Aleutian mink disease virus infection may induce host gene shutoff

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INTRODUCTION

Mink respond differently to infection by the Aleutian mink disease virus (AMDV). Some mink remain infected for life, while others halt viral replication or clear the virus.

The animal's innate immune system is activated to combat the pathogen immediately after an infection. Events that take place in the body during the early stages of infection could have pronounced effects on the animal's ability to cope with the virus.

OBJECTIVE

To investigate the effects of inoculation of mink with the Aleutian mink disease virus on the expression of genes in leucocytes.

MATERIALS AND METHODS

Animals: 12 black male mink (3 full-sib families)

Experimental design

Sampling	Full-sib families			
Day	1	2	3	
0	X	X	X	⇐ Sedated & sampled (pre-inoculation)
1	X	X	X	⇐ Sedated & inoculated intra-nasally with a spleen homogenate containing a local strain of the AMDV.
2	X	X	X	
7	X	X	X	

Blood collection
By heart puncture into PAXgene Blood RNA tubes

⇩

RNA extraction & purification

⇩

Library preparation
The IlluminaTruSeq™ RNA preparation kit.

⇩

Sequencing
HiScanSQ (Illumina)

⇩

Paired-end sequence reads
75-bp (1st analysis), 100-bp (2nd analysis)

⇩

Aligned with the dog genome
Burrows-Wheeler Aligner (BWA)

⇩

Statistical analysis
T-test with Benjamini & Hochber adjustment
Only reads with quality score >10

RESULTS

Number of paired-end reads generated

Analysis	Total (12 mink)	Min.	Max.
1st	794,241,780	7.5 M	182.9 M
2nd	819,437,070	13.4 M	176.2 M

Reads aligned with the exons of the dog genes

1st analysis: 5.6%
2nd analysis: 11.9%
Combined: 8.8%

Transcripts were aligned to14,845 of the 19,565 annotated genes on the dog genome.

Number of differentially expressed gens

Days	Up-regulated	Down-regulated
0 vs 1	6	575
0 vs 2 & 7	0	0
1 vs 2	128	1
1 vs 7	1	0
2 vs 7	1	0

The level of expression of the six up-regulated genes on day 1 remained significantly elevated compared with the controls until day 7 pi.

CONCLUSIONS

The results suggest an abrupt mink gene shutoff by the AMDV within 24 h after infection, parallel with the virus multiplication phase.

Viruses have the ability to inhibit host gene expression or prevent host protein synthesis.

Mechanism is not known for parvoviruses. They do not have the gene for the enzyme that shutoff host genes

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