FACULTY OF ENGINEERING & TECHNOLOGY

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Unit- I

Topic:- Immunology and Immune system.

Immunology

•Immunology is the study of our protection from foreign macromolecules or invading organisms and our responses to them.

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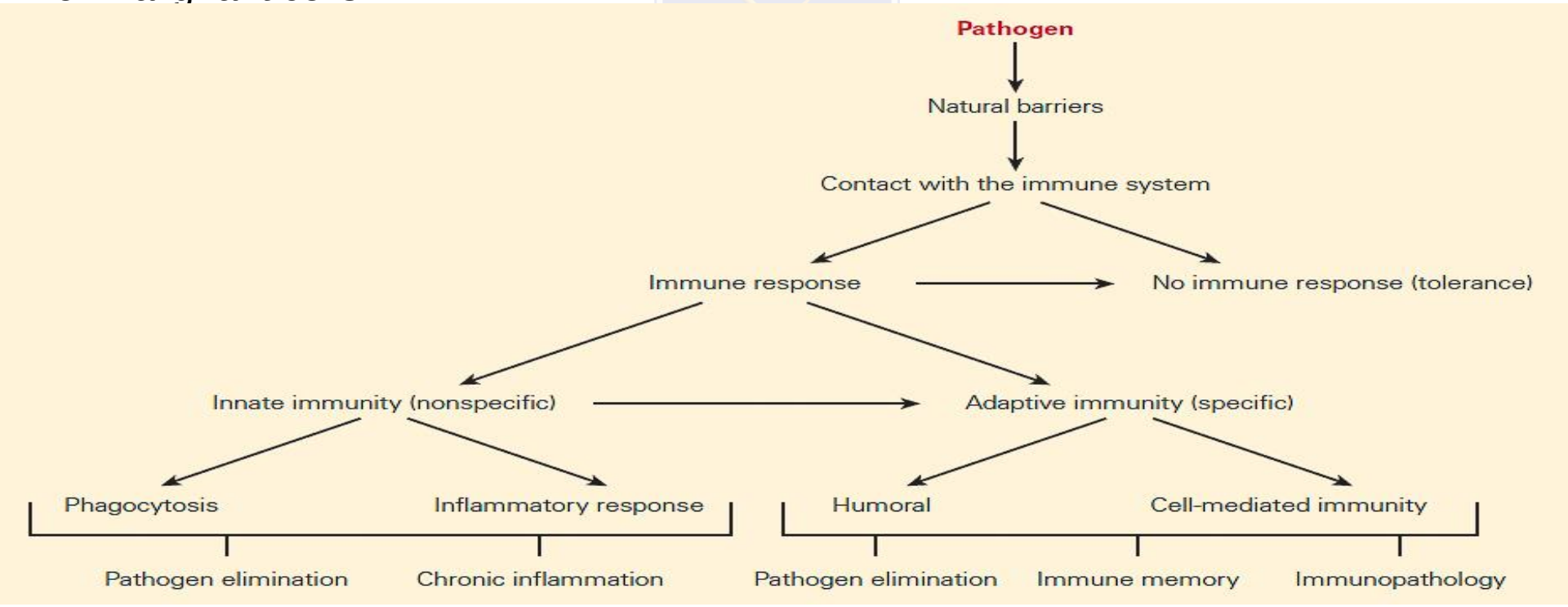
•Foreign macromolecule, antigen – e.g. virus protein, worm, parasite (Everything that should not be in our body).

•Immune System- Provides protection against pathogens and Eliminate damaged or malignant cells.



History of Immunology

•430 B.C: Peloponesian War:-Thucydides describes plague – the ones who had recovered from the disease could nurse the sick without getting the disease a second time.

•15th century: Chinese and Turks use dried crusts of smallpox as ”vaccine”.

•1798 –Edward Jenner noticed immunity bestowed to milkmaids – injected fluid from cowpox blister into skin of patient (orphan or prisoner).

•1989- WHO announced smallpox was eradicated from the world.

•May, 1881 1879- Pasteur discovered that aged bacterial cultures of Pasteurella lost virulence. Referred to injection of weakened culture a “vaccine” in honor of Jenner.

• 1881- He applied the same technique vs. anthrax ….and then rabies

•1880’s- Metchnikoff discovered phagocytic cells that ingest microbes and particles :-cells conferred immunity.

•1890- Von Behring and Kitasato discovered blood sera could transfer immunity :- liquid of blood conferred immunity.

•1970: WHO defined immunity as immune response to antigen (Foreign body) in form of - Humoral (activation of B-lymphocytes) and Cellular (by activation of T-lymphocytes

Immune System

•Immune system is a biological structures and processes within an organism that protects against disease by identifying and killing pathogens and tumor cells.

•It detects a wide variety of agents, from viruses to parasitic worms, and needs to distinguish them from the organism's own healthy cells and tissues in order to function properly.

•Immune system provides body’s defense against disease causing organisms, malfunctioning cells, and foreign particles

•Immune system includes all parts of the body that help in the recognition and destruction of foreign materials. White blood cells, phagocytes and lymphocytes, bone marrow, lymph nodes, tonsils, thymus, and your spleen are all part of the immune system.

