VETERINARY ONCOLOGY

CANCER AND CHEMOTHERAPY

Kenneth T Crump, AHT
Animal Cancer Center
Colorado State University

The following article is a digest of cancer concepts. Being more aware of these concepts will help create a context for the work you'll be doing with the Clinical Oncology Service at CSU. Although some doses and indications for use of cytotoxic agents are mentioned in this paper, it is important that such information be viewed as very general. The choice of chemotherapeutic agent and dose is always the discretion of a veterinarian.

Introduction

Open acknowledgement of the human-animal bond has elevated the importance of pets to that of human beings in many owners' eyes. Most Americans view their pets as family members. In fact, studies show that more than 70 percent of pet owners think of their pets as children. Cancer is a great health concern among pet owners, and 40 percent worry about their pets having cancer regardless of the age of their pets.

Cancer is the number one natural cause of death in geriatric cats and dogs, and it accounts for nearly 50 percent of deaths each year. Although cancer is the leading cause of death in geriatric patients, it's also the most treatable disease when compared with congestive heart failure, renal failure, and diabetes mellitus. A trained and dedicated veterinary team is essential to compassionately care for cancer patients and clients. When a well-informed client sees a family member, whether human or non-human, stricken with cancer, s/he will embrace every possible cancer treatment. Each staff member, from receptionist to kennel attendant, must understand that s/he plays a vital role in determining a patient's quality of life. And extending a patient's good quality of life is the best reason to treat cancer.

Cytotoxic drugs can be life saving for patients with cancer, but they can also be very dangerous for the staff members who must handle and administer them. The purpose of this paper is to provide general information about cancer and address concerns regarding chemotherapy administration and safety.

Cancer

Cancer is the unrestrained growth of cells that destroy normal tissues and body parts. To the medical professional, cancer is a word used to describe a condition of uncontrolled growth. We've studied it, categorized it, and classified it by any number of criteria. Very few words, however, create more fear in the imagination of people. To the layperson, cancer is the beginning of the end of a loved one. It's an uncle who's lost a

leg, or a cousin whose hair has fallen out. It's a grandmother who has had too many surgeries, or it's a father who lost the battle entirely. Most people's perception of cancer, surgery, and chemotherapy is colored with fear and hopelessness. When treating a animal patient with cancer, overcoming the owners' fear is the first job for every veterinary team.

Cancer is a common and serious disease. Many owners have had or will have personal experience with cancer in themselves, a family member, or a close friend. Keeping this in mind, we should approach the pet with cancer in an educated, positive, and compassionate manner. With increased optimistic media coverage, pet owners are becoming more knowledgeable and more demanding in seeking care for their pets with cancer. The veterinary profession needs to be prepared for these demands, rather than thinking nothing can be done. When clients hear about advances in human medicine, they expect the same treatment options for their pets.

To understand cancer as a process, let's look at the development of a tumor. Most cancers are believed to arise through a process called *multistep carcinogenesis.* This theory is based on the fact that in the majority of cancers, at least two genetic changes have occurred prior to the induction of malignancy. There are three basic steps in multistep carcinogenesis. These steps ultimately lead to the evolution of a cancer cell from a normal cell.

(1) ***Initiation***: Initiating agents induce a permanent and irreversible change in the DNA of the affected cell. In and of itself, the initiating event is not significant to induce neoplastic transformation. Initiated cells cannot be distinguished from other cells in the surrounding environment.

(2) ***Promotion***: Promoting agents cause reversible tissue and cellular changes. Promoting agents can induce changes in cellular morphology, mitotic rate, and degree of terminal differentiation. Promotion serves to expand the initiated cell population and alter it in such a way as to increase the likelihood of another irreversible change occurring.

(3) ***Progression***: Progressing agents are able to convert an initiated cell, or a cell undergoing promotion, into a cell exhibiting malignancy, capable of developing into a mature neoplasm. The process of progression is irreversible.

