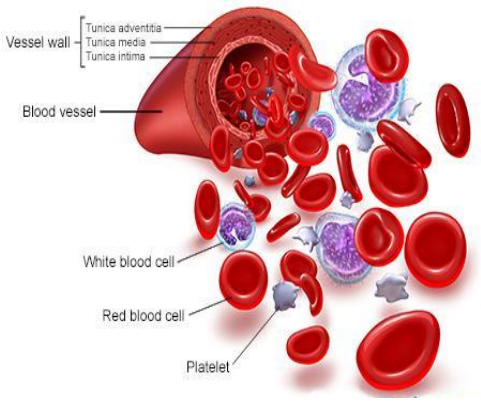
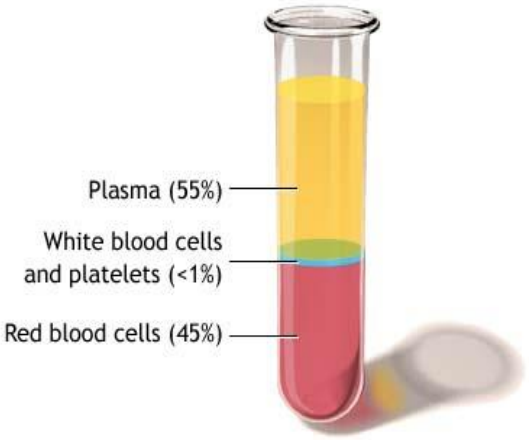
2.2.1 State the composition of blood



- Blood is heavier and more _____ than water and accounts for about 8% of our total body weight.
- Healthy adult males have around 5-6 liters of blood and _____ about 4-5 liters.
- Its color varies, depending upon the _____ of oxygen it is carrying, from dark ____ (oxygen poor) to bright red (oxygen rich).

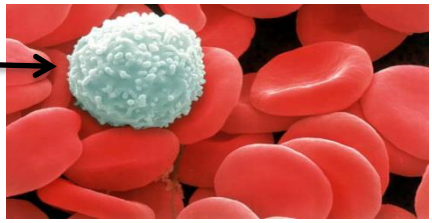
- _____ (Red Blood Cells RBC's)
- **Leukocytes** (White Blood Cells)
- **Platelets** (_____)
- **Plasma**: _____ portion of blood and responsible for the transport of electrolytes, proteins, _____, nutrients, waste products and _____.



<u>The total volume of erythrocytes is known at the **hematocrit**!</u>

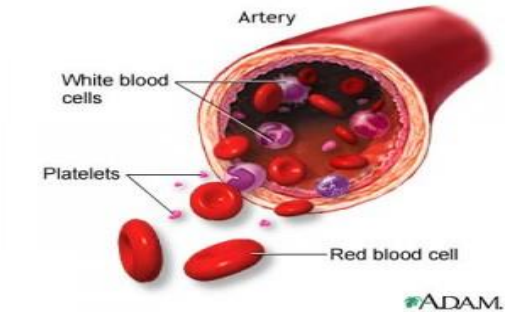
2.2.2 Distinguish between the functions erythrocytes, leucocytes and platelets

- **Erythrocytes (Red Blood Cells)**: contain an oxygen-carrying pigment called _____, which carries oxygen gives blood its red color.
  - The cells live for around 120 days, and are _____ at the astonishing rate of <u>2 million cells per second</u>.



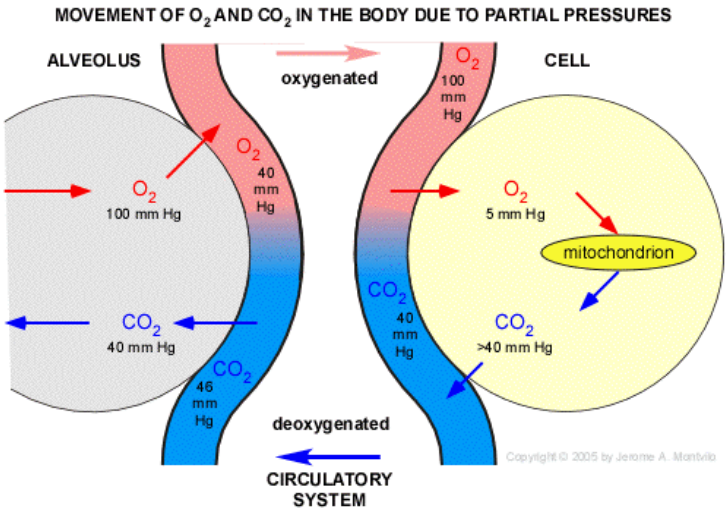
- **Leukocytes (White Blood Cells):** exist in our bodies to combat infection and _____.
  - They do this by ingesting _____ microbes in a process called <u>phagocytosis</u>.

