

<http://www.docstoc.com/docs/83830364/Anatomy-and-Histology-of-the-Immune-System>

<http://www.pathpedia.com/Education/eAtlas/Histology.aspx>

www.pathpedia.com/Education/eAtlas/Histology.aspx

Histologia narządów układu odpornościowego

**Centralne narządy limfoidalne:
szpik kostny
grasica**

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Szpik kostny:

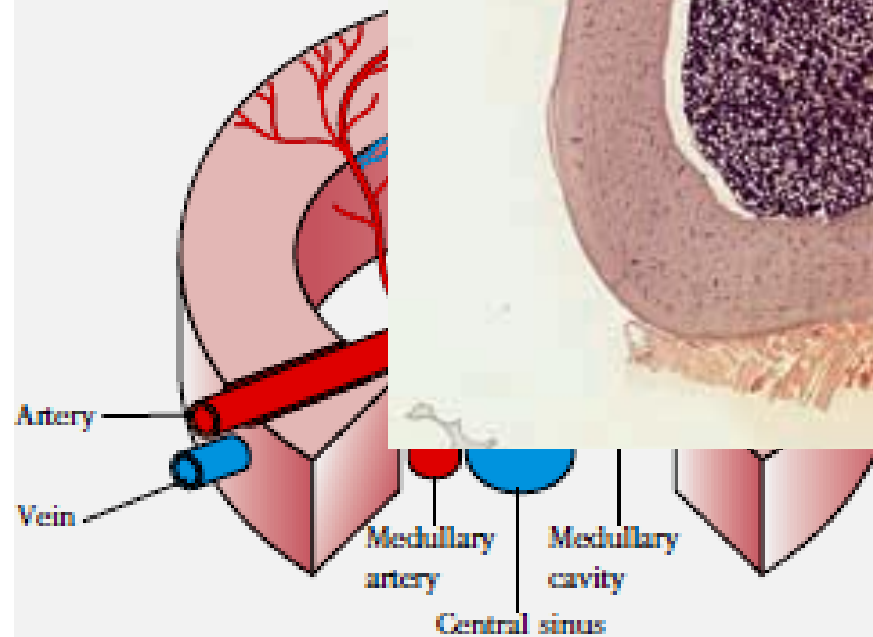
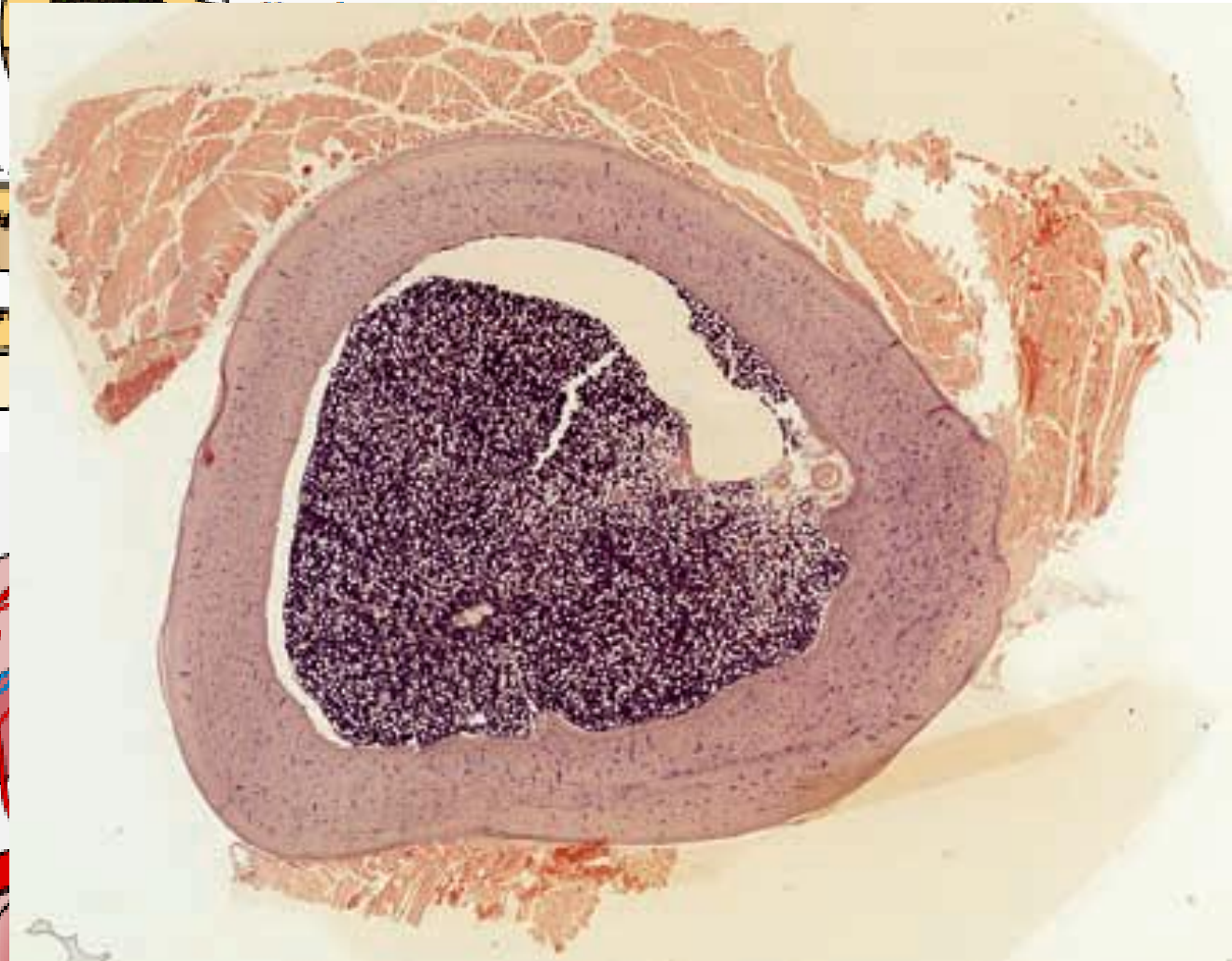
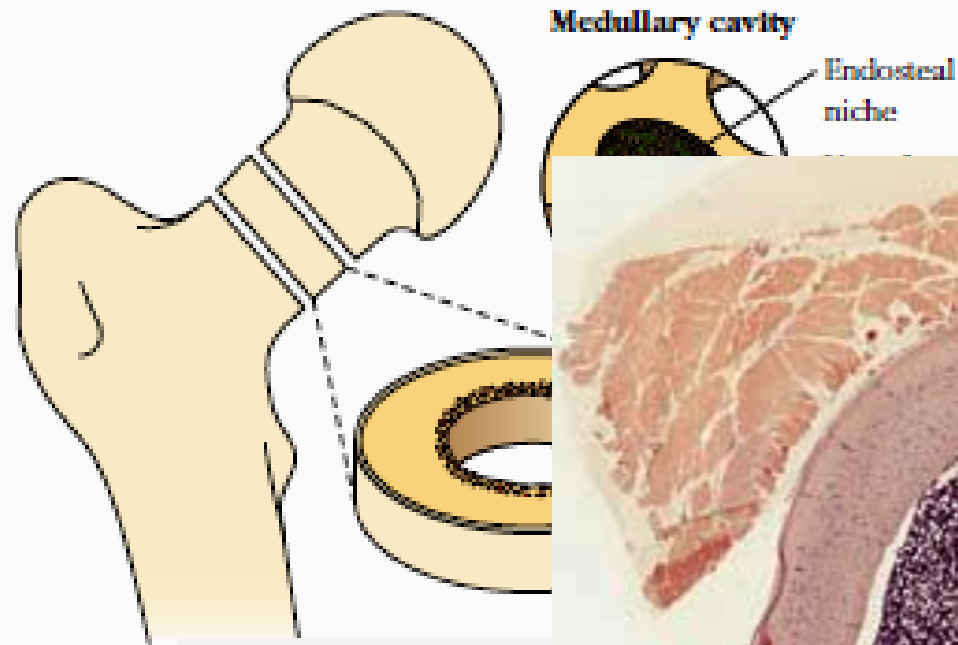
Kości długie, kości biodrowe, mostek

Miejsce hematopoezy

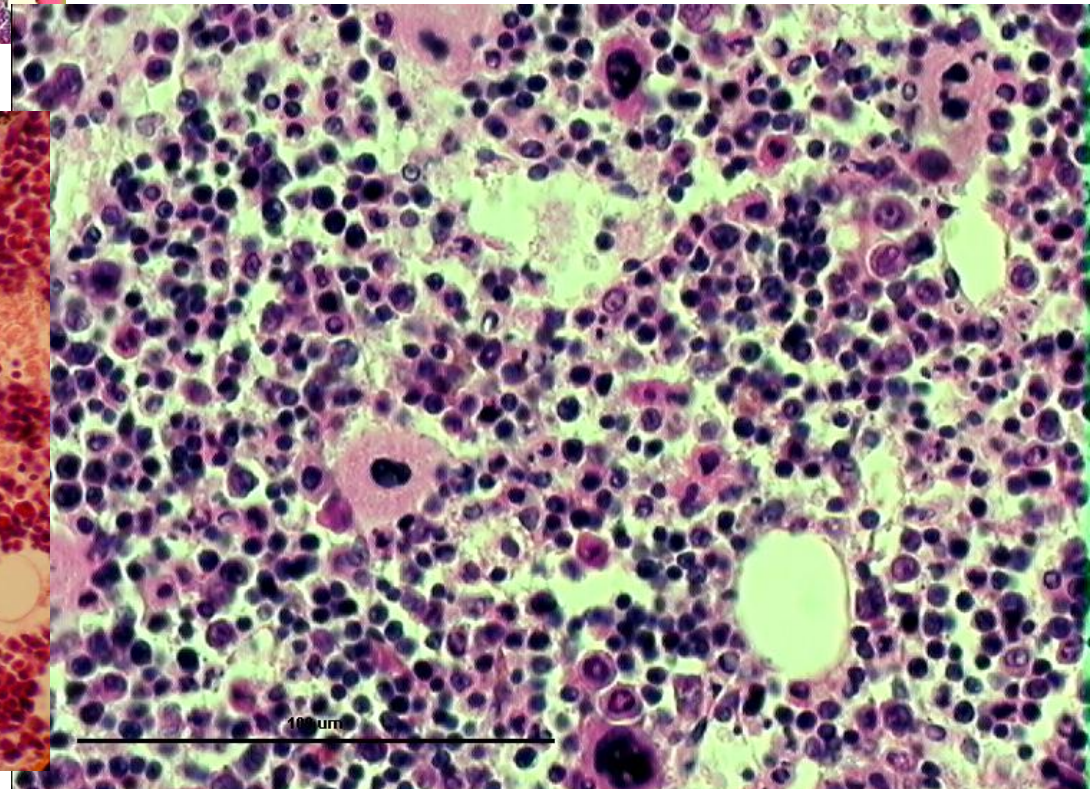
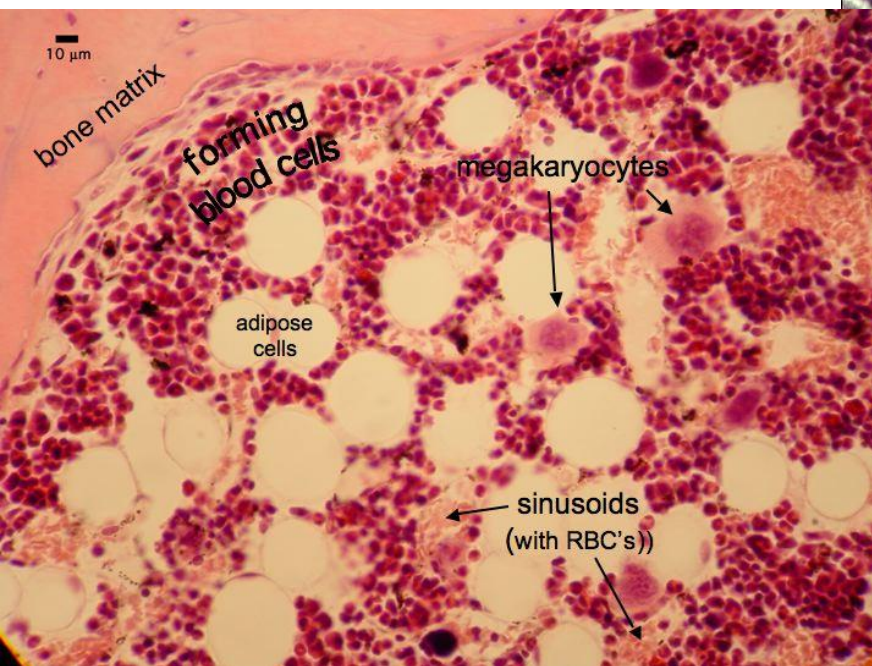
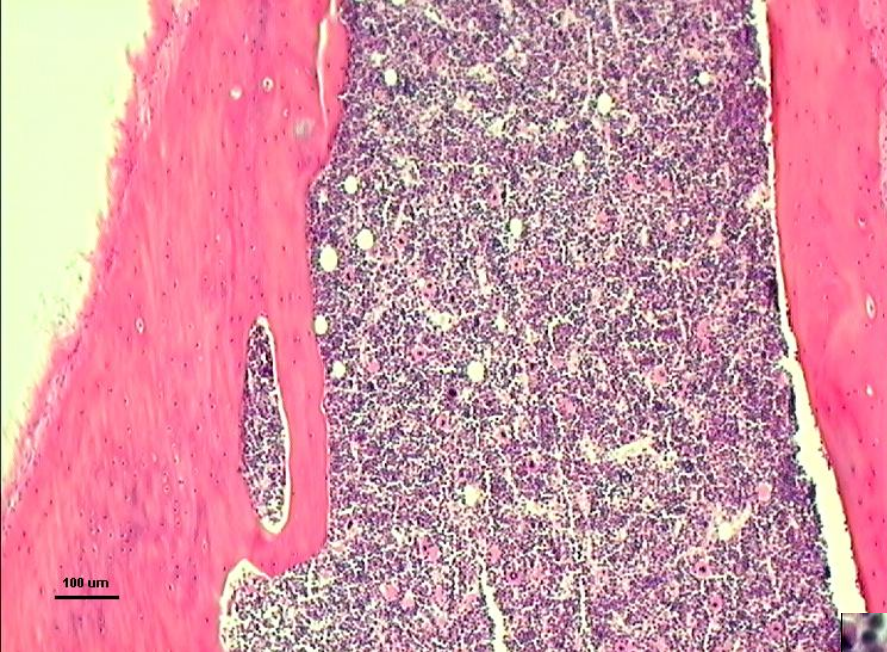
HSC

**Komórki szpiku kostnego uczestniczące w różnicowaniu
HSC – osteoblasty, komórki endotelialne, komórki
retikularne, neurony współczulne**

**Z wiekiem zwiększa się przestrzeń zajmowana przez
komórki tłuszczowe.**



Szpik kostny



Grasica:

**centralny narząd limfoidalny i gruczoł wydzielania
wewnętrznego**

Narząd limfonabłonkowy, w którym odbywa się:

- **dojrzewanie limfocytów T**
- **indukcja tolerancji pierwotnej**
 - **produkcja hormonów**

Budowa grasicy: rozmieszczenie tymocytów

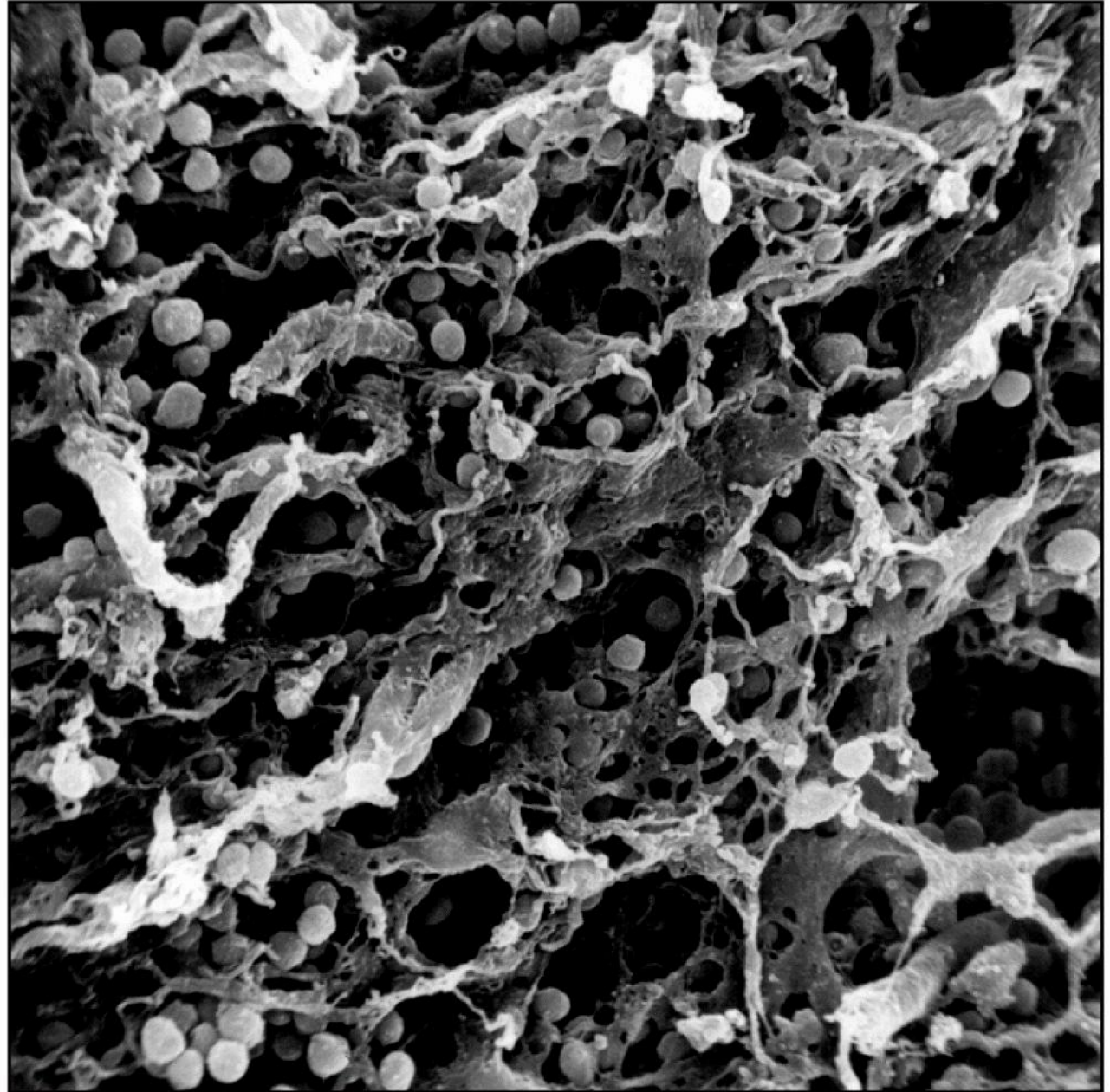
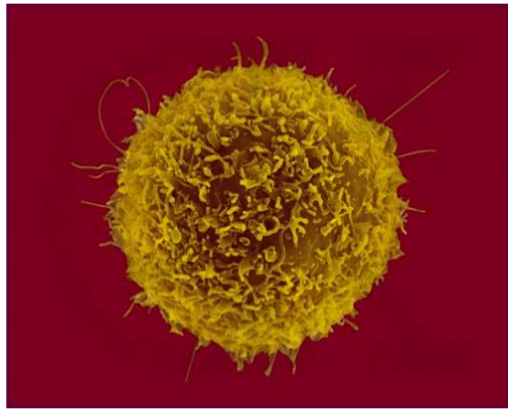
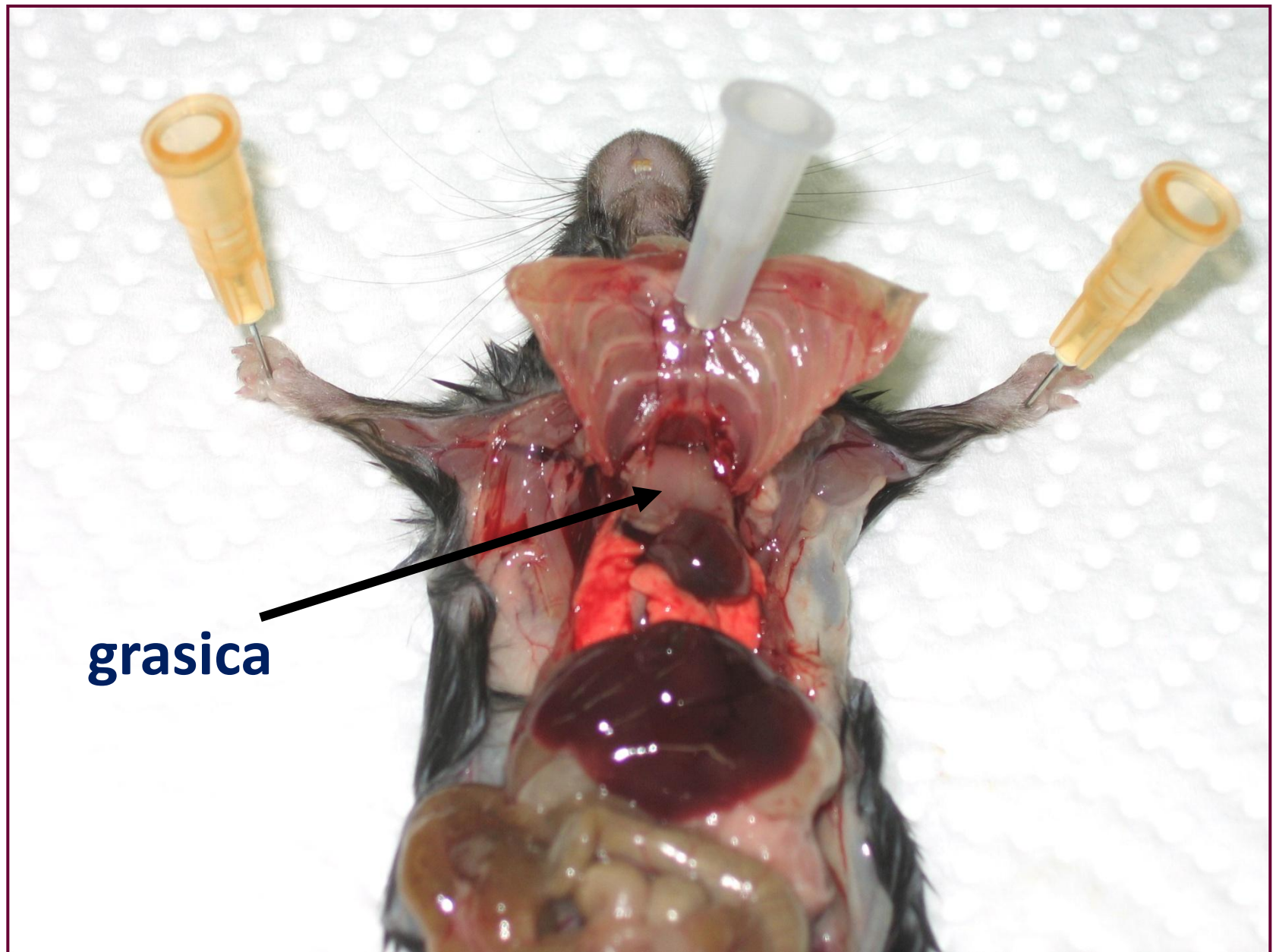


