





The ABO's of Rh

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Before We Start:

- Antigen, Ag, a substance that is considered foreign by the body and produces an immune response.
- Antibodies (Ab), are proteins (immunoglobulins), produced by the immune system, that develop in response to the presence of a specific antigen. They are specific to the antigen.
- Most antibodies develop after exposure to an antigen. The exception to this are the ABO antibodies, they are called natural antibodies.
- In the blood, antigens are found on RBC's and antibodies in the serum/plasma.
- Antibodies eliminate RBC antigens by;
 - “hemolysis” poking holes in RBC's
 - “agglutination” causing RBC's to stick together
 - “flagging” the antigen so it can be removed by the spleen and phagocytic WBC's,
- Normally you will never develop an antibody to a molecule that is part of your own body. The exception to this is when a person has an autoimmune disease.
- When people speak about transfusing a unit of blood, they are referring to giving packed RBC's, not whole blood.

The ABO's

ABO blood type of patient	ABO antigens on his/her red cells	Antibody in patient's serum/plasma	Which donor RBC's are compatible
A			A, B, AB, O
B			A, B, AB, O
AB			A, B, AB, O
O			A, B, AB, O

Some Fascinating Facts

“There are 800,000 units of RBC’s transfused in Canada (except Quebec) each year. Of there 20 are ABO incompatible. This is the most common cause of morbidity from a RBC transfusion. Half the errors are caused by administering improperly labeled blood to wrong patient; other errors are the result of improper labeling of samples or testing errors.” (Bloody Easy 2)

WOW “There are 2.5 trillion RBC’s in your body at any moment. To maintain this number, about two and a half million new ones need to be produced every second by your bone marrow. That’s like a new population of the city of Toronto every second”. (www.maximalhealth.com)

“In one day, the blood travels a total of 19,000 km – that’s four times the distance across the US from coast to coast.” (www.maximalhealth.com)

WOW!! “Except for your brain cells 50,000,000 of the cells in your body will have been replaced with others, all while you have been reading this sentence.” (www.maximalhealth.com)

Blood type O most common in the Americas
A Central and Eastern Europe
B Asia especially China and India
AB Japan, regions of China, Korea.

According to Canadian Blood Services different medical procedures may require varying amounts of packed cells:

Cancer treatment; up to 8 units a week
Heart bypass surgery; 1-6 units
Car accident/gunshot wound; up to 50 units
Abdominal surgery; 2 – 4 units
Brain aneurysm; 4 units

Of course individual amounts will vary.

Rh

Before we move on:



Sensitization – when a person develops antibodies to an antigen.

During pregnancy a mother's IgG antibodies (which are found in her plasma) pass through the placenta into the baby but her red cells don't. In nature this occurs because the baby's immune system is immature and these antibodies help the baby as his/her immune system matures. The baby's red cells do not normally pass into the mother's body.

The D antibody (Anti D) is not preformed; it is developed in response to the Rh antigen.

Rh immune globulin = RhoGam = Anti D.

Rh

Rh type of patient	Rh antigen on his/her RBC's	Antibody in patient's serum/plasma	Antibody in serum/plasma of person exposed to Rh positive blood cells	Which donor RBC's are compatible
Rh pos				Rh pos, Rh neg
Rh neg				Rh pos, Rh neg

More Fascinating Facts

Here is a breakdown of the different blood types within the Canadian population:

O pos 39 %

A pos 36 %

B pos 7.5 %

AB pos 2.5 %

O neg 7 %

A neg 6 %

B neg 1.5 %

AB neg 0.5 %

Approximately 85% of the population is Rh pos.

Wow. “At the time of writing there are 22 blood group systems, including the ABO, Rh and Kell blood groups. These three contain antigens that can provoke the most severe transfusion reactions.” (www.ncbi.nlm.nih.gov ...)

References

www.ncbi.nlm.nih.gov/bookshelf/br.fcgi?book=rbcantigen&par

my VCC teaching notes

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