PhD Program between the Freie Universität Berlin (FUB) and the China Scholarship Council (CSC)

Open PhD Position at Freie Universität Berlin, offered only to Chinese CSC scholarship candidates 2019

Please Note: this PhD position is only offered to Chinese PhD candidates for the application in the framework of the FUB-CSC PhD Program.

Department/Institute:	Institute of Virology
Subject Area:	Virology
Name of Supervisor:	Prof. Dr. Klaus Osterrieder/ Dr. Walid Azab
Number of Open PhD Positions:	1
Type of the PhD Study:	Full-time
Project Title:	Study of Zoonotic Viruses' Pathogenesis in Microfluidic Cell Culture System

PhD Project Description:

Zoonotic and emerging diseases are constant threats to public health. Host switching, in which pathogens (particularly viruses) jump from their natural host into accidental hosts, i.e. other species, are responsible for the majority of emerging/zoonotic infections. In all cases of cross-species transmissions, the new intruders have to face organismal defenses and use the same host machineries and elements to replicate and spread. Only successful emerging pathogens have evolved different strategies to overcome host immune barriers, particularly presented by mononuclear cells (MC).

Members of several virus families, including hanta-, herpes-, toga-, filo-, flavi- and arenaviruses can infect MC with either productive or non-productive replication, hijack MC machineries, and spread to the final target, the endothelium, where efficient virus replication takes place. The aim of this proposal is to track virus infection and spread from mononuclear cells to the endothelium using in vitro models that mimic the in vivo situation. Furthermore, we will investigate the regulated cellular events between the infected and non-infected cells during virus cell-to-cell spread. Understanding these mechanisms and virus-cell crosstalk will facilitate the control of existing zoonotic viruses and help the preparedness for any future emerging zoonotic ones.

The overall goal is to develop and establish a universal in vitro microfluidic system to imitate tissue-specific microarchitecture and track virus infection and spread. The system will be flexible to involve all zoonotic and emerging viruses that share the same pathogenesis.

The approach of microfluidic technology had superior advantages over the conventional cell culture system. Microfluidics can create controllable, reproducible and optimizable dynamic microenvironment that mimic the in vivo environment and provide efficient and high throughput cellular analysis and in situ monitoring of cellular events. The combination of

microfluidic technology with 3D cell culture offers great potential to advance the study of virus pathogenesis and disease etiology.

We will focus on one representative of the zoonotic viruses, Puumala Hantavirus (PUUV). Infection of humans with Hantaviruses can cause two main disease complexes: (i) Hantavirus cardiopulmonary syndrome (HCPS, also referred to as hantavirus pulmonary syndrome), a condition caused by infection with New World Hantaviruses, including Andes virus (ANDV) from Latin America and Sin Nombre virus (SNV) from North America; and (ii) Hemorrhagic fever with renal syndrome (HFRS) after infection with Old World Hantaviruses from Europe (Puumala virus; PUUV and Dobrava-Belegrade virus; DOBV) and Asia (Hantaan virus; HTNV). The case fatality ratios associated with Hantavirus infections ranges from 50% in the case of ANDV or SNV to 0.1% in case of PUUV. Arguably, the most significant problem with Hantavirus infections is that there is still no approved antiviral drugs, vaccines, or immunotherapeutic agents available. Hantavirus replication started in the respiratory epithelial cells where MC pick the virus and subsequently transfer it to the endothelium. Yet, the mechanism of virus spread and the interplay between infected and non-infected cells are not determined. Understanding of the events leading to disease outcomes is essential to help the targeted design of antiviral therapeutics and is a prerequisite for the development of predictive mechanisms that are essential for the risk assessment of zoonotic agents.

Objectives:

Objective 1 – To track virus transfer from the respiratory epithelium to the vasculature endothelium

Objective 2 - To determine cellular factors and biomarkers associated with virus transfer.

Language Requirements:

IELTS: 6,5 / TOEFL: 95 ibt

Academic Requirements:

Experience in virology and molecular biology
Master degree in a related discipline is required

Information of the Professor or Research Group Leader:

http://www.vetmed.fu-berlin.de/einrichtungen/institute/we05/02_mitarbeitende/aktuelle_mitarbeitende/osterrieder_klaus/index.html

http://www.vetmed.fu-berlin.de/en/einrichtungen/institute/we05/02_mitarbeitende/aktuelle_mitarbeitende/azab_walid/index.html

http://www.vetmed.fu-berlin.de/en/einrichtungen/institute/we05/publikationen/index.html

Please Note: In a first step, the complete application should be submitted to the Beijing Office for evaluation by January 4th, 2019. Please do not contact the professor before. He/she will get in contact with you after having received the complete application via the Beijing Office in January.