Blood Basics

Forensic Science

T. Trimpe 2006 http://sciencespot.net/

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.

Blood Facts

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 carries oxygen and nutrients to all parts of the body, and carries carbon dioxide and other waste products back to the lungs, kidneys and liver for disposal. It also fights against **infection** and helps heal **wounds**, so we can stay healthy.

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.

http://www.bloodbankofalaska.org/about_blood/index.html

Genetics of Blood Types

- Your blood type is established before you are **BORN**, by specific **GENES** inherited from your parents.

- You inherit one gene from your **MOTHER** and one from your **FATHER.**

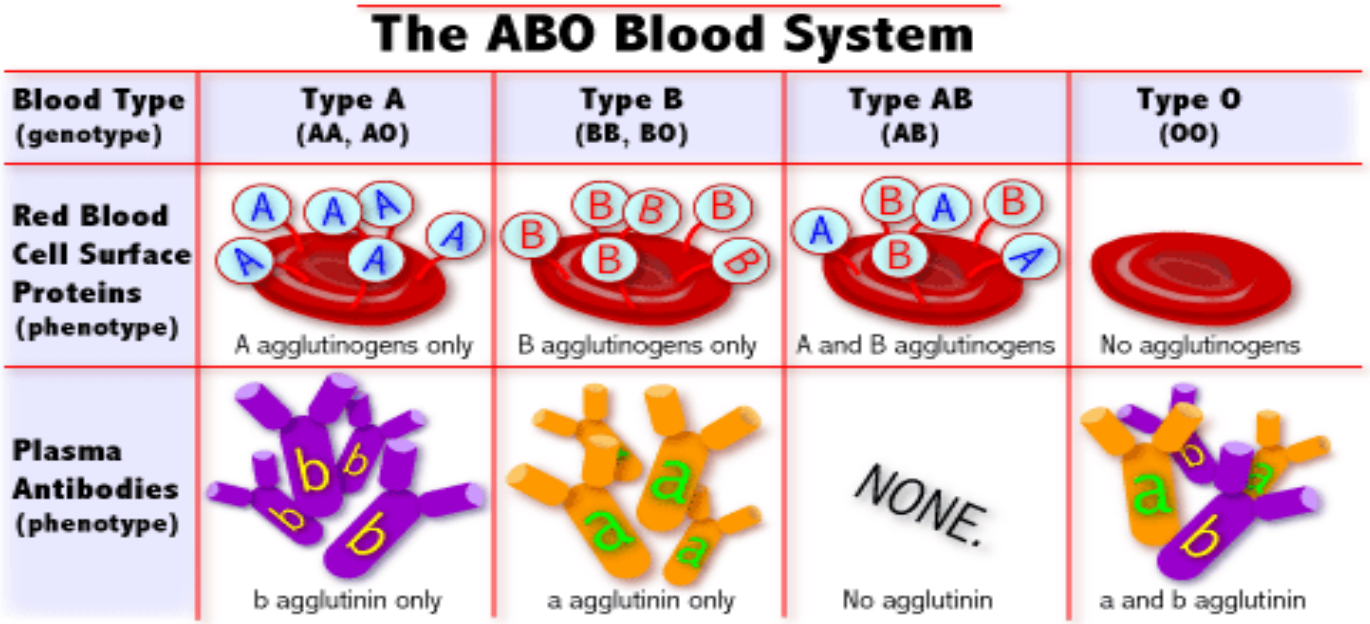
- These genes determine your blood type by causing proteins called **AGGLUTINOGENS** to exist on the surface of all of your red blood cells.

What are blood types?

There are 3 alleles or genes for blood type: A, B, & O. Since we have 2 genes, there are 6 possible combinations.

Blood Types

AA or AO = Type A
BB or BO = Type B
OO = Type O
AB = Type AB



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

How common is your blood type?

