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Principles of Cancer Control in Companion Animals

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INTRODUCTION

Cancer management in companion animals has evolved considerably during the last 15-20 years. Increased information regarding treatment options has enabled clinicians to make better recommendations regarding curative or palliative treatment and technological advances have made treatment more sophisticated. For instance, new surgical procedures result in prolonged survival for many patients presenting with oro-facial tumors, permit limb-sparing for dogs with primary bone tumors, and the development of vascular pedicle grafts and tissue expanders facilitate the reconstruction of normal tissue following tumor resection in situations not previously possible. Radiation therapy has been refined in both technological and clinical application such that it is now an essential tool for management of incompletely resected solid tumors, nasal tumors, and oral melanoma and for pain relief in patients with bone cancer. The use of chemotherapy in combination with surgery or radiation therapy has resulted in better management of canine hemangiosarcoma and osteosarcoma and mammary carcinoma in cats.

WEB RESOURCES

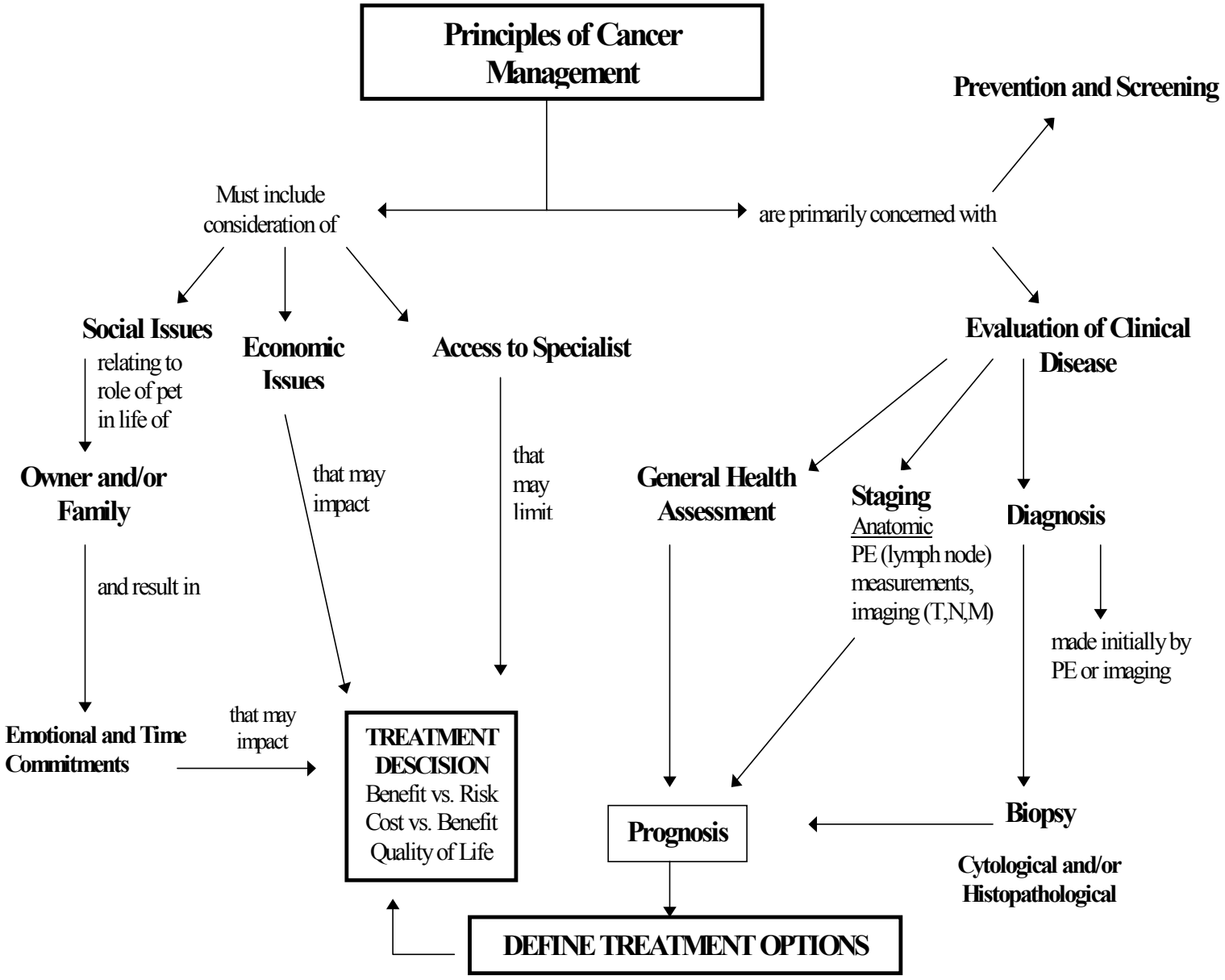
Comparative Cancer Program at Cornell University www.vet.cornell.edu/cancer
An excellent site for owners of pets with cancer.

National Cancer Institute www.cancer.gov
The most comprehensive site for cancer information in the world. Patient support services, a cancer dictionary, extensive descriptions of tumors for patients and physicians as well as many support services (chemotherapy and radiation descriptions for patients and access to clinical trials.

American Cancer Society www.cancer.org
A complete and interesting site on prevention and screening for most common
types of cancer in people.

