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Experimental infection of pregnant sows with African swine fever (ASFV Georgia 2007): Clinical outcome, pathogenesis and vertical transmission

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African swine fever virus (ASFV) causes a severe hemorrhagic fever in domestic pigs. The disease was introduced from the African continent to Georgia in 2007 and has since spread throughout the Caucasus and the Russian Federation. ASF is now established in Eastern Europe and outbreaks have occurred in domestic pigs and wild boar in Poland and the Baltic countries in 2014. Therefore, there is an increased risk of further transmission across Europe. The present study investigates the properties and the effect of the circulating ASF virus strain in Danish pregnant sows

Study design

Three pregnant sows about 2 weeks prior to farrowing (ca. 100 days in gestation), were inoculated, with a high dose ($10^{4.3}$ TCID₅₀ im.) of ASFV Georgia (2007). The sows were examined for clinical signs of ASF and rectal temperatures were recorded daily. Blood samples and nasal swabs were collected on predefined days and fecal samples were collected on a daily basis. Tonsils, spleen and lymphoid tissue were collected at necropsy from sows and fetuses. Placenta was collected from 2 sows. Blood counts and analyses of virus distribution were performed.

Results

All 3 sows developed fever (rectal temperature 39-40 °C), lost their appetite and showed depression, starting at 3 days post infection (dpi). During dpi 4-5, two of the animals died and one was euthanized (due to animal welfare reasons), thus ending the experiment.

Blood counts indicated a severe fall in circulating B-cells (mean value: dpi 0 = 3,5%; dpi 4 = 0,1%) and T-cells (mean value: dpi 0 = 35%; dpi 4 = 7,5%), while granulocytes and monocytes initially increased and thereafter declined. Red blood cells decreased in sows 2 and 3 after dpi 4. Platelet counts showed overall a minor decrease in all 3 animals.

PCR analyses quantifying ASFV DNA in the sows found virus DNA on dpi 4 in serum (Ct level 20-21), in nasal swabs (Ct level 30–36) and on dpi 5 in fecal samples (Ct level 37-39). Organ material collected at necropsy showed much higher levels of virus in sows than in fetuses (see results boxes for individual pigs). Placenta from 2 sows (nos. 1 and 3) showed Ct values of 31 and 29, respectively. None of the animals produced ASFV-specific antibodies.

At necropsy only a few scattered signs of bleedings, mainly in lymph nodes, were consistent with ASFV infection.

Sow1 and fetuses (22)	Tonsil	Spleen	LN M/G
Sow	18	19	19/17
Fetus 1-1	38	36	N/-
Fetus 1-2	N	N	N/-
Fetus 1-3	N	N	N/N
Further 1/22 fetus positive in tonsil (Ct 36)			

Sow2 and fetuses (20)	Tonsil	Spleen	LN M/G
Sow	18	19	18/18
Fetus 2-1	37	N	36/-
Fetus 2-2	N	36	34/-
Fetus 2-4	36	N	43/37
Further 0/20 fetus positive in tonsil			

Sow3 and fetuses (22)	Tonsil	Spleen	LN M/G
Sow	18	17	18/18
Fetus 3-1	36	N	N/36
Fetus 3-2	37	34	36/-
Fetus 3-6	35	34	35/38
Further 3/22 fetus positive in tonsil (Ct 37-38)			

PCR results for organ tissue from sows and fetuses, results are shown as Ct-values for each tissue. Tonsil, spleen and lymph nodes (LN) (mesenteric (M) and/or gastric (G)) were examined for sows and 3x3 fetuses. Tonsils only were examined for the remaining fetuses

Discussion

In the present study we saw acute deaths in pregnant sows infected with ASFV Georgia 2007. Two out of three animals died without any preceding potentially lethal symptoms. The animals showed lymphoid cell depletion and wide virus distribution in blood and lymphoid organs. Vertical transmission was demonstrated however not to a very extensive degree.



CONTACT INFORMATION

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