**CONCEPT:** CELLS OF THE INNATE IMMUNE SYSTEM: GRANULOCYTES

●**Granulocytes:** white blood cells with visible cytoplasmic _____.

□ **Granules:** contain compounds used for protective functions & are visible under a light microscope.

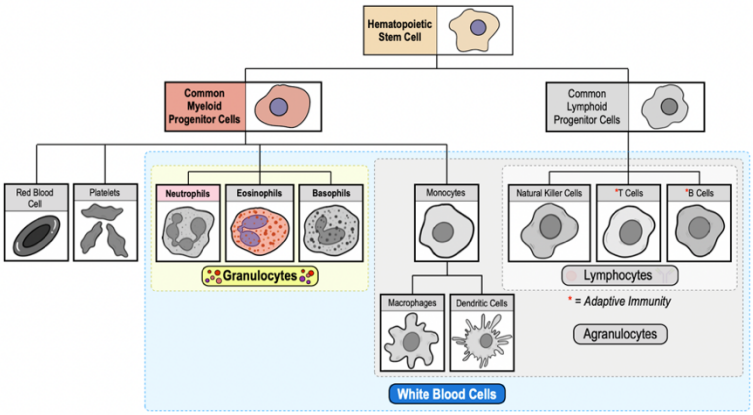
●There are _____ types of granulocytes named based on the staining properties of their granules:

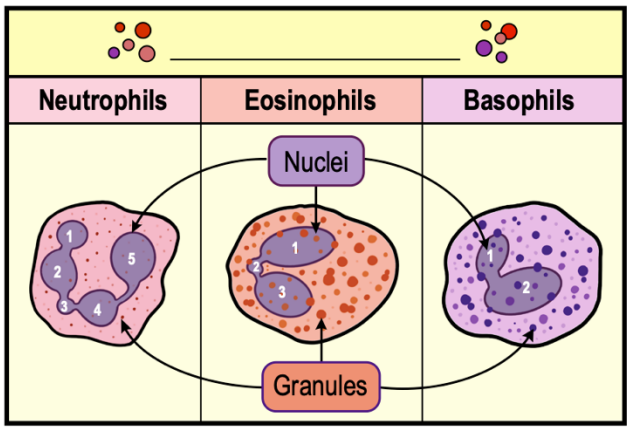
1) **Neutrophils:** have a nucleus with 5 lobes & small granules which do _____ stain well.

□ Also known as: **P**oly**M**orphonuclear **N**eutrophils (_____s).

2) **Eosinophils:** have 2-3 lobes in the nucleus & large granules that stain a _____/orange color.

3) **Basophils:** have a two-lobed nucleus & large granules that stain a dark _____/purple color.




**Neutrophils**

●**Neutrophils** are the most _____ type of leukocyte in the blood (can make up to 70% of all leukocytes).

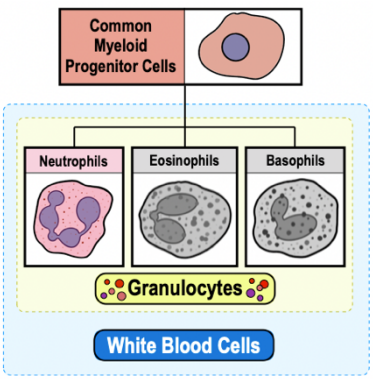
□ Migrate to different locations via _____stream & are often *first* to respond to infection or tissue damage.

