Host response to Foot- and Mouth Disease infection in cattle; possible implications for the development of “carriers”. - DTU Orbit (13/08/2019)

Foot-and-mouth disease (FMD) is a viral disease with severe financial implications for agricultural industries and the trade of animal products in affected countries. Any cloven hoofed animal species may become infected, and ruminants, especially cattle and buffalo, may develop into persistently infected “carriers” shedding low amounts of virus for several years after exposure to the disease. FMD in ruminants involves initial viral replication in pharyngeal epithelia, from where the virus spreads systemically. Mortality rates are low in adult animals but the morbidity is very high and the disease spreads rapidly amongst susceptible animals. The host response involves initial activation of the innate immune response, followed by subsequent production of high titres of anti-FMDV antibodies in the circulation. Antibodies are effective in clearing virus from the circulation, but in a proportion of animals (approximately 50 % in cattle) the virus is capable of persisting at a low level within pharyngeal tissue. The animals are defined as persistently infected (“carriers”) when live virus can be detected in pharyngeal excretions for more than 28 days post infection, and the mechanisms involved in persistence of FMD in cattle are not fully known. A series of animal experiments, with the aim of investigating the innate immune response, and possible implications for the development of persistently infected FMD carrier-animals in cattle has been performed. Bull calves of 4-5 months of age were infected with FMDV O UKG 34/2001, and disease development was monitored for 35 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). Quantification of serum concentrations of acute phase proteins Serum Amyloid A (SAA) and Haptoglobulin (Hp), as well as biologically active type 1 interferon (IFN) indicated a clearly detectable acute phase response coinciding with the onset of clinical signs of disease. Results from these assays were compared to measurements of IFN α and -β, and Toll-like receptor 3 and -4 mRNA in small tissue samples derived from endoscopical collection of biopsies of the dorsal soft palate from live animals at different times post infection.

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