FACULTY OF ENGINEERING & TECHNOLOGY

TOPIC

BRAND GUIDELINES

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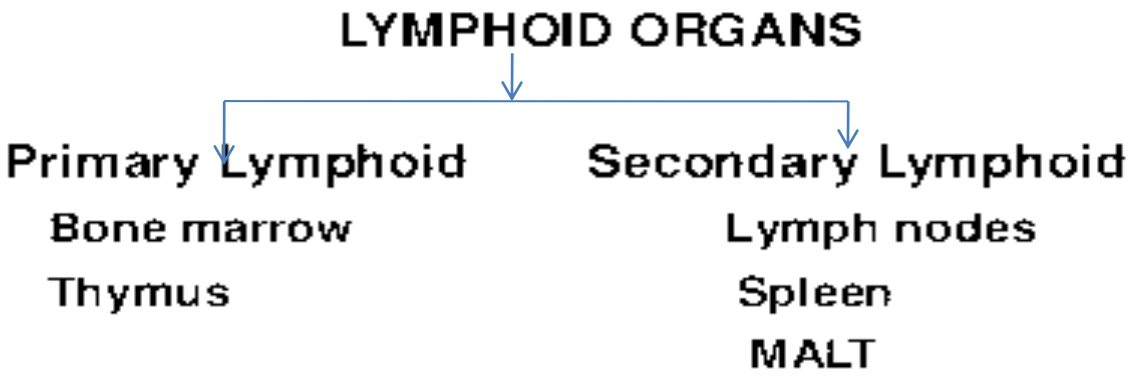
Lymphoid Organs



PRIMARY LYMPHOID ORGANS

Lymphoid stem cells undergo proliferation differentiation and maturation into T and B cells.

- ⇨ Acquire antigen specific reception.
- ⇨ After maturation T and B cells migrate to secondary lymphoid organs.
- ⇨ In mammals - Thymus, Bone marrow
  In Birds -Thymus, Bursa of Fabricius
- ⇨ Major sites of Lymphopoiesis
  T cell - Thymus, B cell - Bone marrow
- ⇨ Control Peripheral Lymphoid Organs.

Thymus

Bilobed organ.

Situated above the heart.

Each lobe enclosed by capsule

Each lobule separated by connective tissue called trabeculae.

