

How Does the Immune System Protect the Body?

Name: _____

Date: _____

Great Ready to Learn

- ♦ In the beginning, God created the human body _____ – no disease, no death.
- ♦ When _____ came into the world, things changed.
- ♦ Even with the effects of sin, your body is still _____.
- ♦ It even works even it is _____ taken care of as well as it should be.
- ♦ At times, the body can become _____, or an illness can take hold.
- ♦ A simple _____ can cause a cold or the flu.
- ♦ _____ may cause an earache or sore throat.

Immune System

- ♦ Every surface you touch, even the air you breathe, has the _____ to make you sick.
- ♦ _____, organisms that can cause disease, lurk all around us.
- ♦ They are _____, _____, _____, and _____.
- ♦ Fortunately, our bodies have several _____ that protect us against all types of pathogens.
- ♦ The initial defenses are known as _____-line defenses.
- ♦ Your skin, your respiratory system, and your digestive system all have first-line defenses that form _____ to harmful pathogens.
- ♦ Sometimes, however, harmful pathogens manage to get _____ these first-line defenses.
- ♦ Then your _____ system, a complex group of your body's defenses against disease, works against specific pathogens.
- ♦ The immune system is your _____ weapon in your body's defense against specific harmful pathogens.
- ♦ There are _____ lines of defense that the immune system has at its disposal.

First-Line Defenses: The Barriers to Infection

- ♦ The first-line defenses against pathogens are made up of _____ and _____ barriers.

- ♦ These barriers can trap or kill pathogens _____ they can attack you.
- ♦ Your _____ is the largest physical barrier against pathogens.
- ♦ The outer layer of skin is made up of tough cells that are constantly _____, making it difficult for pathogens to enter.
- ♦ _____, or tiny hairs, line the nose and respiratory tract.
- ♦ Pathogens are trapped by cilia and can be _____ by sneezing, coughing, or blowing your nose.
- ♦ _____ barriers, such as mucus, tears, saliva, and sweat, trap or wash away pathogens.
- ♦ Your saliva and tears contain an enzyme called _____ that protects you from bacterial invasion.
- ♦ Acid and other types of disease-fighting enzymes line your _____ and _____.
- ♦ Parts of the first-line defenses: _____
 - ♦ Tears wash away _____ substances and microbes.
 - ♦ _____ kills many bacteria.
- ♦ Parts of the first-line defenses: _____
 - ♦ Skin provides a _____ barrier against microbes.
 - ♦ Acidic skin cells discourage the growth of _____.
 - ♦ Sweat, oil, and fatty acid secretions _____ many bacteria.
- ♦ Parts of the first-line defenses: Large Intestine
 - ♦ _____ bacterial inhabitants keep invaders in check.
- ♦ Parts of the first-line defenses: _____
 - ♦ Saliva washes _____ from the teeth and mucous membranes of the mouth.
 - ♦ Lysozyme kills many bacteria.
- ♦ Parts of the first-line defenses: Respiratory Track
 - ♦ _____ traps organisms.
 - ♦ Cilia sweep away trapped _____.
- ♦ Parts of the first-line defenses: Stomach
 - ♦ _____ kills organisms.
- ♦ Parts of the first-line defenses: Bladder
 - ♦ _____ washes microbes from the urethra.

Second-Line Defense: The Inflammatory Response

- ♦ Sometimes a pathogen manages to get _____ your body's physical and chemical barriers.
- ♦ For example, you might get a splinter in your foot.
- ♦ Pathogens from the splinter can _____ your body.

