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Discovery of key protein in malaria parasite opens door to novel treatment

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An international team has discovered a protein that plays a key biological role in a parasite that causes malaria. Deactivating this protein reduces in vitro growth of Plasmodium falciparum, the protozoa behind the most

virulent form of the disease, by more than 75%. The team, led by Professor Dave Richard of Université Laval, recently published details of the discovery in the scientific journal *mBio*.

"This breakthrough could lead to the development of a treatment that targets a function of the parasite that no malaria drug has yet exploited," said Richard, professor in the Faculty of Medicine at Université Laval and researcher at CHU de Québec–Université Laval Research Centre.

Plasmodium falciparum is transmitted to humans through mosquito bites. After infecting the host's liver it circulates in the blood, hiding inside red blood cells and thereby avoiding attacks from the immune system. The parasite's main food source is hemoglobin, the protein that carries oxygen from the red blood cells to the rest of the body. The parasite digests the hemoglobin in structures called digestive vacuoles.

"The protein we discovered, PfPX1, is involved in transporting hemoglobin to these digestive vacuoles," said Professor Richard. "When we deactivate PfPX1, we deprive the parasite of its main source of amino acids. This has an impact on its growth and survival."

In light of these findings, Richard sees a potential new way to fight malaria: "We could block the parasite's PfPX1 protein from performing its functions. Since the protein isn't present in humans, there would be decreased risk of disrupting any important functions in the human body."

Malaria continues to plague many parts of the world, including Sub-Saharan Africa. In 2020, 241 million people contracted malaria and 627,000 died from it. The disease mainly affects children under the age of five and pregnant women.

Although the World Health Organization recognized the first malaria

vaccine last year, Richard thinks it is essential to continue exploring new therapeutic avenues: "As we have seen with COVID-19, new strains can continue to emerge and threaten the effectiveness of vaccines. What's more, strains resistant to artemisinin, the main anti-parasite drug used against malaria, have already emerged in Southeast Asia. To maintain treatment efficacy and reduce the risk of new drug-resistant strains, it is important to combine therapeutic approaches, as we do with AIDS. Our discovery may well have a role to play in the fight against malaria."

Provided by Laval University