Outer Cortex –

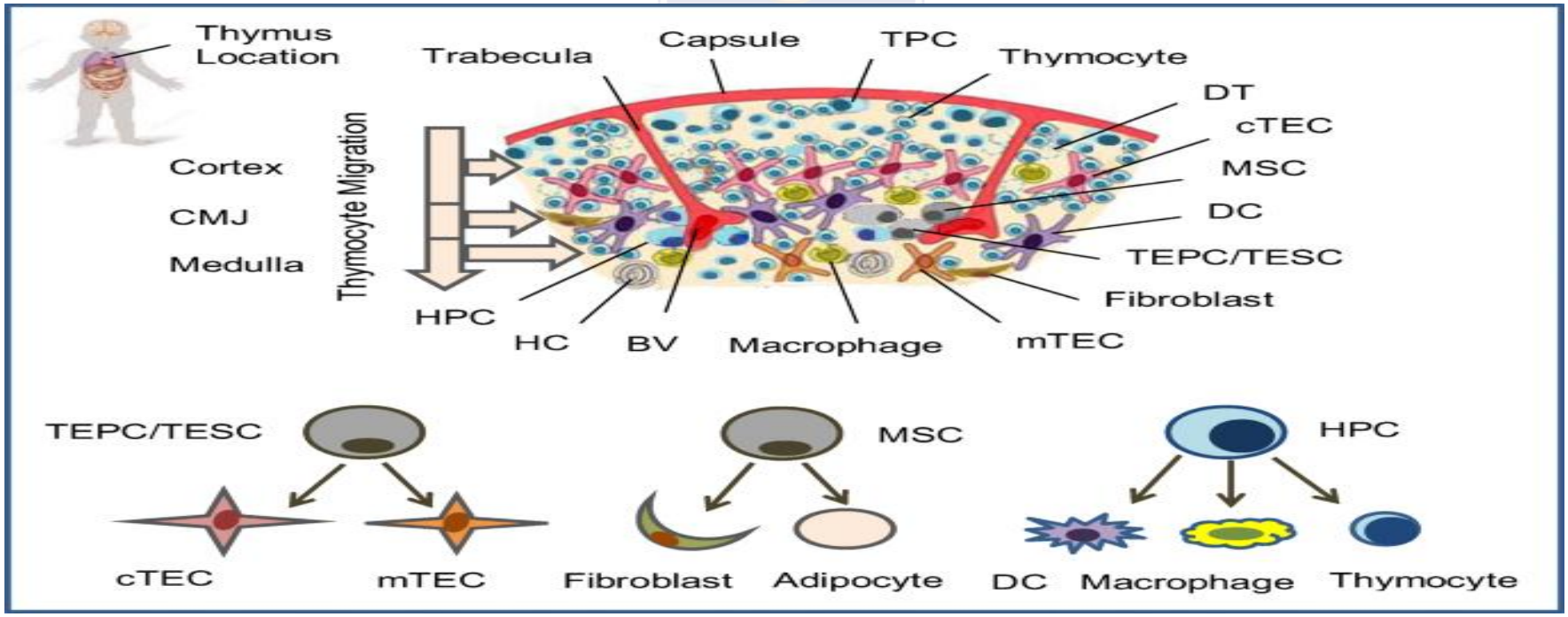
Inner Medulla –

⇨ Immature T cells in called – Thymocytes

⇨ Thymic epithetical cells in outer cortex called Nurse cells.

⇨ Hassall's corpuscles – contain degenerating epithelial cells.

- ⇨ **Site of T cell development and maturation.**
- ⇨ **Development of cell mediated immunity.**
- ⇨ **Thymic epithelial cells produce hormones** thymosin **and** thymopoietin.
- ⇨ T cell receptor generated.
- ⇨ Recognizing antigen MHC complex.
- ⇨ T cells protect body from infection.



Bone Marrow

Site of blood cell formation.

B cell origin and mature

E.g. Humans and Mice

Fat cells, bony tissue, dendritic cells

⇨ Stomatal cells interact with B cells

⇨ Secrete cytokines.

⇨ Selection process occur.

⇨ It is not the site of B cell development in all species.

Bursa Of Fabricius

- Gut associated lymphoid organs.
  [Birds]
- Lymph epithelial tissue.
- Hindgut of chicken.
- Multiply and differentiate into B lymphocytes.
- Immuno globulins synthesis.
- Described by Fabricus in 1621.
- Humoral immunity in birds.
- Absent in mammals (primates, rodents).

Secondary Lymphoid Organ

- ⇨ Organs in which antibodies are formed.
- ⇨ Antigen trapping and lymph filtration mechanism.
- ⇨ Receive immuno competenal cells (primary lymphoid gan for making them and active).
- ⇨ Spleen
- ⇨ Lymph nodes
- ⇨ Mucosa associated lymphoid tissue.
- ⇨

Lymph Nodes

Solid encapsulated bean shaped structure.

Seen in Armpits, Mesenteries.

Network packed with lymphocytes, macrophages, dendritic cells.

Three concentric regions :-

Cortex , Para cortex, Medulla

CORTEX :-

Outer most layer

Contains lymphocytes, macrophage, follicular dendritic cells arranged in primary follicle

⇨ **Lymphoid tissues organized into structures - lymphoid follicle.**

⇨ **Lymphoid follicle activated by antigen – primary follicle**

[Follicular Dendritic Cell, Resting B Cell]

⇨ Primary follicle develop into secondary follicle.

⇨ In children with B cell deficiency cortex lack primary follicles and germinal centers.

PARACORTEX :-

[T lymphocytes, interdigiting dendritic cells].

