



Histology Lecture (4) Lymphoid Tissue

Med433

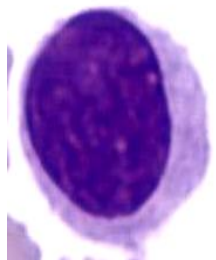
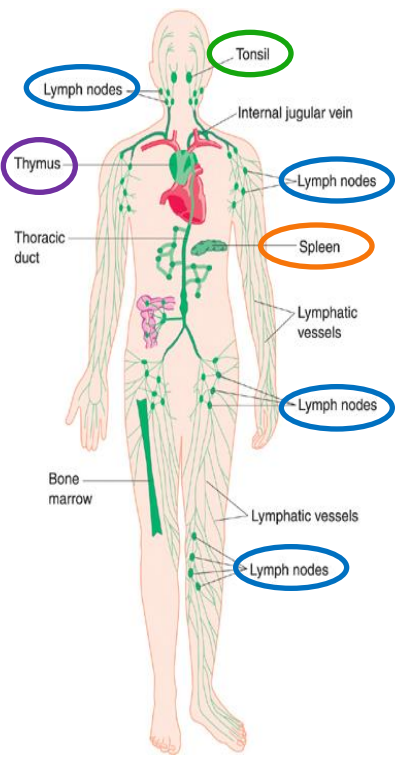
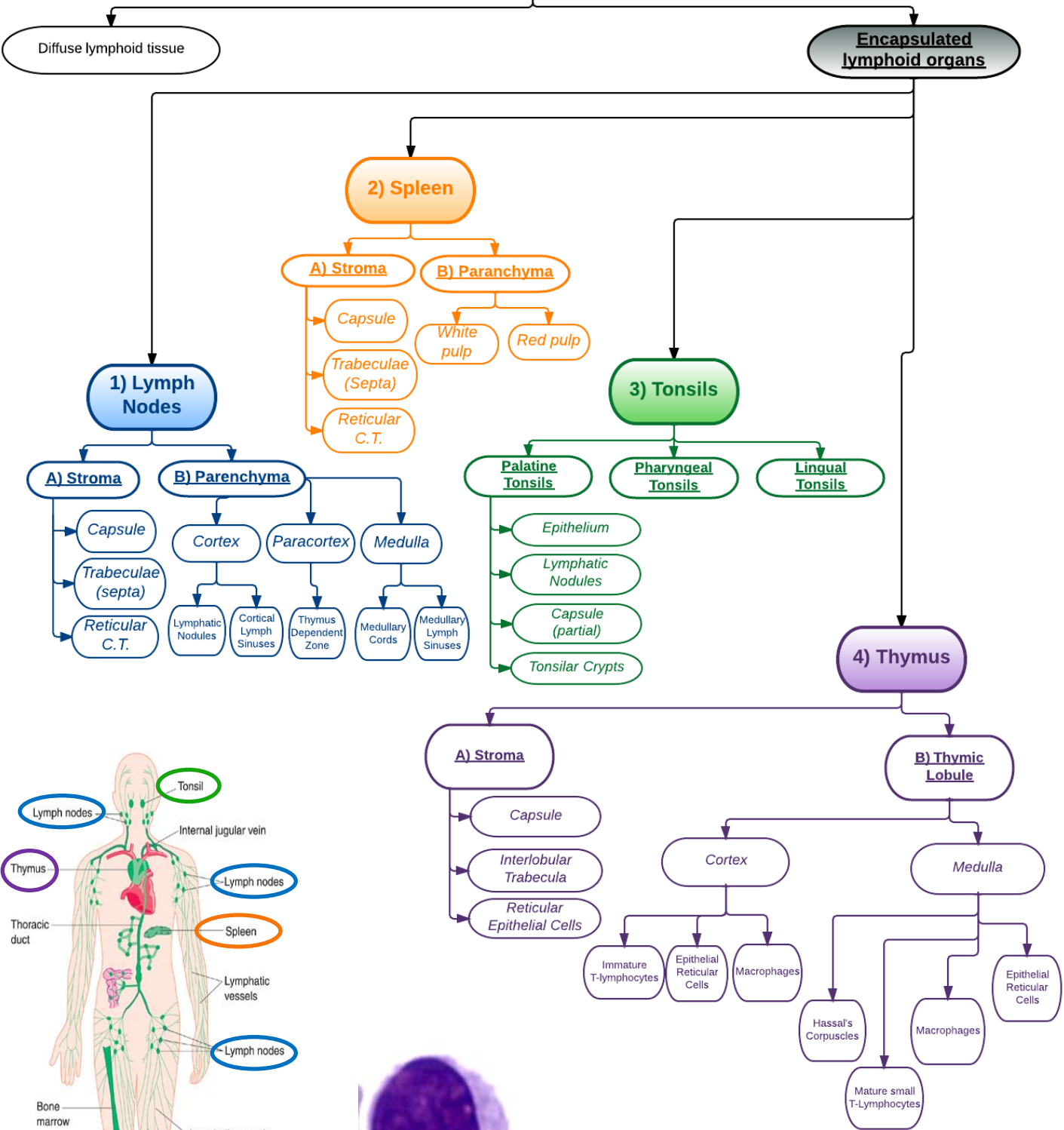
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• Objectives:

