BIG QUESTION: What happens if organisms get past my natural barriers?

WARM-UP: Discuss in your groups: Have you ever been bitten by an insect? What insect bit you? How did your body react?

LESSON OBJECTIVES: SWBAT
• Describe how the body’s innate immune system fights foreign invaders.
• Explain using steps and illustrations, how the body reacts to a splinter or bee sting.
If foreign particles and pathogens (disease causing bacteria) get past the body’s natural defenses they are met by the body’s **INNATE IMMUNE SYSTEM**, which is sometimes referred to as the **non specific immune response**.

1. If you ever got bit by an insect you would have experienced the body’s innate response. What happens to your body? Share your “Do Now”.

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**L4: The Innate Immune System**

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L4: The Innate Immune System

SCENARIO: You are enjoying a nice relaxing walk in the forest when all of a sudden.......
...The bee flies over and sits on your hand pushing its stinger deep into your skin.

You let out a cry! Why did the bee do such a bad thing? You start to feel pain and a swelling in the region that got stung. What is happening?
L4: The Innate Immune System

When you are stung by an insect, there are a number of event that happen inside the body to help protect you. These events form the body’s innate immune response.

1. The Bee puts its stinger into your hand.
2. Blood supply in the affected area increases and the flow of blood slows down.
3. The **blood pressure** in the effected area **increases**, this causes fluid to leak from cells, causing the **region to swell** (inflammation).
4. The fluid contains lymph fluid which contains white blood cells, in particular PHAGOCYTES.
5. The phagocytes start to devour the foreign particles that are related to the Bee’s stinger.
L4: The Innate Immune System

• Once the phagocytes start attacking the foreign particles they release a special protein called interferon.

• Interferon prevents viruses from reproducing and helps other cells fight the infection.

• If the infection becomes too wide spread the person will get a fever.

• The fever signals the body to produce more white blood cells.
L5: The Adaptive (Specific) Immune System

p. 59 - 60 of journal “Innate (Non-Specific) Immune System”

BIG QUESTION: If my infection is too big should I see a doctor? Or will my body be able to fight it off?

DO NOW: Discuss in your groups: When was the last time you were sick? What happened? How did you get better?

LESSON OBJECTIVES: SWBAT
• Describe the Adaptive Immune System.
• Explain the roles of B-Cells and T-Cells in the immune system.
The Adaptive Immune System

The Adaptive Immune System, sometimes referred to as the Specific Immune Response, is the next line of defense against foreign particles and disease causing bacteria (pathogens) that might enter the body and get past the inflammatory, Innate Immune system.
The Adaptive Immune System comprises of specialized white blood cells, they are like The U.S Military’s Black Operation Specialists, they are the Marines of the immune system.

These specialized cells are specific to a particular pathogen and the poison that it produces.

They seek them out to destroy them and often create memory cells which are able to identify them in the future, meaning that they can be destroyed more swiftly.
The cells that are involved in the **Adaptive Immune system**, include 3 types of lymphocytes; B-CELLS, T-CELLS and Natural Killer Cells.

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**LYMPHOCYTES**

- **T**
- **B**
- **NK**

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**Yeah So what! Im the mighty STREP THROAT. You aint got nothin’ on me!**

**ARE YOU CHALLENGING MY SOLDIERS? THIS IS WAR!!**
By exploring the body’s response to the streptococcus bacteria that causes Strep Throat, we will be able to examine the role of each cell in fighting the infection.

1. Foreign particles get past the non specific immune system.
L5: The Adaptive Immune System

2. Macrophages (which were once monocytes) engulf the pathogen.

Pathogen = any invader
Antigen = proteins on surface of pathogen (it’s ID)
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3. The pathogen has surface structures (antigens). The macrophage presents the surface structures to T-CELLS.

The T-Cells now have the **antigen** which is causing the infection.
4. The T-CELLS, multiply at the site of infection.
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T-cells activate B-CELLS
5. B-CELLS multiply.
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5. B-CELLS multiply, some of the B-CELLS and T-CELLS become memory cells.
6. The B-CELLS have surface receptors, which break off to form antibodies.
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6. The antibodies attach themselves to the antigens of the pathogen.
L5: The Adaptive Immune System

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L5: The Adaptive Immune System

7. Once the antibodies have been attached to the pathogen’s antigens, special T-CELLS attack and destroy the pathogen.
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PATHOGEN: the streptococcus bacteria has been DESTROYED!
8. Memory B-CELLS and T-CELLS remain in the system. If the pathogen returns they will kill it on sight.