In order for a tumor to result, the affected cell must be irreversibly altered at least twice. The cell is altered once in the initiation phase and once in the progression phase. The promotion phase changes the affected cell in a way to increase the likelihood that the cell changed by the initiation will be in a position to be changed by the progression phase.

Chemotherapy

The three most common treatment options for cancer are surgery, radiation therapy, and chemotherapy. Surgery is useful to remove or debulk localized tumors. Radiation therapy can be used alone, or in conjunction with surgery and chemotherapy, to treat local disease. Radiation therapy is most often used to treat smaller tumors. Chemotherapy is used treat cancer systemically. The attempt to stop or reverse the growth of malignant growing cells with drugs began in the late 1940's.

Chemotherapy is a word that creates an instant emotional response in everyone. Chances are that you, or someone you know, have experienced chemotherapy for the treatment of cancer. Visions of debilitating nausea and vomiting, coupled with loss of hair and lack of energy appear at the thought of having to receive chemotherapy. At first, many are opposed to making their pets go through that torture. However, the reality of chemotherapy for animals is much different from that for human cancer patients. For animals receiving chemotherapy, quality-of-life for the patient is the primary concern. Doses of drugs and treatment schedules are calculated to minimize discomfort to the patient, while providing the most effective defense against the disease. As a result, most people are pleasantly surprised at how well their pets feel while undergoing chemotherapy.

Mechanism of Action

The goal of chemotherapy is to inhibit the growth of cancer cells with minimum effect on normal cells. Most chemotherapeutic agents either bind directly to genetic material in the cell nucleus, or affect a cell's ability to synthesize protein, which may damage growth and reproduction of normal cells as well. Both normal cells and cancer cells go through the same cell division cycle. However, most tumor cell populations are characterized by genetic instability, which can impact the effect of chemotherapy drugs. For instance, individual tumor cells can mutate and produce variant cells. These variant cells are genetically distinct from the tumor cell of origin. This genetic instability is an important concept because it can be linked to chemotherapy-resistant cells.

Chemotherapeutic agents are classified according to their pharmacologic action, and the point in the cell cycle at which they interfere with cellular reproduction. Drugs that are active only during a specific phase of the cell cycle are considered cell cycle phase-specific. Drugs that are active regardless of the cell cycle phase are called cell cycle phase-nonspecific. The use of cell cycle phase-nonspecific drugs appears to result in the death of both resting cells and cycling cells. Following cell death, resting cells are 'awakened' into the reproduction cycle and are then more susceptible to chemotherapeutic agents. Regardless of the specific mechanism of the intracellular disruption, the cell will die as it attempts cell division if it is not capable of repairing itself. The cell kill rate of various drugs is related to the concentration of the drug and to the degree of tumor cell exposure over time. Therefore, an apparent resistance due to inadequate blood levels can occur when a drug is poorly absorbed or when the drug is excreted or metabolized at an increased rate.

Combining cytotoxic drugs is an important, effective strategy in chemotherapy. When drugs are used in combination, they often enhance the activities of each other. This synergistic action can occur by either sequential scheduling or by pharmacologic mechanisms. Drugs are also combined to minimize their dose-limiting toxicities. Furthermore, combination chemotherapy helps reduce the development of tumor resistance, since cells resistant to one of the drugs in a combination regimen may be sensitive to another drug within that regimen.

Administration

Treatment dose and schedule depends on the type of cancer and chemotherapy method. In many cases periodic chemotherapy will be necessary to control the cancer for the rest of the pet's life. For maximum therapeutic effect, a drug should be used with a dose that causes minimal toxicity with maximal effectiveness. The most effective dose of chemotherapeutic agents is often very close to the toxic dose.

