

SI A&P - Full Discipline Demo - Digital

The Lymphatic System - No Materials

Final Report - Answer Guide

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

Test Your Knowledge

Match each term with the best description.

Terms to match:

- Lymphatic system
- T cells
- Lymph nodes
- B cells
- Lymph

Descriptions to match:

- Interstitial fluid containing bacteria, cellular debris, plasma proteins, and other cells
- Lymphocytes that produce antibodies
- Tissues that function as filters to remove pathogens and eradicate infection
- Lymphocytes that destroy infected cells
- Collection of organs, vessels, cells, and fluid that functions to maintain fluid balance and support immunity in the body

Correct answers:

- 1 Lymph 2 B cells 3 Lymph nodes 4 T cells
5 Lymphatic system

Classify each statement as true or false.

⚡ Through agglutination, the body can eliminate large groups of foreign bodies at once.	
⚡ Antibodies consist of protein chains that form a X shape.	
⚡ The thymus gland functions to develop mature T cell lymphocytes.	
⚡ The spleen, located in the back of the throat, defends against inhaled foreign pathogens.	
True	False
1	2

Correct answers:

1

Through agglutination, the body can eliminate large groups of foreign bodies at once.

The thymus gland functions to develop mature T cell lymphocytes.

2 Antibodies consist of protein chains that form a X shape.

The spleen, located in the back of the throat, defends against inhaled foreign pathogens.

Exploration

Lymphatic system organs include the ____.

- ☐ thymus
- ☐ spleen
- ☐ tonsils
- ☐ All of the above



Multiple types of antigens may bind to the arms of a single antibody.

- ☐ True
- ☒ False ✓

____ lymphatic vessels transport unfiltered lymphatic fluid from the body tissues to the lymph nodes.

- ☒ Afferent ✓
- ☐ Efferent
- ☐ Medulla
- ☐ Germinal

Tonsillar ____ increase the surface area of the lymphatic tissue.

- ☐ nodules
- ☐ capsules
- ☒ crypts ✓
- ☐ cortex

Exercise 1

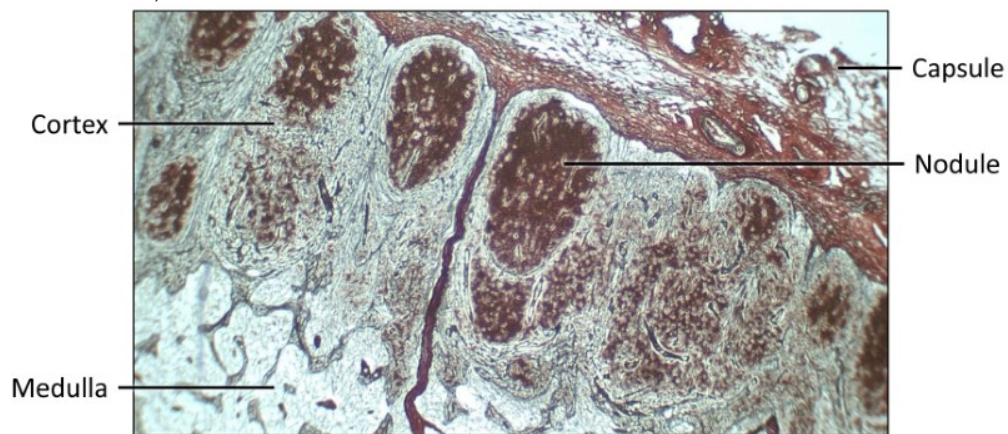
How do the structure and functions of the cortex and medulla compare between lymph nodes and the thymus gland? Reference Photos 1 and 2 in your explanation.

The cortex is the outer layer of nodules within the lymph nodes and the thymus gland whereas the medulla forms the inner portion of these nodules, as labeled in Photos 1 and 2. The cortex functions to stores inactivated/maturing lymphocytes in the lymph nodes and thymus respectively, while the medulla of each structure consists of activated/functioning lymphocytes.

What are the compositions of the red and white pulp of the spleen that were labeled in Photo 3?

The red pulp is composed of venous sinuses with both red and white blood cells. The white pulp is composed on lymphoid tissue.

Photo 1: Reticular Connective (lymph node)
(SAMPLE ANSWER BELOW)



Panel 1: Reticular Connective Magnification
(SAMPLE ANSWER BELOW)

Student should upload an image using the low power objective for a total magnification of 40x or 60x depending on the microscope used. Student should only include additional comments if they were unable to identify a structure.

