

Diagnosing feline dental disease

Frequent oral examinations, prophylaxes and home care allow practitioners to identify—and treat—dental disease early.



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During examinations, most of us have encountered otherwise agreeable feline patients who nonetheless have breath that could curdle milk on a plate. This bad breath is not merely distasteful—it may also be a clear warning of potential health problems for the Pet. Veterinarians are in a unique position in that they are generally the only source of information clients have about their Pet's health concerns; thus, veterinarians also have a unique responsibility in safeguarding a Pet's health. Good health care for cats is primarily good preventive care, and preventive care should always include dental hygiene.

Dental disease is one of the most important, and pervasive, preventable diseases in veterinary medicine. Seventy percent of cats will show clinical evidence of oral disease by 3 years of age.¹ Nonetheless, recent studies have indicated that millions of cats (and dogs) with periodontal disease of stage 2 or greater have not received dental prophylactic therapy.² All of us have seen the deleterious effects

of poor dental hygiene. Most of us think first of the obvious effects: bad breath, stained teeth, thick calculus buildup and gingivitis.² However, there are more serious, less obvious effects to consider: oral pain leading to inappetance and weight loss, facial swellings and draining tracts from tooth root abscesses, subgingival plaque and bone resorption.^{2,3} Additionally, we know that periodontal disease can lead to serious renal, cardiac and hepatic disease. Providing thorough oral exams each time we see our feline patients can help us diagnose, intervene and treat the Pet early. Moreover, every time we have a feline patient under anesthesia, we are given an ideal opportunity to conduct an even *more* thorough oral exam—with less risk to our fingers.

Progression of feline periodontal disease

To better understand dental disease and the complications that it can present, we will examine its progression in detail.³ Our starting place is a healthy mouth. When a cat's mouth is healthy, there is a knifelike margin to the gingiva and a

smooth-flowing gingival line between each tooth. Radiographs will show alveolar crestal bone close to the neck of the tooth.

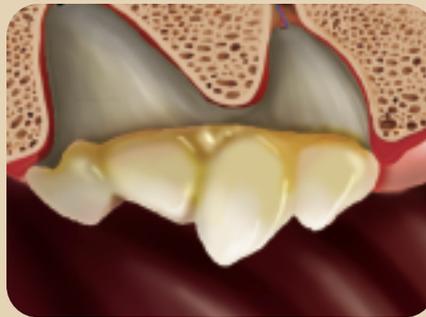
Stage 1 periodontal disease (*Figure 1a*) is considered early gingivitis. The Pet's teeth have accumulated a mild amount of plaque and calculus, and there is a reddening of the gingival margin at the crest. Minute blood vessels at the gingival margins can no longer be seen. However, there are not yet any changes in the radiographic appearance of the alveolar bone and teeth. With treatment, early gingivitis is reversible.

Stage 2 periodontal disease (*Figure 1b*) is referred to as established, or chronic, gingivitis. At this more advanced stage, the Pet shows gingival edema and subgingival plaque, which indicate an increase in inflammation. More supragingival plaque and calculus are present. The once-smooth flow of the gingival margin becomes irregular, but there is no root exposure at this time. Alveolar bone and teeth also show little to no radiographic changes. As with stage 1, stage 2 disease is considered reversible with treatment.⁵

The last two stages of periodontal disease, on the other hand, are irreversible. In stage 3, early periodontitis (*Figure 1c*), there is early gingival pocket formation, greater amounts of plaque and calculus both supra- and subgingivally, widespread gingivitis and gingival edema. Gentle probing of the gingiva during an examination may cause gingival bleeding. The gingival margin is no longer smooth between each tooth, and there may

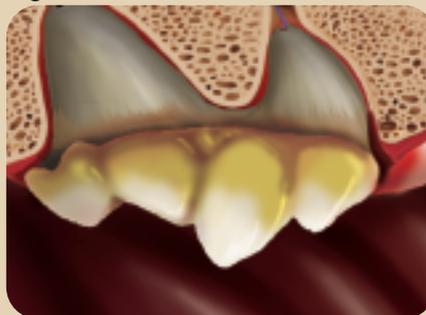
Figure 1: Stages of Periodontal Disease

Figure 1a



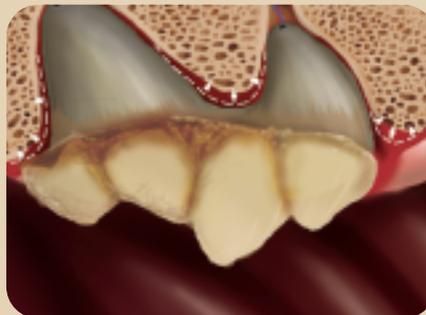
Stage 1 periodontal disease (early gingivitis). There is mild plaque and calculus accumulation as well as inflammation of the gingiva. Tooth support is still intact.

