3.1

OVERVIEW OF THE LYMPHATIC AND NON-SPECIFIC INNATE RESPONSE OF THE IMMUNE SYSTEM

Although most of us would prefer not to think about it, we are constantly coming in contact with fungi, bacteria, and viruses that could make us sick. Almost every time we take a breath of air or a bite of food, we are introducing potential **pathogens** (organisms that can cause disease) into our bodies. Even the slightest scratch on the skin can open up a pathway for pathogens to get into our body and cause damage. If we are constantly under attack by organisms that can do us harm, why aren't we sick all the time? Thankfully, we have an amazing system of defense provided by the lymphatic and immune systems to protect us from infections and help us get over them when they do occur.

The lymphatic system consists of **lymphatic vessels** and lymphoid organs, such as **lymph nodes, lymph nodules,** and the **spleen.** The lymphatic system has the following functions.

1. **Return tissue fluid to the bloodstream.** When blood flows through capillaries, water and small solutes are pushed out of the capillary into the tissues. While most of the water is returned to the capillary, there is a net loss of fluid from the blood to the body tissues. If this fluid were to remain in the tissues, the tissues would swell up by retaining the extra fluid. The lymphatic system functions to return excess tissue fluid to the bloodstream, thereby helping maintain the normal balance of water in the tissues and the blood. The disease elephantiasis illustrates the importance of this function of the lymphatic system. This disease is caused by a parasitic worm that disrupts the normal functioning of the lymphatic system, stopping it from removing all of the excess tissue fluid from certain body sites. As a result, the affected tissues accumulate extra fluid and swell to abnormal size.

2. **Body defenses.** The lymphatic system works with the immune system to help defend our bodies from pathogens. Lymph nodules, lymph nodes, and the spleen provide locations where white blood cells can congregate and mount a defense against any pathogens that have entered the body. The lymphatic system also helps defend against infections by transporting pathogens found in the body tissues to the lymph nodes. As the excess tissue fluid is collected by the lymphatic vessels, any pathogens in the fluid will also be collected and moved to the lymph nodes where white blood cells can destroy them.

3. ***Transportation of lipids absorbed in the digestive tract.*** Lipids from our foods do not immediately enter the blood when they are digested and absorbed in the small intestine. Rather, they enter into the lymphatic vessels and are transported to the blood through the lymphatic system.

The lymphatic system functions as a vital part of our immune system. Our immune system is designed somewhat like a fortified castle. There are 3 layers or "walls" of defense organized to protect our health. The outermost wall is constantly exposed to potential pathogens. This wall consists of **physical barriers,** such as the epidermis and the mucous membranes that line the respiratory, digestive and urinary tracts. If pathogens break through the physical barriers, we have a second wall of defense called **internal non-specific defense mechanisms** that can hopefully destroy them before they can cause damage to our tissues. These include inflammation, phagocytes, complement proteins, and fever. The final wall of defense is referred to as the **specific defenses** or the **immune response.** This wall consists of helper T-

cells, cytotoxic T-cells, and B-cells. Each of these walls of defense and the functions of these cells will be described later.

Structure and Function of the Lymphatic System
Physical Barriers: First Wall of Defense
Internal Non-Specific Defense Mechanisms