epoetin (e-po-et-in)
(epoetin alfa, epoetin beta, epoetin alfa recombinant)

Classification
Therapeutic: anemias
Pharmacologic: hormones, erythropoietin stimulating agents (ESA)

Pregnancy Category C.

Indications

Action
Stimulates erythropoiesis (production of red blood cells). Therapeutic Effects: Maintains and may elevate RBCs, decreasing the need for transfusions.

Pharmacokinetics
Absorption: Well absorbed after subcut administration.
Distribution: Unknown.
Metabolism and Excretion: Unknown.
Half-life: Children and Adults—4–13 hr; Neonates—11–17 hr.
TIME/ACTION PROFILE (increase in RBCs)
ROUTE ONSET† PEAK DURATION
Subcut, IV (Adults): 7–10 days within 2 mos, 2 wk‡
†Increase in reticulocytes.
‡After discontinuation.

Contraindications/Precautions
Contraindicated in: Hypersensitivity to albumin or mammalian cell-derived products. Uncontrolled hypertension. Patients with erythropoietin levels > 200 mU/mL. Uncontrolled seizures. Patients receiving chemotherapy when anticipated outcome is cure. Neutropenia in newborns.

Use Cautionally in: History of seizures or stroke. Cardiovascular disease. History of prostate, OR. Evidence of fatal harm in animal studies—use only if potential benefit outweighs potential risk in patients. OR. Caution: Lactated published information, however, erythropoietin alfa is a normal constituent of breast milk, which can cause potentially fatal gasping syndrome in neonates.

Adverse Reactions/Side Effects

Interactions
Drug-Drug: May require monitoring of heparin anticoagulation during hemodialysis.

Route/Dosage
Anemia of CKD
(Do not initiate if hemoglobin > 10 g/dL).
Subcut, IV (Adults): 50–100 units/kg 3 times weekly initially; use lowest dose sufficient to maintain hemoglobin levels; if Hgb increases by > 1.0 g/dL in 2 wk, dose by 25%; if Hgb increases by > 0.5 g/dL after 4 wk of therapy (with adequate iron stores), dose by 25%; do not exceed hemoglobin of 10 g/dL.
Subcut, IV (Children 1 mo–16 yr): 50 units/kg 3 times weekly initially; use lowest dose sufficient to maintain hemoglobin levels; if Hgb increases by > 1.0 g/dL in 2 wk, dose by 25%; if Hgb increases by > 0.5 g/dL after 4 wk of therapy (with adequate iron stores), dose by 25%; do not exceed hemoglobin of 12 g/dL.

Anemia Secondary to AZT Therapy
Subcut, IV (Adults): 100 units/kg 3 times weekly for 8 wk, if multiple response, max 7 by 50–100 units/kg every 4–8 wk (max 300 units/kg 3 times weekly).
Subcut, IV (Children 8 mo–17 yr): 50–400 units/kg 2–3 times weekly.

Anemia from Chemotherapy
(Use only for chemotherapy-related anemia and discontinue when chemotherapy course is completed; do not initiate if hemoglobin > 10 g/dL).

Dosing Considerations
Pediatric:
Children: Use lowest dose sufficient to maintain hemoglobin levels; if Hgb increases by > 1.0 g/dL in 2 wk, dose by 25%; if Hgb increases by > 0.5 g/dL after 4 wk of therapy (with adequate iron stores), dose by 25%; do not exceed hemoglobin of 12 g/dL.

Notes:
- Cardiac drug name.
- Generic Implication.
- CONTRAINDICATED indicate most frequent.
- Discontinued.
Subcut (Adults): 30 units/kg 3 times weekly or 60,000 units weekly; adjust dose to maintain hemoglobin level sufficient to avoid blood transfusions (do not exceed hemoglobin of 12 g/dL). If Hgb/T < 11 g/dL or reaches a level needed to avoid red blood cell transfusions, dose by 25%; if Hgb/T < 10.5 g/dL, then re-initiate at a dose 25% lower than previous dose. If hemoglobin exceeds 12 g/dL, withhold dose until hemoglobin approaches level of 10 g/dL. Patients with lower baseline serum erythropoietin levels may respond more rapidly; not recommended if levels < 500 mUnits/mL may not respond to therapy. Monitor hemoglobin weekly during initial therapy. If response does not reach hemoglobin level of 11 g/dL within 8 wk of therapy, monitor hemoglobin weekly and adjust dose 25%; then adjust dose by 25% at 4-wk intervals until desired response attained. If no response after 12 wk of escalation, further dose increases may be made at 6-wk intervals until desired response is obtained. Use lowest dose that will maintain target range (10–12 g/dL) to reduce need for transfusions.

Anemia from Chemotherapy:

- Monitor hematocrit before and periodically during therapy. If hematocrit exceeds 50% in any 2-wk period, discontinue dose until hematocrit is < 45% in WBCs and platelets. May need to reduce chemotherapy dosage.
- Monitor serum ferritin, transferrin, and iron levels to assess need for concurrent iron therapy. Transferrin saturation should be at least 20% and ferritin should be less than 100 ng/mL.
- Monitor for infections: neutropenia, fever, sepsis.
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But higher doses will produce a response. For weekly dosing regimens, if response is not adequate (hemoglobin < 11 g/dL by 1 g/dL after 4 wk in absence of RBC transfusion), dose is 60,000 units weekly (adults) or 900 units/kg (max: 60,000 units) (children).

