



Analyzing the Response of Immune System to Protozoan Parasite Invasions

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DESCRIPTION

The immune system is an incredibly complex and intricate network of cells and organs that work together to protect the body from foreign invaders. When protozoan parasites invade, the immune system responds in a variety of ways in order to eliminate or contain the infection. The immune system has a specialized type of white blood cells called macrophages, which are responsible for recognizing and engulfing any foreign particles or pathogens and produce plasma cells that release antibodies into our bloodstreams for targeting specific antigens on protozoans. This process, known as phagocytosis, is how macrophages respond to protozoan parasites. In addition, B-cells produce plasma cells that release antibodies into the bloodstream which can target specific antigens on the surface of protozoans. T-cells also play an important role by recognizing antigens on their surface and triggering an effective response from all parts of our immune systems.

Protozoa are single-celled organisms that can invade the body and cause disease. There are many different types of protozoan parasites, each with its own unique way of affecting the body's immune system. One common type of protozoan parasite is the *Plasmodium* species, which causes malaria. These parasites enter the body through mosquito bites and invade red blood cells, where they feed on hemoglobin and reproduce. The immune system responds by releasing cytokines and antibodies to kill off the invading *Plasmodium* cells. However, these defenses are not always effective in eliminating all of the parasites. Another type of protozoan parasite is *Giardia lamblia*. These parasites live in contaminated water or food sources and can cause an infection known as giardiasis when ingested by humans. The immune system responds by producing white blood cells called neutrophils that attack and kill the *Giardia* cells. However, this response is often not enough to completely eradicate the infection from the body. *Cryptosporidium parvum* is another type of protozoan parasite that can cause an infection known as cryptosporidiosis when ingested by humans. This parasite invades the small intestine where it multiplies quickly before being excreted in feces. The immune system responds by releasing cytokines that help to clear out infected cells while also activating

other components of immunity such as T-cells and B-cells to fight off any remaining parasites in the body.

Protozoan parasites can have a significant impact on a person's health if left untreated for too long or if their immune system is weakened due to other factors such as HIV/AIDS or cancer treatments. Therefore it is important for individuals to practice good hygiene habits such as washing hands regularly after using public restrooms or handling animals in order to prevent infections caused by these parasites from occurring in the first place.

The first step in detecting a protozoan parasite invasion is for the immune system to recognize the presence of these invaders. Immune cells, such as macrophages, neutrophils, B-cells, and T-cells all have specific receptors on their surface that allow them to detect foreign substances. Once these receptors detect a protozoan parasite, they send out signals that allow other cells in the immune system to mount a response. Once the protozoan parasites have been detected by the immune system, it begins its response. The main goal of this response is to eliminate or neutralize the invading protozoan parasites before they can cause any harm. To do this, the immune system produces specialized proteins called antibodies that specifically target and bind to components of the invading protozoans. These antibodies then signal other parts of the immune system, such as macrophages or natural killer cells, which then attack and destroy the protozoans.

The immune system also produces cytokines which help regulate its response by sending chemical signals between different cells in order to coordinate an effective attack against the invading protozoans. These cytokines can also activate other parts of the immune system in order to produce more specialized responses depending on what type of protozoan parasite has invaded. In addition to attacking directly with antibodies and cytokines, another important part of responding to a protozoan parasite invasion is preventing further infections from occurring by stimulating certain parts of our body's natural defenses such as mucus production or increased skin cell turnover rates in order to create an inhospitable environment for further invasions by these parasites. By understanding how our bodies detect and respond to the protozoan parasite invasions we can better equip

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ourselves with knowledge about how best to protect ourselves from becoming infected with these pathogens as well as providing insight into possible treatments for those who are already infected. Vaccines can help to protect against the most common protozoan parasites and their associated diseases. Some vaccines are available for specific protozoan parasites, such as *Plasmodium falciparum* or *Giardia lamblia*. It's important to note

that not all protozoan parasite infections can be prevented by vaccination. For example, some species of parasitic amoebas cannot be targeted with a vaccine because they do not produce antigens that stimulate the immune system in the same way as other parasites do. In these cases, other preventive measures such as avoiding contaminated water sources or using repellents should be taken instead.