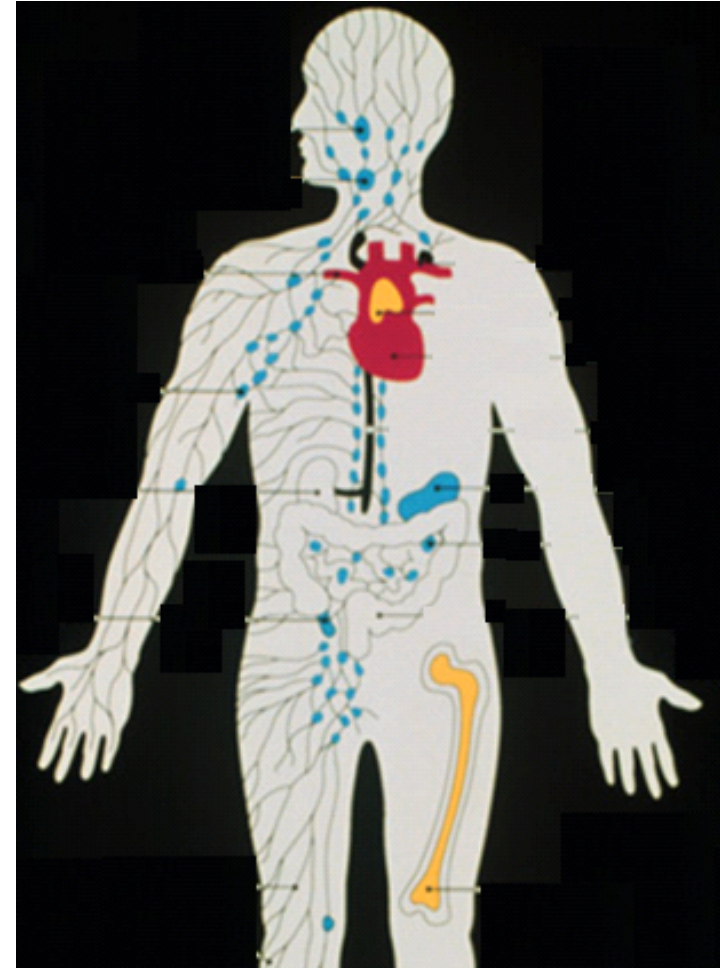
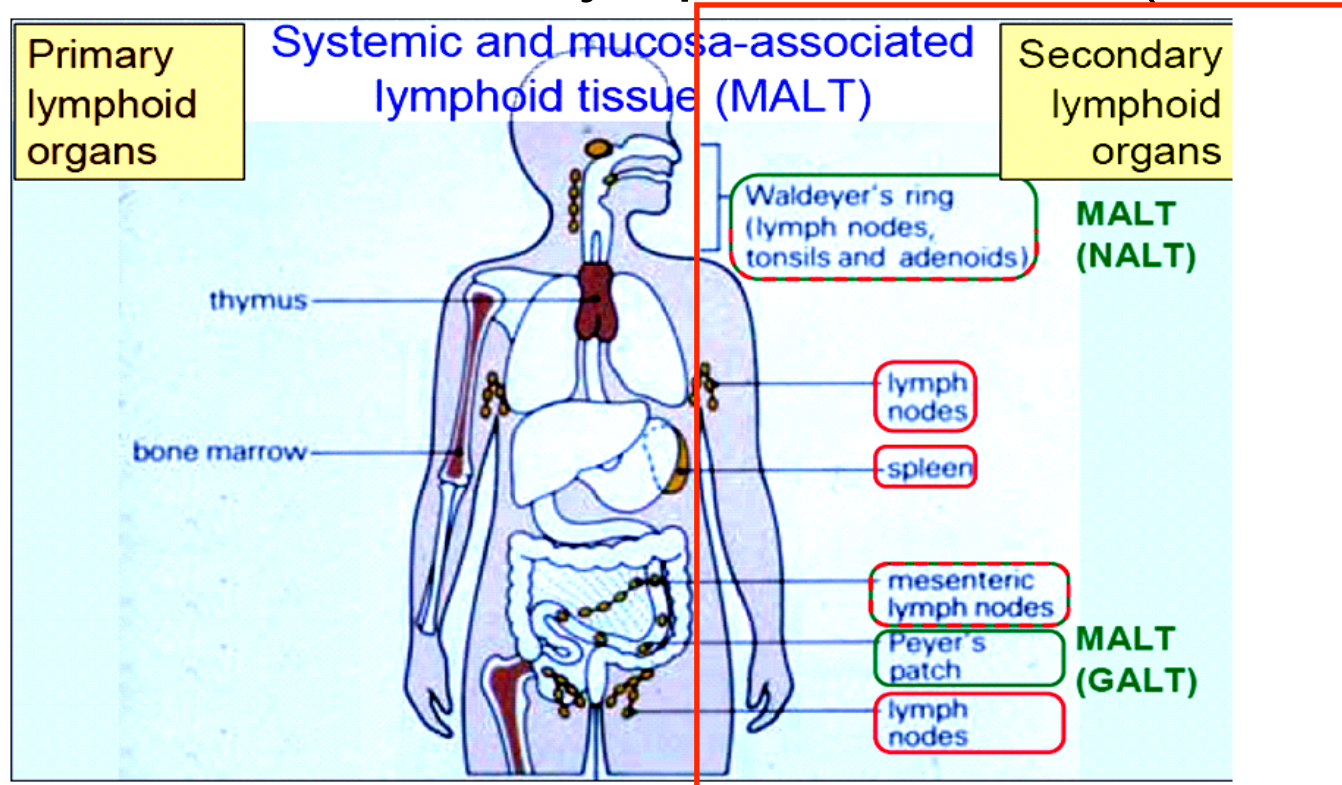


