3

Tumor Tidbits

Acute Lymphoid Leukemias in Dogs and Cats

Common Clinical Signs:	Rapid onset of anorexia and weight loss; lymphadenopathy is common.
Common Histologic Types:	Lymphocytosis >20,000 cells/µl whole blood; predominantly lymphoblasts; difficult to differentiate from lymphoma.
Biological Behavior:	May occur at any age; large breed dogs or young cats; most cats are FeLV antigenemic.
Prognostic Findings:	None identified.

Treatment Considerations:	Supportive treatment—antibiotics and transfusions of blood and blood products. Chemotherapy—consider using prednisone and Elspar to initially decrease malignant cell counts, then follow using a combination drug protocol (see protocols 6 and 7; protocols are outlined in Chapter 7) and anticipate a 60–70% remission rate for a median duration of 7–9 months.

Acute Nonlymphoid Leukemia in Dogs and Cats

Common Clinical Signs:	Nonspecific; rapid onset of inappetence and lethargy; clinical signs reflect cytopenias; hepatosplenomegaly.
Common Histologic Types:	Not clinically relevant to distinguish because of poor prognosis, but terminology includes acute myeloid (granulocytic), myelocytic, promyelocytic, monocytic, monoblastic, myelomonocytic, megakaryocytic, and erythroleukemic;

	myelomonocytic is the most common type.
Biological Behavior:	May occur at any age; female dogs or young cats; FeLV antigenemia in 90% or more of cats; rapidly progressive; organ infiltration is common.
Prognostic Findings:	None identified.
Treatment Considerations:	Supportive treatment—antibiotics and transfusions of blood and blood products. Chemotherapy—no real efficacy of chemotherapy in this disease, aggressive chemotherapy often causes marrow ablation and death.

Anal Sac Adenocarcinoma

Common Clinical Signs:	Dyschezia, perianal mass, and polyuria and polydipsia due to hypercalcemia.
Common Histologic Types:	Adenocarcinoma.
Biological Behavior:	Old, female dogs; production of parathyroid hormone-related protein causes hypercalcemia; metastasis to regional lymph nodes is common.

Prognostic Findings:	Dogs with hypercalcemia or with detectable metastases have shorter survival times.
Treatment Considerations:	Surgery—may require local excision of tumor and sublumbar lymph nodes; surgery usually resolves hypercalcemia.
	Radiation therapy—applied to local tumor site and sublumbar nodes to prevent tumor regrowth; may resolve hypercalcemia.
	Chemotherapy—may be useful as an adjunct to surgery or radiation therapy; consider cisplatin, Adriamycin, or mitoxantrone (see protocols 1–4).

Bone Tumors in Cats

Common Clinical Signs:	Lameness for appendicular tumors (60% of tumors); palpable mass for axial tumors, which most commonly affect the head; primarily lytic lesions.
Common Histologic Types:	Osteosarcoma.
Biological Behavior:	Old cats; no obvious gender predilection; metastatic rate is low.

Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—potential for cure if surgery eliminates all tumor (e.g., amputation). Radiation therapy—seems to improve local control of osteosarcoma. Chemotherapy—not reported.

Brain Tumors in Cats

Common Clinical Signs:	Sudden-onset visual deficits and neurologic dysfunction.
Common Histologic Types:	Meningioma.
Biological Behavior:	Old cats (75% >9 years of age); locally invasive, rare metastases.
Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—treatment of choice due to slow regrowth of meningioma. Radiation therapy—may be useful adjunct to incomplete excision.

Brain Tumors in Dogs

Common Clinical Signs:	Seizures and temperament changes.

Common Histologic Types:	Meningioma.
Biological Behavior:	Mixed breeds and boxers; old dogs (10 years of age and older); slight male predilection; locally invasive, rare metastases.
Prognostic Findings:	Worse prognosis with severe neurologic dysfunction, abnormal cerebrospinal fluid, or multiple tumors.
Treatment Considerations:	Palliation—corticosteroids and anticonvulsants.
	Surgery—may be beneficial for meningiomas.
	Radiation therapy—treatment of choice for gliomas; useful alone or as an adjunct to surgery for meningiomas.
	Chemotherapy—hindered by blood-brain barrier; possible role for carmustine and lomustine.

Cardiac Hemangiosarcoma in Dogs

Common Clinical Signs:	Collapse and cardiac tamponade; hind limb paresis; and right atrial mass.

Common Histologic Types:	Hemangiosarcoma.
Biological Behavior:	Average age is 10 years; German shepherds are predisposed; metastasis may be widespread, common to lungs.
Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—palliative in dogs with resectable lesions. Chemotherapy—consider Adriamycin-based protocols (see protocol 1).

Chronic Lymphocytic Leukemia in Dogs

Common Clinical Signs:	Nonspecific; often asymptomatic.
Common Histologic Types:	Mature lymphocytosis; differentiate from reactive lymphocytosis and well-differentiated lymphoma.
Biological Behavior:	Old dogs; often slow to progress.
Prognostic Findings:	None identified.
Treatment Considerations:	Supportive treatment—repeated monitoring by blood counts may be all that is required for asymptomatic animals.

	Chemotherapy—combined use of prednisone and an alkylating agent (Cytoxan, melphalan, or Leukeran) provides long-term remissions in symptomatic dogs.

Cutaneous and Extramedullary Plasmacytomas in Dogs

Common Clinical Signs:	Solitary cutaneous mass in trunk or limbs; may affect oral cavity, ears, and head; less commonly, may occur in multiple or other sites, such as diffuse gastrointestinal (GI) tumors.
Common Histologic Types:	Mature plasma cells.
Biological Behavior:	Old dogs; cutaneous tumors are usually benign; plasmacytoma of other sites (e.g., GI) may metastasize.
Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—surgery with wide surgical margins is curative in most cases of cutaneous plasmacytoma. Radiation therapy—radiation-sensitive tumor.

	Chemotherapy—melphalan, prednisone, and doxorubicin have caused tumor responses, often for a long duration in dogs with extramedullary plasmacytoma.

Cutaneous Hemangiosarcoma in Dogs

Common Clinical Signs:	Raised, red lesion, often in skin that is lightly pigmented.
Common Histologic Types:	Hemangiosarcoma.
Biological Behavior:	Average age is 10 years; whippets and other dogs with glabrous skin are predisposed; metastasis is uncommon.
Prognostic Findings:	Histopathologic evidence of solar elastosis adjacent to tumor is good prognostic sign.
Treatment Considerations:	Surgery—curative for dermal origin tumors; approximately 30% of subcutaneous origin tumors metastasize.
	Radiation therapy—radiation-sensitive tumor; excellent local control for incompletely excised tumors.