- ♦ Or maybe you are tired or stressed, have not been eating well, or are recovering from another illness.
- ♦ If so, your body's physical and chemical barriers might not be able to fight off _____.
- ♦ They can enter your body and begin to _____ your cells.
- ♦ What are other examples of how pathogens might be able to get past the body's first-line defenses?
- ♦ If pathogens invade your body, the attackers are met by a _____ line of defense.
- ♦ The _____ **response** takes over.
- ♦ If a splinter has entered your skin, _____ from the damaged cells cause the walls of nearby blood vessels to _____.
- ♦ This allows _____ blood to flow into the area under attack.
- ♦ This _____ blood flow can cause the area around the splinter to become red, swollen, and painful.
- ♦ Other chemicals from the damaged cells attract white blood cells, known as _____.
- ♦ There are two main types of leukocytes, _____ and _____.
- ♦ _____ are white blood cells that engulf foreign particles, bacteria, and other harmful pathogens.
- ♦ One type of phagocyte, a _____, can migrate out of blood vessels and into tissues.
- ♦ There, the monocyte develops into a _____.
- ♦ Macrophages work slowly, taking _____ to surround and break down pathogens.
- ♦ They consume _____ quantities of materials and release some undigested particles back into the _____ to be devoured by other phagocytes.
- ♦ You have probably seen the _____ that sometimes forms around an infection.
- ♦ Sometimes the inflammatory response also causes a _____.
- ♦ A fever may make you feel uncomfortable, but it is _____ your body.
- ♦ Higher body temperatures slow the _____ of some pathogens.
- ♦ Thus, a fever helps fight off _____.
- ♦ The inflammatory response also helps your body deal with _____, burns, and other damage to _____.

Third-Line Defense: The Immune Response

- ♦ The first and second lines of defense are _____ responses.
- ♦ That is, the chemical and physical barriers and the inflammatory response does not _____ one invader from another.
- ♦ Sometimes a _____ gets by these first two lines of defense.
- ♦ That is when a _____ line of defense steps in.
- ♦ A specific _____ **response** occurs against specific pathogens.
- ♦ Your immune system contains tens of millions of _____, which are special white blood cells known as lymphocyte.
- ♦ T-helper cells turn on the _____ system.
- ♦ _____ cells identify specific pathogens.
- ♦ That is because each pathogen contains a specific marker called an _____ that only one type of killer T cell can recognize.
- ♦ Thousands of kinds of pathogens exist, but you have so many different T cells that they can _____ nearly all of them.
- ♦ Think about how you can look at a large crowd of students and immediately identify your classmates.
- ♦ In a similar way, T cells can _____ one pathogen from another.
- ♦ If a T cell recognizes the antigen of a pathogen on a body cell, it _____ that cell.
- ♦ Your immune system also contains another kind of white blood cell, a _____.
- ♦ B lymphocyte cells, also known as _____, produce proteins that help destroy pathogens.
- ♦ Each kind of B cell produces just one kind of _____.
- ♦ Each protein, called an _____, has a structure that fits onto the molecules from a certain pathogen.
- ♦ The antibody and the pathogen fit _____ like puzzle pieces.
- ♦ After an infection is gone, memory B cells and memory T cells _____ in your body.
- ♦ They will help your immune system respond _____ if you are exposed to the same kind of pathogen again.
- ♦ They also help you resist some illnesses by giving you _____, the body's ability to fight off pathogens before they can cause illness.
- ♦ Your parents or grandparents might remember getting chicken pox as children.

- ♦ _____ people have been infected with chicken pox, their immune systems produce memory T cells and memory B cells.
- ♦ These memory cells _____ in their bodies again.
- ♦ The antibodies in their blood quickly _____ the chicken pox virus before it can make them sick.
- ♦ Because of the memory cells, many people who have had chicken pox are _____ to the disease.

Types of Immunity

- ♦ The complexity of your immune system goes _____ the three lines of defense build into your body.
- ♦ Immunity also takes three different forms: _____ immunity, _____ immunity, and _____ immunity

Types of Immunity: Innate Immunity

- ♦ The innate immune system is made up of your _____ and _____ lines of defense.
- ♦ But the innate immune response is not _____ to a particular pathogen.
- ♦ As soon as a body is infected with a pathogen, the _____ immune system is activated.
- ♦ The quick response in the first hours of exposure to a new pathogen allows this system to _____ the body.

