LABORATORY NO. 14

LYMPHATIC SYSTEM AND IMMUNITY

Scope of Laboratory Activity:

This laboratory activity consists of three (3) worksheets

Worksheet no 1 Functions of lymphatic system
Worksheet no 2 Structures and organs of lymphatic system
Worksheet no 3 Lymphatic and immunity

Overview

Are you curious how your body is keeping you from getting infected by harmful microbes or pathogens? If your body is not able to resist disease causing organisms that enters in your body, you would constantly be ill or suffer from a premature death. Fortunately, our body consist of layers of defenses that keep organisms from penetrating your body through your lymphatic system.

In this laboratory activity, the mechanism of body defenses and immunity will be presented.

Objectives

After completing this exercise, you should be able to:

1. Explain the functions of lymphatic system.
2. Recognize the different structures and organs that make up the lymphatic system
3. Explain the relationship between lymphatic system and immunity

Materials

- Glass jar with lid, 16 oz. A smaller or larger glass jar (with lid) would work too
- Salt/ sugar (1 cup)
- Small safety pins
- Magnets

Worksheet no 1 **Functions of lymphatic system**

A. Answer the following question completely and briefly.

1. The functions of lymphatic system are:

2. What is the function of lymphatic vessel?

3. What factors are involved in the flow of lymphatic fluid?

4. Describe the structure of lymphatic capillaries emphasizing its unique features and into what structure do they drain?

5. How do lymphatic vessels resemble veins?

Worksheet no 2 **Structures and organs of lymphatic system**

A. Labelling of structures and organs

1. Identify the structure being asked. Write your answer in the space provided.

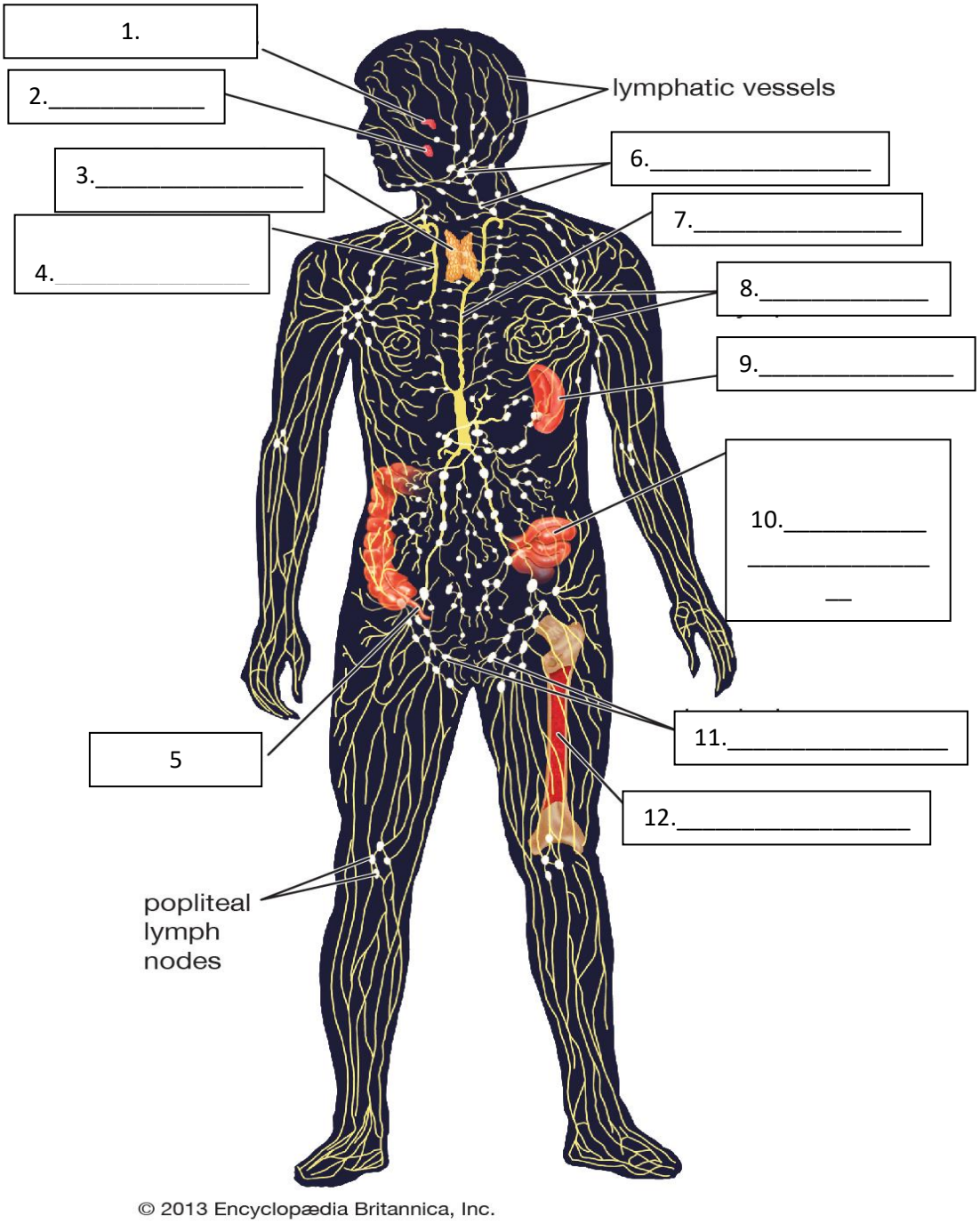
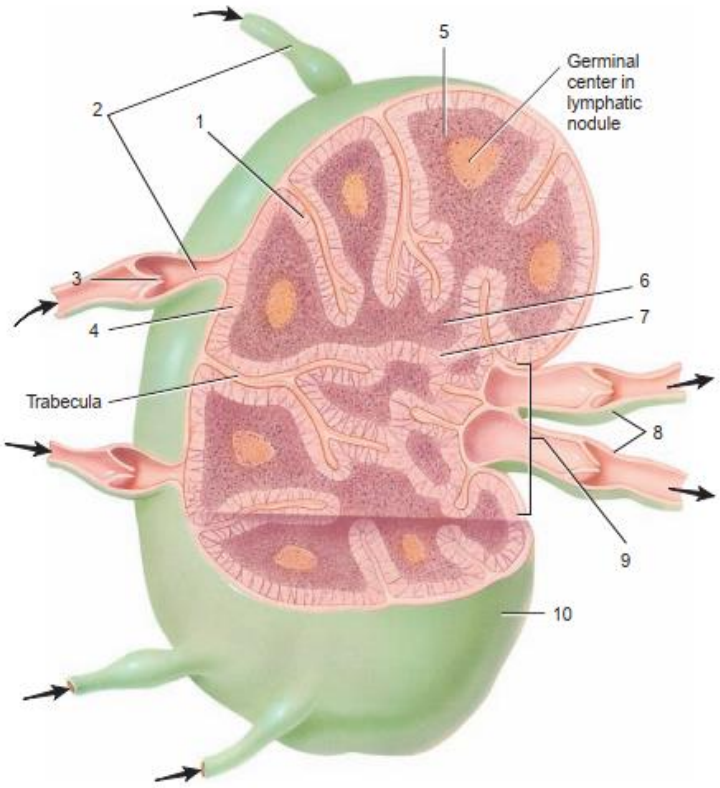


