

TEACHING TARGET

DIAGNOSE AND TREAT THESE COMMON ORAL HEALTH PROBLEMS OF YOUR FELINE PATIENTS—AND BE COGNIZANT OF THEIR FREQUENCY IN PRACTICE.

Top 5 Feline Oral Health Concerns

- Gingivostomatitis (Caudal Stomatitis)
- Juvenile Hyperplastic Gingivitis/Periodontitis
- Squamous Cell Carcinoma
- Tooth Fracture
- Tooth Resorption.

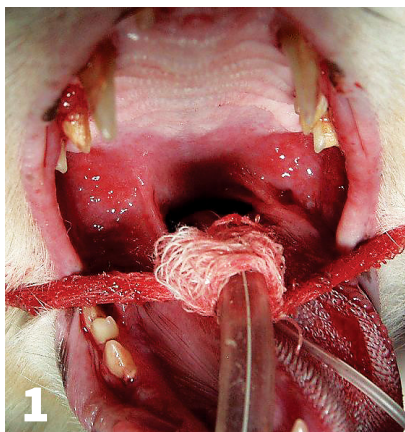
TOP

Feline Oral Health Concerns

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Both dogs and cats suffer from dental disease, but following are 5 oral health concerns more commonly diagnosed in cats.



Gingivostomatitis showing the extent of oral inflammation
All photos courtesy of the author unless noted otherwise

1 Gingivostomatitis (Caudal Stomatitis)

Stomatitis is defined as an inflammation of the mucous membranes anywhere in the oral cavity.¹ This inflammation is more severe than gingivitis or periodontitis because it can extend into the submucosal tissues.

Gingivostomatitis—chronic active inflammation of the mucosa and submucosa—presents with erythematous, ulcerative and/or proliferative lesions commonly found on the gingiva, buccal mucosa, lips, palatal glossal folds, lateral pharyngeal walls, and lateral aspects of the tongue.²⁻⁴ (See **Figure 1**.) No sex, age, or breed predilection exists. The median age of patients with this disease is 7 years.²

The cause is currently unknown, but bacterial, viral, and immunological causes (eg, plaque bacteria, calicivirus, FHV-1, coronavirus, *Bartonella henselae*, FeLV, FIV, immune reaction) are being investigated.²⁻⁴ The most common signs in cats with this disease include halitosis, blood-tinged saliva, ptyalism, dysphagia, difficulty opening the mouth, and weight loss. These cats also become less active, show reluctance to groom themselves, and may become aggressive.² Caution must be taken when examining these patients' mouths because they are in pain.

Treatment is a combination of medical and surgical therapy²⁻⁴ aimed at controlling the disease. Relapses may occur. Medical therapy may include antibiotics, corticosteroids, pain medications, immunostimulants, and immunosuppressants.^{2,3} Extracting the teeth

in the inflamed areas has shown the best outcome.⁵ In general, 60% of cases that have surgical intervention will have complete resolution, 20% will have minimal inflammation, 13% will have partial improvement but require continued medical therapy, and 7% will show no improvement.²

2 Juvenile Hyperplastic Gingivitis/Periodontitis

Some form of periodontal disease, the most common inflammatory disease in cats, affects 85% to 95% of cats over age 2, especially if their teeth are not cleaned professionally or home care is not performed regularly.² One form is juvenile hyperplastic gingivitis/periodontitis, which occurs soon after permanent tooth eruption. This condition is confined to the gingiva, which can become overgrown or hyperplastic. (See **Figure 2**.)

Resources

- Dental fracture classification. ADVC Nomenclature Committee. American Dental Veterinary College. <http://www.avdc.org/nomenclature.html#toothfracture>.
- Tooth resorption. ADVC Nomenclature Committee. American Dental Veterinary College. <http://www.avdc.org/nomenclature.html#resorption>.

