# **Exotic Companion Mammal Dentistry**

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### Terminology

- Herbivorous rodent: refers primarily to the guinea pig and chinchilla in this paper
- Elodont: Continuously growing teeth that do not develop anatomical roots (also called aradicular as in the incisor and cheek teeth of the rabbit)
- Hypodont: long-crowned teeth
- Anelodont: Teeth with a limited period of growth
- Brachydont: Short-crowned teeth
- Peg teeth: A much smaller second pair of incisors that lie directly behind the visible upper incisors.
- Cheek teeth: Includes all the premolars and molar teeth which are visually indistinguishable.
- Clinical Crown: Exposed portion of the tooth above the gingival margin
- Reserve Crown: In a hypsodont tooth, the part of the crown below the gingival margin
- Root: For the rabbit the embedded reserve crown of aradicular hypsodont teeth is often referred
- to (improperly) as the "root"

# Rabbit dental disease

The rabbit dental formula is: 2I OC 3P 3M = 28

### 1I 0C 2P 3M

Numerous writings on rabbit dental disease have been published in the past decade with entire texts [Rabbit and Rodent Dentistry 2005, Zoological Education Network] and journals [Journal of Exotic Pet Medicine 2008; 17(2)] being devoted to the subject. Rabbits and herbivorous rodents have continuously growing teeth making them susceptible to dental developmental problems throughout their lives. It is important to remember the direct association between diet and rabbit dental disease. Elodont teeth are worn during normal chewing activity, effectively reducing the length of the clinical crown and allowing the reserve crown to replace the worn portion. This feature allows the rabbit to continuously replace the occlusal surface of the teeth when fed free-choice grass hay which stimulates this prolonged chewing. Alternatively feeding a diet of pellets and grains alone fails to stimulate the full chewing action and jaw movement necessary to prevent acquired dental disease. Acquired dental disease most commonly manifests as uneven tooth wear and resulting painful molar spurs or points. Alternatively, as the rabbit ages, the cheek teeth may grow at different rates resulting in uneven overgrowth known as step mouth. Either of these conditions will result in oral pain, increased salivation, decreased food intake/dysphagia and general loss of condition. Overgrowth and elongation of the clinical crown may be accompanied by elongation of the reserve crown and extension of the tooth apices into the periapical tissues (apical elongation). This can lead to palpable swellings on the ventral surface of the mandible. Ephiphora, exophthalmos, and conjunctivitis develop when the zygomatic process of the maxilla and the floor of the orbit become involved. Metabolic bone disease associated with a poor diet and inadequate calcium, vitamin D and natural sunlight has also been incriminated as a cause of malocclusion, overgrown dental roots and mandibular abscesses.

A variety of special instruments have been designed to enhance visualization of the oral cavity and aid in treatment of dental disease in rabbits and smaller herbivorous species. The rabbit and herbivorous rodent oral anatomy including the fleshy tongue, buccal skin folds, a long and narrow oral cavity and caudally placed cheek teeth make oral examination of the non-anesthetized patient difficult to impossible. When history and physical examination findings suggest dental disease, general anesthesia for thorough oral examination is indicated. General loss of condition, decreased appetite, digestive disturbances and ocular discharge may all be associated with dental disease in these species. The author finds the following invaluable in assessing and treating dental disease in the rabbit, guinea pig and chinchilla:

- Skull radiographs, preferably 6 views that evaluate lateral, ventrodorsal, dorsoventral,
- rostrocaudal, and right and left lateral oblique projections, are an invaluable aid in
- assessing dental health.
- To aid in the visualization of the teeth use specialized dental tools such as the oral dental speculum, inserted between the incisor teeth and in order to open the mouth from top to bottom, and cheek dilators that have spatulated wings that open the mouth from side to side with a spring action.
- Many veterinarians prefer to use a specially designed dental platform, the rodent table retractor restrainer, which allows hands-free elevation of the head and opening of the mouth.
- A stainless steel spatula, used to move oral soft tissues, allows for visual assessment of the premolars and molars and protects the oral mucosa and tongue during filing or burring of teeth.
- A high speed dental drill is the preferred method of trimming or filing of overgrown incisors, in order to properly shape and contour teeth with minimal damage to the reserve crown located below the gum line.
- A diamond coated rasp may be used to manually smooth small dental points and spurs.
- Alternatively a low speed burr attachment is available from IM3 (IM3 Pty Ltd, Lane Cove, NSW Australia) and serves as a great tool for the atraumatic filing of overgown cheek teeth.

