**Feline Chronic Gingivitis Stomatitis**

**Introduction**

Feline Chronic Gingivitis Stomatitis (FCGS) is a familiar problem in small animal practice. In reality the term covers a wide range of manifestations from the most severe inflammation and ulceration of the whole oral cavity to more focal conditions where inflammation may be confined to specific tissues and locations. It can affect all oral and pharyngeal soft tissues commonly including gingiva, oral and pharyngeal mucosa and the tongue. Inflammation can occasionally be confined to the tissues lateral to the palatoglossal folds -- known as caudal mucositis. When inflammation affects the tissues overlying the teeth (premolars/molars/canines) it is termed alveolar mucositis. The term stomatitis is generally reserved for widespread oral inflammation, beyond gingivitis and periodontal disease that may extend into submucosal tissues. (Source: http://www.avdc.org/nomenclature.html)

This condition is reported to have prevalence in the UK of 0.7% in a study of nearly 5,000 cats by 12 practices (Healey 2007). Anecdotally prevalence appears to be higher, with lesions more intense and severe, in North America and southern Europe.

**Aetiology**

The actual aetiology is thought to be a complex result of reactions involving a number of disparate factors. It has previously been stated that environmental factors, bacterial infection (and the host response to it) acting in combination with viral infection all influence the disease process. (Tenorio 1991: Addie 2003).

One study (Dolieslager 2011) compared the oral bacterial flora in normal and FCGS diseased cats using traditional and culture independent methods (bacterial 16S rRNA gene sequencing) in order to identify novel pathogens and species that may be fastidious and challenging to cultivate. In diseased cats the oral flora was found to be less diverse, compared to normal cats, with *Pasteurella multocida* subsp. *multocida* representing more than half the identifiable flora of the oral cavity in these cats lending credence to the theory that it may be an important factor in the aetiology. A subsequent study by the same group (Dolieslager 2013a) discovered a group of novel and previously identified bacteria that have potential importance in aetiology that warrants further investigation using 16S rRNA gene sequencing.

The major difference between normal and diseased cats appears to be a hyperimmune response to the antigenic burden that is dental and oral plaque (Harley 1999). Low levels of plaque biofilm are able to initiate this abnormal response in susceptible individuals. A study of the innate immune response in both normal and FCGS cats (Dolieslager 2013b) compared that response in the presence of putative pathogens previously identified. The study found a good correlation between the severity of clinical signs and the presence of several of these putative pathogens, including feline calicivirus and *Tannerella forsythia*. Complex inter-reactions occur in affected cats and bacteriology results suggest that opportunistic infections are likely to play a role in influencing the disease process.
With regard to environmental factors, colony cats or those in multi-cat households appear to be more commonly affected early in life. Increased stress levels plus the close proximity of other cats allowing transmission of viruses and other microorganisms are most likely to be significant factors.

Many studies report a level above 70% of chronically affected individuals (showing signs for over 6 months) testing positive to virus isolation following oropharyngeal swabbing for feline calicivirus. (Knowles 1989, Thomson 1984, Harbour 1991). The actual significance of this, within the syndrome, is not accurately known. It is possible that the virus damages cell membranes allowing easier antigenic penetration by other agents. However, other co-factors are necessary before this virus can cause disease as FCV carriage in the cat population is around 20-30% (Knowles 1989, Zicola 2009). One study (Hennet & Boucrault-Baralon, 2005) felt that the distribution of lesion in FVC positive cats to be more frequently associated with caudal mucositis. The relationship between calici infection and FCGS appears strong with 70-90% of chronic stomatitis cats testing positive compared with 20% of general population cats (Knowles 1989, Harbour 1991).

Feline Immunodeficiency Virus (FIV) infection may also have a role to play by predisposing the cat to secondary infections. Both FIV and FeLV contribute to an aberrant immune response to oral antigens but one study (Dolieslager 2011) showed a group of FCGS cats to have 4% prevalence for testing positive FIV and FeLV. This is similar to the UK cat population as a whole. It has been reported that the relationship between FCV and FIV appears strong but the association between the two has never been established for FCGS cats. (Knowles 1989 and 1991)

Pre-existing dental disease of any form can also have an exacerbating effect on the syndrome. Conditions such as periodontal disease, tooth resorption lesions or both, are important contributing to the overall hyperimmune response. Paradoxically the condition is often present in the absence of significant accumulation of calculus on the teeth.