	Chemotherapy—role undecided due to low metastatic rate and resultant lack of need for adjuvant therapy.

Cutaneous Melanoma in Dogs

Common Clinical Signs:	Darkly pigmented epidermal lesion, usually raised but not ulcerated.
Common Histologic Types:	Most are well differentiated (benign); subungual tumors are more aggressive.
Biological Behavior:	Adult to aged dogs.
Prognostic Findings:	Subungual melanoma, 50% metastasize; other cutaneous sites, metastasis is rare.
Treatment Considerations:	Surgery—surgical excision curative for most cutaneous lesions
	Radiation therapy—radiation-sensitive tumor; >85% local control rates observed for 2 years or longer.
	Chemotherapy—cisplatin or carboplatin chemotherapy for metastatic lesions or possibly as an

adjunct to surgery in subungual melanoma; see protocol 5.

Cutaneous Squamous Cell Carcinoma in Cats

Common Clinical Signs:	Ulcerated cutaneous lesions, most often on head and neck.
Common Histologic Types:	Most are well differentiated; metastasis to regional lymph nodes is rare.
Biological Behavior:	Cats lacking skin pigment are prone to actinically induced tumors; tumors are locally invasive with a low metastatic rate.
Prognostic Findings:	None identified.
Treatment Considerations:	Early lesions—brachytherapy, radiation therapy, local current-field hyperthermia, photodynamic therapy, and cryotherapy if lesions are <1 cm. Invasive lesions—external beam radiation therapy, surgery, photodynamic therapy, and intralesional chemotherapy may be considered. Chemotherapy—anecdotal reports of bleomycin have shown efficacy.

Cutaneous Squamous Cell Carcinoma in Dogs

Common Clinical Signs:	Ulcerated cutaneous lesions, most often on limbs (digits); lesions may be induced by sunlight on trunk.
Common Histologic Types:	Most cutaneous squamous cell carcinomas are well differentiated and rarely metastasize.
Biological Behavior:	Large, black-breed dogs are prone to subungual tumor, which may metastasize; light-skinned dogs are prone to actinically induced tumors.
Prognostic Findings:	Nasal-plane tumors more aggressive; subungual and skin tumors may metastasize; lymphatic invasion for subungual lesion does not influence prognosis for survival.
Treatment Considerations:	Early lesions—surgical excision, retinoids, topical 5-fluorouracil or carmustine ointments, and cryotherapy if lesions are <1 cm. Invasive lesions—surgery, with or without radiation therapy and intralesional chemotherapy.

	Metastatic lesions—cisplatin or mitoxantrone chemotherapy.

Erythrocytosis in Dogs and Cats

Common Clinical Signs:	Polyuria, polydipsia, bleeding, seizures, and hyperemic mucous membranes.
Common Histologic Types:	Mature erythrocytosis; rule out relative and secondary polycythemia.
Biological Behavior:	Middle-aged animals; no breed predilection; bleeding and seizures due to hyperviscosity; elevated red cell mass with no increase in erythropoietin.
Prognostic Findings:	None identified.
Treatment Considerations:	Phlebotomy—periodic removal eventually induces iron deficiency and microcytic cells that may assist in palliation.
	Chemotherapy—hydroxyurea has shown efficacy giving long remission durations.

Pancreatic Tumors (Exocrine) in Dogs

Common Clinical Signs:	Nonspecific anorexia and weight loss.
Common Histologic Types:	Exocrine pancreatic carcinoma.
Biological Behavior:	Old dogs (mean age is 9 years); cocker spaniels may be predisposed; high metastatic rate.
Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—may not be beneficial due to high metastatic rate. Chemotherapy—anecdotal reports of Gemzar efficacy in dogs.

Hemangiosarcoma in Cats

Common Clinical Signs:	Intraabdominal and cutaneous tumors occur with similar frequency as in dogs.
Common Histologic Types:	Hemangiosarcoma.
Biological Behavior:	Cutaneous hemangiosarcoma may be sunlight induced in areas of unpigmented skin.
Prognostic Findings:	Hemangiosarcomas of spleen and mesentery are highly metastatic;

	tumors of skin are highly recurrent and >50% develop metastasis.
Treatment Considerations:	Surgery—excision of cutaneous tumors is reported to be curative by some if margins are wide; survival <6 months reported by others regardless of surgical procedure.
	Radiation therapy—radiation-sensitive tumor; prognosis guarded due to metastatic behavior.
	Chemotherapy—unproven but consider protocol 7.

Hyperadrenocorticism in Dogs

Common Clinical Signs:	Hypercortisolism, polydipsia, polyuria, and cutaneous changes; nervous system dysfunction with large pituitary tumors.
Common Histologic Types:	Pituitary adenomas of par distalis in 80% of dogs; less commonly, adrenal gland tumors (usually carcinoma).
Biological Behavior:	Middle-aged to old dogs; poodles, dachshunds, and boxers are at higher risk; no gender predilection; metastasis is rare for pituitary

	tumors but common for adrenal tumors.
Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—treatment of choice for adrenal tumors.
	Medical management—for pituitary tumors, mitotane and ketoconazole offer good long-term palliation by their effects of adrenal cortical destruction and interference with steroid synthesis, respectively; L-deprenyl may also be a useful agent; mitotane (o,p'-DDD) may be a useful agent at high doses for adrenal tumors.
	Radiation therapy—provides good palliation for neurologic dysfunction caused by large pituitary tumors and gives moderate control of cortisol levels.

Hypereosinophilic Disease in Cats

Common Clinical Signs:	Gastrointestinal signs due to eosinophilic infiltration; often chronic history.

Common Histologic Types:	Mature eosinophilia; rule out allergic diseases and eosinophilic granuloma complex.
Biological Behavior:	Adult cats (median age is 8 years); females may be predisposed; cats may have widespread organ infiltration.
Prognostic Findings:	None identified.
Treatment Considerations:	Prednisone and hydroxyurea may be palliative, consider dietary modification using hypoallergenic diets.

Injection Site–Associated Sarcomas in Cats

Common Clinical Signs:	Mass near site of previous vaccination.
Common Histologic Types:	Fibrosarcoma or other soft tissue sarcoma; other histologic types have been reported (malignant fibrous histiocytoma).
Biological Behavior:	Tumor develops months to years after vaccination; multiple vaccinations at the same site at one time increase risk of tumor development; locally aggressive; frequent recurrence after surgery; rare distant metastasis.

Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—treatment of choice; wide and deep surgical margins are essential for all tumors. Radiation therapy—should be consider prior to surgical excision to reduce tumor burden and provide greater local control. Chemotherapy—unproven efficacy alone but should be considered concurrently with radiation therapy; consider Adriamycin or mitoxantrone (see protocols 4, 7, and 10).

Insulinoma in Dogs

Common Clinical Signs:	Hypoglycemia and hyperinsulinemia; tachycardia and neurologic signs may be intermittent; peripheral polyneuropathy may cause tetraparesis.
Common Histologic Types:	Carcinoma.
Biological Behavior:	Old dogs with no gender predisposition; large-breed dogs are more commonly affected; most tumors are highly metastatic.

Prognostic Findings:	Dogs with tumors confined to pancreas have a longer symptom-free period and survival after surgery; dogs that have only lymph node metastasis live longer than dogs with distant metastasis.
Treatment Considerations:	Surgery—treatment of choice for localized tumors.
	Medical management—prednisone, diazoxide, Sandostatin, octreotide, and propranolol may control hypoglycemia.
	Chemotherapy—streptozotocin and alloxan may be effective; however, both are extremely nephrotoxic and require diuresis.

Intestinal Tumors in Cats

Common Clinical Signs:	Small intestine—vomiting, weight loss, and anorexia.
	Large intestine—hematochezia.
Common Histologic Types:	Adenocarcinoma; other tumors are rare.
Biological Behavior:	Old cats; mean age is 11 years; Siamese are predisposed; tumors usually cause annular constriction;

	and metastasis to peritoneal surfaces is common.
Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—surgical resection results in 15-month average survival; some cats live more than 2 years; lymph node metastasis at surgery does not always influence survival. Chemotherapy—unproven effect on survival but consider protocol 10 as adjunctive to excision or protocol 7 if surgery cannot be performed.

Intestinal Tumors in Dogs

Common Clinical Signs:	Duodenum/jejunum—vomiting, melena. Jejunum/ileum—weight loss and diarrhea. Colon/rectum—tenemus and hematochezia.
Common Histologic Types:	Adenocarcinoma; less commonly, leiomyosarcoma and lymphoma; leiomyosarcoma common in the cecum.

Biological Behavior:	Old, male dogs; most tumors are adenocarcinoma; adenocarcinoma is more likely to metastasize than leiomyosarcoma, usually to regional lymph nodes.
Prognostic Findings:	Colorectal—dogs with annular lesions have poor chance of survival; other types of lesions have a better prognosis.
Treatment Considerations:	Surgery—little information for adenocarcinoma; average survival of dogs with colorectal adenocarcinoma is 15 months after surgery; median survival is >1 year for leiomyosarcoma.
	Radiation therapy—rectal adenocarcinoma may be controlled by high-dose fractions; median control is >6 months.
	Cryotherapy—small, minimally invasive tumors of the rectum and distal colon.
	Chemotherapy—consider adjunct to surgery or radiation therapy; consider protocol 1, 2, or 4.

Liver Tumors in Cats

Common Clinical Signs:	Nonspecific lethargy and anorexia; cats often have a palpable mass.
Common Histologic Types:	Intrahepatic bile duct tumors (more than half are benign); hepatocellular carcinoma is next most common type.
Biological Behavior:	Most cats >10 years of age; intrahepatic bile duct tumors may progress from benign to malignant; benign tumors usually involve a solitary lobe; carcinomas often metastasize.
Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—treatment of choice for benign tumors; however, carcinomas are usually diffuse and prognosis is poor. Chemotherapy—rarely considered due to hepatic insufficiency to metabolize anticancer agents.

Liver Tumors in Dogs

Common Clinical Signs:	Nonspecific lethargy and weight loss; dogs may be asymptomatic and may have a palpable mass.

Common Histologic Types:	Primary hepatocellular carcinoma.
Biological Behavior:	Old dogs; large solitary lesions have low metastatic rate, but the majority have multiple nodular or diffuse involvement.
Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—treatment of choice; dogs with solitary hepatocellular carcinoma, regardless of size, have a good prognosis after resection (median survival exceeds 1 year). Chemotherapy—palliative use of alkylating agents (Cytoxan and Leukeran) have been beneficial in dogs with diffuse or nodular disease.

Lower Urinary Tract Tumors in Cats

Common Clinical Signs:	Hematuria, mucoid vaginal discharge, and other signs of bladder inflammation.
Common Histologic Types:	Transitional cell carcinoma, squamous cell carcinoma.
Biological Behavior:	Old cats, except lymphoma and rhabdomyosarcoma.

Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—recurrence is common unless surgery is aggressive; cats are more amenable to surgery than dogs, because tumors are more cranioventral in location.
	Chemotherapy—may be helpful; consider protocol 4 for carcinomas and protocol 6 or 7 for lymphoma.

Lower Urinary Tract Tumors in Dogs

Common Clinical Signs:	Mimic infection—hematuria, stranguria, and pollackiuria; dogs often have secondary infections.
Common Histologic Types:	Transitional cell carcinoma.
Biological Behavior:	Old dogs, usually female; insecticidal dips and obesity may be associated with development of bladder tumors.
Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—palliative only; most tumors involve trigone region of the bladder.

	Radiation therapy—excellent local control; however, fibrosis of bladder may occur as a late effect.
	Chemotherapy—palliative at best, should be consider adjuvant to surgery or radiation; best results are seen with mitoxantrone combined with piroxicam (protocol 4) followed by carboplatin or piroxicam.

Lung Tumors in Dogs and Cats

Common Clinical Signs:	Persistent cough, dyspnea, hemoptysis, lameness in cats (metastasis to digits), hypertrophic osteopathy (in dogs), anorexia, lethargy, and malaise.
Common Histologic Types:	Adenocarcinoma (bronchogenic) is most common.
Biological Behavior:	Disease of older aged animals; tumors are likely to cause pleural effusion and respiratory stridor; metastases are common early in the course of the disease.
Prognostic Findings:	Normal appearing hilar regional lymph nodes are associated with significantly longer survival time

	following surgery than enlarged nodes; effusion, increasing size, and presence of metastases are also negative prognostic signs.
Treatment Considerations:	Surgery—lung lobectomy is the treatment of choice in dogs and cats without effusive disease; median survival exceeds 1 year.
	Chemotherapy—unproven results, consider protocols 1–3 or 10 adjuvant to surgery due to the high metastatic potential for lung tumors.

