



Blood Types





Blood Types

What's Your Blood Type?





Blood Types

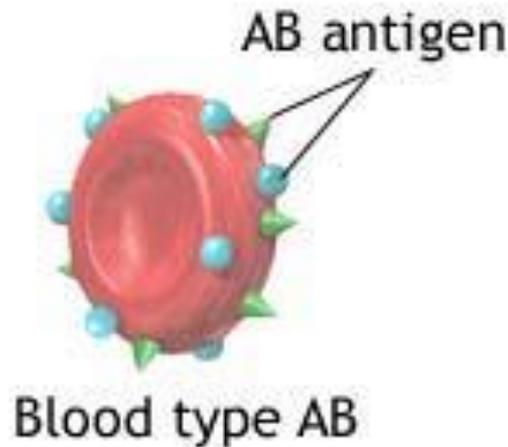
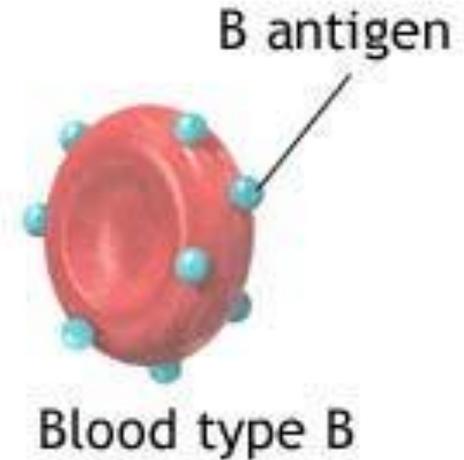
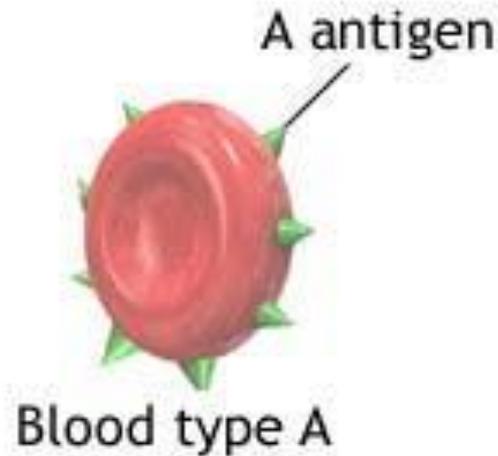
Blood cells have different markers on their surface. These markers are called **antigens**.

Common antigens:

A

B

Different combinations of these antigens result in different **blood types**.





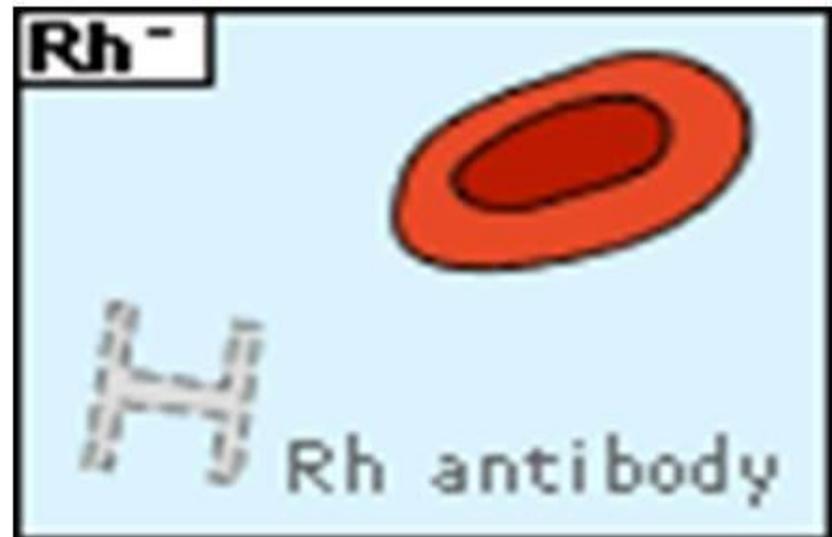
Blood Types

Another antigen of clinical significance is **D antigen**

This antigen is used to identify the **Rhesus factor** (**Rh**) of the blood.

