filgrastim (fil-gra-stim)
Neupogen, G-CSF, granulocyte colony-stimulating factor

**Classification**
Therapeutic: colony-stimulating factor

**Pregnancy Category C**

**Indications**

**Action**
A glycoprotein, filgrastim binds to and stimulates immature neutrophils to divide and differentiate. Also activates mature neutrophils. **Therapeutic Effects:** Decreased incidence of infection in patients who are neutropenic from chemotherapy or other causes. Improved harvest of progenitor cells for bone marrow transplantation.

**Pharmacokinetics**
Absorption: Well absorbed after subcut administration. Distribution: Unknown. Metabolism and Excretion: Unknown. Half-life: Adults—5.5 hr; neonates—4.5 hr.

**Contraindications/Precautions**
Contraindicated in:
Hypersensitivity to filgrastim or Escherichia coli–derived proteins. Use Cautiously in:
Malignancy with myeloid characteristics; Pre-existing cardiac disease; OB: Use only if potential benefit justifies potential risk to fetus; Lactation: Unlikely to adversely affect breast-fed infant.

**Adverse Reactions/Side Effects**

**Interactions**
Drug-Drug: Simultaneous use with antineoplastics may have adverse effects on rapidly proliferating neutrophils—avoid use for 24 hr before and 24 hr after chemotherapy. Lithium may potentiate the release of neutrophils; concurrent use should be undertaken cautiously.

**Route/Dosage**
**After Myelosuppressive Chemotherapy**
IV, Subcut (Adults and Children): 5 mcg/kg/day as a single injection daily for up to 2 wk. Dosage may be increased by 5 mcg/kg during each cycle of chemotherapy, depending on blood counts.

**After Bone Marrow Transplantation**
IV, Subcut (Adults): 10 mcg/kg/day as a 4- or 24-hr IV infusion or as a continuous subcut infusion; initiate at least 24 hr after chemotherapy and at least 24 hr after bone marrow transplantation. Subsequent dosages are adjusted according to blood counts.

**Peripheral Blood Progenitor Cell Collection and Therapy**
Subcut (Adults): 10 mcg/kg/day as a single injection daily for at least 4 days before first leukapheresis and continued until last leukapheresis; dosage modification suggested if WBC < 100,000 cells/mm³.

**TIME/ACTION PROFILE**

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>ONSET</th>
<th>PEAK</th>
<th>DURATION</th>
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<tbody>
<tr>
<td>IV, subcut</td>
<td>unknown</td>
<td>unknown</td>
<td>4 days†</td>
</tr>
</tbody>
</table>

†Return of neutrophil count to baseline

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**Drug-Lab Interactions**
Lithium may potentiate the release of neutrophils; concurrent use should be undertaken cautiously.

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Subcut (Adults): 10 mcg/kg/day as a single injection daily for at least 4 days before first leukapheresis and continued until last leukapheresis; dosage modification suggested if WBC < 100,000 cells/mm³.
Severe Chronic Neutropenia

**Subcut (Adults):**
- Congenital neutropenia—6 mcg/kg twice daily. (Achieved by using the "standard" or "low" dose of granulocyte colony-stimulating factor [G-CSF].)
- Idiopathic/cyclic neutropenia—5 mcg/kg daily (decrease if ANC remains <10,000/mm³).

**Neonatal neutropenia**

**IV, Subcut (Neonates):**
- 5–10 mcg/kg/day once daily for 3–5 days.

**NURSING IMPLICATIONS**

- **Assessment**
  - Monitor heart rate, BP, and respiratory status before and periodically during therapy.
  - Assess bone pain throughout therapy. Pain is usually mild to moderate and controllable with nonopioid analgesics, but may require treatment with opioid analgesics, especially in patients receiving high-dose IV therapy.
  - Monitor for signs and symptoms of allergic reactions (rash, urticaria, facial edema, wheezing, dyspnea, hypotension, tachycardia). Usually occur within 30 min of administration. Treatment includes antihistamines, steroids, bronchodilators, and/or epinephrine; may recur with rechallenge.
  - Assess for signs and symptoms of acute respiratory distress syndrome (fever, lung infiltrates, or respiratory distress). If symptoms occur, withhold filgrastim until symptoms resolve or discontinue.
  - Lab Test Considerations:
    - After chemotherapy, obtain a CBC with differential, including examination for the presence of blast cells, and platelet count before chemotherapy and twice weekly during therapy to avoid leukocytosis. Monitor ANC. A transient rise is seen 1–2 days after initiation of therapy, but therapy should not be discontinued until ANC <10,000/mm³.
    - After bone marrow transplant, the daily dose is titrated by the neutrophil response. When the ANC is <1000/mm³ for 3 consecutive days, the dose should be reduced to 5 mcg/kg/day. If the ANC remains <1000/mm³ for 3 or more consecutive days, filgrastim is discontinued. If the ANC decreases to <1000/mm³, filgrastim should be resumed at 5 mcg/kg/day.
    - For chronic severe neutropenia, monitor CBC with differential and platelet count twice weekly during initial 6 wk of therapy and during 2 wk after any dose adjustment.