Lymphoma in Cats

Common Clinical Signs:	Anterior mediastinal or alimentary involvement.
Common Histologic Types:	Typically mixed B and T cell.
Biological Behavior:	Often FeLV positive but depends on anatomic location of lymphoma; occurs in all breeds with a bimodal age peak.
Prognostic Findings:	Single nodal (mediastinal) or extranodal (nasal) location stage better than multiple locations.

	FeLV positive—worse survival rate, no effect on response to therapy.
Treatment Considerations:	Surgery—considered only for localized conditions (intestinal).
	Radiation therapy—extremely radiation-sensitive tumor; consider for curative intent for nasal locations.
	Chemotherapy—consider protocols 6 and 7 as primary therapy or adjunct to surgery or radiation therapy; median survival typically ranges from 6–12 months (mediastinal) to >18 months (nasal or if radiation or surgery used).

Lymphoma in Dogs

Common Clinical Signs:	Generalized peripheral lymphadenopathy.
Common Histologic Types:	Diffuse large cell, immunoblastic, and small lymphocytic.
Biological Behavior:	All breeds, middle-aged, systemic disease.
Prognostic Findings:	Clinical stage—advancing stage and dogs with clinical signs are associated with a worse prognosis.

	Hypercalcemia—worse when associated with an anterior mediastinal mass.
	Sex—female dogs have a better prognosis than male dogs.
	Body size—small dogs do better than large dogs.
	Pretreatment corticosteroids: worse (controversial findings).
	High grade: higher response rate and longer duration of remission.
Treatment Considerations:	Surgery—rarely considered unless confined to a single node.
	Radiation therapy—unproven efficacy; considered in the palliative care of multidrug-resistant lymphoma (4–6 months additional remission).
	Chemotherapy, single agent—prednisone, cyclophosphamide, vincristine show 50% complete remission (CR) for a median of 1–6 months; doxorubicin shows 60–75% CR for a median of 6–8 months.
	Chemotherapy, combinations—various usages of multiple drugs show 70–80% CR for a median of

9–18 months (see protocols 6 and 7).

Mammary Tumors in Cats

Common Clinical Signs:	Presence of a mass in the mammary chain.
Common Histologic Types:	Mammary adenocarcinoma.
Biological Behavior:	Siamese may be at increased risk; most affected cats are 10–12 years of age; 70–90% of tumors are malignant; >25% are ulcerated; >50% involve multiple glands; >80% have metastases at time of euthanasia.
Prognostic Findings:	Increasing tumor size is associated with a poor prognosis.
Treatment Considerations:	Surgery—mastectomy of the affected side is superior to regional resection; recurrence is unlikely to be reduced by ovariohysterectomy; recurrence of tumor should be treated with surgery whenever possible. Radiation therapy—rarely considered due to excessive local disease and metastatic behavior.

	Chemotherapy—doxorubicin and cyclophosphamide reported to reduce metastatic disease; mitoxantrone may be helpful in some cases (see protocols 2, 4, and 7).

Mammary Tumors in Dogs

Common Clinical Signs:	Presence of a mass in the mammary chain.
Common Histologic Types:	Approximately 50% are benign (e.g., fibroadenomas, simple adenomas, and benign mixed mammary tumors); approximately 50% are malignant (e.g., solid carcinomas and tubular or papillary adenocarcinomas).
Biological Behavior:	Most common neoplasm in females; average age is 10–11 years; poodles, terriers, cocker spaniels, and German shepherds are overrepresented; early ovariohysterectomy protective; 50% of tumors are multiple; lungs and lymph nodes are most common sites of metastasis.
Prognostic Findings:	German shepherds have a poor prognosis; poor prognosis is

	associated with increasing tumor size, ulceration, degree of invasion, increasing degree of malignancy, lymph node involvement, and lack of hormone receptors.
Treatment Considerations:	Surgery—regional resection of tumor is as effective as mastectomy for localized tumor(s); removal of lymph node may be of prognostic value; ovariohysterectomy may not be of value for preventing recurrence.
	Radiation therapy—unproven efficacy; may be considered in the palliation of inflammatory carcinomas.
	Chemotherapy—doxorubicin- or mitoxantrone-based protocols may be effective in some cases (see protocols 1, 2, 4, and 7).

Mast Cell Tumors in Cats

Common Clinical Signs:	Cutaneous—single or multiple raised hairless masses.
	Lymphoreticular—splenomegaly and chronic vomiting.

	Intestinal—chronic vomiting or diarrhea.
Common Histologic Types:	Cutaneous tumors are usually well differentiated; lymphoreticular and intestinal tumors are malignant.
Biological Behavior:	Histiocytic cutaneous mast cell tumors in Siamese may regress spontaneously; lymphoreticular and intestinal tumors are always malignant; cutaneous tumors are often benign, even multiple tumors; may occur in young animals.
Prognostic Findings:	None identified.
Treatment Considerations:	Cutaneous—surgery, radiation therapy, with or without corticosteroids, for invasive lesions.
	Lymphoreticular—splenectomy gives 12-month median rate of survival.
	Intestinal: wide resection, with or without corticosteroids, but survival is poor
	Chemotherapy—unproven efficacy but may consider protocol 8.

Mast Cell Tumors in Dogs

Common Clinical Signs:	Raised or ulcerated intracutaneous mass; may be hairless or haired; may be single or multiple. Mast cell tumors can look and feel like anything.
Common Histologic Types:	Histologic grade influences surgical prognosis. Moderately differentiated (grade II) tumors are the most common.
Biological Behavior:	Boxers, Boston terriers, and golden retrievers are predisposed but can occur in any breed, at any age; metastasis is similar to other hematopoietic tumors, to regional lymph nodes as well as liver, spleen, and bone marrow.
Prognostic Findings:	Tumors on limbs have better prognosis than those on the trunk (especially perineum); slow growth and long duration of presence may be favorable; most important prognostic factor is histologic grade.
	Recurrence rate 6 months after incomplete-excision surgery—25% for well-differentiated tumors;

	44% for moderately differentiated tumors; 76% for poorly differentiated tumors.
Treatment Considerations:	Well-differentiated to moderately-differentiated tumors—wide surgical excision; adjunctive radiation therapy (88% achieve 5-year control for moderately differentiated tumors); although efficacy is uncertain, recent use of CCNU or Velban have shown promise. Poorly differentiated tumors—surgery, with or without radiation therapy, is palliative; H2 blockers, prednisone, and vincristine chemotherapy may be helpful (see protocol 8).

