Lec.7 Oral Physiology Dr. Muna

**The blood Groups**

**Human Blood Groups:**

People have different blood groups and transfusion of incompatible blood can be fatal. RBC plasma membranes bear highly specific (**antigens**) at their external surfaces, which identify each of us as special from all others.

Antigen: is a substance that is capable of stimulating the formation of specific protein called antibody.

Antibody: is specific protein are produced in response to antigen and are able to combine with antigen.

The antigen –antibody reaction produces different classification of blood groups

There are two systems of classification of blood groups:

-The ABO blood groups system.

-The **Rh blood groups system.**

❖*T****he ABO blood groups system:***

In **the ABO system of antigens**: there are two antigens: **antigen A** and **antigen B** may present in surface of the red blood cells. So, there are **four** groups of blood of **ABO system:**

• **Blood Group A**: has antigen A.

• **Blood Group B**: has antigen B.

• **Blood Group AB**: has both antigen A and antigen B.

• **Blood Group O**: neither antigen A nor antigen B.

**Types of Blood groups**:

Blood groups types are done to assure that a person who needs blood transfusion will receive the right type of the blood. The ABO system is mostly commonly used.

- ABO system depends on the presence or absence of two antigen called **agglutinogens**: type A and type B

- Blood type (or blood group) is determined by ABO blood group antigens present on the RBCs.

- In ABO blood groups the presence of the plasma preformed antibodies called **agglutinins.** The agglutinins act against RBCs ABO antigens.

There is an agglutination reaction between similar antigen and antibody (for example, antigen A agglutinates the antibody A and antigen B agglutinates the antibody B). Thus, transfusion can be considered safe as long as the serum of the recipient does not contain antibodies for the blood cell antigens of the donor.





**The type AB** is called the **universal recipient:** Type AB blood will not agglutinate or clump with either anti-A or anti-B serum because it no contains anti-A or anti-B serum.

- the person with type AB blood can give blood to AB

- but can receive from anyone donor.

**The type O** is called the **universal donor**: Type O blood will agglutinate or clump with either anti-A or anti-B serum.

- the person with type O blood can give blood to anyone

- but can receive only from type O donor.

**The type A:** blood agglutinate with anti-A serum.

- People with type A blood can receive from donors of either type A or type O

- give recipients of either type A or AB.

**The type B:**blood agglutinates with anti-B serum.

- -People with type B blood can receive from donors of either type B or type O

- -give to people with either type B or AB blood.



***The Rh blood group system****:*

The Rh system (Rh meaning *Rhesus*) is the second most significant blood group system in human-blood transfusion.

It is depending on the Rh antigen in the surface of red blood cell. If it is present which is called Rh positive, if Rh antigen is not present is called Rh negative. - A person’s ABO and Rh blood groups are reported together, for example, O+, A–, and so on.

-The presence or absence of the Rh antigen is signified by the + or − sign, so that, for example, the A- group is ABO type A and does not have Rh antigen.

**Transfusion Reactions: Agglutination and Hemolysis:**

When mismatched blood is infused, a ***transfusion reaction*** occurs in which the donor’s red blood cells are attacked by the recipient’s plasma agglutinins.

The initial event is ***agglutination*** of the foreign red blood cells, clump together and clot formation in small blood vessels throughout the body.

During the next few hours, the clumped red blood cells begin to rupture or are destroyed, and their hemoglobin is released into the bloodstream.

These events lead to two easily recognized problems:

(1) The oxygen-carrying capability of the transfused blood cells is disrupted.

(2) The clumping of red blood cells in small vessels prevents blood flow to tissues.

The consequence of hemoglobin escaping into the bloodstream and the circulating hemoglobin passes freely into the kidney tubules, causing cell death and renal shutdown and the renal failure occur and the person may die.

Transfusion reactions can also cause fever, low blood pressure, rapid heartbeat, nausea, vomiting, and general toxicity; maybe there is a rash and etching, shortness of breath pain in the kidney region, chest and legs.