



# From Teeth to Tail and Back Again

## Oral Manifestations of Systemic Disease and Systemic Effects of Oral Disease in Cats

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In a study of 15,226 cats in the United States in primary care facilities, 24% of cats had dental calculus and 13% had gingivitis.<sup>1</sup> The statistics are worse in cats over three years old: 70% have periodontal disease. Dental calculus and gingivitis rank second to obesity in prevalence in cats yet fewer than one-third with dental disease receive treatment. Periodontal disease as a cause for systemic effects receives the most attention; however, other conditions can affect overall health as well as the health of the mouth.

There are two forms of periodontal disease: gingivitis and periodontitis. Gingivitis refers to the reversible inflammation of the gingiva. Due to more extensive inflammation extending to the periodontal ligament and alveolar bone, periodontitis involves loss of tooth attachment and is irreversible. Alveolar hyperplasia commonly follows periodontal ligament destruction and inflammation.

Any disease that affects the mouth can result in pain and thereby can impact well being. Oropharyngeal inflammation and resorptive lesions can cause severe pain, halitosis, dysphagia with or without bleeding, ptyalism, anorexia, weight loss and stress. In the young patient, there may be malocclusion, retained deciduous teeth, juvenile polyps or foreign bodies that impede normal prehension and mastication. Cats of any age can be afflicted by calculus interfering with chewing and periodontal disease resulting in discomfort or pain. Fractured teeth or jaws may impede proper occlusion and cause pain, resulting in suboptimal dietary intake.

### Infectious agents that directly affect oral health

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Calicivirus and feline herpes virus-1 (FHV-1) may manifest in lingual ulceration. Calicivirus is also implicated in deep gingival infection as a cause for oropharyngeal inflammation.<sup>2-4</sup> To date, there is little or questionable evidence for *Bartonella henselae* being a cause of oral disease in cats. Its presence as shown by antibody or PCR assessment merely points to exposure to a common organism among cats. No difference in prevalence has been shown between cats with or without oral disease.<sup>3,4</sup> In a 2006 study by Dr. Jan Bellows and Idexx Laboratories, 8,982 cats from primary care facilities with oral disease were tested for retroviruses. Of those cats, 1,276 (14.2%) were retrovirus positive (612 were FIV +, 563 were FeLV + and 101 tested + for both FIV and FeLV).

### Lumps, bumps and swelling

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Eosinophilic granuloma complex is found orally in the cat. It may manifest as a "rodent ulcer," on the lip or intra-orally as a proliferative or ulcerative condition on or under the tongue, inside the cheeks, on the gums, etc. This is an important differential for oral neoplasms as they may look ulcerative or be profusely or regionally proliferative.

Foreign bodies, polyps and abscesses may also appear as masses with or without granulation tissue. Simple or dentigerous cysts, sialoceles are benign but potentially uncomfortable masses. Neoplasia, squamous cell carcinoma and the less-common fibrosarcoma, lymphoma and salivary adenocarcinoma have less favorable prognoses, but cannot be diagnosed without histopathology. It is essential to biopsy any oral mass.



Oropharyngeal inflammation describes the distribution of the inflammatory—most commonly lymphocytic plasmacytic—lesions. A substantial amount of research appears to support that oropharyngeal inflammation is not a simple problem with a single etiology. Some of the suggested causes include FeLV, FIV, calicivirus, *Bartonella henselae* or an abnormal or dysfunctional immune response.

## Erosions, ulcers and cavitations

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Eosinophilic granulomas may present in either an ulcerative or proliferative form at any age. Other causes of ulcers are feline calicivirus, feline herpes virus-1 (FHV-1), retroviruses (FeLV and FIV), chemical or electrical-thermal burns. Ulcers associated with renal insufficiency tend to occur in the older cat population, as do ulcers and proliferative lesions associated with neoplasia.

Feline odontoclastic resorptive lesions are found in the mouths of 50% of the domestic cat population five years or older. In one study they were found in 48% of cats over one year.<sup>5</sup> These are described by Dr. Jan Bellows on the website [www.OralATP.com](http://www.OralATP.com) as two types based on radiographic findings and five recognized stages based on clinical and radiographic findings:

- Type I lesions arise in the cervical area of the tooth and extend inward and/or up and down the root. Type I lesions are inflammatory in nature and, on radiographs, have relatively normal root structures.
- The more common Type II lesion begins subgingivally. In radiographs the roots appear to be resorbing; the periodontal ligament will not be readily recognizable due to ankylosis.
- Stage 1: Lesions extend into cementum only on the root surface.
- Stage 2: Lesions have destroyed a significant amount of dentin and cementum but have spared the pulp.
- Stage 3: Lesions enter the pulp without extensive crown destruction.
- Stage 4: Lesions have extensive root and crown damage.
- Stage 5: The tooth lacks a clinical crown but root fragments remain on radiographs.

What is the relevance of oral disease to the cat? Arguably, the most important consideration is that it causes pain. While this should be sufficient motivation to improve oral assessment, treatment and preventive care in our feline patients, a cat with a painful mouth will attempt to compensate for debilitation to a point. Pain may interfere with quality of life manifested as a reluctance to eat or changes in eating habits with a declining body condition; less effective grooming resulting in a poor hair coat; behavior changes such as lower energy, irritability or aggression; less interaction with the family or hiding. Cats may paw at their mouths or salivate excessively. Sneezing, nasal discharge (including epistaxis), facial swelling, draining tracts or ocular changes may be a result of oral disease. Resorptive lesions are so painful that when probed even under sedation, a cat will flinch. Yet the cat may still manage to eat by swallowing food quickly or manipulating it away from the lesion. Another extremely unpleasant, disturbing condition that appears to be extremely painful is Feline Orofacial Pain Syndrome (FOPS). This condition is well described by Dr. Clarie Rusbridge at <http://www.veterinary-neurologist.co.uk/fops.htm>.