Figure 1b



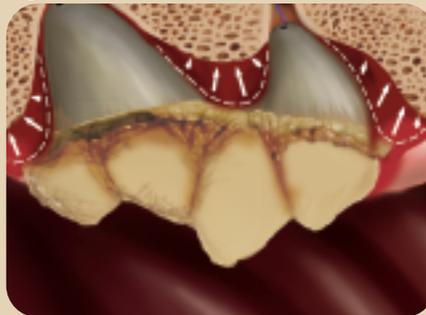
Stage 2 periodontal disease (established gingivitis). Both gingival edema and subgingival plaque can now be seen, along with increases in supragingival plaque and calculus.

Figure 1c



Stage 3 periodontal disease (early periodontitis). Gingival pockets are beginning to form, and there are greater amounts of plaque and calculus both supra- and subgingivally. There may be irreversible bone loss of up to 30 percent, as indicated by the arrows in the figure.

Figure 1d



Stage 4 periodontal disease (established periodontitis). This is the most advanced stage of the disease, with severe inflammation, additional supra- and subgingival plaque and calculus, infection with exudate, loose teeth and irreversible bone loss that may be greater than 30 percent (indicated by arrows). Gingival pockets may extend even beyond the alveolar bone (infrabony).

be gingival recession or gingival hypertrophy. Subgingival calculus may be visible on radiographs, as well as rounding or blunting of the alveolar crest. There may be horizontal and/or vertical bone loss

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affecting up to 30 percent of the alveolar bone in contact with the tooth root.³

Stage 4, established periodontitis (*Figure 1d*, page 25), is the most advanced form of periodontal disease. This stage involves severe inflammation, gingival recession, infection with exudate, loose teeth, additional bone loss and the formation of deep gingival pockets. Subgingival calculus is much easier to see on radiographs than in previous disease stages, as is horizontal or vertical bone loss. Probing of the gingiva is very likely to cause bleeding. The deep gingival pockets can be further classified based on whether the fundus of the pocket extends beyond the margin of the alveolar bone (infrabony) or is superficial to the alveolar bone margin (suprabony).³ Accurate classification of the deep-pocket type is important because it may affect treatment choices.

Remember, with stages 3 and 4 periodontitis, a full dental cleaning may halt the progression of periodontal disease, but the damage that is already present is permanent. It is also important to remember that there are variations in the clinical presentation of periodontal disease and that you may find several stages of disease present in a single mouth.

