Virulent calicivirus infection in cats: just the references

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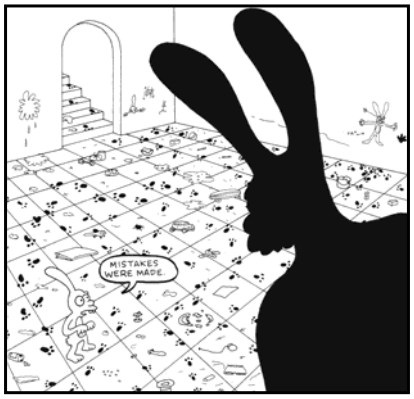
Mechanisms for mutation

- Immune pressure during chronic infection
  - Within a cat[1]
  - Within a colony[2]
- Recombination[3]
  - Multiple endemic strains within a colony
  - Co-infection within a single cat



References

1. Kreutz, L. C., R. P. Johnson, et al. (1998). "Phenotypic and genotypic variation of feline calicivirus during persistent infection of cats." Veterinary Microbiology 59(2-3): 229-236.
2. Radford, A. D., S. Dawson, et al. (2003). "High genetic diversity of the immunodominant region of the feline calicivirus capsid gene in endemically infected cat colonies." Virus Genes 27(2): 145-55.
3. Radford, A. D., P. C. Turner, et al. (1998). "Quasispecies evolution of a hypervariable region of the feline calicivirus capsid gene in cell culture and in persistently infected cats." J Gen Virol 79(Pt 1): 1-10.

Receptor binding?

- "Junctional adhesion molecule 1 is a functional receptor for feline calicivirus." [1]
  - JAM -1 associated with tight junctions, found on epithelium, endothelium, platelets, WBCs
  - JAM-1 expressed in non-permissive cells led to binding and infection
  - Antibodies against feJAM reduced cytopathic effect
- *FCV-Kaos 20X more cytolytic in JAM-transfected CHO cells than FCV-F9*[2]

References

1. Makino, A., M. Shimojima, et al. (2006). J Virol **80**(9): 4482-90.
2. Robert Ossiboff, John Parker. Baker Institute, Cornell School of Veterinary Medicine

Vaccination?

- Vaccine and field strains can establish carrier state and become more resistant over time
- Vaccine related strains isolated from apparent vaccine failures[1]
- 5/23 strains from UCD VMTH client cats were resistant (VN titer <8) or possibly resistant (titer 8-16) to 3 MLV vaccine strains[2]
  - Inactivated 2280 and original FCV-F9 more protective than F9 derivatives
  - 15/23 possibly resistant to at least 1 MLV vaccine
  - 2/23 resistant to 7/9 vaccine and field strains

Vaccination? [3]

Date	Susceptible to F9*	Susceptible to 2280*
1958-1979 (USA)	88% (11/13)	92% (12/13)
1980-1989 (USA)	56% (2/9)	78% (7/9)
1990 – present (USA)	43% (26/61)	71% (43/61)
1980-present (UK)	10% (10/98)	42% (41/98)

*10 units of antibodies

References

1. Radford, A. D., M. Bennett, et al. (1997). "The use of sequence analysis of a feline calicivirus (FCV) hypervariable region in the epidemiological investigation of FCV related disease and vaccine failures
2. Pedersen NC, Hawkins KF. Mechanisms for persistence of acute and chronic feline calicivirus infections in the face of vaccination. Vet Microbiol. 1995;47(1-2):141-156
3. Lauritzen, A., O. Jarrett, et al. (1997). "Serological analysis of feline calicivirus isolates from the United States and United Kingdom." Veterinary Microbiology 56(1-2): 55-63.

Vaccine strategies

- Broader protection and non-replicating would probably be optimal
- Safety versus efficacy?
- Vectored/recombinant [1, 2]
- Multivalent[3]
  - Synergistic effect
- Multivalent vectored (myxoma)[4]

Multivalent vaccination?

References

1. Yokoyama, N., K. Maeda, et al. (1996). "Vaccine efficacy of recombinant feline herpesvirus type 1 expressing immunogenic proteins of feline calicivirus in cats." Arch Virol 141(12): 2339-51.
2. Sommerville, L. M., A. D. Radford, et al. (2002). "DNA vaccination against feline calicivirus infection using a plasmid encoding the mature capsid protein." Vaccine 20(13-14): 1787-96.
3. Poulet, H., S. Brunet, et al. (2005). "Immunisation with a combination of two complementary feline calicivirus strains induces a broad cross-protection against heterologous challenges." Vet Microbiol 106(1-2): 17-31. Epub 2005 Jan 21.
4. McCabe, V. J. and N. Spibey (2005). "Potential for broad-spectrum protection against feline calicivirus using an attenuated myxoma virus expressing a chimeric FCV capsid protein." Vaccine 23(46-47): 5380-8.