

# Lab 1 Blood & Heart

Notes are posted on AP 2 lab page for: “Heart & Blood Slides”

## *PART 1. Blood*

### **FORMED ELEMENTS - Identification & Recognition** (p. 658 & 659 or 644 & 645)

See also laserdisc images and wall poster to view samples of human blood and identify the formed elements.

#### **ERYTHROCYTES (RBCs)**

Shape? \_\_\_\_\_

Function(s) \_\_\_\_\_

Life span = 100 – 120 days

#### **THROMBOCYTES (PLATELETS)**

Cell fragments that have the tendency to aggregate / agglutinate together at sites of tissue damage and initiate the blood clotting process. Life span = 10 days.

#### **LEUKOCYTES (white blood cells) (WBCs)**

- A “mobile army” of cells helping our immune system protect us against microorganisms.
- Life spans range from a few days to many years depending on type of cell.
- NORMAL WBC COUNT = 4,000 - 11,000 /mm<sup>3</sup>.
  - If >11,000 / mm<sup>3</sup> then condition is called **LEUKOCYTOSIS**
  - If < 4,000 / mm<sup>3</sup> then condition is called **LEUKOPENIA**

#### **Neutrophils**

Shape of nucleus?

Color of granules?

#### **Eosinophils**

Shape of nucleus?

Color of granules?

#### **Basophils**

Shape of nucleus?

Color of granules?

#### **Lymphocytes**

Shape of nucleus?

Size of cell?

#### **Monocytes**

Shape of nucleus?

Size of cell?

**OYO:** Define **LEUKEMIA** and explain the effect of leukemia on WBC numbers and function.

**OYO:** In acute leukemia the most common causes of death are internal hemorrhage and infections. Why?

**OYO Self-quiz: Functions of Leukocytes (WBCs)**

Which of the WBCs contain granules in their cytoplasm and are therefore considered “granulocytes?”  
After staining, what is the respective color of the granules in each?

Which WBC contains and releases histamine and other chemical mediators of inflammation? \_\_\_\_\_

Which WBC directly attacks virus-infected cells and tumor cells? \_\_\_\_\_

Which two WBCs are actively phagocytic? \_\_\_\_\_ & \_\_\_\_\_

Which of these two lives longer? \_\_\_\_\_

Which of these two is actively phagocytic against bacteria? \_\_\_\_\_

Which WBC produces massive quantities of antibodies as part of your immune response? \_\_\_\_\_

Which WBC is identified by its multilobed nucleus? \_\_\_\_\_

Which WBC is identified by having a more or less round nucleus that nearly fills the entire cell? \_\_\_\_\_

Which two WBCs have bilobed nuclei? \_\_\_\_\_ & \_\_\_\_\_

So how do we distinguish between these two? \_\_\_\_\_



## ***PART 2. The Heart***

**Instructor will give notes: “Blood & Heart Slides”**

### **Before you begin you should know:**

- Arteries are vessels that carry blood away from the heart. Always.
- Veins are vessels that carry blood toward the heart. Always.
- On models, the color of any vessel, red or blue is determined by whether or not it is carrying oxygen-rich or oxygen-poor blood. Color does not indicate whether it’s an artery or a vein.
- Most arteries will be red and most veins will be blue... except in the pulmonary circulation where the colors are reversed. Can you explain why this is so?

### **SUPERFICIAL ANATOMY OF THE HEART**

Identify each of the following structures on diagrams and on human heart models.

**Base** of the heart - the upper, broader end of the heart where the major vessels enter/exit the. The pericardial sac surrounding the heart also attaches here.

**Apex** of the heart - the lower, more pointed end of the heart.

The **Pericardial Sac** around the Heart (p. 662, 663) or there’s a very good alternate explanation at:

<http://www.daviddarling.info/encyclopedia/P/pericardium.html>

The sac around the heart is composed of two layers; the tough, thick, superficial **Fibrous Pericardium** and the thinner, deeper, more delicate **Serous Pericardium**. What can be confusing here is that the **serous pericardium** is made of two layers (two serous membranes) connected to each other at the base of the heart. The layer attached to the inner surface of the fibrous pericardium is the **Parietal layer (a.k.a. parietal pericardium)**. The layer attached directly to the surface of the heart is the **visceral layer (a.k.a. visceral pericardium)**. When describing the layers of the heart wall rather than the layers of the sac this visceral layer is called the **epicardium**. Imagine ‘cracking’ the chest and cutting open the pericardial sac. If you were to reach in and touch the surface of the heart you would be touching the **visceral pericardium** or you could also call it the **epicardium**. Your fingers would be in the space between the sac and heart, the **pericardial cavity**.