By the end of the lecture, the student should describe the microscopic structure of the following organs in correlation with their functions:

- 1- Lymph nodes.
- 2- Spleen.
- 3- Tonsils.
- 4- Thymus.

Lymphoid Tissue



Lymphocytes

↗ B-Lymphocytes
 ↘ T-Lymphocytes

LYMPHOID TISSUE

Diffuse lymphoid **tissue**

- Found anywhere that has C.T.
 - Doesn't form organs.
- Acts as a first line of defense.

Encapsulated lymphoid **organs**

- 1) Lymph nodes
- 2) Spleen
- 3) Tonsils
- 4) Thymus

N.B: Both red bone marrow & thymus are considered 1^{ry} lymphoid organs.

- We can classify **B-cells** and **T-cells** into: **primary & secondary** depending on the *factories that make them*.
- They both **originate** from bone marrow, but not both **mature** in bone marrow.
- **Bone marrow** → **Active & mature B-cells** - In this case the bone marrow is a primary lymphoid organ.
- **Bone marrow** → **Inactive & immature T-cells** - In this case the bone marrow is a secondary lymphoid organ.
- → **Immature T-cells go to the Thymus** → **Active & mature T-cells** - In this case the thymus is a primary lymphoid organ.

- **T-lymphocytes & B-lymphocytes** look the **same** under the LM. To differentiate between them, we use special antibody dyes → **Immunohistochemistry**

1) LYMPH NODES (L.N.)

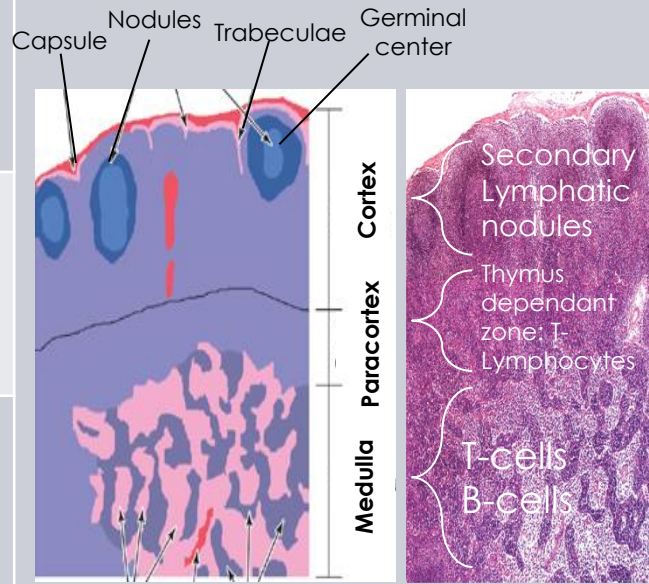
STROMA

(Support)

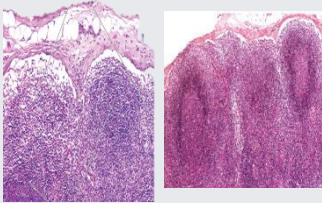
1. Capsule: Made of C.T.

