

Cells and Tissues (Abbas Chapter 2)

Phagocytes, including neutrophils and macrophages, are cells whose primary function is to identify, ingest, and destroy microbes

Neutrophils, also called polymorphonuclear leukocytes, are the most abundant population of circulating white blood cells and mediate the earliest phases of inflammatory reactions

Mast cells are bone marrow–derived cells that are present in the skin and mucosal epithelium and contain abundant cytoplasmic granules filled with cytokines histamine, and other mediators.

Basophils are blood granulocytes with many structural and functional similarities to mast cells.

Eosinophils are blood granulocytes that express cytoplasmic granules containing enzymes that are harmful to the cell walls of parasites but can also damage host tissues

Cells and Tissues (Abbas Chapter 2)

Mononuclear Phagocytes, Monocytes – Macrophages

- A major function of macrophages in host defense is to ingest and kill microbes
- In addition to ingesting microbes, macrophages also ingest dead host cells as part of the cleaning up process after infection or sterile tissue injury
- Activated macrophages secrete proteins, called cytokines, that bind to signaling receptors on other cells and thereby instruct those cells to respond in ways that contribute to host defense
- Macrophages serve as APCs that display antigens to and activate T lymphocytes
- Another important function of macrophages is to promote repair of damaged tissues by stimulating new blood vessel growth (angiogenesis) and synthesis of collagen-rich extracellular matrix (fibrosis).

Cells and Tissues (Abbas Chapter 2)

Antigen-presenting cells (APCs) are cell populations that are specialized to capture microbial and other antigens, display them to lymphocytes, and provide signals that stimulate the proliferation and differentiation of the lymphocytes

Dendritic cells are the most important APCs for activating naive T cells, and they play major roles in innate responses to infections and in linking innate and adaptive immune responses

Lymphocytes, the unique cells of adaptive immunity, are the only cells in the body that express clonally distributed antigen receptors, each with a fine specificity for a different antigenic determinant

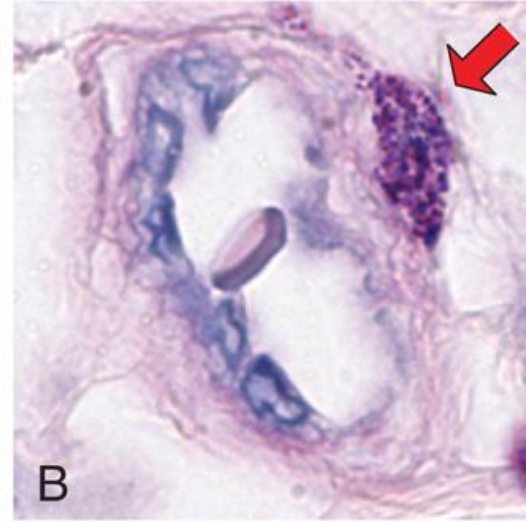
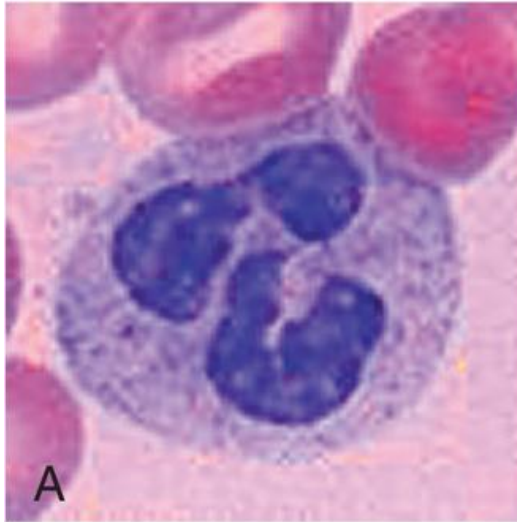
T- and B-cells, Natural Killer Cells

Cells and Tissues (Abbas Chapter 2)

Neutrophils

polymorphonuclear
leukocytes

lysozyme
collagenase
elastase
defensins



Mast cells

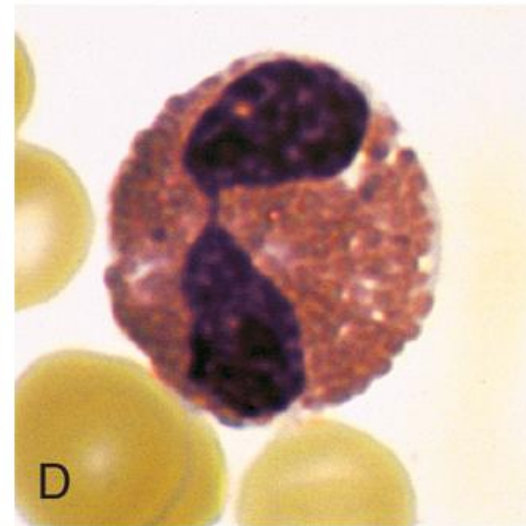
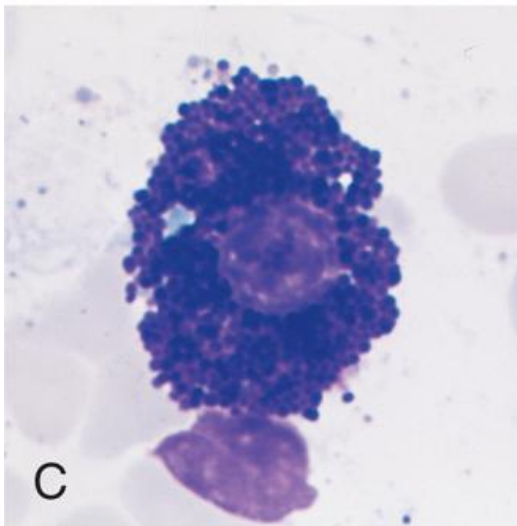
IgE-receptor+

