

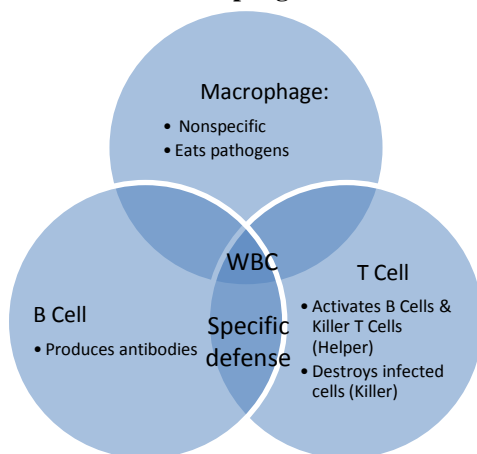
**Biology – Unit #9c: Human Body Systems – The Immune System**

**Unit 4 Essential Skills:**

9-4. Identify and describe the roles of **B-cells** and **T-cells** in maintaining the **immune system** in humans. (HS-LS1-2)

**Study Guide**

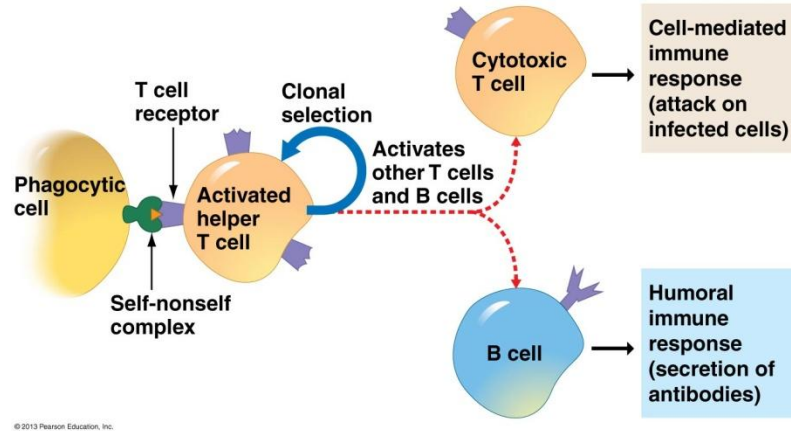
1. Compare and contrast **B Cells**, **T Cells** and **Macrophages**, in terms of normal percent of blood **and** function.



2. What is the difference between **nonspecific** versus **specific defenses**?  
**Nonspecific immune defenses will protect the body from any pathogen. Examples of nonspecific immune defenses are skin, mucus membranes, mucus, anti-microbial proteins, nose hair, stomach acid and macrophages. Specific immune defenses will fight a specific pathogen.**
3. Give 3 examples of your **1<sup>st</sup> line of defense**. How do these work to protect you? Give 3 examples of your **2<sup>nd</sup> line of defense**. How do these work to protect you?  
**1<sup>st</sup> Line: Skin, mucus, mucous membranes, Stomach acid, sweat, oil, wax**  
**2<sup>nd</sup> Line: Macrophages, Neutrophils, Natural Killer Cells**  
**3<sup>rd</sup> Line: Helper T cells, Killer (Cytotoxic) T Cells, B Cells, Antibodies**
4. Why is a macrophage part of your **specific** and **non-specific defenses**?  
**Macrophages are part of both the nonspecific and specific immune defenses because they will destroy cells that are infected with any type of pathogen, but they activate helper T cells and start the specific immune response.**
5. Explain the difference between a **pathogen, parasite** and an **antigen**.  
**A pathogen is any biological agent that causes damage to cells & causes disease. A parasite is an organism that lives in or on a host and feeds on its host. An antigen is a marker protein on the cell membrane.**
6. How are **Helper T-cells** different from **Cytotoxic (Killer) T-cells** in the way they defend your body?  
**Helper T cells activate the killer T cells & B cells, but they do not directly fight off pathogens. Killer T cells destroy cells that have been infected by specific pathogens.**
7. How are **B-cells** involved in your specific defense? What are **antibodies**?  
**B cells produce antibodies that are specific to each pathogen. Antibodies that bind to the antigen on a pathogen, preventing the pathogen from entering body cells.**
8. What are the 5 main **types of pathogens**? List them and explain their differences in cell type, cell structure and energy sources.

<b>Kingdom</b>	<b>Example</b>	<b>Transmission</b>	<b>Treatment/Prevention</b>
Bacteria	E. coli, salmonella	Direct contact (usually contaminated food)	Wash food before preparing, rest, antibiotics
Protozoa	giardia	Contact with contaminated water	
Fungi	ringworm, athletes' foot	Direct contact with fungus	Antifungal creams or oral medication
Plant	generally causes allergic reactions	Often airborne	Antihistamines
Animal	tape worm, round worm	Eating contaminated food	

9. What are **Prions** and **Viruses**? Why are they not classified in a Kingdom? Give examples of pathogens in each of the Kingdoms.  
**Prions** – proteins that cause damage to cells, ex: Mad Cow Disease (no treatment known)  
**Viruses** – DNA molecules surrounded by a protein coat, ex: influenza (prevented by vaccines)  
 Neither prions nor viruses are able to reproduce, maintain homeostasis, or metabolize, so they are not considered to be living things
10. Explain the difference between **immunodeficiency** and **autoimmunity**? Give examples of each of these disorders.  
**Immunodeficiency** results in a weakened immune system that cannot respond well to pathogens. **Autoimmunity** occurs when the immune system attacks the body's own cells.
11. Explain the difference between a **vaccine** and an **antibiotic**. When and why would each of these be given to a person? How do human diseases caused by bacteria and diseases caused by viruses react to antibiotics?  
**Vaccine** – prevents infections (usually for viruses)  
**Antibiotics** – treats a bacterial infection by killing bacterial cells by interfering with cellular processes (does work for viruses, which do not have cells)
12. Explain how a **vaccine** works to promote production of antibodies.  
 A vaccine contains antigens from a pathogen that cause the immune system to produce killer T cells & B cells
13. You are exposed to a virus on this paper. Draw a picture showing the immune system cells involved in your bodies response.



14. Other than a flu shot, what are 3 ways to prevent the flu virus from causing your immune system to react?  
**Wash your hands regularly, avoid contact with infected people, do not share food or drinks with others, etc...**