Figure 7-9 Immunobiology, 6/e. (© Garland Science 2005)



grasica

Budowa grasicy

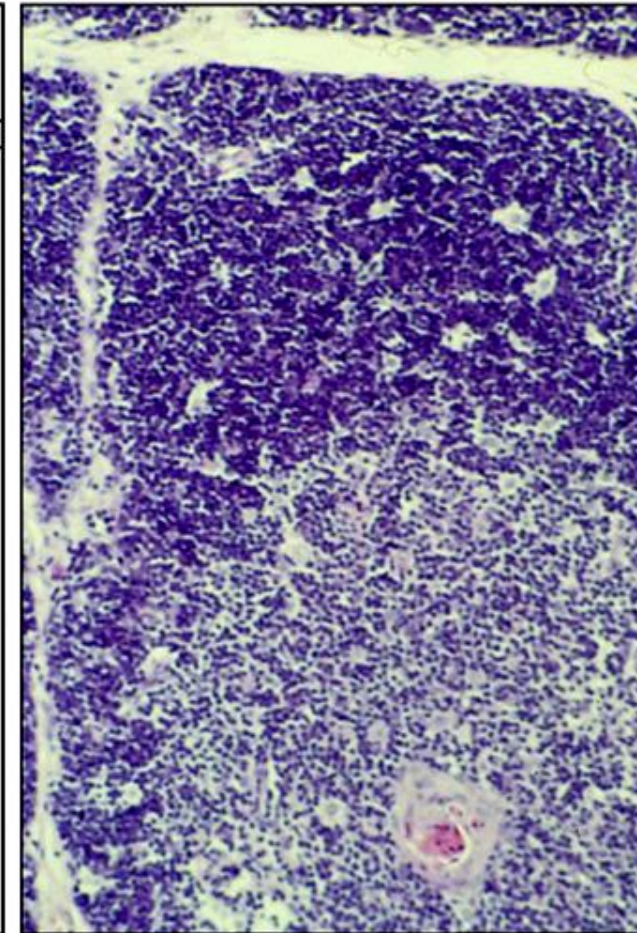
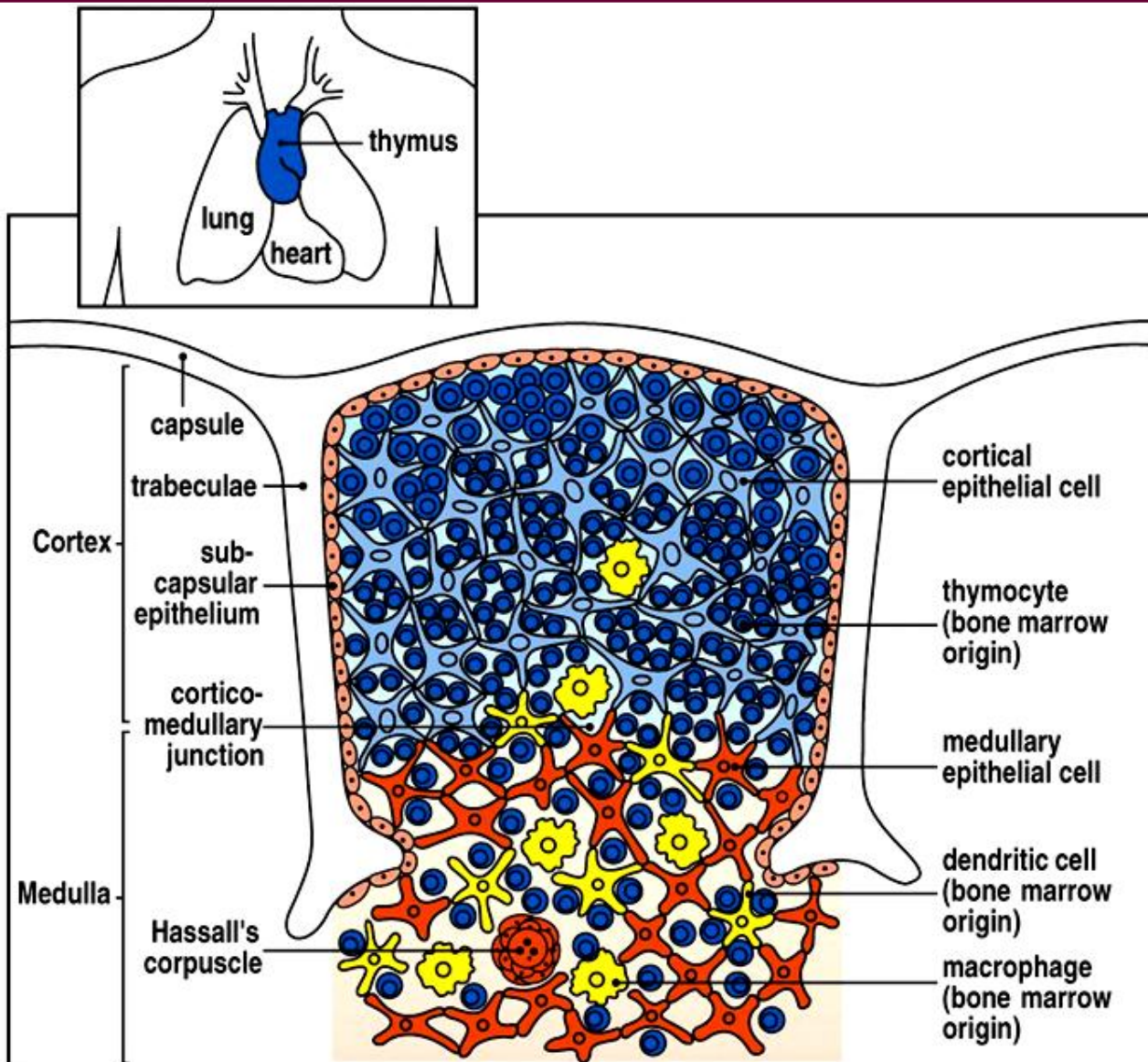


Figure 7-8 Immunobiology, 6/e. (© Garland Science 2005)

Rozmieszczenie tymocytów w grasicy w zależności od stadium rozwoju

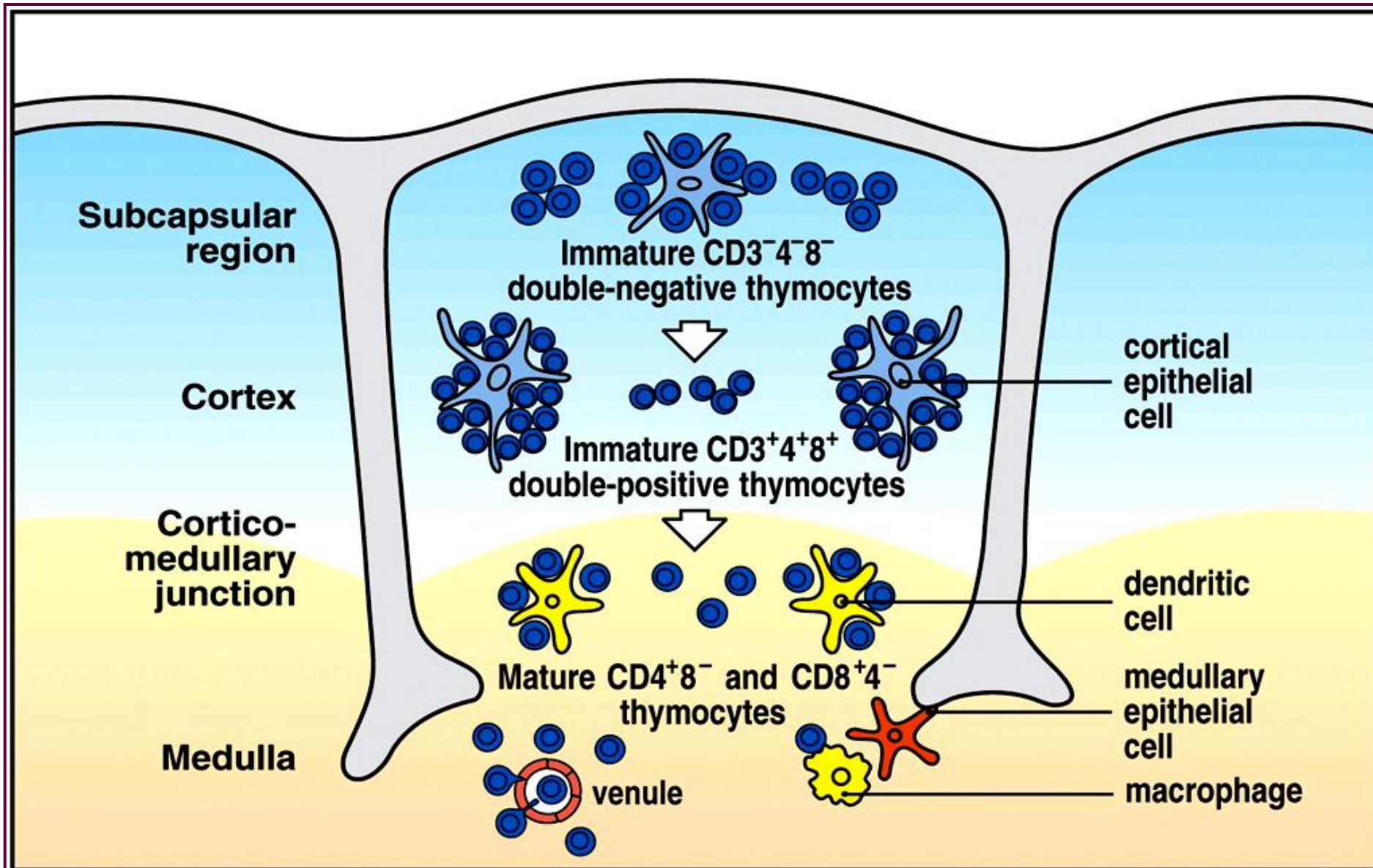
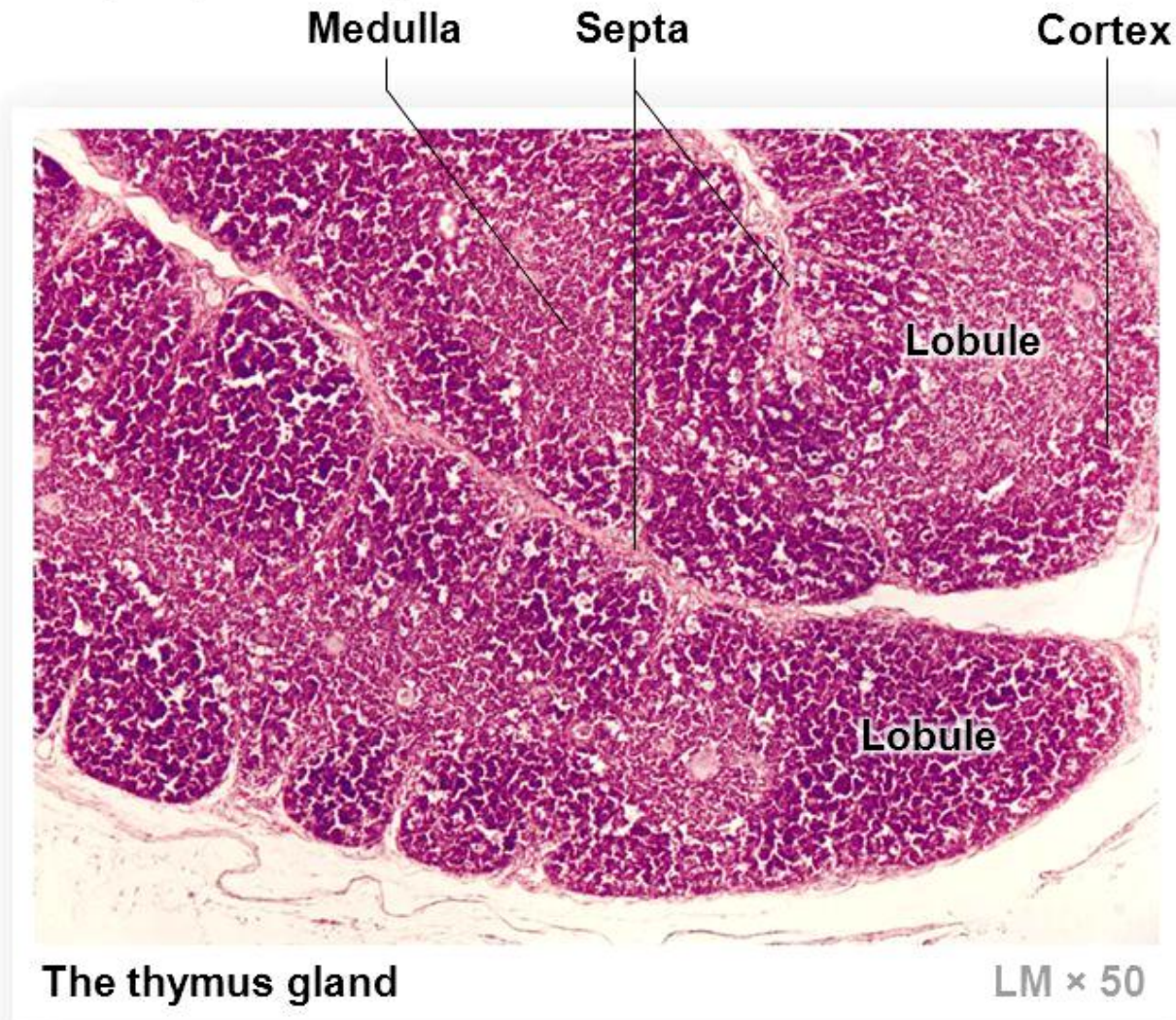


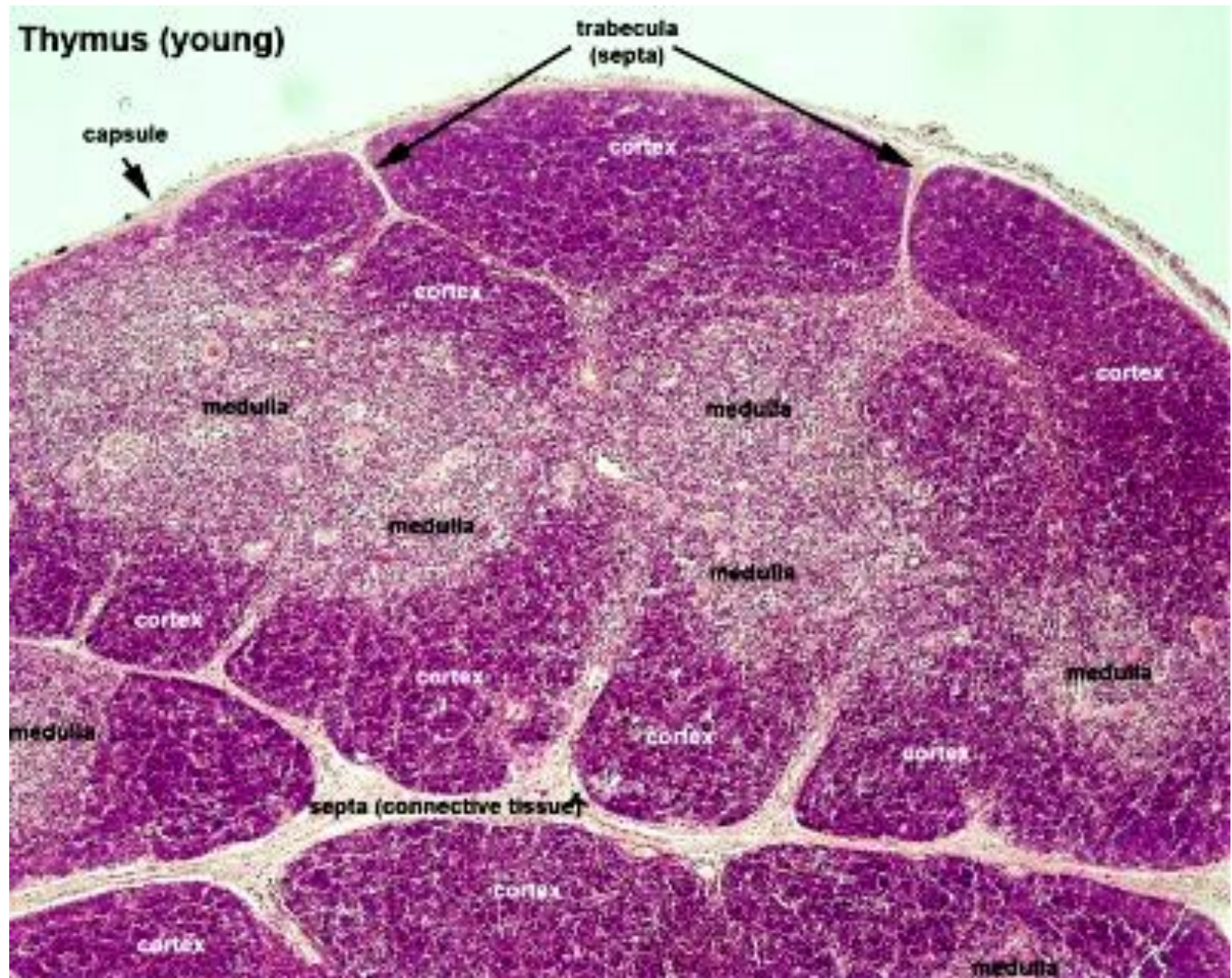
Figure 7-14 Immunobiology, 6/e. (© Garland Science 2005)

Figure 23.15c Anatomy and Histological Organization of the Thymus

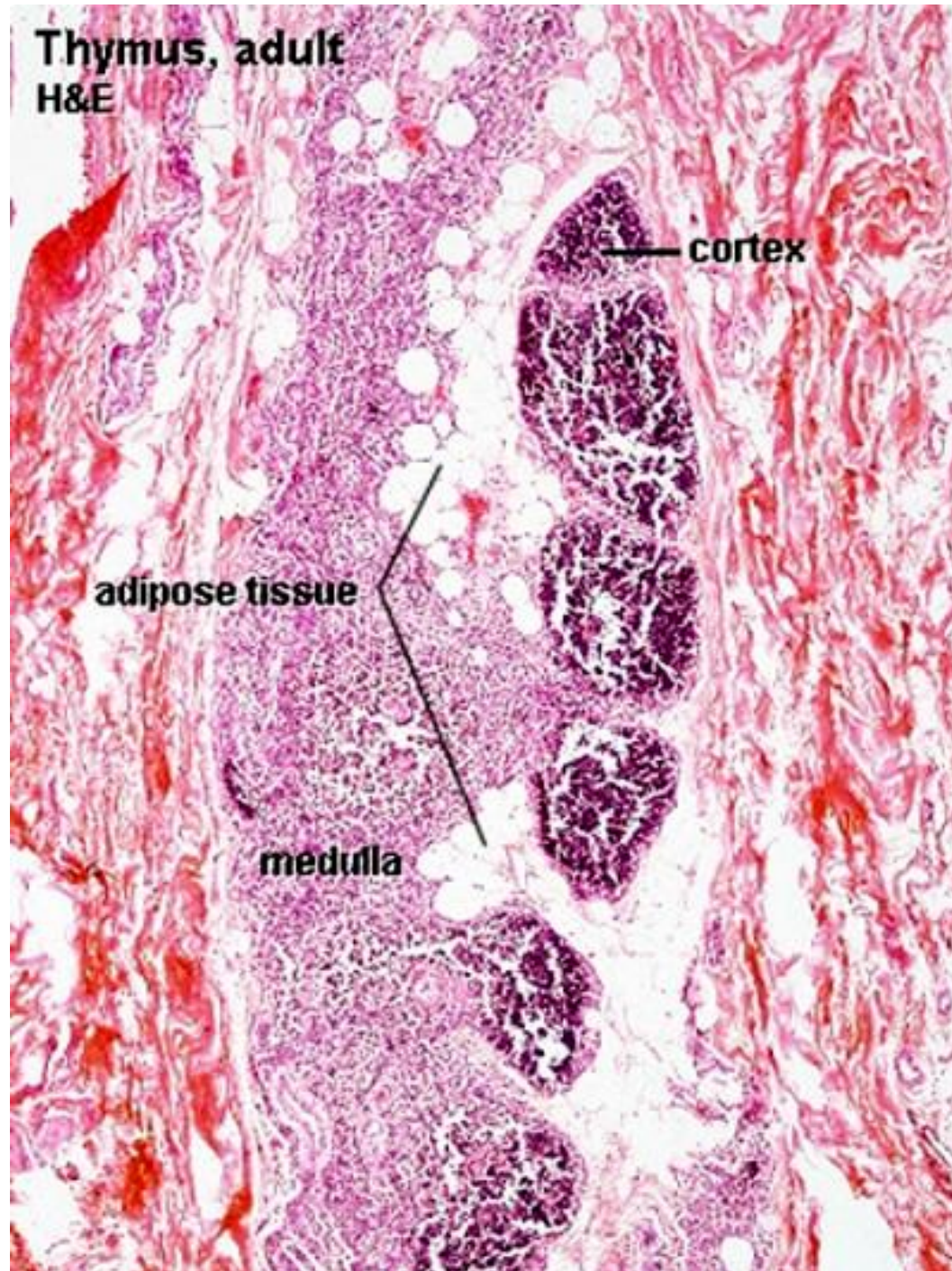


- c** Histology of the thymus. Note the fibrous septa that divide the thymic tissue into lobules resembling interconnected lymphoid nodules.