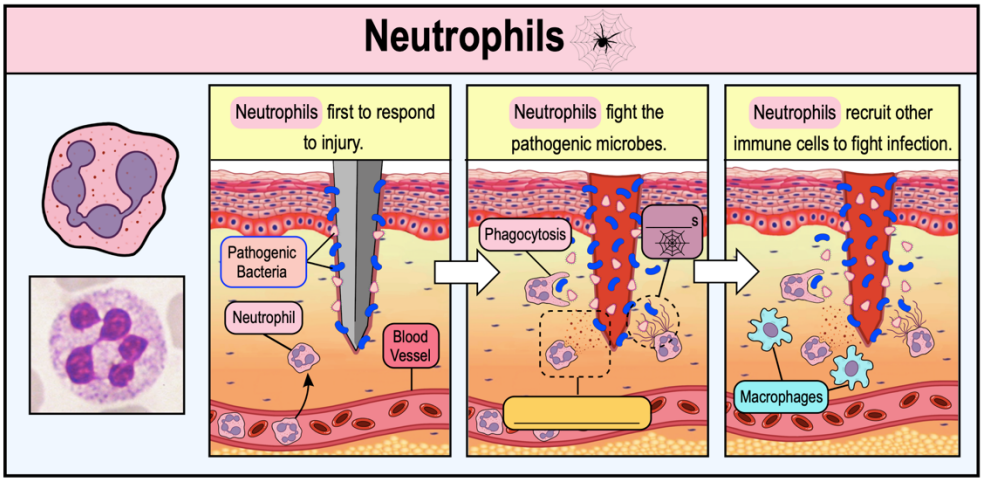
□ Granules contain variety of defensins & hydrolytic enzymes that _____ microbes.

□ Granules can be _____ from the cell (**degranulation**) or used to destroy microbes during *phagocytosis*.

□ **Phagocytosis:** process of _____ & digesting material including invading microbes (cell "eating").

□ Can also release neutrophil extracellular traps (NETs) or webs of chromatin that _____ infecting microbes.



**CONCEPT:** CELLS OF THE INNATE IMMUNE SYSTEM: GRANULOCYTES

**PRACTICE:** Which granulocyte is the first to respond to an infection, has hydrolytic enzymes in its granules, and possesses the ability of phagocytosis?

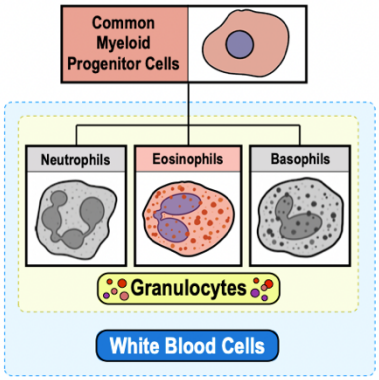
a) Basophil.
b) Eosinophil.
c) Neutrophil.
d) Macrophage.

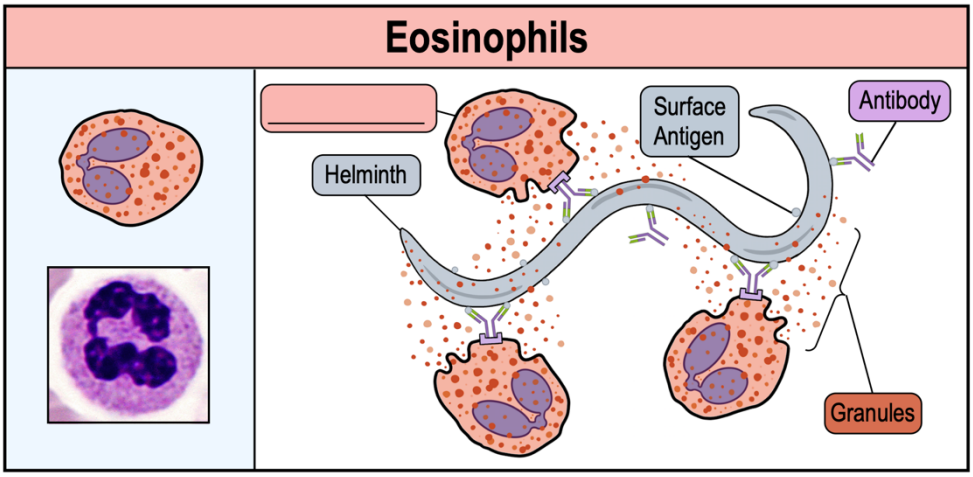
## Eosinophils

●Primary role of **Eosinophils** is to protect against parasitic _____ (helminths).

□ Granules have antimicrobial substances that bind parasites & enzymes that disrupt membrane permeability.

□ Can also cause some symptoms associated with _____.