histamine
leukotriens
cytokines

Basophils

similar to mast cells
IgE receptor+

low numbers in
tissue



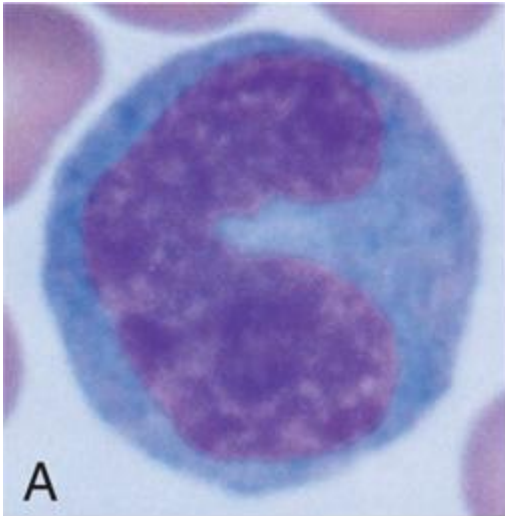
Eosinophils

attack parasites
are promoted by IL-5

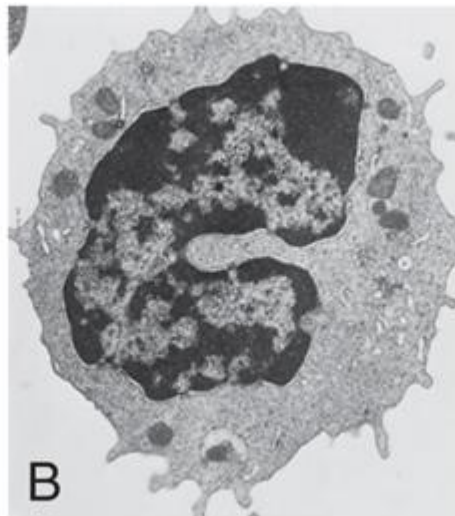
play a role in
lung inflammation

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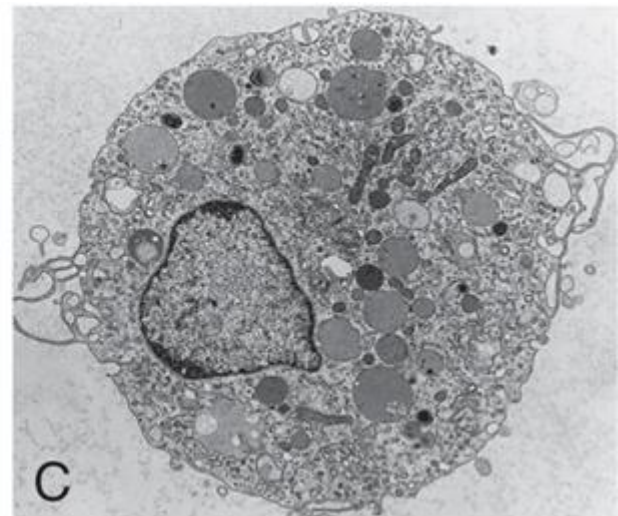
Monocyte (LM)
in peripheral blood smear



Monocyte (ELMI)
in peripheral blood

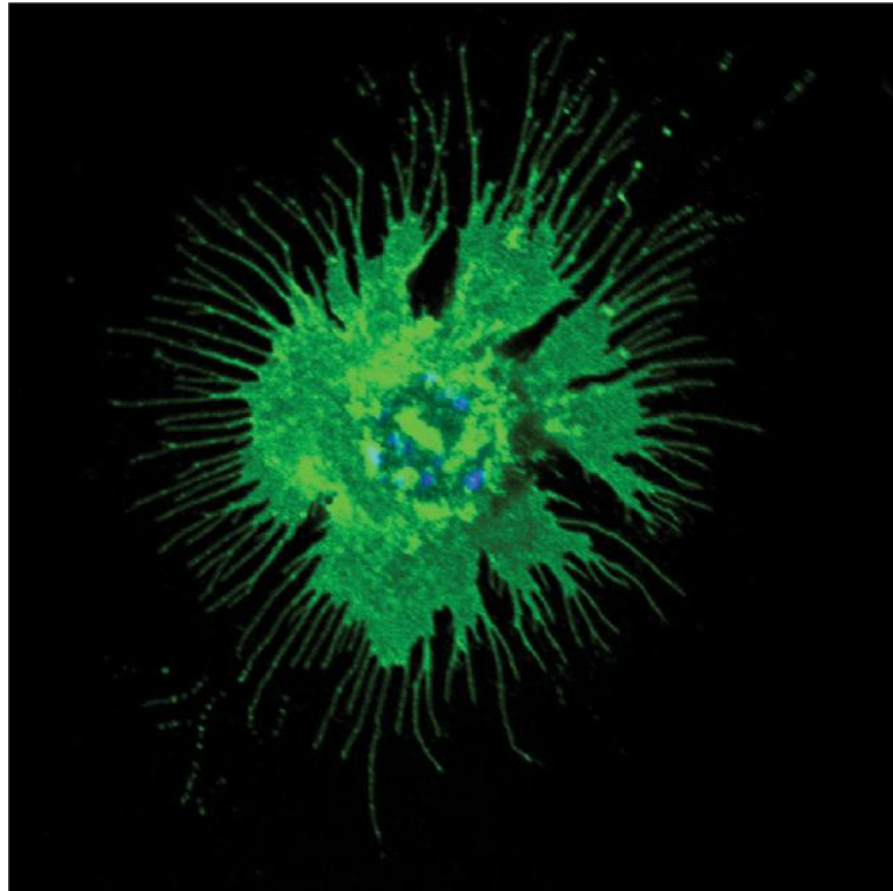


Activated macrophage
in tissue – numerous vacuoles/organelles



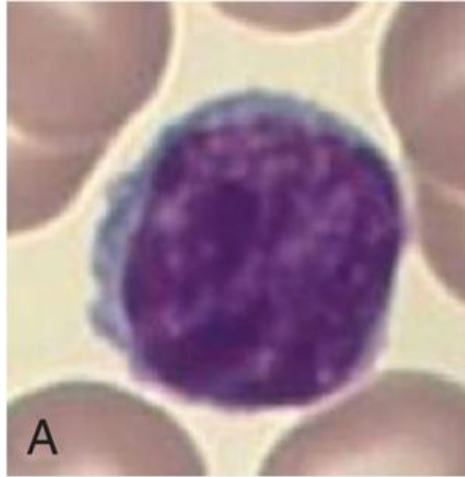
Cells and Tissues (Abbas Chapter 2)