Lymphoid Tissues



Peripheral or Secondary Lymphoid Tissues

- Lymph nodes
- Spleen
- Mucosal associated-lymphoid tissues (MALT)



Secondary Lymphoid Tissues

- Trap antigen-bearing dendritic cells.
- Initiation of adaptive immune response.
- T cell and B cell activation.

Lymph Nodes

- Encapsulated bean-shaped structures,
- Full of lymphocytes, macrophages, and dendritic cells.
- Sites of Immune responses
- Morphologically divided into:
 - Cortex
 - Paracortex
 - medulla

Lymph Node Structure

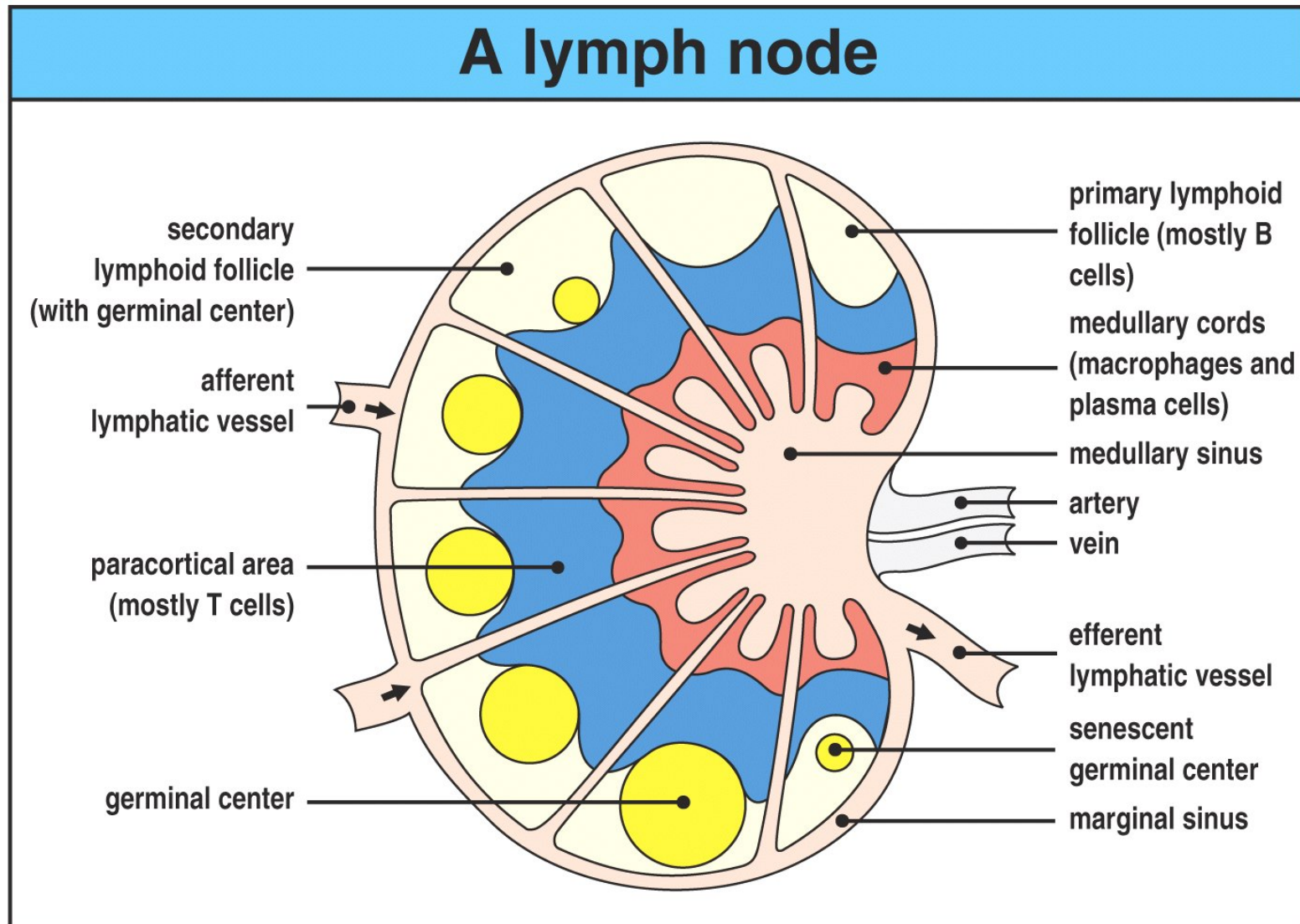
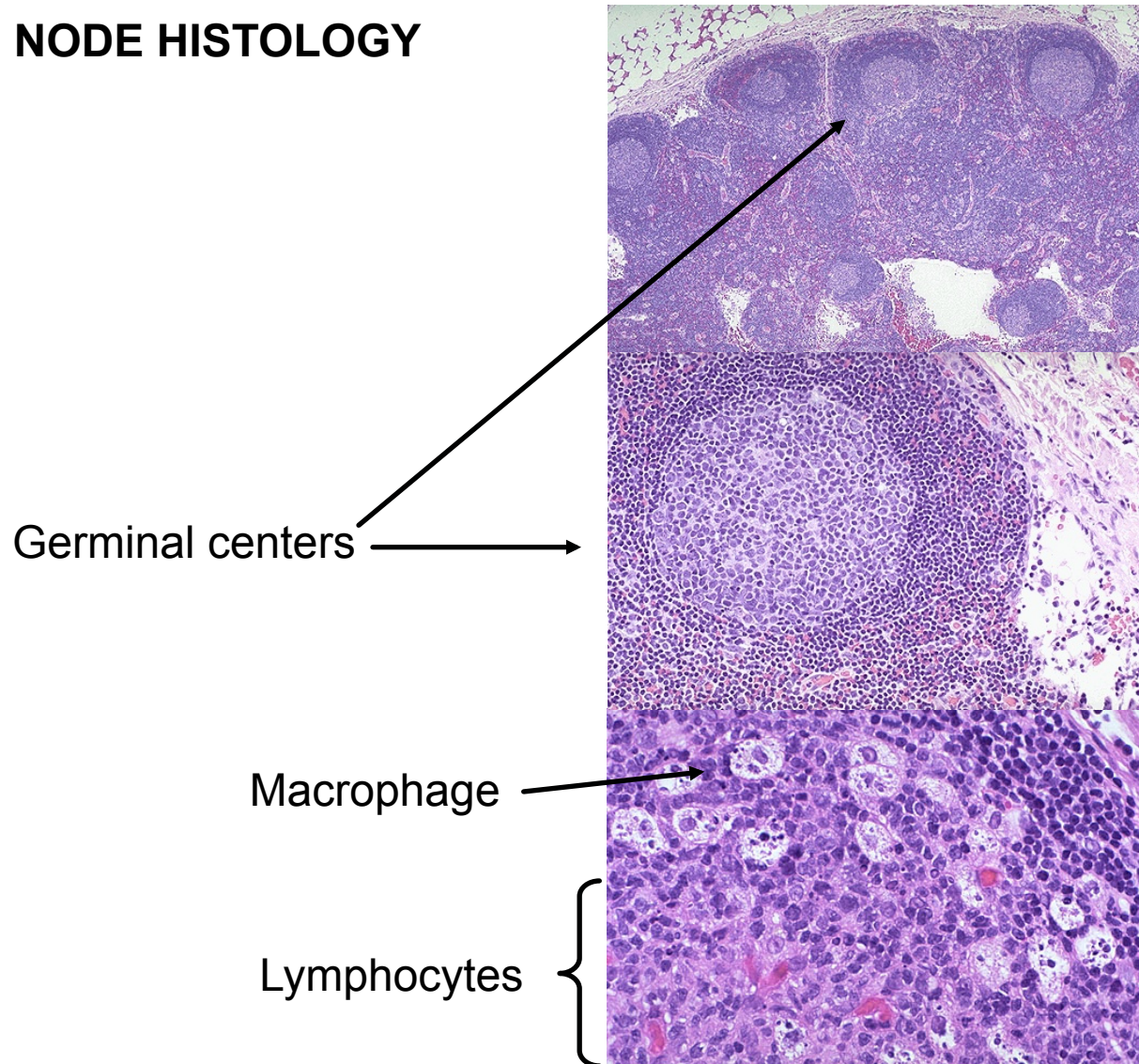


Figure 1-8 part 1 of 2 Immunobiology, 6/e. (© Garland Science 2005)

LYMPH NODE HISTOLOGY



Lymph Nodes

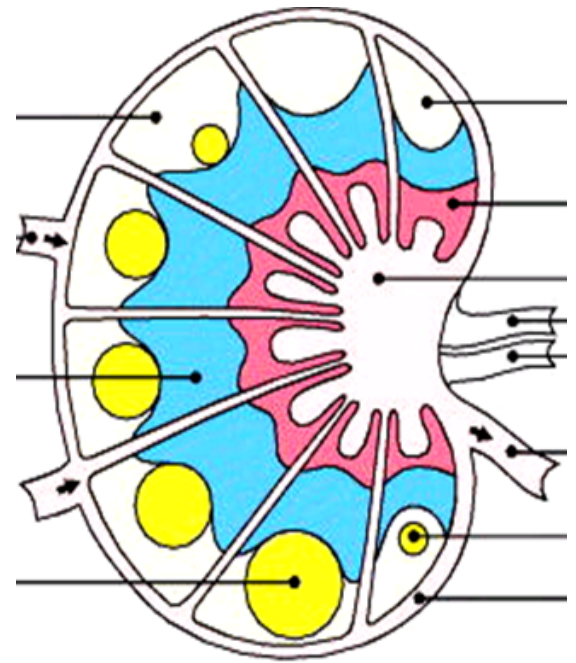
1. Cortex

- **Contains** 1^{ary} & 2^{ary} follicles mainly B cells + GCs
- **mostly B cells, macrophages and follicular dendritic cells.**