Rh+ = presence of D antigen

Rh- = lack of D antigen



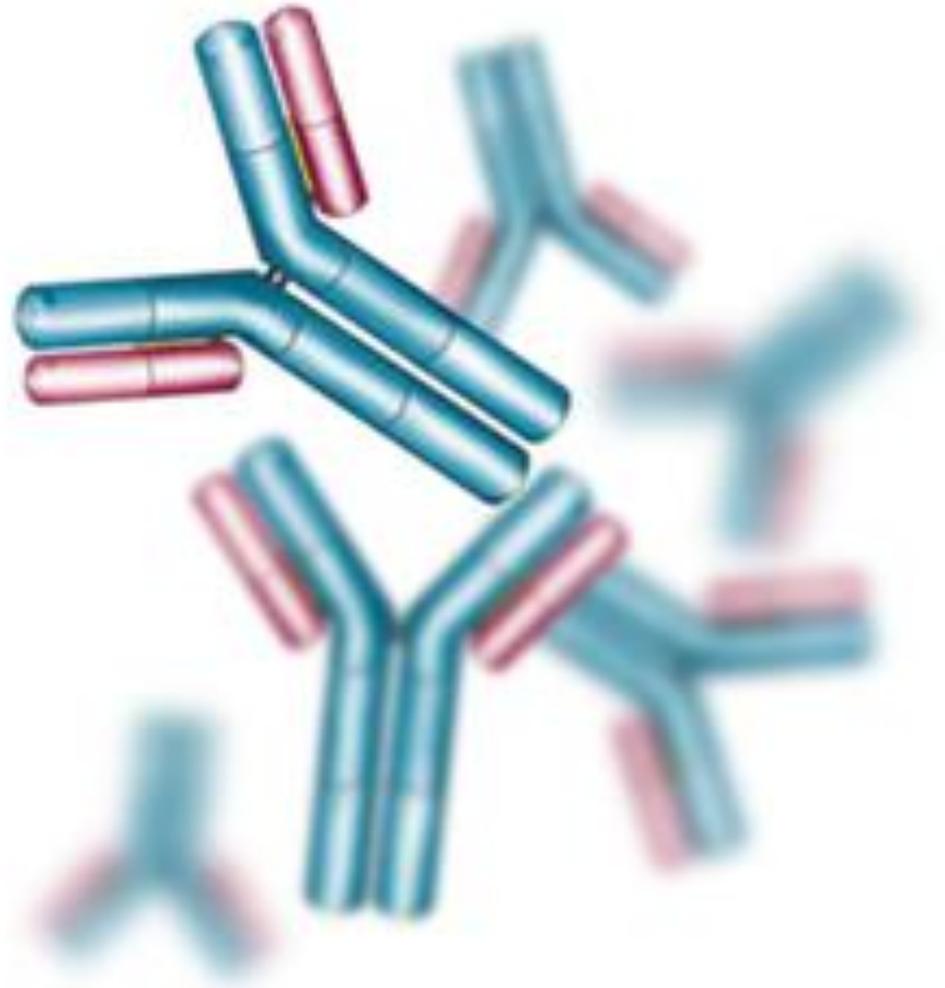


Blood Types

Along with antigens on the surface of red blood cells, the body contains specific **antibodies** dissolved in the blood.

These antibodies **bind** to foreign blood and cause the blood to **clump** together.

