

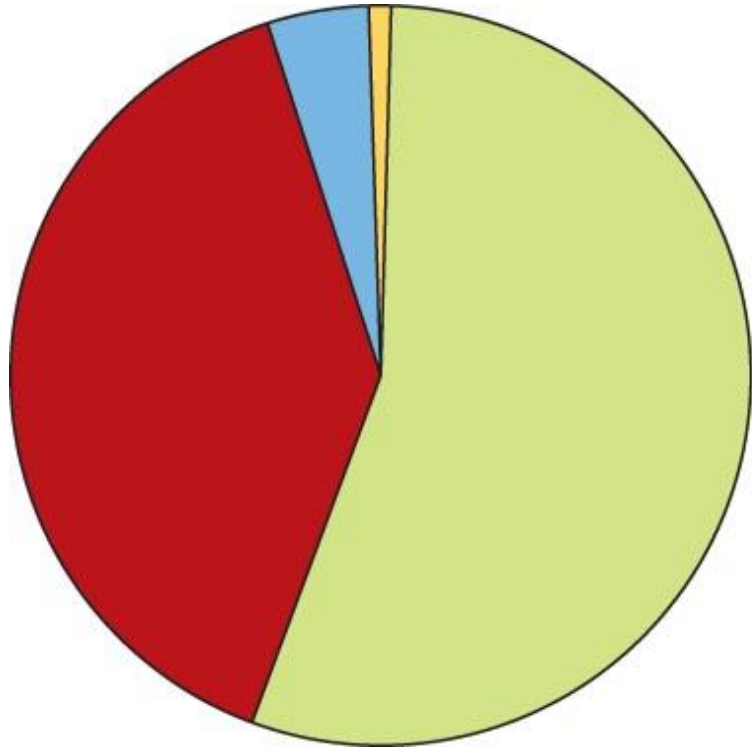
BLOOD

TYPING

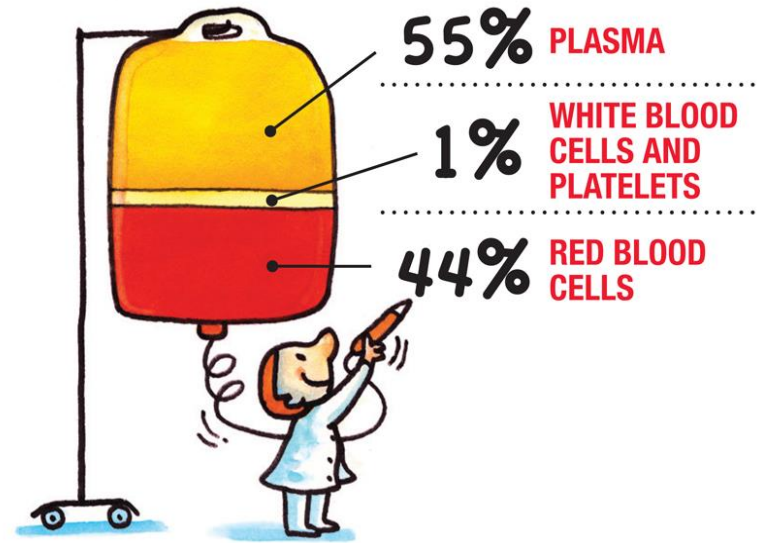
Simply put, blood is **the fluid that travels through your circulatory system.**

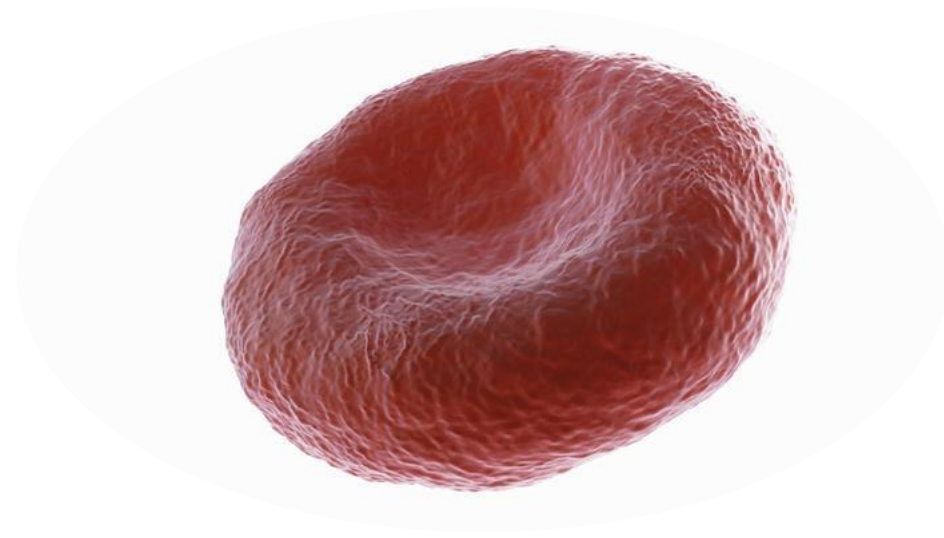
Blood has 3 main functions:

TRANSPORT	REGULATE	PROTECT
<ul style="list-style-type: none">■ Nutrients and oxygen TO the cells■ Waste and CO₂ AWAY from the cells	<ul style="list-style-type: none">■ Body temperature■ Body fluids	<ul style="list-style-type: none">■ Protect against disease and infections.