Photo 2: Thymus
(SAMPLE ANSWER BELOW)

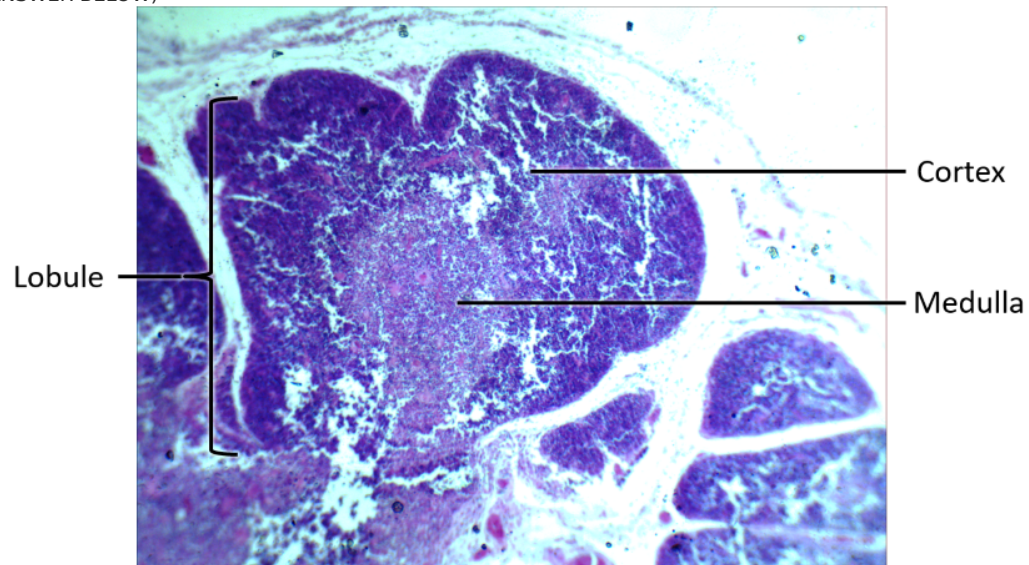


Photo 3: Spleen
(SAMPLE ANSWER BELOW)

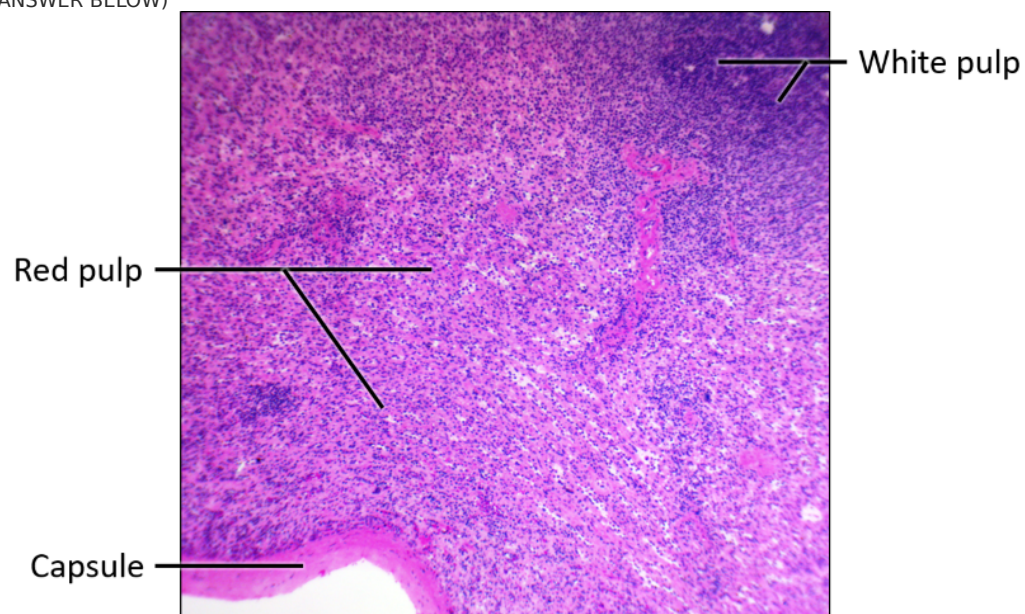
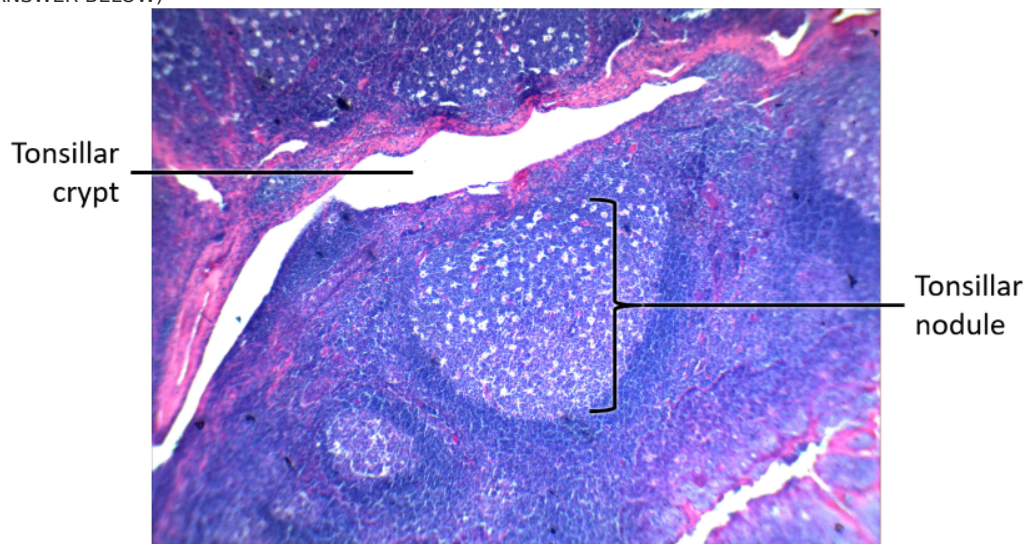