Thymus (young)



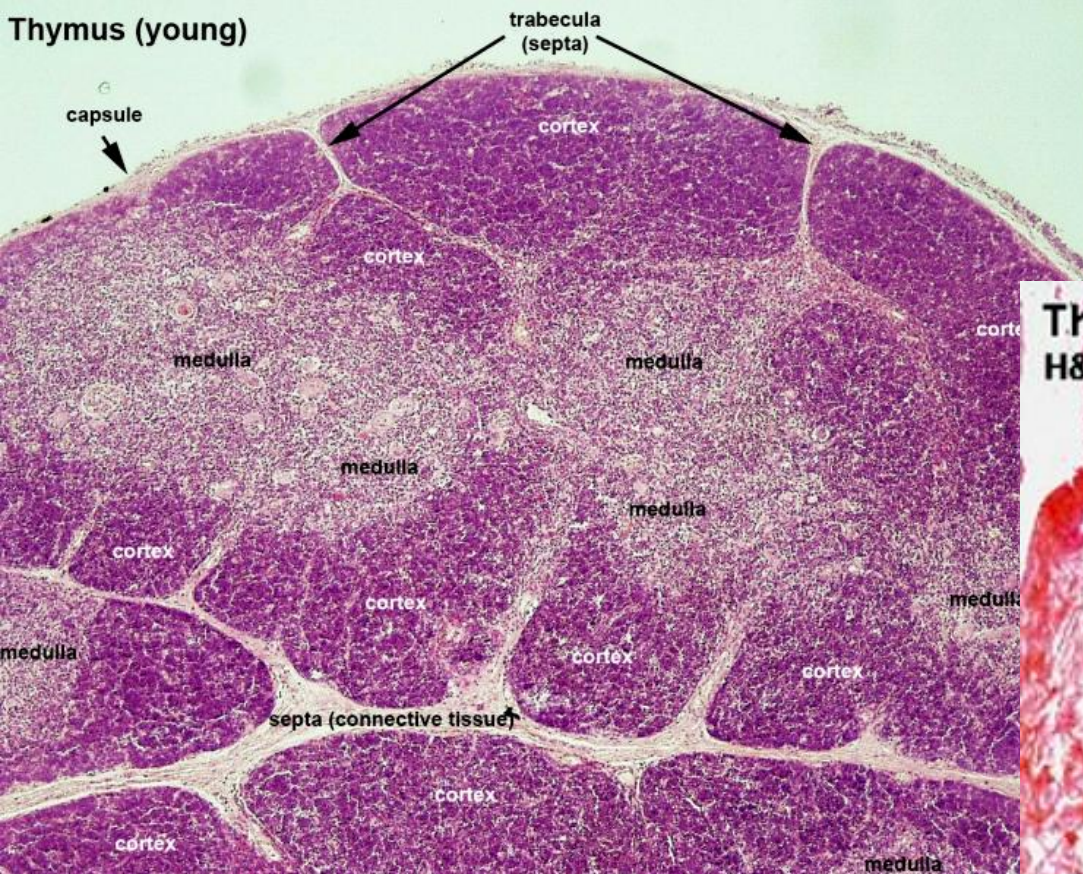
Thymus, adult
H&E



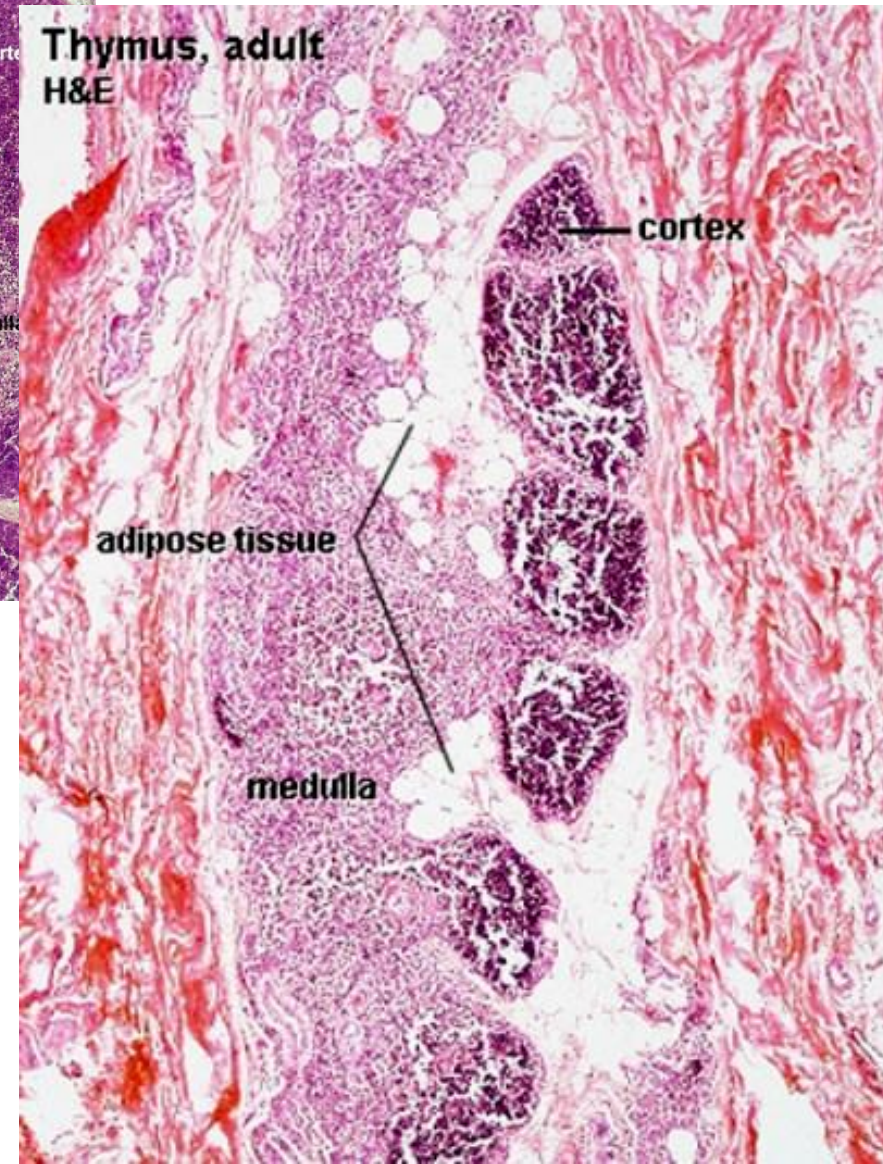
cortex

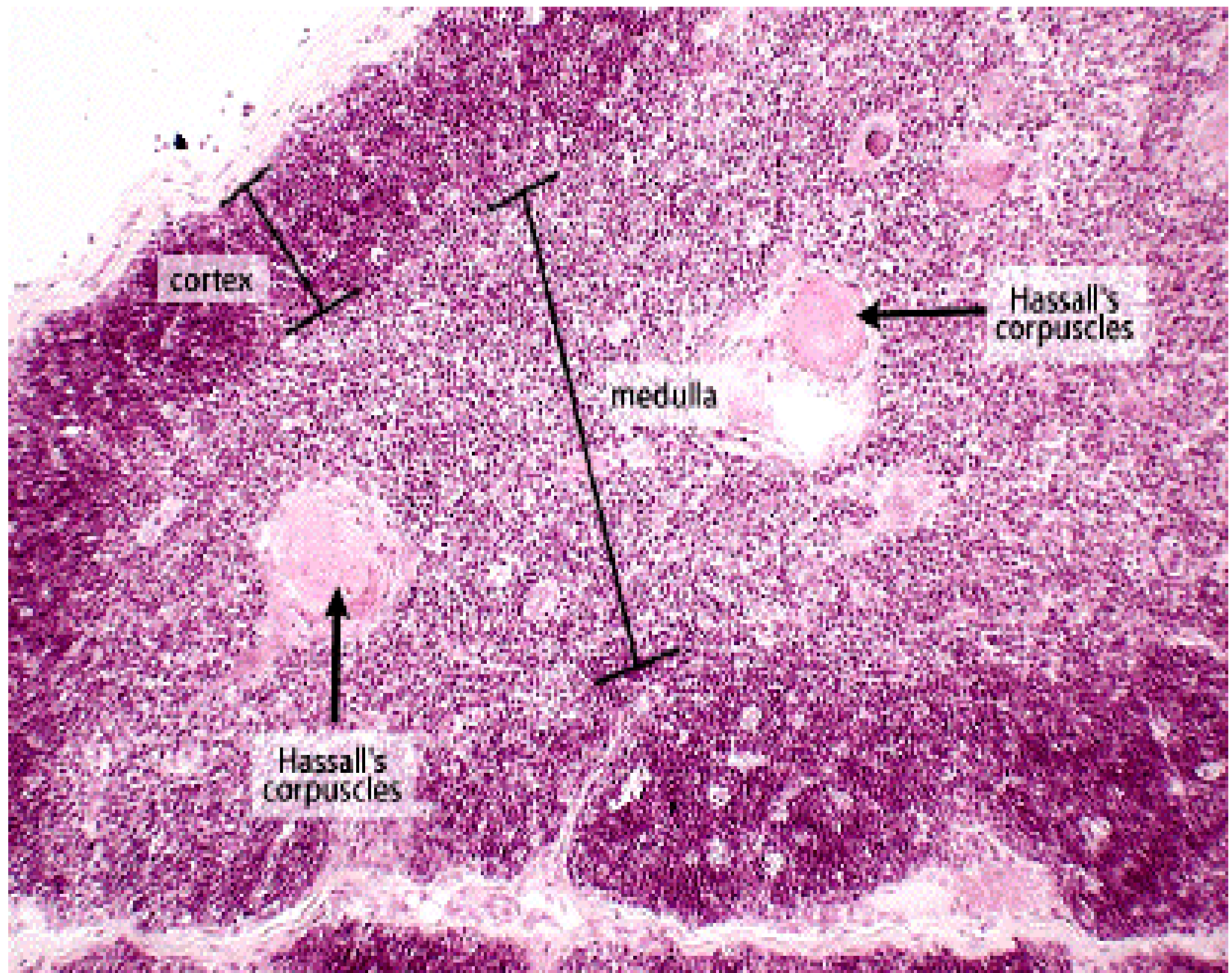
adipose tissue

medulla



grasica





**Obwodowe narządy limfoidalne:
węzeł chłonny (limfatyczny)
śledziona**

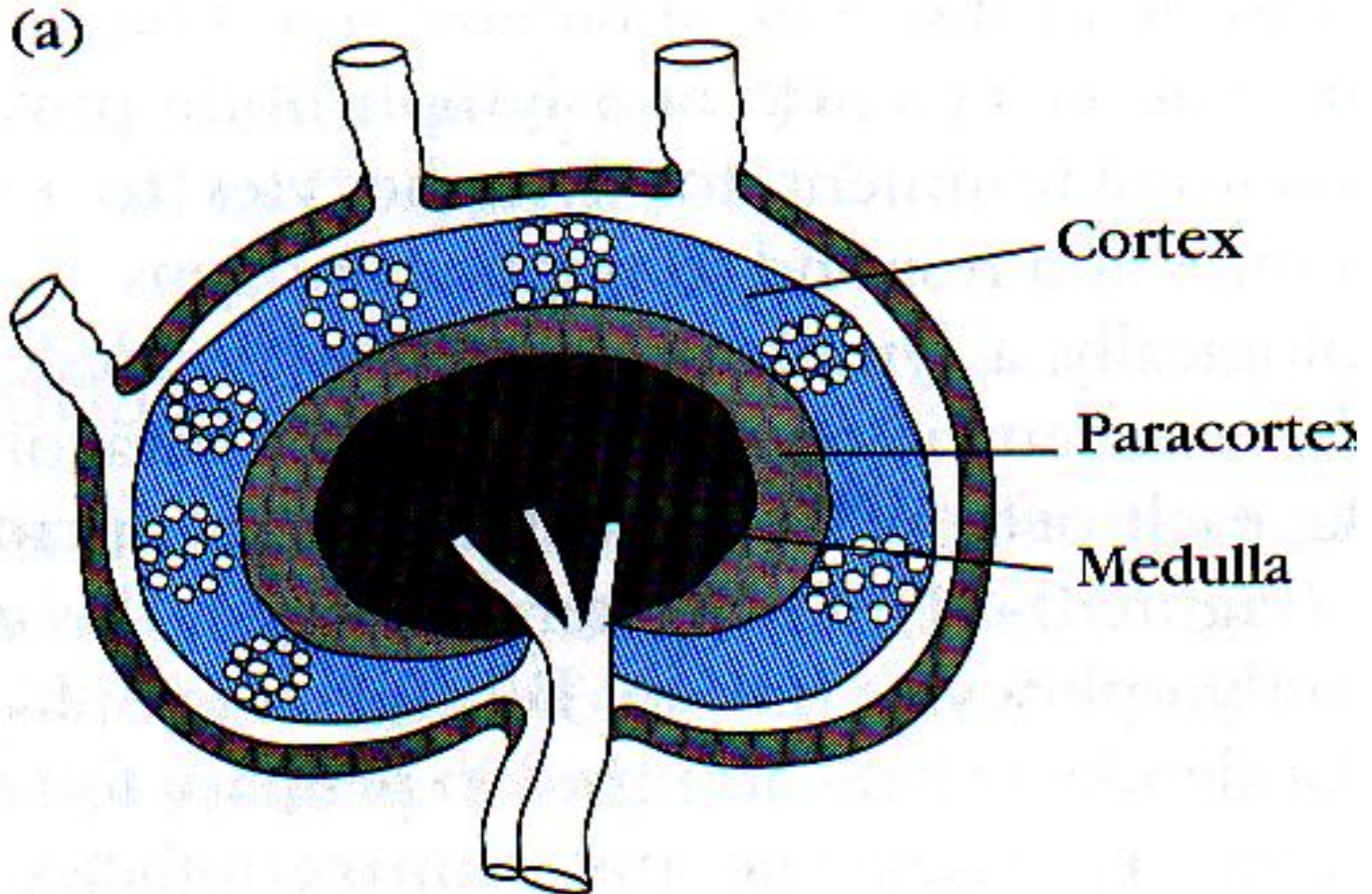
Funkcje węzłów limfatycznych

Węzły limfatyczne to typowe narządy limfoidalne.

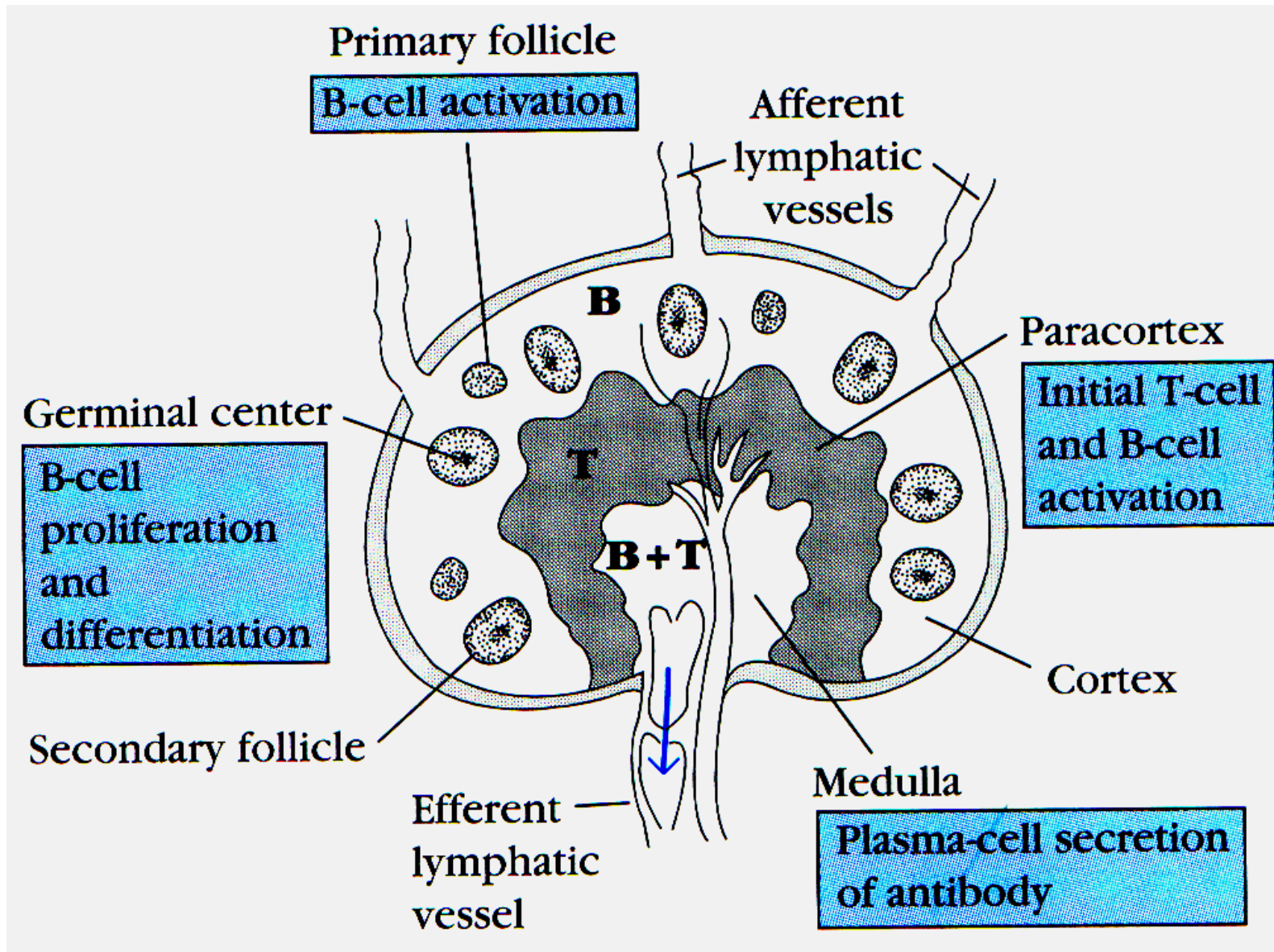
- filtracja limfy (drobne cząstki stałe, antygeny wolne i zaadsorbowane na powierzchni komórek, mikroorganizmy, komórki nowotworowe)
 - aktywacja limfocytów T i B
 - udział w odpowiedzi immunologicznej



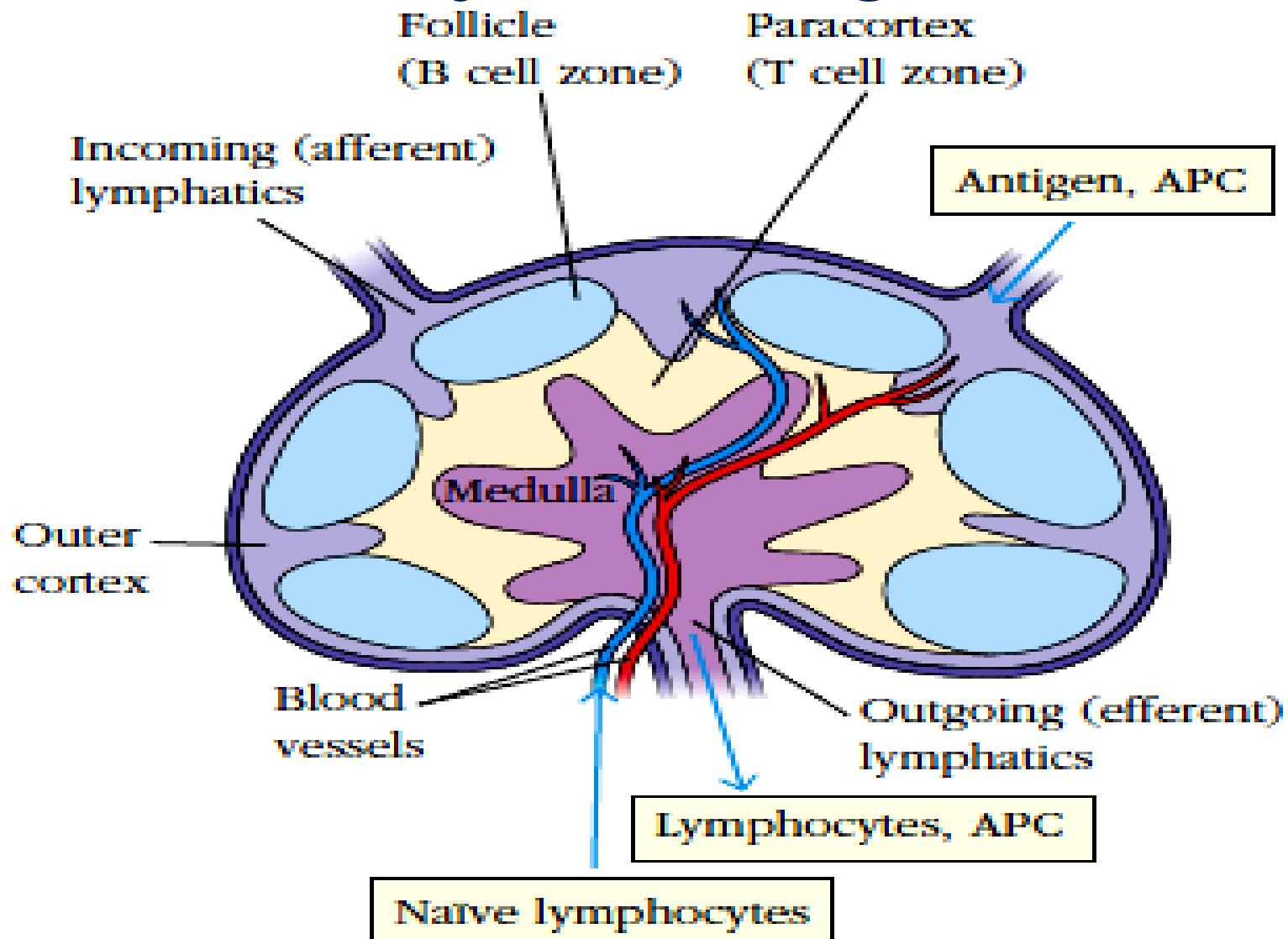
Schematyczna, trzywarstwowa budowa węzła chłonnego