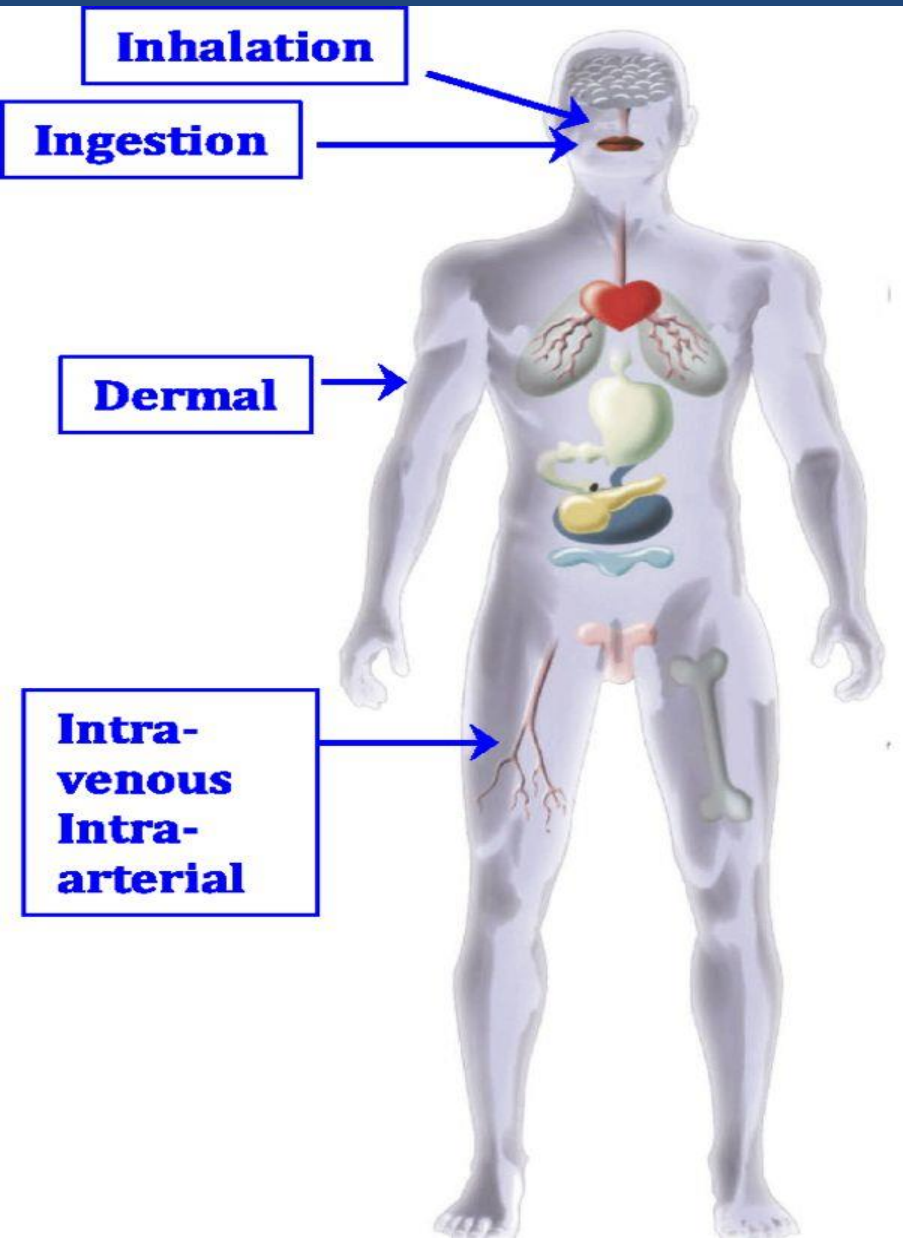
Effects of Immune system

- Beneficial: Protection from Invaders ,Elimination of Altered Self

- Detrimental: Discomfort and collateral damage (inflammation) ,Damage to self (hypersensitivity or autoimmunity)

The functional importance of the immune system

Role of the immune system	Implications
Defense against infections	Deficient immunity results in increased susceptibility to infections; exemplified by AIDS Vaccination boosts immune defenses and protects against infections
Defense against tumors	Potential for immunotherapy of cancer
Clearance of dead cells and tissue repair	Deficient immunity can lead to secondary infections after injury, and excessive immune reposnes can lead to fibrosis and organ dysfunction
The immune system can injure cells and induce pathologic inflammation	Immune responses are the cause of allergic, autoimmune, and other inflammatory diseases
The immune system recognizes and responds to tissue grafts and newly introduced proteins	Immune responses are barriers to transplantation and gene therapy



Immune activation

Desirable

- Vaccine efficacy
- Anti-tumor effects

Undesirable

- Inflammation
- Anaphylaxis
- Hypersensitivity

Immune suppression

Desirable

- Treatment of inflammatory disorders
- Prevention of allergic responses
- Transplant acceptance

Undesirable

- Reduced response to infection and cancer
- Myelosuppression and thymic dysfunction

Scope of Immunology

SCOPE

Major areas of Interests includes

- Immunity
- Innate Immunity
- Microbiology
- Pathology
- Bacteriology
- Virology
- Pathophysiology
- Bacterial Infections
- Viral Infections
- Infection Surveillance
- Pediatric Infections

JIID do not stick to particular area of research, as infectious diseases is a vast field it covers all areas.