Photo 4: Palatine Tonsil
(SAMPLE ANSWER BELOW)



Exercise 2

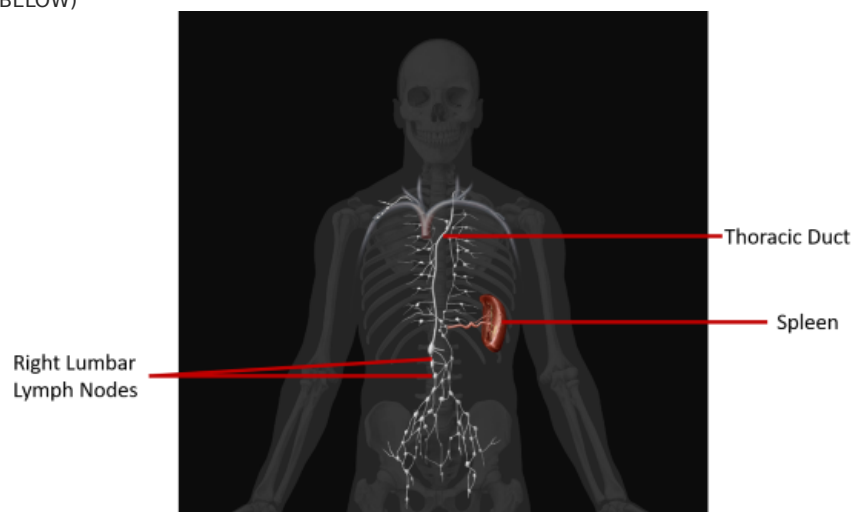
What is the function of the thoracic duct as described by the virtual model?

The thoracic duct carries lymph from most of the body to the terminal point of the left subclavian vein.

Is the thoracic duct considered an afferent or efferent lymphatic vessel? Provide a definition of each vessel type in your explanation.

The thoracic duct is considered an efferent lymphatic vessel because it transports filtered lymphatic fluid from lymph nodes into the venous system. Afferent lymphatic vessels transport unfiltered lymphatic fluid from the body tissues to the lymph nodes.

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





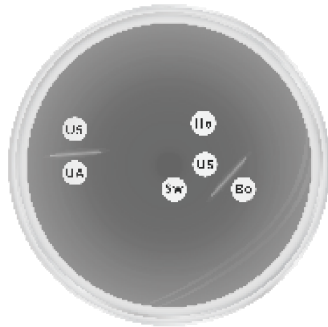
Exercise 3

How did the agar-gel immunodiffusion test performed in this exercise allow for the visualization of agglutination?

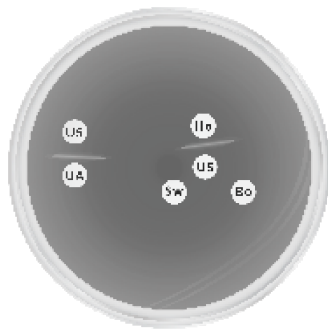
The agar-gel immunodiffusion allowed for the visualization of agglutination between a sera containing unknown antigen and a series of sera containing unknown and known antibodies. The sera were placed in wells and allowed to diffuse through the agar before meeting in a zone between two wells. Agglutination between the antigen and antibodies produced a visible white line between the wells where the two diffused substances met.