- In rabbit oral surgery where endotracheal intubation will interfere with visualization and access; injectable maintenance anesthesia using drugs such as medetomidine alone (80-120µg/kg) or in combination with ketamine (25-30mg-kg) is preferred by many rabbit oral surgeons.
- Use of local anesthetic dental blocks with approaches extrapolated from those used in dogs and cats and a knowledge of rabbit skull anatomy. The author uses faster-onset 2% lidocaine (Vedco, Inc. St. Joseph MO) mixed with slow onset 0.5% bupivicaine (Hospira, Inc. Lake Forest, IL) at a rate of 1 mg/kg body weight for each drug and dilutes with saline to a final volume of 1 ml.
- Elongation of the incisors is due to three main causes: decreased gnawing due to poor diet or lack of suitable chewing substrate (this applies more to the herbivorous rodents vs.the rabbit), trauma that results in misalignment, or faulty genetics that results in dolicognathia or brachygnathia. Husbandry and dietary changes along with trimmings at regular intervals may control all three causes. Extraction of the incisor teeth is recommended for long term resolution of persistent incisor malocclusion in rabbits and herbivorous rodents.
- Periapical infection with abscessation and osteomyelitis require aggressive and prolonged therapy. The author has found the following to be the key to long term resolution; extract all diseased teeth associated with the abscess, thoroughly debride necrotic and infected jaw or skull bone tissue, when possible; marsupialize abscess to facial skin and treat as an open wound. Pack marsupial site gauze strips impregnated with antibiotics, preferably based on bacterial culture and antibiotic sensitivity and the proclivity of anaerobic bacteria. Change packing and flush daily or every other day until healing and wound granulation and contracture occur. If marsupial site healing is delayed use medicinal grade honey to pack marsupial site and discourage local infection.
- Facial dermatitis as a result of chronic epiphora secondary to dacryocystitis is not uncommon in the rabbit. Many times this is in association with elongated incisor tooth roots and blockage of the nasolacrimal system. A topical ophthalmic anesthetic can be applied and in the sedated patient a 23 ga (0,64mm) lacrimal canula, or small plastic irrigating canula can be used to canulate the *punctum lacrimale* in the medial canthus for gentle flushing with saline. This will help remove purulent debris and possibly relieve any blockage. This same cannulation technique can be used to infuse iodine-based contrast media in order to perform a contrast study to confirm severity of the blockage and aid in prognosis and long term management.

# Guinea pig and chinchilla dentition: elodont, hypsodont

#### Dental formula: 1I OC 1P 3M = 20

1I OC 1P 3M

Guinea pig and chinchillas are also true herbivores and benefit from a diet rich in abrasive foods (such as grass hays) which stimulate the prolonged chewing that keep the cheek teeth in wear. As in the rabbit, the length of the clinical crown is worn through this normal chewing action. Malocclusion and elongation of cheek teeth may also result from an abnormal incisor relationship or anisognathia (variation in width between maxillary and mandibular dental arcade). In the guinea pig the cheek teeth occlusal planes are at an angle of about 30 degrees to the horizontal plane, whereas this occlusal surface is nearly horizontal in the chinchilla. Cheek tooth clinical crown elongation as described above in the rabbit is also commonly seen in the guinea pig and chinchilla as the result of insufficient tooth wear. Sharp enamel points or spurs on the buccal and lingual surfaces of the maxillary and mandibular cheek teeth respectively, can cause mucosal irritation, ptyalism, and oral pain. In addition, guinea pigs may suffer from marked overgrowth of the cheek teeth which often lead to inability to fully close the mouth, rostral displacement of the lower jaw, and weight loss. The mandibular premolar teeth often grow across and trap the tongue.

Apical elongation of the reserve crown tends to be less severe in the guinea pig, but is not uncommon in the chinchilla. In the mandible the apical elongation causes the tooth to impinge on the ventral cortex which induces bone remodeling resulting in palpable swellings in the ventral mandible. The swellings may be painful. Maxillary apical elongations may extend into the nasal cavity or orbital bones and may cause pain, nasal and ocular discharge and epiphora.

#### Hamster and rat dentition: Elodont, hypsodont incisors/ anelodont brachydont molars

Dental formula: 1I 0C 0P 3M = 16

1I OC OP 3M

The most common dental problem seen by the author in these species is maloclusion and subsequent overgrowth of the incisor teeth. This overgrowth is usually related to primary congenital deviation or acquired as the result of trauma resulting from the constant chewing of cage bars and tooth fractures which can interfere with normal tooth eruption. Overgrown incisors can be intermittently trimmed and filed with a high speed dental drill. As this is a chronic recurring problem some clinicians choose to extract the incisors for long term resolution.

#### The ferret

Eruption of permanent teeth is normally completed between 42-77 days after birth.

