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Perspective

A note on granulocyte cell and its variants

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DESCRIPTION

The granulocyte cells of the innate immune system are characterized by the presence of certain granules in their cytoplasm. They are also called polymorphonuclear leukocyte (PMN, PML, or PMNL) because of the variation in the structure of the nucleus, which usually folds into three parts. This separates them from mononuclear agranulocytes. The term polymorphonuclear leukocyte usually refers directly to "neutrophil granulocytes", the most abundant granulocytes; some species (eosinophils, basophils, and mast cells) have fewer lobe. Granulocytes are produced by granulopoiesis in the bone marrow.

Types

Neutrophils: Neutrophils are commonly found in the blood and are the most common type of phagocytes, comprising 60% to 65% of the total circulating white blood cells, and consisting of two smaller components: neutrophil-killer and neutrophil-cagers. One liter of human blood contains about 5 billion neutrophils ($5x10^9$), about 12–15 micrometres. Neutrophils do not return to the blood; they turn into red cells and die. Mature neutrophils are smaller than monocytes, and have separate nucleus with several phases (two to five parts); each component is connected by chromatin fibers. Neutrophils do not normally leave the bone marrow to maturity, but during infection neutrophil precursors called myelocytes and promyelocytes are released.

Neutrophils have three mechanisms of direct attack of micro-organisms: Phagocytosis (invasion), release of soluble anti-microbials (including granule proteins), and the production of neutrophil extracellular traps (NETs). Professional phagocytes neutrophils. They are vicious predators and eat the invaders immediately covered by the immune system and complete them, as well as damaged cells or cellular debris. Intracellular granules of human neutrophils have long been recognized because of their protein-destroying and bactericidal properties. Neutrophils can produce products that stimulate monocytes and macrophages; these secretions increase phagocytosis and the formation of active oxygen involved in intracellular killing.

Eosinophils: Eosinophils also have kidney-shaped nuclei (two to four lobes). The number of granules in eosinophil can vary because it has a tendency to decompose while in the bloodstream. Eosinophils play an important role in killing parasites (e.g. enteric nematodes) because their granules contain unique toxic proteins and cationic protein receptors binding to IgE are used to aid in this activity. These cells also have limited ability to participate in phagocytosis, which are antigen-presenting cells, which regulate other cellular functions (e.g. CD4 + T cell, dendritic cell, B cell, mast cell, neutrophil, and basophil functions). They are involved in the destruction of tumor cells, and they promote the repair of damaged tissue. A polypeptide called interleukin-5 interacts with eosinophils and causes them to grow and differentiate; this polypeptide is produced by basophils and T-helper 2 cells.

Basophils: Basophils are one of the smallest cells in the bone marrow and blood (which make up less than 2 percent of all cells). Like neutrophils and eosinophils, they have lobed nuclei; however, they have only two lobes, and the chromatin strands they connect are less visible. Basophils contain receptors that can bind the complement, as well as histamine. The cytoplasm of basophils contains a wide range of granules. These granules are usually large enough to hide the nucleus slightly. The granule content in basophils is high with histamine, heparin, chondroitin sulfate, peroxidase, platelet-activating factor, and others.

Mast cells: Mast cells are a type of granulocyte that is present in muscles. They mediate immunity to pathogens (e.g. parasites) and allergies, especially anaphylaxis Mast cells also play a role in mediating inflammation and immunity as well as mediating and controlling the neuroimmune system responses.

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