

OFFICE OF SPONSORED RESEARCH

McGill

TECHNOLOGY OPPORTUNITY

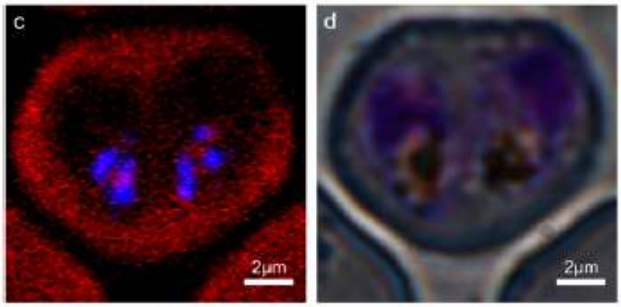
Rapid Malaria Detection

Several methods for diagnosing malaria infection have been developed, but these all rely on clinical suspicion and therefore, an explicit clinical request. The technology describes a unique system for detecting malaria infection. The approach relies on the detection of a strong third harmonic signal generated when malaria pigment is excited with ultra short laser pulses centered at approximately 1200 nm. The system is able to detect very low numbers of infected blood cells (10 attomolar 10-17 M) with the requirement for minimal sample preparation (sealed blood samples containing ~ 0.5 mL of blood, 200 s measurement time per sample) and would greatly improve on the existing clinical method of measuring parasitemia levels using giemsa staining of blood smears. This technology is protected with a US utility patent filing.

Applications

Although some present detection methods lend themselves to automation (e.g. PCR), no technique can yet be used for routine clinical automated screening. The advantage of the methods of the invention system compared to non automated techniques is the small amount of time it takes to perform a test, and the minimal training needed to operate the device; thereby eliminating the need for a trained clinician. Compared to other techniques, the cost per test of this method is further reduced since no reagents are required. In addition, better sensitivity makes it a more suitable solution for a screening tool. Using a blood droplet from the patient, the user transfers the sample to a sealed container, starts the device and obtains a read out (positive, negative, parasitaemia level). Originally this technology was demonstrated in a lab scale system and currently a table top version is undergoing testing and characterization. The goal is to develop a portable turnkey device suitable for field work.

Technology



After the malaria parasite digests blood, it produces a crystalline waste by product – hemozoin. The image on the left shows the third harmonic generation emitted from hemozoin in a red blood cell. This results in the blue region and this strong signal can be easily captured and used to determine infection levels. On the right, the parasites are visible with a microscope and is due to the Giemsa staining. A skilled technician is required to interpret the results.

The Principal Inventor

Dr. Paul Wiseman
Associate Professor; Physics & Chemistry

Research:

• Biophysical chemistry with emphasis on measuring macromolecular interactions in living cells using single photon and two-photon variants of image correlation spectroscopy (ICS) and image cross-correlation spectroscopy (ICCS)

• Live cell measurement of macromolecular dynamics and clustering phenomena of green fluorescent protein (GFP) integrin constructs to study their role in assembly of cell adhesion structures and in receptor "cross-talk" with other signaling systems in cells.
• Development of new microscopic techniques that extend the capabilities of the ICS and ICCS methods. Development of a combined ICS, ICCS and imaging fluorescence resonance energy transfer microscopy. Applications of nonlinear harmonic microscopy and ICS to measurements of macromolecular mobilities in live cell systems. Application of bio-conjugated quantum dot labels for dynamic ICS measurements in living cells.
• Extension of ICS and ICCS for application to research problems in areas of neuroscience

CONTACT:

Derrick Wong
Office of Sponsored Research
McGill University
Tel: 514-398-5858
Email: derrick.wong@mcgill.ca
Reference code: ROI 07116

McGill

OFFICE OF SPONSORED RESEARCH