Veterinary Cancer Society www.vetcancersociety.org Some useful links

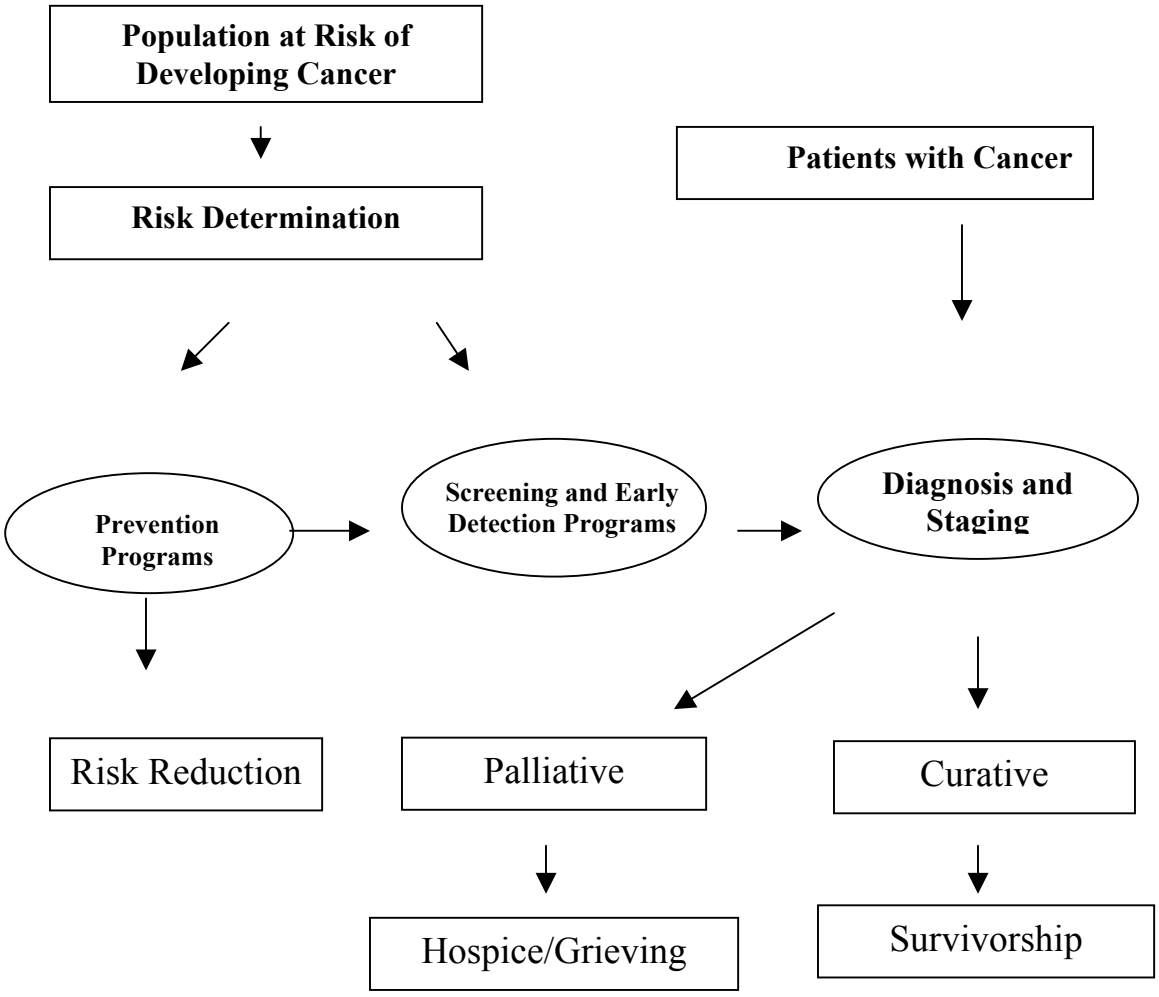
Home Care Guide for Cancer - Am College of Physicians
www.acponline.org/public/h_care
Excellent information on palliative and hospice care.



PRINCIPLES OF CANCER MANAGEMENT: PREVENTION, SCREENING AND EARLY DIAGNOSIS

Cancer control, until recently, has been focused on treatment of already existing, clinically detectable disease. However, this strategy is not optimal for control of most types of cancer since even if the tumor is diagnosed when it is small (1 cm diameter) the process is already well advanced and may be beyond our capability of complete eradication of all cancer cells. The **goa**l of cancer research is to decrease the morbidity and mortality associated with this disease and in order to achieve this goal we must: 1) cure existing and invasive cancer, 2) control preinvasive

cancers, 3) prevent new cancer and 4) better manage pain and symptoms of noncurable cancers. The figure below illustrates the features of **the continuum of cancer care**.



The key to early diagnosis and prevention of cancer is to identify patients at increased risk of cancer development at a stage when interventions will be most successful. For some tumors, treatment is not curative even if a relatively early diagnosis is made. In dogs, tumor types that fall into this category include oral melanomas, hemangiosarcoma, osteosarcoma, bladder cancer, nasal tumors, brain tumors and most tumors arising from internal organs. In cats, oral squamous cell carcinoma, vaccine-associated tumors and mammary gland tumors are difficult to control once they have developed. If risk factors for development of these tumors could be identified, specific screening programs could be developed which would allow detection at stages where better outcomes may be offered with therapy. More importantly, detection of **pre-invasive** forms of malignant tumors affords the opportunity to initiate strategies to keep the cancer contained. New compounds specifically developed to keep tumors "differentiated" rather than eradicate them is a rational method of cancer control since these strategies are much less toxic

than conventional therapy and may be just as useful. This new field is called chemoprevention. **Chemoprevention** of cancer is conceptually similar to prevention of cardiovascular diseases in patients that are at high risk by administering medication to lower cholesterol and blood pressure before any symptoms occur. An example of chemoprevention for cancer in women is the use of tamoxifen to reduce the incidence of recurrent breast cancer.