2. Trabeculae (Septa):
It helps divide the glands
(يشبه الكسرات في الستارة)

3. Reticular C.T.
It is the background that carries Parenchyma.



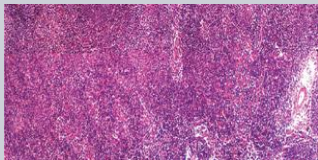
CORTEX



- Lymphatic nodules (follicles):
 - 1ry:** without germinal center: **Inactive** (the nodules are one color. Found only in unborn children, because the uterus is sterile, so the nodules don't have the need to filter anything)
 - 2ry:** with a light germinal center: **Active** (The nodules are active and filtering)

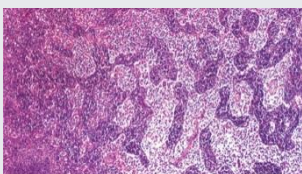
- Cortical lymph sinuses:
They're like blood capillaries, but bigger, wider and lighter because they only contain plasma (No RBCs)

PARACORTEX



- It is the **thymus-dependent zone** of L.N.
- It is composed mostly of **T-lymphocytes**.

MEDULLA



- Medullary cords: are formed of lymphoid cells (**B & T lymphocytes, plasma cells, macrophages**)
- Medullary lymph sinuses.

PARENCHYMA

(Lymphoid Tissue + Sinuses)

Functions of L.N.

- Production of **immunocompetent cells**.
- Filtration of lymph.**

2) SPLEEN

STROMA

(Support)

1. Capsule

2. Trabeculae

3. Reticular C.T.

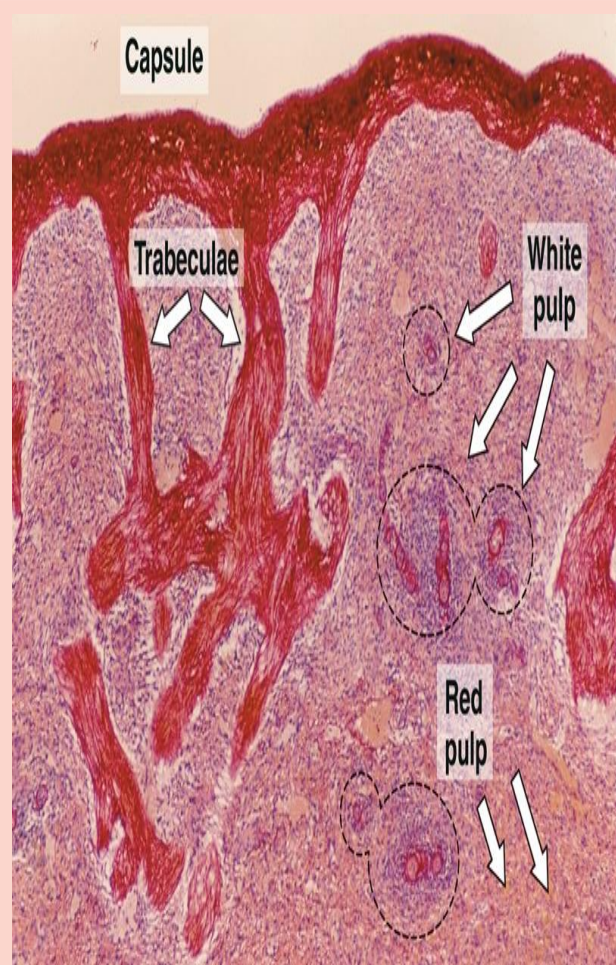
PARENCHYMA

1. White pulp

(Called "white" because it contains lymphocytes)

2. Red pulp

(Called "red" because it contains blood)



Note: No cortex, No medulla.

Functions of Spleen

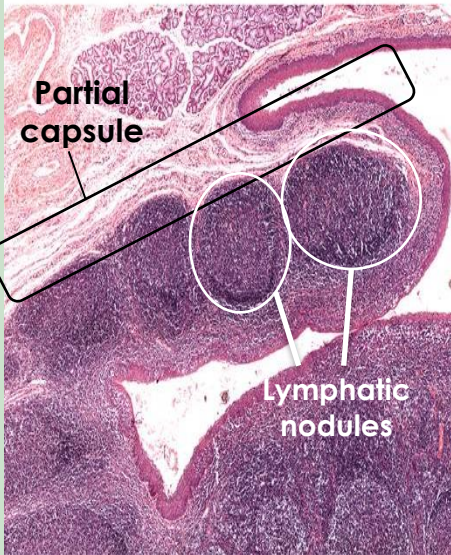
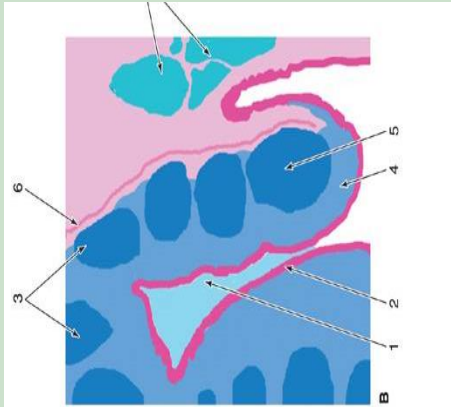
- 1- **Filtration** of blood.
- 2- **Phagocytosis** of old RBCs & old blood platelets & invading microorganisms.
- 3- **Production & proliferation** of immunocompetent B & T lymphocytes.
- 4- **Production** of antibodies.