- Plasma
- Platelets
- Red blood cells
- White blood cells

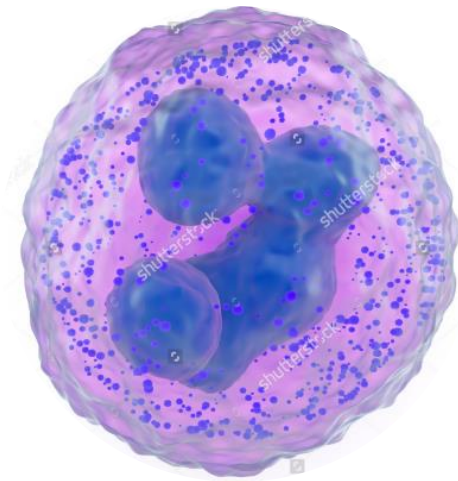




RED BLOOD CELLS

(Erythrocytes)

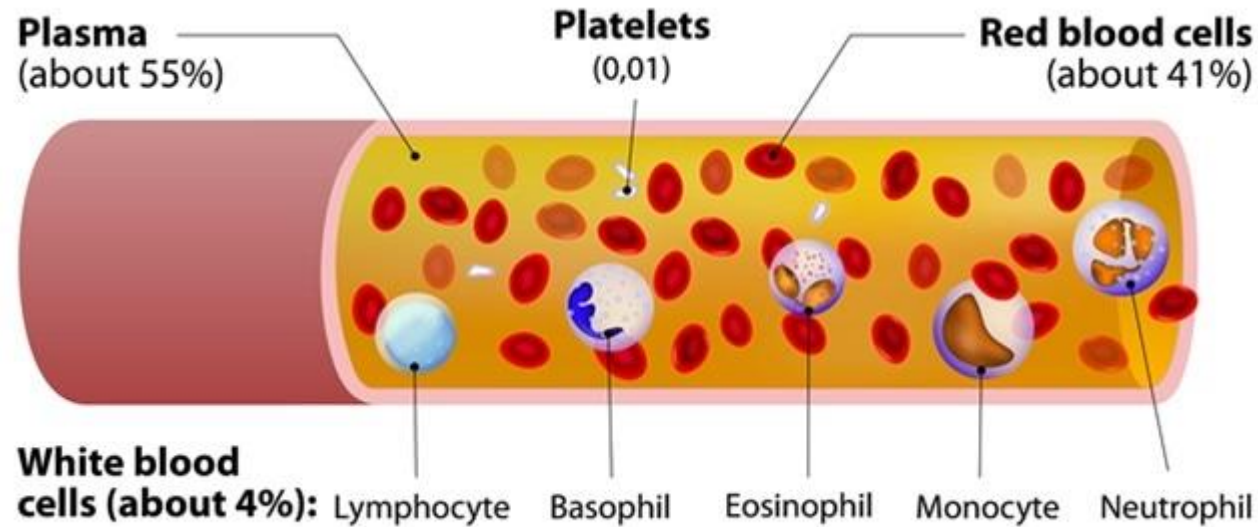
The most abundant cells in our blood; they are produced in the bone marrow and contain a protein called hemoglobin that carries oxygen to our cells.



WHITE BLOOD CELLS

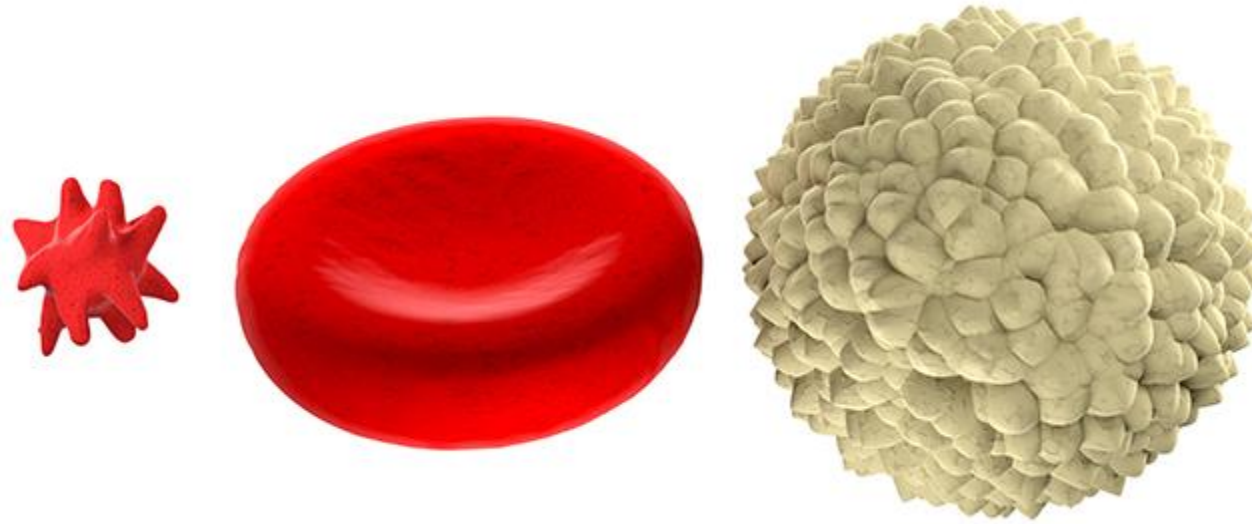
(Leukocytes)

They are part of the immune system and destroy infectious agents called pathogens.



