Host response to Foot- and Mouth Disease infection in cattle; possible implications for the development of "carriers". - DTU Orbit (03/12/2018)

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FMD is a viral disease with severe implications for agricultural trade in affected countries. Any cloven hoofed animal species may become infected, and ruminants, especially cattle and buffalo, may develop into "carriers" persistently shedding low amounts of virus for several years after exposure to the disease. The FMDV infection is defined as persistent when live virus can be detected for more than 28 days post infection. FMD infection in ruminants involves initial viral replication in pharyngeal epithelia, from where the virus spreads systemically. Characteristic vesicular lesions develop in the cornified stratified squamous epithelia of the coronary bands and oral cavity within a few days of infection. Viremia occurs within 2-3 days of infection, but is rapidly cleared through the effect of circulating antibodies generated by the adaptive immune response. The host response involves initial activation of the innate immune response, with activation and recruitment of effector-cells, and subsequent activation of T- and B-cells, leading to the production of circulating antibodies, as well as activation of cytotoxic T-cells. Previous experiments have indicated that the site of persistent replication of FMDV is located in pharyngeal lymphoid tissue, as well as the basal epithelia of the dorsal soft palate. A series of animal experiments, with the aim of investigating the host immune response, and sites of viral replication at different time points during both acute and persistent phases of FMDV infection in cattle has been performed. During these experiments, bull calves of 4-5 months of age were infected with FMDV O UKG 34/2001, and disease development was monitored for 32 days. Disease progression was monitored through observation of clinical signs, and analysis of serum for the presence of viral genomes as well as FMDV-specific antibodies. Viral shedding was measured through qPCR of mouth swabs and oropharyngeal fluid (probang samples). Tissue samples derived from endoscopical collection of biopsies of the dorsal soft palate from live animals at different times post infection, as well as samples of lymphoid tissue derived from staged post mortems were analysed for the presence of viral proteins through indirect immunofluorescence. These samples have also been analysed for the presence of specific populations of immune cells such as CD8+ T-cells and Dendritic cells. Biopsy samples are collected at different time points during acute and persistent infection in order to monitor the progress of viral replication, as well as the local cellular immune response, at specific sites over time. In order to measure the systemic response to infection, serum concentrations of acute phase proteins Serum Amyloid A (SAA) and Haptoglobin, as well as biologically active type 1 interferon (IFN 1) are being quantified. These markers of host immune response are also being used in order to detect any possible differences in host response throughout the infection in animals that become persistently infected compared to those that clear the infection effectively.

General information
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Organisations: Sektion for Eksotiske Virussygdomme, Division of Virology, National Veterinary Institute, Innate Immunology, Division of Veterinary Diagnostics and Research, Technical University of Denmark
Contributors: Stenfeldt, C., Heegaard, P. M. H., Tjørnehøj, K., Belsham, G.
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