TYPE	DISTRIBUTION	RATIOS	
O +	1 person in 3	38.4%	46.1%
O -	1 person in 15	7.7%	
A +	1 person in 3	32.3%	38.8%
A -	1 person in 16	6.5%	
B +	1 person in 12	9.4%	11.1%
B -	1 person in 67	1.7%	
AB +	1 person in 29	3.2%	3.9%
AB -	1 person in 167	0.7%	

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

Blood Transfusions

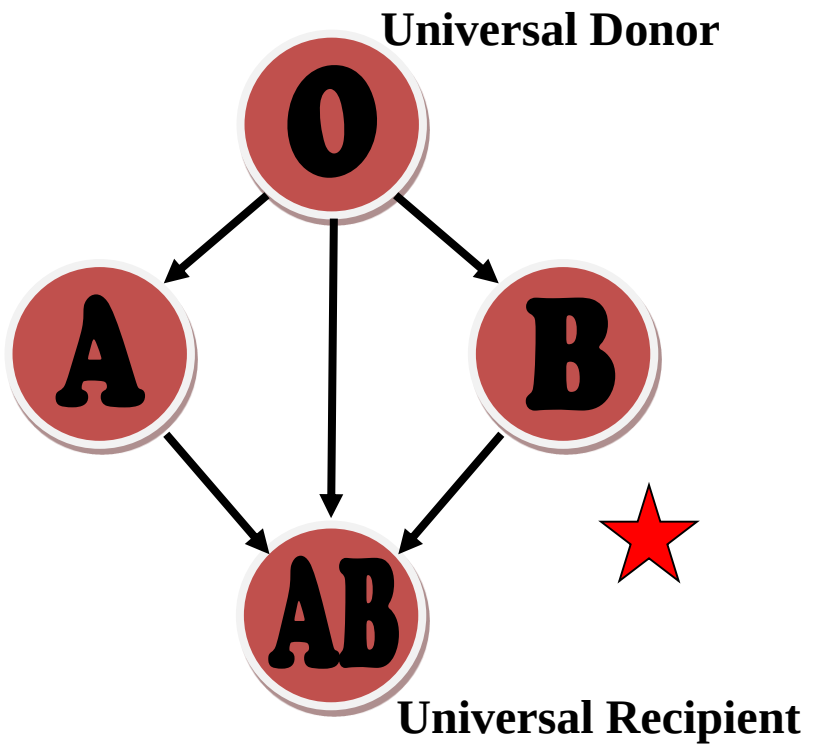
A **blood transfusion** is a procedure in which blood is given to a patient through an intravenous (IV) line in one of the blood vessels. Blood transfusions are done to replace blood lost during surgery or a serious injury. A transfusion also may be done if a person's body can't make blood properly because of an illness.

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.

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



Rh Factors

- Scientists sometimes study **Rhesus monkeys** to learn more about the human anatomy because there are certain similarities between the two species. While studying Rhesus monkeys, a certain blood protein was discovered. This protein is also present in the blood of some people. Other people, however, do not have the protein.
- The presence of the protein, or lack of it, is referred to as the Rh (for **Rhesus**) factor.
- If your blood does contain the protein, your blood is said to be Rh **positive** (Rh+). If your blood does not contain the protein, your blood is said to be Rh **negative** (Rh-).

A+ A-
B+ B-
AB+ AB-
O+ O-

http://www.fi.edu/biosci/blood/rh.html

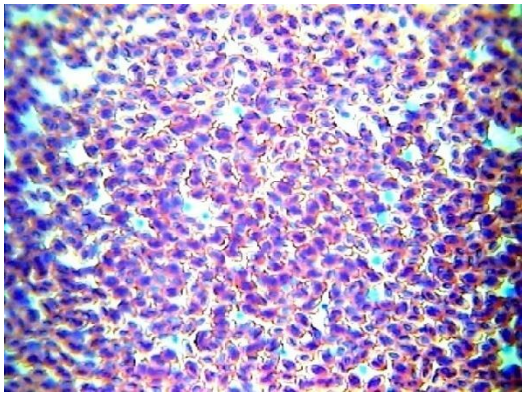
Blood Evidence

- **Blood samples** – Can be analyzed to determine **blood type** and **DNA,** which can be matched to possible suspects.

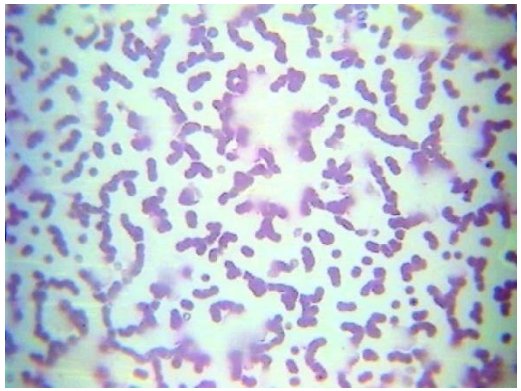
- **Blood droplets** – Can be analyzed to give clues to the location of a **crime,** movement of a **victim,** and type of **weapon.**

- **Blood spatter** – Can be analyzed to determine **patterns** that give investigators clues to how a crime might have happened.