2. Paracortex → **Mostly T cells, and dendritic cells.**

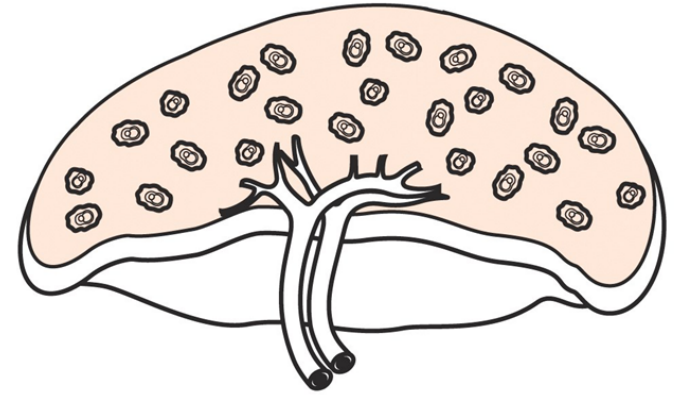
3. Medulla → **Mostly plasma cells**

Lymph Nodes

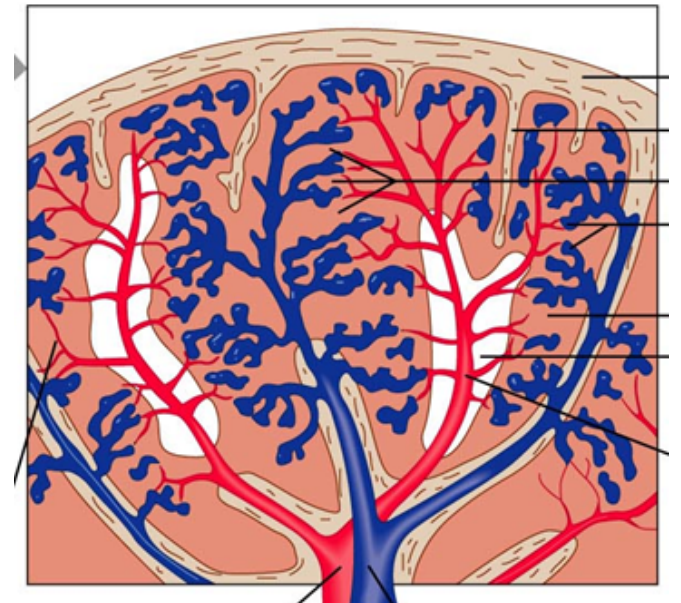


- Lymphocytes enter via high endothelial venules (HEVs) or afferent lymphatic vessel.
- Lymphocytes exit via efferent lymphatics which drain into the thoracic duct and back to the blood

