

Chemotherapy Use and Administration for the Veterinary Technician

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 **AETC**

Grayslake+Chicago

Animal Emergency & Treatment Centers

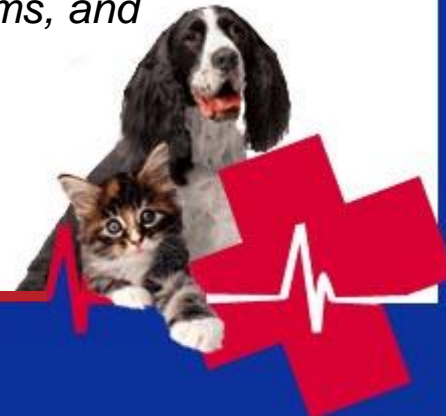
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Cancer in Pets

- Cancer is defined as an abnormal growth of cells which tend to proliferate in an uncontrollable way and has the potential for metastasis
- Can affect just about every organ in the animals body

“Cancer, unlike politics and religion, is not a topic of controversy. No one is for it. Cancer is not another word for death. Instead, it takes many forms, and each form responds differently to treatment.”

- author unknown



Chemotherapy Terms

- **Chemotherapy**
 - The treatment of cancer using specific chemical agents or drugs that are selectively destructive to malignant cells and tissues
- **Chemotherapeutics**
 - A chemical agent used in chemotherapy
- **Nadir**
 - Refers to the lowest point. In chemotherapy, describes the point when blood cell counts are at their lowest after chemotherapy treatment



Chemotherapy Terms, *continued*

- Extravasation
 - The accidental administration of IV medications/chemotherapeutics into the surrounding tissues, either by leakage (vasculitis) or direct exposure (given IM/SQ when it was to go IV)
- PPE
 - **Personal Protective Equipment.**
 - Gloves, Goggles, Gowns and Masks

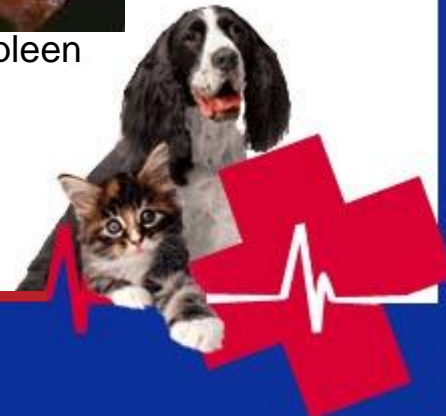


Neoplasias That Are Commonly Treated

- Lymphoma, Lymphosarcoma, LSA
- Mast Cell Tumor, MCT
- Osteosarcoma, OSA
- Carcinoma
- Hemangiosarcoma, HSA



Hemangiosarcoma of the spleen



Neoplasias Treated By An Oncologist

- Squamous Cell Carcinomas
- Melanomas
 - Vaccines only available through an oncologist
- Grade III Mast Cell Tumors
 - Need to be treated with a combination of Surgery, Radiation and IV Chemotherapy
- Pulmonary Carcinomas
- Soft Tissue Sarcomas
 - Better response seen with radiation therapy



Chemotherapeutics Used at AETC

L-Asparaginase – *Elspar*

- Given SQ – safest way to administer
 - Given in combination with other chemotherapeutics for the treatment of lymphoma, usually at time of induction
- Nadir – none, with no real effect on bone marrow
- Side effects
 - Anaphylaxis/hypersensitivity – increases with subsequent doses or IV injections
 - Hemorrhagic Pancreatitis
 - Effects on protein synthesis are rare



Chemotherapeutics Used at AETC, *continued*

Cyclophosphamide – *Cytoxan*

- Usually given IV as a slow bolus, can be given PO
 - Given in combination with other chemotherapeutics in the treatment of lymphoma
 - Also used to treat leukemias, carcinomas and sarcomas
 - Can be used to treat ITP & IMHA – used as an immunosuppressant
- Nadir – 7 to 14 days for dogs & cat
- Side Effects
 - Sterile/Hemorrhagic cystitis
 - Myelosuppression – especially WBCs
 - GI issues – anorexia, nausea, vomiting and diarrhea
 - Alopecia