PLASMA

This is the yellowish liquid portion of blood that contains electrolytes, nutrients and vitamins, hormones, clotting factors, and proteins such as antibodies to fight infection.



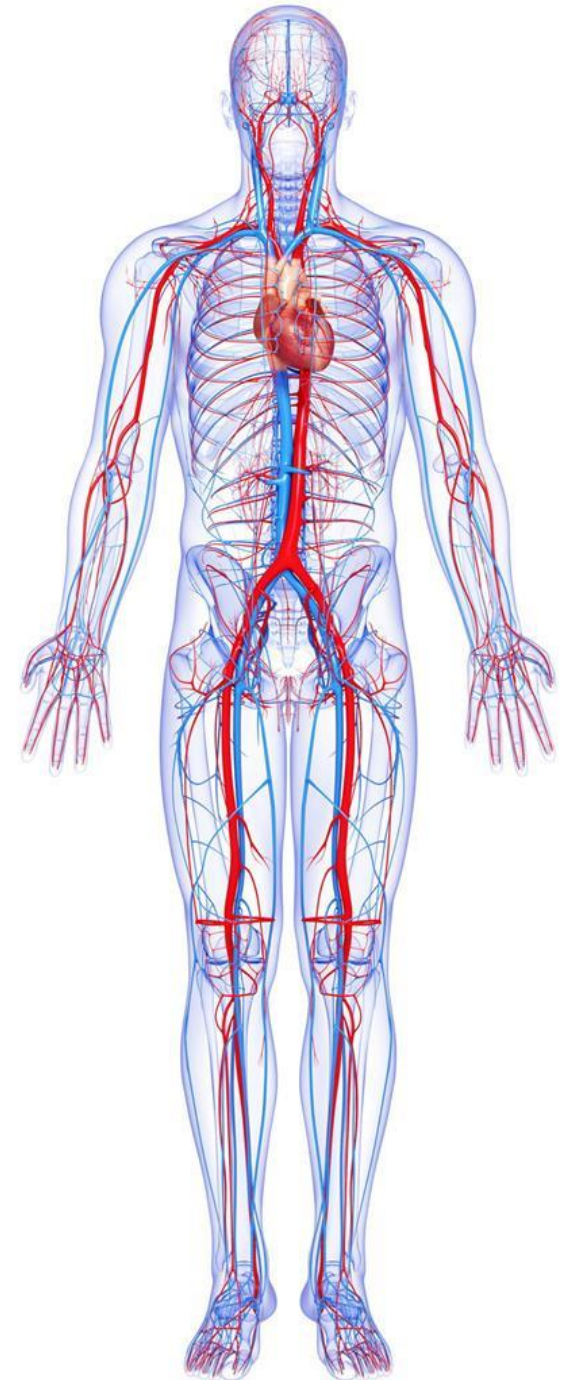
PLATELETS

(Thrombocytes)

The clotting factors that are carried in the plasma; they clot together in a process called coagulation to seal a wound and prevent a loss of blood.

The average adult has about FIVE liters of blood inside of their body, which makes up 7-8% of their body weight.

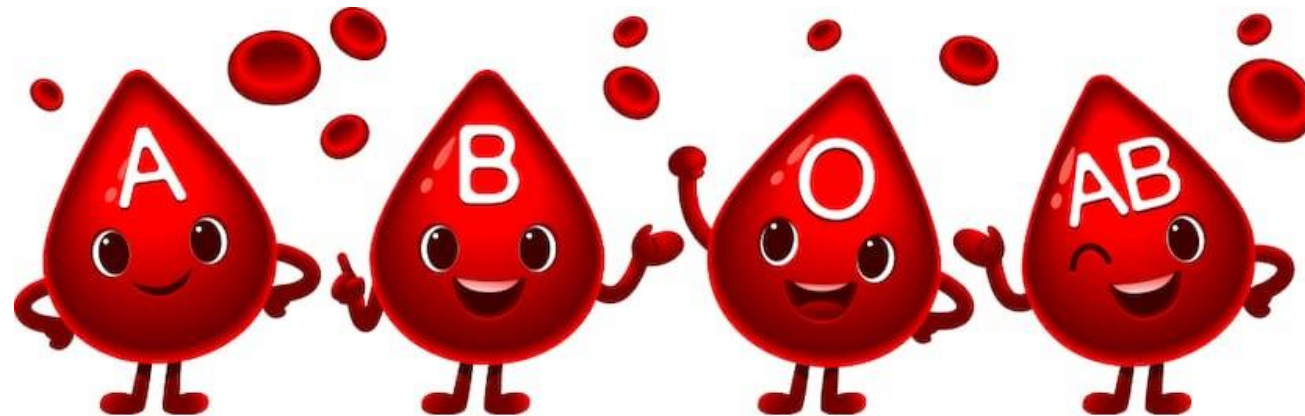
There are about one billion red blood cells in two to three drops of blood. For every 600 red blood cells, there are about 40 platelets and one white cell.