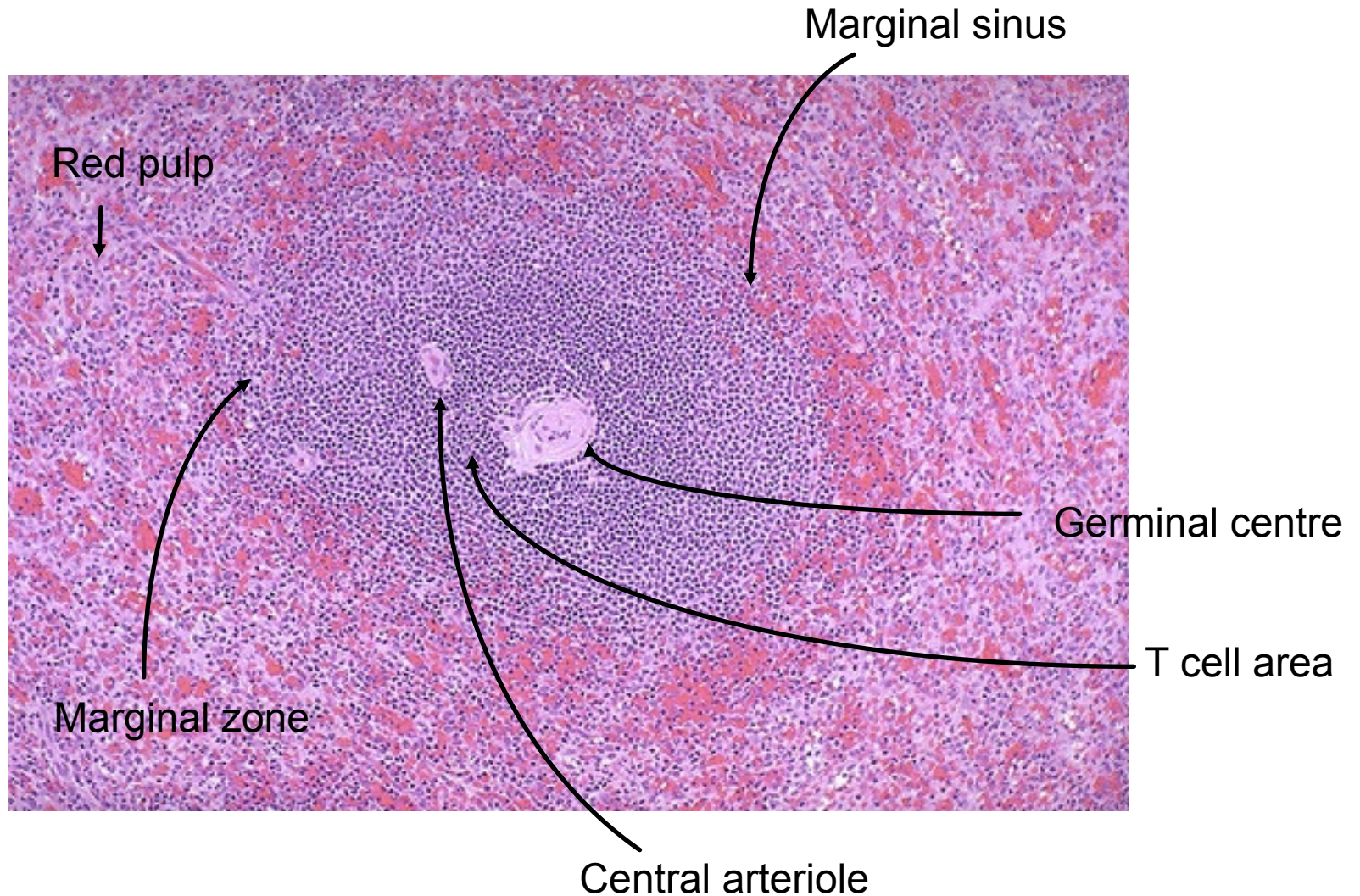
Spleen



- Largest lymphoid organ
- Major role in mounting immune responses to antigens in the bloodstream
- Filters blood and traps antigens
- White pulp
- Red pulp



Spleen white pulp



Structure of the Spleen

- **White pulp**

- populated primarily by T cells.
- Primary lymphoid follicles are rich in B cells and some contain germinal centers (GCs).
- Marginal zone, is populated by lymphocytes and macrophages

Spleen-function

- Destruction and removal of blood-borne antigens.
- Site of B cell maturation into plasma cells.
- Phagocytosis of bacteria and worn-out RBCs, WBCs and platelets.
- Storage of platelets

The Mucosal Lymphoid tissues

- Mucosal associated lymphoid tissue = MALT
- Gut associated lymphoid tissue = GALT
- Bronchial associated lymphoid tissue = BALT

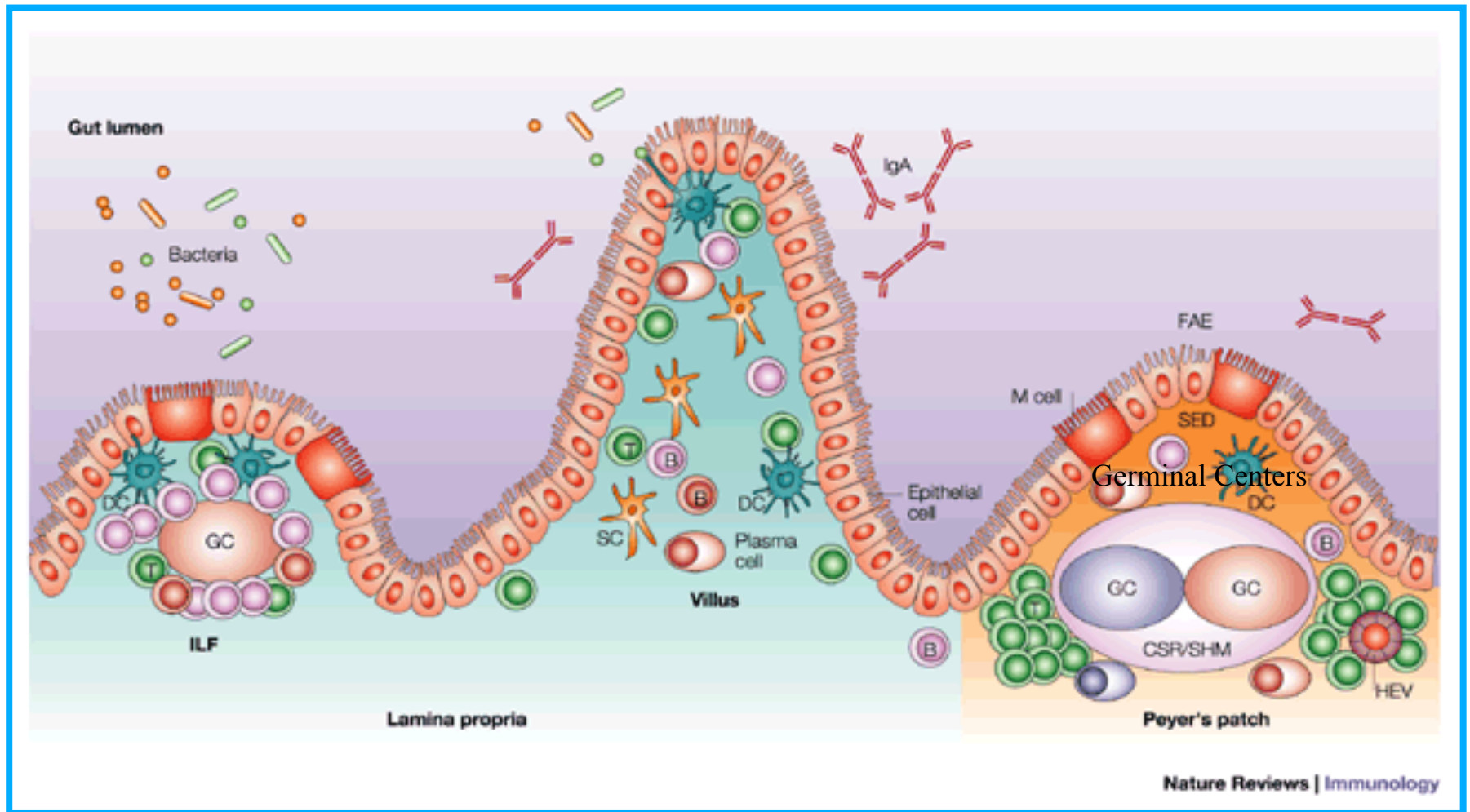
Dual Functions:

defence against pathogens and prevention of response to commensal flora, food antigens or inhaled antigens.

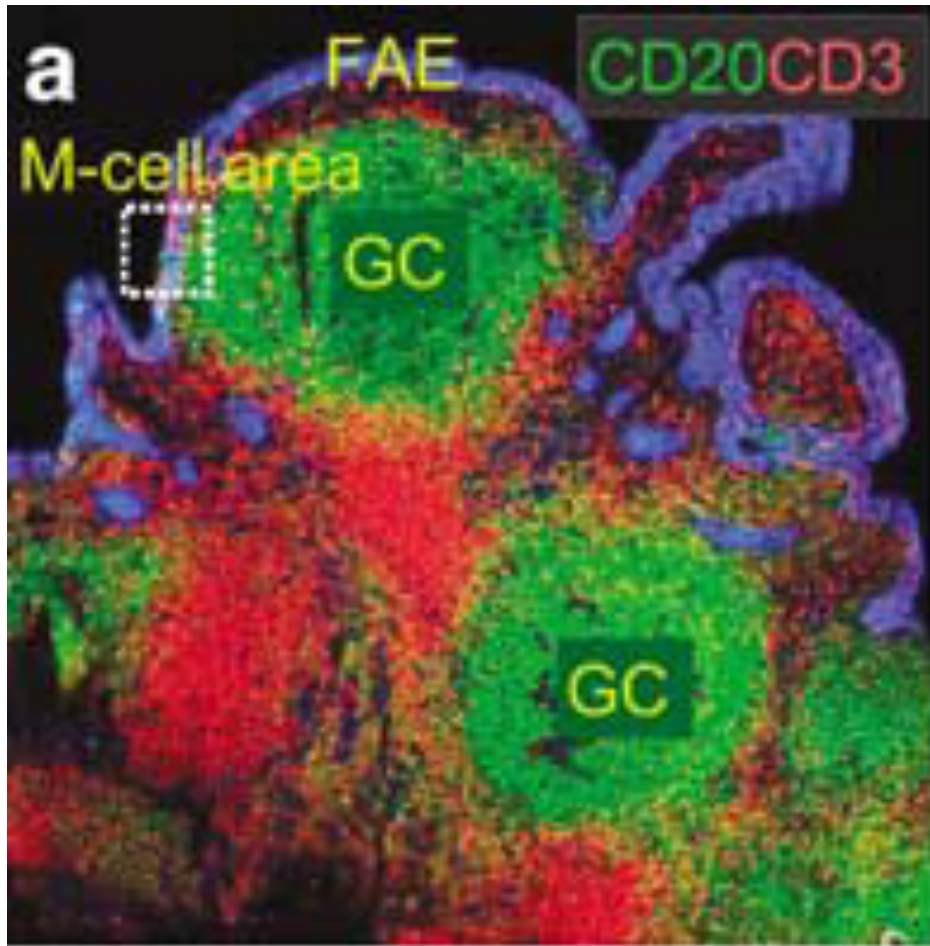
GALT: Peyer's Patches

- Located in ileum
- Structure:
 - dome-like “follicle-associated epithelium” (FAE)
 - M (microfold) cells that lack microvilli
 - underlying lymphoid follicle, containing dendritic cells, macrophages, T- & B-cells
- Function:
 - antigen-sampling: endocytosis / transcytosis
 - initiation of immune responses in naive lymphocytes

