

SI A&P - Full Discipline Demo - Fetal Pig

The Lymphatic System

Final Report - Answer Guide

Institution	Science Interactive University
Session	SI A&P - Full Discipline Demo - Fetal Pig
Course	SI A&P - Full Discipline Demo - Fetal Pig
Instructor	Sales SI Demo

Test Your Knowledge

Identify each characteristic as relating to the thymus, spleen, or tonsils.

⌘ Aids in T-cell maturation	⌘ Crypts increase surface area
⌘ Decreases in size significantly after puberty	
⌘ First defense against ingested or foreign pathogens	
⌘ Includes areas of red pulp and white pulp	⌘ Recycles red blood cells

Thymus	Spleen	Tonsils
1	2	3

Correct answers:

- | | | |
|---|---|---|
| 1 | Aids in T-cell maturation | Decreases in size significantly after puberty |
| 2 | Includes areas of red pulp and white pulp | Recycles red blood cells |
| 3 | Crypts increase surface area | |
| | First defense against ingested or foreign pathogens | |

Match each term with the best description.

Terms to match:

- Agglutination
- Antibody
- Antigen

Descriptions to match with:

- 1 Foreign body targeted by the immune system.
- 2 The clumping that occurs when multiple particles or cells are bound.
- 3 Immunoglobulin protein that specifically binds to a particular foreign body.

Correct answers:

1 Antigen 2 Agglutination 3 Antibody

Match the type of white blood cell with the correct method employed to destroy foreign bodies.

Terms to match:

- Phagocytes
- T-cells
- B-cells

Methods to match with:

- 1 Production of cytokines
- 2 Production of antibodies
- 3 Phagocytosis

Correct answers:

1 T-cells 2 B-cells 3 Phagocytes

Exploration

Foreign bodies that are targeted by the immune system are called _____.

- ☒ antigens ✓
 - ☐ antibodies
 - ☐ leukocytes
 - ☐ cytokines
-

T-cells produce antibodies.

- ☐ True
 - ☒ False ✓
-

Active lymphocytes are located within the medulla of the lymph nodes.

- ☒ True ✓
 - ☐ False
-

Active lymphocytes are located within the medulla of the lymph nodes.

- ☒ True ✓
 - ☐ False
-

Active lymphocytes are located within the medulla of the lymph nodes.

- ☒ True ✓
 - ☐ False
-

Active lymphocytes are located within the medulla of the lymph nodes.

- ☒ True ✓
 - ☐ False
-

The thymus gland is the site of ____ maturation.

- ☐ antibody
- ☐ antigen
- ☒ T-cell
- ☐ B-cell

✓

Tonsils have no known value to the human body.

- ☐ True
- ☒ False

✓

Exercise 1

What is the purpose of lymph nodes? How do the structures labeled in Photo 1 support this function?

At these nodes, immune cells (e.g. leukocytes, B cells, and T cells) are concentrated to remove foreign invaders such as bacteria in the lymph. Inactive lymphocytes are stored in the cortex. The nodules with the medulla contain densely packed active lymphocytes.

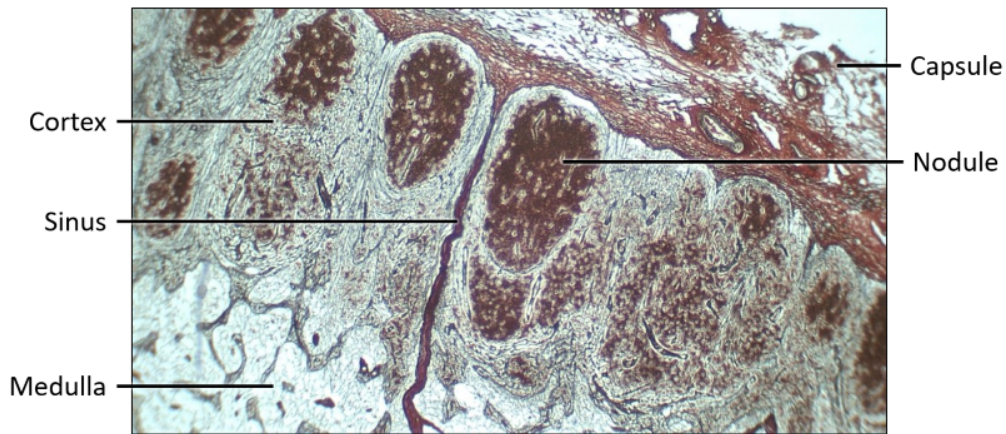
If a surgeon removes a cancerous tumor, why might the lymph nodes, which are in close proximity to the tumor, also be removed?