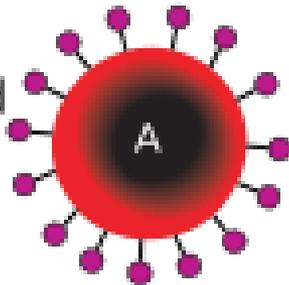
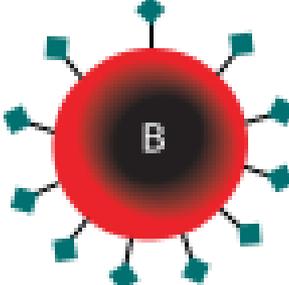
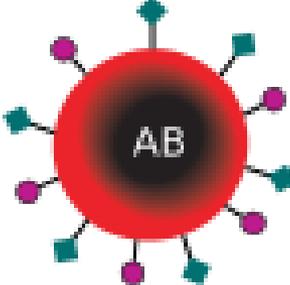
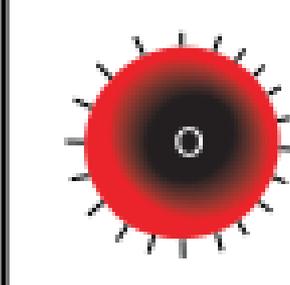
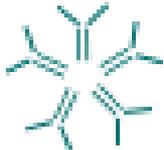
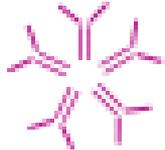
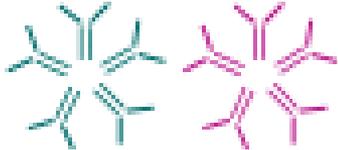
These antibodies **attack foreign blood** types (i.e. Type A blood has Anti-B antibodies)





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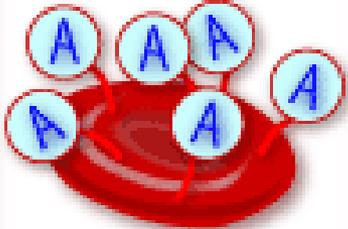
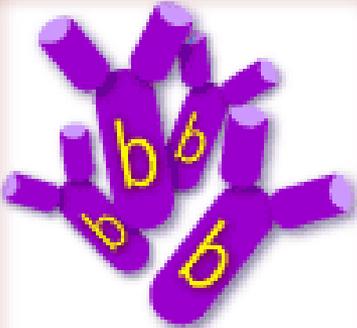
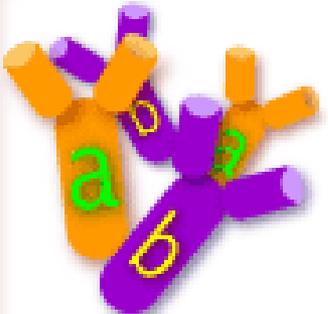
Summary of **blood types** and **antibodies**

	Group A	Group B	Group AB	Group O
Red blood cell type	 <p>A</p>	 <p>B</p>	 <p>AB</p>	 <p>O</p>
Antibodies present	 <p>Anti-B</p>	 <p>Anti-A</p>	None	 <p>Anti-A and Anti-B</p>
Antigens present	 <p>A antigen</p>	 <p>B antigen</p>	 <p>A and B antigens</p>	None



Blood Types

The ABO Blood System

Blood Type (genotype)	Type A (AA, AO)	Type B (BB, BO)	Type AB (AB)	Type O (OO)
Red Blood Cell Surface Proteins (phenotype)	 A agglutinogens only	 B agglutinogens only	 A and B agglutinogens	 No agglutinogens
Plasma Antibodies (phenotype)	 b agglutinin only	 a agglutinin only	NONE. No agglutinin	 a and b agglutinin

This means that people with Type B blood cannot receive a blood transfusion with Type A blood.



Blood Types

Only type AB blood has no antibodies against other blood types.

The presence of antibodies presents a challenge for blood transfusion/donation.

Video:

[Blood groups and antibodies](#)

Summary of Blood Type and Antibodies

Phenotype (blood type)	Antibodies in serum
A	Anti-B
B	Anti-A
AB	None
O	Anti-B and Anti-A