Dendritic cell (fluorescence micrograph)
bone marrow-derived, MHCII=green, nucleus=blue

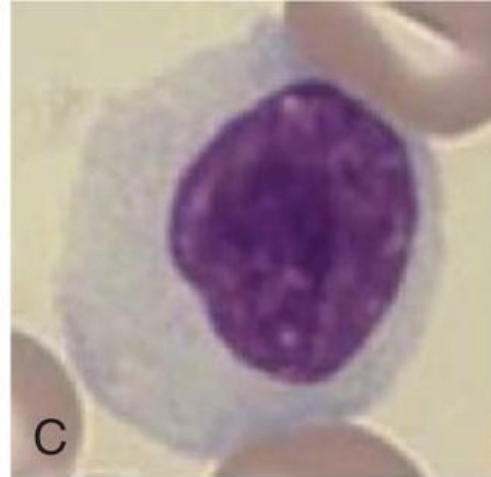


Cells and Tissues (Abbas Chapter 2)

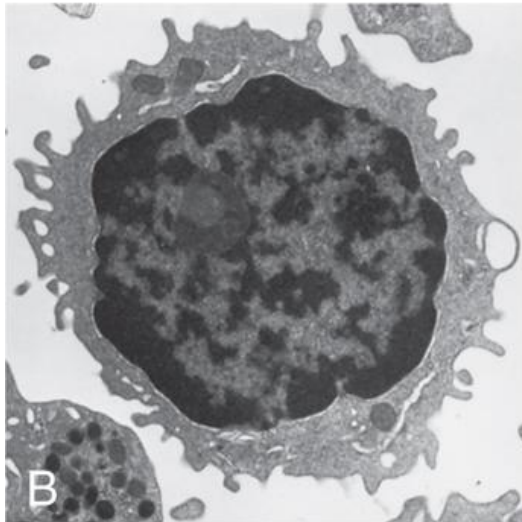
Lymphocyte
