sargramostim (sar-gram-oh-stim)
Leukine, rHu GM-CSF (recombinant human granulocyte/macrophage colony-stimulating factor)

**Classification**
Therapeutic: colony-stimulating factors
Pharmacologic: biologic response modifiers

**Pregnancy Category C**

**Indications**

Mobilization and after transplant of autologous peripheral blood progenitor cells (PBPCs); increases harvest by leukapheresis.

**Action**
Consists of a glycoprotein produced by recombinant DNA technique that is capable of binding to and stimulating the production, division, differentiation, and activation of granulocytes and macrophages. Therapeutic Effects: Accelerated recovery of bone marrow after autologous bone marrow transplantation, resulting in decreased risk of infection and other complications.

**Pharmacokinetics**
Absorption: After IV administration, absorption is essentially complete. Well absorbed after subcut administration.

Distribution: Unknown.

Metabolism and Excretion: Unknown.

Half-life: Unknown.

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

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>ONSET</th>
<th>PEAK</th>
<th>DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subcut, IV</td>
<td>rapid</td>
<td>unknown</td>
<td>3–7 days</td>
</tr>
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</table>

- C = Caution; G = Grade; NP = Not pertinent; OPT = Occasionally pertinent; SD = Substantially decreased.

**Contraindications/Precautions**
Contraindicated in: Presence of >10% leukemic myeloid blast cells in bone marrow or peripheral blood; Hypersensitivity to granulocyte macrophage colony-stimulating factor (GM-CSF), yeast products, or additives (mannitol, tromethamine, or sucrose). **Pediatric**: Products containing benzyl alcohol should not be used in newborns.

Use Cautiously in: Pre-existing fluid retention, HF, or pulmonary infiltrates; Pre-existing cardiac disease; Myeloid malignancies; Previous extensive radiation or chemotherapy (response may be limited); OB: Use only if clearly needed; Lactation: Safety not established.

**Adverse Reactions/Side Effects**
CNS: Headache, malaise, weakness.
Resp: Dyspnea.
CV: Pericardial effusion, peripheral edema, transient supraventricular tachycardia. 
GI: Diarrhea, nausea.
Derm: Pruritus, rash.
MS: Arthralgia, bone pain, myalgia.
Misc: Chills, fever, first-dose reaction.

**Interactions**
Drug-Drug: Lithium or corticosteroids may potentiate myeloproliferative effects of sargramostim (concurrent use should be undertaken cautiously).

**Route/Dosage**
After Bone Marrow Transplantation

**IV (Adults):** 250 mcg/m²/day for 21 days.

Failure/Delay of Engraftment after Bone Marrow Transplantation

**IV (Adults):** 250 mcg/m²/day for 14 days; may be repeated after a 7-day rest between courses; if results are inadequate, a 3rd course at 500 mcg/m²/day for 14 days may be given after a 7-day rest.

After Chemotherapy for AML

**IV (Adults):** 250 mcg/m²/day started around day 11 or 4 days after induction if day 10 bone marrow is hypoplastic with <5% blast cells and continued until absolute neutrophil count (ANC) ≥ 1500 cells/mm³ for 3 consecutive days (not to exceed 42 days); if adverse reactions occur, decrease dose by 50% or temporarily discontinue.

**Mobilization of PBPCs**

**IV, Subcut (Adults):** 250 mcg/m²/day continued throughout collection of PBPCs.

**Contraindications/Precautions**
Contraindicated in: Presence of >10% leukemic myeloid blast cells in bone marrow or peripheral blood; Hypersensitivity to granulocyte macrophage colony-stimulating factor (GM-CSF), yeast products, or additives (mannitol, tromethamine, or sucrose). **Pediatric**: Products containing benzyl alcohol should not be used in newborns.

