



The Magic of Human Immune System

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We are surrounded by millions of microorganisms, but we do not fall sick very often: Thanks to our incredible "immune system".

Now let us understand how our immune system works.

Our immune system is broadly divided into two types:

- Innate immunity
- Adaptive immunity- which is subdivided into Humoral immunity (also called antibody-mediated immunity and cellular immunity).

Innate immunity

This is the first line of defense and is also referred to as non-specific defense mechanism that responds immediately or within hours of an antigen (pathogen) appearance in the body and comprises of physical barriers like skin, various chemicals in the blood and the immune cells that attack the foreign cells in the body. Apart from being immediate and rapid, this immunity does not need prior exposure and is not associated with the memory. A type of white blood cells (Neutrophils and Monocytes) also called Phagocytes and Natural killer cells comprise innate immunity. Phagocytes use Phagocytosis to engulf bacteria, foreign particles and dying cells to protect the body.

Adaptive immunity

Adaptive immunity is also referred to as acquired immunity that is composed of specialized, systemic processes to eliminate pathogens from human body. Adaptive immunity is comprised of antibody and cellular immunity. Adaptive immunity creates immu-

nological memory after an initial response to pathogen and leads to an enhanced response to further encounter that pathogen. Antibodies are a critical part of adaptive immunity and can provide a long-lasting protection, sometimes for the person's entire lifetime.

Adaptive immunity is the basis of vaccination. Two types of lymphocytes namely, B lymphocyte and T lymphocytes carry out antibody responses and cell mediated immune response respectively. In antibody responses B cells are activated to secrete antibodies (also called immunoglobulins), which are produced in response to pathogen. These antibodies travel through the bloodstream and bind to foreign antigen causing it to inactivate and thus does not allow the pathogen to bind to host cell.

What is a vaccine?

Vaccines contain killed or weakened form of the organism (a virus or bacterium). The organism in the vaccine is altered so that it won't make you ill but can stimulate the immune system to respond.

What happens after vaccination?

After receiving vaccine, the B lymphocytes responsible for protection against the disease react as if the real infectious organism is attacking the body and form two types of cells,

- **Plasma cells:** That produce antibodies.
- **Memory B cells:** These cells provide a quick antibody response after reexposure to infectious organism.

This response generated by B lymphocytes is known as primary response. It takes several days to develop a good antibody response and the antibody concentration in the blood peaks at about 14 days.

Booster dose: Many diseases require a booster shot after initial dose. Over time the body can lose the antibodies provided by the first dose, in such case the body needs a wake up call to continue preventing disease in the form of booster dose. Some of the vaccines needing booster doses are Polio, Hepatitis B, Tetanus, Pertussis (Whooping cough).

Thus, the Human Body is bestowed with an incredible immune system which does a remarkable job of defending against various pathogens.

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