



DISEASE INFORMATION FACT SHEET

Feline calicivirus



This Disease Information Fact Sheet accompanies the 2013 AAFP Feline Vaccination Advisory Panel Report published in the *Journal of Feline Medicine and Surgery* (2013), Volume 15, pp 785–808.

Disease facts

The many strains of feline calicivirus (FCV) typically cause upper respiratory tract disease (URD) and oral ulceration, though some may induce febrile lameness or subclinical infection.^{1–4} FCV is also associated with chronic gingivitis/stomatitis,^{1,5,6} although its exact role is unclear. The more recently emerged virulent systemic feline calicivirus (VS-FCV) disease shows high mortality, edematous and ulcerative skin lesions and jaundice (Figures 1–4).^{7–13} Other conditions, including disinfectant toxicosis and herpesvirus infection, can also cause oral ulceration and respiratory symptoms; hence diagnosis of calicivirus infection should not be based on these signs alone, especially when VS-FCV infection is being considered.

Transmission is largely by direct contact with infected ocular, nasal or oral secretions.^{3,4}

The 2013 Report of the Feline Vaccination Advisory Panel of the American Association of Feline Practitioners (AAFP) provides practical recommendations to help clinicians select appropriate vaccination schedules for their feline patients based on risk assessment. The recommendations rely on published data as much as possible, as well as consensus of a multidisciplinary panel of experts in immunology, infectious disease, internal medicine and clinical practice. The Report is endorsed by the International Society of Feline Medicine (ISFM).

However, FCV survives better than feline herpesvirus 1 (FHV-1) in the environment (~1 month); some disinfectants are more effective than others.¹⁴ Aerosols are not of major importance in transmission.



Figures 1 and 2 Marked facial edema, extensive hair loss, oozing and ulceration of the skin in two cats affected by VS-FCV. Less virulent strains can cause slight crusting on the muzzle and feet. Images courtesy of Dr Kate Hurley



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Figure 3 Hair loss, crusting and edema of the feet in a cat with VS-FCV. Image courtesy of Dr Kate Hurley

Acutely infected cats generally shed virus for up to 2–3 weeks, although some shed persistently for varying periods, and re-infection is common.^{1,4,15,16} Carriers are widespread and important in the epidemiology of the disease; the highest prevalence is in groups of cats (25–40%), and lowest in household pets (~10%).¹⁴ Disease is more prevalent, therefore, in boarding, shelter facilities and breeding colonies,^{4,17,18} and tends to occur in young kittens following the decline of maternally derived antibodies (MDA), though subclinical infection may occur while MDA are still present.^{3,4}

Vaccine types

The majority of FCV vaccines are in combination with FHV-1 vaccines; as well, other antigens may be included. At the time of writing, there is one dual strain FCV vaccine without any other antigens. Both modified-live (ML) and inactivated vaccines are available for injection. Attenuated vaccines for intranasal administration are also marketed in some countries. Both ML and inactivated vaccines are reasonably effective against disease, but do not prevent infection or the carrier state. In some vaccine studies reduced viral shedding after challenge has been shown,^{19–21} though in others a longer duration of shedding was reported.²²

FCV strains comprise one serotype and predominantly one genogroup worldwide, although there is considerable variation between strains, which has an impact on vaccination.^{1,23–27} However, most strains used in vaccines protect against the majority of isolates, but not equally well against all, including some of the VS-FCV viruses.^{12,14,19,28} Protection for both classical and VS-FCV isolates relates largely to their antigenic cross-reactivity with the vaccine strain in question, as both groups show antigenic variation.²⁰

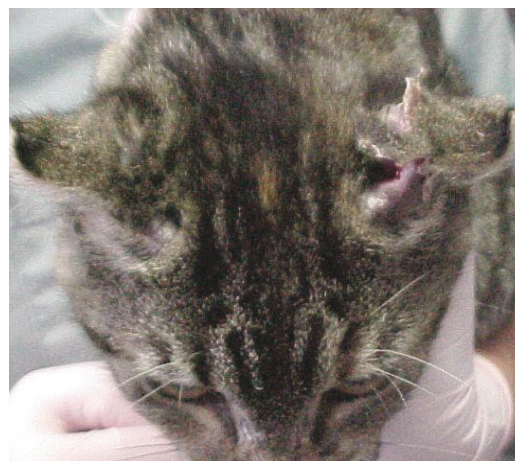


Figure 4 Hair loss and crusting of the ears in a cat with VS-FCV. Image courtesy of Dr Kate Hurley