Conventional risk factors (signalment, family history, carcinogen exposure) can identify some general populations of dogs and cats at risk of developing certain cancers. Although not available for veterinary medicine yet, new technology is making pre-malignant changes easier to detect in some populations of humans and surrogate markers for cancer development are being used to screen for tumors of internal organs more easily. It is currently possible to assign risk factors in companion animals for some of the more common and most difficult tumors to control. From this information, specific screening programs and owner recommendations for prevention and surveillance of these cancers can be developed as described below.

General Recommendations for Cancer Screening

As in humans, screening tests for cancer will evolve as new technology is developed and information is acquired to suggest improved outcome or quality of life. Colonoscopy, mammography and tissue specific protein assays (Prostate, Ovarian cancer proteins) have become mainstream screening tools for humans. In companion animals, it is well known that certain breeds are prone to develop cancer. In general, because cancer is a common disorder of older dogs and cats, animals beyond the age of 7 or 8 years of age should be considered "at risk" for cancer. General screening recommendations such as bi-annual physicals, screening laboratory bloodwork and urinalysis are becoming more common for geriatric animals. In addition, the use of cutaneous maps to chart the location, size and diagnosis of all skin masses will help to determine rapid changes in growth or any new masses to be concerned about.

Owners must take responsibility for prevention of cancer. Early neutering of male and female dogs is the best example of cancer prevention. Dogs are now known to develop upper respiratory and lung cancer when exposed to second-hand smoke and should be removed from a passive smoke environment. Observation of bowel or urinary habits should be strongly encouraged. Owners should also be able to accurately evaluate mammary glands, peripheral lymph nodes, oral cavity structures, examine interdigital spaces and external ear canals.

Recommendations for more thorough screening are also needed. Recommendations for thoracic radiographs, abdominal ultrasound, colonoscopy and even CT/MR of the nasal cavity and brain may not be too extreme if early diagnosis means improved outcomes for serious forms of cancer. More sophisticated screening tools may create a dilemma if a nodule is identified in an organ of an asymptomatic patient. Nodules in the adrenal gland, lung, kidney or bladder should be examined further for evidence of neoplasia since non-neoplastic nodules in these organs are rare. In some circumstances, invasive investigation of nodules identified on routine screening may not be conducted. Nodules in the spleen or liver are often non-neoplastic when small and should be re-evaluated periodically for changes in size. **It is important to remember** that tumor volume doubles rapidly as the linear measurements increase. For instance: a 1 cm diameter mass doubles in volume when the diameter measure 1.2 cm! (1.3 x 1.3 x 1.3 = 2.1 cc)

Specific Prevention and Screening for Cancer in Dogs

	Risk Factors	Prevention Recommendations	Screening Recommendations
Adrenal Tumor	Unknown	Unknown	Abdominal US, lab tests
Anal/Perianal Gland	Male	Neuter	Rectal, perirectal exam
Bladder Cancer	Female, Small Size, Old Age	Judicious insecticide use and weight control.	Early US if dysuria, hematuria; urine dx test.
Bone Cancer	Body Size, Anatomic Site	Unknown	Early radiograph if lame
Brain Cancer	Boxer	Unknown	MR?
Breast Cancer	Ovaries	Neuter	Frequent palpation
Hemangiosarcoma	G.Shep, G.Ret	Unknown	Abd US
Lymphoma	Various Breeds, Herbicides	Avoidance	Frequent LN palpation
Nasal Tumors	Passive smoke	Avoidance	CT
Oral Tumors	Unknown	Unknown	Freq inspection, dent prophylaxis
Pulmonary Tumors	Passive smoke	Avoidance	Thoracic radiographs
Reproductive Cancers	Unknown	Neuter	Female – US Male - palpate
Thyroid	Unknown	Unknown	Frequent exam
Skin	Boxer – mct Lack of pigment - scc	UV radiation avoidance	Skin mass topography maps

Specific Prevention and Screening for Cancer in Cats

	Risk Factors	Prevention Recommendations	Screening Recommendations
Breast Cancer	Siamese, Repro Hormones?	Neuter	Frequent Palpaltion
Lymphoma	FeLV exposure	Confinement	Frequent exams
Oral Tumors	FIV infection, Dental Inflammation?	Unknown	Frequent exams
Vacc-Assoc Sarc	Rabies & Felv vacc.	Prudent Vacc use	V.A. S. Task Force Reccs.

PRINCIPLES OF CANCER MANAGEMENT: CLINICAL CONSIDERATIONS

Preliminary Evaluation

Signalment: Many neoplasms more commonly affect animals of a certain age, sex or breed and such knowledge often aids diagnosis . Table 1 is a partial list of specific breeds and characteristics of dogs and cats predisposed to certain types of neoplasia.

Partial list of factors predisposing dogs and cats to specific neoplasms.

