

Tracking down fake medicine makers using modern forensic DNA methods

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Criminals selling falsified medicines to profit from deceiving vulnerable malaria sufferers, especially in Asia, Africa and Latin America, could more easily be brought to justice as international forensic experts work on new DNA tracking techniques.

In-depth forensic DNA analysis led by Flinders University and experts from the Lao-Oxford-Mahosot Hospital-Wellcome Trust Research Unit and Oxford University, investigated whether bacterial, plant, fungal, animal and even human DNA traces, or environmental DNA (eDNA) could be found in the ingredients of falsified (also known as counterfeit) antimalarial medicines.

The WHO estimates at least 10% of medicines sold in low and [middle-income countries](#) are either substandard or falsified—with falsified antimalarials prevalent in disease hotspots where access, affordability and corruption supports their distribution.

South Australian collaborators at Flinders University and the University of Adelaide ran massively parallel sequencing to compare environmental or "eDNA" signatures between falsified and genuine antimalarials collected in Southeast Asia.

"We found a much greater diversity of eDNA in the falsified tablets, with differences between the diverse falsified packaging types, as well as traces of human DNA," says lead scientist Dr. Jennifer Young, who led the DNA analysis with a multidisciplinary team based in Lao People's Democratic Republic and elsewhere.

The findings, just published in *Scientific Reports*, focused on falsified antimalarial medicines which are a major threat to global health as a prime target of criminal manufacturers and distributors.

The pilot study coined the term "pharmabiome" for the genetic signatures found in the medicines, paving the way for further studies to improve and adopt these techniques to help trace the origins, and possible manufacturers, of dangerous falsified medicines.

Infectious disease physician, Oxford University Professor of Tropical

Medicine Paul Newton, kickstarted the research eight years ago when based in the Lao-Oxford-Mahosot Hospital-Wellcome Research Unit, based at Mahidol Hospital, Vientiane, Lao PDR.

"Poor quality medicines are a serious threat to global public health, but there has been very little research to innovate new techniques to provide actionable evidence as to where they are coming from, who is making them and what their illegal trade routes are," says Professor Newton.

"This pilot research, building on forensic investigations in other fields, yields hope that eDNA could become, with the falling cost of genetic analysis, a cost-effective tool to help investigators understand much more objectively where falsified medicines originate."

This DNA testing work is being expanded as part of the FORESFA (Forensic epidemiology and impact of substandard and falsified antimicrobials) Wellcome Collaborative Award to the Medicine Quality Research Group of the Infectious Diseases Data Observatory.

The article, "Environmental DNA as an innovative technique to identify the origins of falsified antimalarial tablets—a [pilot study](#) of the pharmabiome," has been published in *Scientific Reports*.

More information: Jennifer M. Young et al, Environmental DNA as an innovative technique to identify the origins of falsified antimalarial tablets—a pilot study of the pharmabiome, *Scientific Reports* (2022).

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