

Caliciviridae

Feline Calicivirus infection

Calici: from Latin *calix*, “cup”, from cup-shaped depressions on the virion surface observed by electron microscopy

Group IV; ssRNA positive-strand viruses

The family includes **eleven genera** of which members of **seven infect mammals** (*Lagovirus*, *Norovirus*, *Nebovirus*, *Recovirus*, *Sapovirus*, *Valovirus*, and *Vesivirus*), members of two genera infect birds (*Bavovirus*, *Nacovirus*), and members of two genera infect fish (*Minovirus* and *Salovirus*).

Genus of Medical and Veterinary importance comprises of

Family: *Caliciviridae*

Genus: *Norovirus*

Species: *Norwalk virus*

Genus: *Vesivirus*

Species: *Feline calicivirus*

Species: *Vesicular exanthema virus* in swine

NATURAL HOSTS Human, feline, swine.

Feline calicivirus occurs worldwide and although all *Felidae* are probably susceptible, natural infection has been reported only in domestic cats and cheetahs.

Human Noroviruses (Norwalk)

- Norovirus is thought to be the most common cause of acute gastroenteritis (diarrhea and vomiting illness) around the world.
- It spreads easily through food and drink and have a big impact on people's health.
- Norovirus was originally called the Norwalk virus, after the town of Norwalk, Ohio, USA, where the first confirmed outbreak happened in 1968-72.

Vesicular exanthema virus in swine

Feline Calicivirus

Feline Calicivirus infection : Primary site of replication is the upper respiratory tract – **acute upper respiratory disease**. The first known outbreak of FCV occurred in Northern California in 1998

Properties of virus

Virions are non-enveloped,

35-40 nm in diameter, icosahedral symmetry.

Some virions have a characteristic appearance, with **32 cup-shaped depressions on their surface**.

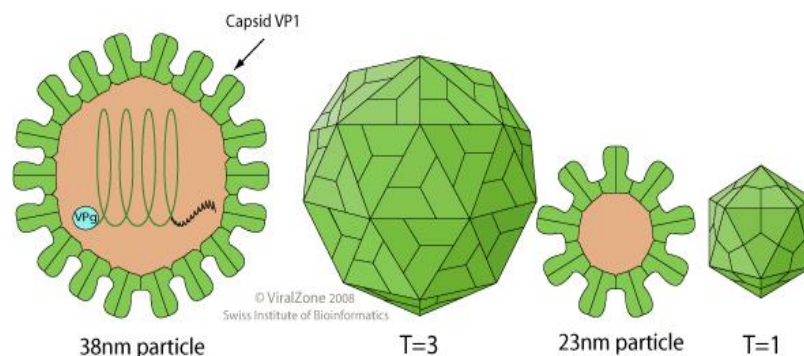
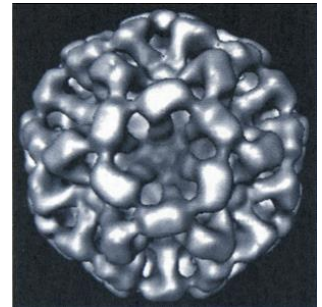
Genome is composed of a **single molecule of linear positive-sense, single-stranded RNA**, 7.4-7.7 kb in size.

Genomic RNA is polyadenylated at its 3' end and has a protein linked covalently to its 5' end;

genomic RNA is infectious.

Caliciviruses **replicates in the cytoplasm**

Calicivirus capsid structure, resolved using cryoelectron microscopy and computer analysis of images. The characteristic cup-shaped depressions are seen to reflect the placement of the protein subunits on the surface of the capsid. (Courtesy of J.-Y. Sgro.)



(Image source: Viralzone)

Physical properties of Caliciviridae

Caliciviruses are stable in the environment and many strains are resistant to inactivation by heat and certain chemicals (ether, chloroform and mild detergents).

Not very resistant to acidic conditions (>99% inactivated at pH 3).

Enteric caliciviruses are acid-stable.

Antigenicity

Feline calicivirus (FCV) is a member of a different species in the *Vesivirus* genus and although antigenic variants have been described,

FCV represents a single serotype.

The virions are predominantly composed of one major capsid protein, VP1 (58–60 kDa) and a second minor structural protein named VP2 (8.5–23 kDa) has been found in association with FCV and RHDV virions, and Norwalk virus-like particles.

Incubation period: 2 to 6 days .

Natural transmission occurs via aerosol and fomites; the virus is often carried to susceptible cats by human handlers.

Lesions are usually confined to the respiratory tract, oral cavity and eyes.

