

Example mentioned by the doctor about the previous lecture topic:

AMNRh + (MALE) × (FEMALE) ABNNrh –

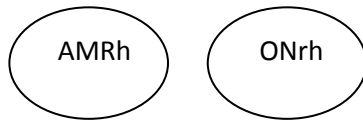
Genotype: AO MN RhRh AB NN rhrh

AO MN Rhrh

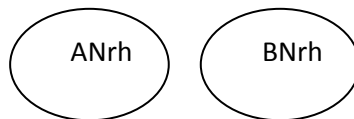
AA MN RhRh

AA MN Rhrh

Expected Gametes: for the (AO MN Rhrh) in male (الدكتور اخذ حالة واحدة بس (المفروض كلهم هون كمثال)



For female



Children : 1- AAMNRhrh

2- ABMNRhrh

3- AONNrhrh

4- BONNrhrh

Thanks to Ashjan Shakkah :D

Blood Transfusion

- **Indications of Blood Transfusion (why do we use it):**

1. To restore blood volume.
2. To provide RBCs ... Only RBCs such as in the case of Anemia.
3. To supply Clotting Factors , such as in Hemophilia.
4. To replace the infant's blood with (rh-) blood.
5. To supply Antibodies.
6. To provide WBCs.
7. To supply plasma proteins.

- Recently, scientists have developed machines to separate the blood cells from each other. Also it separates the antibodies, plasma proteins & coagulation factors!

- What are the complications of Blood Transfusion >??!
Actually it's divided into EARLY & LATE complications.

* **Early Complications :**

1. Hemolytic Reactions ----> Either Immediate or Delayed.
2. Reactions due to infected blood.
3. Allergic reactions to WBCs, Platelets or Proteins.
4. Circulatory overload (as the volume of the blood increases).
5. Air embolism.
** Types of embolism:
 - A. Air embolism
 - B. Fat embolism
 - C. Thrombo-embolism
 - D. Amniotic-Fluid embolism (A rare obstetric emergency)
6. Citrate toxicity.
7. Hyperkalemia.
8. Clotting Abnormalities.

* **Late Complications :**

1. Transmission of diseases, such as : Hepatitis, AIDs & Malaria.
2. Iron overload due to hemolysis.
3. Immune sensitization.

- What should be done when taking blood from the donor ??!

First, the blood should be tested & grouped. **After that**, it should be stored at 4°C - because the RBCs rupture at a degree *below* 4°C while they rot the blood *above* 4°C.

* The anticoagulant used is an ACD (Acid-Citrate-Dextrose) - another name is CPD (Citrate-Phosphate-Dextrose) - for better survival of the cells.

- A patient comes in with an emergent case & he needs blood, you have to find a matching blood group (of course) - 'A' group people should get 'A'-grouped blood & they may get 'O' rh- too.

You need to do cross-matching as well (which is of two steps : RBCs with plasma & Plasma with RBCs) , to exclude any incompatibility of the major and minor blood groups.

**** In extreme emergencies, 'O' rh+ is transfused !**

- In the RBCs of the stored blood, Sodium-Potassium Pump ($\text{Na}^+ / \text{K}^+ \text{-ATPase}$) is weakened, therefore, Sodium enters while Potassium leaves the cell due to the concentration gradient. Because of that, the cell swells (High intracellular $[\text{Na}]$) , becomes shorter & more fat & gets a spherocytic shape. In this case, the RBCs hemolyze easily.

-Because the Potassium has increased extracellularly, the patient becomes hyperkalemic which is very serious. Hyperkalaemia leads to death as it affects the ventricles of the heart.

The hemolyzing RBCs also lead to the death of the patient if it exceeds more than 400 ml blood.

- Stored blood cannot be used to compensate or replace the platelets deficiency or WBCs deficiency because of the half life. We need Fresh blood.

- Blood is stored for two weeks, then, it's transfused to a patient. After one day of transfusion, we find that 80% of the donated RBCs functioning while 20% hemolyzed !

(then 1% of the transfused RBCs are gonna be destructed daily !)

-Therefore, it's recommended NOT to transfuse the blood stored for more than two weeks unless needed as in the case of war & this makes the most common cause of death in wars after hyperkalaemia !

* Plasma can be stored as liquid for months & if it is dried, it can be stored for years.

- How does **Agglutination** occur ?!

The antibodies (IgG & IgM) in the plasma, have binding sites for the RBCs (IgG has 2 binding sites, IgM has 10).

-When there is incompatibility, the antibodies bind the RBCs & thus, agglutination occurs after the hemolysis.

**** QUESTIONS :**

-The following points are general statements about blood transfusion & blood groups:

A. Donor blood is usually collected into Heparin as anticoagulant. [**FALSE**] ...
The correct anticoagulant is ACD / CPD.

B. Most ABO incompatible blood transfusions are due to failure of check identity. [**TRUE**]

C. Antibodies are often absent in the serum of group 'O' babies. [**TRUE**]

*Why ? because in the new born, there're no antibodies as they start to develop after the second month till the eighth month.

*Why 'O' babies ? because they have (later on in life) both antibodies alpha & beta while others have either alpha or beta depending on their blood group.

(Beta in 'A' blood group .. Alpha in 'B' blood group)

D. Is this born child the son/daughter of this father ?!

ANNrh+ (Father)

AMNrh+ (Mother)

ONNrh- (Child)

The Result : Exclude The Paternity

True Or False ?!

False .. (Don't exclude the paternity)

*father might be AONNRhrh giving this gamete (ONrh) and the mother AOMNRhrh (ONrh) so yes he might be the father of this child!

E. After blood has been stored for 3 weeks, at least 70% of the transfused RBCs are still functioning in the circulation after 24 hours of transfusion.
[**TRUE**]

That's it for this lecture

" Just Be Yourself, & Always Wear A Smile "