3) Tonsils

a) Pharyngeal Tonsils : at nasal area المنطقة الموجودة حولين فتحة التنفس (الحمية)

b) Lingual Tonsils: Dome shaped at the end of tongue

c) Palatine Tonsils



Structure

1. **Epithelium:**
non-stratified
stratified
squamous

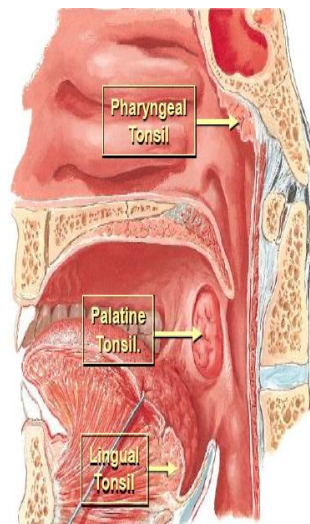
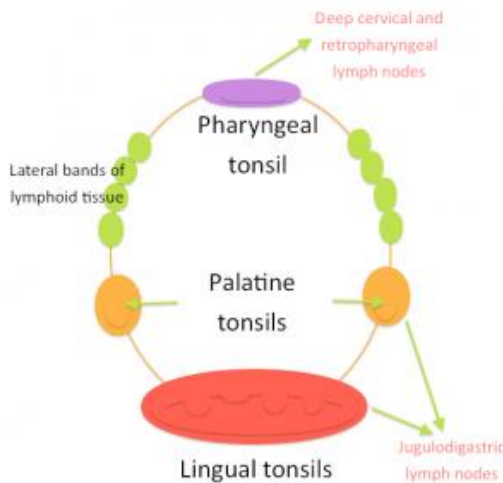
2. **Tonsilar crypts**
(Grooves)

3. **Lymphatic Nodules**

4. **Capsule (partial)** -
partial means that it's
incomplete, so it is
completed it with
epithelium BUT the capsule
can't be made of only
epithelium.

Function

Production of
antibodies



4) THYMUS

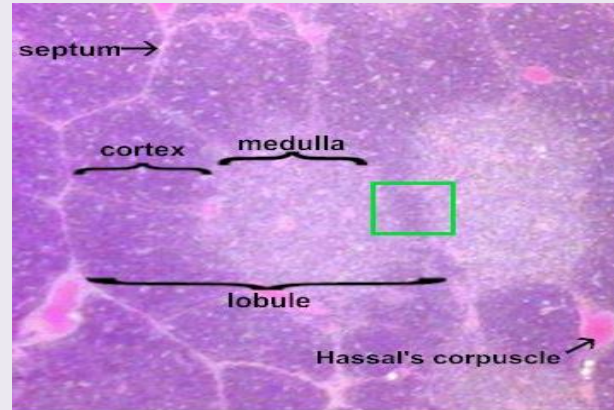
- Pure **T-Lymphocytes**.
- **NO NODULES** – Because: we don't have B-lymphocytes.
- **NO Plasma cells** – Because they originate in B-cells and we don't have B-cells.
- **Active stage:** Between childhood and puberty – if removed before puberty it will cause AIDs
- No reticular fibers
- No sinuses (*Found in L.N.*) or sinusoids (*Found in Spleen*)

STROMA

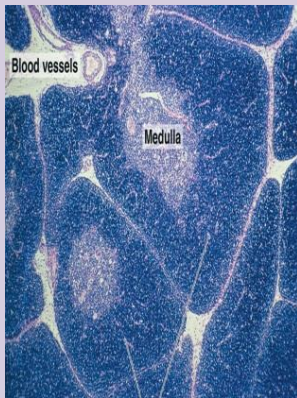
1- Capsule

2- Interlobular trabeculae -Incomplete

3- Reticular epithelial cells (makes a network & contain keratin – unique in thymus)



CORTEX



a) **developing (immature) T-lymphocytes** (thymocytes)