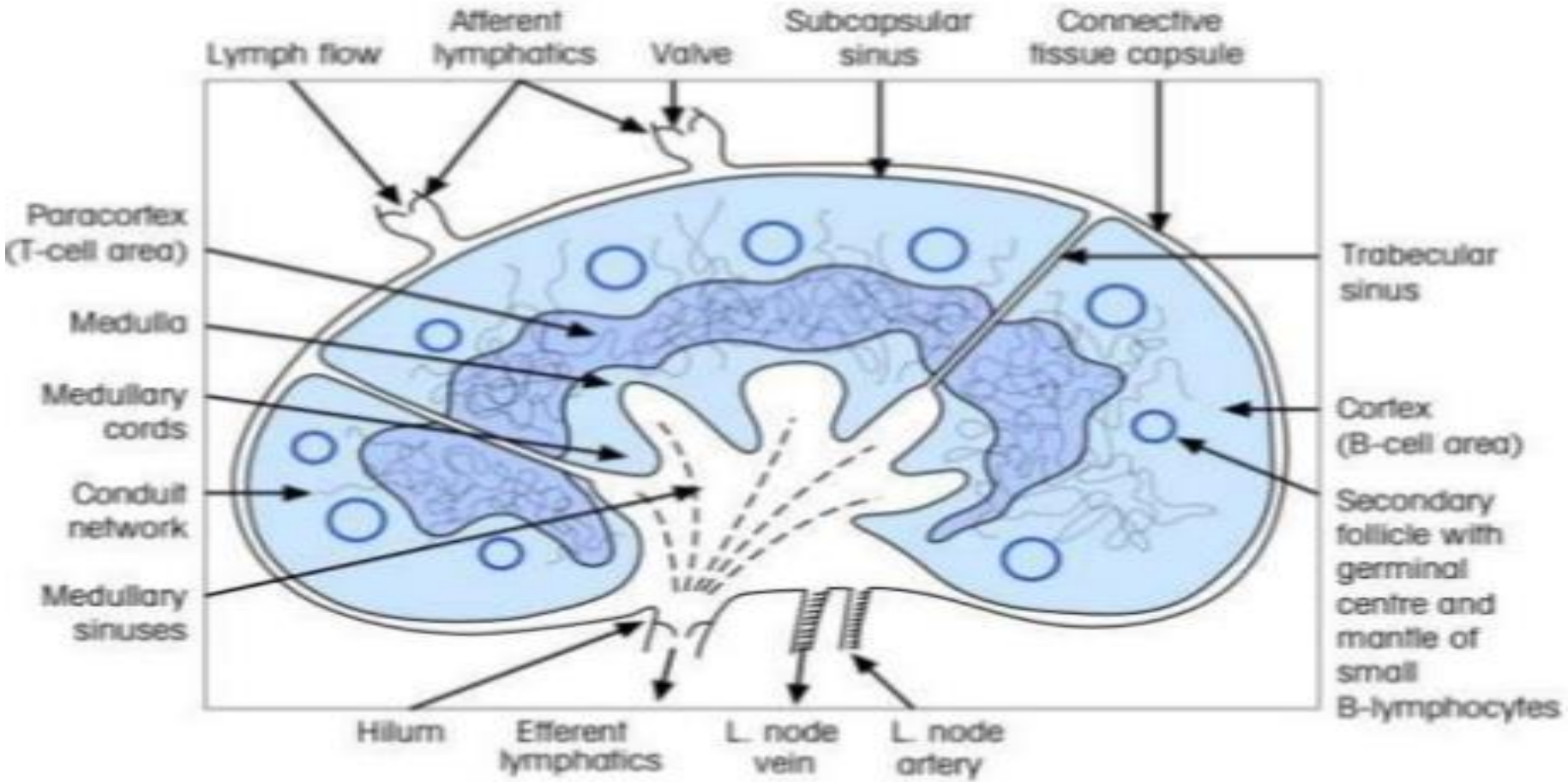
Thymus dependent area – Para cortex

Thymus independent area – Cortex

Class II MHC present.

MEDULLA :-

Inner most layer


Lymph flow
Afferent lymphatics
Valve
Subcapsular sinus
Connective tissue capsule
Paracortex (T-cell area)
Medulla
Medullary cords
Conduit network
Medullary sinuses
Trabecular sinus
Cortex (B-cell area)
Secondary follicle with germinal centre and mantle of small B-lymphocytes
Hilum
Efferent lymphatics
L. node vein
L. node artery

⇨ Antigen reaches regional node (lymph)

⇨ It is trapped

⇨ Class II MHC molecules – Antigen (interdigitating dendritic cells)

⇨ Resulting activation of T_H cells.

⇨ Activation of B cells.

⇨ Initial activation of B cells take place within Para cortex.
B cells differentiate into plasma cell.

⇨ Secreting IgG.

⇨ Secondary follicle develop.

⇨ (Follicular dendritic cell, B cell, T_H cell)

Spleen

- Bean shaped organ.
- Left side of abdominal cavity.
- Specializes in filtering blood and trapping blood borne antigens.
- Blood borne antigens, lymphocytes into spleen through splenic artery.
- Spleen surrounded by capsule.
- Two types of compartment red and white pulp.

Red pulp – network of sinusoids macrophage, RBC, lymphocyte.

