Non-Invasive Electromagnetic Method for Continuous Detection and Monitoring of Malaria

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Technology description

The Need

Plasmodium falciparum(PF), a form of malaria, is the deadliest and most prevalent parasite in humans due to its pervasiveness in temperate areas of the underdeveloped world. In 2013, there were nearly 198 million cases of malaria and an estimated 584,000 deaths, mostly among African children (BCC Research: Global Markets for Infectious Disease Treatments).
One of the quickest and cheapest methods of detecting malaria is with the use of rapid medical diagnostic kits (MDKs). An MDK typically consists of multiple parts including a device carrier (vial, card, slide and film), reagents (dry or liquid form), packaging (microtiter tray, paper strip, filter and membranes) and instructional materials. Although they are simple to use and provide fast, easy-to-read results, they may produce negative or inconclusive results that require a more thorough test to properly diagnose a patient. Analyzing red blood cells from a blood sample via microscopy is a common method for detecting malaria. However, there is a significant lack of equipment and skilled labor in impoverished nations and rural areas that can properly analyze the samples. Therefore, diagnosis via microscopy is often impractical at the point of care. Additionally, a strong logistics network must be available to provide results in a timely manner for proper treatment, and the results are only as reliable as the laboratory performing the analysis. In fact, the variance in experience and equipment has led to false positive rates as high as 36% and false negative rates as high as 18%.
The gestational process of PF also makes microscopy ineffective during the early onset of malaria when the parasite lies within the organs and capillaries prior to infecting red blood cells. In order to properly diagnose and treat victims of malaria, a non-invasive method of continuous monitoring for the presence of PF, without the need of advanced skills or equipment, must be developed.

The Technology

Researchers at the Ohio State University, led by Dr. Vishwanath Subramaniam, developed an electromagnetic device for the continuous detection of malaria. The device non-invasively detects the presence of the PF parasite by monitoring the electromagnetic properties of infected red blood cells flowing in the vicinity of the device. The device is inexpensive to produce, provides quick results, and

can be coupled with a simple display system to clearly indicate results without the need of specialized skills or equipment.
An inexpensive device that utilizes non-invasive electromagnetic interactions with red blood cells to provide continuous monitoring for or diagnosis of malaria.

Application area

Diagnostics
Point of care testing

Advantages

Inexpensive - more accessible
Quick results
Easy to use
Non-invasive
Continuous

Institution

Ventech Solutions

Inventors

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