Lymphatics

1) Compare innate and adaptive immunity.

Born with it
- Genetic
- Passed from mother during gestation
- 1st line of defense
- Phagocytosis
* Quick response

↳ Develops over time
- Cells "learn" how to fight off antigens thru exposure
* Slow response

2) What are the functions of the lymphatic system?

1) Removal of excess tissue fluid (plasma)
2) Waste material transport
3) Filtration of lymph
(Microorganisms, cellular debris, & foreign matter)
4) Protein transport
(Enzymes & Proteins too large for venous transport)

3) Lymph is fluid carried by the lymphatic system. It is a transparent fluid that primarily contains lymphocytes. What other parts of blood are fond in lymph?

MORE (than blood)
- water
- sugar
- electrolytes

LESS (than blood)
- Large proteins
  ↳ albumin
  ↳ globulin
  ↳ fibrinogen

} & plasma

4) What is lymph composed of?

the above AND
- nutrients & hormones
- lymphocytes

5) What tissues/organs/cells are associated with the lymphatics system?

- Lymph Nodes
- Lymphatic Vessels
- Spleen
- Thymus
- Mucous Associated Lymphoid Tissue (MALT)
  - Tonsils
  - Peyer's Patches
  - Appendix (rabbit)
- Lymphocytes
  → T cells, B cells, & NK cells

6) Lymph Nodes drain fluid from a specific area. This means that lymph form specific areas will ALWAYS pass thru the same nodes. As lymph asses thru lymph nodes, macrophages will remove microorganisms or foreign matter.

7) Lymph enters thru the afferent vessel and exits through the efferent vessel. Cortex (↳ Inside) is the site of lymphocyte (nodules). Medulla (↳ Outside) contains macrophages embedded in dense mesh (scaffolding).

8) The spleen is located near the stomach or rumen (ruminants). It is also associated with the external hemolysis process of red blood cells. The spleen is NOT essential for life. It is the largest lymphoid organ. The spleen is covered with a protective fibrous CT capsule and is made of smooth muscle.

9) The spleen contains red and white pulp. What do they do and what system is each associated with?

White Pulp (Immune Component)
- Lymphoid tissue
- Site of lymphocytes which clone themselves during an immune response

Red Pulp (Hematology Component)
- Blood vessels
- Blood storage space
- Macrophages

10) What does the thymus do? Which cells are produced?
- Shrinks with age
- Helps kickstart the adaptive immune system in young animals

→ T-cells are produced

11) What do the tonsils do? What do they contain?
- Prevent spread of infection into the respiratory or digestive tract
- Lacks a protective capsule

→ Contains mature lymphocytes

12) The three lymphatic cells are T cells, B cells, and NK cells. T cells circulate back and forth between lymph and blood. B cells are mainly found in lymph. NK cells are classified as both innate and adaptive immunity. B cells differentiate from stem cells found in adult red bone marrow. T cells differentiate from stem cells in the thymus.

13) T cells are the majority of lymphocytes found in peripheral blood circulation. Where are they produced? Where are they stored?

Thymus ↘ Lymph Nodes

14) What do T cells do?
- Launch the adaptive immune response
  - ↳ (immune response specific to an infectious agent)
- Cell-mediated immunity activators
  - ↳ (do not interact with antigens directly)

15) What are the 3 types of T cells and what do they do?

- Cytotoxic "Killer" T cells: attach to antigen complex & destroy them
  ↳ aren't destroyed themselves
- Helper T cells: Most numerous, secrete cytokines (cell signaling proteins) to activate macrophages [specific ones for specific pathogens]
- Suppressor T cells: Regulate production of T & B cells by negative feedback

16) B cells are produced in red bone marrow. Where are inactive B cells found?

- Circulating in lymphatic system
- Lymph Nodes
- Spleen

17) What do B cells do?

Produce anti-bodies to help fight
- Bacteria
- Fungi
- Viruses
- other pathogens

*Anti-bodies are SPECIFIC

18) NK cells are stimulated by cytokines. What do NK cells do?

- Tumor cells
- Damaged cells
- Infected cells

Identify & Kill
- Viruses
- Stressed cells
- Tumor cells

19) How does apoptosis induced by NK cells work?

↳ programmed cell death or cell lysis

- Release perforins and proteolytic enzymes
  - perforins: creates tiny holes
  - proteolytic enzymes: break down proteins

*No lysis in viruses
↳ Why?
↳ Virions

20) How does a memory response work?

- Both B cells & T cells can become memory cells

- Antigens induce an immune response in the body
- Memory cells wait in circulating blood or lymph nodes & wait for a second infection caused by the same antigen that initially caused their formation

*Secondary response is faster & uses more force

→ Lifespan of memory cell = days to years

21) What are the differences between passive and active immunity?

Colostrum: Antibody rich first milk

Plasma transplant: Immunoglobulins

[Innate]

Vaccines: exposes animal to small amount of an antigen to create a memory immune response

[Adaptive]