The surgeon would want to study the node to see if the cancer is spreading throughout the body. Often, the cancerous cells would travel and get “trapped” by the lymph node. There, the cancerous cells might start to grow in the lymph node as well.

Describe the roles that the thymus, spleen and tonsils play in immunity. How do the structures labeled in Photos 2-4 support this function?

The development of immune cells occurs at the cortex of the thymus. These cells become immunocompetent when they exit the thymus through the medulla. The spleen filters the blood and removes old blood cells and foreign invaders. The lymph cells in the spleen primarily occur in the white pulp. The crypts of the tonsils trap ingested or inhaled foreign pathogens, and the nodules of the tonsils destroy the pathogens.

Photo 1: Lymph Node
(SAMPLE ANSWER BELOW)



Observation 1: Lymph Node Magnification and Comments
(SAMPLE ANSWER BELOW)

60X. Student answers will vary for comments to their instructor.

Photo 2: Thymus
(SAMPLE ANSWER BELOW)

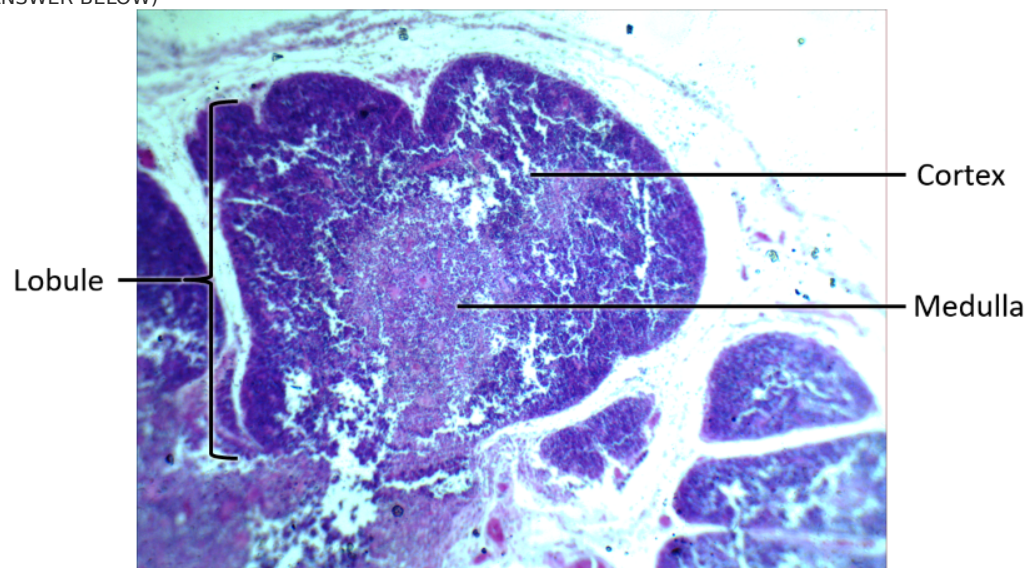


Photo 3: Spleen
(SAMPLE ANSWER BELOW)