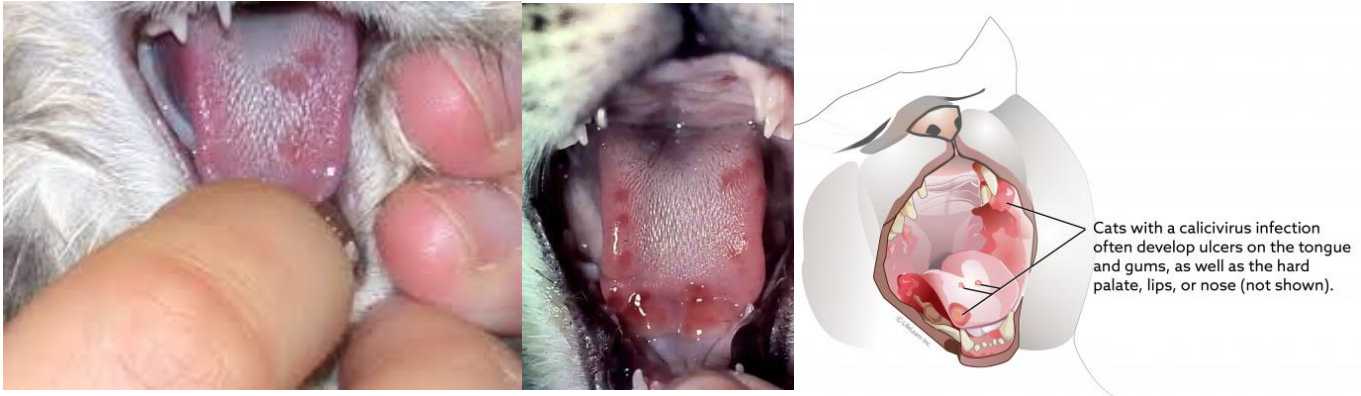
Clinical signs

Disease characterized by conjunctivitis, rhinitis, tracheitis, pneumonia and vesiculation, and ulceration of the oral epithelium.

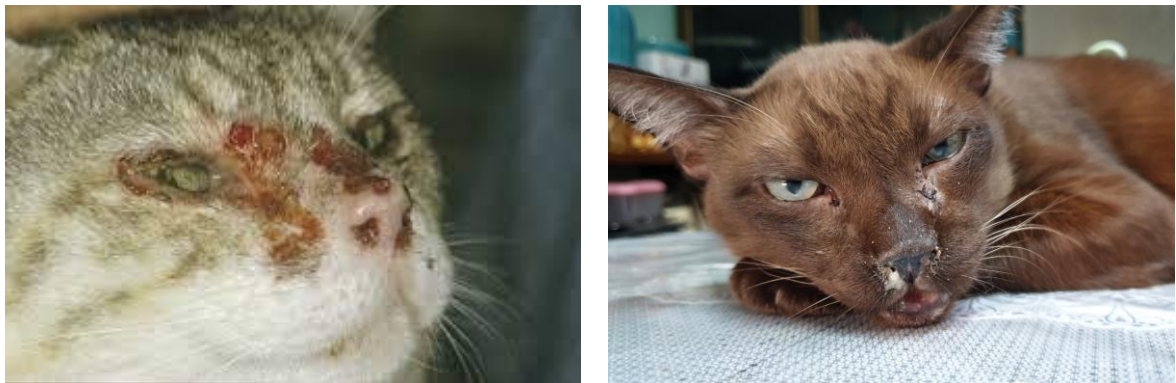
Other common signs are fever, anorexia, lethargy, stiff gait, and sometimes nasal and ocular discharge.

Morbidity is high, mortality may reach 30% in very young kittens, and recovery is followed by a prolonged carrier state.

Pregnant cats may abort.



Feline calicivirus infection in a cat showing unruptured and ruptured vesicles on the tongue



Feline calicivirus infection in a cat showing lesions on the muzzle

Virus is shed in large amounts from infected cats; convalescent cats may continue to shed virus for many months.

Different strains of feline calicivirus vary greatly in virulence; some strains are associated mainly with **subclinical infection** or upper respiratory disease; **highly virulent strains** regularly produce pneumonia, especially in young kittens.

Cats remain **persistently infected and shed virus from the oropharynx for several years, possibly for life.**

Diagnosis

Material Collection: Conjunctival or nasal swabs; swabs collected from the oral and oropharyngeal cavities.

1. Isolation of Feline Calicivirus

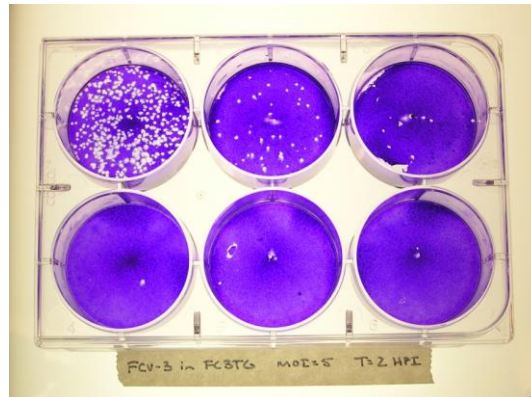
Feline Kidney Cell Line –characteristically grow efficiently and form clear plaque zones, readable in 24 h after virus inoculation. Feline kidney cell line CRFK (*Crandell-Rees feline kidney*)

2. RT-PCR

RNA extraction - encodes the major capsid protein

3. Immunofluorescence Assay

4. Enzyme Immunoassay



Control and Prevention

For control, attenuated virus and inactivated virus feline calicivirus vaccines are widely used, usually in combination with feline herpesvirus I and Panleukopenia vaccine.

Vaccination : First Feline Calici virus Vaccine between 6-8 Weeks, followed by at the age of 10-12 Weeks, followed by 14-16 Weeks and annual booster.