TABLE 1.1

Common Cancers of Dogs

Tumor Type *[Common Primary Anatomic Locations]*	**Behavior**	**Staging Tests**	**Treatment Options**	**Prognosis**	**Known Negative Prognostic Factors**
Anal sac carcinoma	• Locally aggressive; complete excision is difficult owing to proximity to anal sphincter. Metastatic rate is highly variable: <40% to >90%. LN metastasis is seen more commonly and earlier than systemic (liver, bone, pelvis, lung) metastasis. • Often slowly progressive unless diffuse metastasis is present at diagnosis or renal function is compromised from hypercalcemia.	• 3-view thoracic radiographs • AUS +/− abdominal/thoracic CT scan • Ionized calcium	Primary tumor • Surgery with preservation of fecal continence is the best first option. • Lymphadenectomy is an adjunct surgical approach for suspect/confirmed abdominal LN metastatic disease. • Primary RT (palliative or curative intent) can provide good local control for unresectable disease. Systemic treatment • Unproven survival benefit • Carboplatin-based chemotherapy • Mitoxantrone-based chemotherapy • Toceranib phosphate • NSAIDs • Metronomic chemotherapy • Bisphosphonates for hypercalcemia	Dogs with advanced systemic metastasis generally have survival times <1 yr. Dogs with surgical intervention can have survival times of 1.5 to >3 yr and cure. Local and nodal disease impacts quality of life early in the disease process.	• Hypercalcemia • Systemic (non-nodal) metastasis • Primary tumor size >10 cm^3
Lymphoma **[Multicentric (lymph node, liver, spleen), skin, mucocutaneous, central nervous system, bone, bone marrow, GI, mediastinal]**	• Considered a systemic disease, except for epitheliotropic lymphoma, which may be localized to primary sites (oral, skin) and some extranodal sites. • *All* forms of lymphoma have the potential to be disseminated. Some forms may be indolent and slow to progress (spleen or node). • ATLS is associated with extensive tumor burden.	• Immunophenotyping • Histopathology as indicated (inconclusive cytology, solitary node, slowly enlarging LNs, desire for more detailed histological information) • 3-view thoracic radiographs • Advanced imaging (CT/MRI if CNS involvement is suspected) • AUS	Systemic treatment • Prednisone alone • Single-agent chemotherapy • Multiagent chemotherapy • CHOP (cyclophosphamide, doxorubicin, vincristine, prednisone) protocol • +/− stem cell transplantation • +/− half-body RT • Rabacfosadine • Verdinexor	Prednisone alone • MST ~1–2 mo CHOP protocol • MST ~1 yr • Bone marrow transplantation and half-body RT may have an added survival benefit, but length of time is unknown Single agent • Highly variable response and durability, MST <1 yr Rabacfosadine • MST ~6 mo Verdinexor • MST ~2 mo	• T-cell phenotype • Stage V (extra nodal, bone marrow, GI) • Substage b (sick) • High grade, blastic

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TABLE 1.1, CONTINUED
Common Cancers of Dogs

