DOXOrubicin (dox-oh-roo-bik-sen)

Classification
Therapeutic: antineoplastics
Pharmacologic: anthracyclines

Pregnancy Category D

Indications
Use with other modalities in the treatment of various solid tumors including: breast, ovarian, bladder, bronchogenic carcinoma, malignant lymphomas and leukaemias.

Action
Substance DNA and RNA synthesis by forming a complex with DNA; action is cell-cycle S-phase specific. Also has immunosuppressive properties.

Pharmacokinetics
Absorption: Administered IV only, resulting in complete bioavailability.

Distribution: Widely distributed; does not cross the blood-brain barrier; extensively bound to tissues.

Metabolism and Excretion: Mostly metabolized by the liver (primarily by CYP2D6 and CYP3A4). Converted by liver to an active compound. Excreted predominantly in the bile, 50% as unchanged drug. Less than 5% eliminated unchanged in the urine.

Half-life: 16.7 hr.

TIME/ACTION PROFILE (effect on blood counts)

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Contraindications/Precautions
Contraindicated in: Hypersensitivity. GB: Lactation: Pregnancy or lactation.

Use Cautiously in: History of cardiac disease or high cumulative doses of anthracyclines; Depressed bone marrow reserve; Liver impairment; Reduced dose if serum bilirubin > 1.2 mg/dL; Children, geriatric patients, mechanized radiation, concurrent cyclophosphamide (risk of cardiotoxicity); OB: Patients with childbearing potential.

Adverse Reactions/Side Effects

Interactions
Drug-Drug: CYP2D6 inhibitors, CYP3A4 inhibitors, and P-glycoprotein inhibitors may: ↑ risk of toxicity; avoid concurrent use. CYP2D6 inducers, CYP3A4 inducers, and P-glycoprotein inducers may: ↓ effect and ↑ risk of therapeutic failure; avoid concurrent use. Bone marrow depression with other antineoplastics or radiation therapy. Pediatric patients who have received concurrent doxorubicin and dactinomycin: has an ↑ risk of recall pneumonitis; avoid concurrent use. Hyperuricemia. ECG changes.

Other interactions:
- Local: May ↑ incidence and severity of neutropenia and stomatitis.
- CV: May ↑ risk of cardiac toxicity from concurrent use of dactinomycin. May ↓ risk of hepatotoxicity from cyclophosphamide. May ↑ risk of hepatotoxicity from mercaptopurine. Cardiac toxicity may be: ↓ by radiation therapy or cyclophosphamide. ↑ risk of cardiac toxicity with trastuzumab: avoid concurrent use.
- Other regimens are used.

Other:
- IV (Adults): 60–75 mg/m²/day, repeat q 21 days; or 25–30 mg/m²/day for 1–3 days, repeat q 3–4 wk or 20 mg/m²/48h. Total cumulative dose should not exceed 500 mg/m²; or 25–30 mg/m²/day for 2–3 days, repeat q 21 days; or 25–30 mg/m²/day for 2–3 days, repeat q 21 days; or 25–30 mg/m²/day for 2–3 days, repeat q 21 days; or 60 mg/m²/day for 10 days, repeat q 14 days; or 60 mg/m²/day for 14 days; or 60 mg/m²/day for 21–24 days.

References:
- Package insert.
Assessment
- Monitor BP, pulse, respiratory rate, and temperature frequently during administration. Report significant changes.
- Monitor for bone marrow depression. Assess for bleeding (bleeding gums, bruising, petechiae, guaiac stools, urine, and emesis) and periodically during therapy. Cardiotoxicity is more prevalent in children younger than 2 yr and geriatric patients. Dexrazoxane may be used to prevent cardiotoxicity in patients receiving cumulative doses of >300 m g/m².
- Monitor injection site frequently for redness, irritation, or inflammation during and for up to 2 hrs after completion of administration. Doxorubicin is a vesicant but may infil- trate painlessly even if blood returns on aspiration of infusion needle. Severe in- jury may occur if blood returns on aspiration of the administration needle. Use DMSO or dexrazoxane to treat extravasation. For DMSO: Administer 
  oxide (DMSO) 99% by saturating a gauze pad and painting on an area twice the size of the extravasation. Allow site to air dry and repeat application every 6–8 hr until swelling resolved, and then for up to 2 hrs after completion of infusion. Doxorubicin is a vesicant but may infil- 
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Hepatic Impairment
- Monitor renal (BUN and creatinine) and hepatic (AST, ALT, LDH, and serum bilirubin) function prior to and periodically during therapy. Dose reduction is re- 
  for bilirubin >1.2 m g/dL or serum creatinine >3 m g/dL.
- Monitor renal (BUN and creatinine) and hepatic (AST, ALT, LDH, and serum bil- 
  or decreases dosing interval and/or decreased dose is recommended if ANC is <1000 cells/mm³ and/or platelet count is <50,000 cells/mm³.
- Monitor renal (BUN and creatinine) and hepatic (AST, ALT, LDH, and serum bil- 
  1.2 m g/dL or serum creatinine >3 m g/dL.