Age

Histiocytoma	Young dogs
Viral Papilloma	Young dogs

Gender

Malignant Melanoma	Male
Perianal Adenoma	Male
Adrenal Tumors	Female
Meningiomas	Dog (female), Cat (male)

Color

Squamous Cell carcinoma	Non-pigmented regions
Malignant Melanoma	Darkly pigmented regions

Breed

Skin Tumors	Basset, Boxer, Bull Mastiff, Scottish Terrier, Weimaraner
Mast Cell Tumors	Brachycephalic breeds
Bone Tumors	Large/Giant breeds
Thyroid Tumors	Boxer, beagle, Golden ret
Hemangiosarcomas	Golden ret, German shep
Brain Tumors	Bulldog, Boxer, Boston Terrier
Hematopoietic Tumors	Boxer, Golden Ret, Rottweilers
Mammary Tumors	Boxer, Spaniel, dachshund, poodle
Bladder Tumors	Beagle, Terrier, Small Breeds

History: The onset and duration of the mass, growth rate, and prior treatment may narrow the diagnostic evaluation and treatment options as well as help define behavioral characteristics of the neoplasm. Previous tumors diagnosed in the patient should be identified as to type, completeness of treatment and followup. The history of when a female dog was neutered or the reproductive history should be detailed.

Physical Examination: The goal of examination is to characterize concurrent diseases that may limit treatment or survival and to define the extent of the tumor burden. Physical

measurements of the lesion(s) using calipers is useful for discussions with clients and to document tumor response. A topographic map of the patients body is useful for future comparison and for identifying benign skin lesions such as lipoma, sebaceous adenomas for future concern. It is essential to estimate the invasiveness of a tumor to adequately plan the surgical biopsy and/or resection of a lesion. Regional lymph nodes must be evaluated for size, consistency, and fixation to adjacent tissues. Physical exam findings will also help in selection of ancillary diagnostic procedures necessary to define tumor extent (specific imaging techniques, bone marrow aspiration/biopsy, endoscopy, etc.)

Counseling: Cancer treatment in companion animals evokes considerable emotion and ethical deliberation for both owners and veterinarians. It is helpful to first determine the goals and expectations prior to diagnosis and treatment. Once the diagnosis and staging is completed, treatment options can be considered. Treatment recommendations and prognostic factors evolve rapidly for many types of cancer. Therefore, consultation with a specialist regarding specific treatment options will often assist with decision making. Treatment availability and financial considerations must also be considered.

Diagnostic Evaluation

Clinical Evaluation: General health status is assessed to identify disease that may adversely affect prognosis, and limit or alter therapy. After a thorough physical examination the screening laboratory evaluation generally includes a complete blood cell count, serum biochemistry panel, and urinalysis. Other diagnostic tests are performed as indicated. Survey radiographs are indicated to detect metastasis, determine potential bone involvement or evaluate orthopedic soundness prior to amputation or limb-sparing in dogs with osteosarcoma, localize oral or nasal masses, etc. Contrast radiographic studies can determine the extent of gastrointestinal and genitourinary neoplasia. Computed axial tomographic (CAT) scanning is becoming more available and defines the invasive characteristics of deep-seated tumors much more clearly than survey radiographs. CAT scanning procedures are particularly helpful when planning involved surgical procedures. Ultrasonography can be used to determine the proximity of a tumor to large blood vessels, to determine the cavitary or cystic nature of masses, to evaluate possible intra-abdominal metastases to lymph nodes or organs, and to assess the initial and post-treatment tumor volume.

Cytologic examinations of bone marrow aspirates, buffy coat preparations of peripheral blood samples and fine needle aspiration biopsies of accessible tumors and regional lymph nodes are important diagnostic procedures. Fine needle aspiration can be accomplished on any accessible mass. Often, a rapid, inexpensive diagnosis can be made for certain tumor types (lipomas, sebaceous adenomas, lymphoma and mast cell tumors). However, cytologic evaluation of fine needle aspirates or bone marrow specimens must **not be over-interpreted**. Treatment decisions should be considered on a cytologic diagnosis only when a **definitive** diagnosis can be made such as with lymphosarcoma or mast cell tumors.

Tumor Biopsy: Many techniques are available for tissue biopsy. The method selected should safely and simply procure adequate tissue samples to provide an accurate diagnosis without compromising treatment. Biopsies can be **excisional** (complete removal of the tumor) or

nonexcisional (removal of only a portion of the tumor). **Nonexcisional techniques** include: a) cytology from a fine-needle aspirate, brush samples, impression smears or effusions , b) histopathology of cutting forcep biopsies, cutting needle biopsies, punch biopsies, and incisional biopsies. Excisional biopsies should be considered only when disruption of the tumor environment will not compromise further treatment options. Even small disruptions in tissue surrounding the tumor may make a curative treatment plan difficult to achieve. Care should also be taken when conducting non-excisional biopsies. True-cut needle biopsies may penetrate the underlying tissue of a small mass and result in disruption of tissue planes or seeding of tumor. Some deep-seated tumors should not be aspirated: transitional tumors of the bladder or prostate can be seeded along the needle tract.

Excisional biopsies should not be considered a **therapeutic procedure.** In general, excisional biopsy is preferable if the mass is small (<2 cm in diameter), freely moveable, and without adjacent tissue invasion. Specific indications for excisional biopsy include lymph nodes, small cutaneous nodules with ample surrounding normal tissue, mammary gland tumors, tumors of the central nervous system (to provide decompression) and masses found during a laparotomy or thoracotomy since a re-excision is unlikely.

