

Adaptive Immunity

General Characteristics

1. Specific so that it can eliminate with equal precision almost any type of pathogen
2. Functional System: can eliminate specific foreign substances as well as abnormal body cells and can magnify the inflammatory response.
3. Must be primed by an initial exposure to a specific foreign substance called an antigen (takes time).

Two branches of adaptive immunity

1. Humoral immunity or antibody-mediated immunity consists of antibodies circulating in the fluids of the body, produced by B - lymphocytes or their offspring
2. Cellular or cell-mediated immunity – lymphocytes themselves
 - Targets – virus or parasite-infected tissue cells, cancer cells, foreign graft cells
 - Can act directly by lysing foreign cells or indirectly by releasing chemicals that enhance the inflammatory response or activate other lymphocytes or macrophages.

Cells of the Adaptive Immune System

1. B-cells - involved in the humoral immunity
2. T-cells – involved in cell-mediated immunity
3. APC (antigen presenting cells) – does not respond to specific antigens, but plays an auxillary role.

Antigen-Presenting Cells (APCs)

1. Engulfs particles and presents fragments of these antigens on their own surfaces where they can be recognized by T cells. Major types are: dendritic cells, macrophages, and activated B lymphocytes.
2. APCs secrete proteins that activate T cells and activated T cells secrete chemicals that activate macrophages and increase DC maturation.
3. APCs and lymphocytes are found throughout the lymphatic system but T cells are more numerous in paracortical areas of lymph nodes and DC and B cells are more numerous in germinal centers of lymph nodes

Active and Passive Humoral Immunity

Active humoral immunity: when B cells encounter antigens and produce antibodies against them.

- Naturally acquired: obtained by exposure to bacterial and viral infections.
- Artificially acquired: obtained from vaccines, vaccines contain dead or attenuated (living but extremely weakened) pathogens or parts of them.

Passive humoral immunity: antibodies are harvested from the serum of an immune human or animal donor.

- Natural passive immunity can be conferred naturally from a mother to a fetus and the mother's antibodies can protect the baby for several months
- Artificial passive immunity can come from sera such as gamma globulin (administered after hepatitis exposure) or antivenoms or antitoxins.