Clinical Presentation

The syndrome can be seen at three distinct times in a cat’s life.

1. At the time of kitten vaccinations, oral inflammation can occasionally be seen. Whether this is an immune response to vaccinal elements or to the eruption of deciduous dentition and consequential increased levels in dental plaque is not known. The inflammation is generally transient and generally resolves with improved oral hygiene.

2. The second period to see an increase in oral inflammation levels is when the permanent teeth erupt. This is very commonly a time that gingival inflammation levels can be severe, even in normal cats. Cats with lesions beyond the gingiva require improved oral hygiene to both resolve the inflammation and prevent permanent tissue changes such as gingival recession or gingival hyperplasia.

3. The largest group of affected cats is seen later in life with a mean age of 7 years (Johnston 2012).
Adult cases of FCGS syndrome present a wide range of severity and location of clinical signs. The implication is that some cats have a very low threshold to the driving aetiological factors(s) whilst others have a higher threshold approaching the level for normal cats.

Most cats present with dysphagia and pain due to extensive oral inflammation and ulceration of the soft tissues. In some cases it can be hard to understand how the individual eats or functions normally with such extensive oral inflammation. Severely affected cats are often unkempt as grooming is hard or impossible with severe oral pain. Weight loss may also be a feature but many cats with advanced disease do maintain a normal weight.

Inflammatory lesions may involve some or all of the oral soft tissues. Most severe cases present with inflammation and ulceration of the tissues lateral to the palatoglossal folds (caudal mucositis) in addition to the gingiva and mucosa overlying the cheek teeth (alveolar mucositis). Sublingual mucositis can also be present and, also, contact mucositis describing lesions secondary to soft tissue contact with a tooth surface - also known previously as “contact ulcers” or “kissing ulcers”. The pharynx, tongue and mandibular molar salivary glands can also be affected in severe cases.

Halitosis is often marked and cats may drool thick, tenacious saliva. The submandibular lymph nodes are often markedly swollen and palpation is resented.

**Diagnostic Pathway**

A standard, systematic, diagnostic approach is best performed early in the case progression before irreversible changes take place and to ensure samples are collected at a time when the results are of most use.

- **Review the general medical and specific oral history**

- **Perform a full clinical examination.** Cats may present initially with weight loss and poorly thrive. Although the oral cavity may be by far the most obvious reason for concern a full examination is still required to eliminate other conditions.

- **Perform a full examination of the head and mouth** - Many cats resent a thorough oral examination and this may be best performed under anaesthesia.

- **Score the oral soft tissues using the standard method (e.g. Stomatitis Disease Activity Index sheet and chart (Table 1/Table 2/Table 3)**

  Scoring the lesions for location and severity at each examination allows the clinician to establish the severity of clinical signs and assign a score. As time passes the success or otherwise of treatments can be measured. The time taken is minimal but it provides very useful prognostic information. The score sheet is based on one designed by Lommer in her cyclosporine study (2013).

- **Blood tests for Haematology/Biochemistry:** A study (Hennet 1997) reported 10% of affected cats with chronic renal failure. Any underlying systemic disease may significantly affect the prognosis or the safety of anaesthetic protocols and other drugs (e.g. long term NSAID’s)
• **Virus testing:** Testing for FCV assists prognosis. Additional tests for retroviruses (FIV, FeLV) are advised to ensure that there are no contraindications to subsequent therapy.

• **Bacteriology:** Bacteria are a known co-factor in the aetiology of this condition. Cats with FCGS have a less diverse flora than normal cats and a high proportion of cats tested show Pasteurella multocida to be the dominant species *(Dolieslager 2011).* In addition Tannerella forsythia - if found - is considered a putative pathogen *(Dolieslager 2013b).* Test for both aerobic and anaerobic species. Check with your lab what swab material and transport medium they might require.

• **Biopsy:** Histopathology of affected areas often yields little useful information with a high proportion of lymphocytes and plasma cells often found with a non-specific diagnosis given. However before treatment alters the tissue cell content it is important to eliminate neoplasms (e.g. Sq. Cell Carcinoma, Lymphoma etc.) and other immunopathologies. This is very important if lesions are not symmetrical. Sending tissue to a laboratory that is used to reviewing oral lesions is wise.

