

# Difference Between Promyelocyte and Myelocyte

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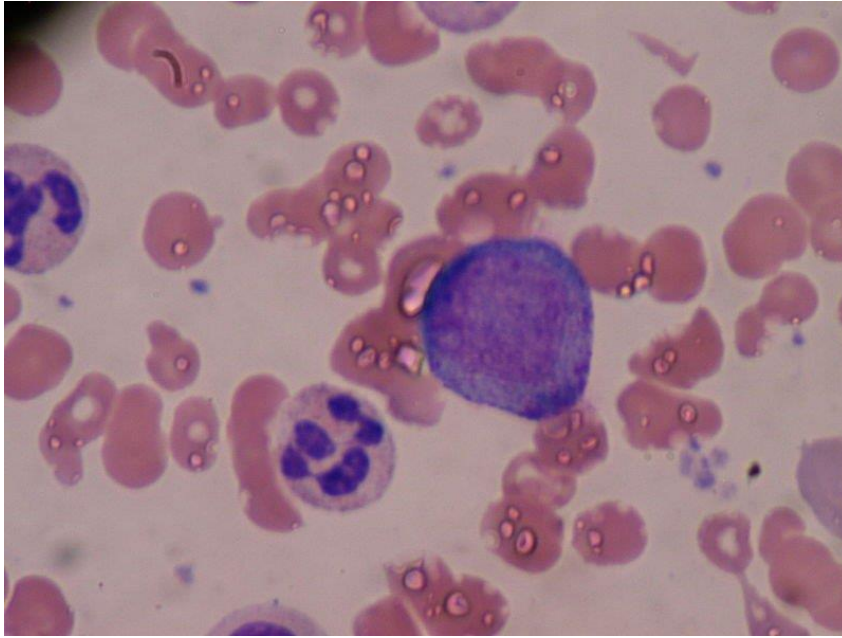
## Key Difference - Promyelocyte vs Myelocyte

Granulated blood cells include [eosinophils](#), [basophils](#), and [neutrophils](#) which participate in a variety of functions in the body. The precursor [stem cells](#) of these cells which arise from the [hematopoietic](#) stem cells are of the [myeloid](#) lineage. Myeloblasts are the precursor cells of granulated blood cells. Myeloblasts then mature into promyelocytes, myelocytes, metamyelocytes, bands, and segments to finally give rise to granulocytes in the peripheral blood tissue. The development process is known as Granulopoiesis. Promyelocyte is the second stage of Myeloblast development. Myelocyte is the third stage of Myeloblast development. The **key difference** between the promyelocyte and the myelocyte is the level of differentiation it exhibits. **Promyelocytes do not show differentiation while myelocytes show differentiation.**

## What is a Promyelocyte?

Promyelocyte is the second stage of the Myeloblast development process. The promyelocyte is larger than the myeloblast. It has a diameter of 12-25µm and is the largest cell type in the myeloid series. It has a prominent [nucleus](#), and the nucleus is placed slightly indented in the [cytoplasm](#). Chromatin and nucleoli are prominent in this. Final structures of [chromatin](#) can be identified through microscopic observations. Towards the complete maturation of the promyelocyte, the chromatins appear as well-condensed structures. The condensed chromatin is placed along the nuclear membrane.

The cytoplasm of the promyelocyte is granulated, and these granules are termed as the primary azurophilic granules. Since the promyelocyte is not differentiated, it is formed of a basophilic cytoplasm. The cell organelle organization is prominent in the promyelocyte stage of the blood cells. The [endoplasmic reticulum \(ER\)](#) appears as dilated vesicles while the [Golgi apparatus](#) is situated in the perinuclear region. Thus the promyelocyte is an active cell which is capable of [cell division](#). Electron microscopic observations allow slight differentiation of the cells.



**Figure 01: Promyelocyte**

Clinical applications of promyelocytes are important in identifying [leukemia](#). Leukemic promyelocytes are of two main types. It can either be hyper-granular containing Auer rods or hypo-granular with a bilobed or a folded nucleus. Depending on the variety, the leukemias are further classified.