Gut-associated Lymphoid Tissues (GALT)



GALT- Peyer' s patch



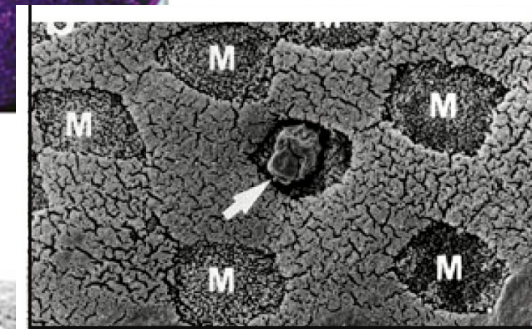
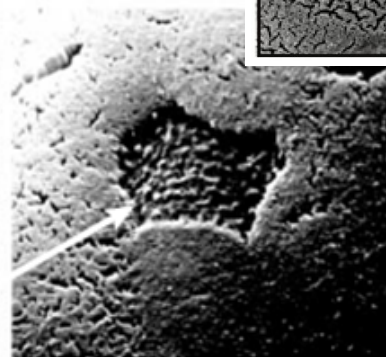
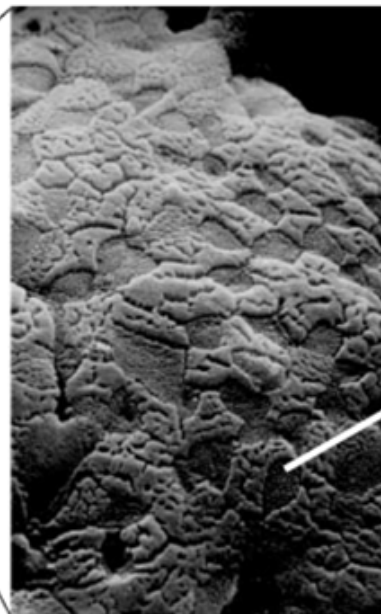
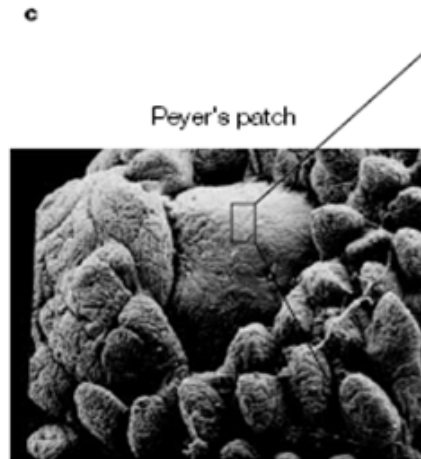
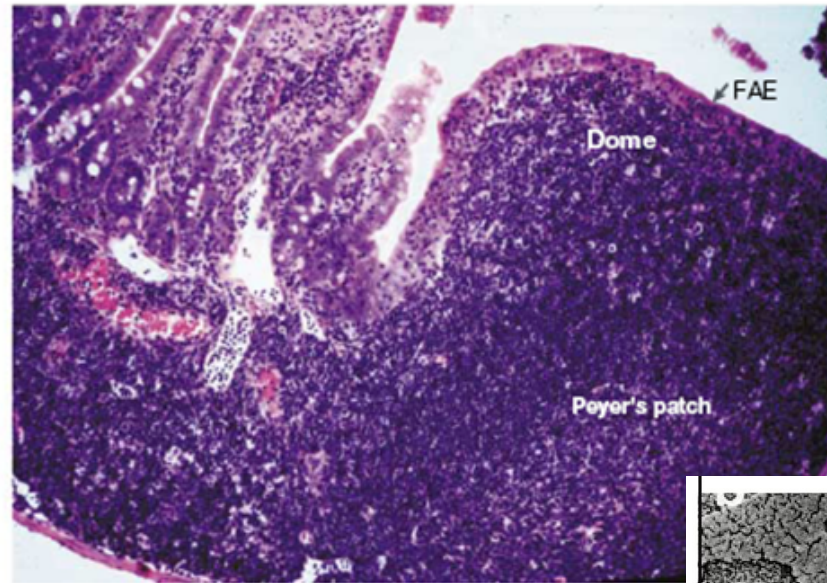
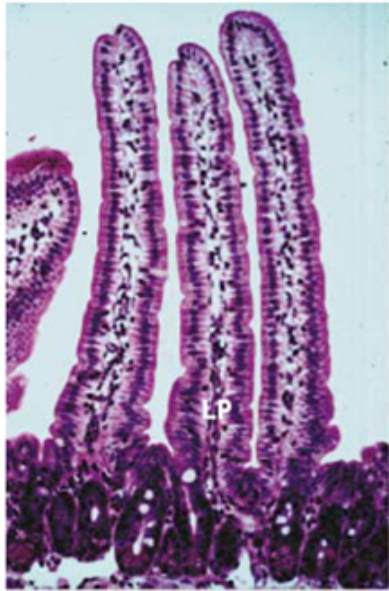
3-color fluorescence staining-in cryosection of human Peyer' s patch.