In human hospitals, medication errors occur more frequently than the public realizes. Depending on the hospital, the medication error rate varies between one and ten percent. That means that as many as 600 people may die each year in the United States as a result of medication errors. Among the problems that contribute to medication errors are lack of knowledge of proper dose and concentration of drugs, and lack of awareness of a patient's treatment schedule. Often health care personnel have inadequate access to such information. However, in some situations, a nurse or technician will recognize that a medication has been dosed incorrectly, but the drug is given anyway. This is considered to be the result of a system breakdown. Managing the risk to each patient must be interdisciplinary. It is imperative that each member of the entire staff be part of the process. Before the administration of chemotherapy to a patient, the nurse or technician should review the patient's record. Additionally, time should be taken to recheck the dose calculation of the chemotherapeutic agent. To that end, the dose chart below gives common doses for many drugs.

Common doses for chemotherapeutic agents		
Name	Brand Name	Common Dose (m2 = meters squared)
Actinomycin	Dactinomycin	0.7 – 1.0 mg/m2 IV q 2-3 weeks
Bleomycin	Blanoxane	10 units/m2 IV or SQ for 3 – 9 days, then weekly; Do Not Exceed 200 Units/m2 total
Carboplatin	Paraplatin	300 mg/m2 IV; 136 mg/m2; Use with caution in cats
Chlorambucil	Leukeran	2 – 8 mg/m2 PO daily
Cis-platinum	Platinol	70 mg/m2 IV drip q 3 weeks with diuresis; 2 mg/kg small dogs with diuresis; NO CATS
Cyclophosphamide	Cytoxan	50 mg/m2 PO 4 consecutive days/week; 250 mg/m2 IV weekly or q 3 weeks
Cytosine arabinoside	Cytosar	100 mg/m2 SQ or IV drip for 4 days, repeat q 3-4 weeks; 600 mg/m2 over 48 hours, repeat in 3-4 weeks; 10 mg/m2 SQ daily or q 12 hours
Doxorubicin	Adriamycin	30 mg/m2 IV q 2 – 3 weeks Do Not Exceed 120 mg/m2 total dose delivered; 1 mg/kg IV for small dogs and cats
L-Asparaginase	Elspar	10,000 – 12,000 units/m2 IM weekly

Melphalen	Alkeran	1.5 mg/m2 PO for 7 – 10 days, repeat
Methotrexate	Methotrexate	2.5 mg/m2 PO daily; 20 mg/m2 IV weekly
Mitoxantrone	Novantrone	5.5 mg/m2 IV (dog); 6.5 mg/m2 IV (cat)
Piroxicam	Feldene	0.3 mg/kg PO daily x 3 – 5 days, then qod
Prednisone	"Pred"	Varies greatly – 30 – 60 mg/m2 PO daily to 20 mg/m2 PO q 48 hours
Vinblastine	Verban	2.0 mg/m2 IV weekly
Vincristine	Oncovin	0.75 mg/m2 IV weekly
*From Small Animal Clinical Oncology Second Edition		

Doses of chemotherapeutic agents are often calculated on the basis of body surface area in square meters, rather than by a patient's weight. The chart below is an effective way to convert from kilograms body weight to square meter surface area.

