

research for health

in humanitarian crises

EbolaCheck:

Westminster University

"This project is the first to bring a lab quality test to the patient, instead of sending the patient's blood sample to the lab. The impact with respect to the cost and time involved to respond to this and future outbreaks of Ebola and other diseases will be substantial."

DR. STERGHIOS ATANASIOS MOSCHOS, UNIVERSITY OF WESTMINSTER

The EbolaCheck project led by Westminster University is working to deliver a rapid portable diagnostic device suitable for use in patient treatment centres in rural West Africa.

EbolaCheck can provide an accurate diagnosis within 40 min inside treatment centres, eliminating the risks caused by transporting blood samples and awaiting results from a centralised lab. This can enhance patient triage and greatly improve healthcare worker safety.

The device uses a new system combining two blood diagnostic processes; the validated, proprietary technology for rapid, direct polymerase chain reaction (PCR) on whole blood samples with the standard RT-qPCR diagnosis currently used in centralised laboratories to confirm Ebola infection. In order to make the device simple and safe for nontechnicians to use in patient care centres, the EbolaCheck consortium (Westminster University, Public Health England, US Army Medical Research Institute of Infectious Diseases, a Biotech Company West of Cambridge and a West African University) have been developing the electronics, software package and plastic consumables for blood testing. At the same time they are evaluating diagnostic assays, optimising diagnostic performance and eliminating cold-chain dependence to equip the A4 sized device for tropical conditions.

After working to minimise reaction times, the team now observe that results can be delivered in as little as 10 minutes for high levels of infection. Furthermore the device is sensitive enough to detect low levels of infection to diagnose early stages of the disease with a high level of accuracy.



Westminster University: A4 size, battery driven EbolaCheck device



Westminster University: Current diagnostics conditions - centralised secure lab environment





The EbolaCheck Diagnostic Device

Programme Name:

EbolaCheck

Key information

Grant awarded: £629,655

Lead organisation: University of Westminster, London

Partnering organisation(s):

US Army Medical Research Institute of Infectious Diseases; Kwame Nkrumah University of Science and Technology; Public Health England.

Project length: Nov-14 to Nov-15

Health sector: Diagnostics

Study location: London & Ghana

Principal Investigator(s)

Dr Sterghios A. Moschos FRSC MSB, University of Westminster

Purpose

Symptomatic patients arriving at Ebola treatment centres in West Africa are triaged by a combination of reviewing their symptoms, assessing Ebola epidemiology in their community, and confirming infection through molecular diagnosis. Beyond acute high fever, symptoms that raise suspicion of Ebola Virus Disease (EVD) include vomiting, diarrhoea and uncontrolled haemorrhage. Importantly, these coincide with high levels of viremia and contagiousness through contact with bodily fluids, and are also symptomatic of other diseases prevalent in West Africa, such as malaria. It is necessary to quickly identify and isolate EVD patients to prevent further transmission. However, until that crucial negative molecular result is returned, patients that might be Ebola-free are cared for side-by-side with confirmed positive cases, at risk of acquiring the disease and death. Minimising the time to molecular diagnosis would therefore greatly improve the chances of controlling the current and future Ebola outbreaks.

Expected outcomes

The project will deliver EbolaCheck, a point-of-need diagnostic device suitable for simple, rapid and safe patient triage at treatment centres anywhere in West Africa. This approach is based on a combination of a validated, proprietary technology for rapid, direct polymerase chain reaction (PCR) on whole blood samples [ExSyte (EBVK8), based on WO2011157989] and the standard of care RTKPCR laboratory diagnostic assays used worldwide to confirm Ebola infection. This project aims to enhance patient triage and improve healthcare worker safety by deploying a rapid (<40 min) diagnostic device based on these laboratory assays.

Progress and outcomes achieved (last updated March 2015)

Testing so far indicates that EbolaCheck can detect very low levels of the Ebola virus (<103 viral particles per ml of blood) – this sensitivity is critical for testing in the early stages of the disease - as well as detecting high levels within 10 minutes. The reduced number of Ebola cases now requires contingency planning for field testing. However it is important to note that EbolaCheck will be useful not just for this and future Ebola outbreaks, but also for other diseases.

http://www.westminster.ac.uk/news-andevents/news/science-and-technology/2014/ university-of-westminster-awarded-620,000grant-to-develop-ebola-diagnostic-device

April 2015







EbolaCheck consumables - Westminster University

