Make Influenza Viruses light up

A multiplex Influenza virus neutralisation assay using fluorescent viruses

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Master Thesis – CMU/UniGE

Field: Virology/Immunology

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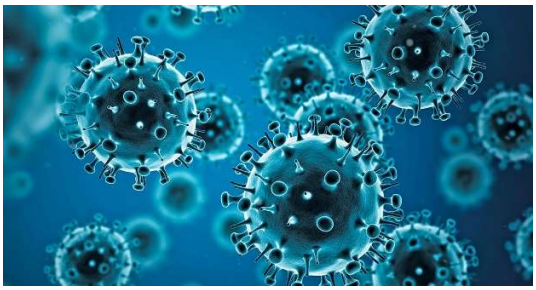

Research interests

Influenza viruses cause a huge burden of disease with an estimated 290,000-650,000 deaths each year worldwide. While a yearly updated vaccine is available, the effectiveness of the vaccine ranges only from 40-60%. Among many other factors immune imprinting and the infection history of each individual are important determinants for the effectiveness of the vaccine. Immune imprinting is a phenomenon where the first influenza virus strain encountered during childhood can lead to a skewed subsequent immune response towards antigenic structures that are closely related to the imprinting strain. We are interested in how the humoral immune response after vaccination is shaped by the previous exposure history and the immune imprinting of human individuals. Therefore, we are developing novel state-of-the-art serological tools to comprehensively analyse functional antibody responses directed against influenza viruses.

Project

You will develop a multiplex neutralisation assay for influenza using reporter viruses that harbour different fluorophores. Therefore, you will design, clone and rescue influenza viruses that contain different fluorescent reporter genes using reverse genetics. You will pseudotype these reporter viruses with different HA and NA combinations and analyse their growth characteristics. Lastly you will develop a focus reduction neutralisation assay that can determine the neuralization properties of human patient sera against four different influenza viruses at the same time.

Methods

Molecular biology (PCR, cloning, propagation of plasmids); cell culture (transfection); virus rescue and cultivation; neutralisation assay; automatization of fluorescence read-out using an ELISpot reader.