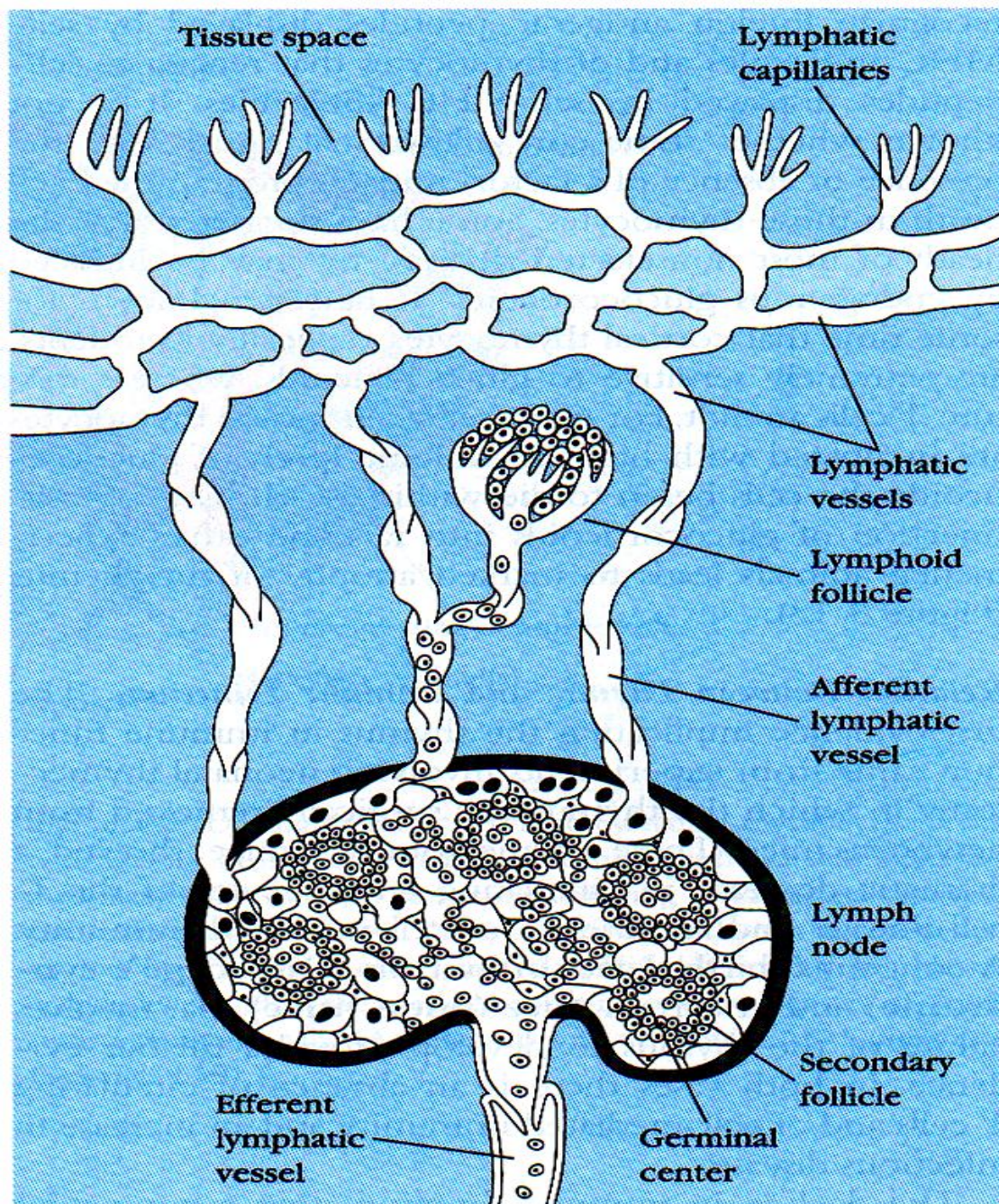


Rozmieszczenie limfocytów w węźle chłonnym



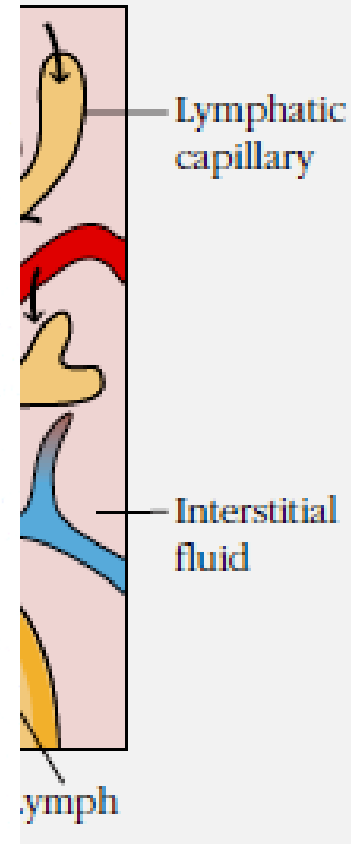
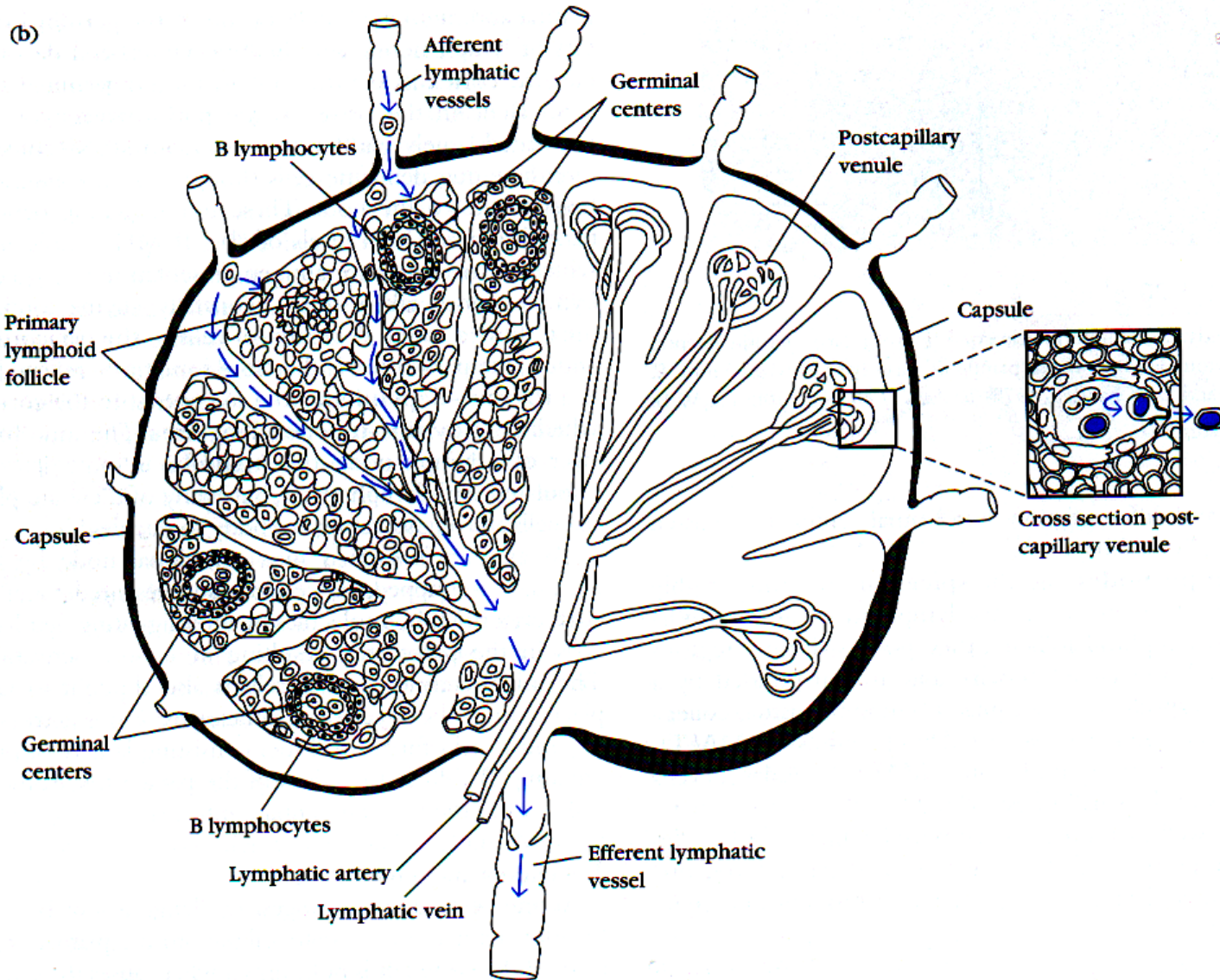
Schematyczna, trzywarstwowa budowa węzła chłonnego



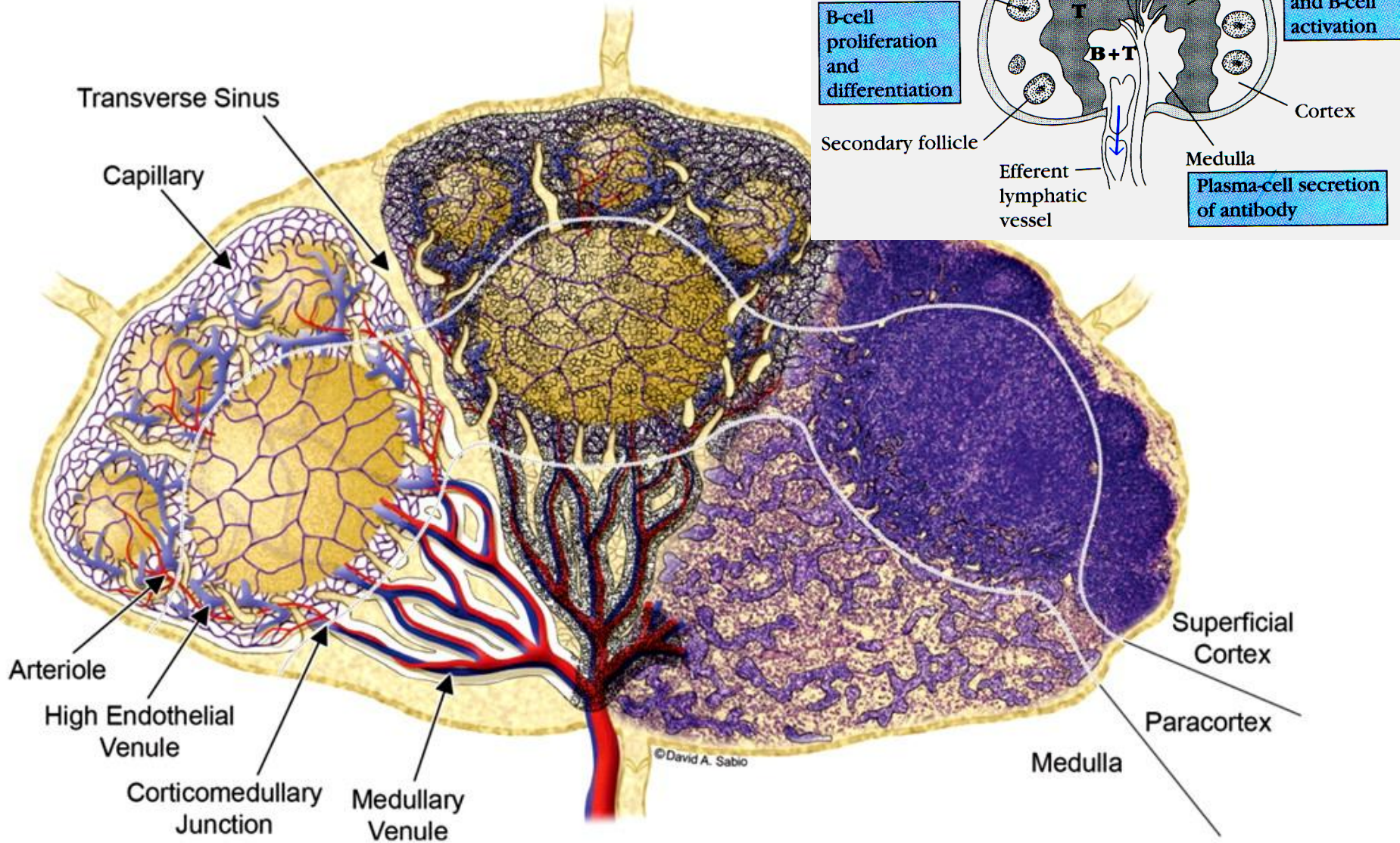


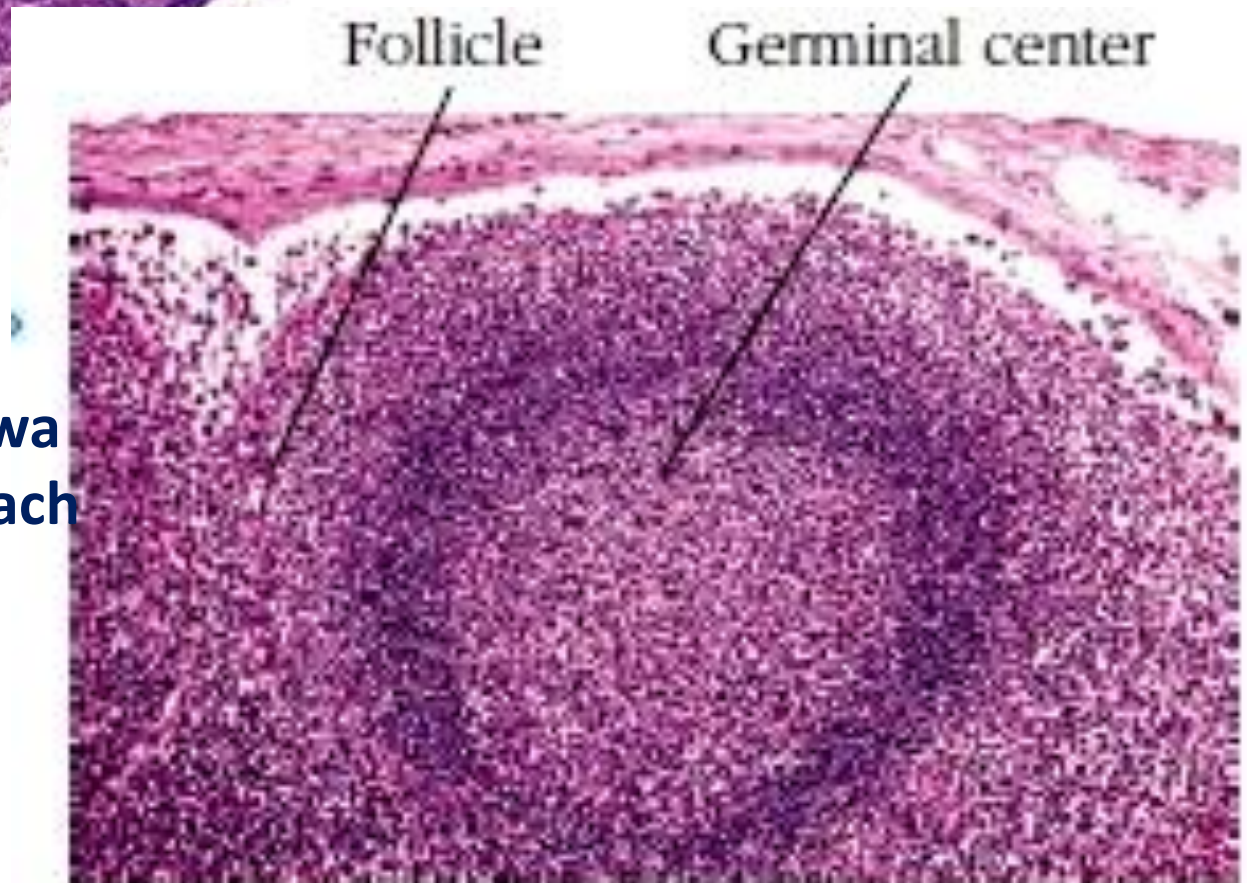
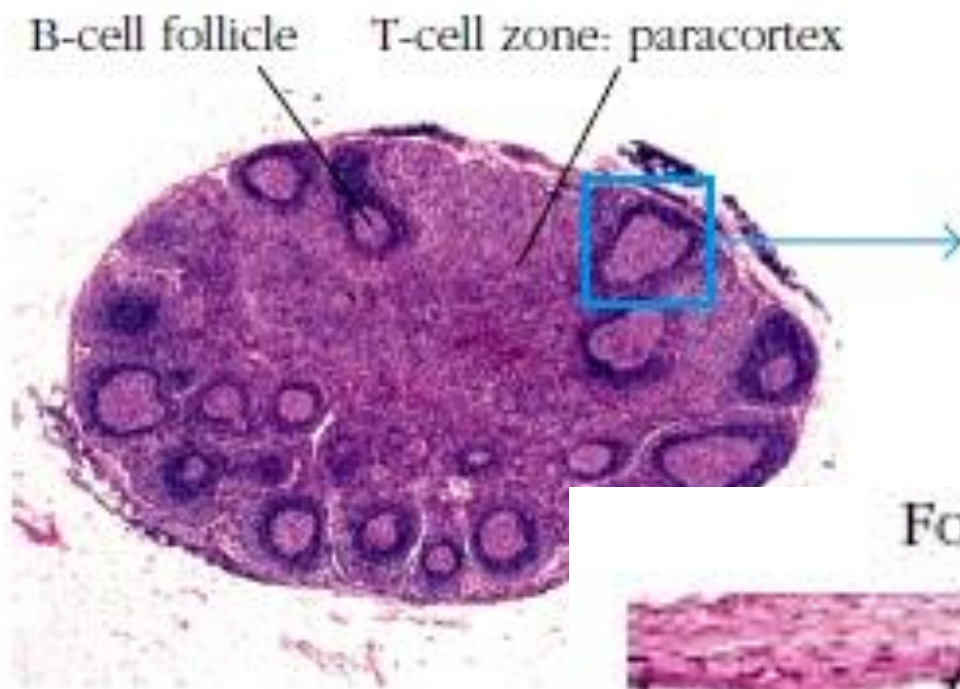
Transport limfy i komórek odpornościowych do węzła limfatycznego

Krazenie krwi i limfy w węzle chłonnym

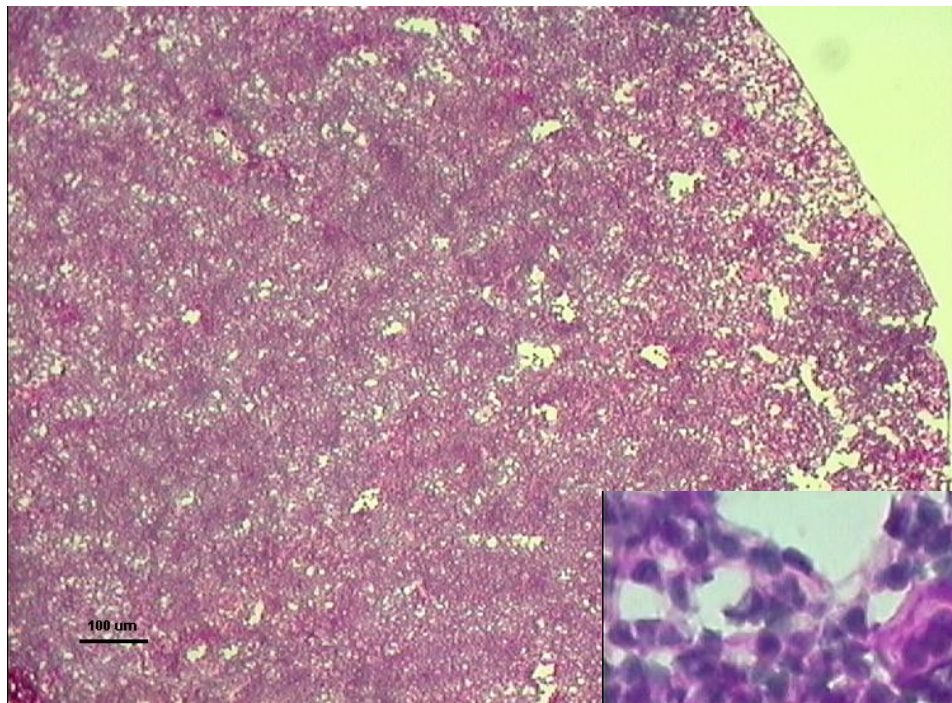


Węzeł chłonny

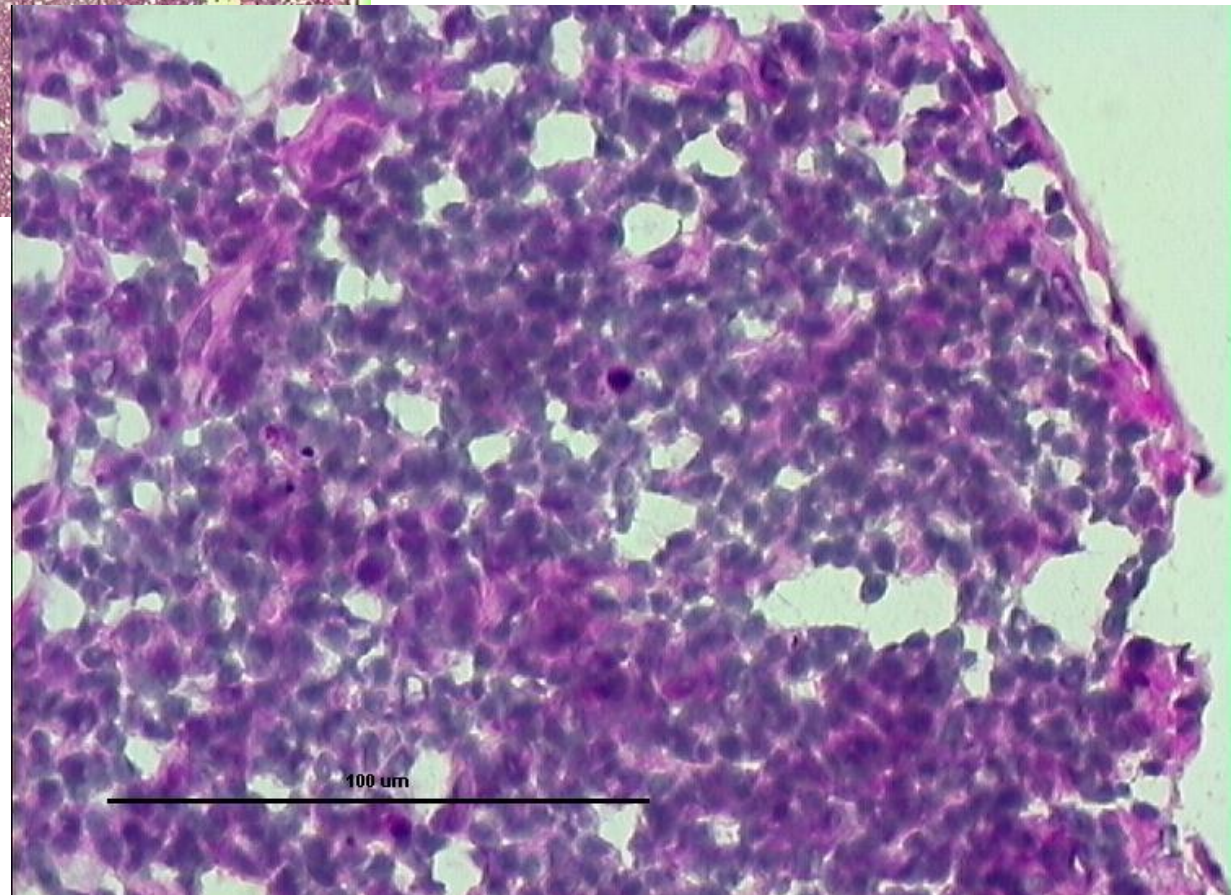




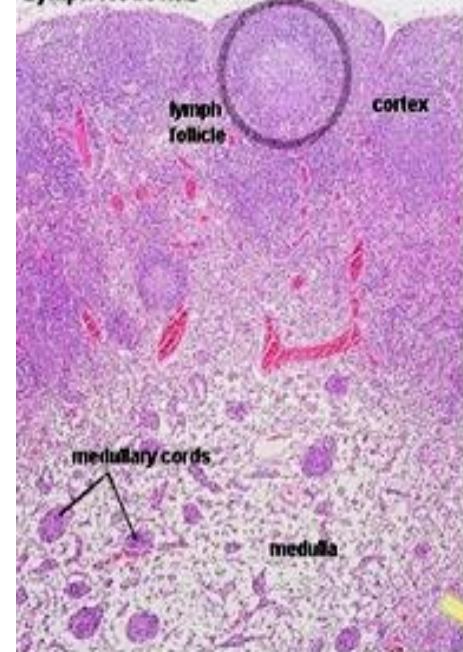
Li B – kora
 Li T – strefa przykorowa
 Ma, DC – w obu strefach
 Plazmocyty - rdzeń