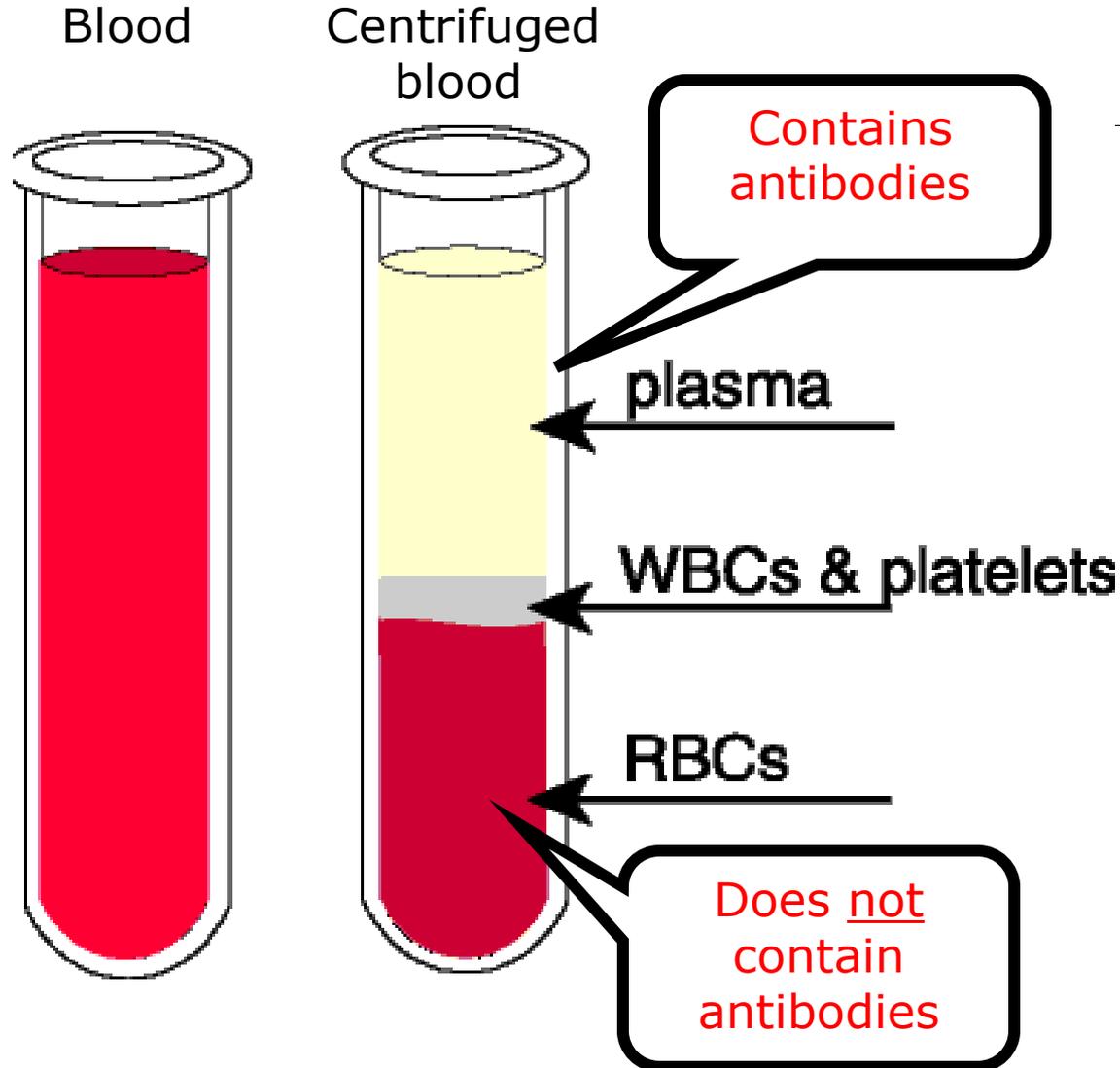


Blood Types

Blood transfusion:

Only red blood cells are transferred in a blood transfusion.

The antibodies in the plasma are **separated** from the red blood cells with a centrifuge.





