Early phase feline leukemia virus shedding kinetics in experimentally infected cats

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BACKGROUND:

Based on virus isolation, saliva (primary source), blood and feces have been identified as FeLV transmission routes. The role played by urine in this context has not been completely clarified.

AIM OF THE STUDY:

- To assess, using sensitive molecular assays, FeLV density variation during the early phases of the infection in the compartments that are potentially responsible for the between-host transmission of the virus.

METHODS:

ANIMALS. 10 outbred SPF cats. 6 SPF cats as negative controls. 12 to 14 weeks old.

INFECTION. Intraperitoneal, with 5 × 10^5 focus forming units of FeLV-A (Glasgow-1 strain).

SAMPLE COLLECTION. EDTA blood and saliva samples weekly, until week 15 post infection. Urine and fecal samples at weeks 3, 6, 9, 12 and 15 weeks post infection.

VIRUS ISOLATION. Performed *in vitro* by inoculation onto QN10S cells [1] and testing of the cell culture supernatant by p27 ELISA and RT-PCR [2].

FeLV VIRAL AND FeLV ANTIGEN LOADS. Viral RNA was quantified by Taqman™ real-time RT-PCR and FeLV antigenemia measured by p27 sandwich ELISA [3,4].

RESULTS:

Table I. ***Virus isolation (VI)*** *from different compartments and viral neutralizing antibodies (NA) at week 3, 6, 9,12 and 15 post-infection in experimentally infected SPF cats.*
Open symbols: negative result, closed symbols: positive result. Symbols in brackets represent weak signals. For NA, – represents absence of NA, + a 1:8, ++ a 1:16, and +++ a 1:32 titer. PL: plasma, SA: saliva, FE: feces, UR: urine.
Persistently infected cats (plasma p27-positive from onset to week 15) are indicated by a grey background.

→ Week	3					6					9					12					15				
↓ Cat	NA	PL	SA	FE	UR	NA	PL	SA	FE	UR	NA	PL	SA	FE	UR	NA	PL	SA	FE	UR	NA	PL	SA	FE	UR
B8	-	♦	●	■	Δ	-	♦	●	■	(▲)	-	♦	●	■	(▲)	-	♦	●	■	▲	-	♦	●	■	Δ
L2	-	♦	○	■	Δ	-	♦	●	■	Δ	-	♦	●	■	Δ	-	♦	●	■	(▲)	-	♦	●	■	▲
M1	-	♦	○	■	Δ	-	♦	●	■	Δ	-	♦	●	■	(▲)	-	♦	●	■	(▲)	-	♦	●	■	(▲)
Y3	-	♦	○	■	Δ	-	♦	●	■	Δ	-	♦	●	■	(▲)	-	♦	●	■	Δ	-	♦	●	■	▲
Y4	-	♦	○	■	Δ	-	♦	●	■	Δ	-	♦	●	■	▲	-	♦	●	■	(▲)	-	♦	●	■	▲
A6	-	◊	○	□	Δ	+	◊	○	□	Δ	++	◊	○	□	Δ	+++	◊	○	□	Δ	+++	◊	○	□	Δ
A7	-	◊	○	□	Δ	+	◊	○	□	Δ	+++	◊	○	□	Δ	+++	◊	○	□	Δ	+++	◊	○	□	Δ
J1	-	◊	○	□	Δ	++	◊	○	□	Δ	+++	◊	○	□	Δ	+++	◊	○	□	Δ	+++	◊	○	□	Δ
K5	-	◊	○	□	Δ	++	◊	○	□	Δ	+++	◊	○	□	Δ	+++	◊	○	□	Δ	+++	◊	○	□	Δ
Y2	-	◊	○	□	Δ	+	◊	○	□	Δ	++	◊	○	□	Δ	++	◊	○	(■)	Δ	++	◊	○	□	Δ