Węzeł chłonny



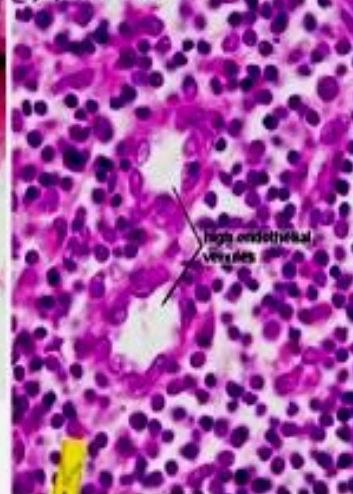
Lymph Node H&E



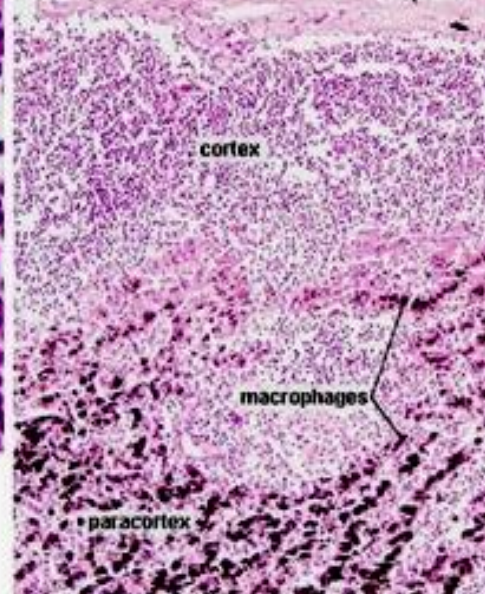
H&E - subcapsular sinus



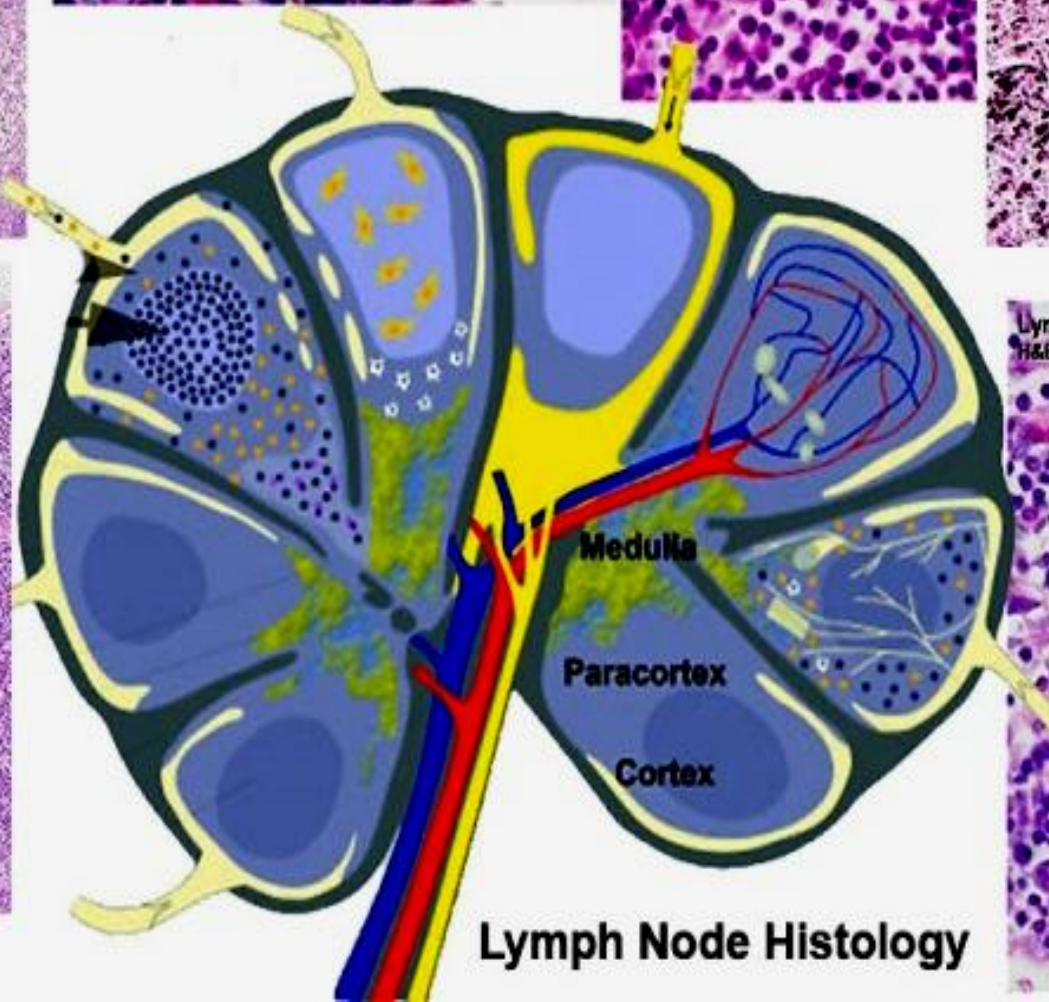
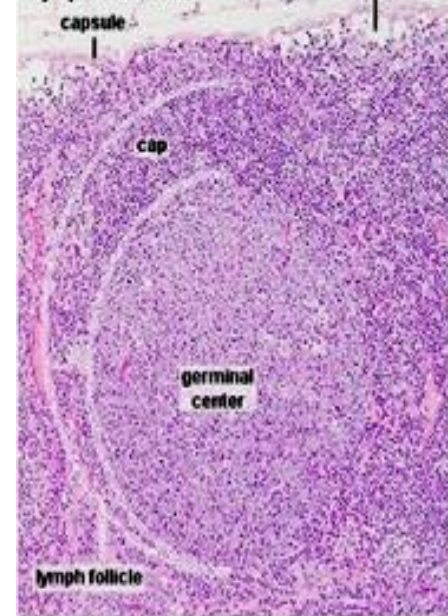
Lymph Node H&E



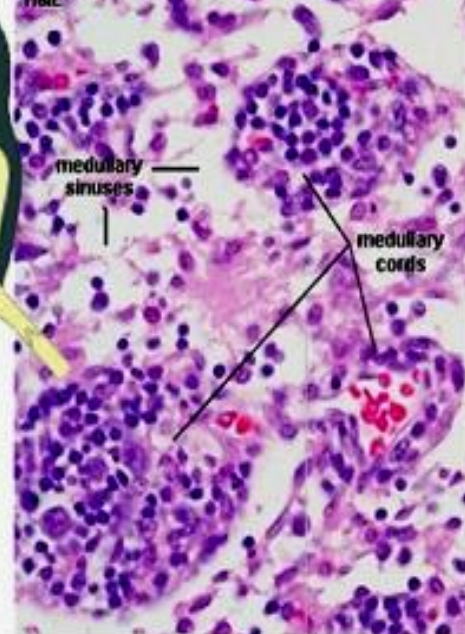
Lymph Node H&E



Lymph Node H&E



Lymph Node H&E



Lymph Node Histology

Podstawowe funkcje śledziony

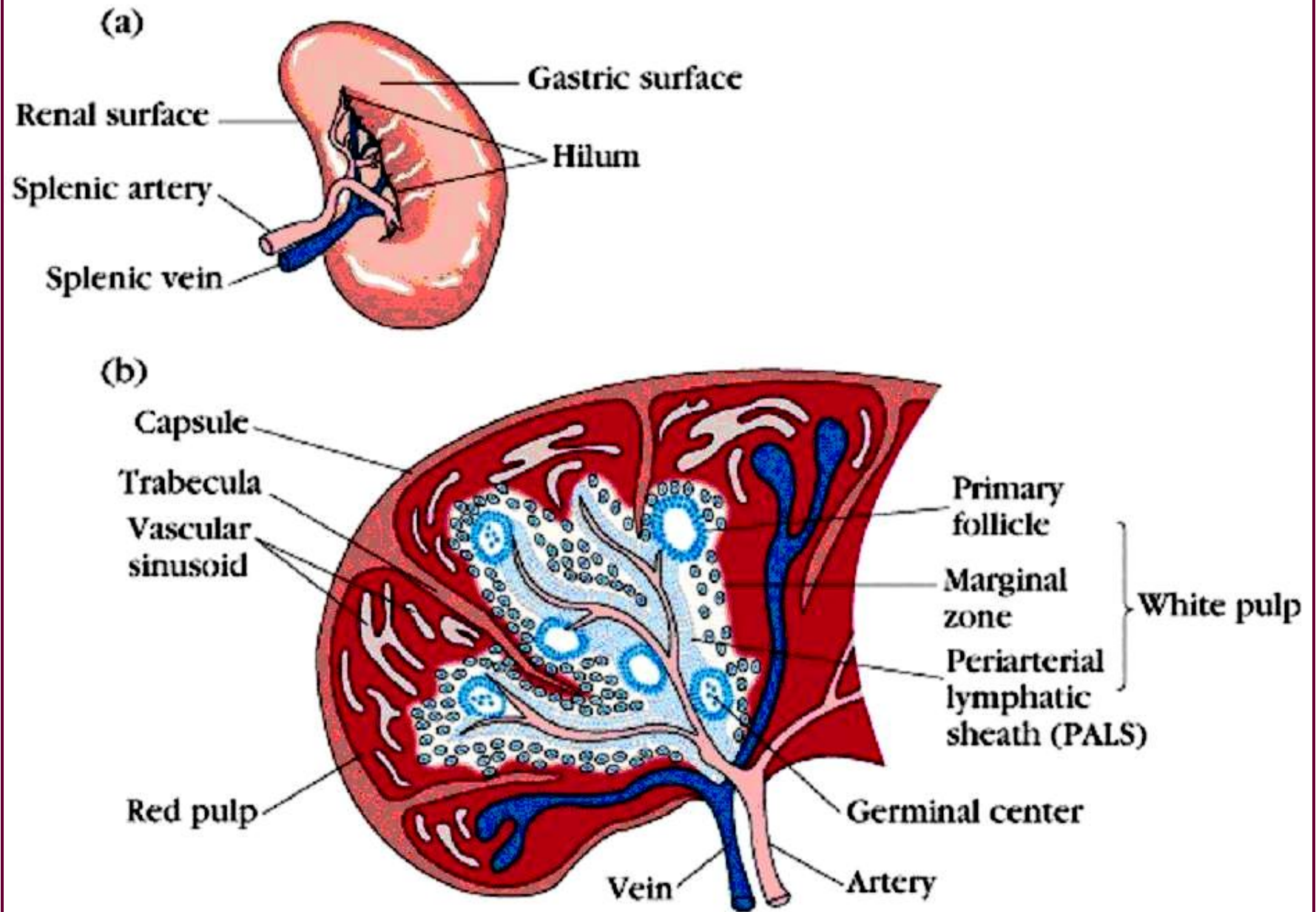
Śledziona to narząd krwiotlimfatyczny.

- magazynowanie krwi i krwinek**
- współudział w wytwarzaniu bilirubiny**
- fagocytoza erytrocytów, leukocytów i trombocytów**
- udział w odpowiedzi immunologicznej**
- wytwarzanie limfocytów i monocytów przez całe życie,
a innych krwinek w życiu płodowym**
 - filtracja krwi**

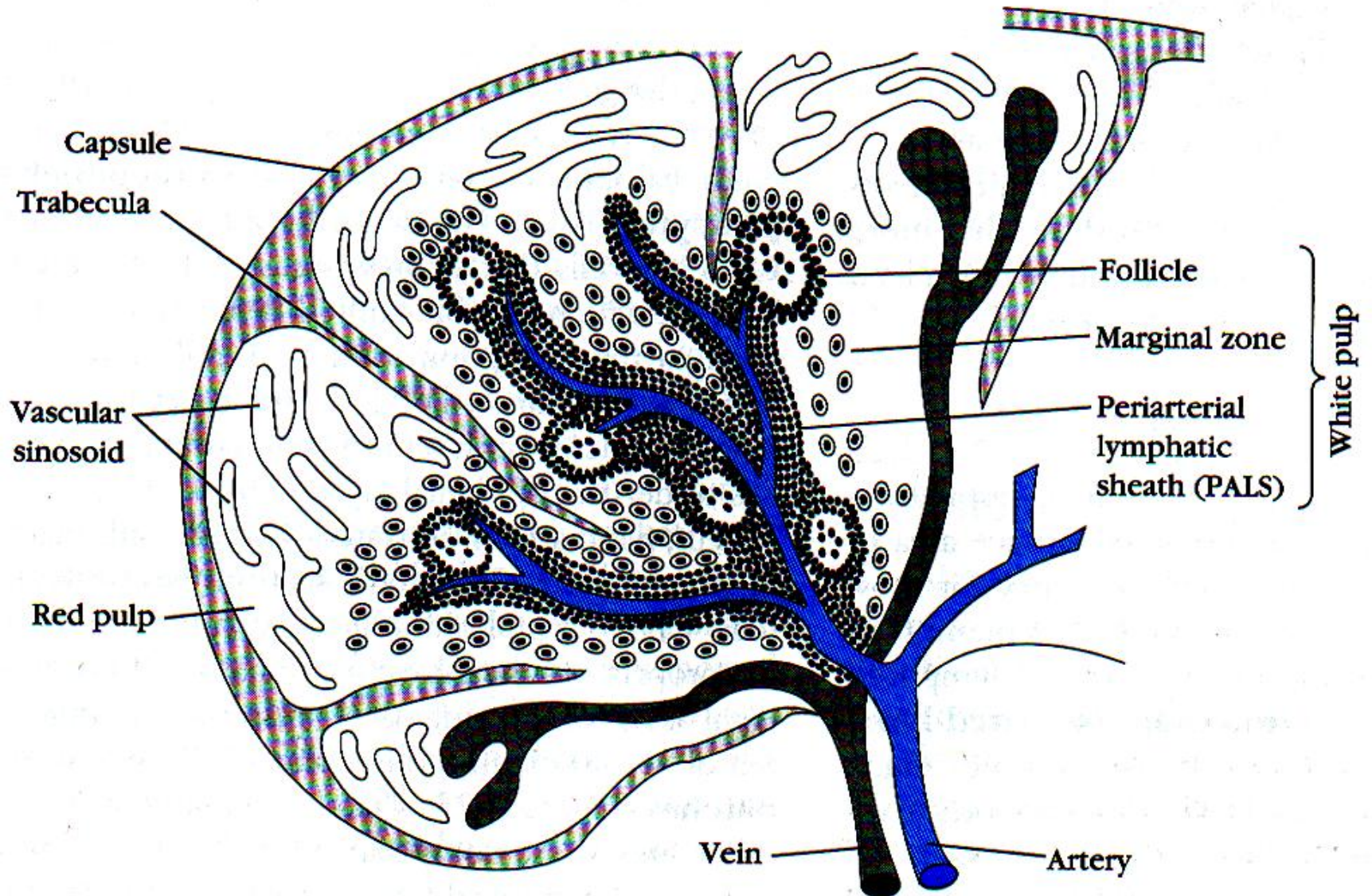


śledziona

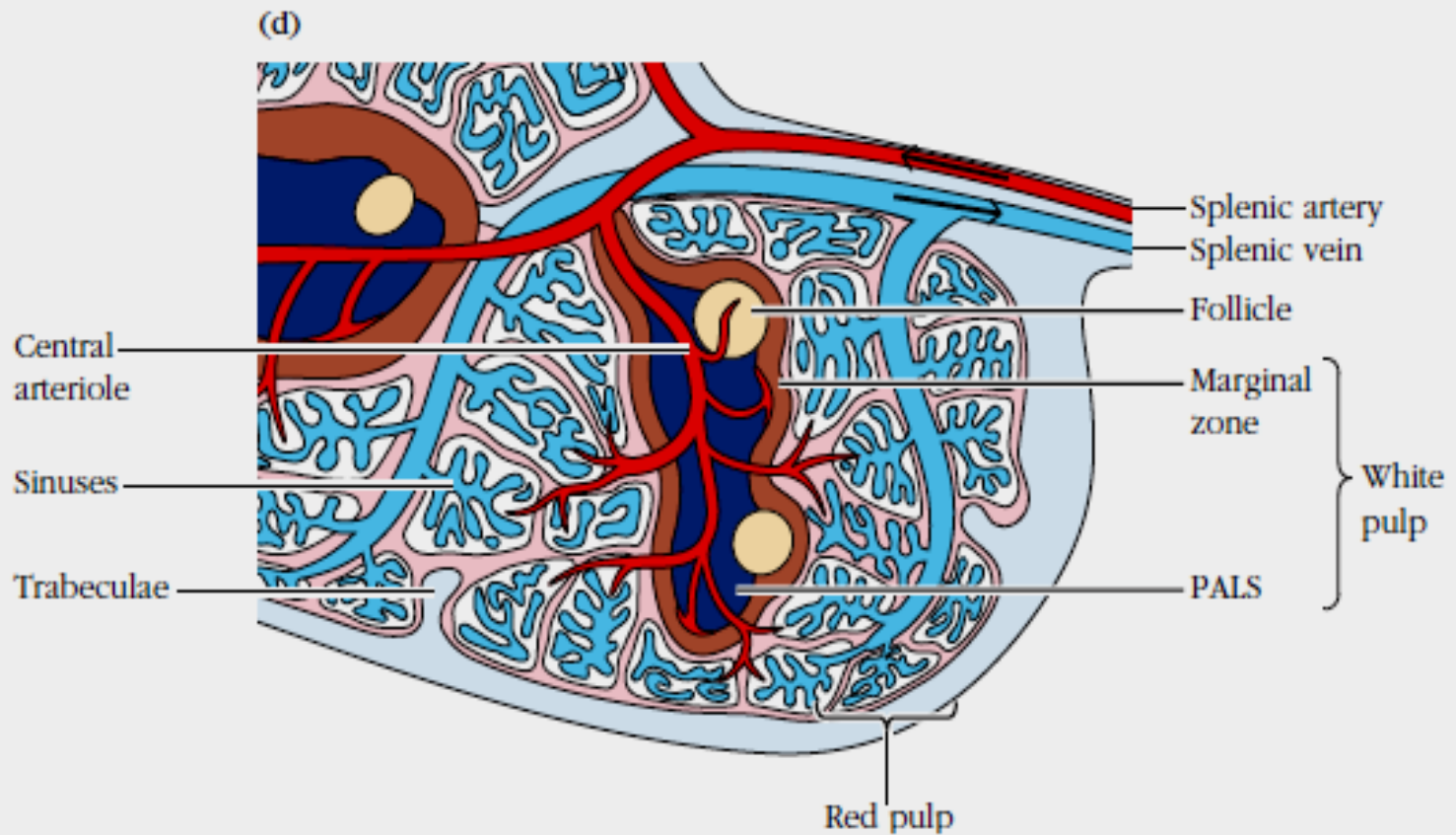
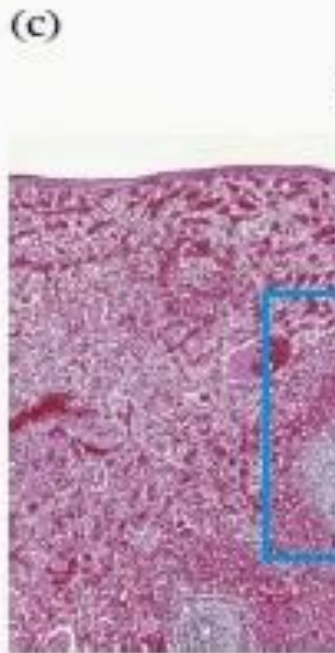
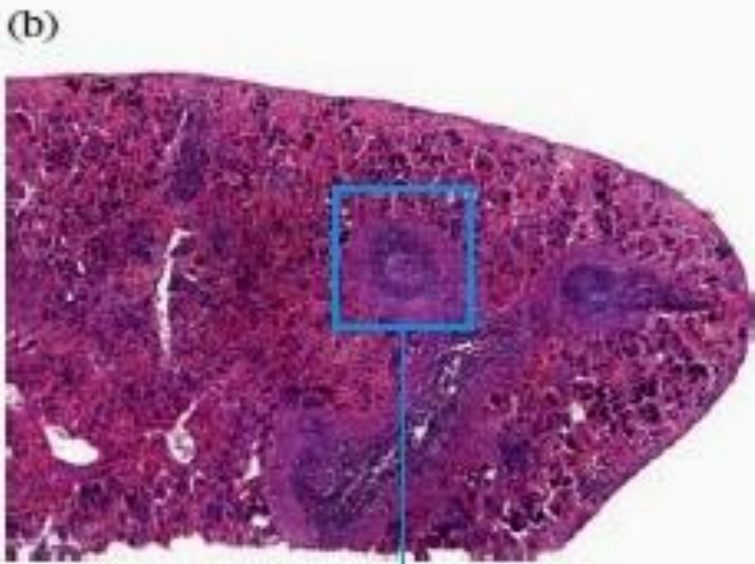
Śledziona

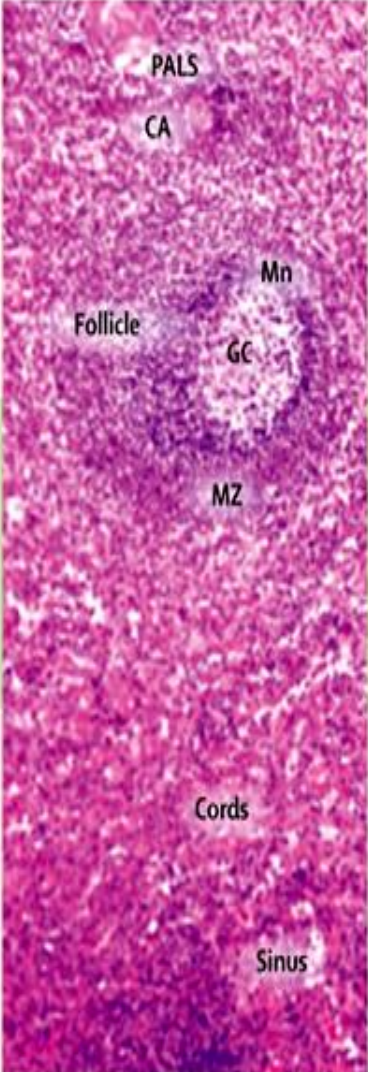
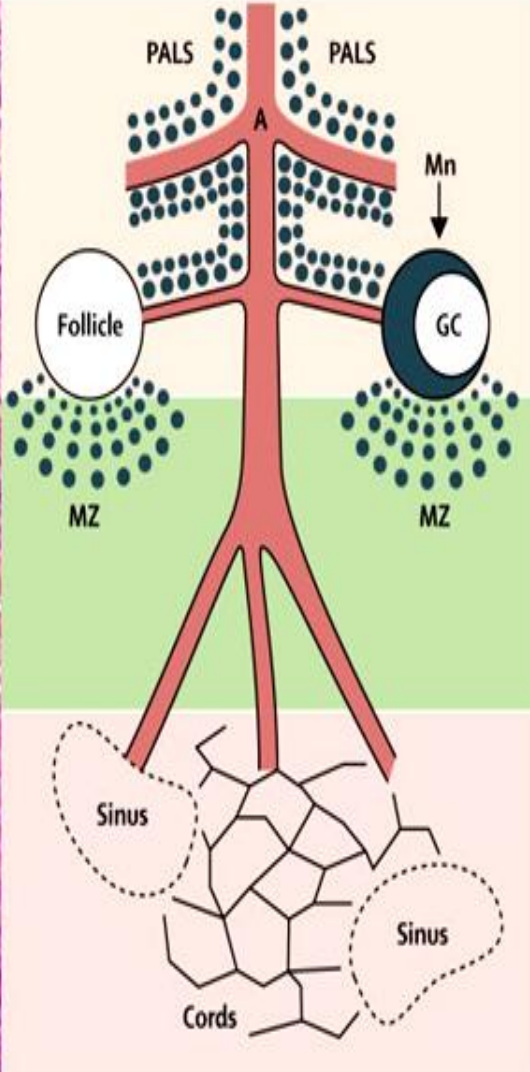


Przekrój przez śledzionę



Budowa śledziony



Compartment	Histology	Structure	Function	Cell
White pulp			Adaptive response (antigen specific) consequent to interaction between antigen-presenting cells (dendritic cells or marginal zone B lymphocytes) and B lymphocytes or T lymphocytes	PALS (T-cell dependent) Small CD4 ⁺ T lymphocytes Dendritic cells B lymphocytes Macrophages Plasma cells Follicle (B-cell dependent) B lymphocytes or plasma cells Dendritic cells
Marginal zone			Innate response (first-line defence, non-antigen specific) characterised by IgM-memory B-lymphocyte production of natural antibodies	Resident B lymphocytes Macrophages In transit CD4 ⁺ T lymphocytes CD27 ⁺ memory B lymphocytes Dendritic cells
Red pulp			Innate response characterised by activation of macrophages in cords Adaptive response characterised by plasma-cell migration from the white pulp after antigen-specific differentiation in follicles Blood filter (pitting, culling)	Cords of Billroth CD8 ⁺ T lymphocytes Fibroblasts Macrophages Natural killer cells Sinusoids CD8 ⁺ endothelial cells

