ID der Kurzfassung : **207**

Development of broadly protective Outer Membrane Vesicle based intranasal betacoronavirus vaccine

Inhalt

Background: After the initial outbreak of SARS-CoV-2, other (partially) immune escape variants appeared rapidly highlighting the need to develop a vaccine that offers a broader protection not only against SARS-CoV-2 variants but also to other members of the betacoronavirus genus. Furthermore, the present SARS-CoV-2 vaccines are administered intramuscularly and do not elicit mucosal immunity, which is deemed important for protection against SARS-CoV-2 infections.
Objective: Here, we develop a new intranasal pan-Betacoronavirus vaccine using Intravacc's established Neisseria meningitis derived Outer Membrane Vesicles (OMV), where the vesicle serves as carrier for viral antigens.
Methods and Results: As a first step, 75 candidates consisting of full spikes, chimeric spikes and Receptor Binding Domain concatemers (RBDs) were designed using 4 sarbecoviruses, 3 merbecoviruses and 4 embecoviruses pre- selected spike sequences. 44 proteins were successfully synthesized and screened by Enzyme linked immunosorbent assay (ELISA) using human sera that were pre-characterized for high titre-pan-coronavirus reactivity by Immunofluorescence assay (IFA). Subsequently, a pool of 22 vaccine candidates consisting of high and low reactive spikes along with 3 binary combinations of proteins were recommended for mice immunogenicity study. For the immunogenicity study, 10 BALB/cOlaHsd mice were vaccinated intranasally on day 0 and day 21 with 20µl of vaccine. The mice were sacrificed on day 35 under anaesthesia and their sera and lung homogenate were analysed. Pooled sera from the mice immunogenicity study were tested for neutralization (1:10-1:1280) against SARS-related CoV, SARS-CoV-2 and MERS-CoV Vesicular stomatitis virus pseudo_particles (VSVpp). Neutralization data showed that 4 candidates; a trimeric RBD concatemer, a hexameric RBD concatemer and 2 binary combination candidates consisting of MERS spike proteins and sarbecovirus tetrameric RBDs elicited broad neutralization until 1:1280 dilution of sera against all 3 above mentioned VSVpp. Furthermore, ELISAs performed for the same candidates with lung homogenate confirmed the presence of IgA and IgG antibodies (102-104). Currently, animal challenge studies for the selected candidates are in progress.
Conclusion: This new platform of intranasal pan corona vaccine can offer early robust mucosal protection against betacoronavirus infections and has the potential for expansion to other novel corona viruses in the future.

Keywords

Vaccine, betacoronavirus, broadly protective, intranasal, OMV

Registration ID

OHS25-50

Professional Status of the Speaker

Postdoc

Junior Scientist Status

Yes, I am a Junior Scientist.

Track Klassifizierung: Vaccines & Immunology

Typ des Beitrags: Oral presentation