Incisional biopsy is recommended if a definitive diagnosis or histologic grade would influence the treatment decision. For example, histologic grade of soft tissue sarcomas and mast cell tumors are prognostic factors that can be helpful in treatment planning. Biopsy results may suggest the degree of surgical resection necessary for definitive control or indicate that additional types of therapy may be beneficial. **Therefore, even if a diagnosis is possible with a fine needle aspiration, a tissue biopsy may be indicated to establish prognosis and guide treatment planning.**

Ideal histologic samples contain a representative sample of the neoplastic tissue. Superficial tumors should be sampled at the tumor/normal tissue interface if regions of ulceration, necrosis or inflammation exist that may reduce the diagnostic interpretation of the sample. Biopsy of deep tumors (> 1 cm below skin) should be given special consideration. Biopsy at the margin can be undesirable in certain deep-seated tumors if it disrupts and thereby extends the tumor margin. This can necessitate wider resection or a larger radiation field for adequate treatment. Procedures to expose the superficial surface of the tumor for incisional sampling or punch biopsy are a preferable approach. The biopsy incision or needle tract for <u>every</u> biopsy should be preplanned since it is a potentially contaminated region, and should be removed at the time of the definitive procedure or included in the radiation treatment field.

During any procedure for biopsy that requires anesthesia, a surgical biopsy of the regional lymph node should be conducted. This will aid in staging and is much more comprehensive than an aspirate of the node. There are some regional lymph nodes that are difficult to identify or to sample (axillary lymph nodes – not palpable unless enlarged and difficult to resect). This procedure could make prognosis much easier to determine and should be part of the evaluation. The lymph node may also be removed during the surgical procedure to definitively resect the mass.

Initial biopsies should be fixed for adequate histologic evaluation. Small tissue samples (<1 cm thick) for routine histopathologic evaluation should be completely immersed in substantial amounts of 10% buffered formalin (10:1 formalin to tissue ratio). Obtain samples for culture or other special analyses at the same time to avoid a second biopsy procedure if histologic analysis identifies an inflammatory or other nonneoplastic process. Include a complete history and description of the clinical and surgical findings with the laboratory submission. For larger samples, the tissue should be sectioned to allow formalin to penetrate the tissue adequately for rapid fixation.

The histologic examination and interpretation of the biopsy specimen is a critical component to assessing prognosis and treatment options. In many instances a pathologist can assign a histologic grade to the tumor specimen. A histologic grade represents the degree of malignancy and is based on tissue differentiation, cellular growth activity and extent of necrosis within the tumor. The grade is often of prognostic significance and can be used to suggest treatment alternatives. If the histologic diagnosis is questionable or does not seem to match the clinical picture, the results should be discussed.

Tumor Staging: Staging is used to determine the extent of neoplastic disease, provide a framework for rational treatment planning, facilitate communication between clinicians, allow for uniform comparison and evaluation of treatment results, and aid prognostication. Accurate staging requires an understanding of the biologic behavior of different tumor types and a thorough diagnostic evaluation.

PRINCIPLES OF CANCER MANAGEMENT: GENERAL THERAPEUTIC CONSIDERATIONS

Tumor Biology and Natural History

Rational treatment planning involves knowledge of the potential for local recurrence and metastasis of the neoplasm. The keystone of this information is the histological assessment or diagnosis. Malignant tumors predisposed to local recurrence should be managed aggressively from the time of initial diagnosis. The chance for long-term tumor control is greatest when the tumor is undisturbed by previous therapeutic intervention. The risks and benefits of aggressive management must be carefully evaluated. However, there is an obvious benefit of prolonged tumor response with reduced overall expense if the tumor can be managed once, albeit initially more costly, compared to multiple, suboptimal attempts at tumor control.

Goals of Treatment

Maintaining the highest quality of life for the longest period of time is always the goal of cancer management in companion animals. This goal must be considered within the context of emotional and financial restrictions. Decisions are often difficult. The best service that can be provided is a knowledgeable, unbiased assessment of the condition and a frank discussion of options sufficient to make an informed decision. This may involve consultation or referral to a specialist or a comprehensive cancer center.