<http://imgarcade.com/1/spleen-histology-pals/>

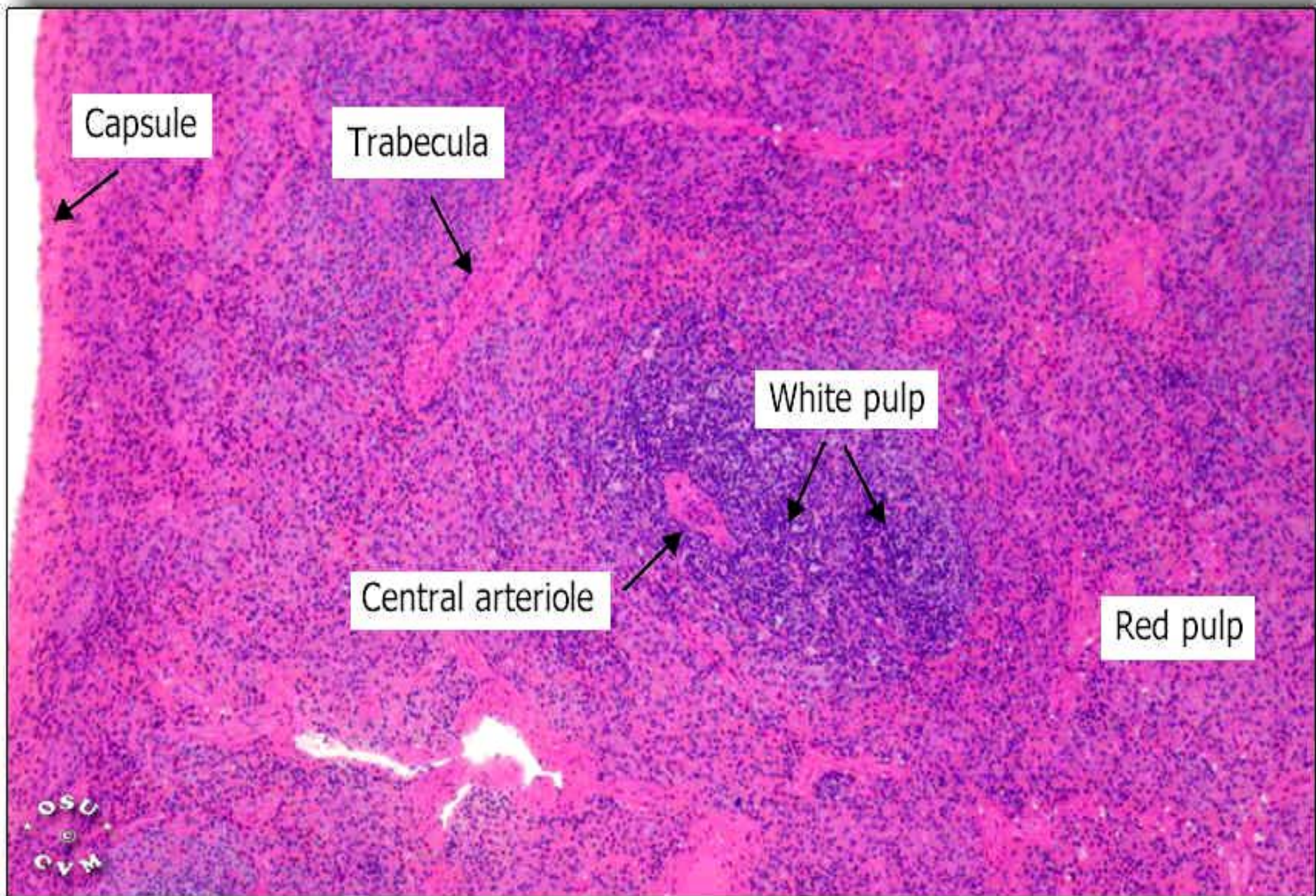
Capsule

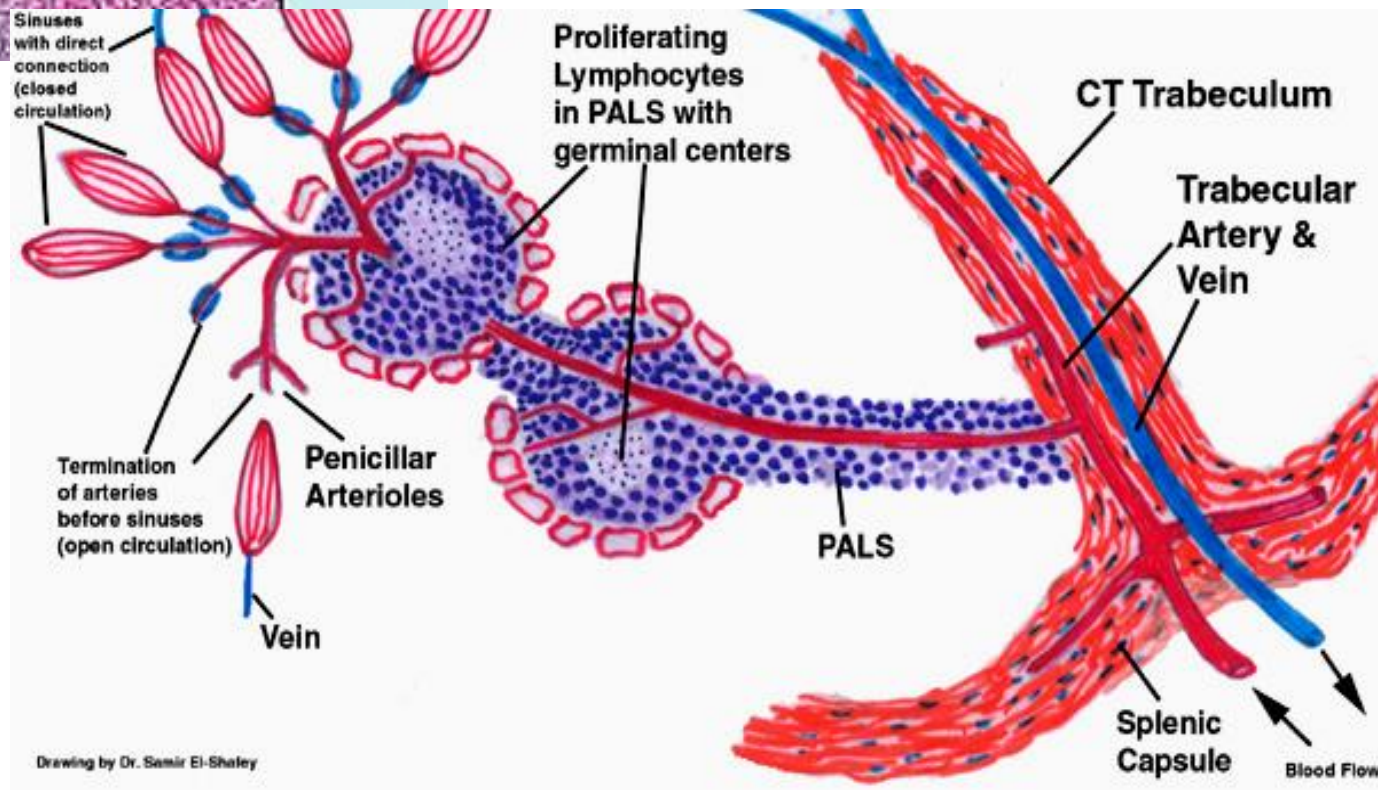
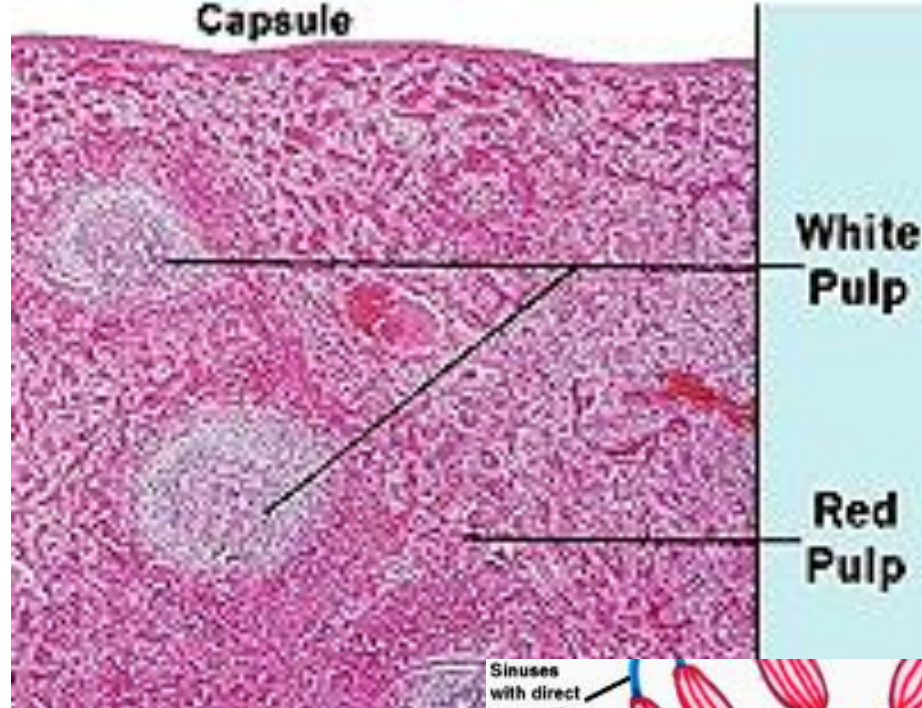
Trabecula