BLOOD

TYPING

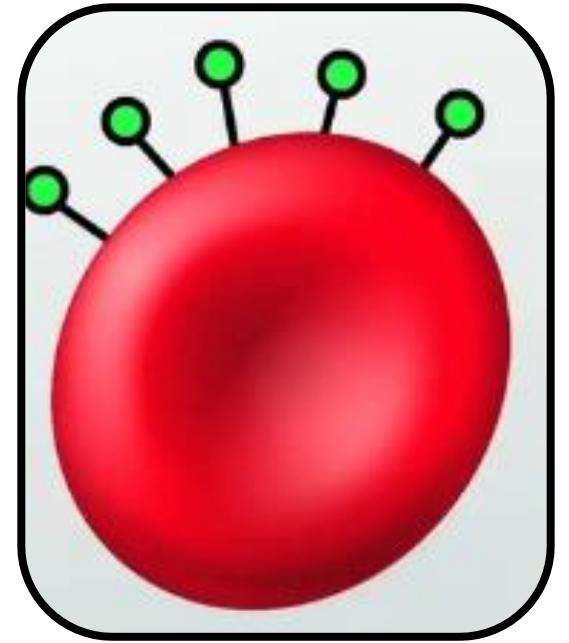
- **Discovered in 1900!**
- **Identifies the presence or absence of particular proteins embedded in the cell**
- **Quicker and less expensive than DNA profiling**
- **Produces class evidence but can still link a suspect to a crime scene or exclude a suspect**
- **Genes determine your blood type by causing proteins called **AGGLUTINOGENS** to exist on the surface of all your red blood cells.**

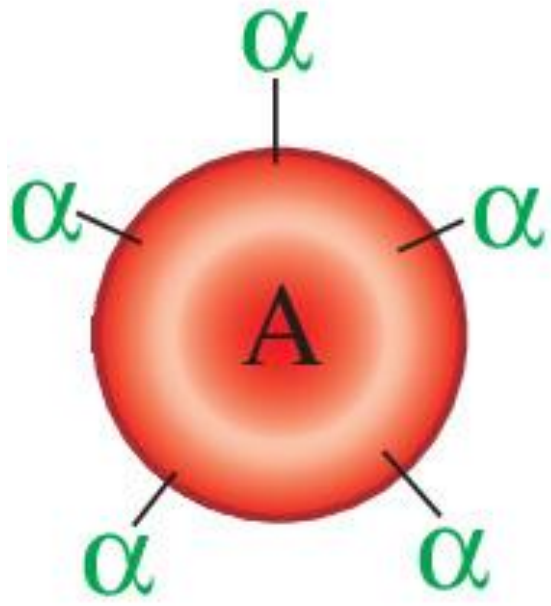


ANTIGENS

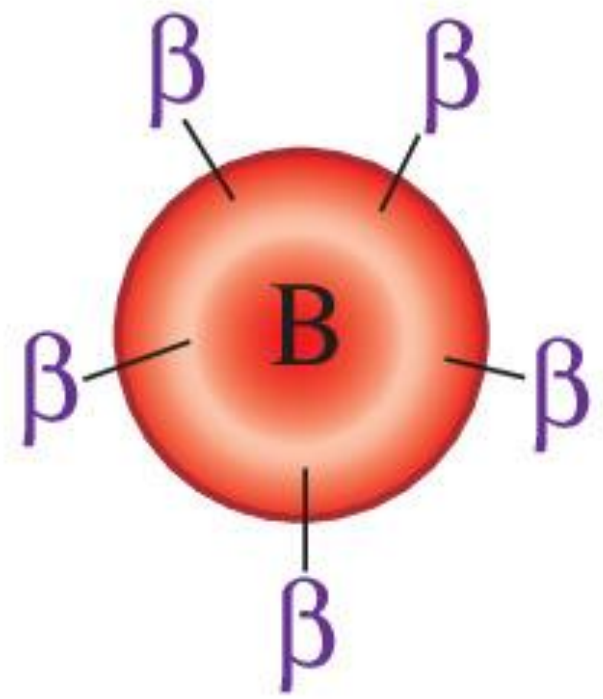
All blood contains the same basic components (red cells, white cells, platelets, and plasma), but not everyone has the same types of **markers** on the surface of their red blood cells.

These markers (also called **antigens**) are **proteins** and sugars that our bodies use to identify the blood cells as belonging in our own system.