- **Implementation**
  - Do not confuse Neupogen with Neumega (oprelvekin).
  - Administer no earlier than 24 hr after cytotoxic chemotherapy, at least 24 hr after bone marrow infusion, and not during the 24 hr before administration of chemotherapy.
  - Refrigerate; do not freeze. Do not shake. May warm to room temperature for up to 6 hr before injection. Discard if left at room temperature for >6 hr. Vial is for 1-time use only.
  - Subcut: If dose requires <1 mL of solution, may be divided into 2 injection sites.
  - May also be administered as a continuous subcutaneous infusion over 24 hr after bone marrow transplantation.

**IV Administration**

- Continuous Infusion: Diluent: Dilute in DSW. Refrigerate; do not freeze. Do not shake. May warm to room temperature for up to 6 hr before administration. Vial is for 1-time use only. Concentration: Dilute to a final concentration of at least 15 mcg/mL. If the final concentration is <15 mcg/mL, human albumin must be added to D5W before filgrastim to prevent adsorption of the components of the drug delivery system. Rate: After chemotherapy dose is administered via infusion over 15–60 min. After chemotherapy dose may also be administered as a continuous infusion.
  - After bone marrow transplant, dose should be administered as an infusion over 4–24 hr.

**Y-Site Compatibility:**
- acyclovir, allopurinol, almitrine, amphotericin B, amphotericin B liposome, ampicillin, ampicillin/sulbactam, aztreonam, bleomycin, bleomycin sulfate, buprenorphine, butorphanol, calcium gluconate, carboplatin, carmustine, cyclophosphamide, cytarabine, dexamethasone, doxorubicin, doxorubicin hydrochloride, droperidol, enalaprilat, famotidine, floxuridine, fludarabine, fluroxen, hydrocortisone, hydroxyurea, imipenem/cilastatin, leucovorin calcium, levofloxacin, leuprolide, metoclopramide, meperidine, methotrexate, mechlorethamine,
filgrastim

- methylprednisolone, mirtazapine, methotrexate, metoclopramide, metronidazole, morphine, nalbuphine, ondansetron, potassium chloride, promethazine, ranitidine, sodium acetate, sodium bicarbonate, streptozocin, ticarcillin/clavulanate, tobramycin, trimethoprim/sulfamethoxazole, vancomycin, vincristine, vinorelbine, zidovudine.

Y-Site Incompatibility: amiodarone, amphotericin B colloidal, cefepime, cefoperazone, cefotaxime, cefoxitin, ceftaroline, ceftriaxone, cefuroxime, clindamycin, dactinomycin, doxorubicin, doxorrubicin, heparin, mannitol, methyldopa, sodium acetate, sodium bicarbonate, streptozocin, ticarcillin/clavulanate, tobramycin, vancomycin, vincristine, vinorelbine, zidovudine.

Patient/Family Teaching

- Explain purpose of filgrastim to patient. Instruct patient and caregiver to read instructions for Patients and Caregivers before starting therapy and with each Rx refill in case of changes.
- Advise female patient to notify health care professional if pregnancy is planned or suspected or if breast feeding. Encourage patients that become pregnant during therapy to enroll in Amgen’s Pregnancy Surveillance Program by calling 1–800–77AMGEN (1–800–772–6436).
- Advise patients that breast feed during therapy to enroll in Amgen’s Lactation Surveillance Program by calling 1–800–77AMGEN (1–800–772–6436).
- Instruct patient on correct technique and proper disposal for home administration. Caution patient not to reuse needle, syringe, or vial. Provide patient with a puncture-proof container for needle and syringe disposal.

Evaluation/Desired Outcomes

- Decreased incidence of infection in patients who receive bone marrow–depressing antineoplastics.
- Reduction of duration and sequelae of neutropenia after bone marrow transplantation.
- Improved harvest of progenitor cells for bone marrow transplantation.

Why was this drug prescribed for your patient?