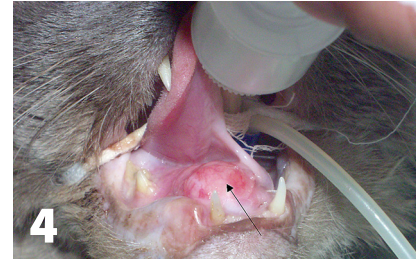
The gold standard for at-home management is brushing, because the abrasion of the brush disrupts the plaque bacteria.



Feline juvenile gingivitis
Figure courtesy of www.animaldental.com.au/juvenile-periodontitis.html



Feline juvenile periodontitis



Squamous cell carcinoma involving the right mandible (arrow)

Significant inflammation begins during eruption of the permanent teeth. The hyperplastic tissue bleeds during mastication, which may make eating difficult and cause the patient pain. The cause is unknown. Susceptibility tends to disappear at about age 2 with consistent professional cleanings that may or may not include hyperplastic tissue removal and at-home care.⁶ The gold standard for at-home management is brushing because the abrasion of the brush disrupts the plaque bacteria. If the pet is uncomfortable with brushing, oral rinses containing chlorhexidine, along with plaque-controlling diets and treats, can be used.⁶

Untreated, the disease may progress to juvenile onset periodontitis, in which plaque and calculus form more rapidly and may result in significant gingival recession, furcation exposure, bone loss, and periodontal pocket formation. (See **Figure 3**.) Teeth that

lose more than 50% support should be extracted.

3 Squamous Cell Carcinoma

These tumors are the most common oral malignancy in cats.⁷ The lesions are pink, firm, and irregular and usually located in the premolar/molar region in the maxilla, the premolar area in the mandible, and sublingually.⁷ (See **Figure 4**.) They are locally aggressive and can metastasize to regional lymph nodes and lungs. Biopsy is crucial for diagnosis, along with aspiration of the affected regional lymph nodes for staging. Therapies include surgical resection, chemotherapy, and palliative radiation. Maxillary and sublingual lesions respond poorly to therapy and have a poor prognosis.⁷ Mandibular lesions have a better prognosis if caught early when they can be surgically excised with wide margins.⁷

Patients that undergo surgical excision have a median survival period of one year that may be extended by adjuvant radiation therapy. The median survival period for palliative radiation is 2 to 4 months, which may be extended to 10 months if remission occurs. Sublingual tumors have a grave prognosis with any therapy because most are diagnosed at an advanced stage and inoperable.⁸

4 Tooth Fracture

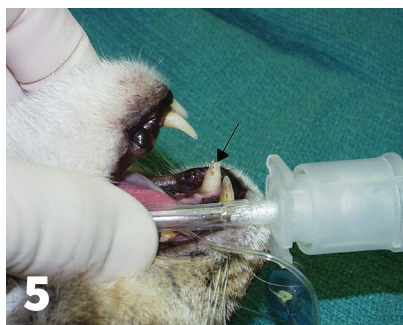
Tooth fracture does occur in cats, which have a thinner layer of tooth enamel than dogs.⁹ Beneath the enamel is a layer of dentin, which is softer, porous, and made up of microscopic tubules that run to the pulp and, when exposed, makes the tooth sensitive. (See **Figure 5**, page 48.) Damage to the enamel exposing the dentin is called an *uncomplicated crown fracture*, which requires treatment because bacteria can enter the bloodstream indirectly

through the dentinal tubules. Because the layer of dentin is narrowed compared with that of dogs, the pulp is considered contaminated and extraction or endodontic therapy (ie, root canal therapy) is recommended.⁹

For root canal therapy to be an option, dental radiographs are necessary to rule out open apices (ie, unclosed root tips) that may be seen in a patient younger than a year. If the fracture occurred before the root apex closed, advanced periodontal disease causing major loss of the periodontal support structures (ie, gingiva, periodontal ligament, alveolar bone) or tooth resorption may be seen.⁹ Root canal therapy involves removing the pulp of the affected tooth, disinfecting the pulp chamber and lining it with a sealer to prevent access to the dentinal tubules, and filling the chamber with a material to remove the dead space, thus restoring the crown of the tooth. Untreated fractured teeth can lead to pulpitis and pulpal necrosis.^{9,10} Patients requiring root canal therapy should be referred to a veterinary dental specialist. (See **Resources**, page 46.)

