IMMUNOPHYSIOLOGY

OUTLINE

- Introduction
- Control of the immune system by the hypothalamo-pituitary axis during an antigen attack.
- Congenital immunity
- Acquired immunity
- Vaccination
- Pathophysiology of the immune system

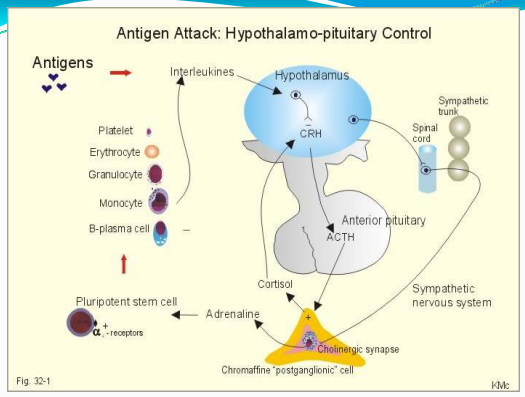
A) Introduction

- The body has two defense systems
  - Non specific defenses
  - Specific defenses
- Cells of the immune system
- Reticuloendothelial system

B) Control of the immune system by the hypothalamo-pituitary axis during an antigen attack.

- Bone marror is the site of haemopoiesis.
- Pluripotent stem cells develop into erythrocytes, granulocyte (neutrophils, eosinophils and basophils), monocytes-macrophages, blood platelets and B and T lymphocytes.

- Interleukines decrease CRH just as cortisol, leading to decrease immune response.
- Cortisol inhibit lymphocyte and monocyte production
- CRH stimulate synthesis and release of ACTH
- Stimulation of sympathetic nervous system by immunological stress releases adrenaline from adrenal medulla which stimulate blood cell formation



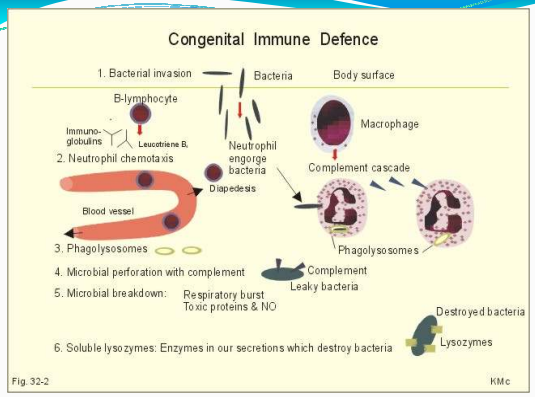
Congenital immunity

- Involves phagocytes, cytotoxic eosinophils, complements and natural killer cells.
- **Phagocytes**
- Neutraphils production is stimulated by production of granulocyte- colony stimulating factor and granulocyte-macrophage colony stimulating factor.

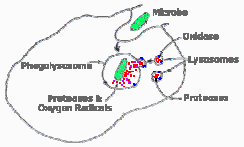
Congenital defense against bacteria

- Bacteria invasion
- Neutrophilic chemotaxis due to release of leutriene B_4
- Phagolysosomes
- Microbial perforation by complement

- Microbial breakdown, by respiratory burst or by gas.Oxygen is reduced to reactive oxygen metabolites by an NADP oxidase e.g. H_2O_2 and oxygen radicals.
- Macrophages produce nitrate and nitrite and their killer activity is due to nitric oxide which kill microbes and cancerous cells.



PHAGOCYTOSIS



Cytotoxic eosinophils

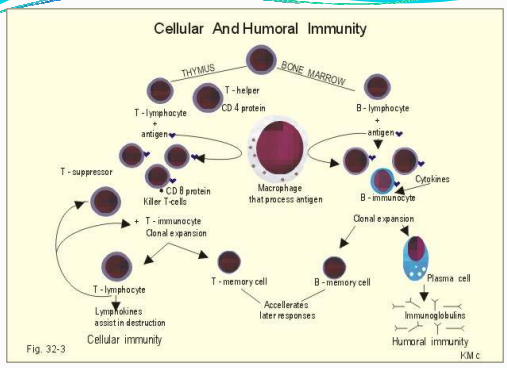
- Contain granules with substances which become cytotoxic when release on the surface of parasites.
- The cytotoxic substances are major basic proteins which kill helminthes, eosinophil cationic protein and eosinophil peroxidase

- **Natural killer cells**

  Destroy tumour and virus infected cells.
- **Complements**

D) Acquired immunity

- Involves humoral and cell mediated immune responses.
- Humoral immune response involves antibodies from B lymphocytes while cell mediated response require cells that produce antigens and helper T cells



Types of immunoglobulins

- **IgG**

- The most abundant which has a high antigen affinity . It can cross the placental barrier and protect the newborn for a couple of months.

- **IgM**

- *It* is confined to the blood, because it is a pentameric molecule . IgM cannot cross the placental barrier, and is responsible for the primary immune response.

- **IgA**

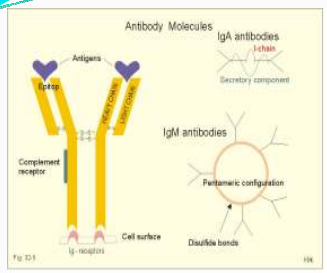
- IgA_1 predominates in serum, whereas IgA_1 and IgA_2 are present in equal amounts in secretions such as saliva, gastric juice, pancreatic and intestinal juice. IgA protects mucosal surfaces in the gut, respiratory and urinary tracts, by preventing the attachment of poliovirus, enterovirus, bacteria, and enterotoxin.

- **IgD**

  The concentration of *IgD* in serum is high in disorders with B-lymphocyte activation such as *AIDS*.

- **IgE**

  IgE is mainly bound to basophils and mast cells, and involved in the pathogenesis of *allergic* and *nematode diseases*.



E) Vaccination

It is iatrogenous immunity

- At first vaccination some plasma cells transform to memory B cells and remain in the reticuloendothelial system.
- At second vaccination, memory B cells evoke an exaggerated antibody production that rapidly deactivate the antigens.

F) Pathophysiology

Congenital and acquired immune deficiencies

- Types of congenital immunity
- B lymphocytes with antibody deficiency
- Absent thymus with T- lymphocytes deficiency

Acquired immuno - deficiency. (AID)

Iatrogenic AID is caused by AIDS. It result from Human Immuno-deficiency Virus, due to lymphocyte defect. HIV is also bound to monocytes and macrophage

Autoimmunity

- Insulin-dependent diabetes mellitus;due to islet cell antibodies that destroy insulin producing B-cells of the pancreatic islets.
- Pernicious anaemia: parietal cell antibodies found in blood.They kill parietal cells leading to atropy of the mucosa
- Rhomatoid arthritis; where the synovial fluid contains IgG, lymphokines.

THANKS FOR YOUR KIND ATTENTION