**DAUNOrubicin hydrochloride**
(daw-noe-roo-bee-sin-hye-dro-klor-ide)

**Classification**
Therapeutic: antineoplastics
Pharmacologic: anthracyclines

**Pregnancy Category D**

**Indications**
In combination with other antineoplastics in the treatment of leukemias.

**Action**
Forms a complex with DNA, which subsequently inhibits DNA and RNA synthesis (cell-cycle phase-nonspecific). Therapeutic Effects: Death of rapidly replicating cells, particularly malignant ones. Also has immunosuppressive properties.

**Pharmacokinetics**
Absorption: Administered IV only, resulting in complete bioavailability.
Distribution: Widely distributed. Crosses the placenta.
Metabolism and Excretion: Extensively metabolized by the liver. Converted partially to a compound that also has antineoplastic activity (daunorubicinol); 40% eliminated by biliary excretion.
Half-life: Daunorubicin — 18.5 hr. Daunorubicinol — 26.7 hr.

**TIME/ACTION PROFILE (effects on blood counts)**

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>ONSET</th>
<th>PEAK</th>
<th>DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7–10 days</td>
<td>10–14 days</td>
<td>21 days</td>
</tr>
</tbody>
</table>

**Contraindications/Precautions**
Contraindicated in: Hypersensitivity to daunorubicin or any other components in the formulation; Symptomatic HF/arrhythmias; Pregnant or lactating women.
Use Cautiously in: Active infections or decreased bone marrow reserve; Geriatric patients or patients with other chronic debilitating illnesses (dosage reduction recommended for patients ≥60 yr); May reactivate skin lesions produced by previous radiation therapy; Hepatic or renal impairment; (dosage reduction recommended if serum creatinine >3 mg/dL or serum bilirubin >1.2 mg/dL). Patients who have received previous antineoplastic therapy or who have underlying cardiovascular disease (increased risk of cardiotoxicity). Patients with dialyzing potential.

**Adverse Reactions/Side Effects**

<table>
<thead>
<tr>
<th>EENT</th>
<th>CV</th>
<th>GI</th>
<th>GU</th>
<th>Derm</th>
<th>Hemat</th>
<th>Local</th>
<th>Metab</th>
<th>Misc</th>
</tr>
</thead>
<tbody>
<tr>
<td>rhinitis, abnormal vision, sinusitis.</td>
<td>CARDIOTOXICITY, arrhythmias.</td>
<td>nausea, vomiting, esophagitis, hepatoxicity, stomatitis.</td>
<td>red urine, gonadal suppression.</td>
<td>alopecia.</td>
<td>anemia, leukopenia, thrombocytopenia.</td>
<td>phlebitis at IV site.</td>
<td>hyperuricemia.</td>
<td>chills, fever.</td>
</tr>
</tbody>
</table>

**Interactions**

**Drug-Drug:** Additive myelosuppression with other antineoplastics. May decrease antibody response to live-virus vaccines and increase risk of adverse reactions. Cyclophosphamide increases the risk of cardiotoxicity. Increased risk of hepatic toxicity with other hepatotoxic agents.

**Route/Dosage**
Other dose regimens are used. In adults, cumulative dose should not exceed 550 mg/m² (450 mg/m² if previous chest radiation).

| IV (Adults ≥60 yr): | 45 mg/m²/day for 3 days in first course, then for 2 days of second course (as part of combination regimen). |
| IV (Adults <60 yr): | 30 mg/m²/day for 3 days in first course, then for 2 days of second course (as part of combination regimen). |
| IV (Children ≥2 yr): | 25 mg/m² once weekly (as part of combination regimen). In children <2 yr of age, dosage should be determined on a mg/kg basis. |

**NURSING IMPLICATIONS**

**Assessment**

- Monitor vital signs before and frequently during therapy.
- Monitor for bone marrow depression, absence of bleeding (bleeding gums, bruising, petechiae, guaiac stools, urine, and emesis) and avoidance of injections and needle sticks if platelet count is low; apply pressure if petechiae occur; apply pressure if puncture site oozes; administer fluids slowly if blood pressure falls; monitor for signs of infection during neutropenia.
- Monitor for increased fatigue, dyspnea, and subcutaneous hypertension.
- Monitor IV site frequently for inflammation or irritation. Instruct patient to notify nurse immediately if pain or irritation at injection site occurs. For extravasation oc-
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1. Infusion must be stopped and restarted in another vein to avoid damage to subcutaneous tissue. Notify physician immediately. Daunorubicin is a vesicant. Standard treatments include local injections of steroids and application of ice compresses.