Surgery: Determine that hemoglobin is > 10 to <13 g/dL before therapy. Epoetin has been used for 10 days before surgery, on the day of surgery and for 4 days post surgery. Implement prophylaxis of deep venous thrombosis during surgical use.

Potential Nursing Diagnoses
Activity intolerance (Indications)
Noncompliance (Patient/Family Teaching)

Implementation

IV Administration

Prescribers and hospitals must enroll in and comply with the ESA APPRISE Oncology Program to prescribe and/or dispense epoetin alfa to patients with cancer. Visit www.esa-apprise.com or call 1-866-284-8089.

Transfusions are still required for severe symptomatic anemia. Supplemental iron should be initiated with epoetin and continued throughout therapy.

Institute seizure precautions in patients who experience greater than a 4-point increase in hematocrit in a 2-wk period or exhibit any change in neurologic status. Risk of seizures is greatest during the first 90 days of therapy.

Do not shake vial; inactivation of medication may occur. Solution is clear and colorless; do not administer solutions that are discolored, cloudy, or contain a precipitate. Discard vial immediately after withdrawing dose from single-use 1-mL vial. Refrigerate multidose 2-mL vial; stable for 21 days after initial entry.

Subcut: This route is often used for patients not requiring dialysis.

May be admixed in syringe immediately before administration with 0.9% NaCl with benzyl alcohol 0.9% in a 1:1 ratio to prevent injection site discomfort.

Direct IV:

Diluent: Administer undiluted or dilute with an equal amount of 0.9% NaCl.

Concentration: 1000–40,000 units/mL.

Rate: May be administered as direct injection or bolus over 1–5 minutes into IV tubing or via venous line at end of dialysis session.

Y-Site Compatibility: alfentanil, amikacin, amphotericin, aminophylline, ascorbic acid, atracurium, azathioprine, azoxuridine, bevacizumab, benzathine, calcium chloride, calcium gluconate, caffeine, cofanil, colchicine, cyclosporine, cefazolin, cefoperazone, cefuroxime, chloramphenicol, clindamycin, creasulfathalidine, cytoxan, dronedarone, diphenhydramine, diltiazem, dipyridamole, dexamethasone, doxorubicin, doxycycline, enalapril, epinephrine, esmolol, fentanyl, fluconazole, gentamicin, glycopyrrolate, heparin, hydrocortisone, imipenem, isoniazid, ketoconazole, lidocaine, lidocaine hydrochloride, magnesium sulfate, mannitol, methotrexate, mitoxantrone, mirtazapine, myelosuppressants, nafcillin, nafion, nafion sodium, nalbuphine, neostigmine, nevirapine, norepinephrine, oxytocin, penicillin G, pentamidine, piperacillin/tazobactam, pirarubicin, platelet function inhibitors, potassium chloride, procainamide, propofol, pyrazinamide, quinidine, quinine, ranitidine, ribavirin, sodium bicarbonate, sodium chloride, sodium bicarbonate, sodium phosphates, succinylcholine, sufentanil, suxamethonium, telithromycin, theophylline, ticarcillin/clavulanate, trimethoprim/sulfamethoxazole, vancomycin, vasoconstriction.

Y-Site Incompatibility: amphotericin B colloidal, chlorpromazine, diazepam, diazoxide, haloperidol, midazolam, pentamidine, phenytoin, prochlorperazine, trimethoprim/sulfamethoxazole, vancomycin.

Patient/Family Teaching

Advise patient to read the Medication Guide prior to initiating therapy and with each Rx refill in case of changes. Patient must sign the patient-healthcare provider acknowledgment form before each course of therapy.

Discuss ways of preventing self-injury in patients at risk for seizures. Driving and activities requiring continuous alertness should be avoided.

Inform patient that use of epoetin may result in shortened overall survival and/or tumor progression.

Advise patient to notify health care professional immediately if signs of blood clots (chest pain, trouble breathing or shortness of breath, pain in the legs, with or without swelling; cool or pale arm or leg, sudden confusion, trouble speaking or trouble understanding others’ speech, unsta-
den numbness or weakness in the face, arm, or leg, especially on one side of the body, sudden trouble seeing, sudden trouble walking, dizzi-
ness, loss of balance or coordination, loss of consciousness or fainting, hemodialysis vascular access stops working) occur.

- Advise patient to inform health care professional of medication prior to treatment or surgery.

- Discuss possible return of normal fertility in women of childbearing age. Patient should discuss contraceptive options with health care professional.

- **Anemia of Chronic Renal Failure:** Stress importance of compliance with dietary restrictions, medications, and dialysis. Foods high in iron and low in potas-
sium include liver, pork, veal, mustard and turnip greens, peas, eggs, broccoli, kiwi, blackberries, strawberries, apple juice, watermelon, oatmeal, and
enriched bread. Epoetin will result in increased sense of well-being, but it does not cure underlying disease.

- **Home Care Issues:** Home dialysis patients determined to be able to safely and effectively administer epoetin should be taught proper dosage, administration
technique, and disposal of equipment. Information for Home Dialysis Patients should be provided to patient along with medication.

### Evaluation/Desired Outcomes

- Increase in hematocrit to 30–36% with improvement in symptoms of anemia in patients with chronic renal failure.

- Increase in hematocrit in anemia secondary to zidovudine therapy.

- Increase in hematocrit in patients with anemia resulting from chemotherapy.

- Reduction of need for transfusions after surgery.

**Why was this drug prescribed for your patient?**