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**Mobilization of PBPCs**

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After PBPC Transplantation

IV. Subcut (Adults): 250 mcg/m²/day continued until ANC/Platelet/mm³ for 3 consecutive days.

NURSING IMPLICATIONS

Assessment

- Monitor heart rate, BP, and respiratory status during and immediately after infusion. If infusion develops, slow infusion rate by half. Reassess; medication may need to be discontinued. Assess for peripheral edema daily throughout therapy.
- Capillary leak syndrome (swelling of feet or lower legs, sudden weight gain, dyspnea) and pleural or pericardial effusion may occur; usually resolves ≤ 5 mcg/kg/day.
- Monitor for first-dose reaction (flushing, hypotension, syncope, weakness). Does not occur with first dose of each course but may occur with first dose of more than 1 course.
- Assess for fever during therapy. Usually mild and dose-related and resolves with discontinuation or administration of antipyretics.
- Assess for arthralgias and myalgias, usually in lower extremities, which tend to occur when granulocyte counts are returning to normal. May also cause mild to moderate bone pain, possible from bone marrow expansion. Usually occurs over 1–3 days before recovery and occurs in the sternum, spine, pelvis, and long bones. Treat with analgesics.
- Lab Test Considerations: Obtain a CBC with differential and platelet count before chemotherapy and twice weekly during therapy to avoid leukocytosis. Monitor ANC; may increase rapidly. If ANC ≥ 20,000/mm³ or 10,000/mm³ after nadir has occurred or if platelet count ≥ 500,000/mm³, interrupt administration and reduce dose by half or discontinue. Excessive blood levels usually return to baseline 3–7 days after discontinuation of therapy. If blast cells appear, sargramostim should be discontinued.
- Monitor renal and hepatic function before and biweekly throughout therapy in patients with renal or hepatic dysfunction. May cause decreases in BUN, creatinine, and hepatic enzymes.
- Monitor serum albumin concentrations.

Potential Nursing Diagnoses

Risk for infection (Indications)

Implementation

- Administer 2–4 hr after bone marrow transplant and no earlier than 24 hr after completion of chemotherapy or 12 hr after last dose of radiotherapy.
- Refrigerate but do not freeze powder, reconstituted solution, or diluted solution.
- Reconstitute with 1 mL of sterile water without preservatives added toward side of vial. Swirl gently to avoid caking. Do not shake. Solution should be clear and colorless. Discard if left at room temperature for > 8 hr. Vials for > 1 time use only.
- Subcut: Administer reconstituted solution without further dilution.

Y-Site Compatibility: amikacin, ampicillin, ampicillin/sulbactam, cefepime, cefotaxime, cefotetan, ceftriaxone, cephalothin, ciprofloxacin, clindamycin, cyclophosphamide, cyclosporine, cytarabine, dacarbazine, daunorubicin, doxorubicin, fludarabine, fluorouracil, fluorothymidine, gemcitabine, ifosfamide, irinotecan, mitomycin C, mitoxantrone, pirarubicin, piperacillin/tazobactam, potassium chloride, ranitidine, tetracycline, vinorelbine, vincristine.

Y-Site Incompatibility: acyclovir, ampicillin, ampicillin/sulbactam, cefoxitin, cefuroxime, gentamicin, imipenem/cilastatin, linezolid, teicoplanin, vancomycin, zosyn.
sargramostim

- phenol, hydroxyzine, suspensions/diluents, benzopam, methylprednisolone succinate, meropenem, nalbuphine, nicotinamide, sodium succinate, mafenide, metronidazole, prednisone, sodium bicarbonate, tolbutamide.

- Additive Incompatibility: Do not admix with other medications.

Patient/Family Teaching

- Explain purpose of sargramostim to patient.
- Instruct patient to notify health care professional if dyspnea or palpitations occur.

Evaluation/Desired Outcomes

- Acceleration of bone marrow recovery and decreased incidence of infections in patients after autologous and allogeneic bone marrow transplantation, bone marrow transplant failure or engraftment delay, chemotherapy for AML and PBPC transplantation.

Why was this drug prescribed for your patient?