Body Surface Area Conversion Chart (Body Weight in Kilograms to Meters Squared)									
Weight to Body Surface Area Conversion Chart – Dogs									
kg	m2	kg	m2	kg	m2	kg	m2	kg	m2
0.5	0.064	10.0	0.469	20.0	0.744	30.0	0.975	40.0	1.181
1.0	0.101	11.0	0.500	21.0	0.759	31.0	0.997	41.0	1.201
2.0	0.160	12.0	0.529	22.0	0.785	32.0	1.018	42.0	1.220
3.0	0.210	13.0	0.553	23.0	0.817	33.0	1.029	43.0	1.240
4.0	0.255	14.0	0.581	24.0	0.840	34.0	1.060	44.0	1.259
5.0	0.295	15.0	0.608	25.0	0.864	35.0	1.081	45.0	1.278
6.0	0.333	16.0	0.641	26.0	0.886	36.0	1.101	46.0	1.297
7.0	0.370	17.0	0.668	27.0	0.909	37.0	1.121	47.0	1.302
8.0	0.404	18.0	0.694	28.0	0.931	38.0	1.142	48.0	1.334
9.0	0.437	19.0	0.719	29.0	0.953	39.0	1.162	49.0	1.352
								50.0	1.371
Weight to Body Surface Area Conversion Chart – Cats									
kg	m2	kg	m2	kg	m2	kg	m2	kg	m2
0.1	0.022	1.4	0.125	3.6	0.235	5.8	0.323	8.0	0.400
0.2	0.034	1.6	0.137	3.8	0.244	6.0	0.330	8.2	0.407
0.3	0.045	1.8	0.148	4.0	0.252	6.2	0.337	8.4	0.413
0.4	0.054	2.0	0.159	4.2	0.260	6.4	0.345	8.6	0.420
0.5	0.063	2.2	0.169	4.4	0.269	6.6	0.352	8.8	0.426
0.6	0.071	2.4	0.179	4.6	0.277	6.8	0.360	9.0	0.433
0.7	0.079	2.6	0.189	4.8	0.285	7.0	0.366	9.2	0.439
0.8	0.086	2.8	0.199	5.0	0.292	7.2	0.373	9.4	0.445
0.9	0.093	3.0	0.208	5.2	0.300	7.4	0.380	9.6	0.452
1.0	0.100	3.2	0.217	5.4	0.307	7.6	0.387	9.8	0.458
1.2	0.113	3.4	0.226	5.6	0.315	7.8	0.393	10.0	0.464

Two pairs of latex gloves or one pair of heavy necropsy gloves should be worn during administration of any chemotherapeutic drug regardless of the route of administration. Intravenous administration should be performed through a well-placed indwelling catheter. Liberally flush the catheter before administration of the drug to insure proper placement and patency of the catheter. Perivascular injection (extravasation) of some agents will result in severe tissue necrosis. A liberal flush after administration of the drug will remove residual drug from inside the catheter. To reduce drug aerosolization or to capture leakage from the needle after administration is

completed, place an alcohol-moistened cotton ball under the needle before withdrawing the needle from the catheter. Recapping, crushing, or clipping used needles and/or syringes should be avoided since this may aerosolize drugs or cause injury.

A flow sheet is an effective way to track a patient through a course of chemotherapy. It consolidates the pertinent information from each visit into a single chart for easy reference. Below is a copy of the chemotherapy flow sheet used by the Animal Cancer Center at Colorado State University.

CHEMOTHERAPY FLOW SHEET								
Client, Patient _____			Case # _____			Diagnosis _____		
Date								
Clinician								
Weight (in pounds)								
Parenteral Agent								
Dose (calculation)								
Route								
Leg Used								
Adverse Reaction								
Administered By								
Response								
Sedation Required	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
Drugs Used for Sedation								

COMMENTS: _____
_____
_____
_____

Adverse Effects

Practically all anticancer drugs have side effects. However, their potential effect against the cancer generally outweighs the possible side effects. Although serious adverse effects can occur with any chemotherapy, there is less than a five percent chance that a patient will be hospitalized with side effects and less than a one percent chance of fatality. Below are listed some potential side effects of many chemotherapeutic agents.

- ***Hair Loss (Alopecia)***

When a person loses hair as a result of chemotherapy, it can be devastating. Pets rarely lose their hair, but if they do, they are not bothered by it as much as people are. In most pet animals, hair does not grow continually throughout their lives like it does in people. Therefore, hair loss in pets is rare. Exceptions are certain breeds of dogs, such as poodles, Old English Sheepdogs and other breeds whose hair grows continually. In general, if a pet needs to visit a groomer periodically to be clipped, then the pet may experience some degree of hair loss as a result of chemotherapy. Cats may, however, lose all or most of their whiskers.

- ***Reduction in the Number of White Blood Cells (Neutropenia)***

There are various types of cells in the blood. The decrease in the number of infection fighting white blood cells is known as *neutropenia*. Many chemotherapeutic agents impair the bone marrow's ability to produce cells. As a result, neutropenia may occur seven to ten days after chemotherapy. Neutropenia, alone, is not a danger to a patient. However, a patient's ability to fight off infection is impaired by neutropenia. All patients are given a complete physical, and a blood test called a *complete blood count* (CBC) is performed prior to most chemotherapy administrations. Should the patient have a significant reduction in the number of white blood cells, the doctor may wish to perform periodic blood tests, and/or prescribe antibiotics to protect against infection.

