***Lecture 8Blood transfusion***

***Biochemistry of Rh Antigens****:*

The final result of gene action is the production of a biochemicalstructure; which is a protein (lipoprotein) and it is an integralpart of the red cell membrane. It is found only on red cell membranes.

***Inheritance of Rh system:***

The Rh locus is located on chromosome I, along with the genes for elliptocytosis. The Rh genes inherited as co dominant alleles, thus the Rh genes from each parent are demonstrated in the offspring under normal circumstances.

CDe/cde Cde/cde

CDe/cdc CDe/cde cde/cde cde/cde

The Rh-negative woman cannot contribute D to any of her offspring. If her husband is homozygous so that D occupies both loci, all their children will inherit one of his D genes and be D positive. On the other hand, if the father is heterozygous and only chromosome carries D, then only those children inheriting D (statistically) one- half them) will be D positive.The other half will not inherit D from the father and will be D(Rh) negative. See diagram.

**Possible Rh genotype of children when the father is heterozygous or homozygous.**

Heterozygous Homozygous

D/d

D/D

D/d

d/d

D/d

D/d

**Rh Antibodies:**

Rh antigens are restricted to red cells and Rhesus antibodies are due to allo-immunization previous transfusion or pregnancy except for some naturally occurring forms of anti E.

Rh antibodies are usually IgG (sometimes with an IgM) react best at 37C°, and do not fix complement.

Haemalysis when it occurs, is extra vascular and predominantly in the spleen. Anti D is the most important clinically. It may cause hemolytic transfusion reaction and was a common cause of fetal death resulting from hemolytic disease of the newborn because it can cross the placenta. Antic is the second most important antibody in the Rh sestem.

***Rh factor system:***

.Many people also have Rh factor on the red blood cell's surface.

•This is an antigen and those who have Rh+.

•A person with Rh- blood does not have Rh antibodies naturally in the blood plasma , But a person with Rh- blood can *develop* Rh antibodies in the blood plasma if he or she receives blood from a person with Rh+ blood, whose Rh antigens can trigger the production of Rh antibodies.

•A person with Rh+ blood can receive blood from a person with Rh- blood without any problems.



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***Partial D and weak D antigen:***

The RhD protein has 2 clinically significant variations, "partial D"” and "weak D."Red cells that lack components of the D antigens are often described as "partial D." Result from amino acid substitutions or protein segment switch on the extracellular portion of the RhD protein. Individuals with partial D are usually typed as Rh-positive but may form anti-D when alloimmunized.

Red cells that carry weak forms of D antigen are classified as "weak D," which usually results from amino acid substitutions within the internal portion or in the membrane-crossing portion of the RhD protein causing quantitative changes. An individual with weak D has a decreased amount of D antigens expressed on the red cell.

When a red cell sample is a typed for the D antigen, certain samples are found to be much weaker in reactivity. So some samples must be tested by the antihuman globulin method to demonstrate that D antigen is present.