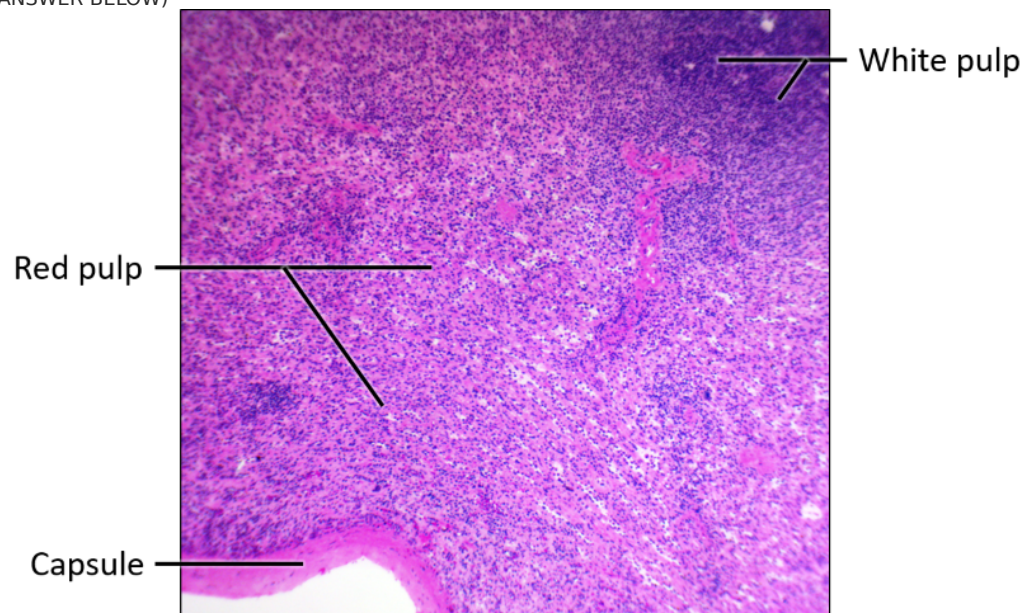
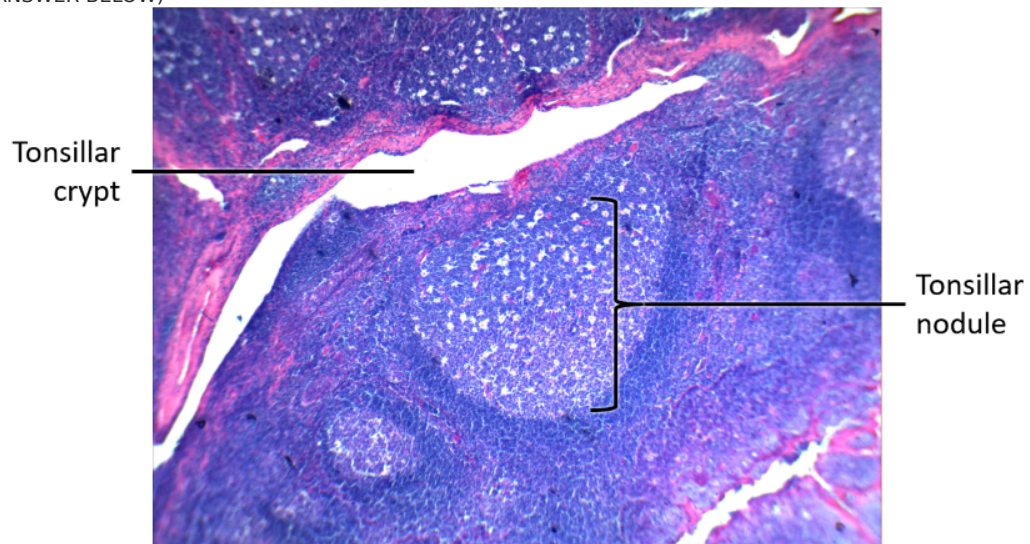


Photo 4: Palatine Tonsil
(SAMPLE ANSWER BELOW)



Exercise 2

Which is more medial, the cisterna chyli or the spleen??