5 Tooth Resorption

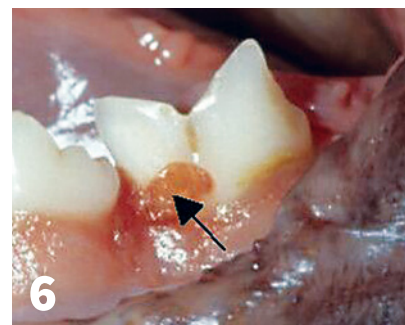
Tooth resorption is a form of external resorption. Resorption



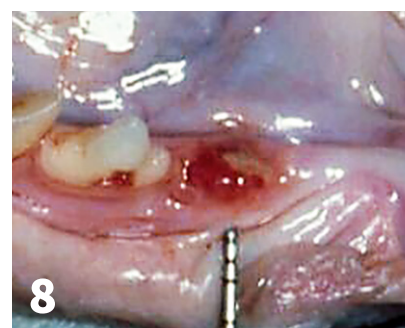
Fractured right maxillary canine tooth (arrow)



Tooth resorption (advanced) with partial crown loss



Tooth resorption: Note the granulation tissue growing into the enamel defect (arrow)



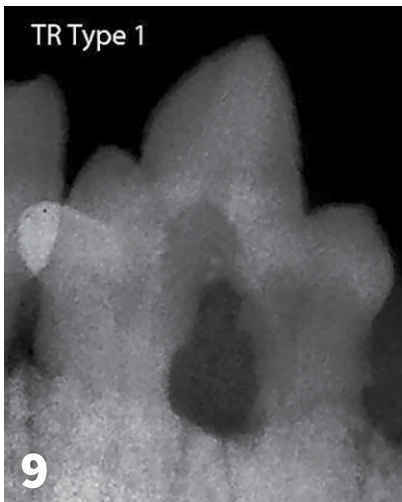
Tooth resorption (advanced) with entire crown loss. The gingiva is inflamed as tooth structure is still present.

is the loss of hard tissues caused by cells called odontoclasts; external resorptions starts in the root's cementum layer and can extend into the dentin. Previously called cervical neck lesions, feline caries, and feline odontoclastic resorptive lesions (FORLs), tooth resorption affects 25% to 75% of the cat population over age 2.¹¹ The odontoclasts, which are derived from hematopoietic stem cells, migrate from the blood cells of the periodontal ligament space toward the external root surface and start

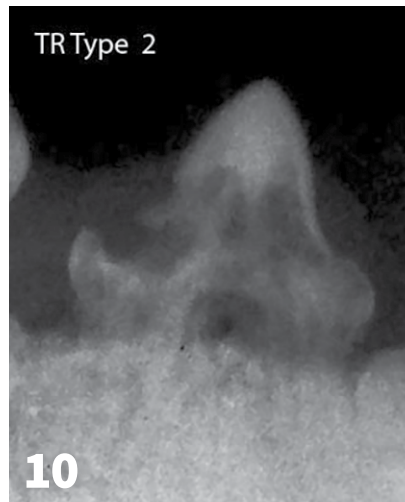
destroying the dental hard tissue.¹¹ (See **Figures 6-8**.)

Three types of tooth resorption, which can only be diagnosed with dental radiographs, are seen. With Type 1, the periodontal ligament and the root remain normal, but there is destruction of the dental hard tissue. (See **Figure 9**.) With Type 2, the periodontal ligament and roots become indistinct as bone replaces them; with Type 2 lesions, it is evident that while resorption is destroying dental hard tissue,

Tooth fracture does occur in cats, which have a thinner layer of tooth enamel than dogs.



