong motivation to improve health outcomes for underserved populations while contributing to a healthier and more sustainable future.