

Researcher invents 'lab on a chip' device to study malaria

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University of British Columbia researcher Hongshen Ma has developed a simple and accurate device to study malaria, a disease that currently affects 500 million people per year worldwide and claims a million lives.

Spread by [mosquitoes](#), malaria is caused by a tiny parasite that infects [human red blood cells](#). Ma and his team designed a "lab on a chip" device to better understand the changes in red blood cells caused by [Plasmodium falciparum](#), the most common species of malaria parasites.

Ma explains the device will help those conducting laboratory research or [clinical trials](#) evaluate the efficacy of different compounds in treating malaria – a disease that is increasingly resistant to drugs.

"Our results show that it's possible to precisely measure the stiffening of red blood cells caused by the parasite at various stages of infection," says Ma, assistant professor in the UBC departments of mechanical engineering and urologic sciences, and senior research scientist at the Vancouver Prostate Center.

Normal human red blood cells must squeeze through capillaries many times smaller than their own diameter in order to deliver oxygen to all tissues in the body. Red blood cells infected with malaria gradually lose this capability, which disrupts blood flow, causing failure of vital organs and eventually death.

Measuring 2" x 1" (50 cm x 25 cm), Ma's microfluidic device deforms

single [red blood cells](#) through a series of funnel-shaped constrictions. The pressure required to push the cell through each constriction is measured and then used to calculate the cell's deformability.

By measuring the deformability of an infected red blood cell, researchers can obtain vital information about the status of the disease and response to treatment, explains Ma, whose findings appear in the current issue of the journal *Lab on a Chip*.

Ma notes that although there has been considerable research on the biomechanics of malaria, "current methods to measure red cell deformability are either too complex to be used in clinical settings or are not sensitive enough."

Provided by University of British Columbia

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