2. Monitor urine output and weight gain. Although mild, may persist for 24–48 hr. Administration of an aminophylline oropharyngeal and periodically during therapy and adjusting dose as tolerated may help maintain fluid and electrolyte balance and nutritional status. Encourage fluid intake of 2000–3000 mL/day. Allergenic and al Blackburn of the terms may be used to help prevent name confusion.

3. Assess patient for evidence of cardiotoxicity, which manifests as HF (peripheral edema, dyspnea, rales, rales, right, rales, weight gain), jugular venous distention, and usually occurs 1–6 mo after initiation of therapy. Chest x-ray, echocardiography, ECG, and radionuclide angiography determination of ejection fraction and may be ordered before and periodically throughout therapy. A 30% decrease in QRS voltage and decrease in systolic ejection fraction are early signs of cardiotoxicity. Patients who receive total cumulative doses > 550 mm3, who have a history of cardiac disease, or who have received mediastinal radiation are at greater risk of developing cardiotoxicity. May be irreversible and fatal, but usually responds to early treatment.

4. Lab Test Considerations: Monitor uric acid levels.

5. Potential Nursing Diagnoses

   Risk for infection (Adverse Reactions)

   Decreased cardiac output (Side Effects)

   Implementation

   High Alert: Fatalities have occurred with chemotherapy agents. Before administration, label all containers; red, blue, and brown of therapy dose limits, have second practitioner independently double-check.

   Original order, calculation, and infusion pump settings. Do not confuse daunorubicin hydrochloride (Cerubidine) with daunorubicin citrate liposome (DaunoXome) or with doxorubicin (Adriamycin, Rubex) or doxorubicin hydrochloride liposome (Doxil). To prevent confusion, orders should include generic and brand name.

   Solution should be prepared in a laminar flow hood. Wear gloves, mask, and mask while handling IV medications. Discard IV equipment in a separately designated container.

   IV: Reconstitute each 20 mg with 4 mL of sterile water for injection for a concentration of 5 mg/mL. Shake gently to dissolve. Reconstituted medication is stable for 24 hr at room temperature, 48 hr if refrigerated. Rinse from multiple. Do not use aluminum needles when reconstituting or injecting daunorubicin, as aluminum darkens the solution.

   pH: 6.5–7.5.

   Dilution IV: Further dilute in 10–15 mL of 0.9% NaCl. Administer over 15–30 min. May also be diluted in 50–100 mL of 0.9% NaCl. Rate: Administer over 30 min. For patients with a small body surface area, administer over 15–30 min.

   Y-Site Compatibility: amifostine, etoposide, filgrastim, gemcitabine, granulocyte colony-stimulating factor, melphalan, methotrexate, ondansetron, sodium bicarbonate, teniposide, thiotepa, vinorelbine.

   Y-Site Incompatibility: allopurinol, aztreonam, cefepime, fludarabine, lansoprazole, piperacillin/tazobactam.

   Additive Incompatibility: Manufacturer does not recommend admixing daunorubicin hydrochloride.

   Patient/Family Teaching

   Instruct patient to notify health care professional of fever; chills; sore throat; signs of infection; bleeding gums; bruising; petechiae; or blood in urine, stool, or emesis occurs. Caution patient to avoid crowded settings and contacts with persons with known infections. Instruct patient to use non-alcoholic mouthwash and rinse mouth with water after eating.

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CONTINUED
DAUNOrubicin hydrochloride

and drinking. Somnolence may require management with speed techniques. Per-
iod of highest risk is 3– 7 days after administration of dose.

Instruct patient to notify health care professional immediately if irregu-
lar heartbeat, shortness of breath, or swelling of lower extremities oc-
curs.

Discuss with patient possibility of hair loss. Explore methods of coping. Reprods
of hair usually begins within 1 wk after discontinuing therapy.

Inform patient that medication may turn urine reddish color for 1– 2 days after
administration.

Inform patient that this medication may cause irreversible gonadal suppression.
Alert patient that this medication may have immunosuppressive effects. Contraception
should be used during therapy and for at least 1 mo after therapy is concluded.

Instruct patient not to receive any vaccinations without advice of health care pro-
fessional.

Emphasize the need for periodic labs to monitor for side effects.

Evaluation/Desired Outcomes

Improvement of hematologic status in patients with leukemia.

Why was this drug prescribed for your patient?