Mesothelioma in Dogs

Common Clinical Signs:	Effusion of body cavities causing abdominal discomfort, tachypnea, and respiratory distress; in decreasing order of incidence—affects pleural, peritoneal, or pericardial cavities.
Common Histologic Types:	Epithelial-type mesothelioma.

Biological Behavior:	Old dogs; exposure to asbestos and pesticide powders may be associated with development of mesothelioma in dogs.
Prognostic Findings:	None identified.
Treatment Considerations:	Chemotherapy—intracavitary cisplatin may provide palliation; responses to intravenous doxorubicin and mitoxantrone have been noted (see protocols 1–4).

Multiple Myeloma in Cats

Common Clinical Signs:	Nonspecific clinical signs; most cats are anemic; lytic bone lesions are rare.
Common Histologic Types:	Mature plasma cells.
Biological Behavior:	Old cats; mostly domestic shorthair; no association with FeLV.
Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—rarely considered. Radiation therapy—radiation-sensitive tumor; excellent local palliation of signs and complete remissions reported; guarded prognosis due to systemic nature of disease.

	Chemotherapy—remission rates of 40% with a median survival of 170 days reported in clinical cases treated with prednisone and an alkylating agent (melphalan, Cytoxan, Leukeran); consider as adjunct to radiation therapy in some patients.

Multiple Myeloma in Dogs

Common Clinical Signs:	Anemia and secondary infections due to myelophthisis; lameness and pain from bone lytic lesions; polyuria and polydipsia from hypercalcemia, renal disease, and paraproteinuria; hemorrhage due to hyperviscosity.
Common Histologic Types:	Mature plasma cells.
Biological Behavior:	Median age is 8–9 years; most cases occur in purebred dogs; systemic disease.
Prognostic Findings:	Dogs with hypercalcemia, extensive bone lysis, or light-chain (Bence Jones) proteinuria have a worse prognosis.

Treatment Considerations:	Surgery—rarely considered; used to palliate neurologic signs (paralysis) due to vertebral disease. Radiation therapy—radiation-sensitive tumor; excellent local palliation of signs and complete remissions reported; guarded prognosis due to systemic nature of disease. Chemotherapy—prednisone is palliative only; median survival is 220 days; melphalan and prednisone provide complete remission in 40% and partial remission in 50% of dogs for a median survival of 540 days; other agents, such as cyclophosphamide or chlorambucil, may be effective; consider chemotherapy adjunct to radiation therapy.

Myelodysplasia in Dogs and Cats

Common Clinical Signs:	Reflects cytopenias, such as fever and neutropenia or petechiation and thrombocytopenia.

Common Histologic Types:	Differentiated from leukemias by <30% blasts in a dysplastic bone marrow.
Biological Behavior:	No age, gender, or breed predilection; usually progresses to an acute leukemia in cats (most are FeLV antigenemic).
Prognostic Findings:	None identified.
Treatment Considerations:	Supportive treatment—antibiotics and transfusions of blood, blood products, or cytokines (Epogen, Neupogen). Chemotherapy—cytosine arabinoside (ara-C) and retinoids are under investigation as differentiating agents.

Nasal Tumors in Cats

Common Clinical Signs:	Epistaxis, sneezing, facial deformity, and epiphora.
Common Histologic Types:	Carcinoma and lymphoma.
Biological Behavior:	Old males (8–10 years of age); locally invasive and rarely metastasizes to distant sites until late in the course of the disease.

Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—contraindicated. Radiation therapy—treatment of choice; survival time for non-hematopoietic malignancies is 20–27 months; median survival time for cats with nasal lymphoma approaches 16 months. Chemotherapy—recommended for nasal lymphoma due to systemic disease (see protocols 6, 7, and 10).

Nasal Tumors in Dogs

Common Clinical Signs:	Unilateral epistaxis, facial deformity, and epiphora.
Common Histologic Types:	Adenocarcinoma.
Biological Behavior:	Most common in old dogs; no breed or sex predilection; tumor is locally invasive and rarely metastasizes to distant sites until late in the course of the disease.
Prognostic Findings:	Brain involvement is a poor prognostic sign.

Treatment Considerations:	Surgery—contraindicated unless combined with radiation therapy. Radiation therapy—with or without surgery, the treatment of choice; median survival rates vary from 8 to 23 months. Chemotherapy—cisplatin is reported to be effective in palliating clinical signs; mitoxantrone is used concurrent with radiation therapy to improve radiation efficacy (survival times exceeding 2 years).

Nonosteosarcoma Bone Tumors in Dogs

Common Clinical Signs:	More often affects axial skeleton than appendicular skeleton; care is required in interpreting incisional biopsy specimens.
Common Histologic Types:	Chondrosarcoma, fibrosarcoma, and hemangiosarcoma.
Biological Behavior:	Old dogs, except oral fibrosarcoma, in which younger dogs predominate; metastases occur at lower rate than with osteosarcoma and may occur late in the course of the disease.

Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—palliative; may be curative in some dogs, although metastases may arise even months or years after surgery. Radiation therapy—may improve tumor control; palliative for bone pain. Chemotherapy—unproven efficacy but consider protocols similar for osteosarcoma to prevent or delay complications arising from metastatic disease (see protocols 1–4).

Ocular Tumors in Cats

Common Clinical Signs:	Buphthalmos, poor vision, iris pigment change, and glaucoma.
Common Histologic Types:	Melanoma; less commonly, ocular sarcoma.
Biological Behavior:	Melanomas are malignant and have high metastatic potential; old cats usually are affected; no association with breed, gender, or FeLV status; sarcomas (often preceded by ocular trauma) are highly malignant.

Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—enucleation should be performed early in course of disease for melanoma; increasing degree of ocular involvement is associated with poorer survival. Radiation therapy—may improve local control, but melanoma and ocular sarcoma have high metastatic rates. Chemotherapy—unproven efficacy; low dosage weekly carboplatin has significantly improved survival in dogs with melanoma and may have efficacy in cats (see protocol 5).

Ocular Tumors in Dogs

Common Clinical Signs:	Glaucoma, uveitis, hyphema, or visible mass.
Common Histologic Types:	Melanoma; less commonly, epithelial tumors of the ciliary body.
Biological Behavior:	Melanomas and epithelial tumors have low potential for metastasis; old dogs are affected.

Prognostic Findings:	High mitotic index may indicate potential for metastasis in melanoma.
Treatment Considerations:	Surgery—enucleation is usually curative, even after failure of local excision; other treatment modalities are generally not required. Chemotherapy—unproven efficacy, possibly consider piroxicam or tamoxifen as palliative therapy.