**Pericardial Cavity** - This is the small cavity between the visceral and parietal layers of the serous pericardium. It’s filled with a lubricating **serous fluid** known in this location as **pericardial fluid**.

**Take a heart model and drop it into a sack. Touch and name all the structures mentioned above.**

**\*\*Confirm the accuracy of your identifications of the above with another student who was NOT in your group. Also confirm with your instructor.**

OYO: Go to [www.clevelandclinic.org](http://www.clevelandclinic.org)

Define **Pericarditis** (and name 2 or 3 possible causes)

Define **Cardiac Effusion**

Define /describe **Cardiac Tamponade**

Predict what would happen to CO (cardiac output) and BP (blood pressure) as cardiac tamponade progresses.

**In lab find:**

**Interventricular Sulcus** – a surface groove on the anterior side of the heart filled with coronary vessels and fat. It runs diagonally from the top middle to the lower right of the heart. Directly behind this, internally, is the **interventricular septum**. Open the heart. Put a finger in each ventricle and pinch them together. The tissue between your fingers is the interventricular septum.

**Coronary Arteries and Veins** - those vessels on the surface of the heart often obscured by fat. These are supplying blood flow to and from the actual myocardial muscle cells themselves.

State a brief function for each of the following with an "\*". E.g. “carries blood from the pulmonary circuit to the left atrium.” “Carries blood from the \_\_\_\_\_ to the \_\_\_\_\_”

\* **Pulmonary Trunk & L and R Pulmonary Arteries**

\* **L and R Pulmonary Veins**

\* **Superior and Inferior Vena Cava**

\* **Aorta** - (Where it makes an abrupt turn and descends downward is called the **aortic arch**.)

**Brachiocephalic Artery** – the 1<sup>st</sup> vessel branching off of the aortic arch. It carries blood to the right arm and the right side of the neck and head.

**Left Common Carotid Artery** – the 2<sup>nd</sup> vessel branching off of the aortic arch. It supplies blood to the left side of the neck and head.

**Left Subclavian Artery** – the 3<sup>rd</sup> branch off of the aortic arch. It supplies blood to the left shoulder and arm.

**Confirm the accuracy of your identifications of the previous page and above with another student who was NOT in your group. And also with your instructor.**

### **INTERNAL HEART ANATOMY:**

Chambers:

\* **Right and Left Atria**

\* **Right and Left Ventricles**

**Interventricular Septum** - “septum” is a generic term for a dividing “wall.” This structure is the wall between the two ventricles. Don’t expect these “walls” to be straight.

**Myocardium** – Put one finger inside and chamber and another finger outside the chamber and pinch the two fingers together. Most of what is between your fingers is the muscular myocardium.

OYO: When comparing the *lateral* walls of the L and R ventricles note that the thickness of the L usually much greater. Why?

**Endocardium** - the innermost layer of the heart wall. It appears as the inner lining of the chambers. Touch the wall inside any chamber and you’re touching the endocardium.

**Atrioventricular Valves** (found between each atrium and its respective ventricle)

Describe the function of each valve as “prevents blood from flowing from the \_\_\_\_\_ back to the \_\_\_\_\_.”

\* **Tricuspid Valve**

\* **Mitral (bicuspid) Valve**

OYO: When you hear of someone having heart valve problems it is usually this. Why?

## Semilunar Valves

\* **Pulmonary Semilunar Valve**

\* **Aortic Semilunar Valve**

## Chordae Tendineae and Papillary Muscles. (Function?)

**Confirm accuracy of your identifications** of the heart's internal anatomy with another student who was not in your group. Confirm with your instructor also if you like.

**Trace the path of blood pumped through the heart** naming each vessel, valve, and chamber encountered beginning with the superior and inferior vena cava and ending with the aorta. (When you can do this from memory on a blank sheet of paper then you know your heart anatomy pretty well.)

Confirm your accuracy with another student or two who was not in your group. Also confirm with your instructor.

**Heart Videos worth watching.** These are also available as active links on my webpage. You can just click the link rather than type in the address. If typing, addresses are case sensitive. (Control/click to go directly)

<http://www.youtube.com/watch?v=D8LK34hoVpU&NR=1>

<http://www.youtube.com/watch?v=AbmWLXpL0Aw&feature=related>

[http://www.youtube.com/watch?v=nx-XRC\\_1n-Q&feature=related](http://www.youtube.com/watch?v=nx-XRC_1n-Q&feature=related)

<http://www.youtube.com/watch?v=oHg5ZvrI4NY&NR=1>

[http://www.youtube.com/watch?v=r\\_RQMdqccqc&feature=related](http://www.youtube.com/watch?v=r_RQMdqccqc&feature=related)

**Bonus: Are you an amateur or a professional?** “An amateur practices until he gets it right, once. The professional practices over and over and over until he/she never gets it wrong.”