- **Platelets (Thrombocytes)**: involved in the process of _____ and help repair slightly damaged blood vessels.



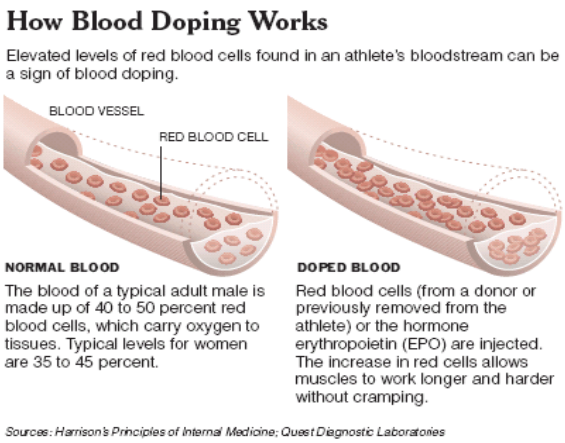
Blood performs a number of specialized functions:

- Transports nutrients, _____, carbon dioxide, waste products and hormones to cells and organs around the body.
- Protects us from bleeding to death - via clotting, from disease, by destroying invasive micro-organisms and toxic _____.
- Acts as a regulator of temperature, the water content in cells, and body pH. (remember that narrow window we like!!)
- Small % of oxygen dissolves in _____, most of it attaches to iron-rich hemoglobin.
    - Lungs have _____ partial pressure of O2 so O2 easily binds to hemoglobin
    - Active muscles have a _____ partial pressure so O2 detaches from hemoglobin easily and diffuses in.
- CO2 is produced during _____ and is transported to the lungs via the veins, partly dissolved in blood but mostly in the temporary form of bicarbonate



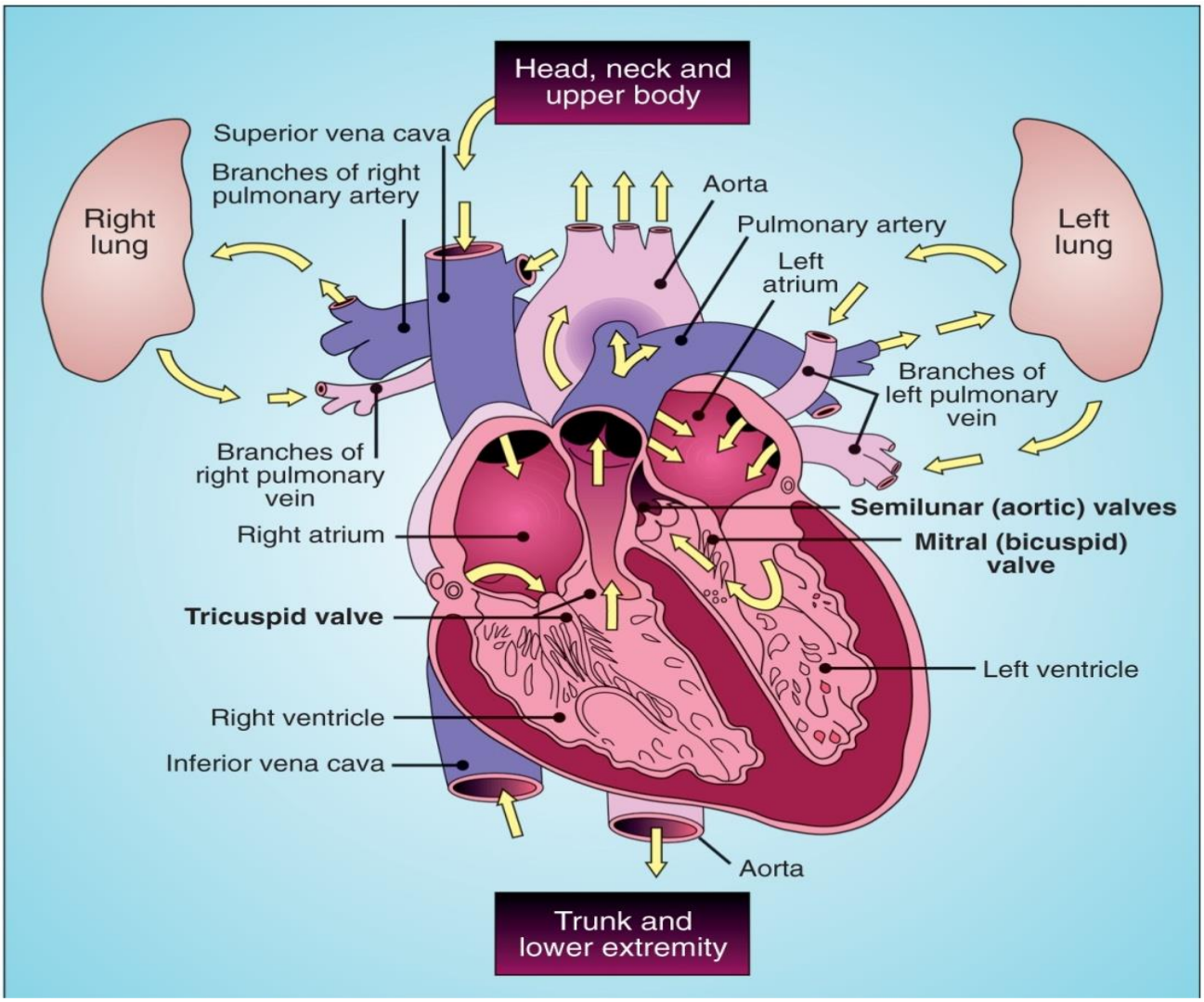
The effect of exercise and altitude on the amount of red blood cells