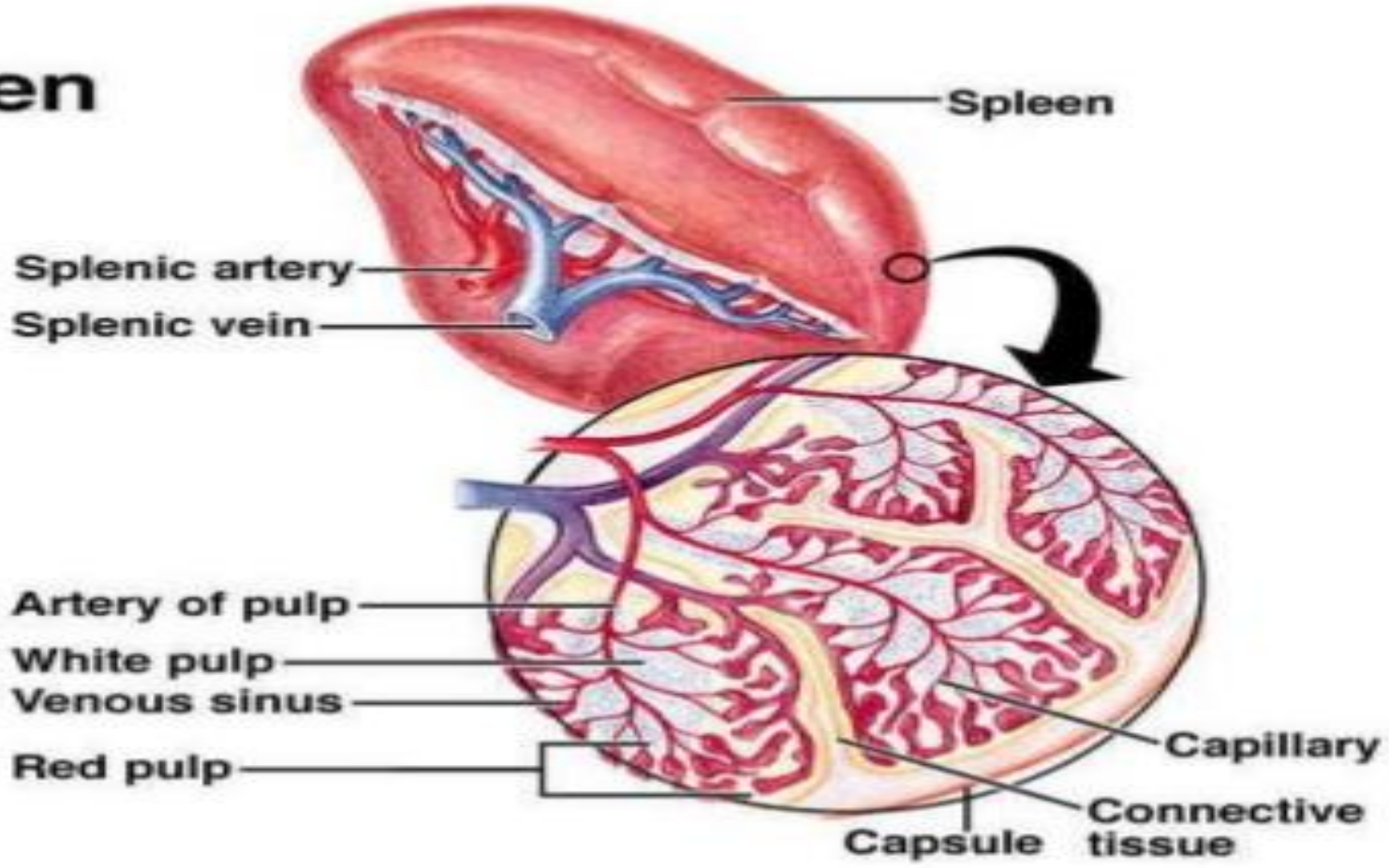
Old and defective RBC destroy.

White pulp - consist of lymphoid tissue, T and B lymphocytes.

- White pulps surrounds branches of splenic artery forming Per arteriolar Lymphoid Sheath (PALS).
- Marginal zone located peripheral to PALS

[Lymphocytes and Macrophages].