Cisterna Chyli

What is the name of the most superior lymph nodes in the head region?

Pre-auricular nodes.

Where are the popliteal nodes located?

Posterior to the knee.

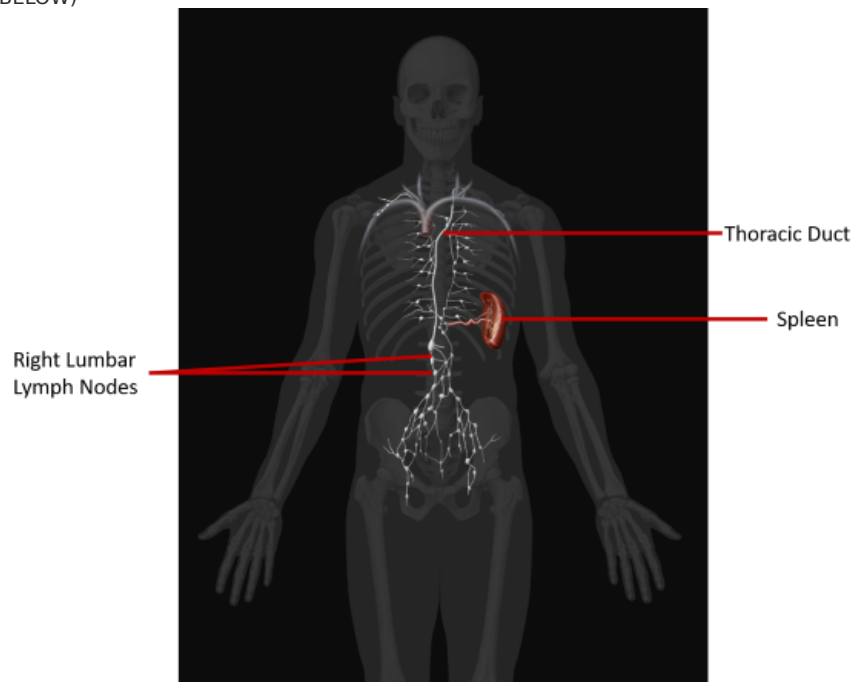
What are the most inferior lymph nodes in the body called?

Popliteal Nodes

What component of the lymphatic system filters lymph from the upper limbs and upper external part of the thorax?

Axillary Lymph Nodes

Photo 5: Virtual Model Lymphatic System
(SAMPLE ANSWER BELOW)



Exercise 3

What occurred to produce the faint white line in the agar?