Oral Tumors in Cats

Common Clinical Signs:	Halitosis, bleeding from mouth, and dysphagia.
Common Histologic Types:	Squamous cell carcinoma is the most common, followed by fibrosarcoma and acanthomatous epulis.
Biological Behavior:	Old cats; sublingual squamous cell carcinoma is more common than gingival squamous cell carcinoma.
Prognostic Findings:	None identified.
Treatment Considerations:	The efficacy of multimodality therapy (surgery, radiation therapy, and chemotherapy) greatly exceeds any single modality

approach. Consider protocols 2 and 4 adjunctive to radiation or surgery.

Oral Tumors in Dogs

Common Clinical Signs:	Oral mass, bleeding from the mouth, and dysphagia.
Common Histologic Types:	Benign—fibromatous epulis; acanthomatous epulis (may invade bone).
	Malignant—melanoma, squamous cell carcinoma, and fibrosarcoma.
Biological Behavior:	Melanoma—high metastatic rate; old dogs.
	Squamous cell carcinoma—moderately metastatic; lingual and tonsillar types are highly metastatic; old dogs.
	Fibrosarcoma—low metastatic rate, young dogs.
	Epulides—do not metastasize; all ages.
	All tumor types—small tumors and rostral location have a better prognosis.

Prognostic Findings:	Melanoma—low mitotic index is associated with a better prognosis.
	Squamous cell carcinoma—dogs with maxillary tumors and young dogs have a better prognosis.
Treatment Considerations:	Surgery—mandibulectomy or maxillectomy for local control of malignant tumors.
	Radiation therapy—curative for acanthomatous epulis; coarse fractionation may be useful for melanoma; adjunctive for squamous cell carcinoma and fibrosarcoma after surgery gives good control.
	Chemotherapy—platinum compounds are best for melanoma, 50% report 1 year survival times; chemotherapy is not usually required for other tumor types; see protocols 2, 4, and 5.
	Biological response modifiers—piroxicam and tamoxifen have anecdotal efficacy for dogs with melanoma and squamous cell carcinoma.

Osteosarcoma of the Appendicular Skeleton in Dogs

Common Clinical Signs:	Lameness and pain at metaphyseal sites, particularly distal radius, proximal humerus, proximal tibia, and distal femur; lytic and productive bone lesion on radiographs.
Common Histologic Types:	Osteoblastic osteosarcoma is most common; other diagnoses are possible—chondroblastic, telangiectic, and fibroblastic.
Biological Behavior:	Large to giant breeds; no sex predilection; usually middle-aged to old dogs; metastasis occurs early but may not be clinically evident.
Prognostic Findings:	Survival is poor; prognosis is uncorrelated with gender, tumor site, or whether a presurgical biopsy is performed.
Treatment Considerations:	Surgery—with amputation alone, median survival is 162 days; 11% of dogs are alive at 1 year; limb sparing provides good limb function for distal radius tumors. Radiation therapy—radiation-sensitive tumor but curative intent protocols rarely are considered

due to poor prognosis; palliative use for pain control as an alternative to amputation is considered good, median duration of pain control is 8 months.

Chemotherapy—regardless of limb removal, various chemotherapy protocols have shown efficacy in prolonging survival time. Cisplatin or carboplatin (protocol 3) shows 40–60% of dogs alive at 1 year; doxorubicin (protocol 1) shows 50% of dogs alive at 1 year; combination (protocol 2) shows 50% of dogs alive at 18 months.

Osteosarcoma of the Axial Skeleton in Dogs

Common Clinical Signs:	Tumors of the appendicular skeleton are four times more common than axial tumors.
Common Histologic Types:	Multilobular osteochondroma and osteosarcoma.
Biological Behavior:	Old dogs (except rib tumors, which often affect young dogs); no breed predilection; more females may be affected; highly metastatic,

	but local recurrence is more of a problem; mandibular osteosarcoma may have lower metastatic rate.
Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—difficult due to location of tumors; mandible and rib tumors can be resected.
	Radiation therapy—may be useful adjunct to surgery to reduce local recurrence or for palliation of pain.
	Chemotherapy—recommended for osteosarcoma of all sites (see protocols 1–3).

Ovarian Tumors in Cats

Common Clinical Signs:	Irregular or prolonged estrus.
Common Histologic Types:	Granulosa cell tumor.
Biological Behavior:	Mainly domestic shorthairs; ovarian tumors are rare tumors.
Prognostic Findings:	None identified.

Treatment Considerations:	Surgery—rarely curative because of high metastatic rate of all tumor types. Radiation therapy—unproven. Chemotherapy—unproven.

Ovarian Tumors in Dogs

Common Clinical Signs:	Abdominal mass or swelling; unexplained or abnormal estrus or bleeding.
Common Histologic Types:	Adenomas and adenocarcinomas.
Biological Behavior:	Old dogs (median age is 10 years); teratomas occur in young dogs.
Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—surgical excision curative for most tumors. Chemotherapy—consider protocols 1–4 adjuvant to surgical excision if carcinomatosis observed.

Peripheral Nerve Sheath Tumors

Common Clinical Signs:	Slowly progressive lameness.

Common Histologic Types:	Dogs—neurofibrosarcoma. Cats—lymphoma.
Biological Behavior:	Dogs—large-breed dogs; middle-aged dogs (average age is 7 years); local disease, rare metastasis. Cats—systemic disease.
Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—surgical resection of tumor for small masses; amputation and resection for large masses or if severe neurologic deficits are present; complete excision is difficult, recurrences are common. Radiation therapy—used for incompletely excised tumors, disease-free times can exceed 2 years. Chemotherapy—most effective for lymphoma; not necessary for soft tissue variants.

Prostatic Tumors in Dogs

Common Clinical Signs:	Tenesmus, constipation, dyschezia, and less commonly, dysuria and hematuria.
Common Histologic Types:	Adenocarcinoma.

Biological Behavior:	Equal frequency in castrated and intact dogs regardless of age at castration; old dogs (median age is 10 years).
Prognostic Findings:	May be more aggressive in castrated dogs but highly malignant in both castrated and intact dogs.
Treatment Considerations:	Surgery—difficult because of anatomy of canine prostate. Radiation therapy—palliative only, due to high metastatic rate. Chemotherapy—has no proven efficacy. Hormonal therapy—ineffective because of hormone independence of canine prostatic carcinoma.

