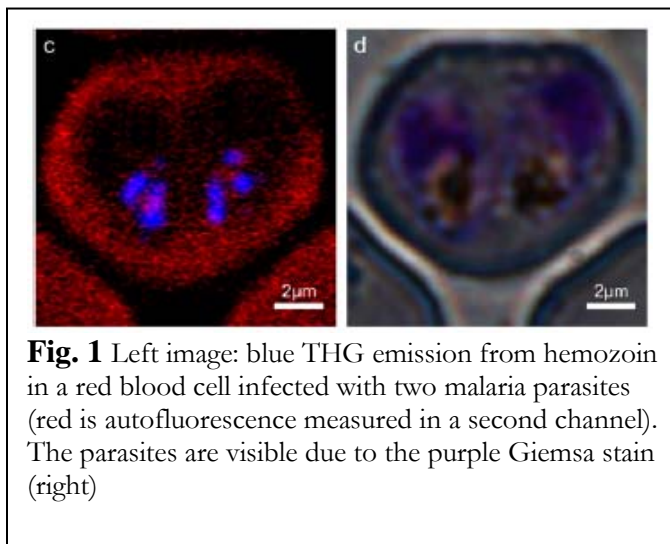


## Rapid Malaria Detection

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### Information Summary

Reference code:	ROI 07116
Technology overview:	Detection of malaria infection based on nonlinear optical emission from the malaria pigment hemozoin.
Validation:	Proof of concept demonstration using a lab scale system. Currently developing a portable prototype.
Lead Inventor:	Wiseman Paul et. al.
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**Fig. 1** Left image: blue THG emission from hemozoin in a red blood cell infected with two malaria parasites (red is autofluorescence measured in a second channel). The parasites are visible due to the purple Giemsa stain (right)

### Technology Description

This invention proposed a unique system for the detection of malaria which would be based the sensitive detection of the infection via laser excited third harmonic generation (THG) emission generated from hemozoin present in red blood cells containing malaria parasites. The system would be 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.

### Benefits

The main advantage this system compared to non automated techniques is the small amount of time it takes to perform a test, and the minimal training

requirements to run the device which eliminates the need for a trained clinician. Compared to other automated or proposed 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. The personnel will only have to extract a blood drop from the patient, place it in a sealed container, start the device and read out the information (positive, negative, parasitaemia level).

### Medical Need and Opportunity

Malaria is an insect-borne disease which today, is widely found in tropical and sub-tropical regions in Africa, Asia and the Americas placing approximately 40% of the world's population at risk. Although malaria is preventable and curable, annually more than a half billion people are infected resulting in over 1 million deaths. In addition to the staggering direct human cost, malaria can dramatically affects the economic development of the countries where the disease is endemic.



**Dr. Paul Wiseman**

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B.Sc. (St. Francis Xavier University, 1989)

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Japan Society for the Promotion of Science (JSPS) Postdoctoral Fellow (Tokyo University & Nagoya University, 1996-1998)

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Biophysical Society Young Fluorescence Investigator 2005

Leo Yaffe Award for Excellence in Teaching 2007

Principal's Prize for Excellence in Teaching (Assistant Professor Level) 2007

**Research Description:**

- 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