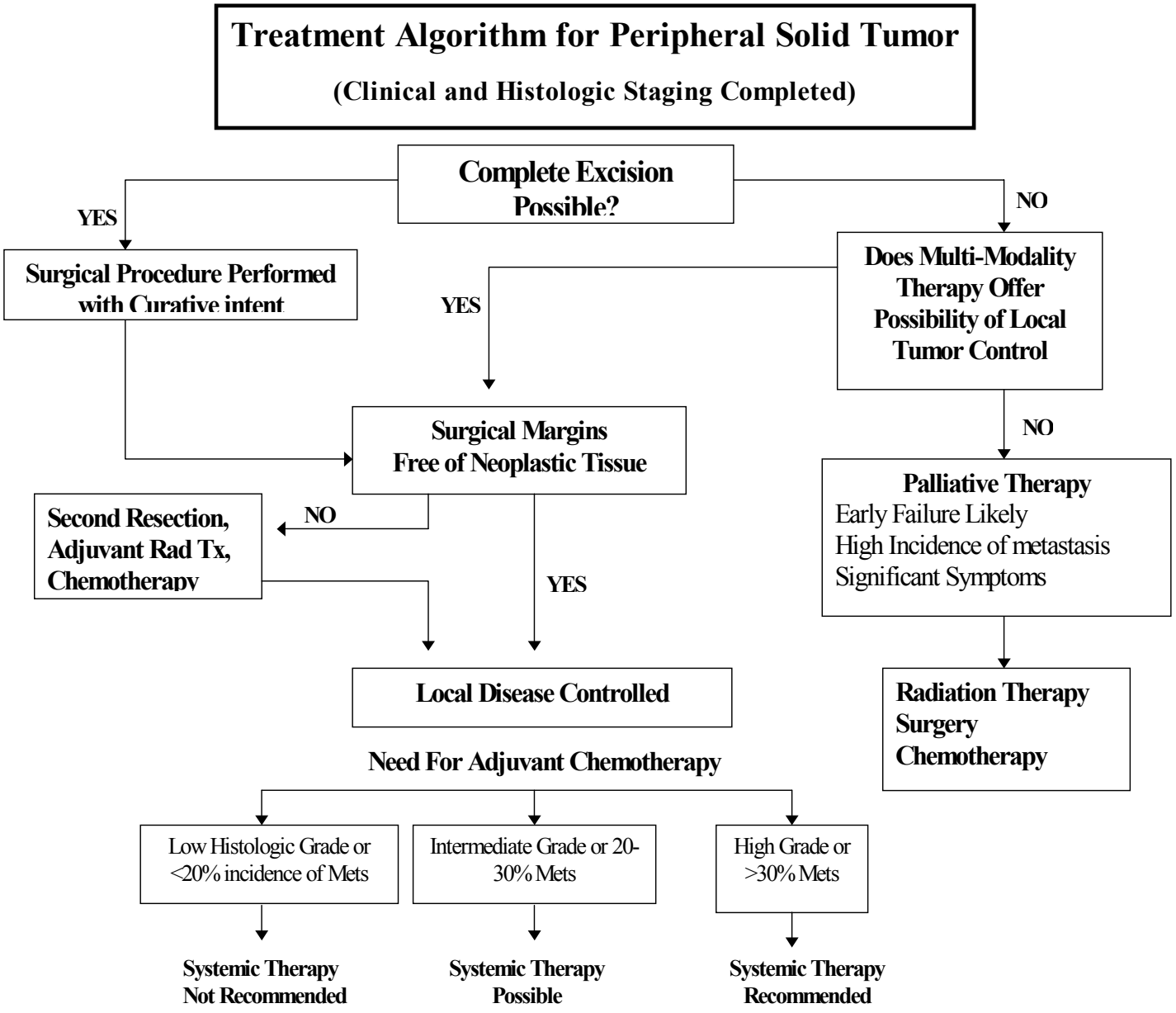
It is a fact that many tumors (>50%) may be cured with complete removal or combination therapies. However, many advanced tumors or highly aggressive tumors cannot be cured. Therefore, determining the ability to treat a tumor with curative intent can be very valuable. A working definition of **'curative' therapy** used in veterinary medicine is a likelihood of >50 % that a given tumor type in the general population of dogs in which it has been diagnosed will be controlled for at least 1 year following treatment. If the best available information suggests this is not possible, **palliative therapy** may be considered (see below). This information will frame the discussion with owners regarding prognosis and should be accurately assessed, even if it requires a formal consultation.

Surgical Options

The first therapeutic determination made by the veterinarian when evaluating a "solid tumor" involves whether the tumor may be completely excised. This is determined based on the **size** of the surgical field necessary to remove all known and probable tumor extent, the **site** of the tumor and the **skill** of the surgeon. The site of the tumor dictates the extent of normal tissue resection. For instance, interscapular injection-site sarcomas in cats require extensive removal of tissue, including portions of dorsal vertebral processes and scapulae, due to the complex nature of the fascial planes within that site. Regions where sufficient normal tissue cannot be removed (e.g., distal extremities, skull) may require extensive reconstruction (grafting) or consideration of multimodality therapy. More sophisticated tumor imaging techniques, such as CT or MR, greatly assist presurgical planning for invasive tumors or for tumors located close to critical normal structures.

The skill and experience of the surgeon is extremely important. Removal of tumors and reconstruction of normal tissue in difficult locations requires skills that must be continuously practiced and updated. Some tumors are radiation sensitive (e.g., acanthomatous epulis, plasma cell tumors, mast cell tumors) and may be considered potentially curable if they are located within a site that is not amenable to complete resection. A combination of radiation and surgery improves outcome in situations when neither treatment modality alone is sufficient to accomplish that goal. Well-planned, combined modality therapy is being used more frequently for tumors that are located in difficult sites.

The flowchart below illustrates the process of determining the general treatment options for a solid tumor. The ability to achieve a curative outcome is based on assessment of the natural history of the specific tumor type as defined by clinically relevant predictive indicators (i.e., grade) and the available treatment options.



The use of such an algorithm is helpful for framing broad decisions about the general approach to management. A careful plan should be detailed for each patient with cancer which includes consideration of alternative plans or contingencies if there are unexpected developments. Each patient should be considered in context of **"the continuum of cancer care".** As treatment outcome develops (cure, recurrence, palliation of signs and symptoms), the skills for managing the patient will change.

Evaluation of the Resected Surgical Specimen

Perhaps **the most important point** in the management of peripheral solid tumors is the assessment of the margins or the resected specimen. The complete removal of the tumor can be difficult to determine. Recently, a systematic approach to determining the location of tumor cells at the edge of the resected specimen has been developed. The use of the colored inks to map the cut-surface of the specimen has made margins easier to assess by the pathologist. The inks are inexpensive, easy to apply to the tissue and do not interfere with the pathologic interpretation. This process will be described in detail during other lectures.

