Mobilization of Hematopoietic Stem Cells for Use in Autologous Transplantation

Hollie Devine, MSN, RN, CNP, D. Kathryn Tierney, RN, PhD, Kim Schmit-Pokorny, RN, MSN, OCN®, and Kathleen McDermott, RN, BSN, OCN®

Autologous hematopoietic stem cell transplantation (HSCT) is a potentially curative therapeutic approach for various malignant hematologic and lymphoid diseases. Hematopoietic stem cells (HSCs) may be collected from the blood or the bone marrow. HSCs are capable of self-renewal and give rise to progenitor cells, multipotent cells that differentiate and proliferate into the mature cells of the blood and immune system. HSCs and progenitor cells are released from the bone marrow into the peripheral blood through a process called mobilization. HSCs then are collected from the blood in a process called apheresis and cryopreserved for administration following the high-dose preparative regimen. This article reviews stem cell biology, current mobilization strategies, use of novel mobilization agents, and nursing care of patients during the mobilization phase of autologous HSCT. Understanding the biology and process of HSC mobilization is critical for transplantation nurses to deliver and coordinate care during this complex phase of autologous HSCT.

At a Glance

- Mobilization of hematopoietic stem cells (HSCs) from the bone marrow into the peripheral blood is a multistep process involving the interplay among chemokines, cytokines, cell adhesion molecules, and the bone marrow microenvironment.
- The goal of stem cell collection is to mobilize a sufficient number of HSCs that are capable of regenerating the full hematopoietic lineages and to achieve adequate engraftment following autologous HSC transplantation.
- Nurses need to understand stem cell biology and the mechanisms of action of current mobilization strategies.

mobilization techniques will be reviewed, including the use of novel mobilization agents. The collection, processing, and cryopreservation of HSCs will be outlined.

Hollie Devine, MSN, RN, CNP, is an adult nurse practitioner and educator for advanced practice nurses and physician assistants in the James Cancer Hospital at the Ohio State University Medical Center in Columbus; D. Kathryn Tierney, RN, PhD, is an oncology clinical nurse specialist at Stanford University Medical Center in California; Kim Schmit-Pokorny, RN, MSN, OCN®, is a transplant manager at the University of Nebraska Medical Center in Omaha; and Kathleen McDermott, RN, BSN, OCN®, is a clinical research nurse at the Dana-Farber Cancer Institute in Boston, MA. (First submission August 2009. Revision submitted September 2009. Accepted for publication October 8, 2009.)