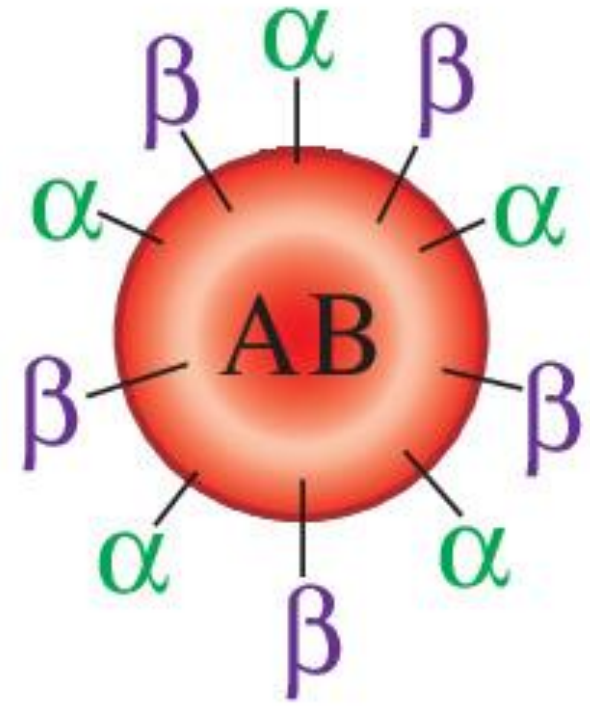




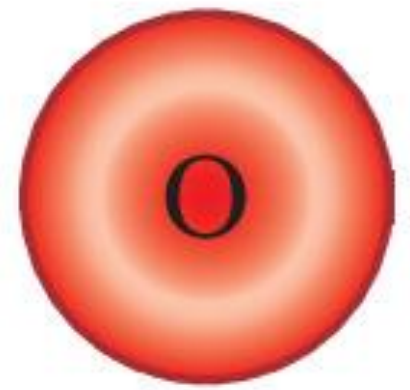
Blood type A
Only A antigen
on RBCs



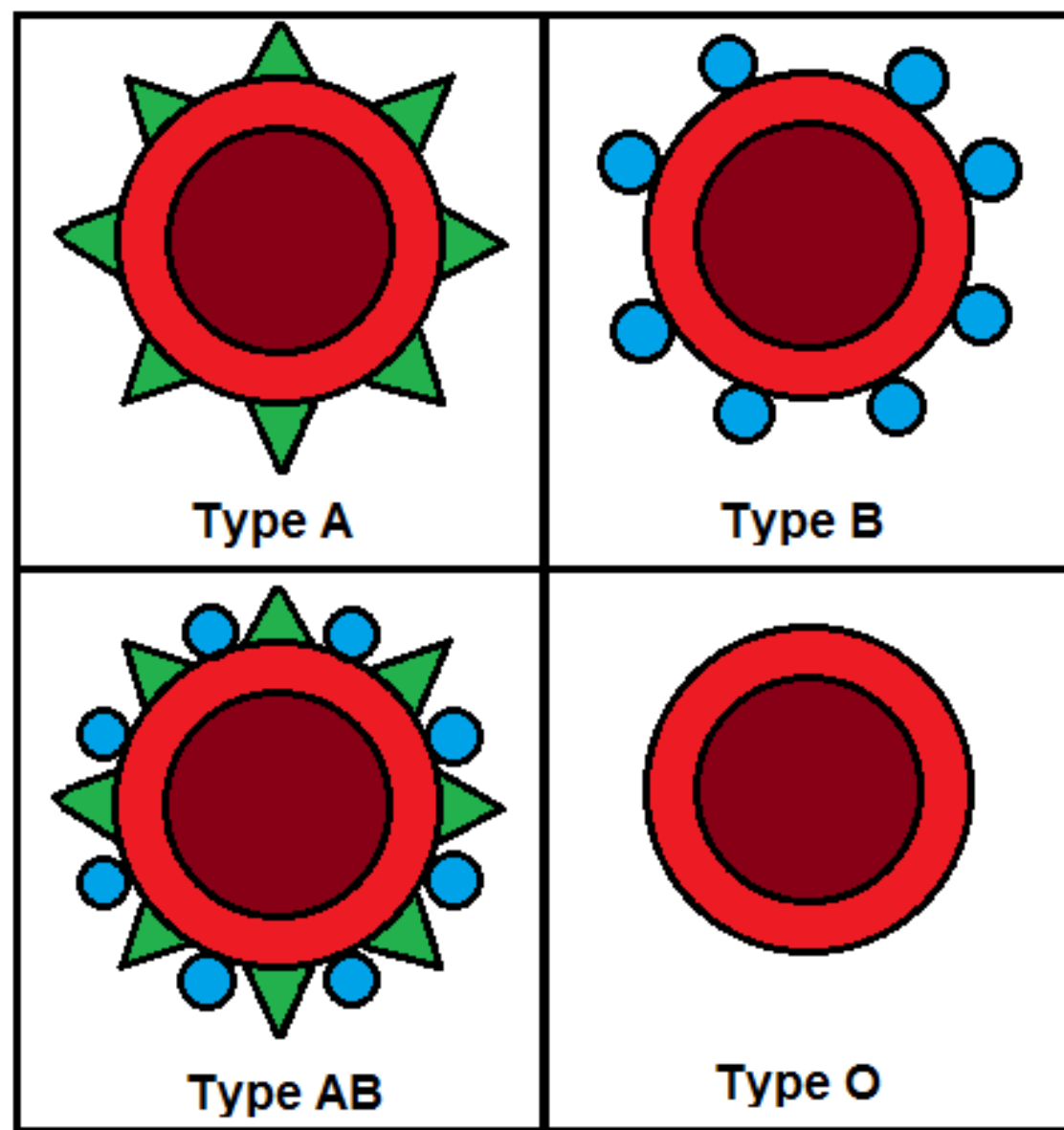
Blood type B
Only B antigen
on RBCs



Blood type AB
Both A and B
antigens on RBCs

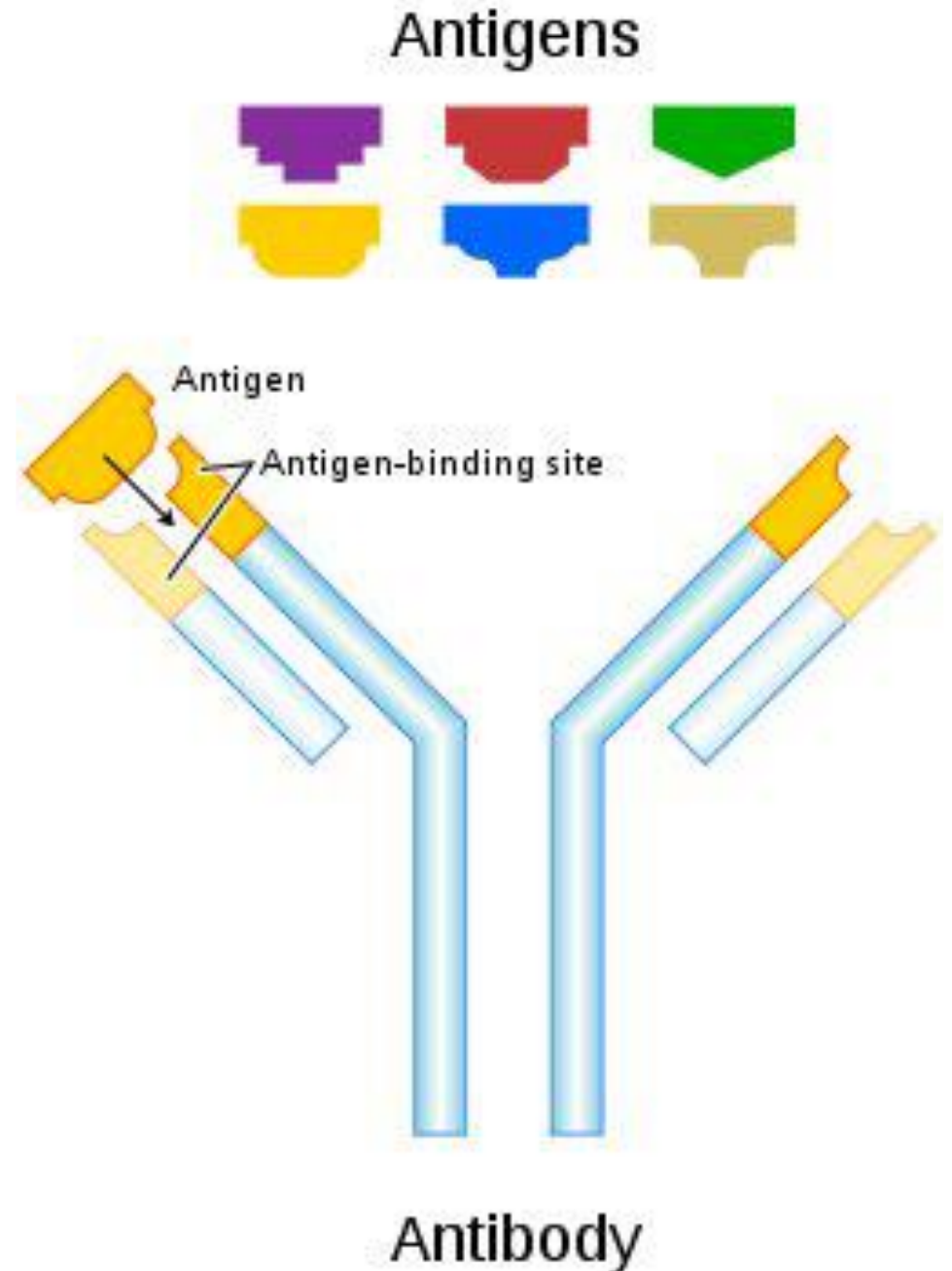


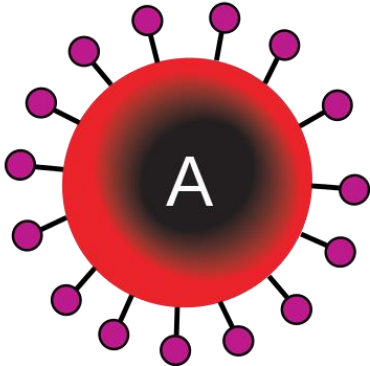
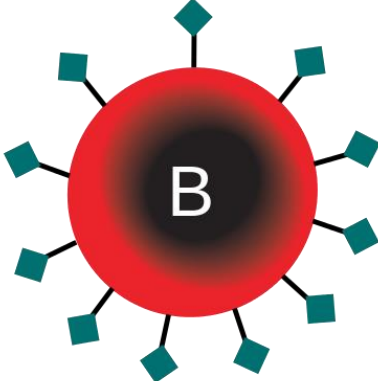