Blood Types

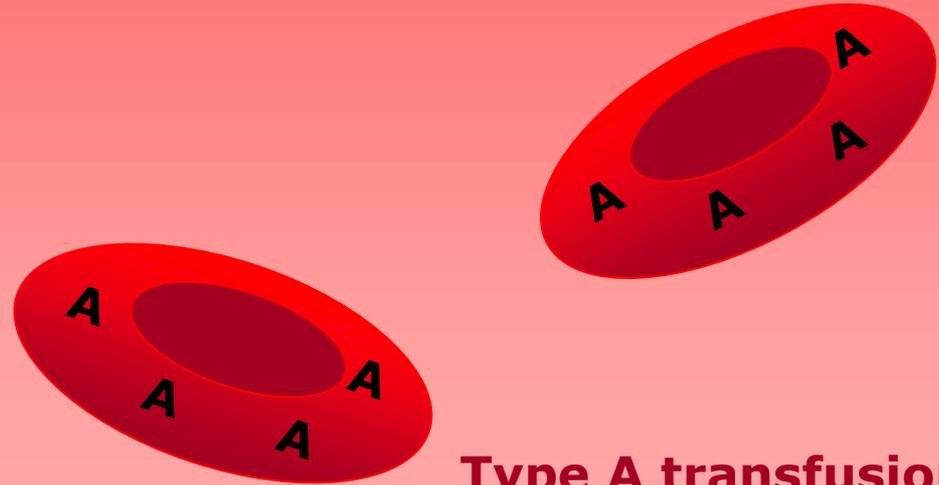
Blood transfusion:

The antibodies in the recipient (the person receiving the blood) will **attack** other types of blood.

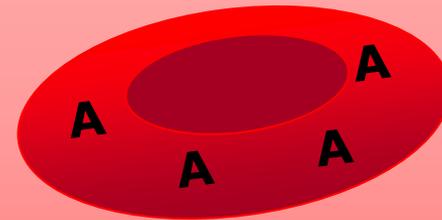
Example:

If Type A blood was given to a Type O recipient, the recipient's Anti-A antibodies will attack the foreign blood and cause it to clump.

