

Introduction to Immunohaematology

Mansour Mohamed Omer El-Sharief

Course title: Advanced Hematology

MLS-HEMA-324

2019-2020

IMMUNOHEMATOLOGY

- **This science merges aspects of hematology, immunology & genetics.**
- **It is a serologic, genetic, biochemical and molecular study of antigens associated with membrane structures on the cellular constituents of the blood.**
- **It is concerned with all immunologic reactions involving all blood components and constituents.**

- **Definitions:-**

- **Immunogens** are molecules that can induce an immune response.

- **Antigens** are molecules that can react with antibodies.

- **Haptens** are small non immunogenic molecules which can become so when bind covalently to proteins.

● Immunogenicity depends on:

1- foreignness

2- Chemical complexity

3- molecular size

4- Antigen determinants (epitopes)

5- Route of entry

6- Dose & frequency

7- Genetic constitution of the individual (eg: HLA genes)

• **Red Cell Antigens:**

- Approximately 400 red blood cell group antigens have been described.
- Blood group serology is mainly concerned with the humoral response which leads to the production of free antibody in the plasma.
- The antibodies, under appropriate conditions of reaction (temperature, pH, ionic strength, etc.), will react specifically with the antigen in some observable way (e.g., agglutination, hemolysis).

- The clinical significance of blood groups in blood transfusion is that individuals who lack a particular blood group antigen may produce antibodies reacting with that antigen which may lead to a transfusion reaction.
- The different blood group antigens vary greatly in their clinical significance with the ABO and Rh groups being the most important.

- **Blood group antibodies:**
- **1- Naturally occurring antibodies:-**
- These occur in the plasma of subjects who lack the corresponding antigen and who have not been transfused or been pregnant.
- The most important are anti-A and anti-B.
- They are usually immunoglobulin M (IgM), and react optimally at cold temperatures (4°C) so, although reactive at 37°C , are called cold antibodies.

- **2- Immune antibodies:**

- These develop in response to the introduction (by transfusion or by transplacental passage) of red cells possessing antigens that the subject lacks.
- These antibodies are commonly IgG, although some IgM antibodies may also develop-usually in the early phase of an immune response.

- Immune antibodies react optimally at 37°C (warm antibodies).
- Only IgG antibodies are capable of transplacental passage from mother to fetus.
- The most important immune antibody is the Rh antibody, anti-D.

History of Transfusions

- **Mid-1600's** - Blood transfused in humans
- **1828** – First successful transfusion
- **1900** – Landsteiner described ABO groups
- **1916** – First use of blood storage
- **1939** – Levine described the Rh factor

Transfusion Overview

- Integral part of medical treatment
- Most often used in Hematology/Oncology, but other specialties as well (surgery, ICU, etc)

THANK YOU