Incomplete resection of a tumor is cause for significant re-evaluation of treatment options. Some tumors may be completely respectable if a second procedure is accomplished. In some sites that is not possible, although radiation therapy may result in a cure in some cases where their tumor is not completely removed.

Adjuvant Chemotherapy or Immunotherapy

The need for **adjuvant therapy** (after surgery or irradiation) is based on a high likelihood of local tumor recurrence following resection or a high rate of metastasis even if the primary tumor is permanently controlled. Adjuvant radiation therapy is recommended for local control of incompletely resected sarcomas or mast cell tumors and results in long term control. Adjuvant chemotherapy or adjuvant immunotherapy would be theoretically valuable for any tumor with a substantial metastatic rate. Tumors that are associated with a risk of metastasis exceeding 20% may warrant consideration for adjuvant treatment if a survival benefit could be documented for that chemotherapeutic protocol. In veterinary medicine, few studies have documented that chemotherapy is associated with prolonged survival in the adjuvant setting. Survival of dogs with osteosarcoma and, perhaps, hemangiosarcoma, is significantly prolonged after chemotherapy. Cats with mammary carcinoma are believed to benefit from adjuvant chemotherapy. A general recommendation for adjuvant therapy in other types of cancer where metastasis is a life-limiting event is difficult to make given the available data. However, some types of cancer (high-grade sarcoma) are associated with a high risk of metastasis and the current clinical judgment suggests that treatment may benefit dogs in this situation. For other types of cancer where insufficient data is available, individual decisions about adjuvant chemotherapy or immunotherapy is made on an individual basis determined by the owners wish and ability to provide such alternatives.

PRINCIPLES OF CANCER MANAGEMENT: PALLIATIVE THERAPY

The world health organization defines palliative care as "The active total care of patients whose disease is not responsive to curative treatment. Control of pain, of other symptoms, and of psychological, social and spiritual problems, is paramount. The goal of palliative care is achievement of the best quality of life for patients and their families". The goals of veterinary oncology and palliative care have always been well aligned since quality of life has been the overriding concern for animals undergoing cancer treatment. The need for palliative care in veterinary oncology is already great but will likely continue to increase as the field better defines

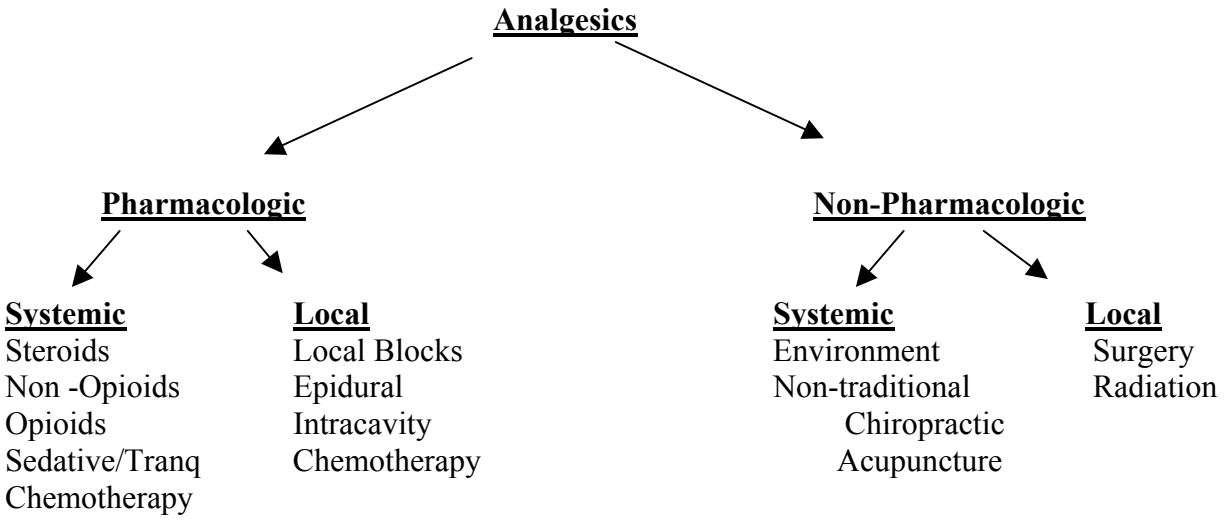
the indications for curative and palliative therapy and recognizes that some aspects of palliative care can be integrated into curative therapies in order to create a continuum of cancer management. For purposes of discussion, the definition of curative therapy will be median control of the primary and any metastatic disease for at least one year with conventional therapy for a given tumor type. Patients with tumors that cannot be controlled for this arbitrary endpoint may be considered eligible for palliative treatment. However, the need for palliative intervention and the type of intervention used is of great debate. The ease of prescribing palliative treatments may restrict future therapies or hinder progress toward a curative treatment. The concept of palliative care in both human and veterinary oncology is in need of rigorous study.

