Tikrit University
College of Veterinary Medicine

Lect. 8-Immunology

Subject name: Types and Grades of Immunity: Adaptive Immunity
Subject year:2024-2023
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Adaptive immunity

1. **It is the resistance acquired by an individual during life.**
2. **It occurs after exposure to an agent and is mediated by antibodies as well as T lymphocytes (helper T cells and cytotoxic T cells).**
3. **It has immunologic memory and a remarkable capability of discriminating between self and nonself antigens.**
4. **Once an antigen has been recognized by the cells of acquired immune system, the response to it is specific and can be repeated**
5. **The immune response to the second challenge occurs more quickly than the first, is stronger, and is often more effective in neutralizing and clearing the pathogen.**

TYPES OF ADAPTIVE IMMUNE RESPONSE

There are two types of adaptive immune responses:

1. ***Humoral immunity:*** **Produced by B-lymphocytes and mediated by the production of antibodies, which neutralize the target microbes and eliminates from the body by several effector mechanisms.**
2. ***Cellular immunity:*** **Produced by T- lymphocytes and mediated by production of effector cytokines which activate macrophages to kill microbes in phagocytes and cytotoxic T cells kill the infected cell to eliminate infection.**

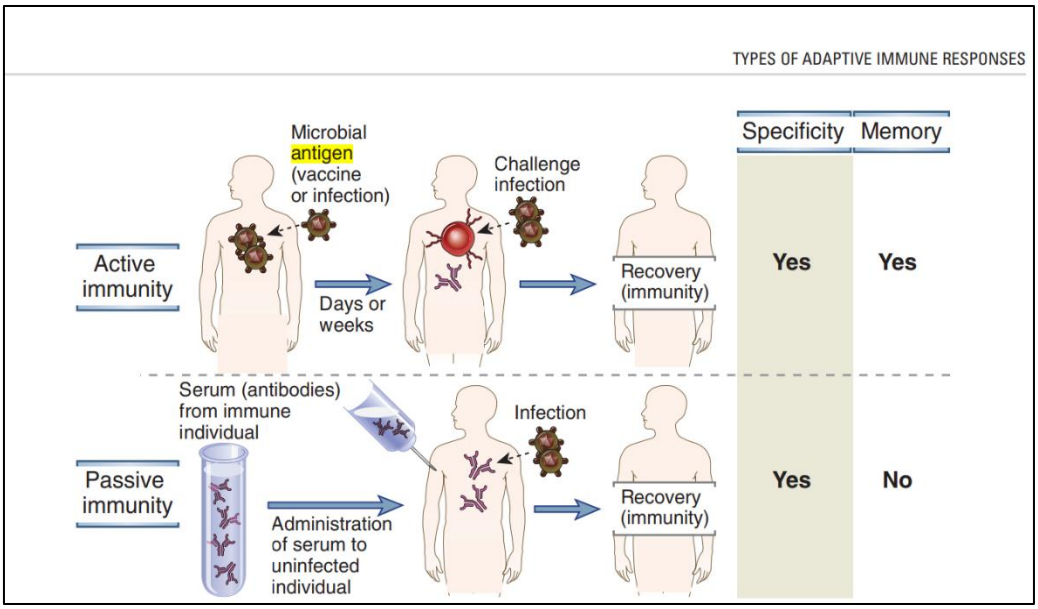
Adaptive immunity can be acquired by two ways

Active immunity
Passive immunity.

1. ***Active immunity:*** **When the host's body in response to foreign antigen produces antibody, the immunity develops slowly and persists for a long time. Active immunity may be**
   a) ***Natural:*** **When produced due to natural infection by infectious organisms.**
   b) ***Artificial:*** **This is produced by the host's body in response to inoculation of an antigen e.g., vaccination**
2. **Passive immunity : The antibody is prepared elsewhere and then introduced into host's body. The immunity is rapidly established but persists for short duration.**

   Passive immunity may be of two types

   a) **Natural**
      - **Maternal antibody from mother to foetus (Tran placental transfer)**
      - **Colostrum antibody through milk from mother to neonates.**
   b) **Artificial**
      - **By injection of immune serum in case of tetanus**
      - **Transfer of lymphocyte or immune cells.**



FEATURES OF AD APTIVE IMMUNE RESPONSES

Both humoral and cell mediated immune responses to antigens have a number of fundamental properties

1. **Specificity : lymphocytes and antibodies only recognize one epitope or antigenic determinant and for each determinant, a specific lymphocyte will be induced.**
2. **Diversity: The lymphocyte repertoire (stock)is very large in an individual. body can respond to an extremely large number of antigens. This is known as diversity of immune system.**
3. **Memory : Secondary response occurs after re-exposure to the same antigen. This property of immune system is known as immunologic memory. The immune response of memory cells is rapid, larger and more efficient compared to the previous exposure.**
4. **Non-reactivity to Self-tolerance : The specific immune system discriminates between 'self' and 'non-self' (foreign) and responds to only foreign materials to the host, which is antigenic.**
5. **Clonal expansion : Lymphocytes specific for an antigen undergo considerable proliferation after exposure to that antigen.This increase in antigen-specific cells enables the adaptive immune response to keep pace with rapidly dividing infectious pathogens.**
6. **Contraction and homeostasis : All normal immune responses decline with time after antigen stimulation, thus returning the immune system to its resting basal state called homeostasis . This contraction of immune responses occurs largely because responses that are triggered by antigens function to eliminate the antigens, thus eliminating an essential stimulus for lymphocyte survival and activation. Lymphocytes, other than memory cells, that are deprived of these stimuli die by apoptosis**

Differences between innate and acquired immunity

Basis of Difference	Innate Immunity	Acquired Immunity
Line of Defense	Innate immunity presents the first line of defense.	It is the second line of defense.
Timeline	Innate immunity is a rapid response.	Acquired immunity is a delayed response.
Cellular components	Natural killer cells, macrophages, complement cells.	Lymphocytes – T and B.
Memory	Not present.	Present.
Specificity	None.	Specific to different pathogens.
Development	Present since birth.	Acquired through the lifetime of an individual.
Distribution	Present in both invertebrates and vertebrates.	Present only in vertebrates.