

FRIEDRICH-LOEFFLER-INSTITUT Bundesforschungsinstitut für Tiergesundheit Federal Research Institute for Animal Health

Ebola Foresight: the Role of Livestock and Wildlife Species in the Biology of Filoviruses

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Summary

Filoviruses, which encompass both Ebola- and Marburgviruses, are zoonotic pathogens responsible for severe hemorrhagic fever in humans. While it was until recently assumed that human pathogenic filoviruses are limited to Central Africa, the unprecedented Ebola outbreak in West Africa 2013-15 made the international community unequivocally aware that filoviruses are in fact more widely distributed than previously thought. Bat species have been identified as natural reservoir hosts for both Ebola- and Marburgviruses. However, to what/which extent other animal species are involved in the transmission cycle to humans or serve as additional hosts for filoviruses is largely unknown.

The aims of this project are, in a close cooperation between the Friedrich-Loeffler-Institut (FLI), the Institut Pasteur in Guinea (IPG), as well as the Njala University (NU) and the Sierra Leonean Agricultural Research Institute (SLARI), to build capacity in the West African partner laboratories as well as to investigate the role of livestock and wildlife species in the biology of filoviruses. Therefore, on-site workshops and training of laboratory staff in biosafety measures, animal sampling and diagnostic methods have taken place and will be continued throughout the project period. Further, modern diagnostic methods for the detection of filoviruses in humans and animals have been developed and will be established within the partner countries. This includes novel, easy-touse sequencing technologies as well as serological assays. The studies will be enhanced by complementary and supportive work at FLI using the latest methods and the newly established maximum containment (BSL4) laboratory. Altogether, this project strengthens the research cooperation between Germany and the African partner countries, and paves the way for future joint research projects.

Capacity building

 Training of African PhD students at the FLI • On-site training of laboratory staff/workshops in Sierra Leone and Guinea Establishment of key technologies for future studies • Training in sampling livestock and wildlife animal species

Analyzing serum samples of animals

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- Establishing serological detection methods
- Collection of serum samples from different livestock and wildlife species
- Analyzing animal samples



Preparedness/

Surveillance

• Studies on seroprevalence and easy-to-use sequencing technologies as part of a rapid outbreak response in the future



Sampling activities in Sierra Leone in 2016: collection of serum samples from pigs and goats



Immunosorbent Assay (ELISA, serological test)

Analyzing sequence data of animal samples	 Novel, highly portable and robust third generation nanopore sequencing technology Sequence analysis of host factors relevant for Ebola virus entry into host cells

- Strengthening the research cooperation between the West African partner countries as well as between Germany and Africa
 - Paving the way for future joint research projects
 - Connecting research projects locally and internationally
 - Implementation of serological detection methods in West Africa





Implementation

Collaboration

- Regular on-site training with FLI scientists
- Implementation of sequencing technology in West Africa

Transmission	 Identification of the transmission potential at the animal - human interface Basic research on the characterization of pathogenesis and immune response in different best species
	response in different host species

Workshop on serological methods in Sierra Leone in 2017 with participants from all project partners



- A collaboration project funded by the German Federal Ministry of Food and Agriculture
- Involved partners: NU, SLARI, IPG, FLI



Kick-Off Meeting in Conakry, Guinea, in 2016 with all project partners as well as local authorities

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