(LM) in blood smear



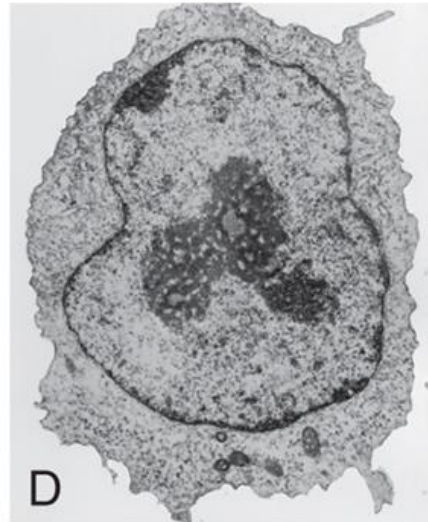
Lymphoblast
(LM) in culture



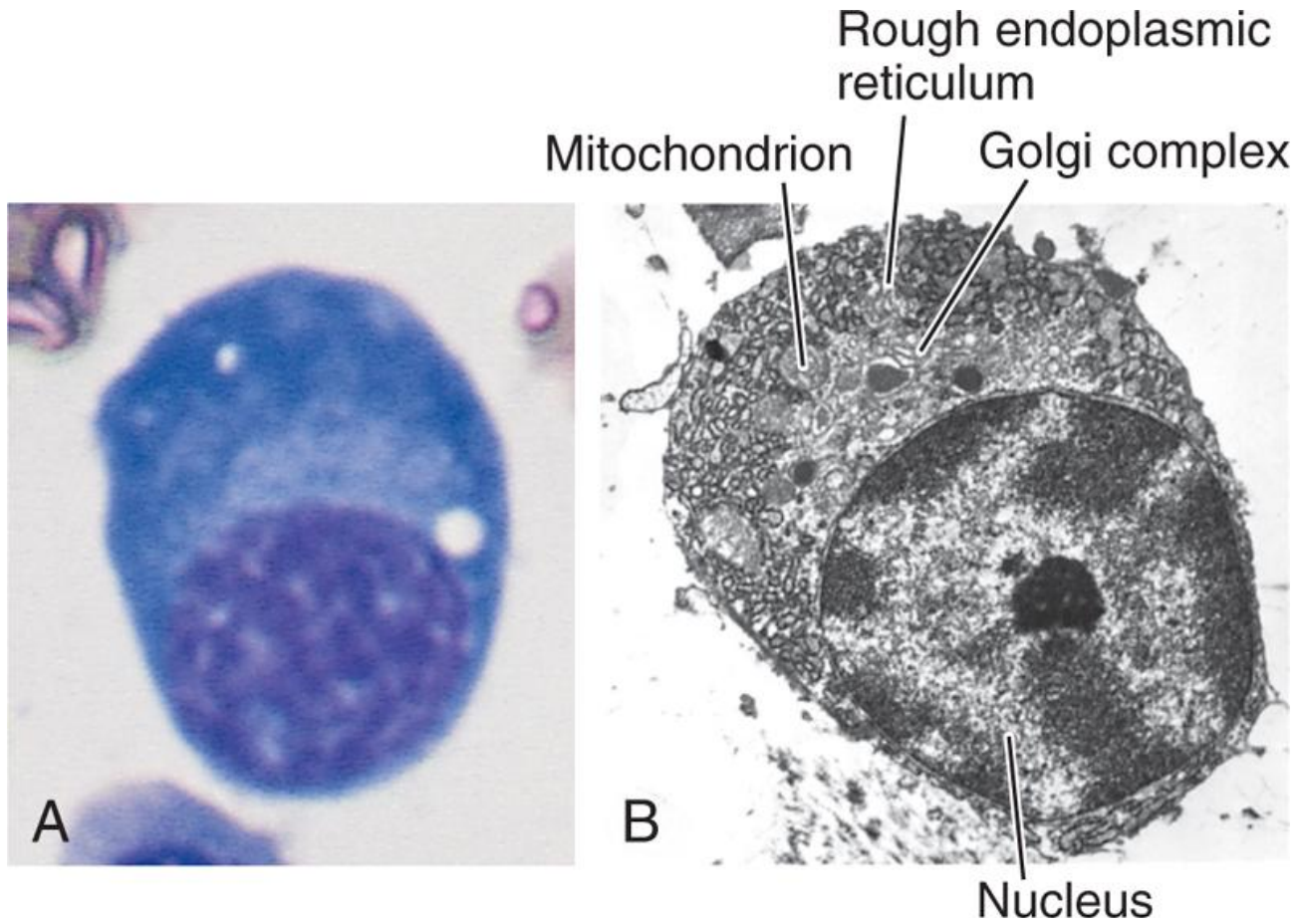
Lymphocyte
(ELMI) in blood



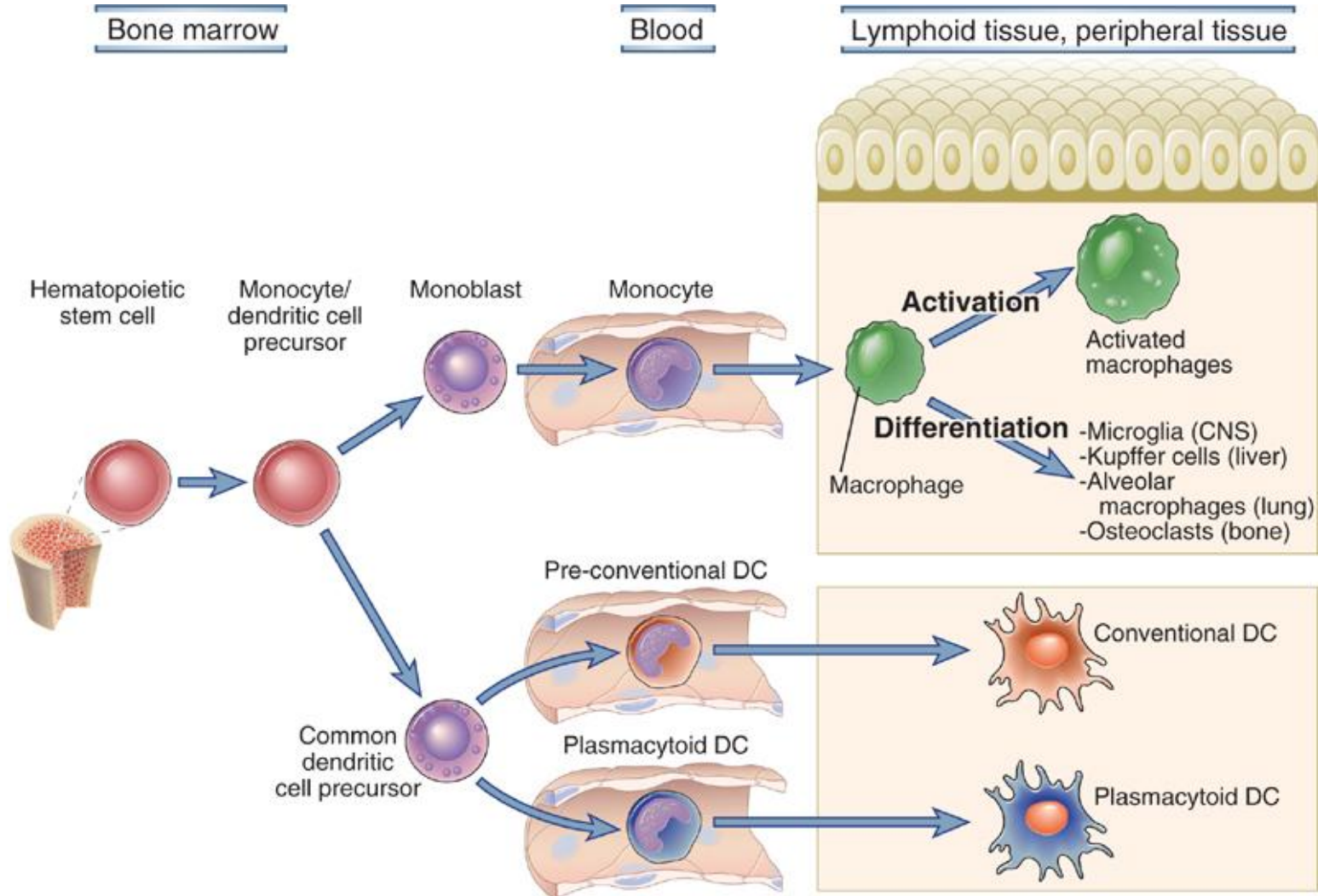
Lymphoblast
(ELMI)



