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NSC306 MEDICAL SURGICAL NURSING
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1.Explain The Role Of The Immune system

Immune system

The role of the immune system is to protect our body from any foreign matters that might cause any damage or homeostatis imbalance. The success of the immune system depends on its ability to discriminate between foreign(non self) and host(self) cells. When an organism is threatened by microorganisms, viruses, or cancer cells, the immune system acts to provide protection. Normally the immune system does not mount a response against self. This lack of an immune response is called tolerance. When a foreign matter enters the human body, our defense system recognizes this as foreign through the immune system. How the human body recognize foreign against itself employs a complex "I.D." system. Each cell in the human body carries on it's surface a mixture of proteins and sugars that serve to identify the cell to the immune system. Foreign objects lack the identifiers that all of the body's cells have, but each one has unique features or antigens where the immune system attaches identifiers called antibodies. This is the basis for the specific defense mechanisms. Once you have built the antibodies for a specific antigen, the immune system will respond faster than

if the had been no previous exposure to the antigen (i.e. you are immune to the pathogen, but only that specific pathogen, because your immune system responds faster.) The non- specific part of the immune system is mostly composed of phagocytes (eating-cells) which engulf and digest foreign substances like bacteria and viruses, which do not bear the body's specifc idenifers.

2.Describe the types of immunity

Two types of immunity exist — active

and passive:
Active immunity occurs when our own immune system is responsible for protecting us from a pathogen. Passive immunity occurs when we are protected from a pathogen by immunity gained from someone else.

Active immunity

Active immunity

Individuals rely on active immunity more so than passive immunity. Active immunity is created by our own immune
system when we are exposed to a potential disease-causing agent (i.e., pathogen). Most of the time, we are exposed to these potential pathogens naturally throughout the course of our day — in the air we breathe, the food we eat, and the things we touch. Luckily, most of these exposures are to agents that will not result in disease, either because they are harmless or because our immune system works to neutralize them.

In addition to “fighting off” these pathogens, active immunity is important because it lasts a long time in the form of immunologic memory. Immunologic memory consists of B and T cells that can recognize a particular pathogen (see "Adaptive immune system"). These cells circulate at low levels in our bodies and if “activated” by recognizing that pathogen in their travels, they quickly start to multiply and signal other elements of the immune system to activate as well. Memory cells are crucial for two reasons. First, they allow our immune systems to respond quickly. Second, they are specific for the pathogen, so the immune response is ready the moment the pathogen is encountered (see "Immunologic memory")

Because we don’t know about most of the work our immune system does, we often do not think about how busy it is. But, the reality is that like our hearts and lungs, our immune system is constantly working to keep us healthy. This effort is evidenced by the fact that

our immune system generates grams of antibodies every single day!

Vaccines contribute to active immunity by providing us with a controlled way to create an immune response. When a vaccine is introduced, our immune system treats it like any other exposure. It works to stop the “assault” and, in the process, immunologic memory develops. Because vaccines are designed such that they do not cause illness, we gain the benefits of the exposure without the risks associated with fighting off a natural infection. In this way, vaccines offer our immune systems a chance to “train” for a future encounter and provide us with a “shortcut” to protection. We gain the immunity that follows surviving a natural infection without having to pay the price of natural infection.

Passive immunity

Passive immunity

Passive immunity, or immunity gained in a way other than from one's own immune system, can occur in a few ways and can be life-saving. However, passive immunity is short-lived because the antibodies are not continually replenished as they would be in an individual whose immune system is responding directly. Passive immunity can occur in a couple of ways:

Maternal antibodies

Unborn and newly born babies are protected by antibodies from the maternal immune system. These antibodies are shared in two ways: across the placenta and in breast milk.

Placenta and circulation — When a woman is pregnant, her blood circulates through the placenta to deliver nourishment and protection to the developing fetus. As the blood circulates, so do the antibodies and immune system cells that travel in blood. Although developing fetuses are not typically exposed to any pathogens in utero, they are exposed to viruses and bacteria during and immediately after birth. The types and levels of antibodies in a baby's blood at birth reflect those of the mother.

Breast milk — Babies also get antibodies from breast milk, particularly from a protein-rich version of breast milk supplied in the first few days after birth known as colostrum. Colostrum, which is produced in the first three to five days after birth, contains higher levels of antibodies that protect the intestinal surface (immunoglobulin A or IgA) and lower levels of nutritional ingredients than milk produced in the weeks following birth. This transfer of antibodies from mother to child suggests its importance in the period before a baby's immune system can generate its own protection.

Immunoglobulin treatments

In certain situations, antibodies obtained from animals, from other people, or synthesized in a laboratory

can be used to treat individuals at risk of infections. For example, infants born to women infected with hepatitis B are treated with antibody preparations in addition to being vaccinated in an effort to protect them from also becoming infected with hepatitis B. In another example, people bitten by some poisonous snakes may be treated with antivenom, a mixture of antibodies against the type of snake venom to which the person was exposed.

3.Explain The Different types of antibodies and their roles

IgG

IgG is the most abundant antibody isotype in the blood (plasma), accounting for 70-75% of human immunoglobulins (antibodies). IgG detoxifies harmful substances and is important in the recognition of antigen- antibody complexes by leukocytes and macrophages. IgG is transferred to the fetus through the placenta and protects the infant until its own immune system is functional.

Roles:

. IgG is the main type of antibodyfound in blood and extracellular fluid, allowing it to control infection of body tissues. By binding many kinds of pathogens such as viruses, bacteria, and fungi, IgG protects the body from infection.

IgM

IgM usually circulates in the blood, accounting for about 10% of human immunoglobulins. IgM has a pentameric structure in which five basic Y-shaped molecules are linked together. B cells produce IgM first in response to microbial infection/antigen invasion. Although IgM has a lower affinity for antigens than IgG, it has higher avidity for antigens because of its pentameric/ hexameric structure. IgM, by binding to the cell surface receptor, also activates cell signaling pathways.

Roles:

IgM is present on B cells and its
main function apparently is the control of B-cell activation. B-cells create IgM antibodies as a first line of defense. Their large size gives them excellent binding avidity, and can pick up trace amounts of infection to mark for recognition by phagocytes.

IgA

IgA is abundant in serum, nasal mucus, saliva, breast milk, and intestinal fluid, accounting for 10-15% of human immunoglobulins. IgA forms dimers (i.e., two IgA monomers joined together). IgA in breast milk protects the gastrointestinal tract of neonates from pathogens.

Roles:

Immunoglobulin A (IgA), as the
principal antibody class in the secretions that bathe these mucosal surfaces, acts as an important first line of defence. IgA, also an important serum immunoglobulin, mediates a

variety of protective functions through interaction with specific receptors and immune mediators.

IgE

IgE is present in minute amounts, accounting for no more than 0.001% of human immunoglobulins. Its original role is to protect against parasites. In regions where parasitic infection is rare, IgE is primarily involved in allergy.

Roles:

IgE's main function is immunity to parasites such as helminths like Schistosoma mansoni, Trichinella spiralis, and Fasciola hepatica. IgE is utilized during immune defense against certain protozoan parasites such as Plasmodium falciparum.

IgD

IgD accounts for less than 1% of human immunoglobulins. IgD may be involved in the induction of antibody production in B cells, but its exact function remains unknown.

Roles:

In B cells, the function of IgD is to
signal the B cells to be activated. By being activated, B cells are ready to take part in the defense of the body as part of the immune system. During B cell differentiation, IgM is the exclusive isotype expressed by immature B cells. ... IgD may have some role in allergic reactions.