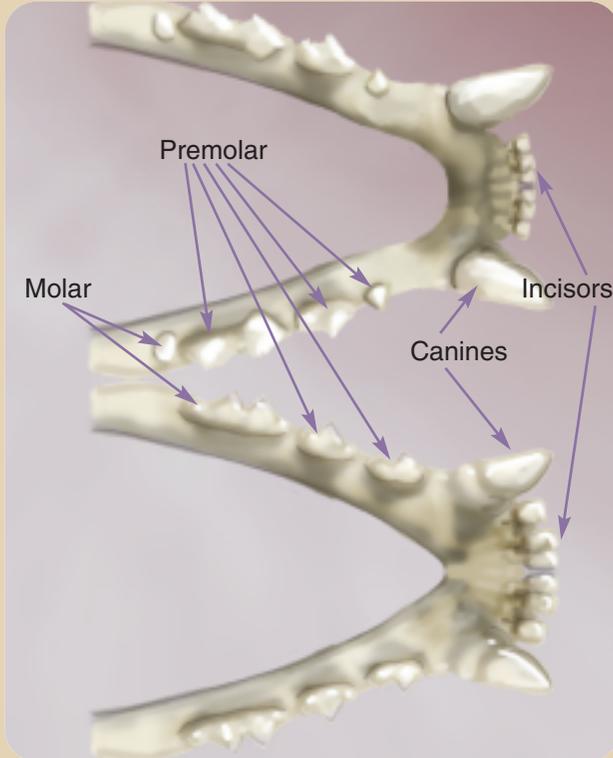
The oral exam

Many clinical signs and presenting complaints can help guide veterinarians to a diagnosis of dental disease. Some of the clinical signs include hypersalivation, bad breath, decreased appetite or anorexia, vomiting and pawing at the mouth. Oral exams to locate the source of the clinical signs may be as simple as manually examining the mouth of a conscious feline patient. (See *Figures 2a* and *2b*, page 28, for visualization of teeth.) However, because many cats are resistant to oral examination and the caudal teeth can be difficult to visualize, an in-depth oral exam will often require sedation.² Good visualization of the caudal teeth, as well as of the lingual surfaces of many teeth, is much easier in a sedated patient. If the patient will allow, it is best to perform an initial exam, then sedate for a more thorough oral exam. If the cat is not amenable to a physical or oral examination, use a sedative first to decrease stress on the patient, so you incur fewer scratches or bites.

An oral examination in a conscious or sedated Pet allows you to observe gross pathology, such as gingivitis, supragingival calculus, crown fractures and missing or supernumerary teeth. However, a complete oral examination requires full anesthesia to allow you complete access and visualization of the Pet's entire mouth. This can be done at the time of a dental prophylaxis. As mentioned earlier, it can also be very beneficial to complete oral exams on all Pets that are placed under anesthesia for other reasons. Many of our feline patients will have their first opportunity for a complete oral exam under anesthesia when they present for an ovariohysterectomy or neuter surgery, and most will have all of their adult dentition in place at that time.

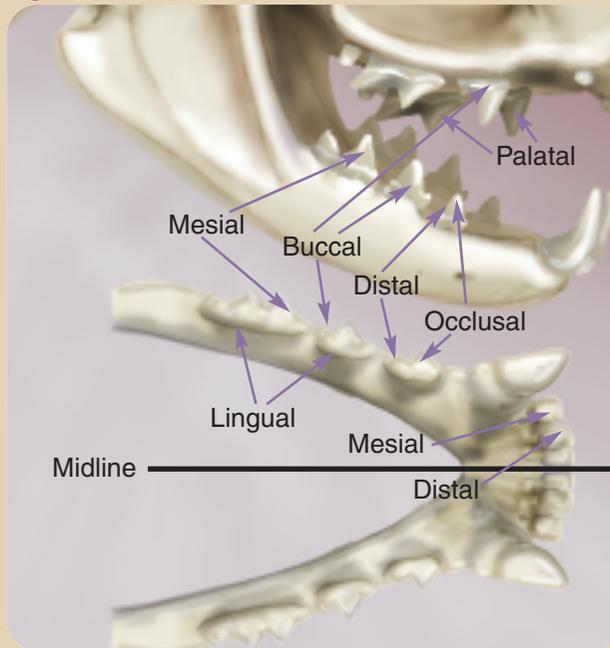
Figure 2: Normal Feline Dental Anatomy

Figure 2 a



Upper and lower dental arcade in cats. Note that there are fewer teeth in the normal cat than in dogs. In the cat, in addition to the incisors and canines, the upper arcade contains PM2, PM3, PM4 and M1. The lower arcade contains PM3, PM4 and M1.

Figure 2 b



Surfaces of feline teeth on upper and lower dental arcades. It is important to describe the surfaces of teeth in a consistent manner to facilitate accurate and effective communication and medical records. The occlusal surface is the edge of the tooth where shearing and crushing occur. The lingual and palatal surfaces are the inner surfaces of the lower and upper jaws, respectively. The facial (or buccal) surface is the outer surface of the tooth, which is in contact with the cheek or lips. Mesial refers to the edge of the tooth closest to the midline (*i.e.*, medial edge of incisors or rostral edge of premolars and molars). Distal refers to the edge of the tooth farthest from the midline (*i.e.*, lateral edge of incisors or caudal edge of premolars and molars).

