Day 1 Immunology

The immune system is an interacting set of specialised cells and proteins designed to identify and destroy harmful foreign inaders before they can damage the body.

Q1. What are immunological disorders caused by?
Immunological disorders are diseases or conditions caused by a dysfunction of the immune system and include allergies, asthma, autoimmune disorders, autoinflammatory syndromes, immunodeficiency syndromes.

History of Immunology
Immunology started with variolation in ancient China, where dried crusts derived from smallpox pustules were either inhaled or inserted into small cuts in the skin (a technique called vari- olation) in order to prevent smallpox, and was then followed by Jenner's work on vaccination.
Pasteur hypothesized and later showed that aging had weak- ened the virulence of the pathogen and that such a weakened or attenuated strain could be administered to provide immu- nity against the disease. He called this attenuated strain a vaccine (from the Latin vacca, meaning "cow"), in honor of Jenner's work with cowpox inoculation.
One consequence of eradication is that universal vaccination becomes unnecessary. This is a tremendous benefit, as most vaccines carry at least a slight risk to persons vaccinated. And yet in many cases every individual does not need to be immune in order to protect most of the population. As a critical mass of people acquire protective immunity, either through vaccination or infection, they can serve as a buffer for the rest. This principle, called herd immunity, works by decreasing the number of indi- viduals who can harbor and spread an infectious agent, sig- nificantly decreasing the chances that susceptible individuals will become infected.

Pasteur showed that vaccination worked, but he did not understand how. Some scientists believed that immune pro- tection in vaccinated individuals was mediated by cells, while others postulated that a soluble agent delivered protection.

Humoral vs Cellular theories
Von Behring demonstrated that the passive administration of serum containing antitoxin from animal suffering with diphtheria protected uninfected animal from infection. An important result that came out of the experiment was that the factor responsible for protection present in the serum is specific - serum from an animalk exposed to a different strain was not useful.

Elie Metchnikoff, another Nobel Prize winner, demonstrated that cells also contribute to the immune state of an animal. He observed that certain white blood cells, which he termed phagocytes, ingested (phagocytosed) microorganisms and other foreign mate- rial . Noting that these phagocytic cells were more active in animals that had been immunized, Metchnikoff hypothesized that cells, rather than serum components, were the major effectors of immunity. The active phagocytic cells identified by Metchnikoff were likely blood monocytes and neutrophils.

Innate Immune system
1. non-specific
2. first line of defense
3. no memory

Components:

1. Physical - skin, mucociliary escalator, flushing action of saliva, tears, urine
2. Biochemical - normal flora that may screte antimicrobial peptides, and compete for resources, HCl in stomach, lysozyme in tears/saliva
3. cells