Primary Palliative Therapy

Primary therapy for palliative purposes is accomplished in order to control a variety of symptoms. Symptoms associated with advanced cancers includes physical disruption of vegetative functions such as difficulty eating, breathing, urinating or defecating and symptoms associated with metabolic problems from cancer such as anemia, nutritional wasting, low blood sugar or increased calcium levels. All of these may induce discomfort, anxiety or pain in addition to organic abnormalities. If symptoms are associated with physical presence of a mass it is generally assumed that reduction of the mass will improve both organic symptoms and pain associated with mass. Primary therapy for palliation includes surgery, chemotherapy and radiotherapy. **The goals of primary therapy in a palliative setting are different than in a curative setting. Palliative surgical debulking is not intended to include large normal tissue margins. Palliative radiation therapy is schedule of treatment associated with few immediate side effects and limited hospital time. Palliative chemotherapy is administered to attempt reduction or stabilization of nodules to improve quality of life.** Supportive medications such as antibiotics, stool softeners, anti-emetics, and others are delivered to ease symptoms either with or without primary therapy. Supportive procedures that may be necessary include transfusions, fluid withdrawal from body cavities, tube placements to control urine build up and nutritional support via feeding tube. Even multimodality therapy (surgery plus chemotherapy or palliative radiation plus chemotherapy) may be appropriate in certain instances.

Pain Management

Pain can be defined as an unpleasant sensory or emotional experience associated with actual or anticipated tissue damage. Pain is the most feared complication of cancer in humans. Approximately 40% of human patients with cancer suffer from pain and 80% with advanced cancer have pain. Pain control in humans and animals has become a major clinical focus in the last 5 years. Pain recognition in animals requires close observation. Vocalization is a very late event for animals in response to pain. Physiologic changes in heart rate, respiratory rate and pupil size (mydriasis) are early signs. Postural signs such as reluctance to lie down and abdominal guarding are also early signs. Restlessness and a change from being interactive to reclusive may be noticeable as well. Pain can be categorized as either acute or chronic. Acute pain may accompany procedures such as surgery or irradiation. Local anesthetics, appropriate use of tranquilizers and pre-emptive pain management is generally sufficient. Chronic pain requires a more comprehensive approach, often involving a combination of pharmacologic and nonpharmcologic analgesic strategies.



Primary treatment of the tumor can cause a direct reduction in pain even if the tumor does not respond by reduction in volume. The analgesic effectiveness of radiation therapy is well documented in the treatment of bone pain, metastases and nervous system neoplasia. In humans, irradiation of peripheral nerves for perineal pain and hepatic irradiation (2,000-3,000cGy) for capsular distention is effective and well tolerated. The effect of primary chemotherapy on cancer pain is most often observed when treatment is associated with reduction in tumor size. Surgery can relieve pain and discomfort from problems such as abscessed or ulcerated superficial masses, \GI obstruction, nervous tissue compression and unstable bony structures. The benefits of primary therapy should be weighed against the risks, hospitalization, recovery time and expected duration of benefit.

Use of specific analgesic agents is frequent for patients with cancer-related pain. Glucocorticosteroids have been used generously for animals with cancer in hopes of increasing appetite, mood and well being. Specific painful conditions associated with tumors that are known to respond to steroids include: raised intracranial pressure, acute spinal cord compression, metastatic bone pain, neuropathic pain due to infiltration or compression by tumor, symptomatic lymphedema, and hepatic capsular distention. Non-Opioid analgesics are usually the first line of management in humans. Escalation of the dose to determine analgesic activity to approximately 2X the normal dose is considered the maximum. Nonsteroidals such as carprofen and piroxicam are generally the initial drugs of choice in this category. If insufficient analgesia is achieved with non-opioids an oral form of opioid is often used and is most often combined with Tylenol (Tylenol with codeine). In cats, oral butorphanol may be used as single therapy. Morphine tablets or morphine suppositories may also be used. Transdermal fentanyl administration has been very useful for both pre-emptive pain relief and ongoing pain relief from chronic pain. Companion animals are rarely sustained on long-term opioid narcotics for chronic pain. Many alternatives exist now for administration of pain medication in humans for prolonged periods such as indwelling SQ ports, implants, etc. In some situations prolonged pain control in dogs or cats may be indicated.

Acupuncture, chiropractic management and physical therapy may be incorporated into pharmacologic management of pain to enhance overall well being.

SUMMARY

The management of cancer must be comprehensive, thoughtful and respectful of the patient and owners situation. Each patient and client have unique circumstances that must be considered. Developing the best treatment plan may not include the most effective therapy or the most expensive. In many situations, there is no wrong decision for owners to make. The process is the most important aspect of cancer management – to provide unbiased options for management based on a thorough understanding of the patients general health, specific tumor type, the likelihood of response to treatment, maintenance of good quality of life and emotional support for owners. Some owners will be capable of investing large time, emotional and financial resources. Some will pursue investigational studies at treatment centers. Others may not be able to consider sophisticated staging or treatment but should still be offered the most current information on which to base management decisions.

Each step of the diagnosis and therapy plan can and should be considered carefully. Many new techniques, procedures and information is available. Consultation by a specialist, for current information, is one of the best investments a client with a pet that has cancer can make.

Biographical Profile

Dr. Rodney Page is the founding director of The Sprecher Institute for Comparative Cancer Research at Cornell University. Dr. Page provides clinical service as well as leadership and growth for development of this campus-wide institute. There are currently 15 faculty and staff at the Cornell University Hospital for Animals and 8 members of the Breast Cancer and Environmental Risk Factor Program, an out reach and education program funded by the NY Dept of Health and the USDA, that are under his direct supervision. He is the author or co-author of over 100 peer-reviewed manuscripts and 30 book chapters or case reports. His research has been funded by federal organizations, foundations and corporate organizations. His research interests involve both laboratory and clinical studies in cancer prevention, diagnosis and therapy in companion animals for the benefit of all species.