Chemotherapeutics Used at AETC, *continued*

Doxorubicin – *Adriamycin*

- Given IV as a 1:1 solution slowly over 20 minutes
 - Has a maximum cumulative dose of 240mg/m²
 - Used in combination with other chemotherapeutics for the treatment of lymphoma, osteosarcoma and hemangiosarcoma
- Nadir – 7 to 9 days in dogs and cats
- Side effects
 - Bone marrow suppression
 - Cardiac toxicity
 - Nephrotoxicity – especially in felines
 - GI issues – vomiting & diarrhea
 - Severe tissue necrosis/sloughing due to extravasation



Chemotherapeutics Used at AETC, *continued*

Vincristine

- Given IV as a bolus
 - Usually given in combination with other chemotherapeutics for the treatment of lymphoma
 - Occasionally used in treating ITP- to induce thrombocytosis
- Nadir – 7 days in dogs & cats
- Side effects
 - Mild leukopenia
 - Tissue necrosis/sloughing due to extravasaion



Chemotherapeutics Used at AETC, *continued*

Vinblastine

- Given IV as a bolus
 - Used as a treatment for Carcinomas and Mast Cell Tumors
- Nadir – 4 to 9 days in dogs and cats
- Side effects
 - Myelosuppression
 - GI issues – nausea and vomiting



Chemotherapeutics Used at AETC, *continued*

Carboplatin

- Must be given IV as a bolus
 - Used in the treatment of osteosarcomas and adenocarcinomas
- Nadir – 14 days in dogs and 21 days in cats
- Side effects
 - Bone marrow suppression- esp. thrombocytopenia and neutropenia
 - GI issues – anorexia and vomiting



Myelosuppressive Drugs

High

Doxyrubicin

Vinblastine

Cyclophosphamide

Lomunstine (CCNU)

Mitoxantrone

Carboplatin

Moderate

Clorambucil

Methothrexate

Cisplatin

Low

L-asparaginase

Vincristine

Corticosteroids

Most myelosuppression caused by these drugs is manageable with the correct doses used in veterinary medicine.



Physical Exam and Blood Work

- Detailed history from the owner
 - Current Medications and Doses
 - Acting Normal???
 - GI Symptoms
- TPR & Weight
- Thorough physical exam done by a DVM
- Blood Work
 - Use the jugular veins for blood draws and save the peripheral veins for catheters
 - At the very least, a CBC & PCV/TS
 - Chemistries and electrolytes when indicated



Physical Exam and Blood Work, *continued*

CBC – Complete Blood Count

- Anemia
 - Treat symptomatically
- Leukopenia
 - Chemotherapy is safe to administer if total WBC > 5000
- Neutropenia
 - Chemotherapy is safe to administer if total Neutrophil count is > 2,000

Each patient is different, and the doctor in charge of the case may continue with chemotherapy if it is in the best interest of the patient.



Physical Exam and Blood Work, *continued*

Chemotherapy has more of a suppressive effect on those blood cells with the shortest circulating lifespan

- Leukocytes (especially Neutrophils)
 - Lifespan ~1 to 3 days
- Thrombocytes
 - Lifespan ~7 to 10 days
- Erythrocytes
 - Lifespan ~120 days



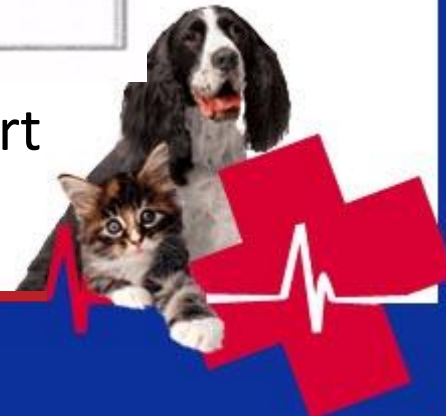
Physical Exam and Blood Work, *continued*

Normal Hematology Values for Dogs and Cats*

	Unit	Canine	Feline
Hematocrit (PCV)	%	40-59	29-50
Hemoglobin	g/dl	14-20	9-15.6
Red Blood Cell Count	$\times 10^6/\mu\text{l}$	5.6-8.7	6.1-11.9
White Blood Cell Count	$/\mu\text{l}$	6,000-17,000	4,900-20,000
Neutrophils	$/\mu\text{l}$	3,000-12,000	2,500-12,500
Lymphocytes	$/\mu\text{l}$	530-4,800	1,500-7,000
Monocytes	$/\mu\text{l}$	100-1800	0-850
Eosinophils	$/\mu\text{l}$	0-1,900	0-1,500
Basophils	$/\mu\text{l}$		
Platelets	$/\mu\text{l}$	145-440	190-800

* normal values may differ from laboratory to laboratory.