- Hemoglobin concentrations are controlled by the _____ **erythropoietin** (EPO)
    - Stimulates red blood cell _____
    - More red blood cells (RBC's) = more oxygen = increased _____ performance
    - This is why endurance athletes live at _____ altitudes
        - Less oxygen in air stimulates EPO to produce more RBC's and thus hemoglobin
        - They return to sea level and perform better
- There are illegal methods to increasing RBC's in athletes
    - **Blood doping** - _____ some blood from an athlete after training at altitude which stimulates EPO to increase RBC's
    - This blood is _____ to the athlete just before competition to increase athletic performance
- Athletes can be _____ with **synthetic EPO** to skip the above process.
- Detection of synthetic EPO and _____ doping is hard
- When you travel to high elevations (even without training) your EPO increases you RBC's

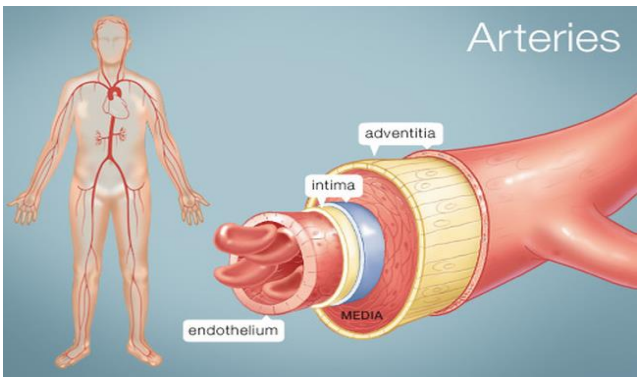


2.2.3 Describe the anatomy of the heart with reference to the heart chambers, valves and major blood vessels

- Your heart is about the same size as your _____.
- An average _____ body contains about five liters of blood.
- All the blood vessels in the body joined end to end would stretch 62,000 miles **or** two and a half times around the earth.
- The heart _____ the body's blood supply about 1,000 times each day.
- The heart pumps the _____ of 5,000 to 6,000 liters of blood each day.

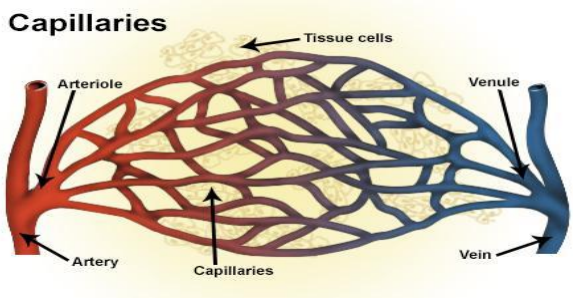


- **<u>Arteries</u>**



  - Relatively _____ blood vessels in diameter
  - Thick muscular walls with considerable _____ exerted by the oxygen-rich blood within
  - Responsible for blood _____ away from the heart
  - Arteries branch into narrower _____

