

<b>From where</b>	<b>The innate immune system</b>	<b>The adaptive immune system</b>
<b>Specify</b>	non-specific	Specific
<b>Char</b>	1- acts rapidly (Rapid responses to a broad range of microbes) 2- has no immunological memory	1- Slower responses to specific microbes 2- last long 3- able to distinguish self from non-self 4- has memory 5- specificity 6- diversity
<b>Its content</b>	- physical : skin barrier - chemical : 1- Complement proteins C1 –C9 2- acid in stomach - cellular : 1- mast cells 2- eosinophils 3- neutrophils 4- macrophages 5- natural killer cells	1- T & B lymphocytes 2- APCs
<b>Fun</b>		- defend the body by: <ul style="list-style-type: none"> <li>♥ Humoral immunity B cells → Against antigens → production of antibodies</li> <li>♥ Cell mediated immunity T cells → Against tumor, transplant cells, virus infected cells &amp; microorganisms</li> </ul>

## The form of the lymphatic tissue

<b>From where</b>	<b>Diffuse lymphatic tissue</b>	<b>Nodular lymphatic tissue</b>
<b>capsule present</b>	No capsule present	No capsule present
<b>The shape of cells</b>	- scattered cells - Appear as scattered dark stained nuclei within C.T	Oval-shaped masses
<b>Found</b>	Found in CT of almost all organs	Found single or in groups
<b>The lymphatic organ that found the form of lymphatic tissue in it</b>	1- Bone marrow 2- Thymus	
	1- Lymph node 2- Tonsils 3- Spleen 4- MALT mucosa associated lymphatic tissue (in trachea)	
<b>Site</b>	1- Lymphocytes in lamina propria 2- submucosa of many organs (RS, GIT, UT, RT)	
<b>Other name</b>	mucosa associated lymphatic tissue (MALT)	

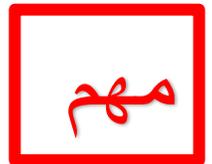
# The types of nodular lymphatic tissue (follicle)

From where	Primary Lymphatic nodules	Secondary Lymphatic nodules
<b>Germinal center</b>	No Germinal center Only small B lymphocytes (not activated)	With Germinal center
<b>Capsulated collection</b>	Non capsulated collection of lymphocyte	-----
<b>Found in</b>	all lymphoid organs EXCEPT thymus & bone marrow.	-----
<b>Contains \ Types</b>	-----	1- Pale germinal center 2- Mantle zone (corona) 3- Peripheral zone

# The types of secondary nodular lymphatic tissue (follicle)

From where	Pale germinal center	Mantle zone (corona)	Peripheral zone
<b>Contain \ Formed by</b>	1- B lymphocytes actively divide as a result of Ag stimulation  2- plasma cells  3- dendritic cells	1- Formed by dense population of resting  2- memory B lymphocytes (Mantel cell lymphoma)	small B lymphocytes
<b>Abbreviation</b>	GC	M	P

# The type of lymphatic organs



From where	Primary Lymphoid organs (central)	Secondary Lymphoid organs (peripheral)
<b>Site</b>	1- Thymus 2- Bone marrow	1- Lymph Nodes 2- Spleen 3- Tonsils 4- MALT
<b>Char</b>	1- B & T lymphocytes <b>arise from</b> same stem cell in bone marrow 2- are initial "education centers" of the immune system 3- In these organs, lymphocytes (T /thymus, B/bone marrow) differentiate into immunocompetent cells (i.e. they can recognize "self" vs. "non-self") 4- This differentiation is said to be <b>antigen-independent</b> 5- The lymphocytes then enter the blood & lymph to reside in the 2nry lymphatic organs	1- Are secondary "education centers" of the immune system, where most immune response occurs  2- In these organs, immuno-competent lymphocytes differentiate into immune effectors & memory cells (The activation and proliferation is <b>antigen-dependent</b> ) These lymphocytes then carry out their functions

# The lymphatic organs

# The secondary lymphoid

# 1- Lymph nodes

<b>From where</b>	<b>Lymph nodes</b>
<b>Def</b>	Principal 2ry lymphoid organs of the body
<b>Found</b>	Found along lymphatic vessels
<b>Char</b>	<ol style="list-style-type: none"> <li>1- Oval or bean shaped</li> <li>2- encapsulated organs</li> <li>3- Have convex surface where afferent lymphatic's <b>enter</b> the node</li> <li>4- Have concave surface (hilum) Where efferent lymphatic's, arteries &amp; veins <b>exit</b> the node</li> </ol>
<b>Types</b>	<ol style="list-style-type: none"> <li>1- Stroma (C.T.)</li> <li>2- parenchyma</li> </ol>
<b>Flow of lymph</b>	<p>Flows from Afferent lymphatic (valves) → lymph node</p> <ul style="list-style-type: none"> <li>• → subcapsular sinus (contains B lymphocytes, macrophages &amp; dendritic cells)</li> <li>• → cortical sinuses (contains B cells )</li> <li>• → paracortex (contains T cells)</li> <li>• → medullary sinuses ( B cells &amp; plasma cells)</li> <li>• → hilum → Efferent lymphatic</li> </ul>
<b>Functions of lymph nodes:</b>	<ol style="list-style-type: none"> <li>1- <b>Filtration</b> of lymph from microorganisms &amp; particles before it reaches the general circulation.</li> <li>2- <b>Promote interaction</b> of the circulating antigens in lymph with lymphocytes to initiate immune response (antigen – dependent differentiation)</li> <li>3- <b>Activation, proliferation of B lymphocytes</b> and antibody production.</li> <li>4- <b>Activation T lymphocytes into cytotoxic T cells</b></li> </ol>