Sample Blood Chart



Calculating Chemotherapeutics

- Always obtain an accurate weight for each chemotherapy appointment
- Calculate drugs using pounds, kilograms or m^2 - most all chemotherapeutics are calculated using m^2
 - Doxorubicin $30mg/m^2$
 - Elspar $400units/kg$

Triple check your calculations!!!



Documentation

A chemotherapy log should be created for each individual patient and should contain the following:

- Patient first & last name, Pt. number
- Diagnosis/type of neoplasia
- Date
- Doctor in Charge of case
- Accurate weight – in lbs, kgs and m²
- Chemotherapeutic agent
- Dosage
- Calculated Dose
- Volume Dose
- Route
- Vein used
- Catheter size
- Premedications- if needed
- Administered By
- Adverse reactions
- Current Medications
- Doctors initials
- Comments/notes



Documentation, *continued*

Chemotherapy Flow Sheet

Client, Patient _____ Case # _____ Diagnosis _____

	Treatment	Treatment	Treatment	Treatment	Treatment	Treatment	Treatment	Treatment	Treatment
Date									
Clinician									
Weight	Lbs								
	Kgs								
	m2								
Parenteral agent									
Dosage (mg/BW)									
Calculated dose (mg)									
Volume dose (mL)									
Route									
Leg/catheter size									
Adverse reactions									
Administered by									
Premedications									
Drugs for home use									
Dr. Initials									

Comments: _____

Sample Log – AETC



Administration and Safety

Personal Protective Equipment A MUST!!!

- Gloves
 - Polyvinylchloride material protects against needle sticks and skin contamination
- Gown
 - Disposable with low permeability
- Mask
 - Decreases the risk of aerosolation and splatter
- Goggles
 - Decreases the risk of splatter to the eyes



Administration and Safety, *continued*

Biological Safety Cabinet

- Permits constant flow of air towards the vent to minimize exposure
- Wipe clean with an alcohol soaked cloth before and after turning on the cabinet
- Cabinet should be left on all day on the days that chemotherapy is administered
- ALL Chemotherapeutics are drawn up, reconstituted and prepared under the on Biological Safety Cabinet
- Use the “scoop” technique to recap your needles



Administration and Safety, *continued*

Safe Handling of Chemotherapeutics

- The PhaSeal System
 - The “Gold Standard” in safe handling
 - The only clinically proven closed-system drug transfer device (CSTD) available on the market today
 - Airtight Expansion Chamber and dry, leak proof connections prevent exposure to hazardous drugs, including aerosols and vapors.



Administration and Safety, *continued*



Assembly

The PhaSeal System



Connector



Injector/Protector



Administration and Safety, *continued*

- Wash hands before and after chemotherapy treatments
- Close the doors and set up signs to alert chemotherapy is in process
- Use Proper restraint
 - May need 1-2 restrainers or sedation if indicated
- Administer chemotherapy over a clean absorbent/leak proof pad
- Flush with saline before and after giving chemo
 - never use Heparin flushes, may interfere with chemotherapeutics
- Use caution removing IVC and secure all disposable waste and dispose of it in the yellow biohazard bin



Administration and Safety, *continued*

Intravenous Catheter Placement

- Proper aseptic technique to prep the area
- Use an appropriate gauge IVC
 - 22ga for Dogs
 - 24ga for small Dogs & Cats
- Alternate veins to avoid excess irritation & scaring
- Make sure it's a “clean stick” – **No Fishing!**
- Secure IVC and use of a Locking “T”-Set
- Flush with Saline-only-flushes before and after administration



Discharging Chemo Patients

- Remind owners to remove bandage, from the IVC site, in 30 minutes
- Send owners home with full report
 - Chemotherapeutic used and its side-effects
 - Monitor closely at home and call with any concerns
 - Next chemotherapy treatment due
 - Chemotherapy can take up to 48 hours to be excreted from the body
 - Inform owners to handle any body fluids with gloves and practice proper hygiene
 - Walk patients in separate areas- especially away from other animals and children



Common Side Effects of Chemotherapy

Extravasation

- A potentially serious condition caused by damage to surrounding tissue when the chemotherapy agent is delivered outside of the vein
- Seen with use of Vincristine, Vinblastine and Adriamycin
- Symptoms
 - Pain, pruritis, erythema, moist dermatitis and tissue necrosis
- Treatment
 - Suction from the IVC, +/- flushing with saline, warm or cold compress, wound management, skin grafts and possible amputation