• **Dental chart and full mouth dental radiographic survey.** For any dental procedure the use of a chart is both useful and necessary in every case to ensure all teeth and tissues are assessed for abnormal findings with all “missing” teeth examined to locate any retained or broken root tips or those with resorptive lesions. The diagnostic yield of full mouth radiographs in cats is very significant. Studies show they reveal clinical hidden pathology in 42% cats with an otherwise “normal” mouth and additional pathology in 54% of cats in mouths with abnormal findings. *(Verstraete 1998)*

**Clinical Management**

It must be understood that the primary role of the clinician in the treatment and management of FCGS is to reduce the burden of oral antigen on a long term basis and simultaneously improve the welfare of the patient by reducing the considerable pain that these cats endure and eliminate or improve the inflammation of the oral soft tissues.

In addition to the diagnostic tests advised above, the most important first step in all cases is to scale/polish the teeth and remove those with no future. Some cats respond very well to routine dentistry and improved hygiene alone, while others will respond poorly to any treatment. The aim is to restore the balance between the immune response and the oral antigen burden. In effect this means zero tolerance of both existing dental disease and of bacterial plaque.

If teeth are affected by advanced periodontal disease they are best removed. Similarly teeth affected by tooth resorption lesions should be removed at this stage using a technique suitable for resorption type. Teeth affected by Type 1 resorption should be removed conventionally. Teeth affected by Type 2 or Type 3 lesions may be suitable for crown amputation depending on radiographic diagnosis.

Antibiotics are initially useful in most cases to control excessive inflammation and allow soft tissues to heal after surgery. Until bacteriology results are available, the initial choice should include agents with a good aerobic and anaerobic spectrum that work in the presence of pus and penetrate bone. For most cases this initially means clindamycin at 11mg/kg/day for up to 14 days. Oral treatment can be challenging for owners when the mouth is very painful.
Aneuctally keeping capsules in the fridge and rolling the powder into butter balls can help the owner administer them orally. It should also be noted that some cats may culture P. multocida which is clindamycin resistant (Unpublished data). Some clinicians find Cefovecin useful as it provides 14 days therapy from a single injection and has good activity against Pasteurella species.

Chlorhexidine provides the most effective oral antisepsis in these cases - both short and long term. Chlorhexidine used once or twice daily will provide excellent post-operative plaque control and aid in reducing the antigenic burden. Finding a suitable product for cats can be a problem due to the bitter taste many formulations seem to have and the withdrawal of Parodongyl paste in 2012. Bright Bark & Meow™ paste from Keystone Industries (www.krpvet.com) appears to be acceptable to most cats. The paste can be wiped inside lips twice daily - or brushed if the cat will allow it. An alternative product from the same manufacturer is PetORALeeze™ spray. Oral disinfection with a suitable chlorhexidine product twice daily is one of the most important and effective measures available. Treatment may well be lifelong.

All cases should be re-assessed in 7-10 days:

If improved - continue chlorhexidine twice daily and review in 4 weeks and subsequently as
required. Advise the owner that more frequent scaling and polishing intervals will probably
be necessary - perhaps up to 3-4 per annum. The need for professional dental cleaning is
signalled when the daily use of chlorhexidine is failing to control the inflammation
adequately.

If not improved - move to elective extraction of all cheek teeth as soon as possible. The
rational is that if the tissues fail to respond (by reduction of inflammation and pain) within 2-
4 weeks despite the best hygiene we can provide, elective surgical extraction of all the cheek
teeth should follow without delay. Although many clinicians and owners are reluctant to take
this step at this time, studies over the last 15 years (Hennet 1997: Girard 2005: Bellei 2008)
consistently show the benefit of this procedure. In general 50% of cases requiring no further
treatment to resolve their signs and a further 37% need only low levels of inflammation
support but being markedly better than before. With the benefit ratio of around 9 out of 10
cases improving it is hard to argue against this step from a welfare point of view.