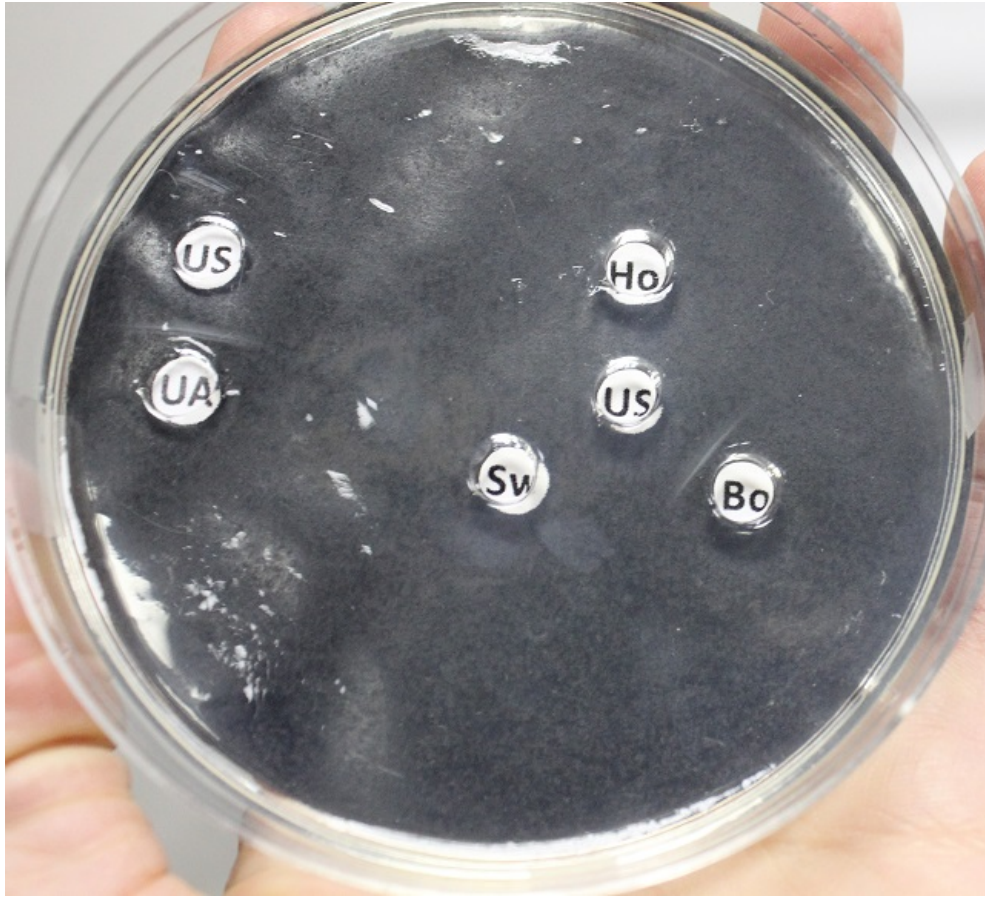
When the antigen mixed with the antibodies, the substances agglutinated.

Why do antibodies accelerate the immune response?

The agglutination response from the antibodies act as a coating on the antigen, and white blood cells can then recognize them as pathogens, and phagocytize these antigens. The clumping also prevents the antigen from entering cells of the body, since it forms a large “mass.”

Photo 6: Antigen and Antibody Response
(SAMPLE ANSWER BELOW)





Observation 2: Antigen and Antibody Conclusions
(SAMPLE ANSWER BELOW)

The precipitate formed between the “US” and the “Bo” wells. Therefore, the unknown serum was bovine albumin since the “Bo” well contained bovine antibodies.

Competency Review

The thoracic duct collects lymph from all of the body except for the ____.

- ☐ left upper quadrant
- ☒ right upper quadrant ✓
- ☐ left lower quadrant
- ☐ right lower quadrant

The thoracic duct collects lymph from all of the body except for the ____.

- ☐ left upper quadrant
- ☒ right upper quadrant ✓
- ☐ left lower quadrant
- ☐ right lower quadrant

The thoracic duct collects lymph from all of the body except for the ____.

- ☐ left upper quadrant
- ☒ right upper quadrant ✓
- ☐ left lower quadrant
- ☐ right lower quadrant

The thoracic duct collects lymph from all of the body except for the ____.

- ☐ left upper quadrant
- ☒ right upper quadrant ✓
- ☐ left lower quadrant
- ☐ right lower quadrant

The thymus aids in ____ maturation.

- ☐ B-cell
- ☒ T-cell
- ☐ Phagocyte
- ☐ Red blood cell

The thymus aids in ____ maturation.

- ☐ B-cell
- ☒ T-cell
- ☐ Phagocyte
- ☐ Red blood cell

The thymus aids in ____ maturation.

- ☐ B-cell
- ☒ T-cell
- ☐ Phagocyte
- ☐ Red blood cell

The thymus aids in ____ maturation.

- ☐ B-cell
- ☒ T-cell
- ☐ Phagocyte
- ☐ Red blood cell

B cells attack ____ through the production of ____.

- ☒ antigens; antibodies ✓
 - ☐ agglutinates; antigens
 - ☐ antibodies; agglutinates
 - ☐ antibodies; antigens
-

B cells attack ____ through the production of ____.

