Neutropenia is a reduction in the white blood cell (WBC) count (Camp-Sorrell, 2005; Cappozzo, 2004; Hawkins, 1997; Lynch, 2000).

- WBC function is to fight off infection.
- Five types comprise the count: neutrophils, lymphocytes, monocytes, eosinophils, and basophils (see Table 1).
- The five types are reported in percentages that add up to 100%.
- Neutrophils are the first line of defense in infection.
- Neutrophils digest bacterial organisms and debris.
- Neutrophils increase during infection or acute trauma.
- Neutrophils have a half-life of seven to eight hours in circulation.
- Bands, also called “stabs,” are the immature form of neutrophils.
- An increase in band level is called a left shift, which occurs with acute infection.

Neutropenia is caused by problems with neutrophil production, problems with neutrophil distribution, infection, treatment, or drugs (Lynch, 2000). Treatment-related causes include chemotherapy, radiation therapy, immunotherapy, and bone marrow transplant (National Comprehensive Cancer Network [NCCN] & American Cancer Society [ACS], 2002).

Despite the cause or treatment modality, patients with neutropenia are at increased risk for infection. The absolute neutrophil count (ANC) is an essential tool used in oncology to determine potential risk (Hawkins, 1997). ANC represents the number of mature WBCs in circulation using a simple, mathematical calculation. See Figure 1 to learn how to calculate the ANC. The ANC is categorized into grades, which reflect the risk for infection. See Table 2 for grading and levels of risk.

The occurrence of neutropenia can lead to life-threatening infections. To decrease the rate of chemotherapy-induced neutropenia, the chemotherapy dose may be reduced or delayed. Reductions or delays diminish the effectiveness of potentially curative treatment (Cappozzo, 2004; Nirenberg, 2003). Prevention of chemotherapy-induced neutropenia is one way to decrease the potential for dose reductions or delays and is achieved through the use of (Camp-Sorrell, 2005)

- Granulocyte–colony-stimulating factor
- Granulocyte macrophage–colony-stimulating factor.

The use of a colony-stimulating factor is recommended when (Camp-Sorrell, 2005)

- Patients have had a previous episode of febrile neutropenia.
- Chemotherapy is being administered in a dose-dense manner.
- A high risk of febrile neutropenia exists. Despite dose delays, reductions, or use of colony-stimulating factors, fever still may develop in the presence of neutropenia.

Table 1. Function of the White Blood Cell Components

<table>
<thead>
<tr>
<th>WHITE BLOOD CELL TYPE</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neutrophils: also called polymorphonuclear cells (polys) or segmented neutrophils (segs)</td>
<td>Phagocytosis: digestion of bacterial organisms and debris</td>
</tr>
<tr>
<td>Lymphocytes: Measurement reflects a combination of the T and B cells.</td>
<td>Combat acute viral infections and chronic bacterial infections</td>
</tr>
<tr>
<td>Monocytes: also called monos</td>
<td>Phagocytosis of bacteria; monocytes last longer in circulation than neutrophils</td>
</tr>
<tr>
<td>Eosinophils: also called eos</td>
<td>Allergic reaction and parasitic infections</td>
</tr>
<tr>
<td>Basophils: also called mast cells or basos</td>
<td>Involved in inflammatory process and allergic reactions</td>
</tr>
</tbody>
</table>

Note. Based on information from Hawkins, 1997; Pagana & Pagana, 2002.