Renal Tumors in Cats

Common Clinical Signs:	Nonspecific; hematuria rare.
Common Histologic Types:	Lymphoma, then adenocarcinoma.
Biological Behavior:	Old cats; no gender or breed predisposition; nephroblastoma can occur in young cats but is rare.

Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—rarely reported; carcinomas may have high metastatic rate.
	Chemotherapy—renal lymphoma may respond to combination chemotherapy (see protocols 6, 7, and 10).

Renal Tumors in Dogs

Common Clinical Signs:	Often no clinical signs; hematuria with transitional cell carcinoma.
Common Histologic Types:	Carcinomas and adenocarcinomas.
Biological Behavior:	Old dogs, usually males; nephroblastoma in young dogs; German shepherds may have cystadenocarcinomas and nodular dermatofibrosis on an inherited basis.
Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—high metastatic rate for carcinomas makes cure unlikely; early removal of nephroblastoma may be curative.
	Chemotherapy—reported only for nephroblastoma; vincristine, doxorubicin, and actinomycin D may

be palliative (consider protocols 1–4).

Retrobulbar Tumors in Cats

Common Clinical Signs:	Exophthalmos or enophthalmos.
Common Histologic Types:	Primary retrobulbar tumors are rare; extension of oral squamous cell carcinoma; nasal tumors and lymphoma.
Biological Behavior:	Old cats; behavior varies with tumor type.
Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—rarely useful as a primary modality, as most tumors have grown by extension from other sites; oral squamous cell carcinoma is unresponsive to surgery. Radiation therapy—may be a useful adjunct for squamous cell carcinoma when used in combination with mitoxantrone chemotherapy or for nasal tumors (consider protocol 4). Chemotherapy—may be useful for retrobulbar lymphoma, with or

without radiation therapy (see protocols 6 and 7).

Retrobulbar Tumors in Dogs

Common Clinical Signs:	Exophthalmos, nicitans protrusion, and deviation of globe.
Common Histologic Types:	Multiple types; osteosarcoma, fibrosarcoma, mast cell tumors, and lymphoma are most common.
Biological Behavior:	Most tumors are locally aggressive; metastatic rate varies with tumor type.
Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—orbitectomy may be curative for small tumors.
	Radiation therapy—should be useful as an adjunct to surgery for all tumor types but is still under investigation.
	Chemotherapy—may be useful for lymphoma; consider protocols 1–4 as adjunct to local modalities for treatment of osteosarcoma and osteochondrosarcoma.

Salivary Gland Tumors in Dogs and Cats

Common Clinical Signs:	Cervical mass; anorexia or dysphagia is possible.
Common Histologic Types:	Adenocarcinoma.
Biological Behavior:	May be diffuse oral tumor rather than a mass; metastasis may be more common in cats than dogs; old animals affected (median age is 10 years); poodles and Siamese cats are predisposed.
Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—high rate of local recurrence in cats and dogs. Radiation therapy—when used as an adjunct to surgery, radiation therapy seems to improve local control in dogs; presumably the same in cats. Chemotherapy—unproven efficacy but should be considered in cats due to aggressive behavior; consider protocols 2–4.

Soft Tissue Sarcoma in Dogs and Cats

Common Clinical Signs:	Subcutaneous firm and irregular mass appears (but is not) encapsulated.
Common Histologic Types:	Fibroma, fibrosarcoma, hemangiopericytoma, neurofibroma, neurofibrosarcoma, schwannoma, rhabdomyoma, rhabdomyosarcoma, leiomyoma, leiomyosarcoma, and malignant fibrous histiocytoma.
Biological Behavior:	Young cats; may be related to FeSV and FeLV infection; possible correlation with vaccination site in cats; locally invasive with a low metastatic rate.
Prognostic Findings:	Wide surgical excision at first surgery; metastasis is uncommon.
Treatment Considerations:	Surgery—wide surgical excision with cancer-free margins rarely results in cure.
	Radiation therapy—adjuvant external beam radiation therapy of >50 Gy gives control of 70–90% at 1 year.

	Chemotherapy—doxorubicin-based protocols and intralesional methods are being investigated; consider protocols 2–4 as adjunct to surgery or concurrent with radiation therapy.

Spinal Tumors in Dogs

Common Clinical Signs:	Pain; slow onset of ataxia and paresis.
Common Histologic Types:	Extradural tumors; vertebral body most common.
Biological Behavior:	Large-breed dogs, young to middle-aged; locally invasive.
Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—treatment of choice for extradural and intradural-extramedullary tumors; intramedullary tumors are not amenable to surgical excision.
	Radiation therapy—may be a useful adjunct to incomplete surgery.
	Chemotherapy—rarely considered unless tumor is of lymphoid origin.

Spinal Tumors in Cats

Common Clinical Signs:	Acute paresis.
Common Histologic Types:	Lymphoma.
Biological Behavior:	70% of cats are FeLV positive and 85% have bone marrow that contains lymphoma; most tumors are extradural.
Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—rarely indicated because of systemic disease. Radiation therapy—may give local palliation. Chemotherapy—in general, gives a poor response; best when used in combination with radiation therapy; consider protocol 6, 7, or 10.

Splenic Hemangiosarcoma in Dogs

Common Clinical Signs:	Palpable abdominal mass; hemoperitoneum; anemia; shock; and possibly collapse.
Common Histologic Types:	Hemangiosarcoma.

Biological Behavior:	Average age is 10 years; German shepherds are predisposed; metastasis may be confined to abdominal cavity if no concurrent right atrial lesion exists.
Prognostic Findings:	Ruptured viscera, hemoperitoneum, coagulopathy, signs attributable to anemia are poor prognostic signs.
Treatment Considerations:	Surgery—palliative without gross metastases, but survival is short. Radiation therapy—considered palliative for some lesions. Chemotherapy—prolongs survival; most protocols result in a median survival time of 12–15 months; consider protocols 1–4 and 7.

Splenic Tumors in Dogs

Common Clinical Signs:	Abdominal swelling and weakness; palpable abdominal mass.
Common Histologic Types:	Leiomyosarcoma, osteosarcoma, and fibrosarcoma.
Biological Behavior:	Average age is 11 years; no breed or gender predilection; metastasis commonly occurs to abdominal sites.

Prognostic Findings:	Ruptured viscera, hemoperitoneum, coagulopathy, signs attributable to anemia are poor prognostic signs.
Treatment Considerations:	Surgery—palliative without gross metastases, but survival is short. Radiation therapy—considered palliative for some lesions. Chemotherapy—prolongs survival; most protocols result in a median survival time of 12–15 months; consider protocols 1–4 and 7.

