

Immune cells act as the body's army

By The Conversation, adapted by Newsela staff on 04.04.17

Word Count **690**

Level **860L**



A woman receives a vaccine from her doctor. Vaccines help our immune system protect us against certain diseases like the flu. Photo from CDC.gov.

The immune system is very important for protecting against illness. It protects against invaders like viruses, bacteria and fungi. All these things are known as pathogens.

Immune cells are constantly on the lookout for pathogens. They patrol the blood by moving around in the blood. Around half your blood volume is fluid known as plasma. The rest is made up of millions of different types of cells.

Most cells are red blood cells that transport oxygen. A small portion is made of white blood cells. These are immune cells that act as the body's army. The immune system produces many different types of these white blood cells, each with a specific role.

Stem Cells Can Replace Themselves

Every type of cell originally comes from blood stem cells. Stem cells can develop into different types of cells. These are produced in bone marrow, which is the hollow part of the bones.

Stem cells are able to replace themselves. They must also constantly produce new cells to replace old ones.

Sometimes bone marrow doesn't produce enough blood cells. This can result in low energy or "immuno-deficiency." The body fails to produce a strong immune response. This leaves the person more likely to become ill.

Producing too many blood cells is also a problem. It can lead to difficulty breathing, high blood pressure and heart attack or stroke. And constant high levels of blood cells can lead to leukemia, a type of cancer.

First Line Of Defense Against Invaders

After immune cells are produced in the bone marrow, they quickly enter the blood stream. Some wait for invaders in body tissue. Others patrol the body until they encounter invaders.

These cells serve as the first line of defense against invaders that would make us sick. They are called the innate immune response.

The innate immune response deals with the majority of invaders that enter our body. The cells respond to very broad signals that are shared by many types of invaders.

When they detect an invader, immune cells sound an alarm. This calls more immune cells to the area. Blood cells rushing to the site can cause signs of inflammation. These include swelling, pain, heat, redness and loss of function.

Sometimes the cells respond to harmless signals. This means you might feel sick when you are not, such as with asthma or an allergy.

Strong Memory Response

If the innate immune response fails to control an infection, there is a second line of defense. This is called the "adaptive" immune response. Adaptive immunity creates a specific response for each invader.

Adaptive immune cells get educated before they can fight invaders.

This education teaches each cell how to respond to their particular invader. It also makes sure that the cells will not respond in a way that fights the body itself. Fighting against other body cells can create an autoimmune disease. Examples of autoimmune diseases include diabetes and multiple sclerosis.

Each adaptive immune cell can only respond to one type of invader. The body must generate a huge number of these. It needs cells for every type of invader.

When they come up against an invader they recognize, adaptive immune cells multiply and attack it. Reproducing immune cells takes time. It is the reason why it can take a week of illness before an infection is cleared.

Once an infection is cleared, the immune cells that fought it stay alive so they can rapidly respond if they ever encounter the same invader again. This is called a memory response. It is the reason vaccine shots work.

Vaccine shots activate our adaptive immune response, without the risk of making us sick. The shot might contain a tiny portion of an invader that would make us sick. It might contain an inactive part of an invader. Our body's immune cells use the shot to learn more about the invader. This creates a strong memory response if our body meets the invader again.

The immune system produces millions of specialized cells every day to keep our bodies healthy. It is an amazing and complicated process. When it works properly, we will not notice it's there at all.

Quiz

1 What is the relationship between the number of blood cells in the body and illness?

- (A) Illness can be caused by too many or too few blood cells in the body.
- (B) Illness is prevented when there are only a few blood cells in the body.
- (C) Illness cannot happen if there are too many blood cells in the body.
- (D) Illness is not related to the number of blood cells in the body.

2 According to the article, HOW do adaptive immune cells help protect the body?

- (A) They keep producing stem cells in the body.
- (B) They disappear quickly after attacking invaders.
- (C) They learn how to fight a specific type of invader.
- (D) They develop into different types of cells.

3 Read the selection from the introduction [paragraphs 1-3].

Immune cells are constantly on the lookout for pathogens. They patrol the blood by moving around in the blood.

Which word or phrase from the article helps you understand the meaning of "pathogens"?

- (A) invaders
- (B) red blood cells
- (C) white blood cells
- (D) signals

4 Read the paragraph from the section "First Line Of Defense Against Invaders."

These cells serve as the first line of defense against invaders that would make us sick. They are called the innate immune response.

What does the author mean by "innate immune response"?

- (A) invaders that enter the body with the purpose of fighting immune cells
- (B) immune cells in the blood that send false signals to other cells about invaders
- (C) invaders that multiply after coming into contact with immune cells
- (D) immune cells in the blood that are the first to respond to invaders