Figure 15. 1 Diagram of the human lymphatic system

2. Label the figure and write your answers in the space provided.



1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Figure 15.2 Partially sectioned lymph Node

B. Write the name of the organ or tissue that matches the description. Terms may be used more than once. Choose your answers from the following choices below

Peyer's patches
appendix (vermiform)
lymph nodes
mucosa-associated lymphoid tissue (MALT)
red bone marrow
spleen
thymus
tonsils

_____1. Filters lymph
_____2.
_____3.
_____4.
_____5.
_____6.
_____7.

Sites for the immune response

_____8. Filters blood and contains red and white pulp
_____9. Programs T cells for immunocompetence
_____10. Programs B cells for immunocompetence

In the figure below, indicate where T and B cells are produced and programmed, and where active T and B cells are located. Choose your answers from the choices below

A – Origin of T cells

B – Origin of B cells

C – T cells become immunocompetent

D – B cells become immunocompetent

E – Active T cells, B cells and macrophages

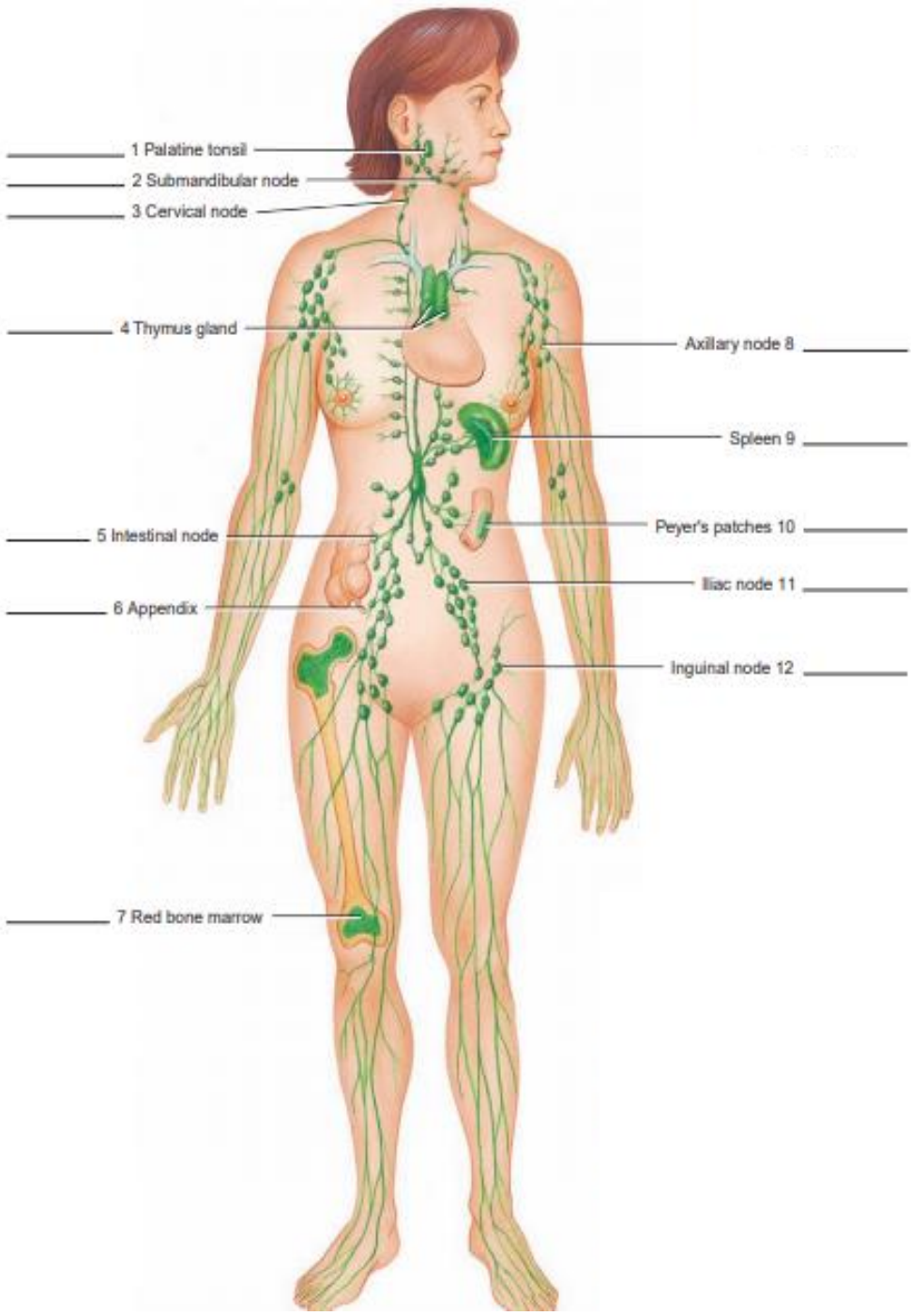


Figure 15. 3 Location of immune system cells

Worksheet no 3 Lymphatic and immunity

A. Complete the process.

Inflammation

1._____ ⇨

B. Process of Phagocytosis

1. _____

⇨

C. F**ighting the Flu: How Your Immune System Uses Its Memory**

- Glass jar with lid, 16 oz. A smaller or larger glass jar (with lid) would work too,
- Salt/ sugar (1 cup)
- Small safety pins
- 3 Magnets

Preparing the Immune System Model

In this activity, you will prepare a model of the human body's immune system. You will fill a jar with salt/ sugar (representing human cells) and small safety pins (representing pathogens). The completed jar will serve as a model of an infected human body. Small magnet pieces will represent human antibodies. *Note:* Each magnet piece will represent many antibodies. The model antibodies should bind to the model pathogens because safety pins are *magnetic*.

1. Carefully fill the glass jar with 1 cup (c.) of salt/ sugar (half full)
2. Add safety pins to the salt/ sugar in the jar then fill the jar with 1 c. of salt/ sugar for the second time. (full)
3. After filling up the jar with salt/sugar, tightly close the jar.
4. Mix the salt and safety pin together by flipping the jar upside down and then right-side up again to be evenly dispersed throughout the salt in the jar. (This is called *inverting* the jar.) Do this about 10 times or until (safety pins) are no longer visible appear.
5. Put magnets in the middle of the salt/ sugar. Pull the magnet one at a time. Repeat step 4 three times. Record how many safety pins are able to attach in each of the magnet.
   Note: Although each one will be referred to as a single antibody, in your model it actually represents many antibodies

6. Record your results in data table below. Record how many safety pins were attached in the magnet.
7. After which, put all three magnets at the jar at the same time. Analyze your data and determine whether using one antibody alone was just as effective as using three antibodies together, or whether using three antibodies together was more effective than one alone.

		Three Antibodies Together				
	One Antibody Alone	1st Antibody	2nd Antibody	3rd Antibody	Total	Average
Trial 1: # of safety pins						
Trial 2: # of safety pins						
Trial 3: # of safety pins						

8. Look at your observations, and try to draw conclusions from your results. What do you think your results tell you about why the immune system creates memory cells? Why is it useful and effective to have memory cells?

References

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Https://www.sciencebuddies.org/science-fair-projects/project-ideas/HumBio_p036/human-biology-health/immune-system-memory?from=FB#procedure. (n.d.).

https://apchute.com/ap2chap/lymphatic.pdf