White pulp

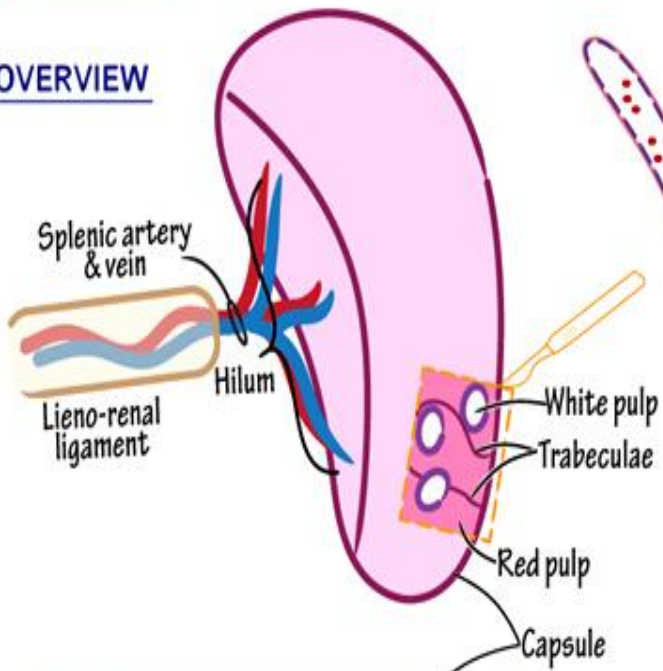
Central arteriole

Red pulp

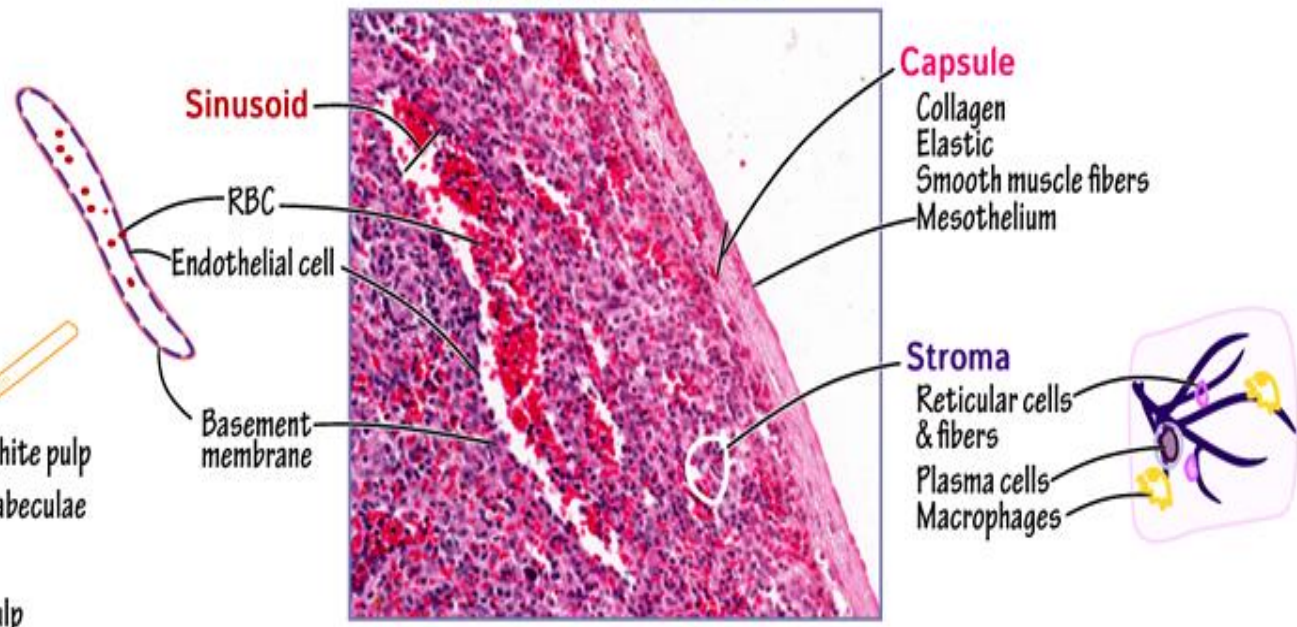




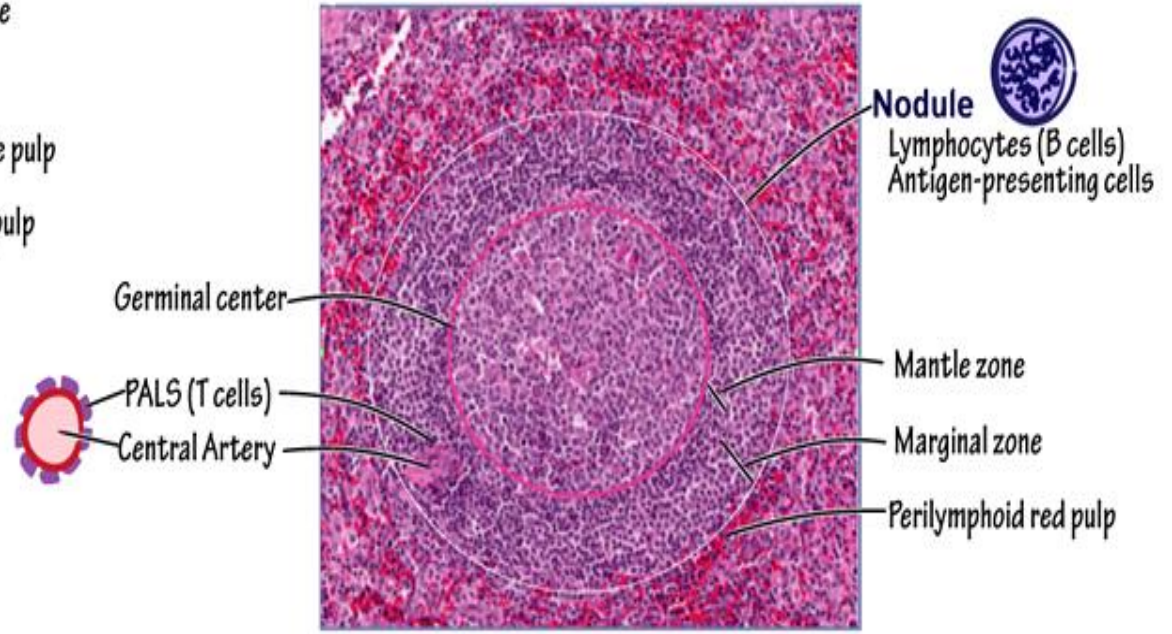
OVERVIEW

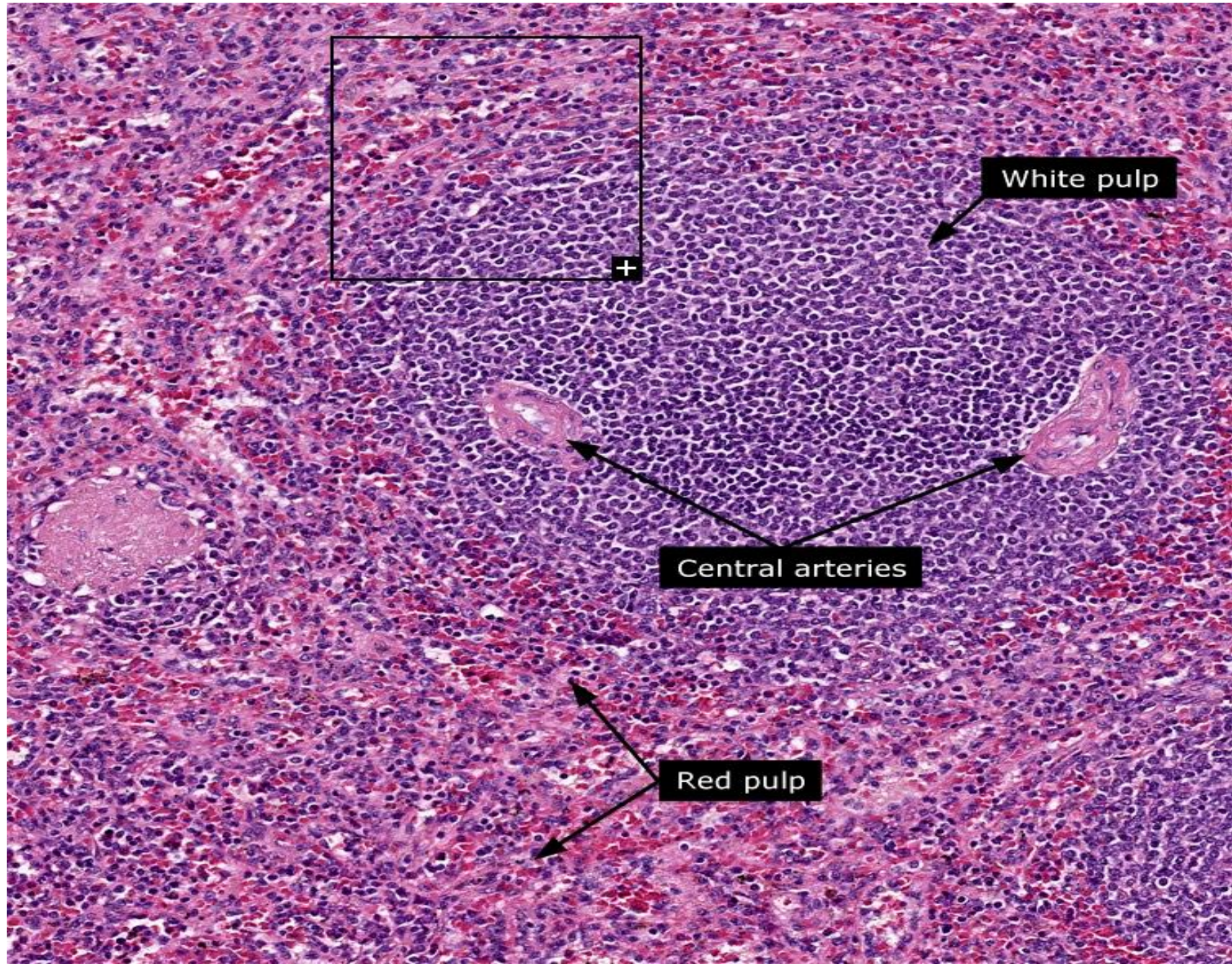


CAPSULE & RED PULP



WHITE PULP



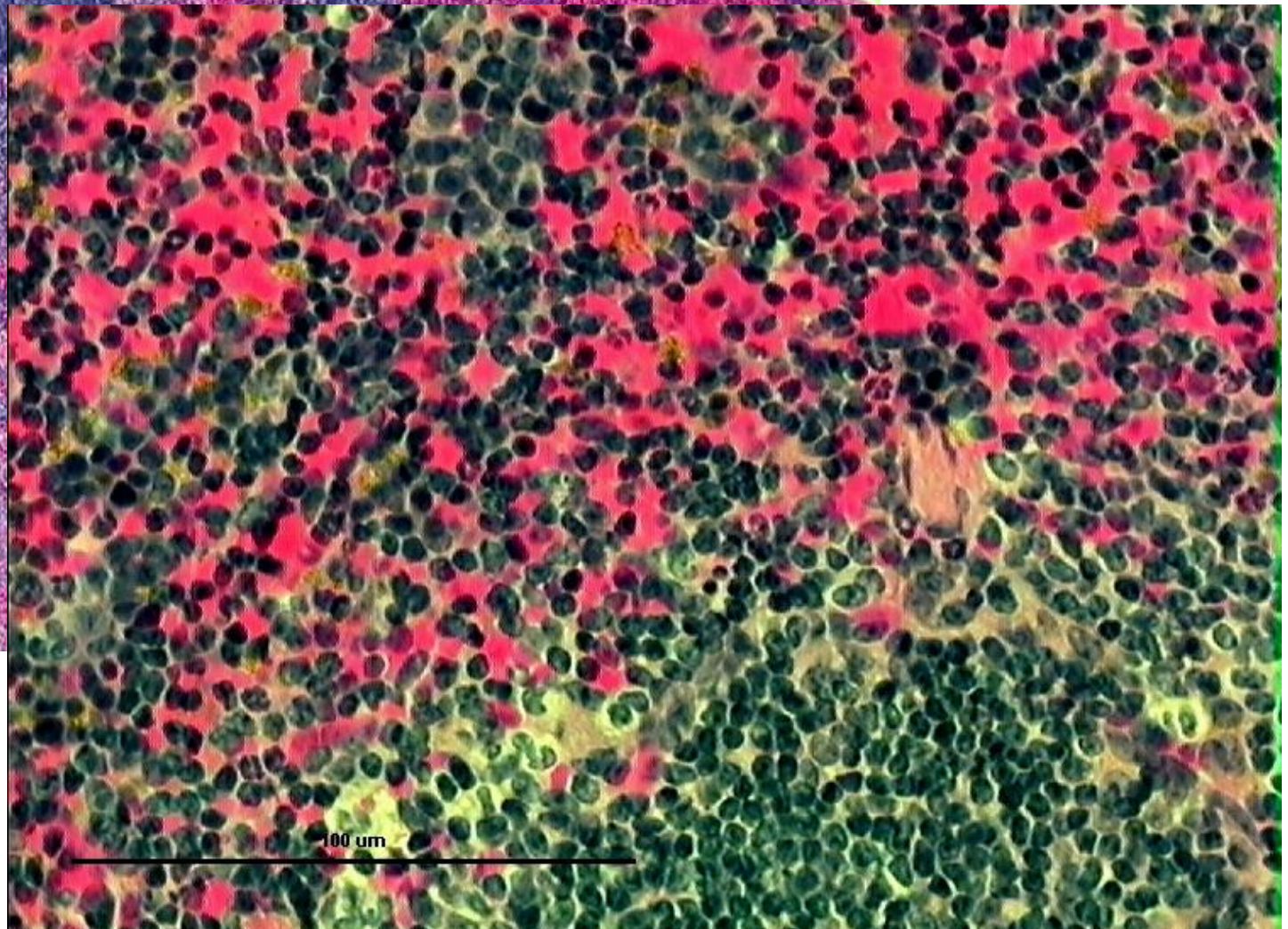
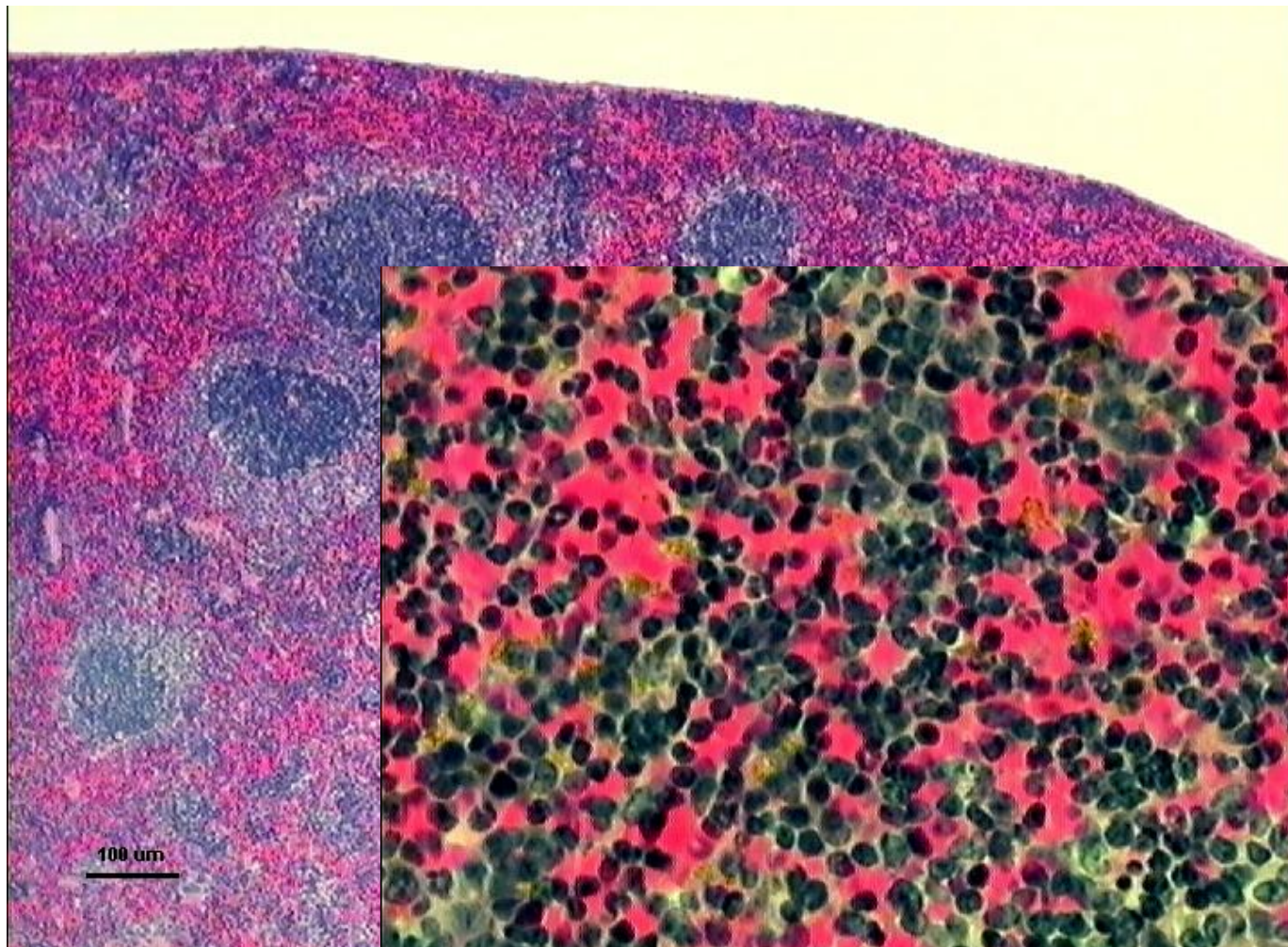


White pulp

Central arteries

Red pulp

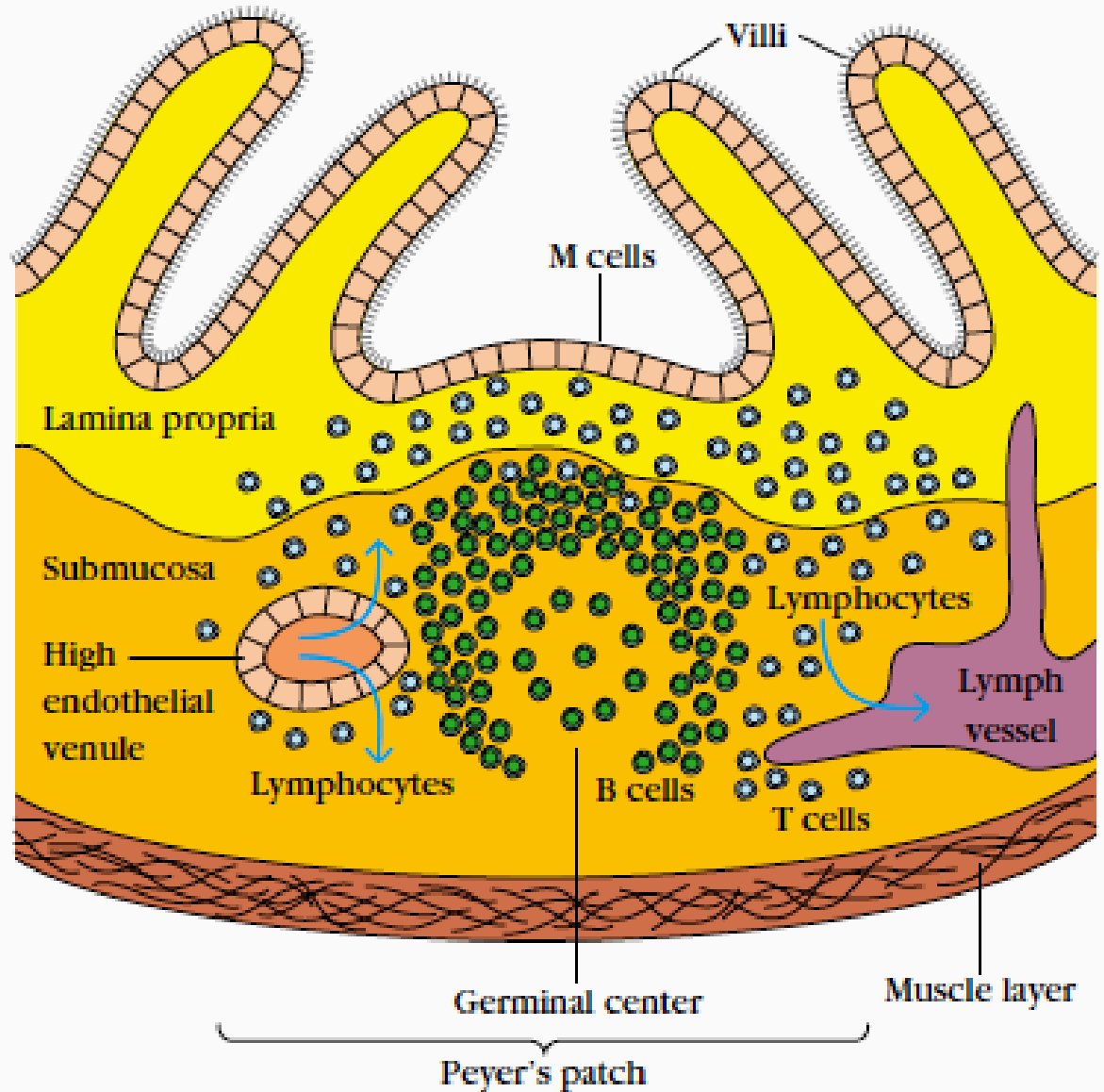
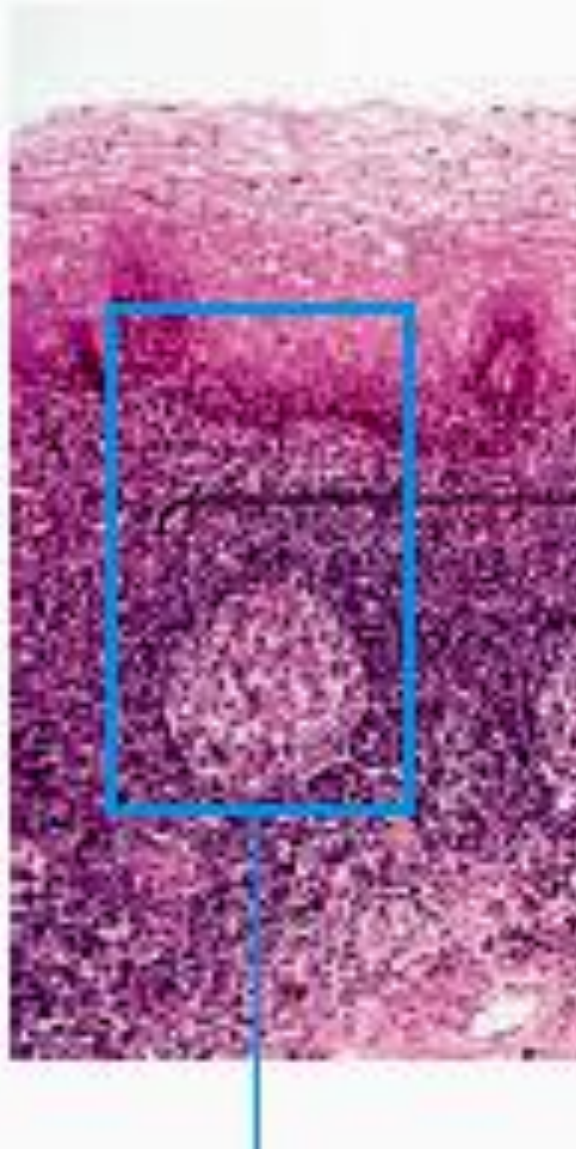
śledziona



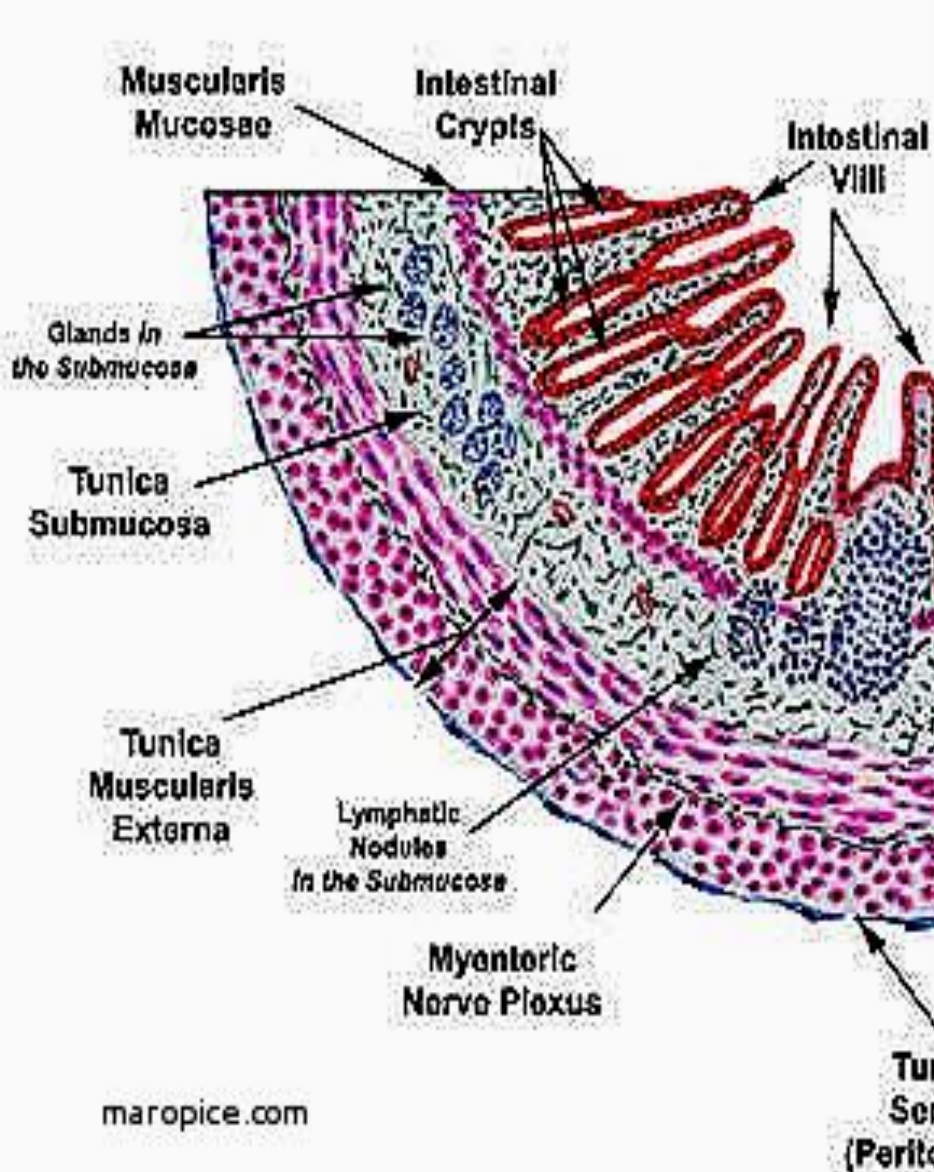
KEPKI PEYERA



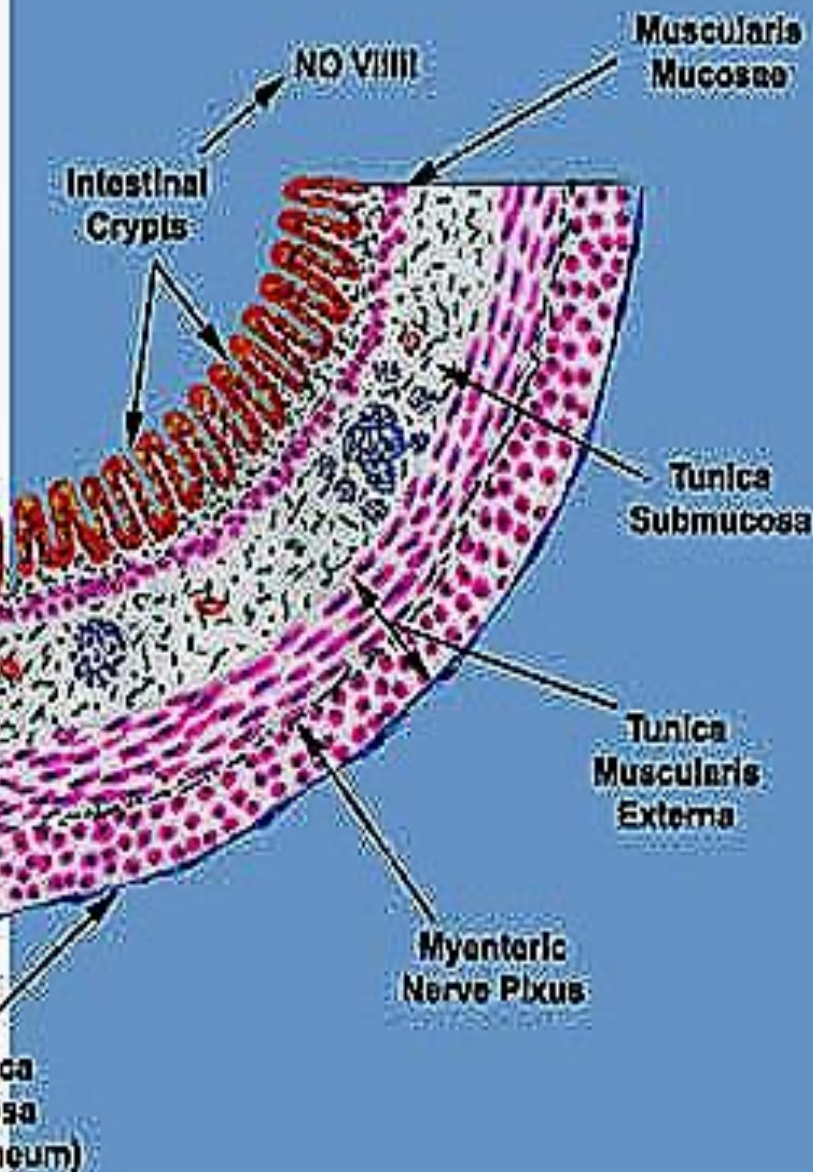
MALT



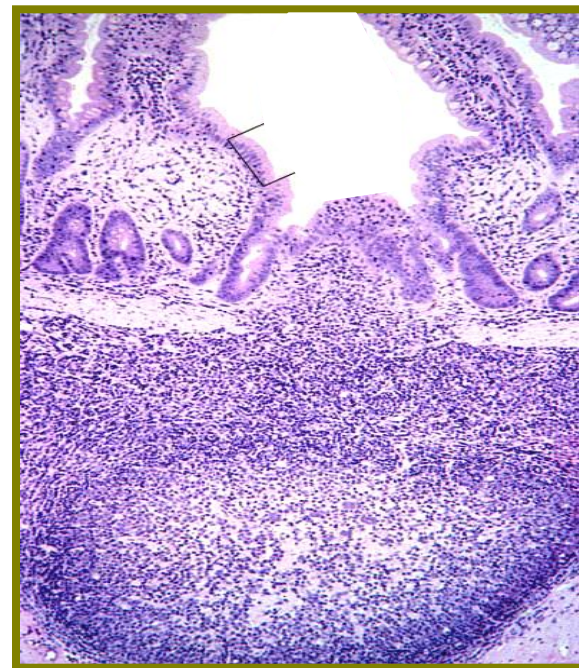
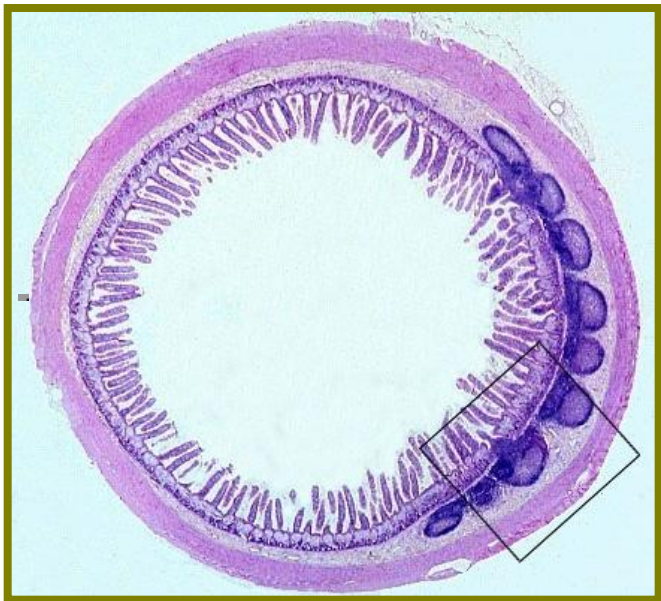
SMALL INTESTINE