Antigen and Antibody Response
(SAMPLE ANSWER BELOW)

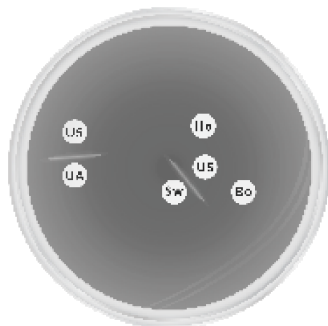
Agar Gel Immunodiffusion Key



The unknown serum was Bovine Albumin since the “Bo” well contained bovine antibodies



The unknown serum was Horse Albumin since the “Ho” well contained horse antibodies



The unknown serum was Swine Albumin since the “Sw” well contained swine antibodies

Antigen and Antibody Conclusions (SAMPLE ANSWER BELOW)

[Example] 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

Lymph consists of interstitial fluid with variable amounts of ____.

- ☐ lymphocytes
- ☐ bacteria
- ☐ cellular debris
- ☒ All of the above

✓

The vessels and capillaries of the lymphatic system transport lymph from body tissues to veins near the ____.

- ☐ brain
- ☒ heart
- ☐ stomach
- ☐ kidneys

✓

Agglutination occurs when antibodies bind to multiple antigens at once, producing clumps of particles and or cells.

- ☒ True
- ☐ False

✓

Antibodies consist of arms that form a ____ shape.

- ☐ T
- ☐ X
- ☒ Y
- ☐ W

✓

The ____ of a lymph node consists primarily of activated lymphocytes.

- ☐ capsule
- ☐ cortex
- ☒ medulla
- ☐ crypt

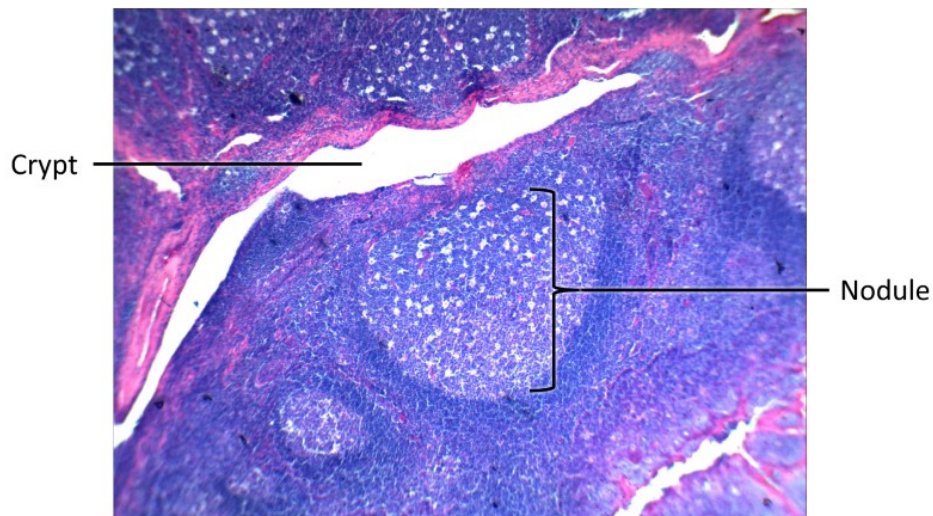
✓

The ____ is classified as a primary lymphatic system organ because it functions to develop mature T cell lymphocytes.