Conduct oral exams in a room that provides bright light. You will need a periodontal probe and/or dental explorer, a mouth gag and possibly a source of magnification (*e.g.*, a magnifying head loupe). There are several techniques that can be employed when conducting oral exams, and all follow a similar approach. First, evaluate the patient's entire facial area, including orbits, muzzle, nostrils, jaw line, lips and cheeks. Look for muscle atrophy, differences in size, uneven appearance or asymmetry and lymphadenopathy. Elevate the lips and examine the buccal and labial surfaces of the teeth and gingiva. Start rostrally and proceed caudally, checking for fractures, crown wear, resorptive lesions, gingival recession, exposed furcations or other pathology.

Next, open the mouth and examine the

lingual, palatal, interproximal and occlusal surfaces of the teeth.³ Examine the hard and soft palate, tonsils, pharyngeal area, tongue and floor of the mouth. Any missing or damaged teeth should be noted on the patient's dental chart. Worn or fractured teeth can be probed with a dental explorer to determine if the pulp cavity is exposed. The gingival sulcus should be probed and charted to identify pockets; the normal feline sulcus should not be more than 0.5 mm deep.⁴ This will point out areas that need special attention during a dental cleaning and also document the pocket depth for comparison at the time of the next oral exam. A mouth gag can be used to provide greater visualization. However, remember to use the mouth gag for only a short period of time

Figure 3

**Dental cleaning.**

Proper subgingival cleaning requires the use of a dental curette that is shaped to the tooth and atraumatic to the gingiva.

Table 1. Common Conditions Clinicians Should Look for in Oral Examinations

- Plaque and calculus buildup
- Gingivitis or periodontitis
- Gingival hyperplasia
- Gingival or mucosal ulceration or swelling
- Gingival pockets
- Missing crowns
- Fractured teeth
- Excessive tooth wear
- Mobile teeth
- Supernumerary teeth
- Retained deciduous teeth
- Foreign bodies
- Misaligned teeth and/or jaws/malocclusion
- Oral masses
- FORLs

to avoid prolonged tension on the temporomandibular joint.³ Also, if there is mandibular pathology, an overextended mouth gag could potentiate a pathologic fracture.

During the exam, you may find other oral abnormalities, such as retained deciduous teeth, masses (epuli, squamous cell carcinoma, malignant melanoma), ulcers, foreign

bodies (grass between teeth, sticks, fur [indicating chewing]) and many others (*Table 1*). Any abnormality encountered during an oral exam should be noted and a plan devised to address it. If significant calculus is present, you may need to remove some of it in order to adequately visualize the teeth and gingiva and gain access for gingival probing.

After completing the visual oral exam and dental charting, consider the benefit of obtaining dental radiographs. Radiography, with a focus on intraoral radiographs, has become a very useful and important tool in diagnosing dental disease. Sedation or general anesthesia is necessary to obtain radiographs with good detail and proper positioning. However, if anesthesia poses an unacceptable risk for the patient, radiographs are not recommended.

Radiographs in young patients can be used to evaluate unerupted, embedded or impacted teeth as well as developmental anomalies.⁵ They can also be useful in assessing the root structure of supernumerary teeth and missing crowns. Before completing a dental cleaning, radiographs can be used to measure bone loss, diagnose and stage periodontal disease and evaluate changes in the root caused by resorptive lesions or abscesses. Radiographs also provide information in cases where oral trauma, neoplasia or metabolic disease may have caused damage to teeth and bone. Radiographs are particularly useful to provide information on tooth root and periodontal bone structure, which can help you decide if extractions are necessary. And, don't forget to take postextraction radiographs to help confirm complete removal of root tips and provide the location of retained root tips.⁵

With your oral examination complete,

you are now ready to discuss with the Pet owner what therapy is needed. It is very important to get full understanding and consent from the Pet owner before providing extensive dental care, especially if there is any indication that extractions or endodontic procedures are necessary. If anesthesia was needed to obtain the initial oral examination, then you should get a phone number from clients and impress upon them the importance of being able to contact them to discuss your findings before proceeding with any extensive care.