- ***Stomach or Intestinal (Gastrointestinal) Discomfort***

Many patients experience some form of stomach or intestinal discomfort two to seven days after a chemotherapy treatment. Doctors usually prescribe medication to try to prevent or treat the discomfort. Below are listed some steps that a client can take at home.

♦ Upset stomach (Nausea)

(1) If a pet begins to show any signs of upset stomach (drooling, 'smacking' lips) or loss of appetite, administer the medicine the doctor prescribed for nausea.
(2) Do not give any food for 12 hours, and offer ice cubes every few hours.
(3) After 12 hours, feed small, frequent meals instead of one large meal.

♦ Vomiting

(1) Do not give any food or water for 12 hours.
(2) After 12 hours, offer ice cubes, then water, then small bland meals.

♦ Loss of Appetite

(1) If a pet begins to show any signs of upset stomach or loss of appetite, administer the medicine the doctor prescribed for nausea.
(2) Offer four small meals a day.
(3) Add warm broth, animal fats, and favorite foods to increase flavor and appeal.

♦ Diarrhea

(1) If a pet begins to show signs of diarrhea, administer the medicine the doctor prescribed for diarrhea.
(2) Keep water available at all times.
(3) If a pet is also not eating, offer chicken or beef broth.
(4) Give Pepto Bismol® (dogs only), 1 tablespoon per 10 pounds of body weight every 4 to 6 hours.

- ***Tissue Damage***

If some chemotherapy agents are accidentally given outside the vein, severe tissue reactions can result. Therefore, chemotherapy agents are handled with the utmost care, and are only administered by highly trained technicians or doctors. If irritation of the injection site develops in the form of pain or redness, apply ice packs for 15 minutes every three hours.

- ***Allergic Reactions***

Allergic reaction to chemotherapeutic agents is rare, and not a problem the client will have to treat at home. Should a patient have an allergic reaction, it would develop upon administration and should be treated as any other allergic anaphylaxis.

- ***Heart Damage***

Some chemotherapeutic agents, in some rare cases, can irreversibly damage the heart muscle. The dose of these agents prescribed for is below the dose that usually causes heart disease. Less than 10% of patients develop heart disease as a result of chemotherapy.

Safety

In 1979, the British journal, *Lancet*, first reported evidence that humans handling antineoplastic agents may be at risk. In a letter to the editor, Finnish researchers reported mutagenic activity in the urine of nurses working in a human oncology unit, and proposed that the cause was related to exposure to antineoplastic agents. Subsequent studies have shown increased chromosomal alterations, hepatotoxicity, and abnormal reproductive outcomes to be associated with exposure to various chemotherapeutic drugs. For these reasons, it is very important that written safety protocols be established and followed in the veterinary clinic. The veterinarian must also provide clear instructions to pet owners for at-home administration and handling of the drugs and for drug-contaminated urine and feces.

It is common for health care professionals to regard themselves as immune from any harm arising from their work. So, during the course of treating patients, many inadvertently expose themselves and their staff to hazardous substances while taking every precaution to ensure that the drugs themselves are protected from contamination. A single needle prick to a finger with a syringe containing the cytotoxic drug mitomycin-C could cause the eventual loss of function of that hand. Nurses working in cancer wards have shown a higher than expected incidence of liver damage, nausea, dizziness and lightheadedness, chronic headaches, hair loss, dermatitis, menstrual cycle irregularities, and miscarriage. Many of the side effects observed in nurses were the same as those noted by patients receiving antineoplastic drugs. Exposure was thought to arise from accidental contact through routine handling of the drugs.

The risk of exposure to chemotherapy agents is greatest during drug preparation and administration, with the primary routes being inhalation, direct contact, and ingestion

of improperly handled drugs. Two other routes of exposure important to veterinarians and their clients include handling of discarded items that have come in contact with chemotherapy (syringes, catheters, gloves, etc.) and contact with excrement from patients treated with chemotherapy.

