

# A Dendritic Cell Primer for Oncology Nurses

Elaine S. DeMeyer, RN, MSN, AOCN®, and Patricia C. Buchsel, RN, MSN, FAAN

**D**endritic cells (DCs) are potent antigen-presenting cells (APCs) in the immune system that have a significant role in the development of acquired immunity (Banchereau & Steinman, 1998; Sompayrac, 2003). DCs monitor for potential viral and bacterial infections; however, researchers have explored the possibility that DCs may capture and process cancer cells for destruction or apoptosis (Armitage, 1998; Kiertscher, Luo, Dubinett, & Roth, 2000). Scientists are discovering methods to optimize the immunogenic potential of DCs with growth factors such as granulocyte macrophage–colony-stimulating factors (GM-CSFs) (e.g., sargramostim [Leukine®, Berlex Laboratories, Inc., Richmond, CA]) and other cytokines to aid the natural ability of the immune system in identifying foreign antigens including cancer. Future research on harnessing DCs' immune stimulatory functions for therapeutic purposes may be defined by new DC imaging techniques, such as fluorescent scanning using a multiphoton microscopy and exosomes (i.e., tiny vesicles attached to cells) (Mariani, 2004).

The immunostimulatory properties of DCs have given rise to research in cancer and other diseases, such as Crohn's disease, as well as in wound healing and mucositis. Cytokines alone or in combination with other agents stimulate DC function, offering a treatment option for cancer (e.g., cancer vaccines). A review of the literature reveals that, although no formal quality-of-life studies have been performed in DC therapy, the seminal goals to identify more

Once believed to be part of the nervous system, dendritic cells (DCs) now are known to be potent antigen-presenting cells of the immune system. Upon capturing a foreign antigen, the immature DC matures as it travels to the T cells to activate an immune response. DCs can be categorized into two main subsets: DC1s and DC2s. DC1s, also called myeloid-related DCs, arise from early-precursor cells or monocytes and play a role in initiating immune responses against antigens such as cancer cells. Various cytokines stimulate the growth and differentiation of DCs, such as granulocyte macrophage–colony-stimulating factor. DC research is evolving rapidly as a clinical therapy; therefore, nurses should appreciate the cell's mechanisms of action.

effective and less toxic therapies clearly are established (O'Day et al., 2002; Pinedo et al., 2003; Rini, Weinberg, Bok, & Small, 2003; Spitler, 2002; Waller & Ernstoff, 2003). The purpose of this article, as well as its accompanying glossary (see p. 463), is to review DCs and enhance oncology nurses' understanding of emerging treatments.

## Dendritic Cells

DCs are an integral part of the lymphohematopoietic system and are unique APCs that can capture antigens and mediate a T-cell response (Kinzler & Brown, 2001; Steinman & Cohn, 1973). DCs are believed to play a significant role in surveillance as well as in activation of naive T cells during primary immune responses. Key DCs act as sentinels or gatekeepers in lymphoid and nonlymphoid tissue (e.g., the skin), where they are poised to identify toxins, capture

and present antigens, and traffic antigens to draining lymphoid organs. There, they will be destroyed by selected antigen-specific lymphocytes. DCs are a system of cells that have diverse properties depending on their phenotype (i.e., genetic lineage and environmental characteristics) and function as they migrate and mature throughout the immune system (Cella, Sallusto, & Lanzavecchia, 1997).

## History

In 1868, Paul Langerhans first noted DCs in the skin epidermis; as a result, these cells were named Langerhans cells.

In 1972, a population of dendrite-shaped cells residing in a mouse spleen were discovered and called DCs because their shape, with extended tendrils (i.e., dendrites), was similar to neuron brain cells (Steinman &

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