Types of Immunity: Adaptive Immunity

- ♦ The adaptive immune system takes a _____ period to react to a new invading pathogen.
- ♦ It may take several _____ or a _____ for the response to be effective.
- ♦ Unlike the innate immune system, adaptive immunity is _____ specific.
- ♦ The immune response is _____ to specific invaders.
- ♦ The adaptive immune system also “_____” when it encounters a certain pathogen.
- ♦ If the pathogen invades the body again, the immune response is _____.
- ♦ The innate immune system, however, does _____ remember an encounter with a pathogen.

Types of Immunity: Passive Immunity

- ♦ Passive immunity is a bit _____.

- ♦ Although it also is specific to a certain antigen, it is acquired _____ rather than formed by the immune system in response to the presence of the antigen.
- ♦ One type of passive immunity is that given from the _____ to a _____ baby.
- ♦ A baby has not yet had the _____ to develop antibodies.
- ♦ Passive immunity _____ the baby against most antigens for its first few months of life, until it develops the ability to produce its own antibodies.
- ♦ Another type of passive immunity is given through special types of _____ that work by giving the body antibodies.
- ♦ The protection given by these vaccines does not _____ if that from traditional vaccines.
- ♦ Often the two types of vaccines are used _____ to prevent immediate infection and to help the body develop long-term protection.
- ♦ One example of this is in the prevention of rabies after a possible exposure to the _____ virus.
- ♦ Several vaccines are administered over the time, the first being an _____-based vaccine given for short-term immediate immunity while the others are given for _____ protection.
- ♦ Antibodies produce _____ if they remain in the body.
- ♦ Passive immunity may last for several _____ or _____ before the body destroys the antibodies.

Problems with the Immune System

- ♦ Our immune system protects us from _____ of diseases.
- ♦ This protection usually allows us to stay _____.
- ♦ However, sometimes an immune system can _____ a person's health instead of protecting it.

Problems with the Immune System: Autoimmune disease

- ♦ An _____ disease is a condition in which the immune system targets a person's cells, tissues, or organs by mistake.
- ♦ This person's immune system cannot tell the _____ between pathogens and the body's own parts.
- ♦ It may attack _____ tissues, such as red blood cells, blood vessels, endocrine glands, joints, muscles, or skin
- ♦ The more than _____ types of autoimmune diseases include multiple sclerosis (MS), rheumatoid arthritis, lupus, and type 1 diabetes.

- ♦ In MS, the nerves of the brain and spinal cord are mistakenly _____ by the person's own immune system.
- ♦ The result is _____ of muscle control, vision, balance, and feeling.
- ♦ A person can have more than _____ autoimmune disease.
- ♦ The treatment for these diseases often includes _____ to reduce the body's immune response.

Problems with Immune System: Allergies

- ♦ An _____ is an immune system response to a foreign substance that an average person would not be affected by.
- ♦ That substance might be _____, foods, animal hair, dust, or mold.
- ♦ It could also be _____, insect _____, or _____.
- ♦ A substance that triggers an allergic reaction is called an _____.
- ♦ When the immune system detects an allergen, it forms _____.
- ♦ The body reacts to the antibodies by releasing chemicals called _____.
- ♦ Histamines cause _____ reactions.
- ♦ They can include red, swollen _____ or itchy _____.
- ♦ Being _____ of one's allergies is an effective way to prevent such potential health problems.
- ♦ Precautions such as _____ the things that cause allergies and taking medications can help reduce or relieve symptoms.
- ♦ _____ medicines usually contain antihistamines.
- ♦ Many allergic reactions result in sneezing, itching, or other _____ reactions.
- ♦ However, some allergic reactions can be _____ and even life threatening.
- ♦ A severe allergic reaction is called _____.
- ♦ Some symptoms of anaphylaxis include difficulty _____ (caused by the swelling of breathing passages), nausea, vomiting, feeling light-headed, skin rash, and a weak pulse.
- ♦ Certain foods, such as _____, or insect bites, such as bee _____, can result in death if not treated immediately.