All chemotherapy drugs should be drawn up, reconstituted or prepared inside of the Biological Safety Cabinet (BSC). However, for many veterinary practices, a BSC is cost-prohibitive. Many chemotherapeutic drugs are expensive and their preparation may be complex or may require special equipment or supplies not readily available in most veterinary clinics. For these reasons, compounding pharmacists are frequently contracted to prepare chemotherapeutic drugs for administration. If chemotherapeutic drugs are prepared in your practice, then only trained staff members should attempt to mix, prepare, or administer the drugs. Of course, eating, drinking, smoking, chewing gum, applying cosmetics, and food storage are all prohibited in the preparation and administration areas. Use the list below as a guideline for safe preparation:

1. Assemble all reagents on an absorbent liner.
2. Remove non-essential people from the area.
3. Wash your hands with normal detergent soap but not disinfectant soap.
4. Put on an impervious, lint-free gown with elastic cuffs. This "cover" should only be worn in the prep area.
5. Put on a pair of unpowdered chemo gloves with the glove over the cuff of the gown or smock. If chemo gloves are unavailable, double glove with disposable latex gloves.
6. Attach injection pins to drug bottles.
7. Select a leur-lock syringe based on estimated volumes (syringe should never be more than half to two-thirds full of solution.)
8. Attach the syringe to an appropriate needle.
9. Draw up the required amount of diluent.
10. Stick the needle into the drug container and draw out a small amount of air. Inject a small amount of diluent. Repeat this process until the entire amount if diluent is injected into the drug vial. The goal of this step is to never have the drug in a "pressurized" container to decrease the likelihood of spraying or aerosolization.
11. With the needle still in the vial, mix the solution by gently swirling until all particulates are dissolved.
12. Invert the vial and withdraw the solution in small amounts. Inject an equal amount of air back into the vial. Repeat this process until the entire drug is drawn up into the syringe.
13. Aspirate slightly on the plunger to remove all drug from the needle and hub then remove the needle from the syringe.
14. Wipe the syringe with an alcohol gauze and replace the cap on the needle using the one-handed technique.
15. Label a zip-lock bag and the syringe with the patient's name, the date and the appropriate syringe label.
16. Place the syringe in a zip-lock bag for transport to the patient administration area.
17. Place all disposable supplies in an appropriate receptacle marked "Chemo". Do not recap remaining needles - dispose of them directly in a sharps container.

When the sharps container is full, seal it and place it inside of the receptacle marked "Chemo".

18. Remove the gown and gloves without touching the outside and dispose of them in the receptacle marked "Chemo".
19. Wash your hands with normal detergent soap but not disinfectant soap.

NOTE: A chemotherapy spill kit should be assembled and maintained near the site where chemotherapy drugs are mixed or administered. Each spill kit should contain *at least* the following: 2 pairs of latex gloves; plastic-backed absorbent pad; zip-lock bag for disposal. The addition of a gown, mask and eye protection is also recommended. If a spill occurs, absorb the spilled liquid with absorbent pads or kitty litter. Wearing gloves, use paper towels to clean up the remaining liquid. The contaminated materials should then be placed in an appropriate zip-locked receptacle marked "Chemo". The contaminated area can then be cleaned with water and detergent.

Chemotherapy safety should be discussed with clients prior to discharge of the patient. There is a fine line between protecting clients and alarming them unnecessarily. While it is important to point out potential hazards associated with human exposure to these drugs, it is equally important to avoid frightening people. Assure the client that the pet is safe to be around all of the family members. Being around family members is an important part of a pet's life. Enjoying normal activities together, hugging, and even kissing the pet are all safe activities. Provide each client with an easy-to-understand information sheet about how to prevent exposure to chemotherapeutic agents. Then, review the information with the client to make sure there is a clear understanding of the hazards and precautions.