# The structure of lymph nodes

<b>From where</b>	<b>Stroma (C.T.)</b>	<b>parenchyma</b>
<b>Def</b>	It is the outer membrane of lymph node	It is the inner membrane of lymph node
<b>Divide into</b>	<ol style="list-style-type: none"> <li>1- Capsule</li> <li>2- Septa (Trabeulae)</li> <li>3- Reticular network CT</li> </ol>	<ol style="list-style-type: none"> <li>1- Cortex</li> <li>2- Paracortex</li> <li>3- Medulla</li> </ol>
<b>Explanation of the divisions</b>	<ol style="list-style-type: none"> <li>1- Capsule: may <b>contain</b> <ol style="list-style-type: none"> <li>1- smooth muscles</li> <li>2- thickened at hilum</li> </ol> </li> <li>2- Septa (Trabeulae): <b>extend</b> from capsule and <b>divide</b> cortex into compartments</li> <li>3- Reticular network: of reticular fibers <b>form</b> the background of the organ to <b>support</b> the parenchyma</li> </ol>	<ol style="list-style-type: none"> <li>1- Cortex: outer zone under the capsule contains:               <ol style="list-style-type: none"> <li>a. lymphatic nodules (1ry &amp; 2ry)                   <ul style="list-style-type: none"> <li>1ry: mainly B cells, APCs, reticular cells (happen activation)</li> <li>2ry: activated B cells, macrophages, Plasma cells (happen activation)</li> </ul> </li> <li>b. lymphatic sinuses (subcapsular &amp; cortical): are spaces contains : lymph, B Lymphocytes, macrophages, few T lymphocytes)</li> </ol> </li> <li>2- Paracortex:               <ul style="list-style-type: none"> <li>♥ between the cortex and medulla</li> <li>♥ Is called the Thymus dependent zone of the lymph node, contains T cells that have migrated from the thymus [T lymphocytes + High endothelial venules (HEV)]</li> </ul> <p>High endothelial venules( HEV): is a post- capillary venule</p> <ul style="list-style-type: none"> <li>- is the point of entry of T cells from blood to lymph node</li> <li>- its endothelial lining is unusual</li> <li>- is cuboidal to facilitate movement of T cells into LN</li> </ul> </li> <li>3- Medulla: contains               <ul style="list-style-type: none"> <li>♥ Medullary cords:                   <ul style="list-style-type: none"> <li>* Cords of aggregated cells</li> <li>* Contains: B lymphocytes, Plasma cells , macrophages</li> </ul> </li> <li>♥ Medullary sinuses:                   <ul style="list-style-type: none"> <li>• Dilates spaces, continuous e cortical sinuses, &amp; contains lymph, B cells, macrophages, they join at hilum → efferent lymph vessels</li> </ul> </li> </ul> </li> </ol>

<b>From where</b>	<b>Tonsils</b>
<b>Def</b>	Masses of Lymphoid tissue at entrance of digestive and respiratory under oral or respiratory epithelium produce lymphocytes to guard against infections
<b>Characteristics of its lymphoid tissue</b>	<ol style="list-style-type: none"> <li>1- Covered by epithelium.</li> <li>2- Not situated along course of lymphatic vessels</li> </ol>
<b>Types</b>	<ol style="list-style-type: none"> <li>1- Palatine</li> <li>2- Pharyngeal</li> <li>3- Lingual</li> </ol>

## The types of tonsils

<b>From where</b>	<b>Palatine</b>	<b>Pharyngeal</b>	<b>Pharyngeal</b>
<b>Type of tissue</b>	Non keratinized stratified squamous epithelium	Pseudo-stratified Col. Ciliated	Non keratinized stratified Squamous
<b>Site</b>	<b>2 tonsils</b> located in the oral part of pharynx.	<b>Single</b> mass of lymphoid T. in nasopharynx	The posterior 1/3 human tongue
<b>Char</b>	<ul style="list-style-type: none"> <li>• Crypt: Epithelial invaginations into the tonsil substance <b>lined</b> by surface epithelium.</li> <li>• Stratified squamous epith: <b>Covers</b> the free surface of the tonsil and <b>lines</b> the crypts.</li> <li>• Lymphoid tissue: diffuse + nodular lymphatic tissue. May <b>contain</b> germinal centers.</li> </ul>	<ul style="list-style-type: none"> <li>• Covered by pseudo-st. columnar ciliated e goblet cells (respiratory epithelium)</li> <li>• It has No crypts</li> <li>• underlying capsule is thin</li> </ul>	<ul style="list-style-type: none"> <li>• Covered e non - k. stratified squamous epith.</li> <li>• Contains crypts, mucus glands at the root of tongue drain through several ducts into the crypts</li> <li>• Tonsils contain lymphoid nodules + diffuse lymphocytes.</li> </ul>