ASTMH

AMERICAN SOCIETY OF TROPICAL MEDICINE & HYGIENE
ADVANCING GLOBAL HEALTH SINCE 1903

2020 ANNUAL MEETING

NOVEMBER 15–19 | VIRTUAL MEETING

astmh.org | ajtmh.org | #TropMed20 #IamTropMed

LB-5180 - Evaluation of an automated microscope using machine learning for the detection of malaria in travelers returned to the UK

📅 November 18, 2020, 11:45 AM - 1:15 PM   📍

Authors

Roxanne Rees-Channer[1], Christine M. Bachman[2], Lynn Grignard[3], Stephen Burkot[4], Matthew P. Horning[2], Charles B. Delahunt[2], Liming Hu[2], Courosh Mehanian[2], Clay M. Thompson[5], Paul Lansdell[1], Sonal Shaw[3], **Peter L. Chiodini**[1]

[1]Hospital for Tropical Diseases, London, United Kingdom, [2]Global Health Laboratories, Bellevue, WA, United States, [3]London School of Hygiene and Tropical Medicine, London, United Kingdom, [4]Global Health Laboratories, Bellvue, WA, United States, [5]Creative Creek LLC, Camano Island, WA, United States

Disclosures

 P.L. Chiodini: None.

Abstract

Malaria microscopy will remain a tool for the foreseeable future. Training microscopists to WHO level 2 requires many hours. An automated microscopy tool could be an effective aid in areas with limited access to skilled microscopists, where malaria is seen rarely, and in studies where consistency in microscopy between sites is essential. The EasyScan GO is an automated scanning microscope combined with machine learning to detect parasites in Giemsa-stained blood films. We evaluated EasyScan GO to determine if it could detect, quantitate, and identify malaria parasites present in Giemsa-stained blood films with consistency and accuracy compared to trained microscopists. Travelers suspected to have malaria were enrolled. Giemsa-stained thick and thin blood films were read by EasyScan GO and an expert microscopist at the Hospital for Tropical Diseases London. Blood samples were tested by qPCR and nested PCR at the London School of Hygiene and Tropical Medicine to confirm the species and resolve differences between EasyScan GO and manual microscopy. 1202 samples were evaluated, 106 positive and 1096 negative by expert microscopy. EasyScan GO, compared to expert microscopy, was 90% (95% CI: 82-95%) sensitive, 89% (95% CI: 86-90%) specific. Sensitivity depended on parasite density, declining to 69% (95% CI: 39-91%) in samples with <80 p/µL (n=13). Of 95 positive by manual microscopy and EasyScan GO, manual microscopy identified 83 *Plasmodium falciparum* and 12 non-*falciparum* (6 *P. vivax*, 5 *P. ovale*, 1 *P. malariae*). EasyScan GO reported *P. falciparum* for 82 of the 83 *P. falciparum* samples and non-*falciparum* for 11 of 12 non-*falciparum* samples (Kappa = 0.905). It failed to distinguish between non-*falciparum* species, reporting all non-*falciparum* as *P. vivax*. Except for one *P. ovale* sample reported as *P. falciparum*, EasyScan GO reported all non-*falciparum* as *P. vivax*. For estimating parasitaemia, EasyScan GO parasite density was within 25% of manual microscopy for 19% of 106 manual microscopy positives, falling short of WHO's quantitation standard (50% of samples within 25%). EasyScan GO can detect malaria parasites in blood films, with roughly 90% accuracy relative to expert microscopy. It accurately distinguished *P. falciparum* from non-*falciparum* samples. Performance at low parasite densities, distinguishing between non-*falciparum* species, and quantitating parasitaemias appear to be areas for further development and evaluation.