## Basophils

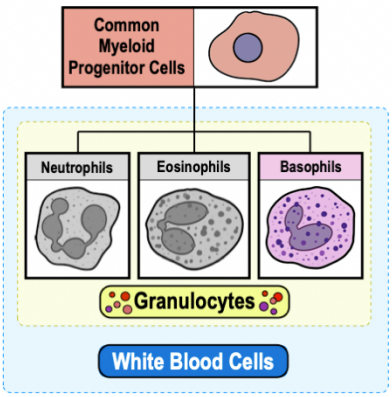
●**Basophils:** are also involved in allergic reactions & inflammation response during infection.

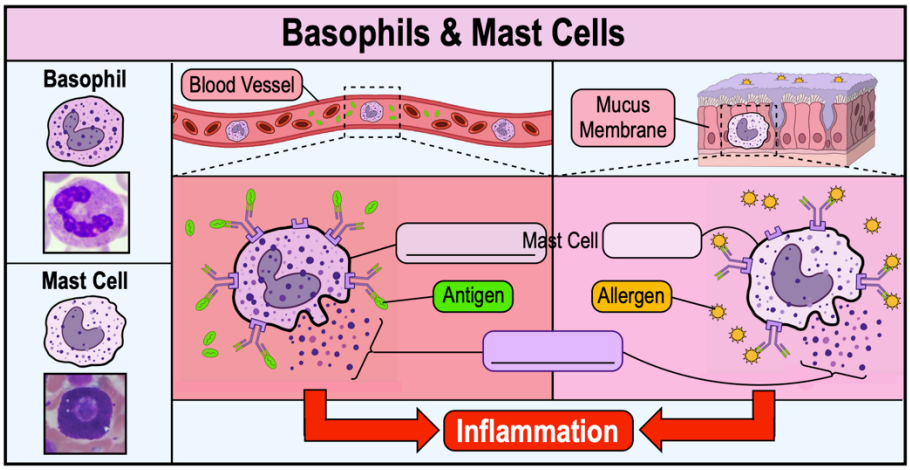
□ Produce _____ that are released during inflammation to increase *capillary permeability*.

□ Allows other defense cells to easily _____ the bloodstream & enter an infected area of the host.

□ _____ **Cells:** similar in function to basophils but are found *inside tissues* rather than circulating the blood.

□ Detects tissue damage, *degranulates* to release *histamine*, which induces *inflammation*.



**CONCEPT:** CELLS OF THE INNATE IMMUNE SYSTEM: GRANULOCYTES

**PRACTICE:** Which of the following is a phagocytic cell found in the human body?

a) Eosinophil.
b) Neutrophil.
c) Basophil.
d) T cell.

**PRACTICE:** Which of the following answers are characteristics or roles of granulocytes?

a) Release of hydrolytic enzymes that damage bacterial cell membranes.
b) Production and release of histamines which increases capillary permeability.
c) Release antimicrobial substances that damage the membranes of parasites.
d) Phagocytose invading microorganisms.
e) All of the above.

**PRACTICE:** White blood cells are referred to as _____.

a) Platelets.
b) Erythrocytes.
c) Leukocytes.
d) Megakaryocytes.

**PRACTICE:** Two immune cells have very similar functions. Both immune cells release histamine and induce inflammation. However, _____ cells reside in specific tissues, while _____ cells travel through the blood stream.

a) Mast cells; Basophil cells.
b) Basophil cells; Neutrophil cells.
c) Granulocyte cells; Basophil cells.
d) Eosinophil cells; Dendritic cells.

**CONCEPT:** CELLS OF THE INNATE IMMUNE SYSTEM: GRANULOCYTES

**PRACTICE:** In type I allergic reactions, antibodies are produced and bind to:

a) Mast cells.
b) Neutrophils.
c) Eosinophils.
d) Monocytes.

**PRACTICE:** Granulocytes:

a) Travel through the lymphatic system.
b) Are the most numerous leukocyte in circulation.
c) Develop in the thymus.
d) Do not contain distinct granules in their cytoplasm.