Type O recipient



Type A transfusion



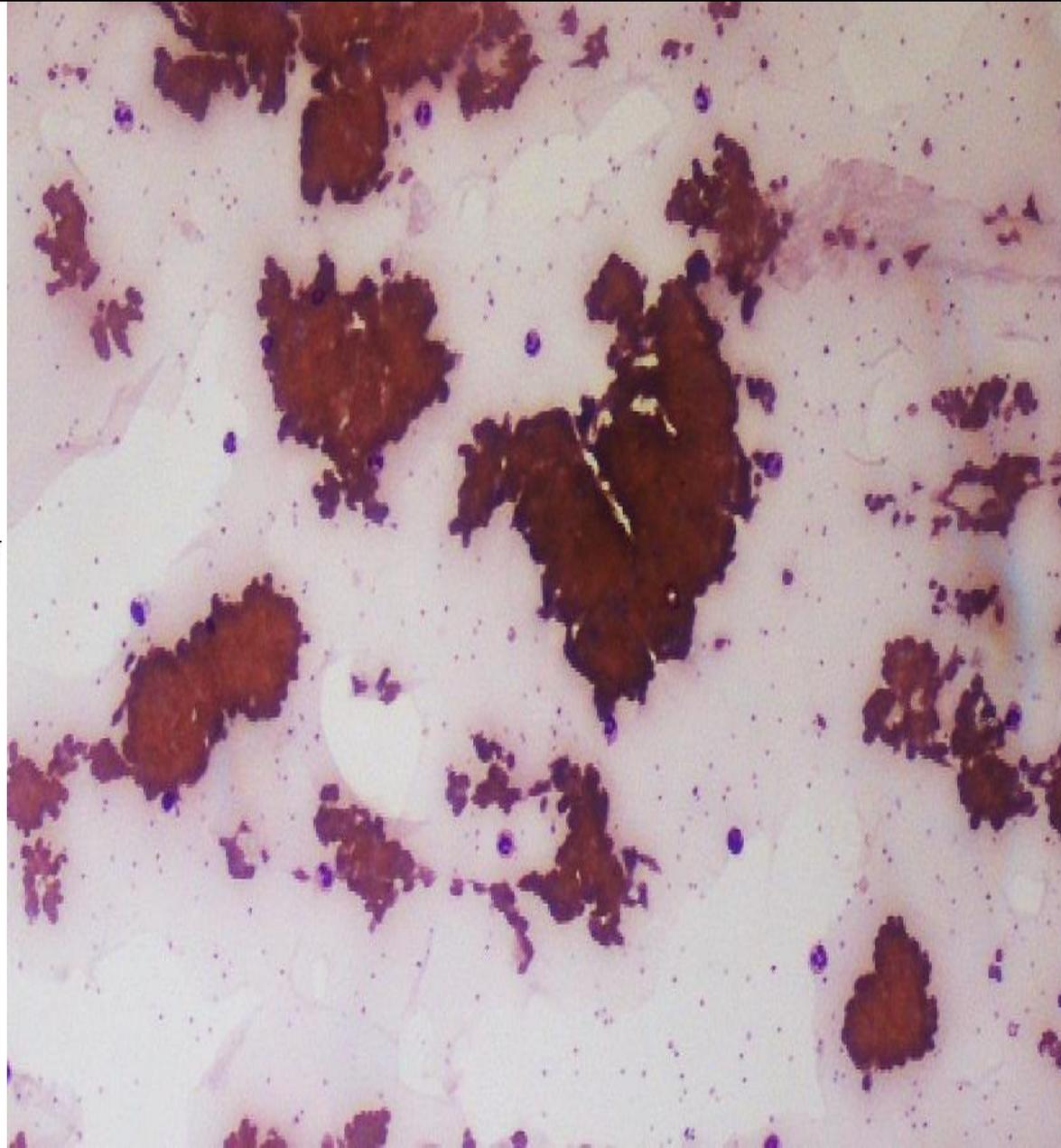
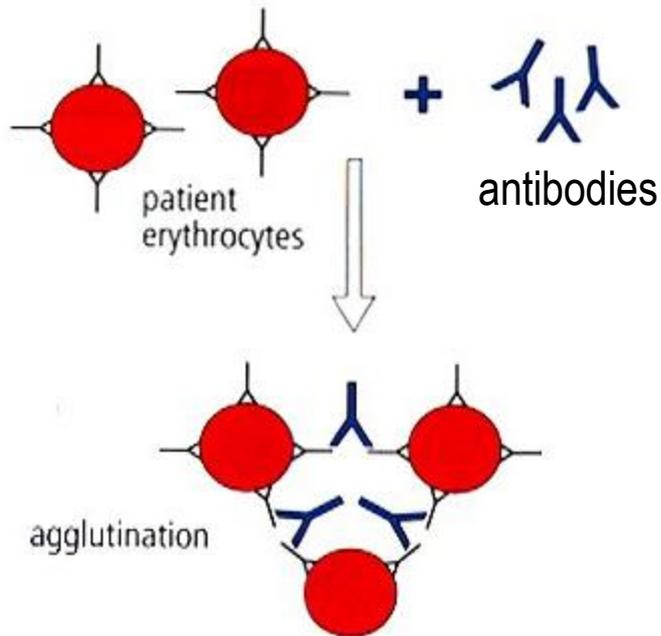
**Antibodies bind to the blood cells
and cause them to clump**



Blood Types

Blood transfusion:

Blood transfusions with the inappropriate blood type causes **systemic blood clumping (agglutination)** and potentially **death**.





Blood Types

Blood transfusion:

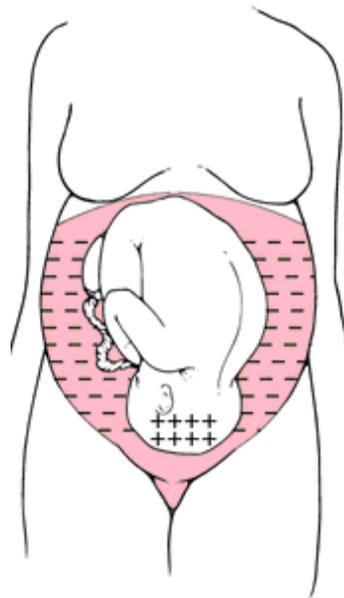
→ Rh-complications

A patient who is Rh-negative **may** have **Anti-Rh antibodies**, which can cause the blood to agglutinate.