Explain to each client that excretions from their pet receiving chemotherapy may be hazardous. The chart below can be used as a guide for determining the risk of exposure. Inform clients that potentially hazardous materials (feces, urine, vomit) should be collected using appropriate protective equipment and disposed of properly. Although there is no conclusive data available on the clearance of most of these drugs in animals, this information has been extrapolated from the data available for humans.

Drug	Urinary Excretion	Biliary Excretion (vomit/stool)	Estimated clearing time from tissues	Present in blood
actinomycin D	yes	yes	36+ hours	yes
bleomycin	yes	questionable	less than 1 hour	yes
carboplatin	yes	no	2 - 3 hours	yes
cisplatin	yes	minimal	120+ hours	yes
cyclophosphamine	yes	questionable	less than 72 hours	yes
cytosine arabinoside	no	no	20 minutes	yes
doxorubicin	minimal	yes	32+ hours	yes
5 fluorouracil	no	no	15 minutes	yes
DTIC	yes	minimal	unknown - less than 3 minutes half life in blood	yes
chlorambucil	yes	no	less than 12 hours	yes
melphalan	yes	no	less than 12 hours	yes
methotrexate	yes	no	less than 10 hours	yes
mitoxantrone	yes	yes	5 days	yes
l-asparaginase	no	no	30 hours	yes
vincristine/vinblastine	minimal	yes	24 hours	yes

For more complete information about safe handling and administration of chemotherapeutic agents, refer to the 1986 OSHA document *Guidelines for Cytotoxic (Antineoplastic) Drugs.*

Conclusion

In every veterinary hospital, the most important goal of cancer therapy must be maintaining the pet's quality of life. Take the first step toward that goal by dispelling cancer myths for clients. Realize too, that veterinarians and staff members may hold similar fearful misconceptions about the disease and its treatment. An educated team creates educated clients. And education dispels myth and fear. Prepare clear and informative handouts about cancer and safe cancer treatments, and provide them to veterinarians, staff members, as well as clients. Be sure the information is presented in terms that can be understood by those who are not in the medical profession. Avoid jargon. Use simple and consistent language that presents a condition, a treatment, or a precaution thoroughly and accurately. Spend extra time answering questions that arise. Be sure the client-information handouts contain the answers to all of those same questions, too. It can sometimes be inconvenient to slow down and take the time to educate clients. It takes more time to prepare and follow clinical safety policies. The goal of veterinary oncology is to provide for the medical and non-medical needs of the cancer patient and the client, and improve the quality of life for both. Educating and protecting the patient, client, hospital staff, and yourself are quality steps toward that goal. Remember, doing more things faster is no substitute for doing the right things.

References:

Withrow SJ, MacEwen, EG: *Small Animal Clinical Oncology, Second Edition.* WB Saunders Company.

Mitchener KL, Ogilvie GK: Give cancer patients hope. *Veterinary Economics - Special Edition:* 82 – 88, Fall 1999.

McCurnin DM: *Clinical Textbook for Veterinary Technicians, Fourth Edition*. WB Saunders Company.

Crump KT: The advanced technician. Now what? *Tenth Annual Conference for Veterinary Technicians, Proceedings*: January 2000.

O'Brien, MG: *Cancer pain management: a review of recent considerations and advancements.* Veterinary Cancer Society Newsletter, Vol 22. No.2, Summer 1998.

Goodman, MS: *Cancer: Chemotherapy and Care*. 1986, Bristol-Myers Oncology Division.

SoRelle, R: *Preventing Errors in Chemotherapy.* Oncology Times, December 1996: 48 – 50

Chemotherapy and cytotoxic drug safety plan. Veterinary Support Personnel Network, (URL): http://www.vspn.org/Library/Misc/VSPN_M01282.htm

Guidelines for cytotoxic (antineoplastic) drugs. OSHA Instruction PUB 8-1.1 Jan 29, 1986 Office of Occupational Medicine

Safe handling of chemotherapy drugs. American College of Veterinary Pharmacists, Vet Talk, Vol 02. No. 06