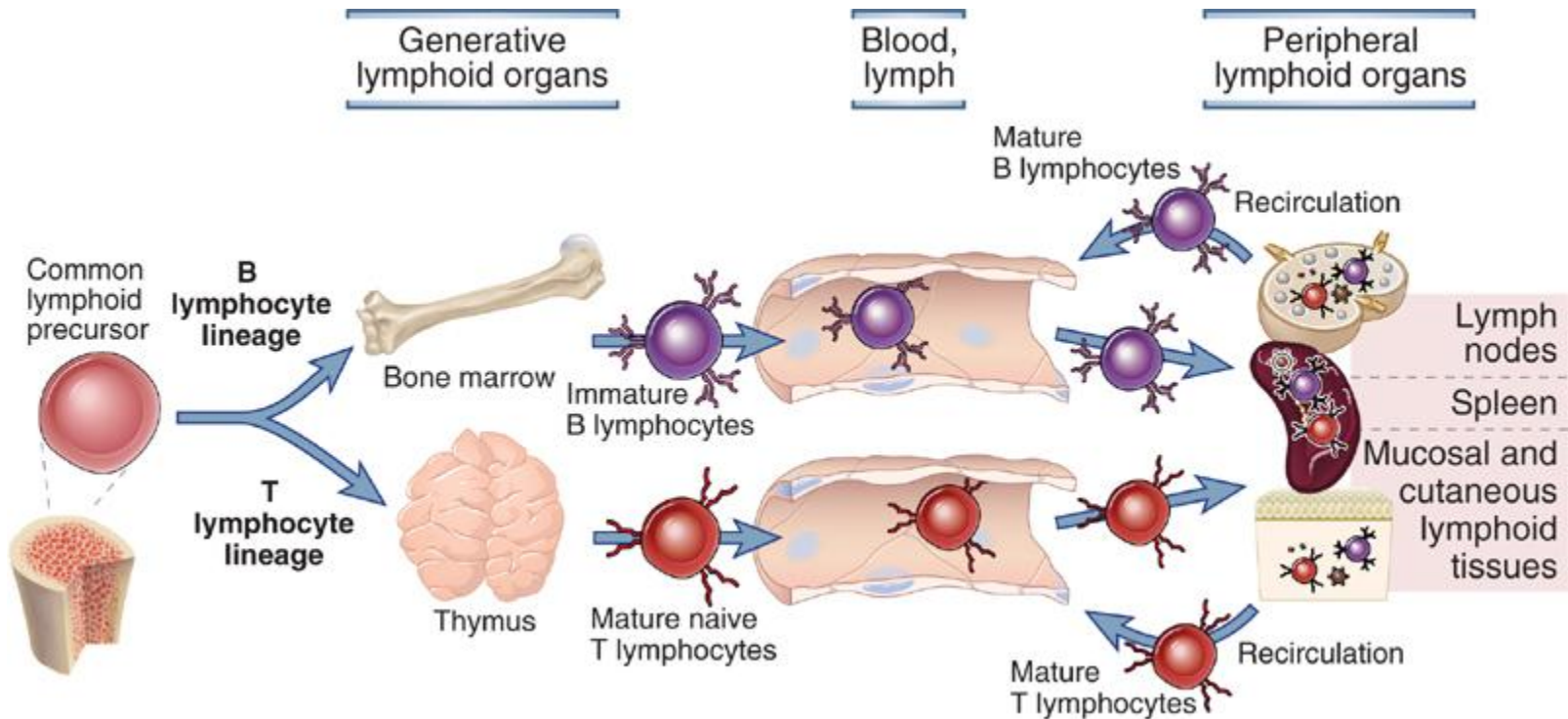
Morphology of plasma cells (Abbas Chapter 2)



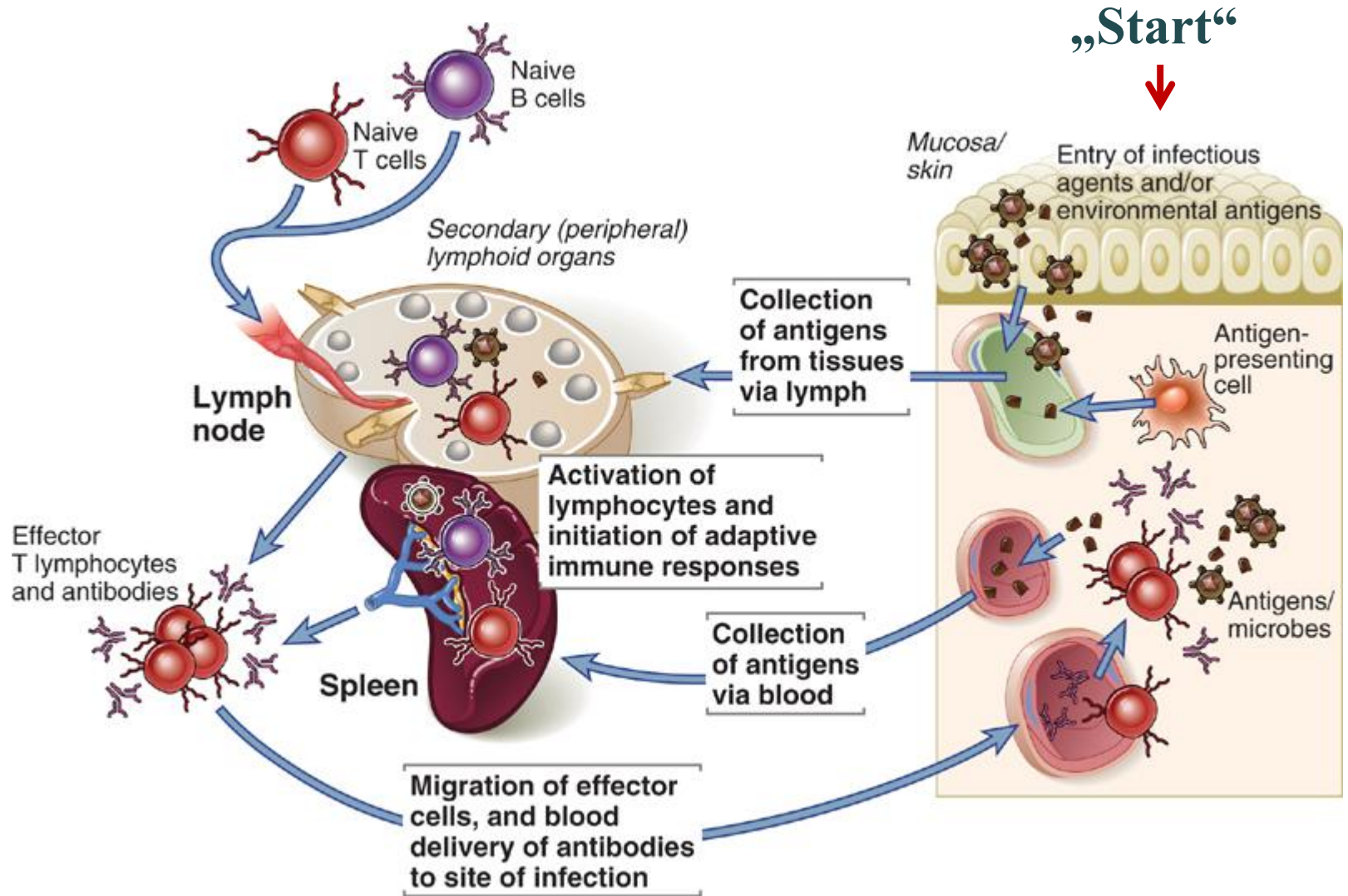
Maturation of APCs (Abbas Chapter 2)