Spleen


Spleen
Splenic artery
Splenic vein
Artery of pulp
White pulp
Venous sinus
Red pulp
Capillary
Connective tissue
Capsule

⇨ Blood borne antigen and lymphocytes

⇩ (Splenic artery)

Spleen

⇩

Marginal Zone [trapped by interdigiting dendritic cells]

⇩

PALS

⇩

⇨ Initial activation of Band T cell in – PALS

⇩

⇨ Dendritic cell capture antigen

⇩

⇨ Combined with MHC molecule and TH cells

⇩

⇨ Activates B cells

⇩

⇨ Primary follicles in marginal zone

⇩

⇨ Secondary follicles [germinal centre]

⇩

⇨ Rapidly dividing B cells

⇩

⇨ Plasma cells - antibody production

Mucosa Associated Lymphoid

Lymphoid tissue in mucosal epithelial surface – **MALT**

Antibody producing plasma cells.

- Nasal associated lymphoid tissue – back of nose, palate, base of tongue, tonsils

Handling airborne microbes

- Tonsils defend against antigen entire through nasal and oral epithelial route

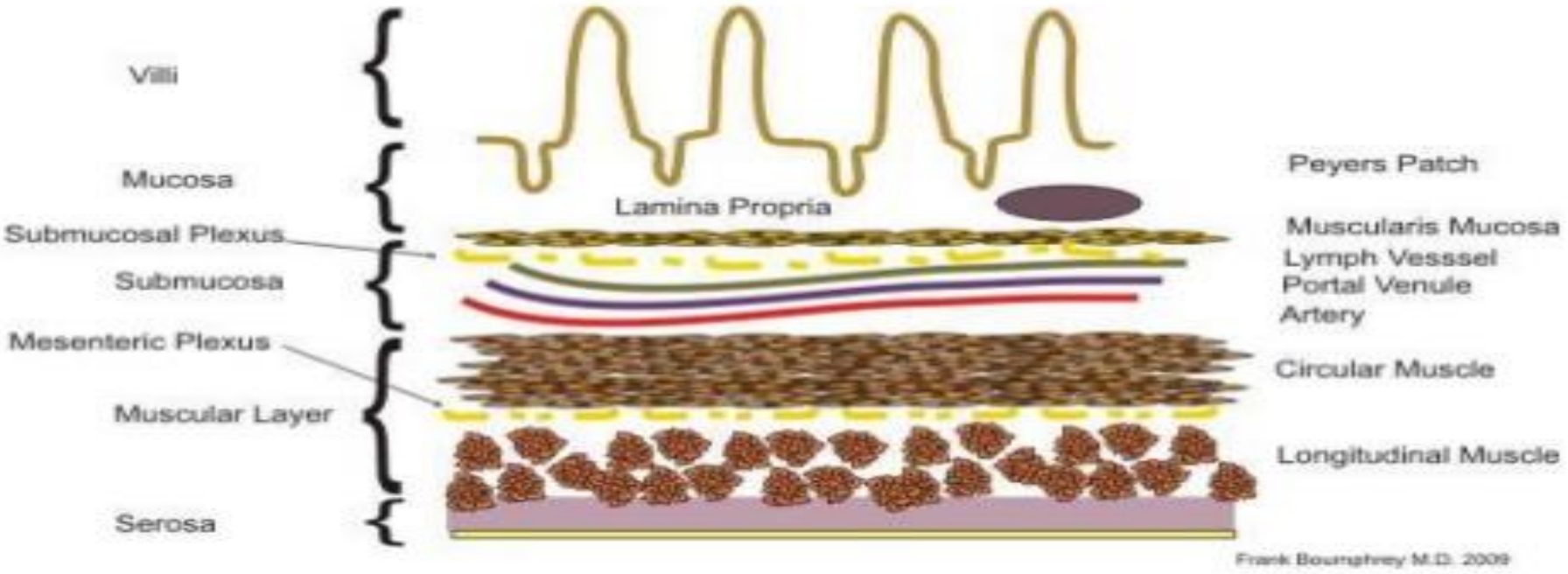
Respiratory, Uriogential, Gastrointestinal tract

- The endocytose antigen from lumen
-

Mucous membrane – effective barrier

- Non specific immunity
-

- Peyer's patches found in ileum.
- Round patches of lymphatic nodes
- Develop into secondary follicle in germinal center
- Antigen transport by specialized M cells.
- Pockets of M cells – B cells, T cells, Macrophages
- M cells locate in inductive sites



