



The Pet Oncologist

Doxorubicin in Cats

Concentration: 2 mg/mL
Reconstitution: Not required
Dosage: 1 mg/kg or 25 mg/m² every two to three weeks
(Refer to the cat's chemotherapy protocol)

STORAGE

Refrigerated.
Protected from light.
Light sensitive. Therefore, return to refrigerated storage ASAP.
Does not contain an antibacterial preservative, therefore discard any unused portions. Alternatively, sterile storage for up to 28 days.

SAFETY

Elimination: Primarily hepatobiliary excretion unchanged and metabolites (~50%).
<10% renal excretion unchanged.
Primary wastes: Faeces and urine.
Clearance time: 7 days. However, studies in dogs show traces of chemotherapy may be detected up to 21 days after administration.
Precautions: Staff and pet owners must take some necessary precautions to prevent exposure during preparation (such as wearing gloves when handling faeces and urine), and to instruct women who are or may be pregnant, breastfeeding, immunocompromised personnel, or children do not handle or make contact with the pet's bodily excreta and blood for up to 7 days after administration.

ADMINISTRATION

Route: Intravenous
Placement: Requires "single clean stick" catheterization and one venipuncture attempt per session.
Rate: Slowly over at least 5 minutes
How: Doxorubicin should be administered via a closed-system drug transfer device (e.g. Phaseal® or Equashield®) either:
1) Without dilution,
2) Diluted with 0.9% NaCl, or
3) Injected via an infusion set concurrently with a running 0.9% NaCl pump or drip at 80-100 mL/hr.
Option 3) is recommended.

Precautions: Sedation may be required to ensure adequate restraint.
Never leave the cat unattended during administration.
Never administer doxorubicin without constant monitoring and direct visualization of the injection site.
Do not use heparin solutions because precipitation may occur.

Monitoring: Although extremely unlikely to occur, monitor for signs of an anaphylactic-like reaction during administration. Fast administration may lead to histamine release and thus an anaphylactic-like reaction. Signs may include agitation, restlessness, vomiting, pale gums, respiratory distress, arrhythmia and collapse. If signs develop, discontinue therapy and treat (just like any other allergic reaction) with antihistamines, steroids, ± adrenaline, ± intravenous fluid therapy, and contact The Pet Oncologist.

CBC before each doxorubicin treatment, and CBC 7 days after the last doxorubicin treatment to establish the neutrophil nadir.

If CBC 7 days after administration reveals a neutrophil count $<1.0 \times 10^9/L$, and the cat is clinically well and afebrile, dispense prophylactic antibiotics (pradofloxacin or marbofloxacin at 5mg/kg q24h) for 7 days and advise the owner to monitor clinical signs and temperature. If unwell or febrile, admit into the hospital immediately for intravenous fluid therapy, broad-spectrum antibiotics and supportive care. Check CBC every 7 days until the neutrophil count is $>1.0 \times 10^9/L$, discontinue antibiotics and decrease subsequent doxorubicin doses by 25% if the platelet count is $<50 \times 10^9/L$, decrease subsequent doxorubicin doses by 25%.

If CBC at the time doxorubicin is due reveals a neutrophil count is $<3.0 \times 10^9/L$ or platelet count $<100 \times 10^9/L$, postpone chemotherapy and check CBC every 7 days until neutrophil count is $>3.0 \times 10^9/L$ and platelet count $>100 \times 10^9/L$. Future doxorubicin chemotherapy doses can remain the same; however, increase dosing interval to when recovery is documented. Occasionally cats will require doxorubicin every 3 weeks instead of every 2 weeks.

Renal parameters (creatinine and urea) and USG performed before each doxorubicin treatment. If serum creatinine is above the normal reference range of $Urea <1.035$, do not administer doxorubicin and contact The Pet Oncologist for a substitute.

SIDE EFFECTS

Gastrointestinal: Lethargy, inappetence, anorexia, nausea, vomiting and diarrhoea may occur in approximately 10-20% of cats that receive doxorubicin. Inappetence or anorexia may be the only side effect seen. Anti-emetics, appetite stimulants and anti-diarrhoea medications usually resolve gastrointestinal signs. Rarely do cats require hospitalisation (<5%) for a chemotherapy side effect.

Myelosuppression: Doxorubicin can cause neutropenia (nadir approximately 7 days after administration) and occasionally thrombocytopenia that is usually clinically insignificant. Refer above to 'monitoring'. Clinically 'well' afebrile cats with a neutrophil count $<1.0 \times 10^9/L$ are at slightly increased risk of sepsis and infection and will require antibiotics for at least 7 days, or until the neutrophil count is $>1.0 \times 10^9/L$.

Clinically 'unwell' or febrile cats with neutrophil counts $<1.0 \times 10^9/L$, require prompt management for presumed sepsis or infection immediately.

- Extravasation:** Doxorubicin is a potent vesicant. Extravasation of doxorubicin outside of the vein is a severe life-threatening complication that often results in amputation of the affected limb from severe tissue necrosis. If extravasation occurs, the drug should be restricted as much as possible by drawing back as much doxorubicin from the catheter as possible, applying ice compresses and calling an available veterinary oncologist or animal emergency hospital for advice immediately. Do not use warm compresses and do not inject the area with saline as these will dilute the doxorubicin and cause more harm.
- Nephrotoxicity:** Doxorubicin can cause cumulative and irreversible nephrotoxicity in cats. Do not use in cats with renal disease. 50 to 100 mL of subcutaneous fluids can be administered with each doxorubicin treatment to reduce the risk of renal toxicity.
- Hypersensitivity:** This has not been reported in cats but seen anecdotally. If the cat experiences a severe hypersensitivity reaction, discontinue doxorubicin and contact The Pet Oncologist for a substitute. For the majority of cases that experiences a mild hypersensitivity reaction, it can generally be prevented by slowing the rate of subcutaneous doxorubicin infusions and pre-treatment with antihistamines and steroid anti-inflammatories.
- Hepatopathy:** Doxorubicin does not cause hepatopathy in cats. However, doxorubicin requires hepatobiliary clearance. Please contact The Pet Oncologist if the cat has elevated bilirubin or liver dysfunction because drug avoidance or dose reduction may be required.
- Cardiotoxicity:** Doxorubicin can cause cardiac damage, but rarely leads to clinical evidence of cardiac disease in cats.
- Radiation recall:** Radiation recall is an acute inflammatory reaction confined to previous radiation therapy sites that may be triggered when doxorubicin is administered during or after radiation therapy. This is rare in people and has not been reported in cats. Nonetheless, doxorubicin should be avoided during radiation therapy, and owners advised of this rare possibility in cats that have previously undergone radiation therapy.
- Anaemia:** Doxorubicin can cause a mild to moderate non-regenerative anaemia that is usually of no clinical significance.
- Alopecia:** Doxorubicin can lead to fur loss, delayed fur regrowth, or permanent texture and/or colour change. This can be distressing to some owners; however, it should not impact the cat's quality of life.
- Urine:** Urine may take on a red colour as the drug is cleared in the urine. However, this is not clinically significant.
- Death:** Unexpected complication that may occur <1% of cats treated with chemotherapy.