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In vivo determination of pathophysiological oxygen levels in ferret lung tissue during SARS-CoV-2 infection

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SARS-CoV-2 causes COVID-19 with varying disease manifestations ranging from asymptomatic to severe symptoms. Especially age is one of the main factors for people at risk. The SARS-CoV-2 virus primarily attacks pulmonary tissues and impairs gas exchange leading to acute respiratory distress syndrome (ARDS) associated with systemic hypoxia. Importantly, the level of tissue oxygen level affects the host cell behaviour that may initiate protective responses or cause detrimental consequences.
Our goal is to understand the processes of hypoxia in the elderly using aged ferrets as model. For that purpose, we infected nine aged (3 years-old) ferrets with SARS-CoV-2 and characterized clinical signs, viral load and the available oxygen in lung tissue at different days post infection (dpi). Oxygen levels were measured invasively in the tissue of anesthetised and room air breathing ferrets using luminescence-based sensors.
The aged infected ferrets showed clinical signs accompanied with viral shedding. At 4 dpi lung and airway lesion scores were higher in infected than in uninfected ferrets, and at the same time, a decrease in tissue oxygen levels to 3,89 %O2 was measured in infected lung tissue.
In conclusion, we successfully determined pathophysiological tissue oxygen level in lungs of aged SARS-CoV-2-infected ferrets. The data of oxygen levels obtained in vivo will be used to establish optimized in vitro methods that mimic hypoxia to study host cell responses during infection.

Keywords

oxygen measurement, in vivo, SARS-CoV-2, COVID-19, animal model, lung tissue oxygen, ferret, aging

Registration-ID code

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Professional Status of the Speaker

PhD Student

Junior Scientist Status

Yes, I am a Junior Scientist.

Primary authors: Ms WIRZ, Katrin (Research Center for Emerging Infections and Zoonoses and Institute for Biochemistry, University of Veterinary Medicine Hannover); Dr SCHULZ, Claudia (Research Center for Emerging Infections and Zoonoses, University of Veterinary Medicine Hannover)

Co-authors: Dr SÖBBELER, Franz (Small Animal Clinic, University of Veterinary Medicine Hannover); Ms PILCHOVÁ, Veronika (Research Center for Emerging Infections and Zoonoses and Institute for Biochemistry, University of Veterinary Medicine Hannover); Dr ARMANDO, Federico (Department of Pathology, University of Veterinary Medicine Hannover); Dr GERHAUSER, Ingo (Department of Pathology, University of Veterinary Medicine Hannover); Dr DE BUHR, Nicole (Institute for Biochemistry, University of Veterinary Medicine Hannover); Mr MEYER ZU NATRUP, Christian (Institute of Virology, University of Veterinary Medicine Hannover); Dr BEYTHIEN, Georg (Department of Pathology, University of Veterinary Medicine Hannover); Prof. BAUMGÄRTNER, Wolfgang (Department of Pathology, University of Veterinary Medicine Hannover); Prof. KÄSTNER, Sabine (Small Animal Clinic, University of Veterinary Medicine Hannover); Prof. VON KÖCKRITZ-BLICKWEDE, Maren

(Research Center for Emerging Infections and Zoonoses and Institute for Biochemistry, University of Veterinary Medicine Hannover)

Presenter: Ms WIRZ, Katrin (Research Center for Emerging Infections and Zoonoses and Institute for Biochemistry, University of Veterinary Medicine Hannover)

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