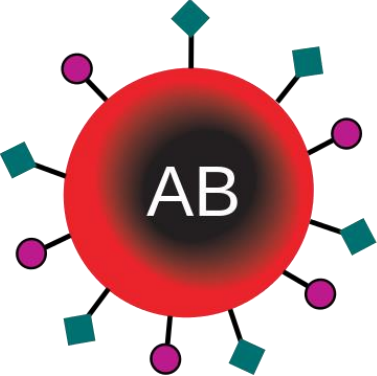
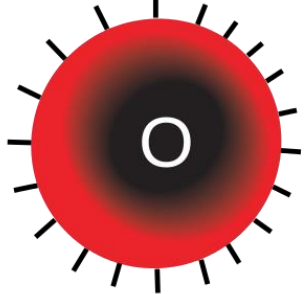
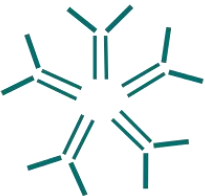

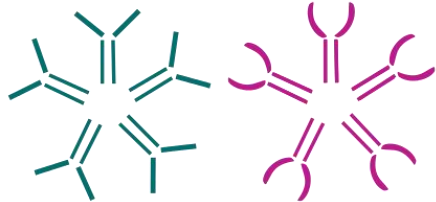



Blood type O
No antigens
on RBCs



ANTIBODIES

- Blood markers are also in plasma.
- These plasma blood markers are called **antibodies**.
- They are the body's response to antigens.
