**Conflict: Immunity**

**Overview**:

An animal’s most basic defenses against pathogens include physical barriers, like skin or a shell, and chemical barriers like sweat, tears, saliva, mucus, stomach acid, and urine. If pathogens are able to breach any of these barriers, it is vital that the immune system is able to distinguish these foreign cells and particles from the animal’s own cells. The conflict immunity game introduces students to the key players of the immune system in a fun interactive manner.

**Learning objectives**:

* Students will learn about the names and functions of various cells in the immune system.
* Students learn about various scenarios of infection and how the immune system responds to them.

**Resource**:

Website **→** [www.biomanbio.com/GamesandLabs/Physiogames/conflictimmunity.html](http://www.biomanbio.com/GamesandLabs/Physiogames/conflictimmunity.html)

Directions:Command and control your army of white blood cells to fight off pathogens like viruses and bacteria! Blast them with antibodies and destroy them before they destroy the body! As you work, be sure to refer back to this sheet frequently in order to record your responses to the questions asked.

**Types of Leukocytes**

1. Another name for leukocytes is .
2. Summarize the function(s) of each type of leukocyte:

|  |  |
| --- | --- |
| Macrophage |  |
| Helper T |  |
| Killer T |  |
| B cells |  |
| Memory Cells |  |

**Humoral Immunity (B cells)**

1. Humoral immunity occurs in

(Fun fact: “humor” is a medieval term for body fluid). This type of immune response is also known as the antibody-mediated response. Humoral immunity occurs when activated Helper T cells stimulate to make .

**Cell-mediated Immunity (T cells)**

1. Cell-mediated immunity occurs when . This type of immune response can activate Killer T cells, which are also known as Cytotoxic T cells because they secrete toxic chemicals that ultimately lead to the death of an infected cell.
2. One such chemical is perforin. How does perforin lead to the death of an infected cell?

**Mission Possible**

Read the mission objectives, and then complete the mission. You may refer to the menu in the top left-hand corner to receive ***Hints***, review the ***Mission***, and check your ***Stats***. You may also ***Replay*** the mission by clicking on the curved arrow in the top right-hand corner.

**Replay**

Once you’ve completed the mission, answer the Multiple Choice questions that follow. Use the Plasma B cell to tag your answer choice with antibody (aim + spacebar). Then ***record the correct answer on this sheet!***

***If you fail*** to complete a mission, you may ***skip*** to the next level.

Mission: Level 1

1. What is an antigen?
   1. A surface molecule on a pathogen that allows the immune system to recognize the pathogen
   2. A disease-causing organism or virus
   3. A protein that attacks a specific antigen to help fight disease
   4. A white blood cell that helps fight off disease
2. What is a pathogen?
   1. A white blood cell that helps fight off disease
   2. A surface molecule found on viruses or bacteria
   3. A disease-causing organism or virus
   4. A protein that attacks a specific antigen to help fight disease

Mission: Level 2

1. What is an antibody?
   1. A surface molecule on a pathogen that allows the immune system to recognize the pathogen
   2. A disease-causing organism or virus
   3. A protein that attacks a specific antigen to help fight disease
   4. A white blood cell that helps fight off disease

Mission: Level 3 (No Multiple Choice questions)

Bonus Level!

**Hint:** Click on a Plasma B cell to use it. When finished, change B cells by clicking a different one.

1. Antibodies are specific. What does this mean?
   1. An antibody will only attach to a particular antigen, but will not attach to others.
   2. Antibodies only work against a particular pathogen, but will not help fight against other, unrelated pathogens.
   3. An antibody that fights against influenza will not work against the bacteria that cause strep throat.
   4. All of the above statements are true about antibody specificity.

Mission: Level 4

1. What do macrophages do?
   1. They ingest pathogens by endocytosis and display the pathogen’s antigens on their surface to help activate the immune response.
   2. They interact with displayed antigens to help activate other lymphocytes (white blood cells) involved in the immune response.
   3. They produce antibodies that make pathogens floating in the blood or other body fluids for destruction. This helps prevent them from spreading.
   4. They destroy cells that have been infected by pathogens.
2. What do helper T cells do?
   1. They ingest pathogens by endocytosis and display the pathogen’s antigens on their surface to help activate the immune response.
   2. They interact with displayed antigens to help activate other lymphocytes (white blood cells) involved in the immune response.
   3. They produce antibodies that make pathogens floating in the blood or other body fluids for destruction. This helps prevent them from spreading.
   4. They destroy cells that have been infected by pathogens.

Mission: Level 5

1. What do B lymphocytes (more specifically plasma cells) do?
   1. They ingest pathogens by endocytosis and display the pathogen’s antigens on their surface to help activate the immune response.
   2. They interact with displayed antigens to help activate other lymphocytes (white blood cells) involved in the immune response.
   3. They produce antibodies that make pathogens floating in the blood or other body fluids for destruction. This helps prevent them from spreading.
   4. They destroy cells that have been infected by pathogens.
2. How do antibiotics affect bacteria?
   1. Antibiotics kill resistant bacteria but do not kill non-resistant bacteria.
   2. Antibiotics kill non-resistant bacteria but do not kill resistant bacteria.
   3. Antibiotics can cause an increase in antibiotic resistance because non-resistant bacteria are killed, but resistant bacteria survive and reproduce.
   4. I only
   5. I and III
   6. II and III
   7. I, II, and III

Mission: Level 6

1. What do Killer T lymphocytes do?
   1. They ingest pathogens by endocytosis and display the pathogen’s antigens on their surface to help activate the immune response.
   2. They interact with displayed antigens to help activate other lymphocytes (white blood cells) involved in the immune response.
   3. They produce antibodies that make pathogens floating in the blood or other body fluids for destruction. This helps prevent them from spreading.
   4. They destroy cells that have been infected by pathogens.
2. What do antibiotics do?
   1. Antibiotics kill bacteria.
   2. Antibiotics kill viruses.
   3. None of the above.
   4. Both A and B.

Mission: Level 7

1. HIV (Human Immunodeficiency Virus) is the virus that causes AIDS (Acquired Immune Deficiency Syndrome). How does HIV harm the body?
2. HIV infects and destroys several types of white blood cells.
3. HIV destroys all types of cells in the body, leading to death.
4. HIV weakens the immune system, causing the body to be unable to fight off pathogens.
   1. II and III only
   2. I and II only
   3. I and III only
   4. I, II, and III

Bonus Level!

**Hint:** Avoid HIV! The game will end when the immune system is overwhelmed with HIV. It is called AIDS when the body is no longer able to fight infection.

**You Are Finished! ☺**

**Score:**

**Note:** As you saw in the game, HIV ultimately weakens the immune system to the point that it is no longer able to fight off pathogens. Even organisms that are not normally pathogens can make a person with AIDS sick. Although currently (as of 2014) there is no cure for AIDS, there are some treatments that can help people with HIV live longer. Scientists around the world continue looking for more effective treatments, for a cure and a protective vaccine.