B cells (CD20, green)

T cells (CD3, red)

Epithelium (cytokeratin, blue)

Payer's Patches and intestinal mucosa



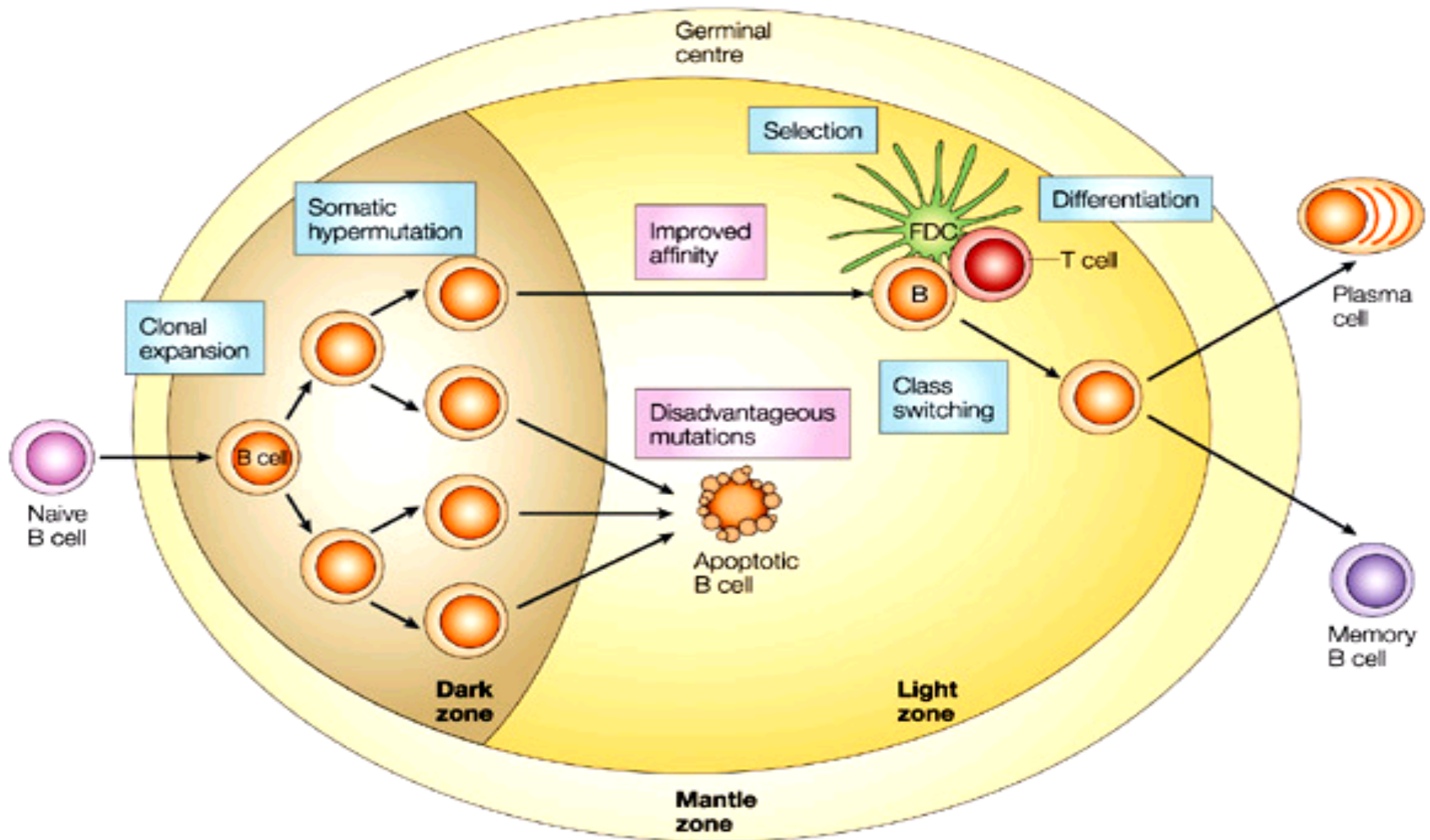
Antigen presentation at mucosal surface

- Microorganisms in lumen sampled by Microfold (M) cells
- Transported to dendritic cells in Peyer's patch or lymphoid follicle
- Stimulate T cell and B cell responses

Lymphoid Follicles

- Primary follicles contain resting B cells
- Secondary follicles contain GCs (sites of B cell proliferation)
- T cells located around follicles

Germinal Centre



Germinal Centres (GC)

- Sites of intense B-cell proliferation, selection, maturation.
- Dark zone: rich in proliferating B lymphocytes,
Light zone: contains FDCs and centrocytes.
- Follicular B cells in GC undergo class-switch recombination and somatic hypermutation

By the end you will be able to answer these questions

- What are the primary and secondary LTs and their respective functions?
- What are the main features and functions of Peyer's patch (PP)?
- What is germinal centre, structure and its function?

Homework assignment:

1- Why do commensals not induce an immune response?

2- Why do pathogen induce an immune response?