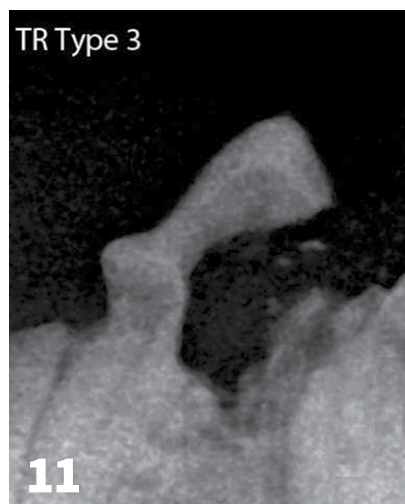
Radiograph of tooth resorption Type 1: Note the hard tissue damage at the gumline even though the tooth roots look normal. Figures 9, 10, and 11 courtesy of AVDC Nomenclature "Types of Resorption Based on Radiographic Appearance." <http://www.advc.org/nomenclature.html#resorption>



Radiograph of tooth resorption Type 2: Note the complete root loss caused by bone replacement. This tooth would be a good candidate for a crown amputation.

osteoblasts are infiltrating the affected area. Over time, the root contour becomes more irregular and bone completely replaces the root.¹² (See **Figure 10**.) Teeth can be affected by both Type 1 and Type 2 resorption, which is known as Type 3. (See **Figure 11**.) The cause of tooth resorption is unknown, although links have been made to periodontal disease, mechanical trauma, immunosuppressive viruses, and increased vitamin A and D intake.¹¹

Diagnosis is made from a visual oral examination using a dental explorer and dental radiographs. (See **Resources**, page 46.) Teeth with any



Radiograph of tooth resorption Type 3: The left root is completely intact and shows a normal periodontal ligament space. The right root is remodeling into bone.

TEAM TAKEAWAYS:



Veterinarians: Confer with team members to ensure standard practice protocols are set for these 5 common presentations. Also, remember to balance a thorough examination with low-stress handling techniques.

Management Team: Consider a practice campaign that focuses on *feline dental health*—cats are experts at hiding any problem, but dental health is a good opportunity for practice growth.

Nursing Team: Brush up on the differences between feline and canine dental health; for example, cats have a thinner layer of tooth enamel, so fractures are a definite possibility.

Client Care Team: Extraction is frequently used to treat many feline oral diseases; be ready for client comments and have talking points that will give clients the confidence to make treatment decisions.

normal structure must be fully extracted; however, if radiographs show the tooth structures have been turned into bone, extraction is not possible and a crown amputation can be performed to the level where recognizable tooth structure does not exist.¹ Crown amputation can only be performed on teeth that radiographs confirm as Type 2 and that show no periapical or periodontal bone loss. Crown amputation should not be performed on teeth with Type 1 lesions because those roots are normal and healthy. Crown amputation should also not be performed where stomatitis is present.

Conclusion

Feline oral health problems require a thorough patient history, complete oral examination, and a full diagnostic workup that includes radiographs. Veterinary professionals should always keep current with the treatment options and/or resources to provide the best outcomes for these patients. ■

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NexGard® (afoxolaner) Chewables

CAUTION: Federal (USA) law restricts this drug to use by or on the order of a licensed veterinarian.

Description:

NexGard® (afoxolaner) is available in four sizes of beef-flavored, soft chewables for oral administration to dogs and puppies according to their weight. Each chewable is formulated to provide a minimum afoxolaner dosage of 1.14 mg/lb (2.5 mg/kg). Afoxolaner has the chemical composition 1-Naphthalenecarboxamide, 4-[5-[3-chloro-5-(trifluoromethyl)-phenyl]-4,5-dihydro-5-(trifluoromethyl)-3-isoxazolyl]-N-[2-oxo-2-[(2,2,2-trifluoroethyl)amino]ethyl].