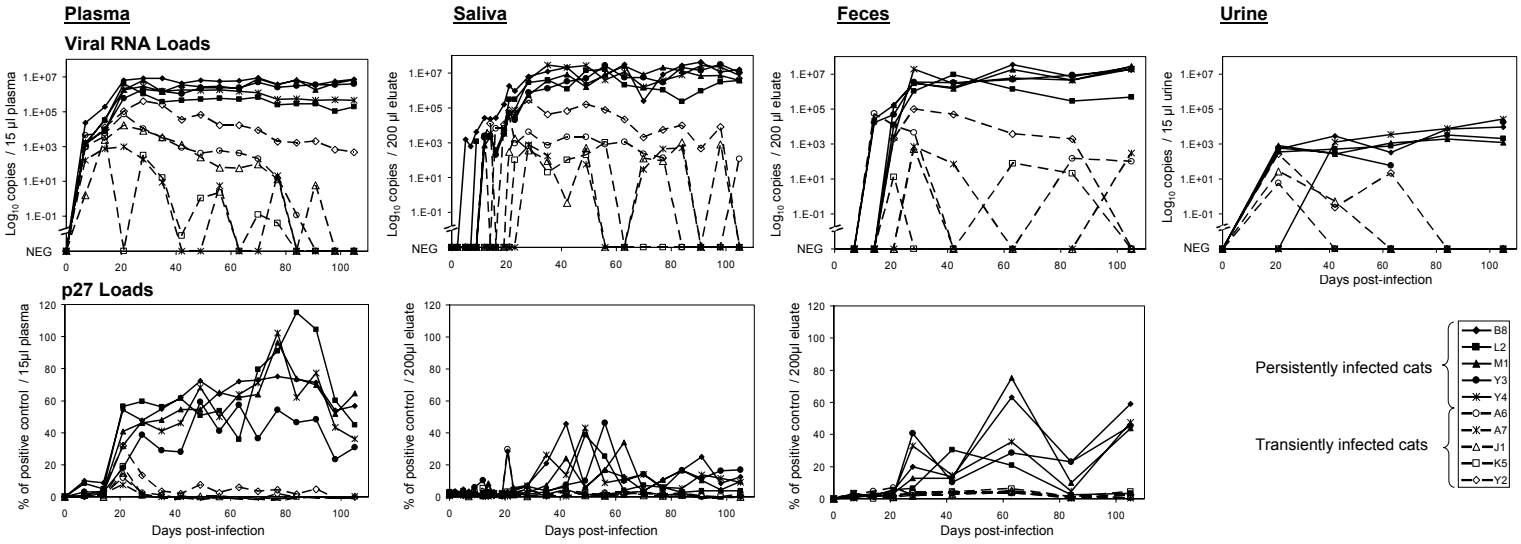

Figure 1. ***Shedding kinetics*** *in experimentally infected SPF cats during the first 15 weeks post-infection (p.i.) in different compartments. The values for the viral (upper panels) and the p27 loads (lower panels) are normalized to each other and correspond therefore to the measurement obtained from the same amount of starting material. Urine p27 ELISA was negative in all cats throughout the experiment (not shown). Negative control cats are not shown and were consistently antigen and viral RNA negative throughout the experiment.*

Viral RNA from persistently infected cats could be detected consistently in samples from urine. Viral RNA and p27 loads correlated linearly in plasma (r^2= 0.38, p_{slope}<0.0001), saliva (r^2= 0.58, p_{slope}<0.0001) and feces (r^2= 0.79, p_{slope}<0.0001).

The set point of viral loads was day 21 p.i. in plasma and urine, day 28 p.i. in feces and day 35 p.i. in saliva. This fact, taken together with the negative VI results at week 3 (see table I), indicates that the infection shows a different kinetic in saliva than in plasma, feces and urine.

CONCLUSION:

- When modelling virulence evolution and FeLV epidemiology, the different density kinetics of FeLV in different compartments during the early phase of infection, as well as urine as potential transmission route for FeLV have to be taken in account.

Literature:

1. Jarrett, O. and J.P. Ganiere, *Comparative studies of the efficacy of a recombinant feline leukaemia virus vaccine.* Vet Rec, 1996. **138**(1): p. 7-11.
2. Gomes-Keller, M.A., et al., *Shedding of feline leukemia virus RNA in saliva is a consistent feature in viremic cats.* Veterinary Microbiology, 2006. **112**(1): p. 11-21.
3. Lutz, H., N.C. Pedersen, and G.H. Theilen, *Course of feline leukemia virus infection and its detection by enzyme-linked immunosorbent assay and monoclonal antibodies.* Am J Vet Res, 1983. **44**(11): p. 2054-9.
4. Tandon, R., et al., *Quantitation of feline leukaemia virus viral and proviral loads by TaqMan(R) real-time polymerase chain reaction.* Journal of Virological Methods, 2005. **130**(1-2): p. 124-132.