Tumor Type *[Common Primary Anatomic Locations]*	Behavior	Staging Tests	Treatment Options	Prognosis	Known Negative Prognostic Factors
Mammary gland cancer	• OVH before first estrus dramatically reduces risk. Risk rises rapidly with additional cycles. • Individual tumors may progress from benign to malignant; the likelihood of malignancy increases with tumor size; dogs may present with multiple tumor types. • Metastatic rate of malignant tumors is likely <50%.	• Primary tumor FNA (may be helpful in ruling out non–mammary gland tumors) • 3-view thoracic radiographs • Regional LN FNA	Primary tumor Single malignant tumors: wide surgical excision with ~2-cm margins +/− deep fascia. Consider chain mastectomy (unilateral vs staged bilateral chain mastectomy) for dogs presenting with multiple tumors or developing multiple tumors over time. Systemic treatment • OVH concurrent with or within 2 yr before tumor removal may improve survival in a subset of dogs. Studies of various chemotherapy protocols have not definitively established a benefit.	• MSTs range widely for malignant tumors. • Consider the 50:50:50:50 rule: ~50% are benign, ~50% are malignant. Of the malignant tumors ~50% can be "cured" with appropriate surgery and ~50% will metastasize.	• Large tumor size • Skin ulceration • LN/distant metastases • High histologic grade • Histologic vascular or lymphatic invasion • Lack of hormone receptor expression • Sarcomas and inflammatory carcinomas are associated with poorer outcomes than carcinomas.
Mast cell tumor **[Skin and subcutaneous tissues]**	• Locally invasive; invasiveness increases with grade. • Metastatic potential (Patnaik system): • Grade 1: metastases are rare • Grade 2: ~20% • Grade 3: 50-100% Tumors may secrete histamine and heparin.	• Pretreatment staging is optional for small tumors exhibiting slow growth. Biopsy to determine histologic grade is advisable for any unresectable, large, or rapidly growing tumor. • FNA cytology of regional LN. • AUS and FNA of spleen or liver if enlarged; if LN metastases or systemic signs are present; or if known grade 3 tumor.	Primary tumor • Surgical excision with 2-cm or proportional margins wide (lateral margins equivalent to the widest measured diameter of the tumor) and 1 fascial plane deep. Wider margins may be necessary for high-grade tumors. • Scar excision may be considered if margins are histologically incomplete. • RT may be considered if adequate margins cannot be achieved or margins are histologically incomplete. • Tigilanol tiglate injection Systemic treatment • Vinblastine-based chemotherapy • CCNU • TKIs • Gilvetmab Ancillary therapy • Consider H1 and H2 blockers for patients with large tumors and/or GI signs.	Primary tumor • Grade 1 tumors and most grade 2 tumors are likely to be permanently controlled by appropriate surgery. • When margins are histologically incomplete, local recurrence rates are ~20–30%. • If wide margins cannot be achieved, RT provides 2 yr local control rates >85%. Metastases • Survival periods are highly variable. Prolonged MSTs and high 1 and 2 yr survival rates have been reported in "high risk" patients receiving prednisone and vinblastine. • TKIs produce a meaningful response rate in grossly measurable tumors; survival data in patients at high risk for metastases have not been reported.	• Large tumors • Higher histologic grades • Advanced LN or distant metastases • Mucous membrane locations • High mitotic index, proliferation indices, microvessel density • c-kit mutation • Histologically incomplete surgical margins • Local recurrence • Systemic illness

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TABLE 1.1, CONTINUED
Common Cancers of Dogs

Tumor Type *[Common Primary Anatomic Locations]*	**Behavior**	**Staging Tests**	**Treatment Options**	**Prognosis**	**Known Negative Prognostic Factors**
Oral malignant melanoma	• Metastatic rate ~80%, LN then lungs. • ~1/3 lack melanin and may be confused with sarcomas histologically.	• 3-view thoracic radiographs • FNA of regional LN (even if normal size) • Resection of medial retro-pharyngeal, parotid, and mandibular LN provides more complete staging. • CT/MRI facilitate surgical planning, particularly for large and caudal tumors.	Primary tumor • Surgery is generally the best first option. Mandibulectomy or maxillectomy is usually required, plus local LN excision. • Adjuvant RT with coarse fractionation if resection is known or suspected to be incomplete. Systemic treatment • Oncept vaccination • Carboplatin-based chemotherapy • Gilvetmab	• Reported local recurrence rates after surgery alone range from 0-48%. • Majority of measurable tumors treated with RT respond, and complete responses are common. • Local recurrence rate of ~26% when RT is used to treat microscopic residual disease. Reported MSTs when surgery is included in treatment range from 5 to 17 mo. Carboplatin produces responses in measurable disease in 30–50% of patients; studies regarding prolongation of survival are conflicting. Studies regarding the ability of DNA vaccination to prolong survival are conflicting.	• Large tumor size, caudal location, and previous local recurrence are risk factors for local recurrence and survival after surgery or RT. • Elevations in proliferation indices • LN or distant metastasis
Osteosarcoma **[Proximal humerus, distal radius, distal femur, proximal and distal tibia]**	• >90% of dogs have pulmonary micrometastases on presentation, rare skeletal metastases.	Essential • 3-view thoracic radiographs Optional • Bone scintigraphy or radiographic bone survey • Thoracic CT • AUS	Primary tumor • Amputation, limb-sparing surgery, or stereotactic RT • Palliative RT Systemic treatment • Carboplatin- or doxorubicin-based chemotherapy	• Amputation alone: MST ~4 mo • Amputation and chemotherapy: MST ~10–12 mo	• Elevated serum ALP • Proximal humeral location

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TABLE 1.1, CONTINUED
Common Cancers of Dogs

