VHFMoDRAD

Viral Haemorrhagic Fever Modern Approaches
for developing bedside Rapid Diagnostics

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CONTEXT

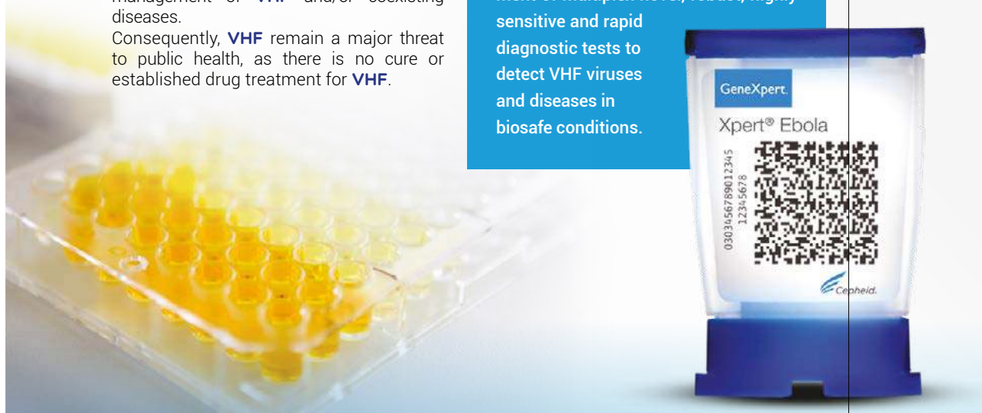
Since the 1930s, an ever increasing number of outbreaks of viral haemorrhagic fevers (VHF), which result in deaths and widespread fear, have been reported mainly from Africa. VHFs are spread by infected animals and insects, which host and /or transmit the diseases by contact to humans and their bodily fluids.

Human cases or outbreaks of haemorrhagic fevers caused by these viruses occur sporadically and irregularly and the occurrence of outbreaks cannot be easily predicted.

The rarity of **VHF**, along with indiscriminate initial symptoms, makes diagnosis problematic. Distinguishing **VHF** from other tropical diseases is also important, not only for isolation and infection control procedures, which can help stop the spread, but for proper management of **VHF** and/or coexisting diseases.
Consequently, **VHF** remain a major threat to public health, as there is no cure or established drug treatment for **VHF**.

Vaccinations exist for only a few viral haemorrhagic fevers. Until additional vaccines are developed, the best approach is prevention.

So, in order to be prepared and for good management of outbreak response, there is an urgent need for the development of multiplex novel, robust, highly sensitive and rapid diagnostic tests to detect VHF viruses and diseases in biosafe conditions.



VHFMoDRAD PROJECT

The **VHFMoDRAD** project is built on the successful achievements of previous funded project **EBOLAMoDRAD** which aimed to develop rapid diagnostics for the Ebola virus on-site and in laboratories in low technical settings. The **VHFMoDRAD** project is going to the next level and will include several other haemorrhagic fever viruses and enable rapid differential diagnostic in epidemic settings.

The project activities are planned from January 2019 to December 2022 and gather a multi-disciplinary network of scientists from key European and African research organisations and also industry and SMEs.

EBOLAMoDRAD
- Rapid diagnostic assays for Ebola detection

VHFMoDRAD
- Rapid Point-of-Care tools for **VHF** diagnostic
- Training and transfer technology

- Start up venture in West Africa

The overall aim of **VHFMoDRAD** is to develop and deliver rapid and multiplex Point-of-Care diagnostic tools that will significantly increase our capacity to handle outbreaks of filoviruses, other viral haemorrhagic fever diseases in Africa and other highly pathogenic emerging viruses. Additionally, this project will also contribute to capacity building through training and technology transfer in West Africa.