Stomach Tumors in Dogs

Common Clinical Signs:	Chronic vomiting, weight loss, and inappetence.
Common Histologic Types:	Adenocarcinoma; less commonly, leiomyomas; most common in lower two thirds of stomach.
Biological Behavior:	Old, male dogs; tumors cause ulceration and commonly metastasize to perigastric lymph nodes or viscera.
Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—tumors are usually diffuse and have metastasized at

	the time of diagnosis; therefore, aggressive surgery is rarely successful; recurrence is common.
	Radiation therapy—unproven.
	Chemotherapy—unproven.

Synovial Cell Sarcoma in Dogs

Common Clinical Signs:	Lameness and palpable mass.
Common Histologic Types:	Fibroblastic cell type.
Biological Behavior:	Middle-aged dogs; medium to large breeds; predominately male dogs; predilection for the stifle.
Prognostic Findings:	Mitotic index has prognostic value.
Treatment Considerations:	Surgery—amputation, better than 75% chance of 3-year survival.
	Radiation therapy—anecdotal responses reported in soft tissue tumors; provides pain palliation in those with substantial bony involvement.
	Chemotherapy—inadequately studied; cisplatin or combination of doxorubicin and cyclophosphamide may be helpful; consider

protocols 1–4 and 10 adjunctive to surgery or radiation therapy.

Testicular Tumors in Dogs

Common Clinical Signs:	Palpable mass in normal or atrophic testis; many are not palpable; feminization changes with some Sertoli cell tumors and seminomas.
Common Histologic Types:	Seminomas, Sertoli cell tumors, and interstitial cell tumors.
Biological Behavior:	Seminomas and Sertoli cell tumors have a high incidence in retained testes; old dogs; no breed predilection.
Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—usually curative as metastatic rate is low. Radiation therapy—may achieve long-term control for metastatic seminoma to sublumbar lymph nodes. Chemotherapy—no reports of chemotherapy for metastatic tumors.

Thymoma in Cats

Common Clinical Signs:	Dyspnea due to pleural effusion or large mass.
Common Histologic Types:	Malignant epithelial component with mature lymphocytes and mast cells.
Biological Behavior:	Old cats; no association with FeLV; tumors are usually encapsulated; paraneoplastic syndromes include myasthenia gravis, but this is less common than in dogs.
Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—treatment of choice in cats, may be curative. Radiation therapy—long-term remissions (>2 years) in nonsurgical patients. Chemotherapy—palliative responses observed using weekly vincristine therapy.

Thymoma in Dogs

Common Clinical Signs:	Cough; less commonly, dyspnea and lethargy; may have aspiration pneumonia secondary to myasthenia gravis and megaesophagus.

Common Histologic Types:	Epithelial malignant component associated with mature lymphocytes and mast cells.
Biological Behavior:	Old dogs; females possibly predisposed; usually large, invasive, slow-growing tumors with low metastatic rate.
	Paraneoplastic syndromes—myasthenia gravis is most common; polymyositis, hypercalcemia, and second malignancies may occur.
Prognostic Findings:	Dogs with megaesophagus have a very poor prognosis.
Treatment Considerations:	Surgery—may be curative for small or encapsulated tumors; dogs with megaesophagus need to be monitored for aspiration pneumonia; most thymomas are unresectable.
	Radiation therapy—long-term remissions (>2 years) in nonsurgical patients.
	Chemotherapy—palliative responses observed using weekly vincristine therapy.

Thyroid Tumors in Cats

Common Clinical Signs:	Hyperthyroidism with associated cardiac and hypermetabolic changes; peritracheal mass may be palpable.
Common Histologic Types:	Adenoma; carcinomas are rare.
Biological Behavior:	Old cats; no gender or breed predisposition.
Prognostic Findings:	None identified.
Treatment Considerations:	Supportive treatment—for example, propranolol and diltiazem, particularly for cardiac conditions.
	Medical management—methimazole and carbimazole reduce circulating thyroid hormone levels, but long-term use requires dosage increase.
	Surgery—as tumors are often bilateral, both glands should be removed; hypoparathyroidism or hypothyroidism may occur but is usually of short duration.
	Radiation therapy—radioactive iodine (^{131}I) gives good response

with prolonged remissions and few side effects; may also palliate effects of thyroid carcinoma.

Thyroid Tumors in Dogs

Common Clinical Signs:	Mass in ventral neck; rarely signs of hyperthyroidism.
Common Histologic Types:	Adenocarcinoma.
Biological Behavior:	Old dogs; no gender predilection; beagles, golden retrievers, and boxers are predisposed; local invasion is common; moderate metastatic rate.
Prognostic Findings:	Dogs with invasive tumors ("fixed" to underlying tissues) or large tumors predict worse survival rates; not correlated with histologic type, age, breed, or gender.
Treatment Considerations:	Surgery—curative for adenomas; may provide long-term control for small, noninvasive carcinomas, but these have potential to metastasize.
	Radiation therapy—external beam radiation may improve local control or reduce size of mass before

surgery; radioactive iodine (^{131}I) may cause regression in active hormonal tumors, which are rarely seen in dogs.

Chemotherapy—significant control of metastatic lesions observed with platinum-based protocols; consider protocols 1–4.

Hormonal therapy—anecdotal reports of long-term palliation of metastatic lesions (>1 year) seen with thyroxine supplementation.

Transmissible Venereal Tumor in Dogs

Common Clinical Signs:	Bleeding mass on external genitalia.
Common Histologic Types:	Transmissible venereal tumor.
Biological Behavior:	Spread by coitus and canine social behavior; females more susceptible than males; spontaneous regression in most cases after months, but not in immunosuppressed animals; rare metastasis.
Prognostic Findings:	None identified.

Treatment Considerations:	Surgery—curative if wide excision and localized tumor. Radiation therapy—low doses (10 Gy); may be curative if localized. Chemotherapy—weekly vincristine for 5–6 weeks may provide cure in 90% of dogs.

Vaginal and Uterine Tumors in Dogs and Cats

Common Clinical Signs:	Signs due to pelvic or urethral obstruction.
Common Histologic Types:	Leiomyoma and fibroma.
Biological Behavior:	Rare tumors, usually benign; often associated with ovarian cysts and endometrial hyperplasia.
Prognostic Findings:	None identified.
Treatment Considerations:	Surgery—may be curative for benign lesions. Radiation therapy—radiation-sensitive tumor; excellent responses observed.