- **Antibodies** are proteins made by the immune system.



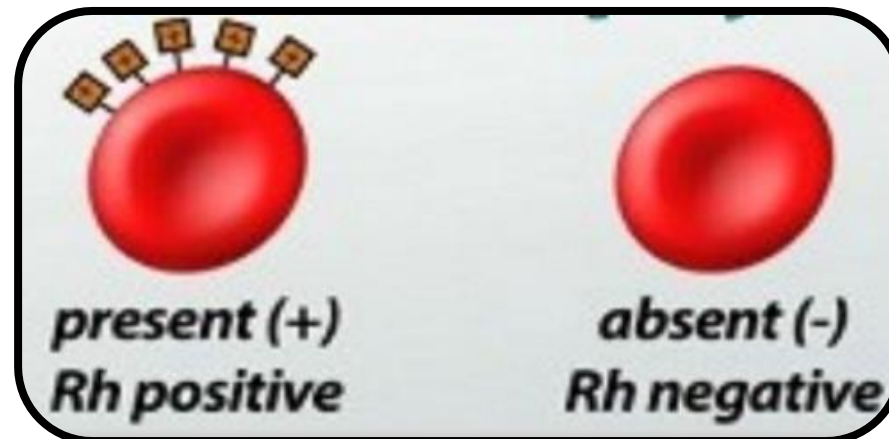
	Group A	Group B	Group AB	Group O
Red blood cell type	 <p>A</p>	 <p>B</p>	 <p>AB</p>	 <p>O</p>
Antibodies in Plasma	 <p>Anti-B</p>	 <p>Anti-A</p>	<p>None</p>	 <p>Anti-A and Anti-B</p>
Antigens in Red Blood Cell	 <p>A antigen</p>	 <p>B antigen</p>	 <p>A and B antigens</p>	<p>None</p>