Tumor Type *[Common Primary Anatomic Locations]*	Behavior	Staging Tests	Treatment Options	Prognosis	Known Negative Prognostic Factors
Soft tissue sarcoma: mesenchymal tumors including fibrosarcoma, peripheral nerve sheath tumor, and others **[Skin and subcutaneous tissues]**	• Locally invasive; invasiveness increases with grade. • Overall metastatic rate is ~20% and increases with grade: Grade 1 and 2 ~15%, Grade 3 ~50%. Clinically apparent metastases develop relatively late (median ~1 yr).	• 3-view thoracic radiographs • CT/MRI may facilitate surgery for large or fixed tumors and tumors adjacent to key anatomic structures.	Primary tumor • Surgical excision with ≥3 cm margins including a fascial plane below if possible. Amputation may be considered if adequate margins cannot be provided. Scar excision may be considered if margins are histologically incomplete. • RT may be considered if adequate surgical margins could not be provided or margins are histologically incomplete. • Metronomic chemotherapy may improve duration of local control.	Primary tumor • When margins are histologically incomplete, local recurrence rate is ~20–35%. Recurrence rates are likely higher for high grade tumors. • RT for incompletely resected tumors provides local control rates: 75% at 1 yr; median time to local recurrence ~2 yr.[a] Systemic disease • Doxorubicin and other agents are known to produce responses in measurable disease. Data regarding treatment of micrometastases with conventional or metronomic chemotherapy are lacking.	• Local recurrence • Incomplete histologic margins • Large tumors • Metastases • High mitotic index/grade

Splenic hemangiosarcoma
Note: Some splenic masses are benign hematomas and cannot be definitively distinguished from HSA before splenectomy and biopsy.
	• Metastatic rate approaches 100%.
	• Liver is the most common metastatic site.
	• Survival times are highly correlated with clinical stage:
	  • Stage 1: No hemoabdomen; no clinically detectable metastases.
	  • Stage 2: Hemoabdomen, no clinically detectable metastases.
	  • Stage 3: Clinically detectable metastases.
		Essential
		• AUS for intra-abdominal metastases. Liver metastases cannot be definitively distinguished from hyperplastic nodules.
		• 3-view thoracic radiographs
		Optional
		• Echocardiography for concurrent right atrial mass; present in ~9% of dogs presenting for splenic HSA.
			Primary tumor
			• Splenectomy with biopsy of liver nodules
			Systemic treatment
			• Doxorubicin-based conventional chemotherapy and/or metronomic chemotherapy
				• Splenectomy alone: MST ~1.5–3 mo
				• Adjuvant chemotherapy: MST ~3–6 mo
					• Clinical stage

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TABLE 1.1, CONTINUED
Common Cancers of Dogs

Tumor Type *[Common Primary Anatomic Locations]*	**Behavior**	**Staging Tests**	**Treatment Options**	**Prognosis**	**Known Negative Prognostic Factors**
Transitional cell carcinoma/ urothelial carcinoma **[Urinary bladder, urethra, prostate]**	• Aggressive with tendency for local invasion and metastasis to regional LNs and lungs, high risk of urinary tract obstruction.	• Physical examination to include rectal exam • 3-view thoracic radiographs • AUS • Cystoscopy • Diagnostic catheterization • BRAF gene mutation test	• NSAIDs: piroxicam • Chemotherapy: mitoxantrone, carboplatin, vinblastine • Intensity-modulated RT	• NSAIDs alone: MST ~6 mo • NSAIDs with chemotherapy: MST ~12 mo • Intensity-modulated RT, NSAIDs, and chemotherapy: MST ~15-18 mo	• Clinical stage
Nasal tumors **[Carcinoma, adenocarcinoma, squamous cell carcinoma, osteosarcoma, fibrosarcoma, undifferentiated sarcoma, lymphoma]**	• Local invasion/ destruction with risk for regional and distant metastasis.	• 3-view thoracic radiographs • LN cytology • CT/MRI • Biopsy	• RT • Chemotherapy: carboplatin, doxorubicin, NSAID (palliative) • Toceranib	• RT: MST ~6-18 mo • Surgery or chemotherapy alone: MST ~3-6 mo	• Clinical stage • Squamous cell carcinoma

ALP, alkaline phosphatase; ATLS, acute tumor lysis syndrome; AUS, abdominal ultrasound; CNS, central nervous system; CT, computed tomography; FNA, fine needle aspirate; GI, gastrointestinal; HSA, hemangiosarcoma; LN, lymph node; MST, median survival time; NSAID, nonsteroidal anti-inflammatory drug; OVH, ovariohysterectomy; RT, radiation therapy; TKI, tyrosine kinase inhibitor.

a Hildebrandt IM, Skinner OT, Mickelson MA, et al. Surgery and postoperative definitive radiotherapy for management of canine soft tissue sarcoma: a multi-institutional retrospective study of 272 dogs (2010-2020). *J Am Vet Med Assoc.* 2024;263(3):1-12.