Example:

A mother may be Rh-negative while her fetus is Rh-positive

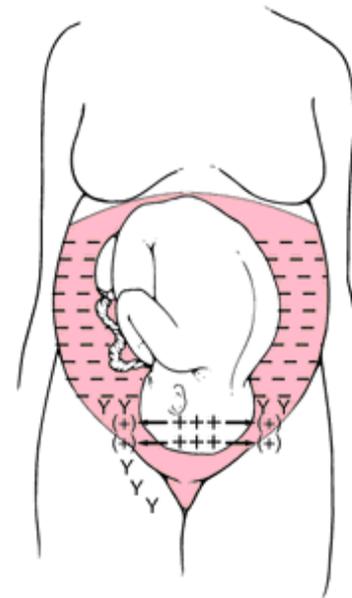
She MAY develop Anti-Rh antibodies if her blood becomes in contact with her baby's blood.



FIRST PREGNANCY

+ = Rh⁺ antigen baby's RBC's

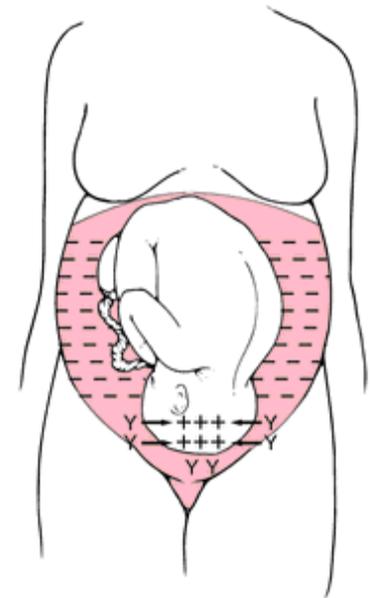
- = Rh⁻ mother



AT DELIVERY OF FIRST PREGNANCY

(+) = Rh⁺ antigen passed from baby to mother

Y = Antibody made by mother in response to Rh⁺ antigen from baby



SECOND PREGNANCY

Y = Antibodies from mother pass to baby and destroy RBC's of baby



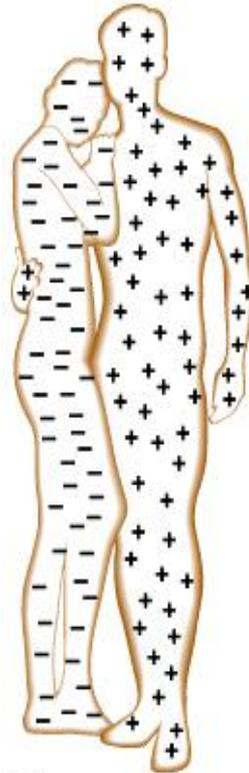
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Blood transfusion:

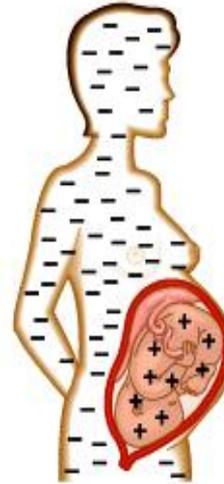
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→ Rh-complications

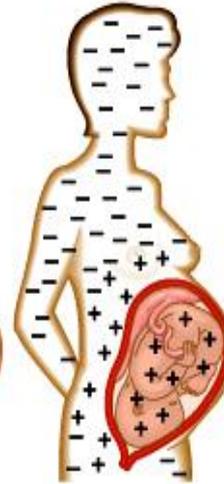
If the Rh-negative mother develops Anti-Rh antibodies, then her next pregnancy may be **terminated** if her new antibodies reach her Rh-positive fetus.



Rh-negative woman and Rh-positive man conceive a child



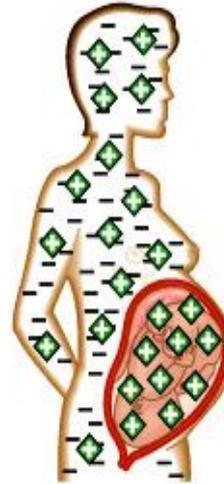
Rh-negative woman with Rh-positive fetus



Cells from Rh-positive fetus enter woman's bloodstream



Woman becomes sensitized—antibodies (◇) form to fight Rh-positive blood cells



In the next Rh-positive pregnancy, maternal antibodies attack fetal red blood cells



Blood Types

Blood transfusion game:

[Blood Typing Game](#)

BLOOD TYPING