STRATEGY

To achieve this overall aim, an **intensive work plan** will be put in place with the following specific objectives:

OBJECTIVE 1

Develop multiplex molecular detection methods (*ie. based on acid nucleic detection*) for highly pathogenic viruses in biosafe conditions at the level of clinical diagnostic laboratories and at healthcare centres in endemic countries. This will be done through: **i)** the development of a unique and innovative flexible cartridge system for molecular diagnosis using **CEPHEID** equipment already existing in most of laboratories and **ii)** the development of low cost lateral flow strips for triplex isothermal assays with virus of interests and an internal positive control **based on successful assays performed with Ebola virus.**

OBJECTIVE 2

Develop biosafe multiplex serological detection methods (*ie. based on antibody and antigen detection*) using lateral flow devices for point-of-care and routine diagnostic laboratories at very early diagnosis stage.

OBJECTIVE 3

Validate the diagnostic tools for successful assays developed in high containment laboratories and in the field.

OBJECTIVE 4

Implement a strong capacity-building programme and contribute to an effective transfer of resources and capabilities for a sustainable management and distribution of these new field diagnostic tools. This will be done through: **i)** training and exchange programme, **ii)** a twinning approach to transfer the production capacity for lateral flow strip.

OBJECTIVE 5

Disseminate widely the project and its results to public health bodies, NGOs, outbreak management teams, laboratories and local hospitals in **West Africa**.

MAIN ACTIVITIES: WORK PLAN

The work plan proposed in VHFMoDRAD foresees 7 interrelated work packages (WP).

Preclinical and clinical validation

- Tests on archived Animal samples
- Tests on archived Human samples
- Tests on samples from animal models (macaques, mice, hamsters)

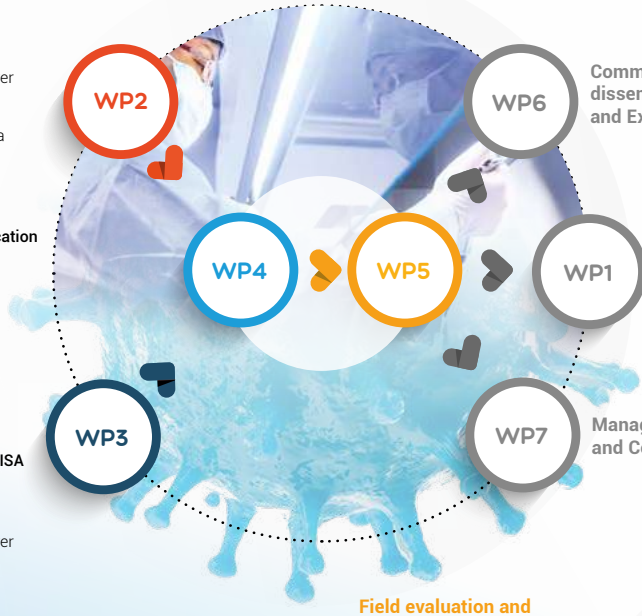
Multiplex molecular diagnostics

Cartridges for:

- Yellow Fever
- Crimean Congo Haemorrhagic Fever
- Rift Valley Fever
- Severe Fever with Thrombocytopenia Syndrome
- Marburg fever
- Lassa fever
- Ebola

Isothermal amplification Tests for:

- Dengue
- Chikungunya
- Zika



WP6 Communication, dissemination and Exploitation

WP1 Ethics

WP7 Management and Coordination

Serological field diagnostics

Lateral flow and ELISA assays:

- Yellow Fever
- Crimean Congo Haemorrhagic Fever
- Ebola
- Marburg fever
- Lassa fever
- Severe Fever with Thrombocytopenia Syndrome

Field evaluation and capacity building

- Tests of diagnostic tools in Senegal and Sierra Leone
- Support a twinning project for transfer of production of lateral flow assays in Senegal
- Training and exchange programs

EXPECTED OUTCOMES

The major expected results and impacts of the VHFMODRAD project will be on two levels:

- Development of innovative and novel diagnostic tools for haemorrhagic fever virus diseases.
- Reinforcement of capacity building.

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