Adult dental formula: 3I 1C 3P 1M = 34

3I 1C 3P 2M

Domestic ferrets are commonly used as animal models for research of human oral conditions. One study (Eroshin VV, et al) evaluated the prevalence of oral pathology in rescued ferrets with oral examination being performed on 63 ferrets, of which 49 underwent general anesthesia for further examination. The most common clinical findings included malocclusion of mandibular second incisor teeth (95.2%); extrusion\* of canine teeth (93.7%); and abrasion and attrition of teeth (76.2%). Tooth fractures were exclusively associated with canine teeth and found in 31.7% of ferrets.

Pulp exposure was confirmed in 60.0% of fractured teeth. The normal gingival sulcus depth measured < 0.5-mm in 87.8% of anesthetized ferrets. Clinical evidence of periodontal disease was present in 65.3% of anesthetized ferrets (gingivitis or probing depths > 0.5-m, however advanced periodontal disease (i.e. periodontal pockets > 2-mm or stage 3 furcation exposure) was not found upon clinical examination. There was no evidence of tooth resorption, dental caries, stomatitis, or oral tumors in the examined group of ferrets.

\*Tooth extrusion was defined as supragingival positioning of the suspected cementoenamel junction (junction of the conical and cylindrical portions of the tooth) with exposure of up to 3-mm of the cylindrical portion of the tooth in the absence of gingival recession. This may be explained either by idiopathic tooth extrusion similar to that seen in domestic cats, or may represent a normal anatomic variation in the ferret.

The author's experience with ferret dental disease agrees with the findings in this study. Lingual displacement of the mandibular second incisor teeth is a common "malocclusion" in the ferret is not associated with clinical discomfort and may be a normal anatomic variation. The high incidence of canine tooth fractures in the ferret may be the result of abnormal chewing behavior exacerbated by cage confinement and the resulting chewing on wire mesh. Environmental enrichment may reduce the incidence of this self trauma behavior. Oral tumors are uncommon in the ferret, but oral squamous cell carcinoma and odontoma have both been diagnosed in the author's practice. As well, the author has diagnosed resorptive neck lesions involving both the maxillary and mandibular premolars.

In the ferret, professional dental cleaning, including supra- and subgingival ultrasonic scaling and polishing of teeth, extractions, and dental radiographs are all performed in a similar fashion as the dog and cat. Also similar to dogs and cats, complicated tooth fractures in ferrets can lead to pulpitis and pulp necrosis with possible periapical infection. Worn and fractured teeth without pulp exposure may also be at risk of endodontic disease with affected ferrets showing signs of discomfort. The treatment of choice for complicated crown fractures is endodontic treatment or extraction. Open extraction procedures are similar to the dog and cat (ie, mucoperiosteal flap creation, partial aveolectomy, elevation of the tooth, and closure of the extraction site), keeping in mind that the oral mucosa of the ferret is extremely thin necessitating gentle handling of flap tissue.

#### References

Capello V, Gracis M. The Rabbit and Rodent Handbook, Zoological Education Network, 2005.

Reiter AM. Pathophysiology of dental disease in the rabbit, guinea pig and chinchilla. Journal of Exotic Pet Medicine 2008, 17(2): 70-77.

Harcourt- Brown FM: The progressive syndrome of acquired dental disease in rabbits. In; Rabbits (Harcourt- Brown FM, ed) Journal of Exotic Pet Medicine 2007,

16(3): 146-157.

Lennox AM: Clinical techniques: small exotic companion mammal dentistry—anesthetic considerations. In: Dentistry of Exotic Companion Mammals (Capello V, Lennox AM, eds.), Journal of Exotic Pet Medicine 17(2): 102-113, 2008

Boehmer E, Boettcher P, Matis U: Zur intbation des kaninchens unter praxisbedingungen. Tierarztl Prax 30(K): 370-378, 2002 (in German)

Legendre LFJ. Oral disorders of exotic rodents. VCNA, Exotic Animal Practice 2003, 6(3): 601-628.

Taylor WM: Treatment of odontogenic abscesses in pet rabbits with a wound-packing technique: long term outcomes. AEMV Scientific Proceedings 103-104, 2008 Tyrrell KM, Citron DM, Jenkins JR, et al: Periodontal bacteria in rabbit mandibular and maxillary abscesses. Journal of Clinical Microbiology 40(3):1044-1047, 2002 Kelleher S: Wound and abscess management in rabbits. Exotic DVM 2(3): 49-51, 2000

Mathews K, Binnington AG: Wound management using honey. Compendium of Continuing Education for Veterinarians 24(1): 53-60, 2002.

Church B. Ferret dentition and pathology. In: Lewington JH. Ferret husbandry, medicine and surgery. (Lewington JH, ed.), Saunders Elsevier 2007; 467-485.

Eroshin VV, Reiter AM, Rosenthal K, et al. Oral examination results in rescued ferrets: clinical findings, JVet Dent, 2011, 28(1):8-15.