Prevention vs. treatment

Dental disease is progressive and, as with many aspects of medicine, prevention of disease is more beneficial to the patient and less expensive than treatment. In addition, early detection and treatment of oral problems that do arise can help avoid potentially more serious issues in the future (*Table 2*). Ideally, you should perform a routine dental

prophylaxis before cats develop periodontal disease. Routine dental prophylaxes must be performed under general anesthesia to allow better access to caudal teeth and lingual surfaces and to permit subgingival cleaning and polishing. The prophylaxis consists of removing the calculus and plaque from the supragingival and subgingival regions, fine scaling and polishing all accessible surfaces of the teeth (*Figure 3, page 32*). This process will promote a gingival healing response.³

The alternative to routine dental prophylaxes is to intervene only after periodontal disease has progressed beyond stage 2. However, by that point more involved treatment will be required and much of the damage will be permanent. Periodontal bone loss or resorptive lesions may necessitate extraction of a tooth, and severe inflammation may require biopsies or gingivectomy. Those biopsies, in turn, may indicate the need for long-term

Table 2. Long-Term Effects of Oral Lesions.

| Oral lesion | Possible long-term effects |
|-----------------------|---|
| Fracture | Oral pain and possible tooth root abscess. Can lead to decreased ability to chew, decreased appetite and vomiting. |
| Missing crowns | Decreased ability to chew. There may be tooth root remnants that can cause abscessation and/or osteomyelitis. Tooth root remnants can potentiate gingivostomatitis in cats. |
| Gingivitis | Can progress to periodontitis. Can lead to bacteremia as a result of chronic, low-grade bacterial migration to the blood stream. Inflammatory mediators caused by chronic gingivitis or periodontitis can cause injury to the heart, liver and kidneys. |
| Oral masses | Pain, difficulty chewing, ulceration and infection. Possible metastatic spread and/or bone destruction, if neoplastic. |
| FORLs | Severe pain, loss of appetite, hyperventilation, vomiting and pathologic tooth fracture with retained root remnants. |

Table 3. Case Examples of Prevention vs. Response to Progressive Periodontitis**Case 1: Preventive response.**

Lucky is a 7-year-old neutered male domestic shorthair cat presented for a reduced appetite over the last few months. Lucky's owner has been brushing his teeth at least four times a week since he was 8 weeks old, and he's had a dental cleaning annually over the past four years.

Diagnosis. Oral examination reveals that all of Lucky's teeth are present with the exception of the upper left PM2, which was extracted two years ago to remove a FORL. Stage 1 periodontitis is present, as well as one new FORL lesion on the lower left PM3 that is very painful on palpation. Oral radiographs show no evidence of loss of alveolar bone. Dental charting shows a few gingival pockets of 2 to 3 mm that have been stable since prior dental charting. Preanesthetic blood work including a serum chemistry panel and a CBC with a differential are normal.

Outcome. Today's plan is to

clean Lucky's teeth, extract the lower left PM3 and then discharge him with analgesics.

Case 2: Response to progressive periodontitis. Tiger is a 7-year-old neutered male domestic shorthair cat presented for a reduced appetite over a few months time. Tiger's owner has never brushed his teeth, and he has never had a dental cleaning.

Diagnosis. Oral examination finds two FORL lesions, both of which are very painful on palpation. Additionally, there is grade 4 periodontal disease around several teeth with significant gingival recession around the canines (the owner states that Tiger has always seemed to have canine teeth that were bigger than those of other cats). Furcation exposure is obvious on some premolars. There are also areas of gingival masses or hyperplasia.

Oral radiographs show 50 percent to 75 percent alveolar bone loss around several tooth roots. The left mandibu-

lar canine is mobile and has a tooth root abscess, which seems to have potential for a pathologic fracture. Dental charting finds multiple gingival pockets with sizes ranging from 3 to 5 mm and some pockets that appear to extend all the way down the tooth root. Preanesthetic blood work—including a serum chemistry panel and a CBC with a differential—shows mild azotemia, hyperglobulinemia and a leukocytosis with an inflammatory leukogram.

Outcome. Today's plan is to perform additional diagnostics (urinalysis +/- urine protein-creatinine ratio, urine culture and abdominal radiographs +/- ultrasound), to initiate IV fluid therapy prior to anesthesia and to conduct a dental cleaning with extractions and periodontal therapy (using renal-friendly anesthetics). Then we'll discharge Tiger with antibiotics, renal-friendly analgesics and possibly a renal diet, depending on the results of the additional lab work.

medication or full-mouth extractions. While this option may save money in the short-term by delaying the first dental cleaning, over the long-term it will be more detrimental to the Pet's health and expensive for the client. *Table 3* shows two case studies illustrating the difference between preventive

and intervention-oriented dental care.

