

BLOOD BASICS

What makes up our blood?

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.

Did you know?

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

Blood is living tissue that acts as a transportation system in our bodies. It also fights against infection and helps heal wounds.

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.

Genetics of Blood

Your blood type is established before you are born, by specific **genes** inherited from your parents.

These two genes - one gene from your mother and one from your father - determine your blood type by causing proteins called **agglutinogens** to exist on the surface of all of your red blood cells.









There are **3 alleles or genes** for blood type: A, B, & O. Since we have 2 genes, there are 6 possible combinations: AA, AO, BB, BO, AB, and OO.

★ Give the genotype(s) for each blood type.

Type A = _____ Type AB = _____

Type B = _____ Type O = _____

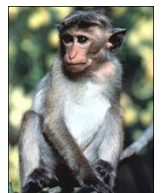
The ABO Blood System

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

<http://learn.genetics.utah.edu/units/basics/blood/types.cfm>

What is the Rh (Rhesus) factor?

A certain blood protein was discovered while studying Rhesus monkeys. The presence of the protein, or lack of it, is known as the **Rh factor**.



★ Rh ☐ Blood → Has the protein

★ Rh ☐ Blood → Does not have the protein

Blood Types

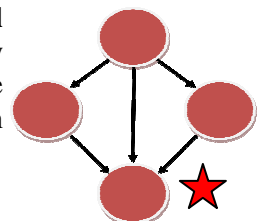
TYPE	DISTRIBUTION	RATIOS
O +	1 person in 3	38.4%
O -	1 person in 15	7.7%
A +	1 person in 3	32.3%
A -	1 person in 16	6.5%
B +	1 person in 12	9.4%
B -	1 person in 67	1.7%
AB +	1 person in 29	3.2%
AB -	1 person in 167	0.7%

<http://www.bloodbook.com/type-facts.html>

Who can give you blood?

People with **Type O** blood are called **universal donors**, because they can give blood to any blood type. People with **Type AB** blood are called **universal recipients**, because they can receive any blood type.

Fill in the diagram with the correct blood types.



Rh + → Can receive + or - Rh - → Can only receive -

Ernie's Exit

Blood Typing Lab Activity

A small pool of blood and a weapon was found near a garbage dumpster. After examining the area, the CSI on the scene discovered a body in the garbage dumpster and identified him as Earnest "One-Eyed" Earl. Earl had a wound to his chest that will be analyzed by the medical examiner.

The CSI tested blood samples from the blood pool and the weapon at the crime scene. It was determined that it was human blood, but he needs to know the blood type to help identify if it was from the victim or the person who murdered him. He has identified three suspects that either knew the victim or were seen in the area before the body was discovered. He would like to question them further while he waits for DNA test results.

Complete the chart using the class notes.

Clumping = + (Positive)

No Clumping = - (Negative)

Type	Reactions w/ Anti-A Serum	Reactions w/ Anti-B Serum
A		
B		
AB		
O		

Rh Serum = Clumping = Rh+ blood

Lab Results - Follow your teacher's directions to complete the lab. Remember to be careful to prevent cross-contamination of the blood samples! Record the results (+ or -) from each group in the trays below.

Suspect #1:

Bobby "Baby" Brooks

A	Rh	Type <input type="text"/>
B		

Suspect #2

"Slim" Jim Snoot

A	Rh	Type <input type="text"/>
B		

Suspect #3

Barbie "Doll" Jones

A	Rh	Type <input type="text"/>
B		

A	Rh	Type <input type="text"/>
B		

Victim

Ernest "One-Eyed" Earl

A	Rh	Type <input type="text"/>
B		

Crime Scene Sample

A	Rh	Type <input type="text"/>
B		

Weapon Sample

Conclusion

What do your results show?

What should investigators do next?