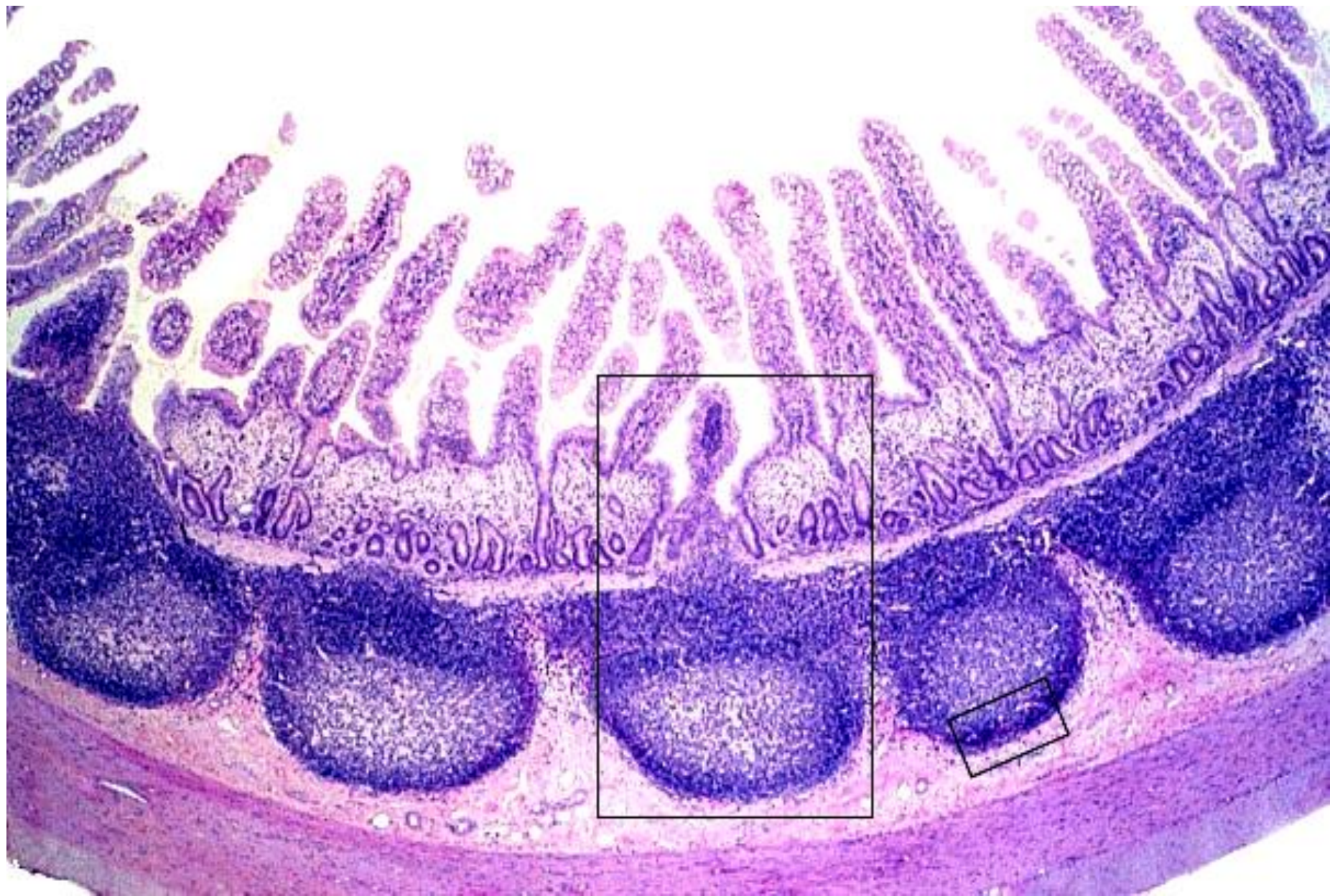


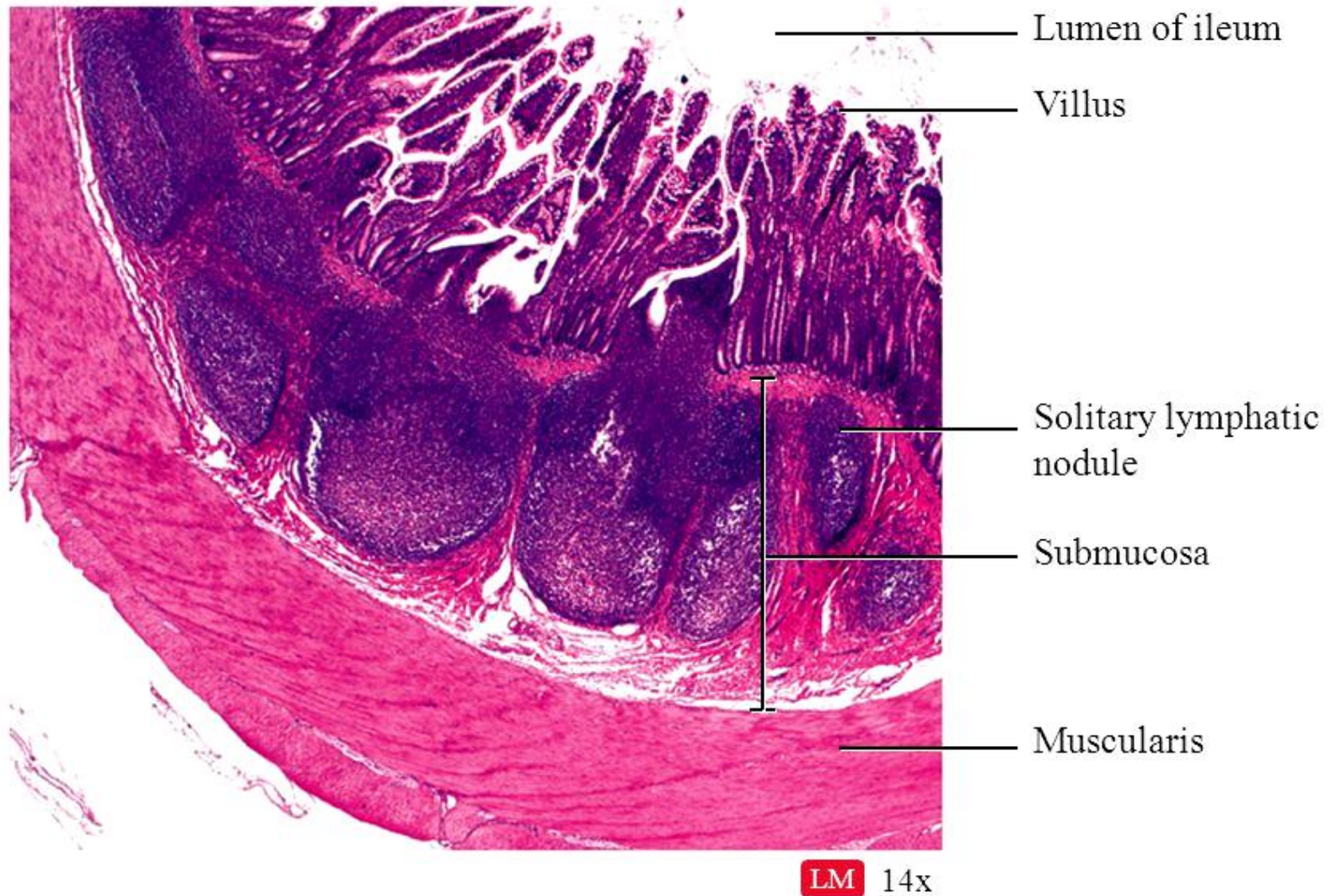
LARGE INTESTINE



ΚΕΡΚΙ PEYERA







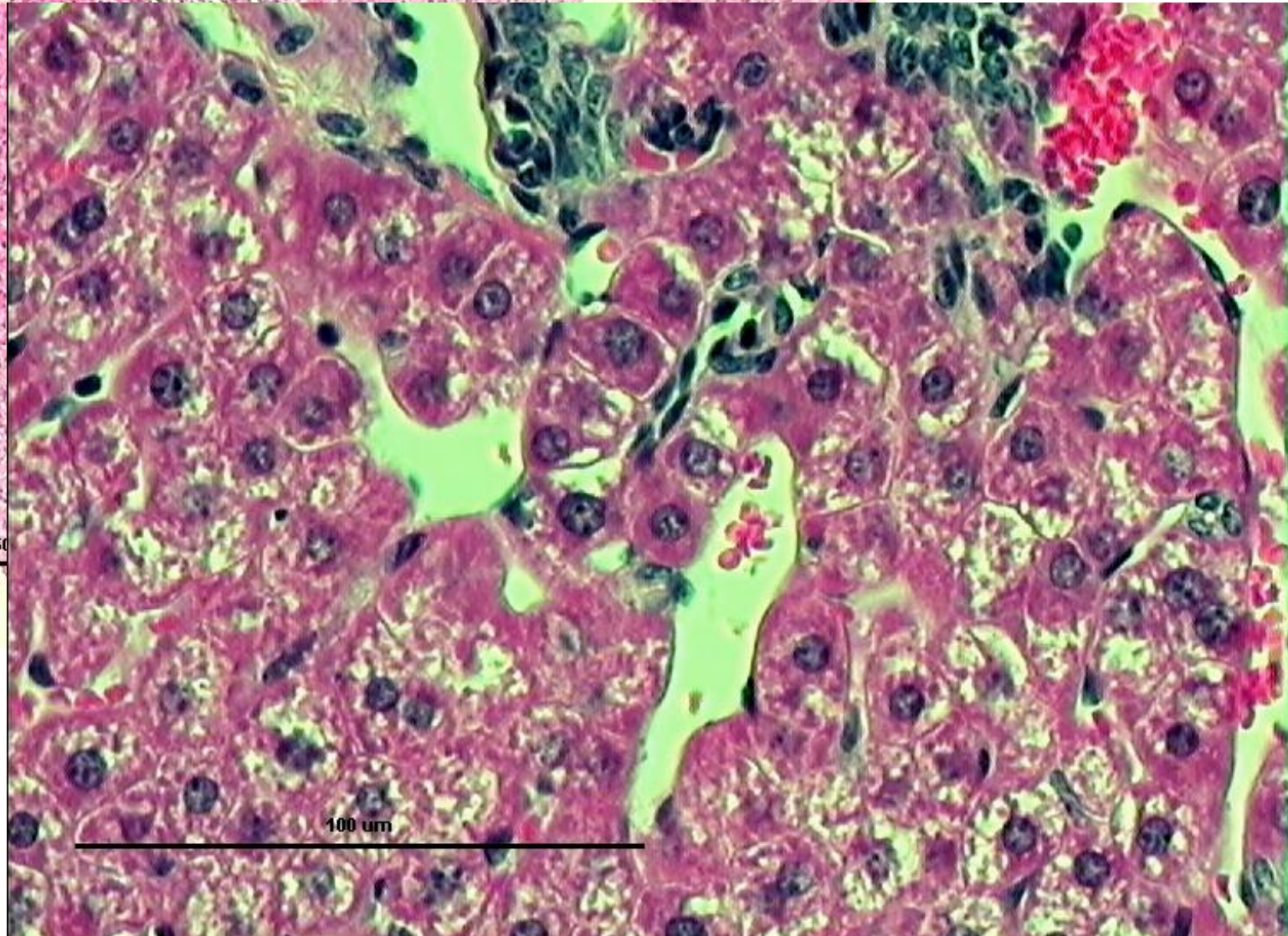
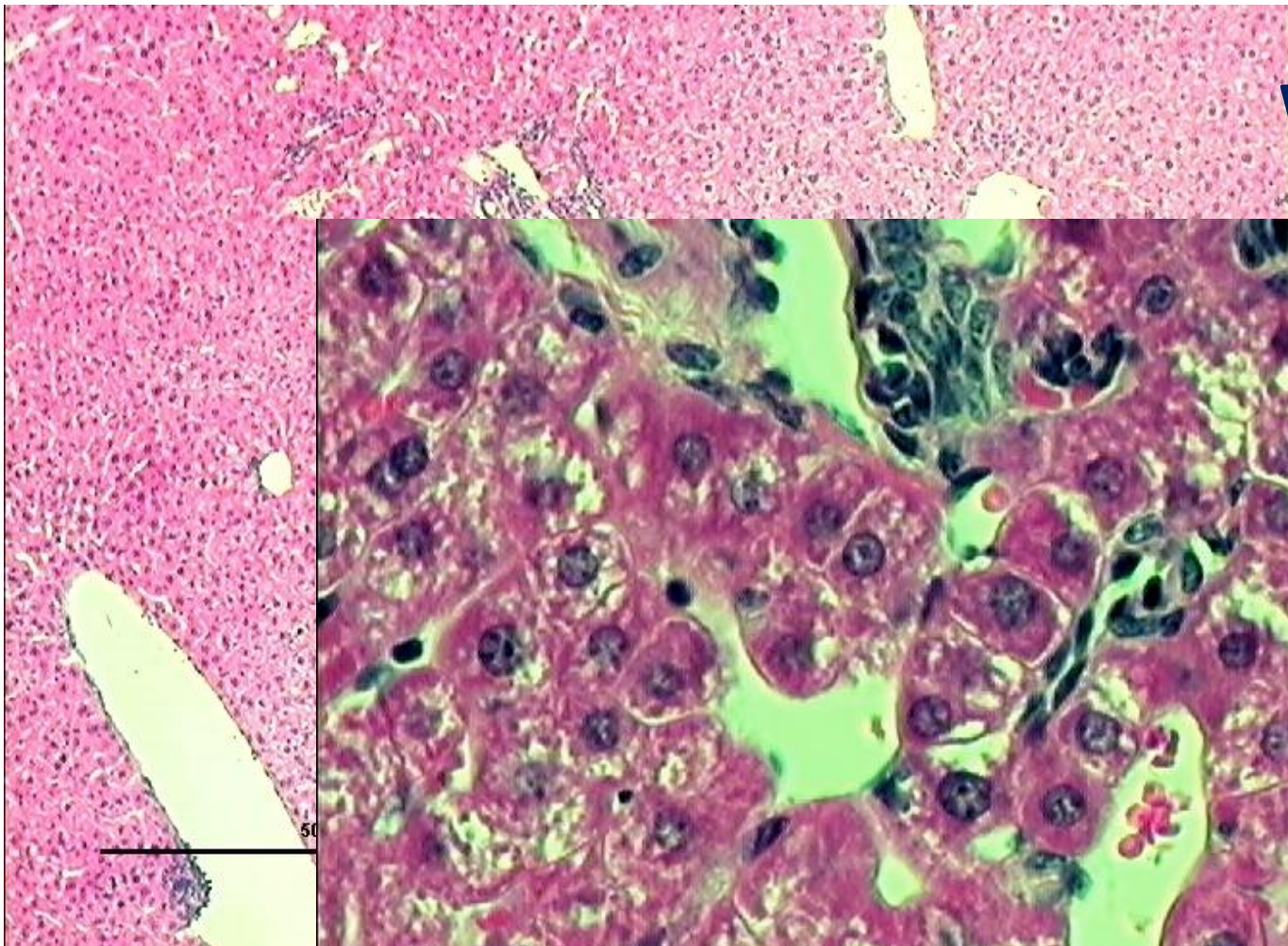
(c) Lymphatic nodules in ileum

Structural Features of the Lymphoid Organs (from [Lymphoid Tissues and Organs](#))

	<u>Thymus</u>	<u>MALT*</u> (Peyer's patches)	<u>Tonsil</u> (palatine)	<u>Lymph node</u>	<u>Spleen</u>
cortex and medulla	<u>yes</u>	no	<u>no</u>	<u>yes</u>	no
lymphoid nodules	no	<u>yes</u>	<u>yes</u>	<u>yes</u>	<u>yes</u>
capsule	<u>yes</u>	no	partial	<u>yes</u>	<u>yes</u>
cords and sinuses	no	no	no	yes	yes
lymphatic vessels	a few efferent only	efferent only	efferent only	afferent and efferent	only some efferent
HEV	no	yes	yes	<u>yes</u>	no
unique structures	<u>Hassall's corpuscles</u>	located in mucosa of ileum	<u>located in invaginated mucosa</u>	cortical nodules, subcapsular sinus	<u>central arteries, red pulp</u>

* MALT, mucosa-associated lymphoid tissue.

Wątroba

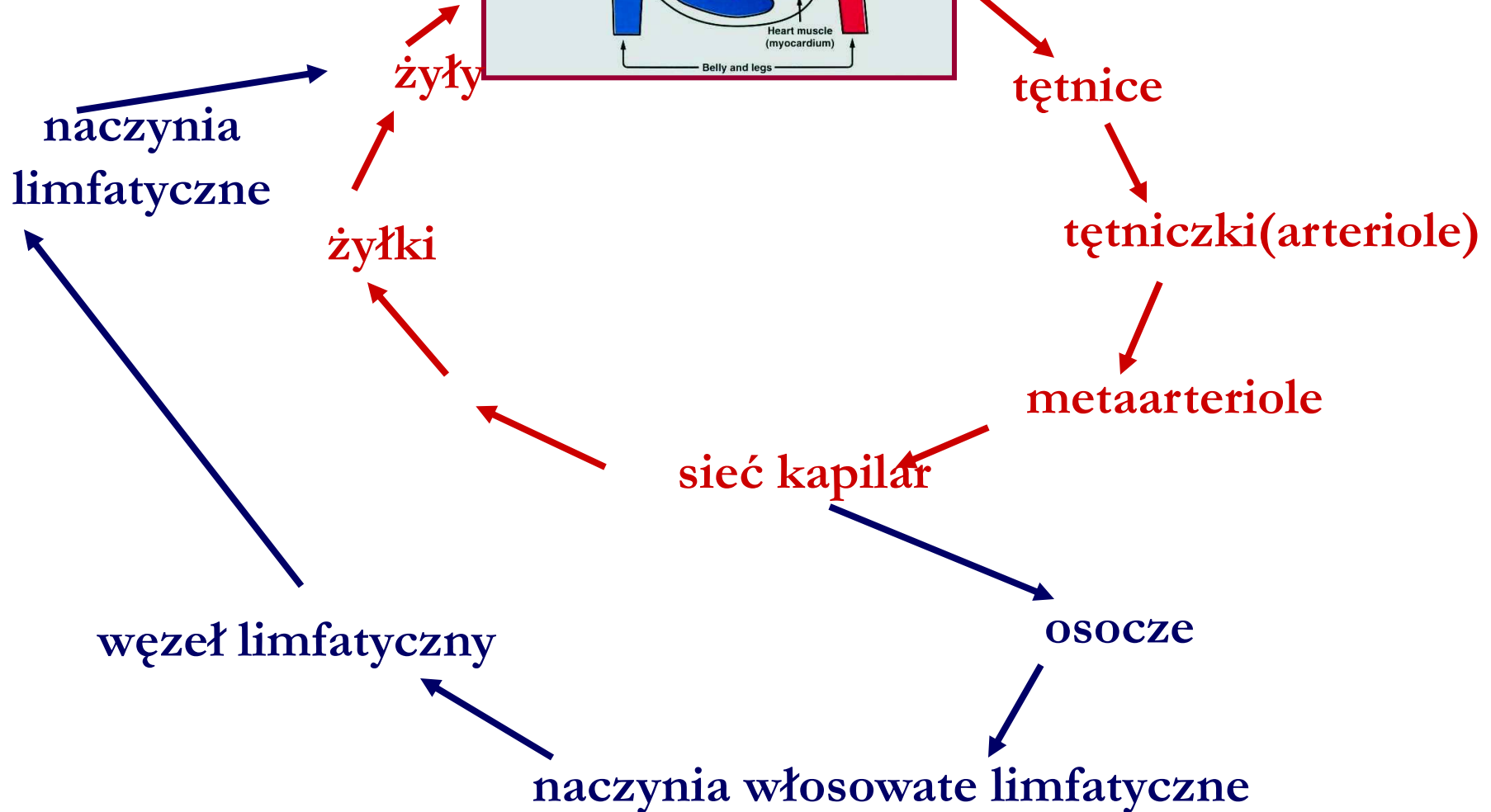
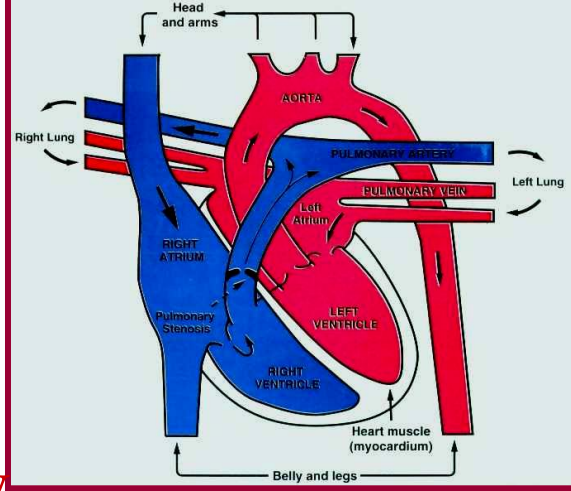


ćwiczenia wg

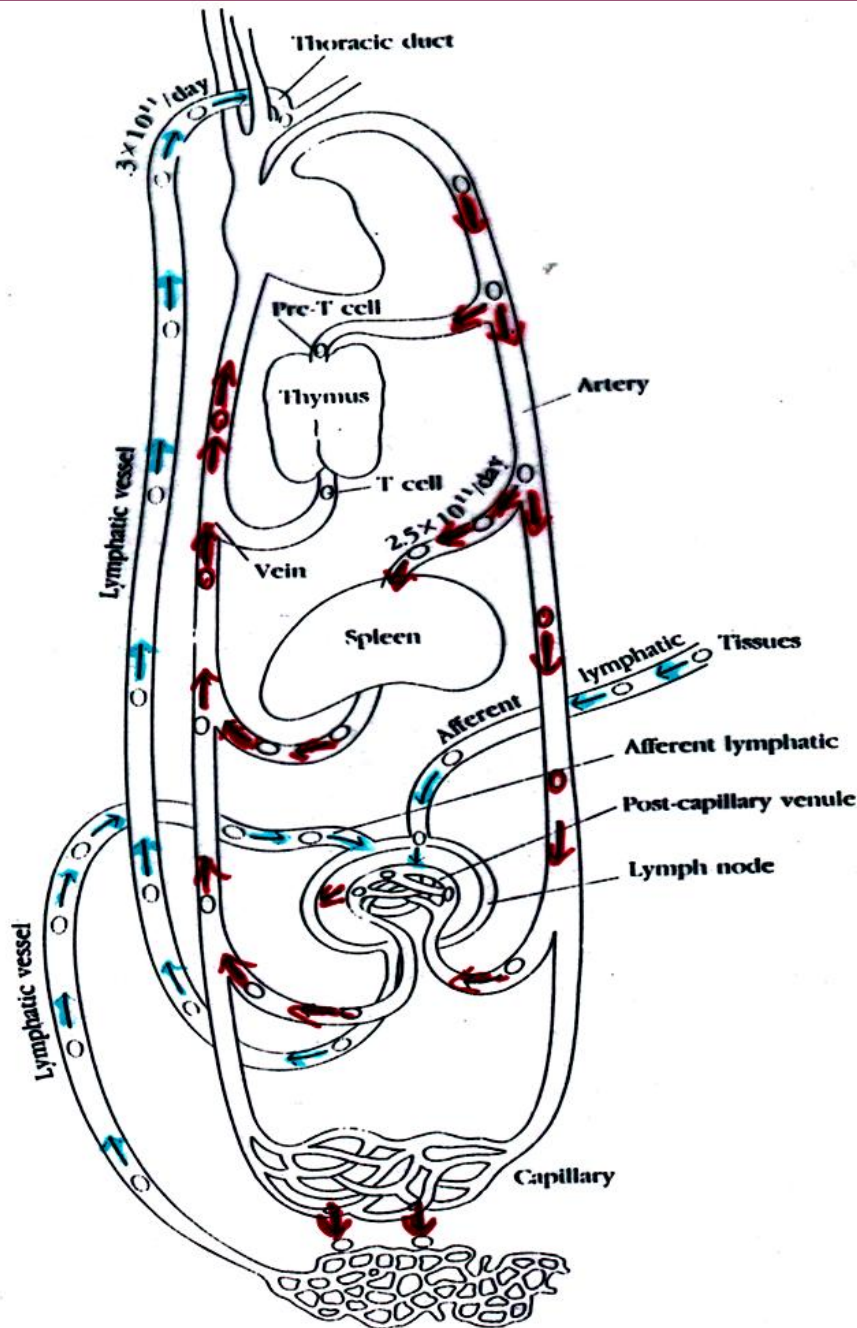
Pathpedia.com

Lymph node
Spleen
Thymus

Schemat krążenia krwi i limfy



Miejsca styku układu limfatycznego z układem krwionośnym



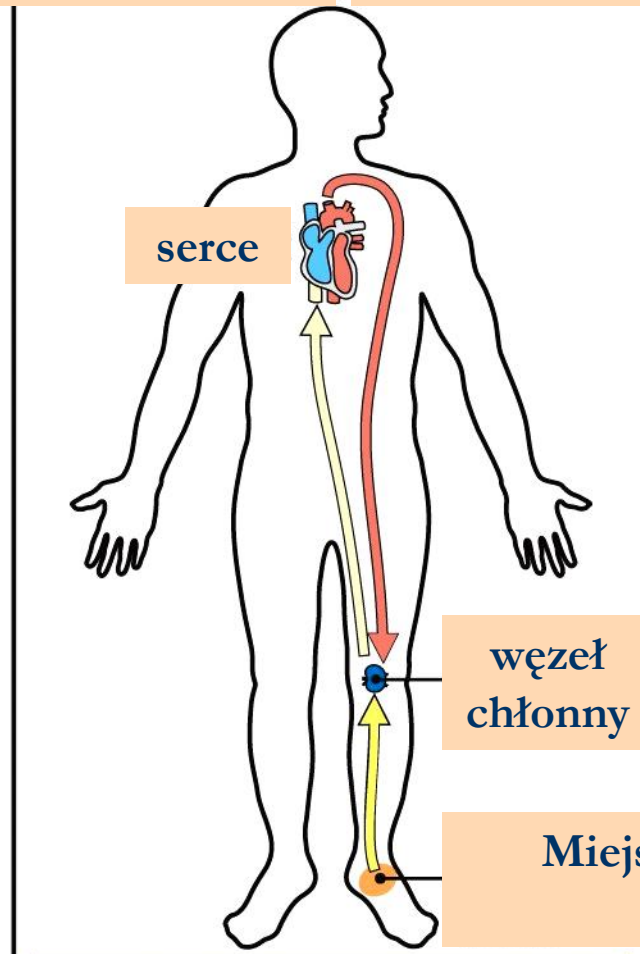
J. Kuby, Immunology

Przewód piersiowy: zbiera limfę z górnej lewej części ciała oraz części dolnych, wpada do ż. podobojczykowej lewej

Przewód limfatyczny prawy: zbiera limfę z górnej prawej części ciała, wpada do ż. podobojczykowej prawej

Limfocyty powracają do
krwi przewodem
piersiowym

Limfocyty „naiwne” ze szpiku,
napływają do węzłów chłonnych z
układu krwionośnego



Krążenie limfocytów i antygeny

Antygeny z miejsca infekcji
napływają do węzłów chłonnych
naczyniami limfatycznymi

Dziękuję