Elective surgical extraction of whole cheek teeth quadrants should not be undertaken lightly.
Consideration should also be made as to whether surgery should or could be performed in
one session. If teeth are excessively mobile, or otherwise easy to extract, one session is
preferable. On the contrary, if the surgery is challenging, it may be best to utilise two sessions
out of consideration to both patient comfort and recovery and, also, operator fatigue. Surgical
extraction, utilising mucogingival pedicle flaps, allows removal of bone and improves access
to the root furcation area. This allows sectioning of multirooted teeth and removal of
individual roots. Closure of flaps in a tension free manner improves post-operative comfort
markedly.

Post-operative management

Analgesia: Morphine or methadone are powerful analgesics for premedication and post-
operative analgesia. Some reports mention dysphoria and hyperthermia in cats post op but
this has not been experienced by the author. Regional analgesia using mepivacaine or bupivacaine is also effective in a multi-modal regime. A NSAID, such as meloxicam, with due regard to the dose recommendations is also useful in addition to, but not instead of, opiates.

Buprenorphine is considered good for moderate to severe pain in cats at 1ml per 15kg every 8 to 12 hours. Owners can administer this analgesic very easily by mouth for transmucosal absorption if the correct dose is dispensed prefilled in 1ml syringes for up to five days post op.

**Antibiotics:** As the primary condition is a hyperimmune reaction to mixed oral antigen, antibiotics by themselves give minimal success. In the perioperative period, they will guard against opportunist infection and are often best started pre-operatively. The selected drug should have good activity in bone and on anaerobic bacteria. Clindamycin, potentiated amoxicillin or Cefovecin (if oral administration is a problem) are the drugs of choice in most cases. Many Pasteurella species are resistant to clindamycin but post extraction it is a good choice as bone has been exposed.

**Feeding:** Nutritional assistance may be necessary short or medium term. In very severe cases it may be necessary to consider oesophagostomy feeding or assisted oral feeding in hospital in others. If fluid intake is sub-optimal, this should be addressed also. Most cats do better at home if the owner is able to provide active help. Favourite soft foods (pilchards in tomato sauce) may be necessary for three to five days post-op.

**Other Anti-inflammatory or Immunomodulation Therapies**

In the past there have been many drugs and therapies advocated for this condition. Most have only anecdotal evidence to support them or the studies are based on very low case numbers. As a result clinicians often find treatment of difficult cases frustrating.

**Feline Recombinant Interferon Omega (Virbagen: Virbac)**

A number of studies have reported using interferon successfully. Long term follow up appears to indicate that it exceeds the potential of other treatments for this condition ([Southerden 2006, Gracis 2010](#)).

Results in a study of 39 cats indicated that feline recombinant interferon is an effective treatment, particularly in the group of cats which are FCV positive and are non-responders to elective extraction. ([Hennet 2011](#)). Our own studies over six years confirm that feline recombinant interferon is able to reduce inflammation and improve comfort levels in the group of cats that are non-responsive to elective cheek teeth extraction ([Johnston 2012](#)). Often the success of interferon allows clinicians to drop less effective treatment regimes. The trend is for oral administration by the owner and this appears to be more effective and cheaper than injections – either subcutaneous or intralesional.

**Transmucosal oral use:** Interferon given per os is believed to work by initiating a cytokine cascade when it comes into contact with oral mucosal cells to provide an immunomodulatory effect over a long period of time. The cascade then has distant effects.
A 10M U vial is reconstituted as directed and injected into a 100ml bag of sterile saline. Ten fractions of 10ml are withdrawn into individual bottles, which are then frozen. Whilst frozen they have a shelf life of one year. The first 10ml fraction in use can be refrigerated to provide a dose of 1ml per os per cat per day. This is a daily dose of 100,000 IU of interferon. This fraction has a shelf life of three weeks. The owner continues to give 1ml per day **using alternate sides of the mouth** until all the fractions are used. Ideally, treatment lasts for 100 days at which point the case is re-assessed and scored.

After the first course (three months), the progress should be reassessed using the **Stomatitis Disease Activity Index (SDAI)** scoring system – table 2. Cats can be re-swabbed for calici virus carriage in the oropharynx at this time but few cats (14%) became FCV negative in our study. In some cases a second course of 100 days is required but no case has yet required a third course in our experience.

### Preliminary results of interferon therapy in a long term study of 29 cats (2007 to 2012)

- Breed: Cats presented with FCGS were CDSH 62% and pedigree 38%
- Age: Mean age at presentation was 6 years 7 months with 60% male/n and 40% female/n
- Calici: 69% of cats tested positive for FCV on first presentation (virus isolation on oral swab).
- Only 13.8% cats initially testing positive to FCV became negative after INF treatment.