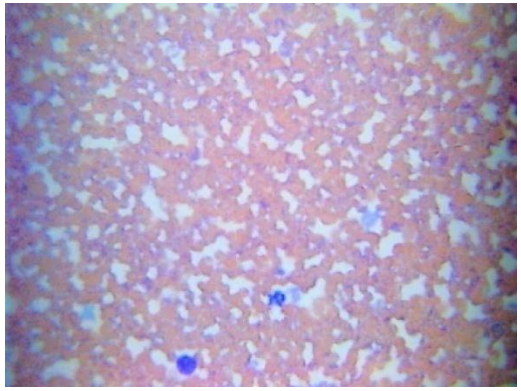
Microscopic Views



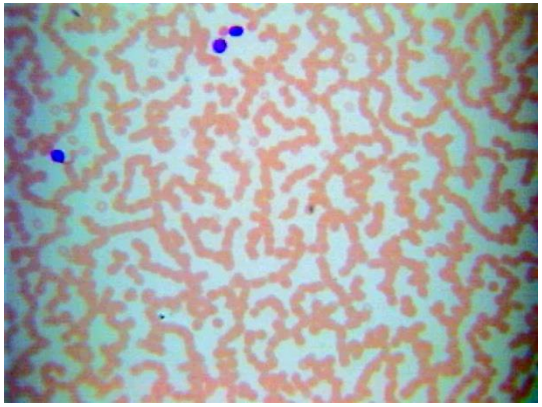
Bird Blood



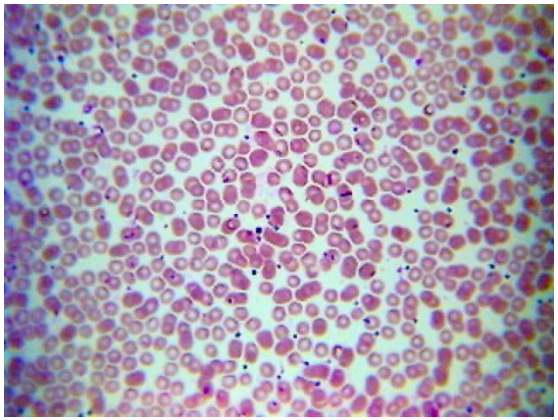
Cat Blood



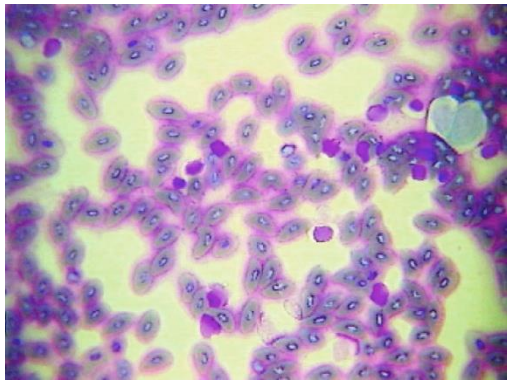
Dog Blood



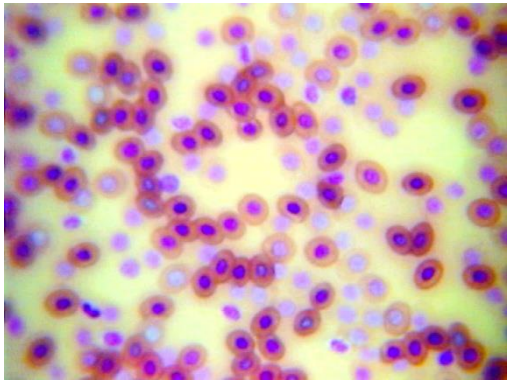
Horse Blood



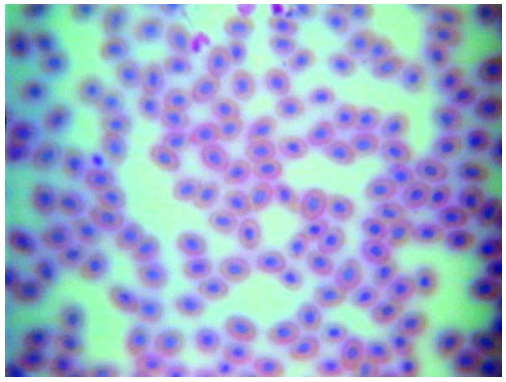
Human Blood



Fish Blood



Frog Blood



Snake Blood