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

✓

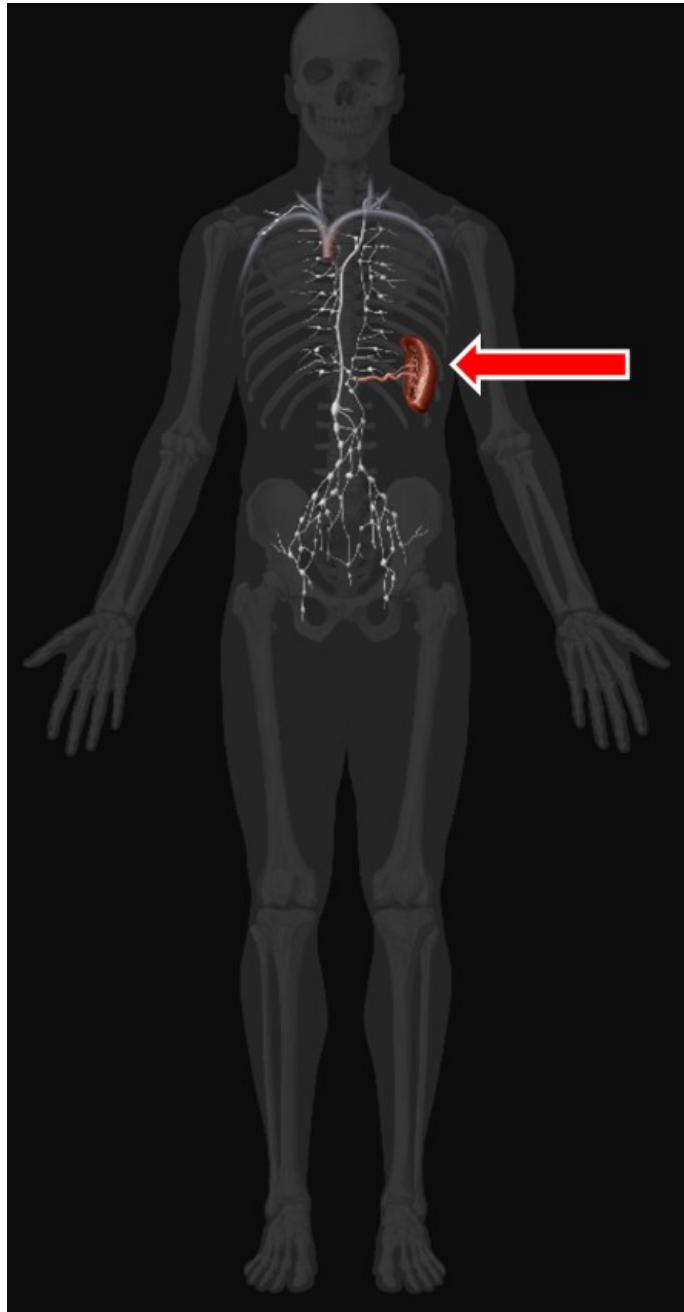
The labeled micrograph below is an example of ____ tissue.



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

✓

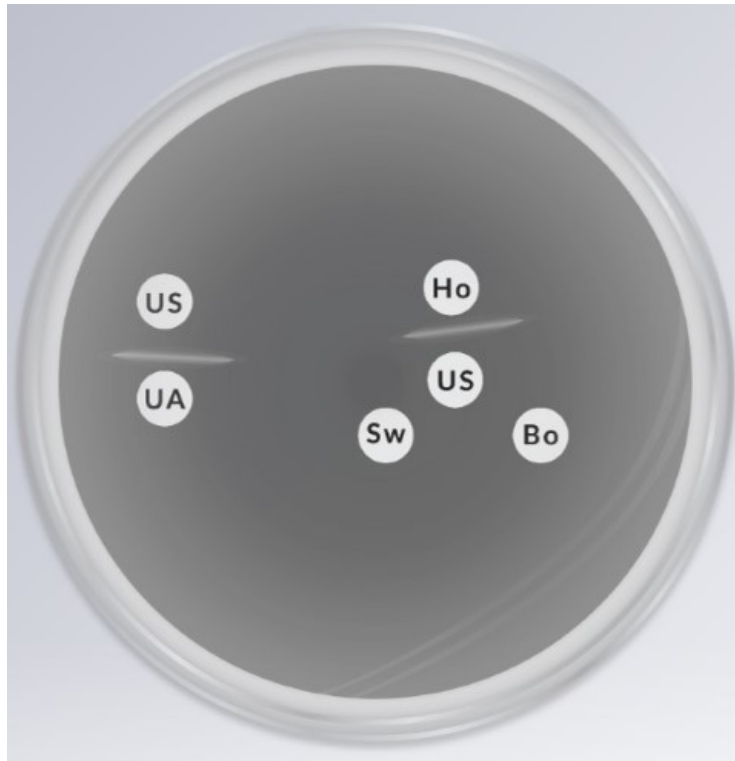
The ____ is indicated by the arrow in the image of the virtual model below.



- ☐ tonsil
- ☒ spleen
- ☐ thymus gland
- ☐ thoracic duct



The agar-gel immunodiffusion results below indicate the unknown animal serum (US) contains horse (Ho) antigen.



☒ True

☐ False



Extension Questions

Some forms of cancer treatment involve the surgical removal of lymph nodes located near tumors. Apply your knowledge of the Lymphatic System to explain why this form of treat could benefit the patient. (SAMPLE ANSWER BELOW)

The removal of lymph nodes near tumors could benefit the patient by preventing the spread cancer cells to other parts of the body. The lymph nodes filter lymph before transporting the fluid through efferent vessels into the bloodstream. By removing nearby lymph nodes, cancer cells that have broken away from the tumor could be prevented from infecting lymph nodes and eventually from being transported into the bloodstream.