BLOOD TYPE	ANTIGENS (ON RBC)	ANTIBODIES (IN PLASMA)
A	A	B
B	B	A
AB	A and B	NONE
O	NONE	A and B

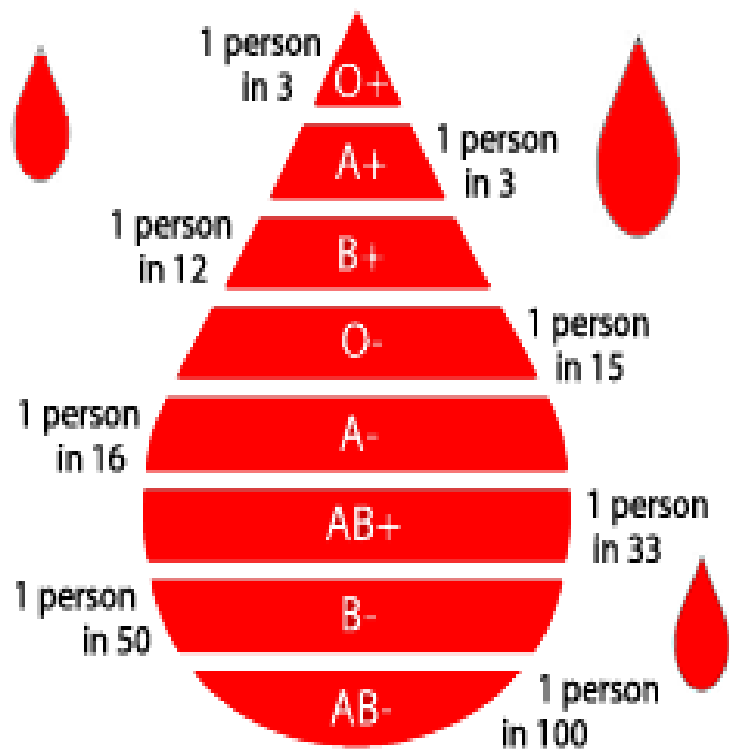
RH FACTOR

Some people have an additional marker, called Rh factor, in their blood.
Rh is a protein on the red blood cell.

Because each of the four main blood groups (A, B, AB, and O) may or may not have Rh factor, scientists further classify blood as either "**positive**" (meaning it has Rh factor) or "**negative**" (without Rh factor).



O -	NEITHER	NO Rh FACTOR
O +	NEITHER	Rh
A -	A	NO Rh FACTOR
A +	A	Rh
B -	B	NO Rh FACTOR
B +	B	Rh
AB -	A and B	NO Rh FACTOR
AB +	A and B	Rh

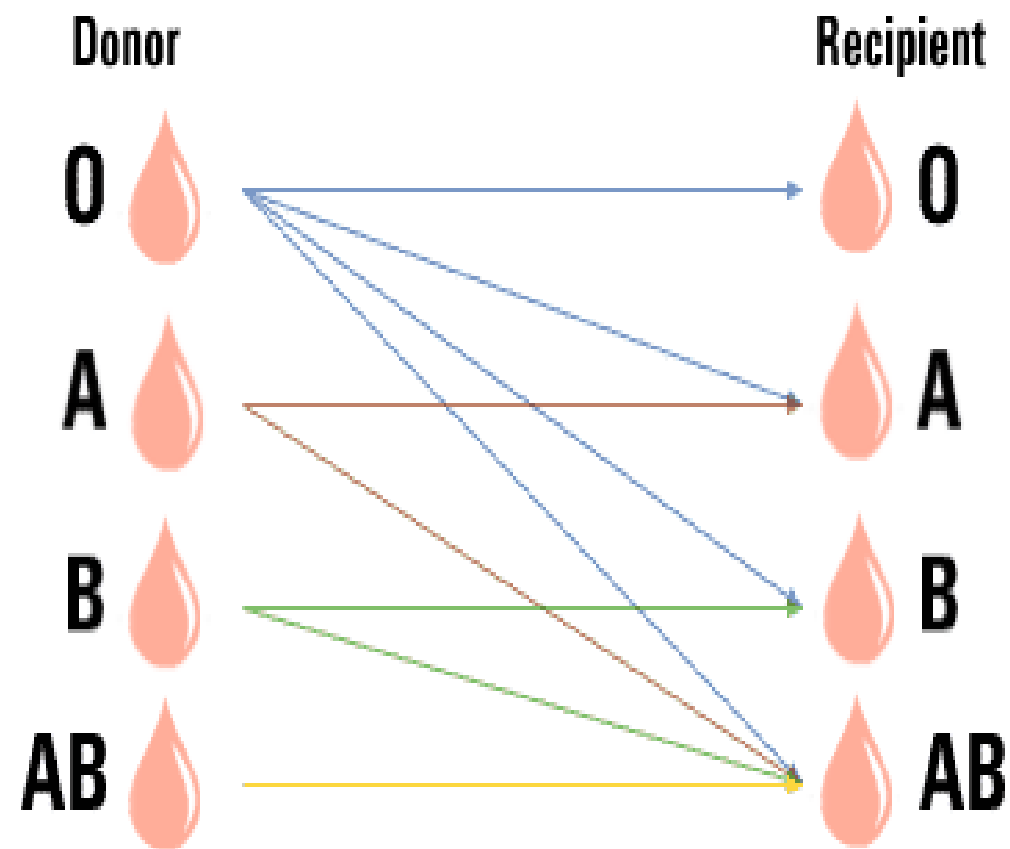


Group O can donate red blood cells to anybody. It's the universal donor.

Group A can donate red blood cells to A's and AB's.

Group B can donate red blood cells to B's and AB's.

Group AB can donate to other AB's, but can receive from all others.



LIMITATIONS

Knowing the blood type of the victim, and of all blood found at a crime scene can:

- Help distinguish the victim's blood from the suspect's blood.**
- Rule out involvement of suspects**
- Narrow down a suspect list**

Blood typing can help narrow down information, however it can not specifically 100% identify a suspect or victim.

For this we turn to the study of DNA...