Humoral Immunity

by Sophia

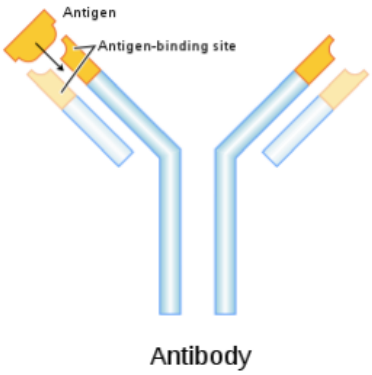
WHAT'S COVERED

In this lesson, you will learn to understand the antibody-mediated immune response. Specifically, this lesson will cover:

1. Humoral Immunity

Antibody-mediated immune response is a type of adaptive immunity. Recall that adaptive immunity is our body's third line of defense against pathogens. In this type of immunity, we are fighting pathogens outside cells: in your blood plasma or your tissue fluids. This takes place in our lymphatic system.

In the antibody-mediated immune response, B cells in your lymph nodes produce**antibodies** against antigens.



B-cells are lymphocytes, a type of white blood cell, and they have antibodies (proteins) bound to the surface of their plasma membranes. The immune system randomly produces millions of B cells, each with one unique antibody. This means that when our body is invaded by a pathogen we've never encountered before, chances are very good that one of those randomly-generated B cells has an antibody that will bind one of the pathogen's unique chemical markers (antigens).

IN CONTEXT

Let's say you were to be invaded by a certain type of virus. That specific type of virus can only be identified by a certain type of B cell. If a particular B cell doesn't have the right proteins on its surface, it won't bind the virus. B cells (each with their own unique antibody) will bounce off of this virus until finally one of them fits with this virus and attaches. When the right B cell attaches to the

virus via its unique antibody, the B cell will become activated. **Dendritic cells** will cause T cells to divide, and effector helper T cells will release something called cytokines. Cytokines will help stimulate the division of the B cells into clones of itself.

When the B cell becomes active and starts to divide, some of its daughter cells will be set aside for future attacks as memory B cells. The others will produce effector B cells, also known as plasma cells, which make and release antibodies.

Antibodies target invaders, bind to them, and flag them for pickup by phagocytes. Phagocytes will engulf them and get rid of them. Antibodies can also inhibit the normal functioning of the pathogen.

↱ EXAMPLE Secreted antibodies (antibodies produced by B cells and secreted into the extracellular fluid) float around in the lymph until they bind to, for example, a virus. An antibody bound to a virus makes it harder for the virus to invade a cell because it has something extra attached to it.

TERMS TO KNOW

Antibody-Mediated Immune Response

Also known as B lymphocytes, B cell carry out a version of specific immunity called humoral immunity; during humoral immunity, B cells produce and secrete antibodies into our body tissue cavities.

Antibodies

Specific protein markers that are created by the immune system for binding and reacting to specific antigens; antibodies are created by B cells during humoral immunity.

Dendritic Cells

A type of phagocyte found in the skin; dendritic cells can also phagocytize (eat) a pathogen or part of a pathogen and display it to a B cell in order to activate it.

2. Classes of Antibodies

There are five classes of antibodies, and each class is distinguished by a different immunoglobulin or protein shape. Some of the five antibody classes are secreted, and some of them are membrane-bound.

Classes of Antibodies	
Secreted Antibodies Antibodies that are released into the body. They float freely, and when they encounter their unique antigen, they bind the pathogen, making it harder for the pathogen to multiply and do damage and making it easier for phagocytes to recognize and eat the pathogen.	*IgG* (immunoglobin G): The main antibody found in your blood.
	IgA (immunoglobin A): A type of antibody that inhibits pathogens from binding to your body's cells. It can be found in your tears, milk, mucus, and saliva.
	IgE (immunoglobin E): A type of antibody which is anchored to different types of white

Membrane-Bound Antibodies Antibodies that are not secreted; they remain attached to the immune cell's plasma membrane.	blood cells. It plays a huge role in allergies and asthma.
	IgD (immunoglobin D): A type of B cell receptor.
	IgM (immunoglobin M): Another type of B cell receptor.

SUMMARY

Humoral immunity, also called the antibody-mediated immune response is a type of adaptive immunity. It fights pathogens in the extracellular fluid and takes place in the lymphatic system. B cells with the right type of protein on its surface can bind to a specific antigen. That specific B cell will then become active and create more of itself. Some of the B cell's daughters will be set aside as memory cells for future attacks, while the others will continue to seek out and bind to antigens. These antibodies will flag the antigens to be destroyed by phagocytes. The antibodies will also inhibit the normal functioning of the antigen. There are five **classes of antibodies**. Membrane-bound antibodies include IgE, IgD, and IgM. Secreted antibodies include IgG and IgA.

Keep up the learning and have a great day!

Source: THIS WORK IS ADAPTED FROM SOPHIA AUTHOR AMANDA SODERLIND

ATTRIBUTIONS

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