Potential Nursing Diagnoses
Bowel for infection (Adverse Reactions) Decreased cardiac output (Adverse Reactions)

Implementation
- High alert. Patients who have received or are scheduled to receive chemotherapy agents. Before administration, clarify all ambiguous orders; double check
- Decreased cardiac output (Adverse Reactions)
**DOXorubicin**

**IV Administration**

**Rate:** Infuse over 30–60 min. Rate is too rapid.

**Dilution:** Dilute each 10 mg with 5 mL of 0.9% NaCl (nonbacteriostatic) for injection. Shake to dissolve completely. Do not dilute in IV solution. Concentration: 2 mg/mL.

**Y-Site Incompatibility:** acyclovir, allopurinol, amphotericin B (cholerose, colloidal, colloidal, liposome, lipid complex), amphotericin B liposome, ampicillin, ampicillin/sulbactam, cefazolin, cefepime, cefotaxime, cefotetan, cefoxitin, ceftazidime, ceftriaxone, cefuroxime, ceftepime, cefuroxime axetil, cefuroxime pivoxil, cefuroxime sodium, cefuroxime sodium, dexmedetomidine, dexamethasone, dexmedetomidine, methylprednisolone, famotidine, fenoldopam, fentanyl, filgrastim, fludarabine, gemcitabine, gentamicin, granisetron, haloperidol, hydrocortisone, hydroxyzine, ifosfamide, imipenem/cilastatin, irinotecan, itraconazole, ketorolac, labetalol, leucovorin calcium, levofloxacin, linezolid, lorazepam, mannitol, mechlorethamine, meperidine, melphalan, midazolam, milrinone, mitomycin, morphine, moxifloxacin, nalbuphine, naloxone, nesiritide, netilmicin, nitroglycerin, nitroprusside, octreotide, oxaliplatin, paclitaxel, palonosetron, pamidronate, pentaxol, phosphates, propofol, rituximab, sodium phosphates, thiopental, trimethoprim/sulfamethoxazole, voriconazole.

**Patient/Family Teaching**

- Instruct patient to notify health care professional promptly if fever, sore throat, signs of infection; bleeding gums, bruising; blood in stools, urine, or emesis; increased fatigue; dyspnea; or orthostatic hypotension occurs. Caution patient to avoid crowds and persons with known infections. Instruct patient to use soft toothbrush and electric razor and to avoid oral anticoagulants. Caution patient not to drink alcoholic beverages or take medication containing aspirin or NSAIDs, because these may precipitate gastric bleeding.
- Instruct patient to report pain at injection site immediately.
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● Instruct patient to notify health care professional immediately if irregular heartbeat, shortness of breath, swelling of lower extremities, or skin irritation (swelling, pain, or redness of feet or hands) occurs.

● Discuss the possibility of hair loss with patient. Explore methods of coping. Regrowth usually occurs 2–3 mo after discontinuation of therapy.

● Instruct patient not to receive any vaccinations without advice of health care professional.

● Instruct patient that medication may cause urine to appear red for 1–2 days.

● Instruct patient to notify health care professional if skin irritation occurs at site of previous radiation therapy.

● Advise family and sex partners to take precautions (i.e., latex gloves) in handling body fluids for at least 5 days posttreatment.

● Instruct patient to notify health care professional of all Rx or OTC medications, vitamins, or herbal products being taken and to consult health care professional before taking any Rx, OTC, or herbal products.

● Instruct patient that discontinuing may increase risk of developing secondary cancer.

● Advise patient that this medication may have teratogenic effects. Contraception should be used during and for at least 4 mo after therapy is concluded. Inform patient before initiating therapy that this medication may cause irreversible gonadal suppression.

● Emphasize the need for periodic lab tests to monitor for side effects.

Evaluation/Desired Outcomes

● Decrease in size or spread of malignancies in solid tumors.

● Improvement of hematologic status in leukemias.

Why was this drug prescribed for your patient?