Success rates were measured using the SDAI score sheets.

- A successful outcome was considered to be an SDAI score of 5 or less at revisit.
- A cure was defined as an SDAI score of 2 or less.
- Improvement was defined as a 50% reduction in initial SDAI score. (NB; a cat with moderate gingivitis would score around 4 on an SDAI sheet).

**FCV negative group (n=9):** 9 cats (100%) scored <5 (successful outcome) at 3 month revisit. (6 of these cats (66%) also scored <2 at 3 months revisit = cure)

**FCV positive group (n=20):** 15 cats (75%) scored less than 5 at 3 month revisit - success. (8 of these cats (40%) also scored <2 at 3 month revisit = cure) 5 cats (25%) improved but did not score <5.

### Corticosteroids

This group of drugs are used to control inflammation in refractive cases which have had elective cheek teeth extraction and are not sufficiently controlled by feline recombinant
interferon. Used as rescue therapy, their use is mainly justified on welfare grounds at the minimum effective dose rate. A short acting molecule, such as prednisolone, at a dose rate of 5mg twice weekly or 2mg every other day tapering downwards. They can be used in conjunction with feline recombinant interferon omega.

**NSAID’s**

NSAID’s do not provide sufficient pain control or inflammation reduction to justify their use in the author’s opinion. If used, the best option appears to be meloxicam with robenacoxib reported as showing some promise. Any NSAID needs to be prescribed with due regard to the appropriate guidelines for use of long term NSAIDs in cats (*Sparkes 2010*).

**Cyclosporine**

Cyclosporine is used to control the signs of FCGS, mainly in countries where feline recombinant interferon omega is not available. A recent study of 16 cats (*Lommer 2013*) reported significant improvement in SDAI scores in most cats. The cats in this study did not receive a commercial product but a micro emulsified liquid formulation compounded by a pharmacy using a tuna flavoured fish oil base. All but one owner managed to administer the medication easily.

Bioavailability of orally administered cyclosporine has been a challenge previously. In this study the micro-emulsified formula improved bioavailability but where trough whole blood levels of cyclosporine dropped below 300ng/ml the oral dose had to be increased to obtain this level.

**CO2 laser surgery**

There is not enough objective and peer reviewed data to recommend CO2 laser use routinely in the management of FCGS syndrome. It may have possible role with adjunctive pain control. One single cat case study concluded that the use of a CO2 laser assisted recovery of soft tissues after extraction therapy but would not have been as useful as a monotherapy (*Lewis 2007*).

**Nutritional Support**

Good quality nutritional support can encourage an effective immunological response and post-extraction healing process. Various diets and supplements have been suggested, including vitamin preparations and omega-3 polyunsaturated fatty acids (PUFA), but there is no study which has data to prove a recommendation for any specific product. Some cats receiving placebo treatment in the Lommer study showed an unexpected improvement, possibly due to the fish oil, high in omega 3 polyunsaturated fatty acids, providing an anti-inflammatory and immunomodulatory effect. There is also anecdotal evidence that use of diets or supplements high in omega 3 EFA’s affects platelet function and can result in excessive haemorrhage during extraction surgery.
**Summary**

Feline Chronic Gingivitis Stomatitis is a poorly defined syndrome characterised by focal or a diffuse chronic inflammatory response involving the gingiva, oral mucosa, and frequently the pharynx, tongue and other oral soft tissues.

The actual aetiology is thought to be a complex result of reactions involving a number of factors including environmental, bacterial, plus an aberrant host response in combination with viral infection.

Studies show the bacterial population of the mouth is less diverse in affected cats and that certain bacteria (Tannerella forsythia) can influence the severity of the immune reaction. There is a correlation between the severity of clinical signs and the presence of putative pathogens, including feline calicivirus and T. forsythia. Opportunistic infections also play a role in influencing the disease process. The major difference between normal and diseased cats appears to be a hyperimmune response to the antigenic burden that is dental and oral plaque with low levels of biofilm able to initiate a disproportionately high response in susceptible individuals.

