

Human antibodies undermine parasite sex

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Credit: CDC

Some people develop an immune response following a malaria infection that stops them from infecting other mosquitoes. The antibodies that these people produce are ingested by the mosquito and destroy the malaria parasite in the mosquito's stomach. Researchers from Radboud university medical center discovered that one in 25 malaria patients prevent the disease from spreading in this way. They also unraveled the defense proteins responsible, which could be used to make a vaccine.

Malaria is a disease that spreads incredibly efficiently. The antimalarial medicines that are currently used are relatively ineffective, because the [parasites](#) remain in the patient's blood for a long time after treatment. This means that other mosquitoes can be infected with the parasite if they bite the patient. The male and female parasites are fertilized in the mosquito's stomach, and the offspring are transferred back to humans via mosquito bite, and the cycle starts again. In this way, just one [malaria](#) patient can cause more than 100 new malaria infections. In the fight against malaria, it is therefore very important to make sure that people are not able to infect other mosquitoes.

People who have been infected with malaria produce [antibodies](#). These antibodies can provide protection from further infection, but they can also prevent the spread of malaria as the antibodies destroy the parasites in the mosquito's stomach, or prevent fertilization. In that case, it is not the patient who benefits from the antibodies that he or she produces, but other people who are bitten by the mosquito. This is therefore an interesting form of altruistic immunity.

Malaria researcher Teun Bousema at Radboud University Medical Center and his colleagues at London School of Hygiene & Tropical Medicine (LSHTM) have discovered that one in 25 malaria patients are able to stop malaria spreading in this way. Amongst missionaries who had been infected with malaria dozens of times during their missionary work, immunity was even more common. Bousema says, "This is the first time that we have been able to produce direct evidence that human antibodies against [malaria parasite](#) proteins are able to prevent the spread of malaria." The results will be published in *Nature Communications* on February 8th.

Research into whether people can stop the spread of malaria is incredibly labor-intensive. For each patient, dozens of mosquitoes need to be investigated to see whether they have been infected after sucking

up the blood of the malaria patient. Until recently, all these mosquitoes needed to be dissected. This problem has now been solved. Bousema says, "We have developed a malaria parasite that expresses a firefly gene, allowing us to see just by looking at the mosquito whether or not it has been infected." This has sped up the research considerably.

Ph.D. student Will Stone studied human immune response to over 300 malaria proteins. Stone says, "We saw that our test subjects produced antibodies that are able to slow the spread of malaria in response to 45 of these proteins. People with these antibodies were 10 times less likely to infect [mosquitoes](#)." Stone will defend his thesis about this research on February 22nd at Radboud university medical center and will continue his research at LSHTM. Bousema says, "This research enables us to better understand which [patients](#) prevent the spread of malaria. We are now looking at whether it is possible to develop a [malaria vaccine](#) using some of these proteins. A vaccine that prevents the spread of malaria would help reduce the disease burden of malaria worldwide."

Provided by Radboud University Nijmegen

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