## Periodontal disease

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What mechanisms are at work in periodontitis? Plaque is mineralized to calculus in two to three days. There are intrinsic antibacterial properties in saliva and chewing results in occlusal scrubbing to mechanically remove plaque. A cat's alkaline mouth predisposes to calculus formation by allowing calcium carbonate and calcium phosphate



to precipitate. Being bacteria-laden, plaque is inherently inflammatory. While a potential for bacteremia or endotoxemia exists, the most likely consequences of ongoing oral inflammation are pain and loss of periodontal ligament attachment, abscesses, osteomyelitis, exposure of dentin or roots and loss of teeth. Periodontal disease may be graded for ease of communication and thinking; an excellent resource is [www.OralATP.com](http://www.OralATP.com).

In humans, associations have been made between periodontal disease and cardiovascular disease, pneumonia, low birth weight and diabetes mellitus.<sup>6,7</sup> In dogs, a relationship has been suggested between periodontitis and renal, hepatic, pulmonary and cardiac pathology.<sup>8</sup> Due to the paucity of evidence for direct cause and effect, we have to be cautious to not overstate the significance of these suggestions. Nevertheless, from a dental health perspective and an awareness of pain, it is sobering to recognize that only 15% of cats with Stage 2 or higher periodontal disease receive treatment.

What role might periodontal disease play in overall health or illness? Both pro- and anti-inflammatory mediators are part of an integrated self-regulatory system in health. In disease, the balance shifts towards perpetuation of inflammation—pain, swelling, redness, heat and dysfunction. Some mediators affect the coagulation system, platelet function and fibrinolysis; others affect phagocytosis. Yet others impact the immune system through complement and antibody production. It is easy to imagine that these effects reach far beyond the oral cavity. We do recognize resistance to the effects of insulin in cats with chronic inflammation, especially in those individuals with untreated periodontal disease or gingivitis as well as with lower urinary tract disease. Cats predisposed to diabetes may lose their ability to maintain successful glycemic control and become clinically diabetic.

## Systemic disease and stress

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Uncontrolled diabetes as well as uncontrolled hyperadrenocorticism predispose to infection and interfere with healing. Optimal oral health is difficult to achieve without controlling these catabolic conditions. In the case of diabetes mellitus, the reverse is true as well, i.e., dental cleaning is critical to attaining glycemic regulation.

Many cats with oral disease are retrovirus positive. It is important to remember that while FeLV may shorten life expectancy to three and one-half years on average past diagnosis, cats shown to be infected with FIV live on average 7–10 years beyond the time of the diagnosis. Just as cats that are not retrovirus positive, they can develop oral or other diseases that may be just as readily treatable. Treatment should be prompt and aggressive in retrovirus-positive cats and requires a thorough diagnostic evaluation. In the case of stomatitis or gingivitis/periodontitis, the emphasis is on regular dental cleaning as part of a good preventive program.

Abnormalities that cause weakness, such as hypokalemia, thiamine deficiency and hyperthyroidism may result in bruxing and impact the patient's ability to eat adequately. Arthritis may interfere with comfort and hence the ability and willingness to eat. Renal insufficiency as well as gastrinoma may cause oral ulceration; uremic ulcers are not uncommon in cats with a decline in renal function. Adequate hydration and H<sub>2</sub> antagonists or proton pump inhibitors can help prevent recurrence of the ulcers once they have healed. Antimicrobials such as clindamycin or amoxicillin-clavulanic acid may be indicated in any ulcerated mouth regardless of cause. Dehydration, by virtue of interfering with tissue oxygenation as well as proper saliva composition, may cause oral ulcers.

Stress, like pain, is made up of complex interactions of physiological and psychological factors designed to enable us to survive danger in the short-term. In the long-term, if not dampened it leads to pathology of many parts of the body through altered hormone levels, inappetance and lack of sleep among other aspects.

## Diagnostics and prevention

In order to do a thorough oral examination and make appropriate treatment recommendations, cats have to be unconscious. In addition to looking at the crowns of the teeth and occlusion, periodontal pockets need to be evaluated and all aspects of gingiva, fauces, lymph nodes, salivary glands, hard and soft palates, inner lips, caudal dorsal and ventral aspects of the tongue need to be properly checked. Radiographs are recommended to assess roots of teeth, periodontal ligaments and alveolar bone. Even if not expected, one should check above the soft palate for foreign bodies. All masses should be biopsied. As referred to earlier, [www.OralATP.com](http://www.OralATP.com) is an excellent learning and teaching resource that includes many excellent images, photos, radiographs and videos.

Prevention of oral disease is best accomplished through regular evaluation of the mouth along with a thorough assessment of the entire individual. In young cats, annual examination is adequate; as the patient becomes older or if there is evidence or a predisposition to certain problems, semi-annual reassessment is advisable. While established periodontal disease cannot be reversed, awareness of risks and regular care, especially at home, provide the chance to prevent its progression. Diets, dental treats, brushing teeth and observation for changes in eating behaviors are important parts of at-home care.

The CE credit seminar *From Teeth to Tail and Back Again: Oral Manifestations of Systemic Disease and Systemic Effects of Oral Disease in Cats* is available online and free of charge at [vet.greenies.com](http://vet.greenies.com).



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### References

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