Introduction
Oral tumors are common in cats and dogs. They may be of dental (odontogenic) or non-dental origin. In dogs, peripheral odontogenic fibroma, acanthomatous ameloblastoma, malignant melanoma, squamous cell carcinoma and fibrosarcoma are most commonly diagnosed in the mouth. In cats, the predominant oral tumors are squamous cell carcinoma and fibrosarcoma.

Benign Lesions
Papillomas are viral-induced, cauliflower-like whitish lesions at mucous membranes and mucocutaneous junctions of the mouth. They occur in dogs less than one year of age and often resolve spontaneously in 1-3 months (unless the patient is immunocompromised). Peripheral odontogenic fibromas are mixed odontogenic tumors and are often located in the gingiva near incisor, canine or premolar teeth. The ossifying type (previously called ossifying epulis) is distinguished from the fibromatous type (previously called fibromatous epulis) by containing varying amounts of bone or dental hard tissue within the tumor’s soft tissue. These tumors are excised together with extraction of the involved tooth and thorough curettage of its alveolus.

Ameloblastomas are epithelial odontogenic tumors. The canine acanthomatous ameloblastoma (previously called acanthomatous epulis) is a locally invasive tumor causing bone lysis around tooth roots and cystic changes. However, it does not metastasize and is therefore considered to be benign. It often has a rough cauliflower-like surface and may sometimes be similar in appearance to a squamous cell carcinoma. It occurs most commonly in the incisor and canine tooth area of the lower or upper jaw, and less commonly in the carnassial tooth area of the lower or upper jaw. Treatment is mandibulectomy and maxillectomy.

Odontomas are not true neoplasms but a conglomerate of disorganized, normal tissue cells. Enamel, dentin, cementum, and small tooth-like structures may compose the mass. Lesions with characteristics resembling normal teeth are considered compound odontomas, whereas complex odontomas have a more disorganized arrangement. Other benign oral tumors that are less common include the feline inductive odontogenic tumor (cats only), amyloid-producing odontogenic tumor, giant cell tumor, granular cell tumor, plasma cell tumor, osteoma, adenoma, and lipoma.

Malignant Lesions
Malignant melanoma usually occurs in older dogs with oral pigmentation, but it is very rare in cats. The tumor is pigmented or nonpigmented (amelanotic), often grows rapidly and invades bone early. The tumor surface usually is ulcerated and foul-smelling because of necrosis caused by the lesion outgrowing its blood supply. Typical locations are the gingiva, palate, dorsal surface of the tongue, and mucosal surface and mucocutaneous junctions of the lips and cheeks. Regional and distant metastasis is common at the time of diagnosis. Nontonsillar squamous cell carcinoma typically is a disease of older cats and dogs, but papillary squamous cell carcinoma has been described in adolescent and young adult dogs.
The tumors most often are found on the gingiva as proliferative and ulcerated lesions and less often on the mucosa of the lips, cheeks, tongue and sublingual area. Bone invasion is common for gingival lesions. If occurring on the upper jaw in cats, the tumor may be less protuberant, while bone invasion is more severe. Metastasis to regional lymph nodes is common, while distant metastasis may occur late in the disease process. Tonsillar squamous cell carcinoma in dogs is highly metastatic.

Fibrosarcomas tend to occur in young adult to mid-aged large breed dogs and older smaller dogs. They affect the gingiva, lip/cheek mucosa, or the hard and soft palate and often appear as protuberant, ulcerated lesions. They may occasionally arise from the lateral surface of the incisive bone and maxilla, presenting a slowly enlarging firm mass at the muzzle.

Fibrosarcomas are highly invasive. Regional and distant metastasis is less common compared to malignant melanoma and squamous cell carcinoma. Low-grade fibrosarcomas appear benign clinically but are malignant biologically. Peripheral nerve sheath tumors are sometimes misdiagnosed as fibrosarcoma. They tend to grow along major nerves of the face, upper and low jaw (i.e., infraorbital nerve or inferior alveolar nerve). Osteosarcoma affects the mandible and, less often, the maxilla, often manifesting as an ulcerative or necrotic oral mass with extensive radiographic evidence of bone invasion. Regional and distant metastasis seems to be less common than for limb osteosarcoma. Multilobular tumor of bone is a variant of osteosarcoma, affecting the maxilla, palate, ramus of the mandible, zygomatic arch, and calvarium. Other less common, malignant lesions include hemangiosarcoma, lymphosarcoma, mast cell tumor, adenocarcinoma, rhabomyosarcoma, and anaplastic and undifferentiated tumors.

**Staging**

Three-view thoracic radiography should be performed prior to placing an oral tumor patient under anesthesia, particularly when a malignant oral lesion is suspected. Proliferative masses, bone swellings and those that cause bone lysis, mucosal lesions suspicious of neoplasia or autoimmune disease, and unilateral oral inflammation/ulceration should be sampled for examination. A biopsy is preferably obtained from an area that can be included in the definitive resection. Areas of necrotic tissue may be present in rapidly growing tumors, and viable tissue should be included in the biopsy sample. A mucosal flap could be raised to access deeper tissue for tumors that are covered by a layer of variably-thick normal tissue. If cytological or histological results do not match the clinical findings, a second, deeper, and larger specimen is obtained.

The TNM (tumor, node, metastasis) system aids in describing the clinical extent (staging) of neoplastic disease through evaluation of the primary tumor, regional lymph nodes, and distant sites of possible metastasis. Parotid, mandibular, and medial and lateral retropharyngeal lymph nodes should preferably be evaluated histologically. A negative lymph node biopsy does not preclude the possibility of regional metastasis, which may occur along perineural or vascular routes, or metastasis to other less accessible lymph nodes.

Cytological sampling can be performed in the awake or sedated patient. Fine-needle techniques are useful for lesions that exfoliate well and are often performed with a 22-gauge needle by means of a needle biopsy (‘woodpecker method’) or needle aspiration. Cytological examination of lymph node needle biopsies and aspirates may be adequate for diagnosing metastatic melanoma and squamous cell carcinoma but is less satisfactory for other oral tumors. Impression smears and scrapings obtained from the surface of an epithelialized or ulcerated tumor have no diagnostic value. Impression smears and scrapings may be of much greater value if obtained from the cut surface of a tumor.

Histological sampling requires general anesthesia and microscopic examination of a formalin-fixed specimen. This is more accurate than cytological sampling. Rongeurs are great
for bone samples and scalpel blades for incisional and excisional soft tissue sampling. Tissue damaging instrumentation must not be used during the sampling procedure so that a diagnosis is not obscured. Multiple samples should be obtained. Hemostasis is achieved by digital pressure, and biopsy sites of more deeply-invading tumors are sutured. For adequate fixation, the specimen is placed in 10% buffered formalin at one part tissue to 10 parts fixative.