Common Side Effects of Chemotherapy, *continued*

Hypersensitivity/Allergic/Anaphylaxis Reaction

- Immediate reaction, usually within 30 minutes of administration of chemotherapy
- Most often seen with the use of Elspar and Doxorubicin
 - Pre-medicated prior to chemotherapy administration with IV Dexamethasone SP and IM Diphenhydramine to decrease the likelihood of this occurrence
- Symptoms
 - Hives, erythema, swelling/edema, vomiting and respiratory distress (rare)
- Treatment
 - Symptomatic with use of an antihistamine and/or steroid



Common Side Effects of Chemotherapy, *continued*

BAG Effect

- **B**one Marrow Suppression
- **A**lopecia
- **G**astrointestinal



Common Side Effects of Chemotherapy, *continued*

Bone Marrow Suppression

- Most chemotherapeutics will result in some degree of myelosuppression – affects all cell types
- Immunocompromised
 - Unable to build a normal immune response
 - Increased risk to nosocomial infections with hospital stays
- Symptoms
 - Depression, lethargy, anorexia and/or fever
- Treatment
 - Depending on how severe the myelosuppression
 - Antibiotic therapy +/- hospitalization on IV fluids



Common Side Effects of Chemotherapy, *continued*

Alopecia

- Not as commonly seen in animals as in human medicine
- Some breeds are more susceptible
 - Poodles, sheepdogs, bichons, scotties
 - Dogs with rapidly growing hair coats
- Whiskers/tactile hair loss is more common in dogs and cats
- Overall decreased hair re-growth



Common Side Effects of Chemotherapy, *continued*

Gastrointestinal

- 25 to 40% of chemotherapy patients will have some GI effects
- Symptoms
 - Nausea, vomiting and/or diarrhea
- Drug dependent
- Treatment
 - Supportive – antinausea, antiemetics and antidiarrheals
 - Mild cases respond well to a bland diet and Metronidazole therapy at home
 - Severe cases require hospitalization with IV fluids



Common Side Effects of Chemotherapy, *continued*

- Treatment, *continued*
 - Anti-nausea/Anti-emetics – Reglan, Cerenia, Anzemet, Zofran
 - Gastro-protectants – Pepcid AC, Prilosec, Carafate, Zantac
 - Anti-diarreal – Flagyl, Kaopectate, Imodium



Common Side Effects of Chemotherapy, *continued*

Acute Tumor Lysis Syndrome

- Develops shortly after effective dose of chemotherapy
- Massive kill off of cancer cells/release of the intracellular contents
- Mostly seen with High Bulk Lymphoms and Leukemias
- Symptoms
 - Vomiting, diarrhea, depression, shock
- Treatment
 - Aggressive fluid therapy to reverse metabolic acidosis and azotemia
 - Can prevent/lessen the effects by adjusting treatment plan
ex: giving only SQ Elspar at induction of chemotherapy
- Prognosis is guarded to grave



When a Chemo Patient Calls

Owners of chemo patients are very dedicated and emotional, usually have to treat the owners along with their pet(s)

- Most common side-effect will be GI upset
 - If symptoms are within 24-48 hours after chemotherapy, and the patient is normal, typically NPO and bland diet will do the trick
 - If the pet is febrile, lethargic with vomiting and diarrhea they should be seen as soon as possible
 - May only need medications and SQ fluids, others may need more aggressive therapy and hospitalization
 - **If the animal is not acting normally they need to be seen immediately!**



Chemo Patients on an Emergency

A Few Things to Remember...

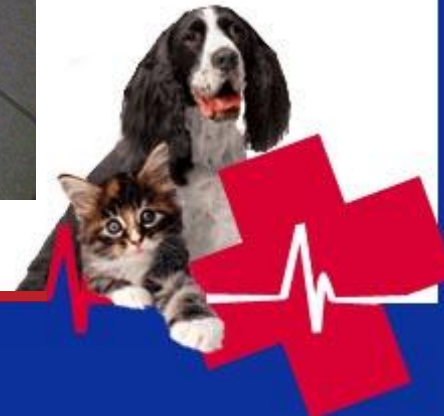
- Both the pet and owner are fragile – treat them accordingly
- These patients are immunocompromised and are at a higher risk for infections
 - Keep them away from other infectious patients
 - Always wear gloves and wash hands frequently
- Their veins are very valuable and essential for treatment
 - Place small gauge catheters and rotate limbs



Questions???



The End



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