Some evidence suggests the profile of FCV strains in the field may be changing over time, although this is not the case in all studies.^{29–33} Factors such as sampling strategy and whether the viruses are from clinically healthy or sick cats may influence the outcome.^{20,29,34–37}

Evidence suggests that use of multivalent FCV vaccines increase the proportion of strains neutralized,^{19,20,35,36,38} and some are now available commercially. In the European Union, an inactivated non-adjuvanted bivalent FCV vaccine is marketed in combination with a ML FHV-1 vaccine.²⁰ In North America, there is a combination dual-strain inactivated adjuvanted FCV vaccine containing both a conventional vaccine strain plus a VS-FCV strain, which was shown to induce homologous protection.³⁵ However, it should be noted that, so far, each VS-FCV outbreak strain appears different.^{1,2,39}

Onset and duration of immunity

In general, onset of protection is considered to be from 1–3 weeks after the second vaccination, and manufacturers recommend revaccination after 1 year.²¹ However, published serological and challenge studies show that there is likely to be reasonable cross-protection in the majority of animals up to 3 years or longer post-vaccination.^{40–44} Nevertheless, protection is not always complete and may decline slightly as the vaccination interval increases.^{4,41,45,46}

Vaccine safety

ML injectable FCV vaccines in combination with FHV-1 vaccines are generally safe, but mild URD signs, and in some cases lameness, may occasionally occur after their use.^{37,47–50} These reactions are mostly due to coincidental

infection with field virus – although, in some cases, sequencing has shown that vaccine virus may be involved.^{48,51,52} (See also FAQs in the Report, page 802.) The F9 vaccine strain appears to circulate to a limited extent in the field, though the significance of this is unclear.^{1,16,51,53,54} URD signs are more commonly seen (in one study, 30% cats)⁵⁵ following intranasal vaccination. Inactivated vaccines may be more appropriate in disease-free colonies as there is no risk of spread or reversion to virulence.

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Advisory Panel Recommendations

Vaccination against FCV is considered core. MDA typically persist for 10–14 weeks and may still be at interfering levels for longer in some cases, but there is considerable variation between individuals.^{4,14,56–59} Some kittens will have low or no MDA titers and may respond to injectable vaccination at 6 weeks of age.⁵⁸ Because of this variability, the initial vaccination series ideally should begin at 6 weeks of age and be repeated every 3–4 weeks (or 2–3 weeks in shelters) until 16–20 weeks of age. However, in some countries vaccines are only licensed for use from 8–9 weeks of age.

Vaccination as early as 4 weeks may be appropriate in situations of high risk (eg, shelters or catteries with endemic disease) or questionable MDA status (eg, orphaned kittens or those born to

queens with unknown vaccine histories). Revaccination should take place at 1 year of age after kitten vaccination, or 1 year after the primary course in older cats. Thereafter, cats should be vaccinated once every 3 years. If a cat is going to be placed in a known high-risk situation, an additional booster vaccination may be warranted 7–10 days prior to entry, particularly if it has not been vaccinated in the preceding year.

A single dose of intranasal vaccine offers more rapid (2–6 days) onset of protection, and can be useful for animals entering a high-risk situation such as a boarding facility or shelter.^{3,4} (See also sections in the Report on boarding catteries and shelters, pages 791–794, for information on the use of intranasal vaccines in these contexts.)

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DISEASE INFORMATION FACT SHEETS

- ❖ Feline herpesvirus 1
- ❖ Feline calicivirus
- ❖ Feline panleukopenia
- ❖ Rabies
- ❖ Feline leukemia virus
- ❖ Feline immunodeficiency virus
- ❖ Feline infectious peritonitis
- ❖ *Chlamydomphila felis*
- ❖ *Bordetella bronchiseptica*

GENERAL INFORMATION FACT SHEET

- ❖ The immune response to vaccination: a brief review

SUPPLEMENTARY FILES

Fact Sheets accompanying the 2013 AAFP Feline Vaccination Advisory Panel Report are available, together with the Pet Owner Guide included in Appendix 2, at <http://jfms.com>
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PET OWNER GUIDE
(APPENDIX 2, pp 807–808)
❖ Vaccinations for Your Cat