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Credit: CDC

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Resistance to a key anti-malarial drug cannot be passed on by mosquitoes in a breakthrough scientists believe could drastically improve

the way we battle the disease.

The discovery could potentially shut down the avenue for mass drug resistance to spread, making malaria treatment significantly more effective for the 3.2 billion people at risk.

The international research project was led by the University of Melbourne and focused on the drug atovaquone.

Atovaquone was introduced in 2000 and is safe for pregnant women and children, so it is one of the few anti-malarials that can be used in mass administration approaches.

It was largely phased out of use because resistance was initially observed.

But as published in the journal *Science* today, the new study reveals that although some malaria parasites had developed a genetic mutation that protected them against the drug in early life, the mutation eventually killed the parasites by stopping production of an essential type of energy as they grew.

Lead authors Professor Geoff McFadden and Dr Dean Goodman are calling it a 'genetic trap' that could prove to be a significant step forward in the anti-malaria fight.

The pair, along with long-term collaborator Vanessa Mollard, led a team investigating the evolution and life cycle of the malaria parasite for the past six years.

"These results are very exciting because the spread of drug resistance is currently destroying our ability to control malaria," said Prof McFadden from the School of Biosciences at the University of Melbourne.

"We now understand the particular genetic mutation that gave rise to drug resistance in some malaria parasite populations and how it eventually kills them in the mosquito, providing new targets for the development of drugs."

"So the development of drug resistance may not be a major problem if the resistance cannot spread, meaning the drug atovaquone could be more widely used in malaria control."

The team also included colleagues from Indonesia's Eijkman Institute and Hasanuddin University, Japan's Jichi University, Nagasaki University and Tokyo University, and in the US Johns Hopkins University, who have been growing and studying billions of malaria parasites used to infect thousands of mosquitoes.

The researchers studied a model strain of rodent malaria and a deadly strain of human malaria to confirm the resistant parasites could not be spread by mosquitoes, thereby preventing the re-infection of humans.

"It is very rewarding that our fascination with basic biology has produced such significant results."

"We are the first group to follow the drug resistant malaria parasite through its entire life cycle to understand what happens after drug resistance initially develops and whether they pass on resistance."

"Our next challenge will be to look for any spread of this drug resistance in field settings such as Kenya and Zambia. We are hopeful that with the development of cheaper generic forms of the drug atovaquone, that there is a new hope in the treatment of malaria."

More information: "Parasites resistant to the antimalarial atovaquone fail to transmit by mosquitoes," DOI: 10.1126/science.aad9279