Maturation of lymphocytes (Abbas Chapter 2)



Anatomy of lymphocyte activation (Abbas Chapter 2)



Hematopoiesis (Abbas Chapter 2)

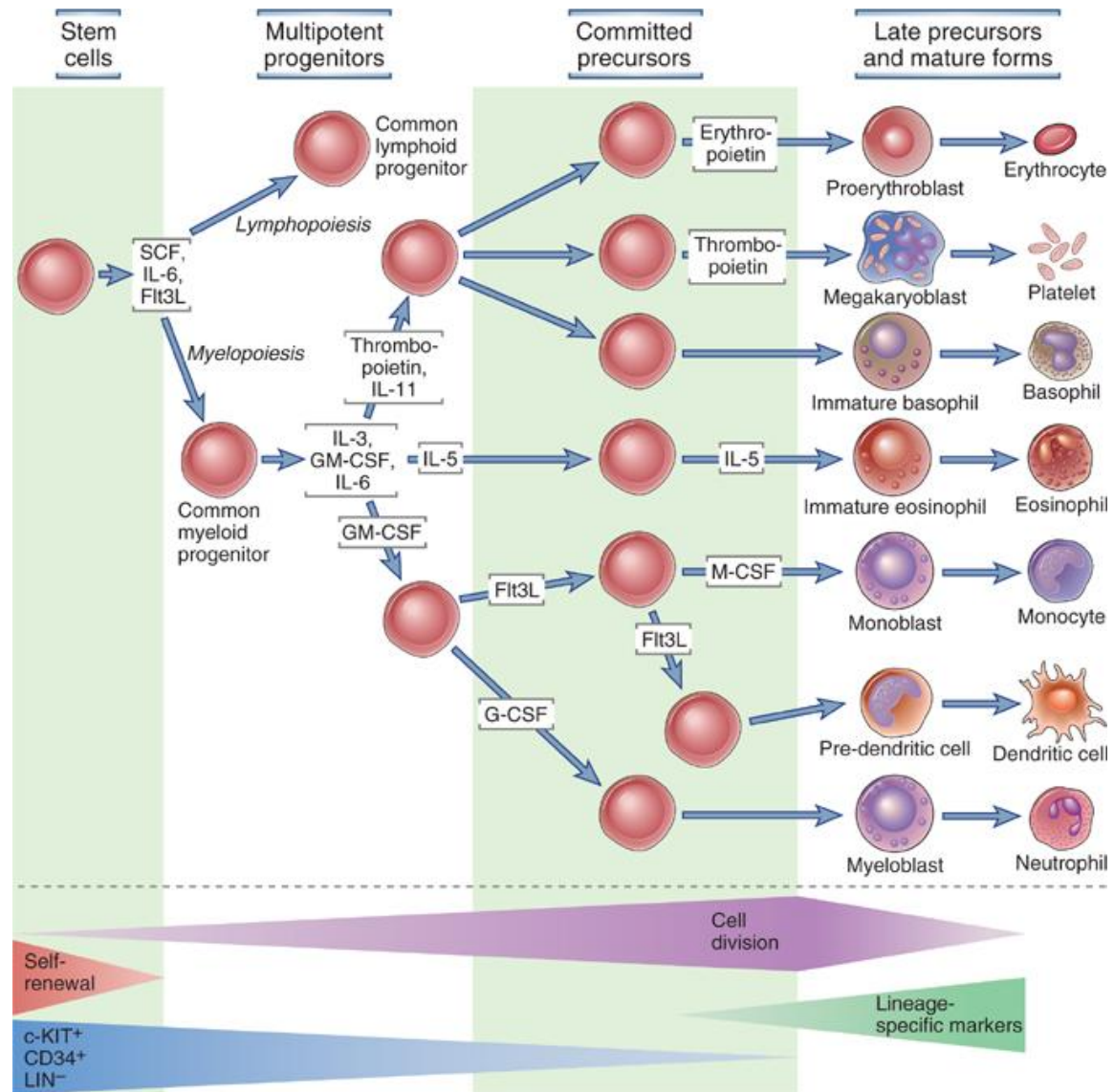
Fetal:

in blood islands of the yolk sac and in para-aortic mesenchyme

in the liver (3-4 month gestation) then in bone marrow

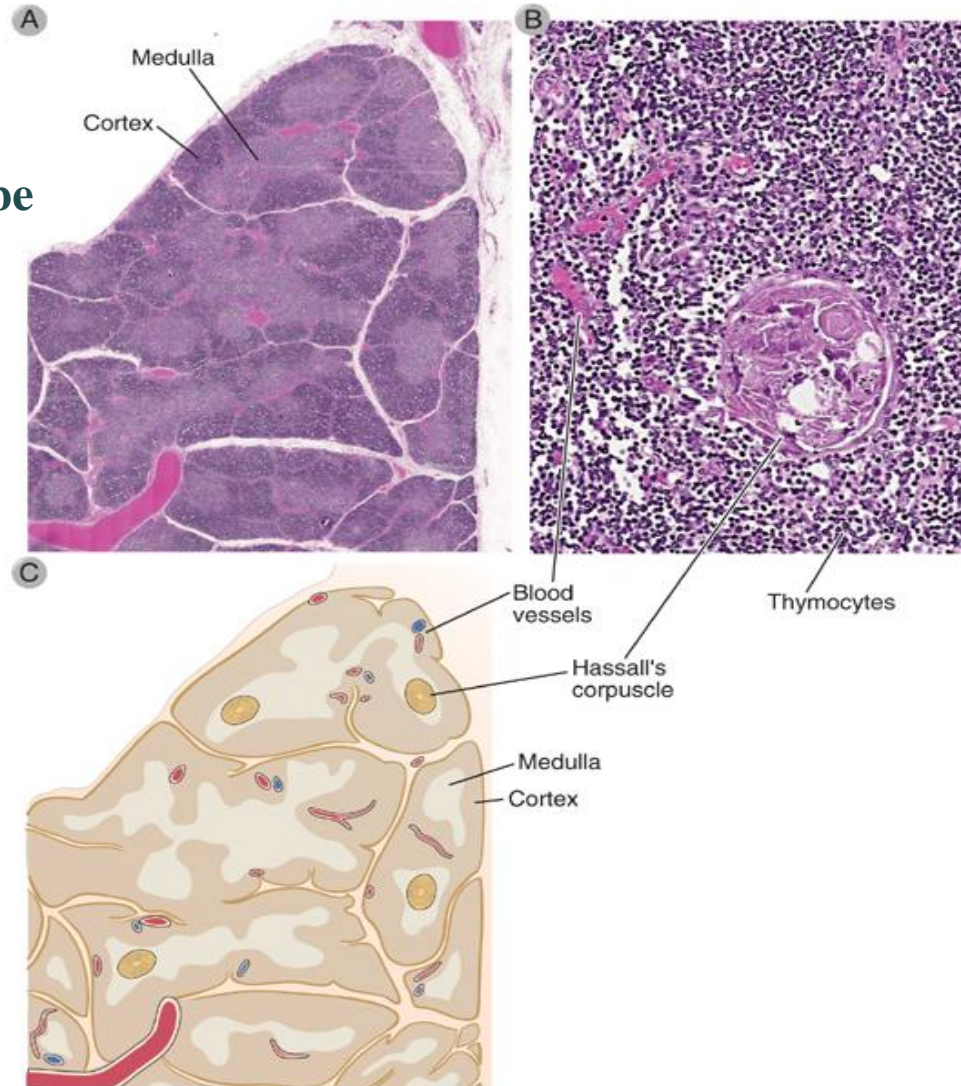
Adult:

in flat bones (sternum, vertebrae, ribs, iliac)



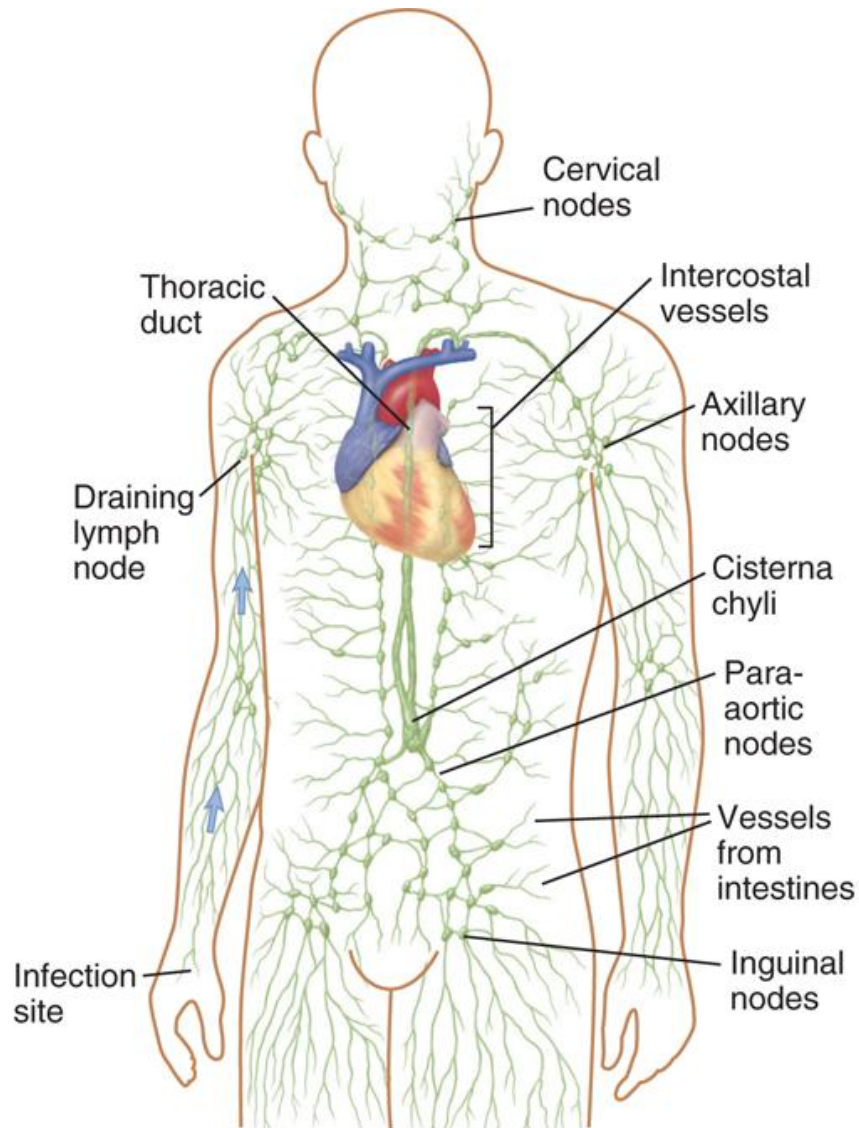
Morphology of the thymus (Abbas Chapter 2)