## What is a Myelocyte?

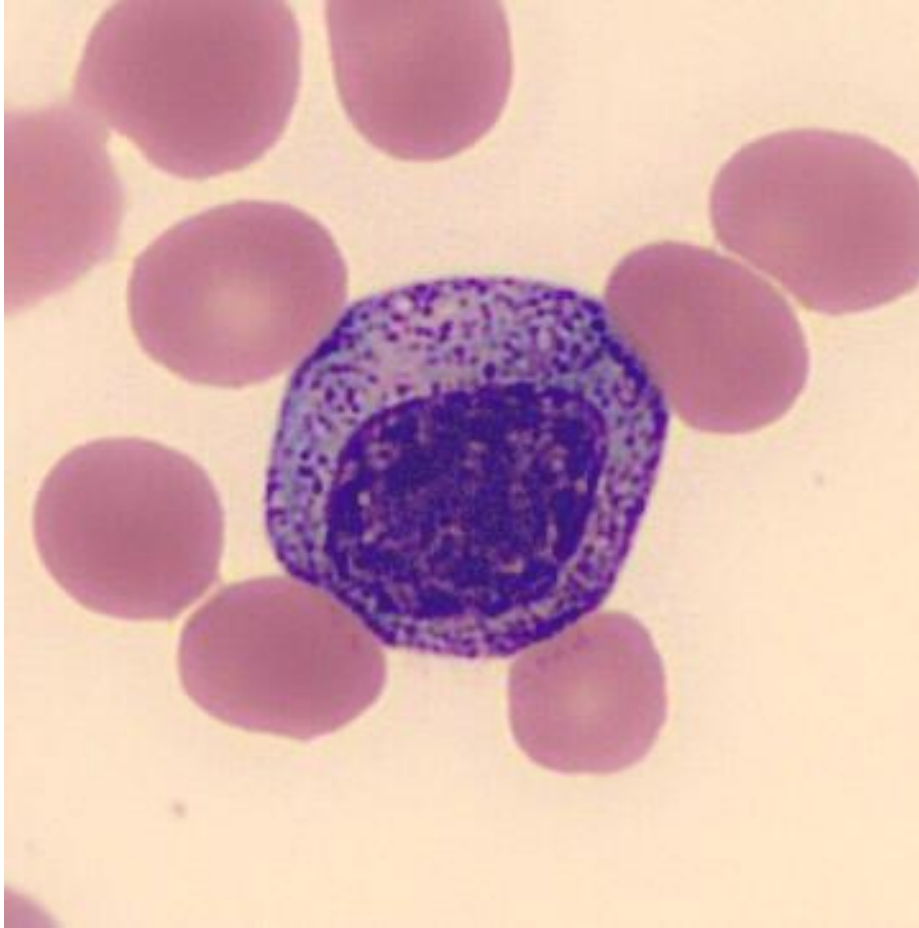
Myelocytes belong to the third stage of granulopoiesis and are widely studied as these are differentiated cells. Myelocytes is of three different types such as, neutrophilic, eosinophilic and basophilic. Upon staining, the granules of the three different types of granulocytes appear in three different colors.

Granules of neutrophils – lilac

Granules of eosinophils – orange-red

Granules of basophils – purple

The structure of the myelocyte is similar to that of the promyelocyte but has a reduced diameter. The cell diameter of the myelocyte is around 10- 20  $\mu\text{m}$ . The myelocyte nucleus is an eccentric nucleus. The nucleus is oval or round in shape, and one end is flattened. Nucleoli and chromatin structures are not very prominent and can only be viewed under the electron microscope. The myelocyte is capable of cell division, and the proliferation of the myeloid lineage cells stop at the stage of the myelocyte.



**Figure 02: Myelocyte**

Granulation in the myelocyte gives rise to both primary and secondary granules. The azurophilic or the primary granules are less in number in comparison with the secondary granules in the mature myelocyte. Granulation can be identified in the endoplasmic reticulum as well, but the number of granules is less than to that of promyelocyte stage.

## **What are the Similarities Between Promyelocyte and Myelocyte?**

- Both are derived from the myeloid lineage.
- The precursor of both cells is the Myeloblast.
- Both cells participate in the process of granulopoiesis and result in the development of granulocytes.
- Both cells are nucleated.
- Both cells are granulated.
- Both cells undergo cell division.
- Both cells have structures such as endoplasmic reticulum and Golgi
- Both cells can be stained to be observed under the light microscope or the electron microscope.

## What is the Difference Between Promyelocyte and Myelocyte?

Promyelocyte vs Myelocyte	
Promyelocyte is the second stage of myeloblast development, and it is the largest cell type of the myeloid lineage.	Myelocyte is the third stage of myeloblast development which can be differentiated into eosinophils, basophils, and neutrophils.
Size	
Promyelocyte cell size ranges from 12 to 25 $\mu\text{m}$ .	Myelocyte cell size ranges from 10 to 20 $\mu\text{m}$ .
Shape of the nucleus	
Nucleus is indented in promyelocyte.	In myelocyte, the nucleus is an eccentric nucleus that is round or oval shaped.
Nucleoli and Chromatin Condensation	
Prominent and seen under the light microscope in promyelocytes.	Not prominent, sparsely identified under the electron microscope in myelocytes.
Number of granules	
A high number of primary granules in the cytoplasm and in endoplasmic reticulum can be seen in promyelocytes.	A low number of primary granules and secondary granules can be seen in myelocytes.

### Summary - Promyelocyte vs Myelocyte

Promyelocytes and myelocytes are cells belonging to the myeloid lineage which give rise to the granulocytes; eosinophils, basophils, and neutrophils. The promyelocytes are undifferentiated, and the myelocytes are differentiated. Both promyelocytes and myelocytes are involved in granulopoiesis. The development of promyelocytes and myelocytes are studied through staining techniques and with the use of microscopic techniques. The study of these cells is important in analyzing different types of leukemia conditions. This can be described as the difference between promyelocyte and the myelocyte.

#### Reference:

1. Deo, Avinash. "Morphology of Myeloid Precursors." All About Blood, 26 May 2016. [Available here](#)

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