

## CONTINUING EDUCATION

# Optimal Use of Granulocyte–Colony-Stimulating Factor in Patients With Cancer Who Are at Risk for Chemotherapy-Induced Neutropenia

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**Purpose/Objectives:** To provide an overview of the risks for and occurrence of chemotherapy-induced neutropenia in patients with cancer and its optimal prophylactic management with recombinant human granulocyte–colony-stimulating factor (G-CSF).

**Data Sources:** Original research, review articles, conference presentations, and published guidelines.

**Data Synthesis:** Chemotherapy-induced neutropenia is a common serious adverse event, and the risks for it can be predicted on the basis of patient characteristics and the chemotherapy regimen.

**Conclusions:** Optimal, cost-effective prophylactic management of chemotherapy-induced neutropenia with G-CSF requires the assessment of patient factors and the myelotoxicity of the chemotherapy regimen.

**Implications for Nursing:** Neutropenia and its complications can be serious adverse events in patients who are treated with chemotherapy. Nurses should be familiar with how to identify patients who are at risk for neutropenia and its complications and should be prepared to discuss the need for first-cycle use of G-CSF with the other members of the treatment team as necessary.

### Key Points . . .

- Severe neutropenia and febrile neutropenia are serious side effects of treatment with myelosuppressive chemotherapy that can require hospitalization and IV antibiotics and often result in substantial morbidity and mortality.
- First-cycle use of granulocyte–colony-stimulating factor (G-CSF) for chemotherapy-induced neutropenia is safe and effective.
- First-cycle use of G-CSF is cost effective when it is targeted to patients at higher risk for neutropenia.
- Prophylactic management of neutropenia may be simplified with the use of pegfilgrastim, a long-acting form of G-CSF that is administered only once per chemotherapy cycle and at a fixed dose.

Neutrophils are the crucial first line of defense against pathogens such as bacteria and fungi (Burg & Pilling, 2001). Produced in the bone marrow from blood progenitor cells, neutrophils have a relatively short half-life of about seven to eight hours in the peripheral blood. The high proliferative activity of neutrophil precursors and the high turnover of neutrophils in the periphery make them a target for cytotoxic agents that destroy rapidly proliferating cells in the body. Thus, patients with cancer who are treated with chemotherapy are at high risk for the development of neutropenia.

Neutropenia is a potentially serious side effect of cancer chemotherapy. Because neutrophils are responsible for protecting against infection, the presence of neutropenia may place a patient at serious risk for infection. Febrile neutropenia (temperature  $\geq 38.2^{\circ}\text{C}$  and absolute neutrophil count [ANC]  $\leq 500 \times 10^6/\text{l}$ ) (Crawford et al., 1991) is a significant risk factor for life-threatening infections that can require hospitalization and treatment with IV antibiotics. The development of infectious complications associated with neutropenia correlates with the depth and duration of the ANC nadir (Bodey, Buckley, Sathe, & Freireich, 1966). Patients with neutrophil counts below  $1.0 \times 10^9/\text{l}$  for one week had a 50% chance of infection and, as the duration of neutropenia increased, the risk of infection neared 100%. These patients had a mortality rate above 50% as long as their counts continued to fall, but

### Goal for CE Enrollees:

To enhance nurses' knowledge related to the use of granulocyte–colony-stimulating factor for the prevention of febrile neutropenia in patients with cancer receiving chemotherapy.

### Objectives for CE Enrollees:

- On completion of this CE, the participant will be able to
1. Describe the effects of granulocyte–colony-stimulating factor on neutrophils.
  2. Discuss the factors that increase the risk of febrile neutropenia during chemotherapy.
  3. Compare the effects and benefits of filgrastim and pegfilgrastim.

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