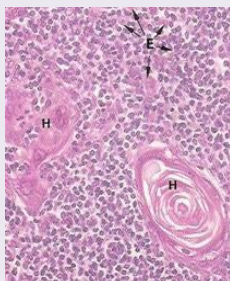
98% of thymocytes die – only 2% mature → Medulla

b) Epithelial reticular cells

c) Macrophages. To engulf the dead 98%

- ❖ **N.B.** No lymphatic nodules
- No plasma cells
- No B-lymphocytes

MEDULLA



a) **Mature small T-lymphocytes.**

b) Hassal's (thymic) corpuscles: Concentrically arranged epithelial reticular cells in the medulla.

c) Macrophages.

d) Epithelial reticular cells.

❖ **N.B.**

Medulla of adjacent thymic lobules are interconnected - Why? Incomplete trabeculae

Functions of Thymus

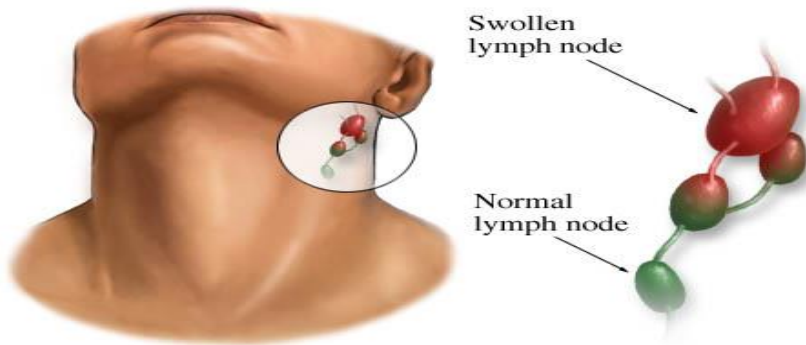
❖ **Maturation of T-lymphocytes:**

Immunoincompetent T-cells → Immunocompetent T-cells

Clinical Applications

Palpable lymph node

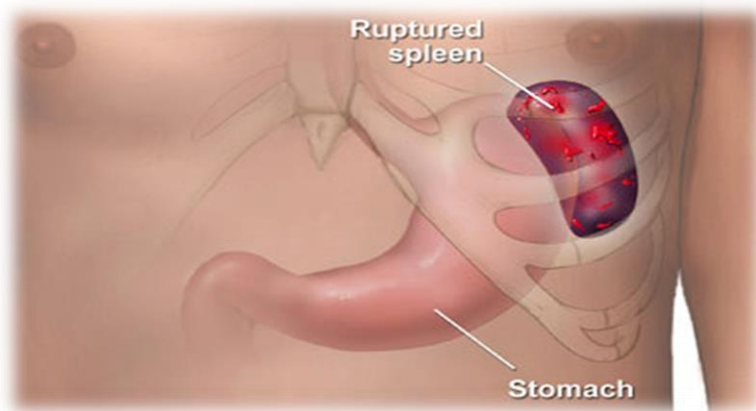
Presence of antigen or bacteria → Rapid proliferation of lymphocytes of L.N. → Increase in size → Becomes palpable to touch



Rupture of the Spleen

Spleen is a fragile or friable organ, so major trauma to the upper left abdominal quadrant *usually leads to rupture of the spleen.*

Surgical removal of that ruptured spleen is essential. (if it is not removed the patient will die)



MCQs

1. T-cells that are immunocompetent are found in:
 - a) Liver
 - b) Spleen
 - c) Thymus
 - d) Bone marrow
2. Organ that filters blood & engulfs old RBCs:
 - a) Tonsils
 - b) Liver
 - c) Kidney
 - d) Spleen
3. Which of the following contains lymphatic nodules?
 - a) Spleen & Tonsils
 - b) Tonsils & Lymph nodes
 - c) Lymph nodes & Thymus
 - d) Spleen & Thymus
4. Surgical removal of the spleen is essential if:
 - a) It is inflamed
 - b) It is attacked by microorganisms
 - c) It is Ruptured
 - d) All the above
5. If the lymphatic nodules in L.N. have a light center, that means:
 - a) It is secondary
 - b) It is Active
 - c) It is filtering
 - d) All the above

1) c 2) d 3) b 4) c 5) d

Answers:

This is the final histology lecture for this block.
We hope we made studying easier for you.
See you next block! Good luck 😊
- Best regards,

THE TEAM

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