⇨ Antigen transported across mucous membrane by M cells

⇨ Activate B cells in follicle

⇩

⇨ Differentiate into plasma cells

⇩

⇨ Secrete 1gA class of antibodies

⇩

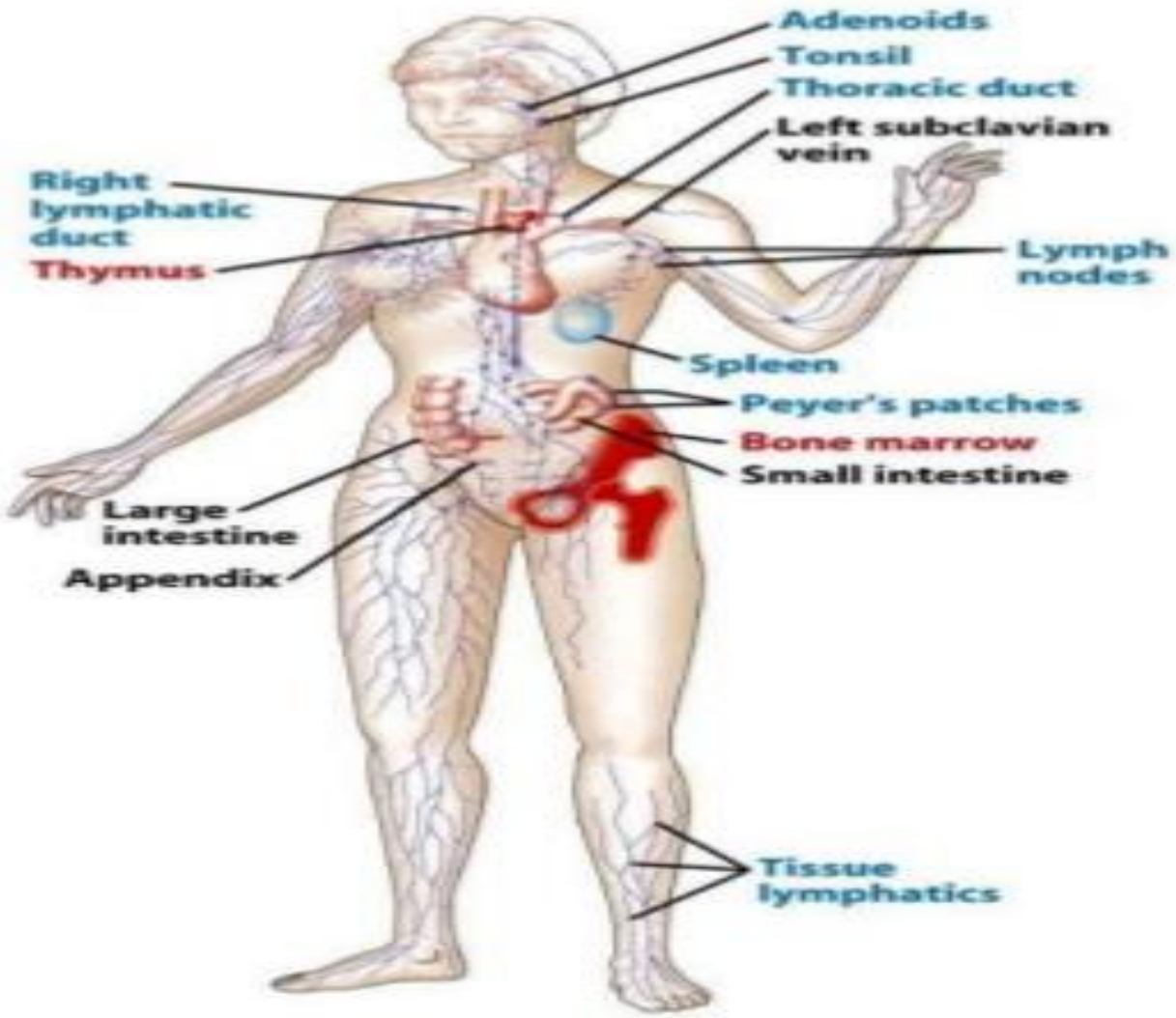
⇨ Transported across epithelial cells

⇩

⇨ Secretary 1gA into lumen

⇩

⇨ Interact with antigen


Adenoids
Tonsil
Thoracic duct
Left subclavian vein
Right lymphatic duct
Thymus
Lymph nodes
Spleen
Peyer's patches
Bone marrow
Small intestine
Large intestine
Appendix
Tissue lymphatics