Successful management of this complex syndrome requires a logical diagnostic approach. A treatment plan must include improved oral hygiene in addition to professional scaling, polishing, subgingival debridement and attention to existing dental disease. The owner should be aware that aggressive homecare will also be required.

Cases failing to respond to professional plaque control should be considered for elective cheek teeth extraction and adjunctive treatments at an early date. Cases still non-responsive can be helped by immunomodulatory therapy which may include daily oral interferon therapy.

It is important that the owner is involved at an early stage with discussions as to prognosis, treatment plans and help with homecare. A highly motivated owner is a strong ally in the provision of successful treatment.
# Table 1

INITIAL EVALUATION FORM: STOMATITIS DISEASE ACTIVITY INDEX

**PATIENT:** _____________________________________________________________

**DATE:** __________  **WEIGHT TODAY:** _________

**DIET:** _______________________________________________________________

**CLIENT REPORT:** Please evaluate the following (circle one number for each of the following criteria):

1. **Appetite:** 3 = eats only pureed food, or only when hand fed  2 = eats wet food on his/her own; cannot eat dry food  1 = eating wet and dry food, but less than normal amount.  0 = eating normally

2. **Activity level:** 3 = no interest in people or other pets, spends most of time sleeping  2 = low activity level, but will play occasionally when engaged by people or other pets  1 = plays spontaneously, but not frequently  0 = normal activity level (playful and active)

3. **Grooming behavior:** 3 = will not groom  2 = grooms occasionally but not at ‘pre-illness’ level  1 = grooming excessively  0 = grooming normally

4. **Perceived comfort:** On a scale of 0-3, with 0 being most comfortable and 3 being most painful, rank your cat’s present comfort level: _______

**VET EVALUATION:**

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<tr>
<th>STOMATITIS DISEASE ACTIVITY INDEX</th>
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<td>Owner’s evaluation (average appetite/activity/grooming)</td>
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<td>Oropharyngeal inflammation</td>
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<td>Lingual and/or sublingual inflammation</td>
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**TOTAL SCORE** (max = 30)

*Owner evaluation: average of the circled values above for 1, 2 and 3.*

*Inflammation of oral cavity sites: 0 = none  1 = mild  2 = moderate  3 = severe*
Table 2

RECHECK EVALUATION FORM: STOMATITIS DISEASE ACTIVITY INDEX

PATIENT: _________________________________________________________

RECHECK DATE: __________    LAST VISIT: _________________

WEIGHT TODAY: _________

<table>
<thead>
<tr>
<th>STOMATITIS DISEASE ACTIVITY INDEX</th>
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<td>Oropharyngeal inflammation</td>
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<td>Lingual and/or sublingual inflammation</td>
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**TOTAL SCORE (maximum = 30**

WEIGHT TODAY: _________
# Table 3

## Feline Dental Chart

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<th>DATE</th>
<th>ANIMAL'S NAME</th>
<th>OWNER'S NAME</th>
<th>BREED</th>
<th>AGE</th>
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### Buccal

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<td>GI</td>
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### Buccal

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<tr>
<td>Other</td>
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### Recommendations

**DIAGNOSIS**

- #1: Missing tooth
- #2: Enamel hypoplasia
- #3: Gingivitis
- #4: Moderate dental calculus

**TREATMENT**

- #1: Extraction of tooth
- #2: Gently remove calculus
- #3: Administer antibiotic

**DENTAL LEADERSHIP**

Produced by Pfizer Animal Health with the kind assistance of Norman W. Johnson and the Pfizer team.


Gracias M Controlled study using a modified 2x2 cross-over design to compare the efficacy of recombinant feline interferon omega and prednisolone in refractory feline chronic gingivostomatitis Proceedings 19TH European Congress of Veterinary Dentistry 2010, p192


Hennet P. Chronic gingivostomatitis in cats: Long-term follow-up of 30 cases treated by dental extractions J Vet Dent 1997; 14: 15-21

Hennet P, Boucrault-Baralon C. Relationship between oral Calici virus and Herpes virus carriage and palatoglossitis lesions. Proceedings 19th Veterinary Dental Forum 2005 p443


Lommer MJ. Efficacy of Cyclosporine for Chronic Refractory Stomatitis in Cats: A Randomized, Placebo-Controlled, Double Blinded Clinical Study. J Vet Dent 2013 (30) 1, pp8-17


