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Development of a potential live-attenuated Langat virus as candidate for novel tick-borne encephalitis vaccine

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Abstract

Background. Tick-borne encephalitis (TBE) is one of the most important tick-transmitted diseases in Europe and Asia. Most infections with the TBE virus (TBEV) are asymptomatic or cause mild flu-like symptoms, but they may induce severe neurological disorders with permanent sequelae. The incidence of TBE cases showed a remarkable elevation in recent years probably due to the geographic expansion of TBEV and its vectors, which is concerning in the absence of a specific antiviral treatment. Vaccination remains the best protective measure against TBE. However, currently available vaccines have a burdensome immunization schedule, and poor immunogenicity in the elderly, which may contribute to observed vaccine failures, i.e., TBE occurrence in vaccinated people. One aim within the Developvaccines@oru project is to develop a novel TBE vaccine that could provide improved immunogenicity using fewer doses. Our strategy is to induce an immune response at possible sites of virus infection by a modified live attenuated vaccine based on Langat virus.

Methods. Infectious clones of Langat virus (LGTV) based on the strain available in our laboratory are created followed by the generation of modified LGTV infectious clone as potential attenuated virus. Then, we compare them with the “original” LGTV strain using cell based and animal models.

Preliminary results. We successfully created LGTV infectious clones. In order to establish a baseline for animal experiments with our vaccine candidates, we planned a pilot study using the “original” Langat virus. First, we conducted a pre-pilot experiment to optimize the study design and evaluation methods. Preliminary data on the establishment process of vaccine candidates *in vitro* as well as cellular and humoral immune response in mice in response to the LGTV infectious clone are presented.

Conclusion. Further investigation of modified LGTV clone seems interesting in the development approach of new TBEV vaccine candidate.