Indications:

NexGard kills adult fleas and is indicated for the treatment and prevention of flea infestations (*Ctenocephalides felis*), and the treatment and control of Black-legged tick (*Ixodes scapularis*), American Dog tick (*Dermacentor variabilis*), Lone Star tick (*Amblyomma americanum*), and Brown dog tick (*Rhipicephalus sanguineus*) infestations in dogs and puppies 8 weeks of age and older, weighing 4 pounds of body weight or greater, for one month.

Dosage and Administration:

NexGard is given orally once a month, at the minimum dosage of 1.14 mg/lb (2.5 mg/kg).

Dosing Schedule:

Body Weight	Afoxolaner Per Chewable (mg)	Chewables Administered
4.0 to 10.0 lbs.	11.3	One
10.1 to 24.0 lbs.	28.3	One
24.1 to 60.0 lbs.	68	One
60.1 to 121.0 lbs.	136	One
Over 121.0 lbs.	Administer the appropriate combination of chewables	

NexGard can be administered with or without food. Care should be taken that the dog consumes the complete dose, and treated animals should be observed for a few minutes to ensure that part of the dose is not lost or refused. If it is suspected that any of the dose has been lost or if vomiting occurs within two hours of administration, redose with another full dose. If a dose is missed, administer NexGard and resume a monthly dosing schedule.

Flea Treatment and Prevention:

Treatment with NexGard may begin at any time of the year. In areas where fleas are common year-round, monthly treatment with NexGard should continue the entire year without interruption.

To minimize the likelihood of flea reinfestation, it is important to treat all animals within a household with an approved flea control product.

Tick Treatment and Control:

Treatment with NexGard may begin at any time of the year (see **Effectiveness**).

Contraindications:

There are no known contraindications for the use of NexGard.

Warnings:

Not for use in humans. Keep this and all drugs out of the reach of children. In case of accidental ingestion, contact a physician immediately.

Precautions:

The safe use of NexGard in breeding, pregnant or lactating dogs has not been evaluated. Use with caution in dogs with a history of seizures (see **Adverse Reactions**).

Adverse Reactions:

In a well-controlled US field study, which included a total of 333 households and 615 treated dogs (415 administered afoxolaner, 200 administered active control), no serious adverse reactions were observed with NexGard.

Over the 90-day study period, all observations of potential adverse reactions were recorded. The most frequent reactions reported at an incidence of > 1% within any of the three months of observations are presented in the following table. The most frequently reported adverse reaction was vomiting. The occurrence of vomiting was generally self-limiting and of short duration and tended to decrease with subsequent doses in both groups. Five treated dogs experienced anorexia during the study, and two of those dogs experienced anorexia with the first dose but not subsequent doses.

Table 1: Dogs With Adverse Reactions.

	Treatment Group			
	Afoxolaner		Oral active control	
	N ¹	% (n=415)	N ²	% (n=200)
Vomiting (with and without blood)	17	4.1	25	12.5
Dry/Flaky Skin	13	3.1	2	1.0
Diarrhea (with and without blood)	13	3.1	7	3.5
Lethargy	7	1.7	4	2.0
Anorexia	5	1.2	9	4.5

¹Number of dogs in the afoxolaner treatment group with the identified abnormality.

²Number of dogs in the control group with the identified abnormality.

In the US field study, one dog with a history of seizures experienced a seizure on the same day after receiving the first dose and on the same day after receiving the second dose of NexGard. This dog experienced a third seizure one week after receiving the third dose. The dog remained enrolled and completed the study. Another dog with a history of seizures had a seizure 19 days after the third dose of NexGard. The dog remained enrolled and completed the study. A third dog with a history of seizures received NexGard and experienced no seizures throughout the study.