LM of a thymic lobe

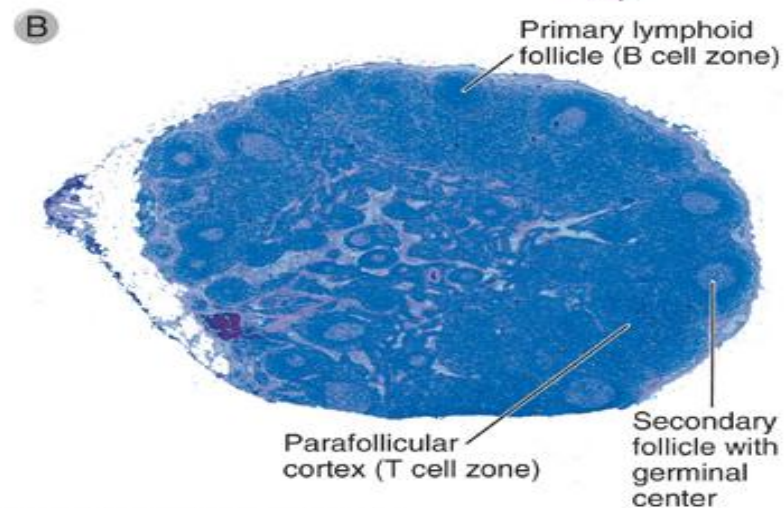
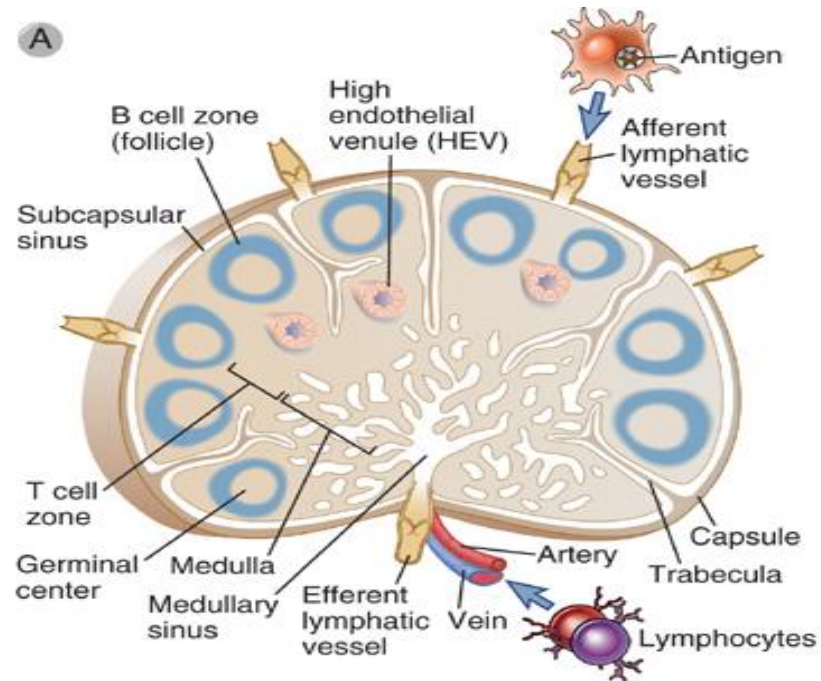


Medulla

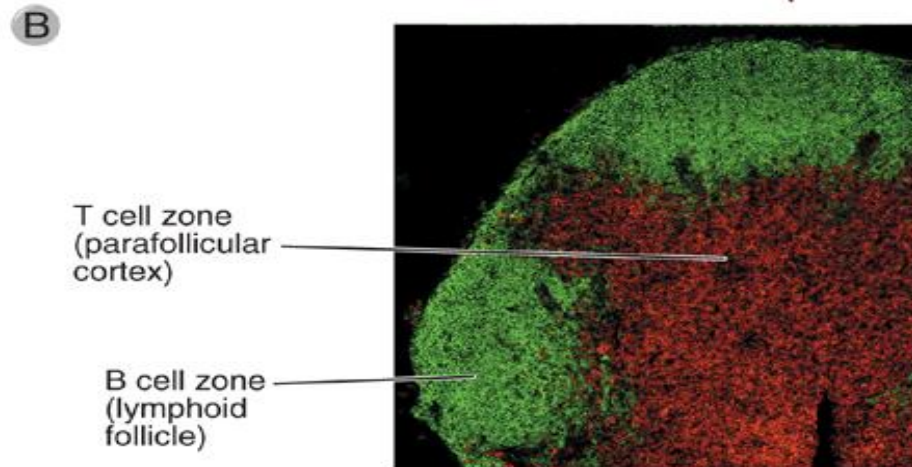
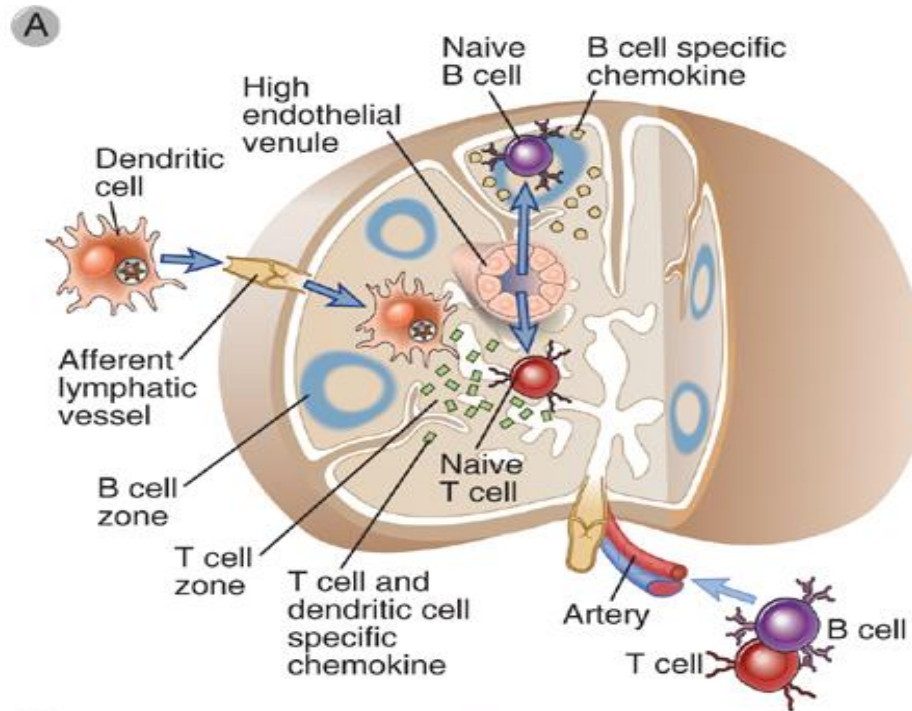
The lymphoid system (Abbas Chapter 2)



Morphology of a lymph node (Abbas Chapter 2)



Segregation of T and B cells (Abbas Chapter 2)



Morphology of the spleen (Abbas Chapter 2)