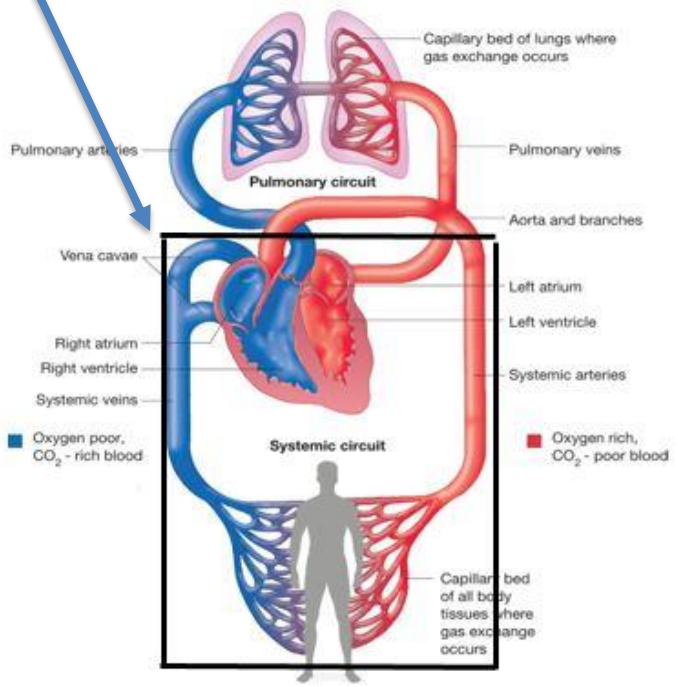
- **<u>Capillaries</u>**



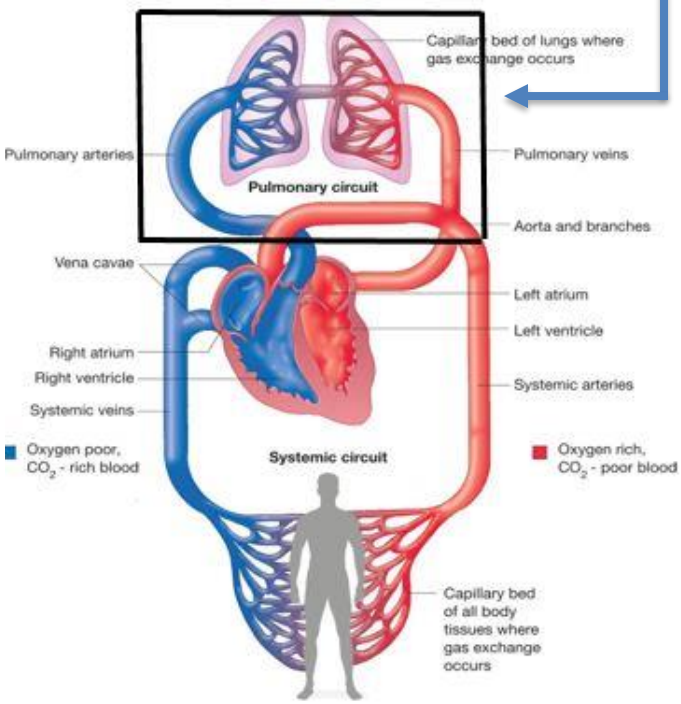
  - Blood supplied by the _____
  - Narrow blood vessels with _____ thin walls
  - Form _____ branching network through tissues
  - Sites of gas exchange between blood and tissues

- **<u>Veins</u>**
    - Capillaries link to larger vessels called _____ and then to larger veins
    - Delivers deoxygenated (low oxygen content) back towards the heart
    - Significantly less muscular and fibrous than arteries due to lower internal pressure
    - Contains series of valves in order to prevent _____
- **<u>The heart</u>**
    - The _____ pump (muscle) at the center of the cardiovascular system
    - It is a sequence of chambers that are enclosed by walls of specialized muscle fibers (cardiac muscle cells!!)
        - Smooth, _____, involuntary
    - The heart is the link between two distinct loops of circulation in our bodies.

1. **Pulmonary circulation** is the portion of the cardiovascular system which **<u>carries</u>** **<u>oxygen-depleted</u>** blood _____ from the heart, to the lungs, and <u>returns oxygenated</u> blood back to the heart.
    - The term is contrasted with systemic _____.
2. **Systemic circulation** is the _____37131 of the cardiovascular system which **<u>carries oxygenated blood</u>** away from the heart, to the body, and **<u>returns deoxygenated blood</u>** back to the heart.
    - This term is contrasted with pulmonary circulation.



Systemic Circulation



Pulmonary Circulation