To report suspected adverse events, for technical assistance or to obtain a copy of the MSDS, contact Merial at 1-888-637-4251 or www.merial.com/NexGard. For additional information about adverse drug experience reporting for animal drugs, contact FDA at 1-888-FDA-VETS or online at <http://www.fda.gov/AnimalVeterinary/SafetyHealth>.

Mode of Action:

Afoxolaner is a member of the isoxazoline family, shown to bind at a binding site to inhibit insect and acarine ligand-gated chloride channels, in particular those gated by the neurotransmitter gamma-aminobutyric acid (GABA), thereby blocking pre- and post-synaptic transfer of chloride ions across cell membranes. Prolonged afoxolaner-induced hyperexcitation results in uncontrolled activity of the central nervous system and death of insects and acarines. The selective toxicity of afoxolaner between insects and acarines and mammals may be inferred by the differential sensitivity of the insects and acarines' GABA receptors versus mammalian GABA receptors.

Effectiveness:

In a well-controlled laboratory study, NexGard began to kill fleas four hours after initial administration and demonstrated >99% effectiveness at eight hours. In a separate well-controlled laboratory study, NexGard demonstrated 100% effectiveness against adult fleas 24 hours post-infestation for 35 days, and was ≥ 93% effective at 12 hours post-infestation through Day 21, and on Day 35. On Day 28, NexGard was 81.1% effective 12 hours post-infestation. Dogs in both the treated and control groups that were infested with fleas on Day -1 generated flea eggs at 12- and 24-hours post-treatment (0-11 eggs and 1-17 eggs in the NexGard treated dogs, and 4-90 eggs and 0-118 eggs in the control dogs, at 12- and 24-hours, respectively). At subsequent evaluations post-infestation, fleas from dogs in the treated group were essentially unable to produce any eggs (0-1 eggs) while fleas from dogs in the control group continued to produce eggs (1-141 eggs).

In a 90-day US field study conducted in households with existing flea infestations of varying severity, the effectiveness of NexGard against fleas on the Day 30, 60 and 90 visits compared with baseline was 98.0%, 93.7%, and 99.9%, respectively. Collectively, the data from the three studies (two laboratory and one field) demonstrate that NexGard kills fleas before they can lay eggs, thus preventing subsequent flea infestations after the start of treatment of existing flea infestations.

In well-controlled laboratory studies, NexGard demonstrated >97% effectiveness against *Dermacentor variabilis*, >94% effectiveness against *Ixodes scapularis*, and >93% effectiveness against *Rhipicephalus sanguineus*, 48 hours post-infestation for 30 days. At 72 hours post-infestation, NexGard demonstrated >97% effectiveness against *Amblyomma americanum* for 30 days.

Animal Safety:

In a margin of safety study, NexGard was administered orally to 8 to 9-week-old Beagle puppies at 1, 3, and 5 times the maximum exposure dose (6.3 mg/kg) for three treatments every 28 days, followed by three treatments every 14 days, for a total of six treatments. Dogs in the control group were sham-dosed. There were no clinically-relevant effects related to treatment on physical examination, body weight, food consumption, clinical pathology (hematology, clinical chemistry, or coagulation tests), gross pathology, histopathology or organ weights. Vomiting occurred throughout the study, with a similar incidence in the treated and control groups, including one dog in the 5x group that vomited four hours after treatment.

In a well-controlled field study, NexGard was used concomitantly with other medications, such as vaccines, anthelmintics, antibiotics (including topicals), steroids, NSAIDs, anesthetics, and antihistamines. No adverse reactions were observed from the concomitant use of NexGard with other medications.

Storage Information:

Store at or below 30°C (86°F) with excursions permitted up to 40°C (104°F).

How Supplied:

NexGard is available in four sizes of beef-flavored soft chewables: 11.3, 28.3, 68 or 136 mg afoxolaner. Each chewable size is available in color-coded packages of 1, 3 or 6 beef-flavored chewables.

NADA 141-406, Approved by FDA

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