- ☒ antigens; antibodies ✓
 - ☐ agglutinates; antigens
 - ☐ antibodies; agglutinates
 - ☐ antibodies; antigens
-

B cells attack ____ through the production of ____.

- ☒ antigens; antibodies ✓
 - ☐ agglutinates; antigens
 - ☐ antibodies; agglutinates
 - ☐ antibodies; antigens
-

B cells attack ____ through the production of ____.

- ☒ antigens; antibodies ✓
 - ☐ agglutinates; antigens
 - ☐ antibodies; agglutinates
 - ☐ antibodies; antigens
-

When studying the histology of the ____, an individual would see crypts and nodules.

- ☐ lymph node
- ☐ thymus
- ☐ spleen
- ☒ tonsil



When studying the histology of the ____, an individual would see crypts and nodules.

- ☐ lymph node
- ☐ thymus
- ☐ spleen
- ☒ tonsil



When studying the histology of the ____, an individual would see crypts and nodules.

- ☐ lymph node
- ☐ thymus
- ☐ spleen
- ☒ tonsil



When studying the histology of the ____, an individual would see crypts and nodules.

- ☐ lymph node
- ☐ thymus
- ☐ spleen
- ☒ tonsil



Agglutination would occur if anti-horse albumin serum was mixed with a _____ albumin serum.

- ☐ bovine
 - ☐ swine
 - ☒ horse ✓
 - ☐ All of the above.
-

Agglutination would occur if anti-horse albumin serum was mixed with a _____ albumin serum.

- ☐ bovine
 - ☐ swine
 - ☒ horse ✓
 - ☐ All of the above.
-

Agglutination would occur if anti-horse albumin serum was mixed with a _____ albumin serum.

- ☐ bovine
 - ☐ swine
 - ☒ horse ✓
 - ☐ All of the above.
-

Agglutination would occur if anti-horse albumin serum was mixed with a _____ albumin serum.

- ☐ bovine
 - ☐ swine
 - ☒ horse ✓
 - ☐ All of the above.
-

The thoracic duct follows the same path as the spinal column.

- ☐ True
- ☐ False

✓

The thoracic duct follows the same path as the spinal column.

- ☐ True
- ☐ False

✓

The thoracic duct follows the same path as the spinal column.

- ☐ True
- ☐ False

✓

The thoracic duct follows the same path as the spinal column.

- ☐ True
- ☐ False

✓

Each antibody binds to one specific antigen.

- ☐ True
- ☐ False

✓

Each antibody binds to one specific antigen.

- ☐ True
- ☐ False

✓

Each antibody binds to one specific antigen.

- ☒ True
- ☐ False



Each antibody binds to one specific antigen.

- ☒ True
- ☐ False



The outermost layer of a lymph node is the _____.

- ☐ medulla
- ☒ capsule
- ☐ cortex
- ☐ nodule



The outermost layer of a lymph node is the _____.

- ☐ medulla
- ☒ capsule
- ☐ cortex
- ☐ nodule



The outermost layer of a lymph node is the _____.

- ☐ medulla
- ☒ capsule
- ☐ cortex
- ☐ nodule



The outermost layer of a lymph node is the _____.

- ☐ medulla
- ☒ capsule ✓
- ☐ cortex
- ☐ nodule

The thymus increases in size after puberty.

- ☐ True
- ☒ False ✓

The thymus increases in size after puberty.

- ☐ True
- ☒ False ✓

The thymus increases in size after puberty.

- ☐ True
- ☒ False ✓

The thymus increases in size after puberty.

- ☐ True
- ☒ False ✓

Extension Questions

Compare and contrast the vessels of the lymphatic system and the circulatory system. (SAMPLE ANSWER BELOW)

The vessels of the lymphatic system are similar to the veins and arteries of the circulatory system. Lymph vessels travel alongside veins and arteries. However, unlike the circulatory system, lymph vessels are not a closed system. The collecting vessels of the lymph system are similar to veins in structure; however, the tissue layers are thinner and not well defined.