Ultimately, prevention of dental disease is a fight against plaque. Remember that a cat's teeth will look nice and clean right after a dental prophylaxis, but plaque will start to reappear within hours and will start to mineralize into calculus within two

Feline Toothbrushing 101

The goal for appropriate maintenance of dental health is that clients brush the outer surfaces of a cat's teeth on a daily basis, or three to four times a week at a minimum.

The following describes a process clients can follow to help make brushing a daily routine that their cats will accept. This is a slow process, and clients need to be aware that it will not work if they rush. Cats are not fond of manipulation of their mouths, so a pleasant-tasting dental paste should be used to convince the cat to accept the unpleasant experience of brushing.

Step 1: Buy a veterinary toothpaste in a flavor your cat likes, as well as a finger brush. Flavors available include mint, poultry, tuna and malt. Note that you should not use human toothpaste, as these pastes have detergents and increased peroxide that can make the cat sick if swallowed.

Step 2: Once a day, when your cat is calm, allow it to lick a small amount of the toothpaste off your finger. Continue this step for one to two weeks to establish a pattern of the toothpaste being a daily treat.

Step 3: Start rubbing the paste lightly on the cat's front teeth while it is licking it off. Don't force the issue, and use minimal restraint. If the cat resists, then back off and go back to allowing it to lick it off your finger for a few days. Continue with this step for at least a week or until it allows you to rub its front teeth with no resistance.

Step 4: Start rubbing the rest of the teeth, starting in the front and slowly moving around the sides to the back. Start slowly and move a bit further back each day if the cat doesn't resist. If the cat resists, back up to the previous step and try again more slowly. Continue this until the cat allows you to rub the teeth with no resistance.

Step 5: Use a soft cloth stretched over your finger or a finger brush to rub or brush the teeth. This will be a new sensation, so start in the front of the mouth again and move toward the back a little bit each day. If the cat resists, go back to the prior step and try again more slowly. If you started with a cloth, then switch to the finger brush and repeat the steps.

Step 6: Optional. If the cat has accepted all of the prior steps, you can attempt to use a small veterinary toothbrush next. A finger brush will do a fine job, but a toothbrush may be more convenient for reaching the back teeth, especially if the cat likes the taste of people as much as it does the toothpaste.

days.⁶ This is why home care is so vital to a lifelong dental health plan. Once we examine the oral cavity and ensure that everything is healthy and normal—or address the disease that is present—we can encourage our clients to begin home care. It should be initiated as early in the Pet's life as possible, taking into consideration the current needs of the cat. This will help get Pets used to the treatment and make them accept the dental health plan for life. Home care can consist of brushing teeth multiple times a week, oral rinses and wipes, C.E.T. (Virbac) or other types of dental chew treats and even some toys.⁶

Remember that no home care plan will succeed if the Pet resists. It doesn't take long for a Pet owner to give up after the cat starts hiding under the bed to avoid its daily tooth brushing. While foods, treats and toys can be implemented rapidly, tooth brushing must be a gradual process. It is vital to teach the Pet owner how to gradually introduce tooth brushing to the Pet in order to maximize the likelihood of success (see *Feline Toothbrushing 101*, page 37).

Additionally, multiple feline dental diets are available that promote chewing and remove plaque from the cat's teeth by mechanical action or reduce the formation of calculus by chemical action. These diets can be very useful in cats that develop periodontal disease more rapidly than normal, despite other home care efforts. Some of these are therapeutic diets (e.g., Royal Canin Veterinary Diet™ feline DENTAL DD 27, Hill's® Prescription Diet® t/d® Feline), but some over-the-counter diets are designed to improve dental health as well. Specialty diets may be more expensive than regular dry food, but when compared to loss of long-term health and the cost of more extensive

dental care, they are well worth the price.

Summary

Dental disease is a common finding during routine physical examinations and a common cause of oral pain, vomiting and weight loss in cats. As dental disease progresses, the damage to the gingiva and periodontal tissues becomes permanent and the risk for systemic effects increases. Prevention of dental disease with home care, dental prophylaxes and frequent oral exams to identify disease early is very efficacious and cost-effective. By educating Pet owners and obtaining their cooperation on a life-long dental plan for their Pet, veterinarians have the ability to improve the quality of life for our feline patients and their families. 

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