



Al-Rasheed University College Pharmacy Department

2nd Stage / 2nd Semester

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Blood pressure

Physiology lab #1

Done by:

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GUESS WHO'S BACK

BACK AGAIN

(THE NEW SEMESTER, THAT'S WHO)

Definition

- Blood pressure is the pressure exerted by the blood against the vessel walls.
- The arterial blood pressure being the most frequently measured pressure and most useful one.



Classification of blood pressure

- Blood pressure is classified into two phases:

- **A) Systolic Blood Pressure;**

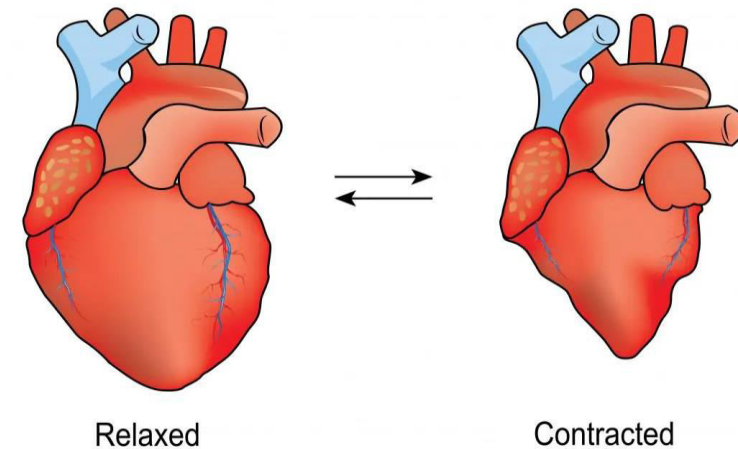
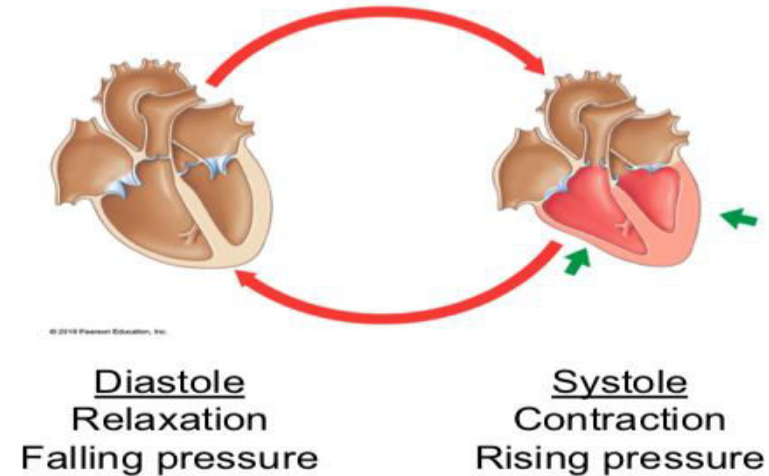
It's the contracting phase of the heart.

Normal pressure = 120mmHg.

- **B) Diastolic blood pressure;**

It's the relaxing phase of the heart

Normal pressure = 80mmHg



Blood pressure terms

- **Pulse Pressure:** is the difference between the systolic and diastolic pressure. The normal value is 40 mmHg

$$\text{*Pulse Pressure} = \text{Systolic BP} - \text{Diastolic BP*}$$

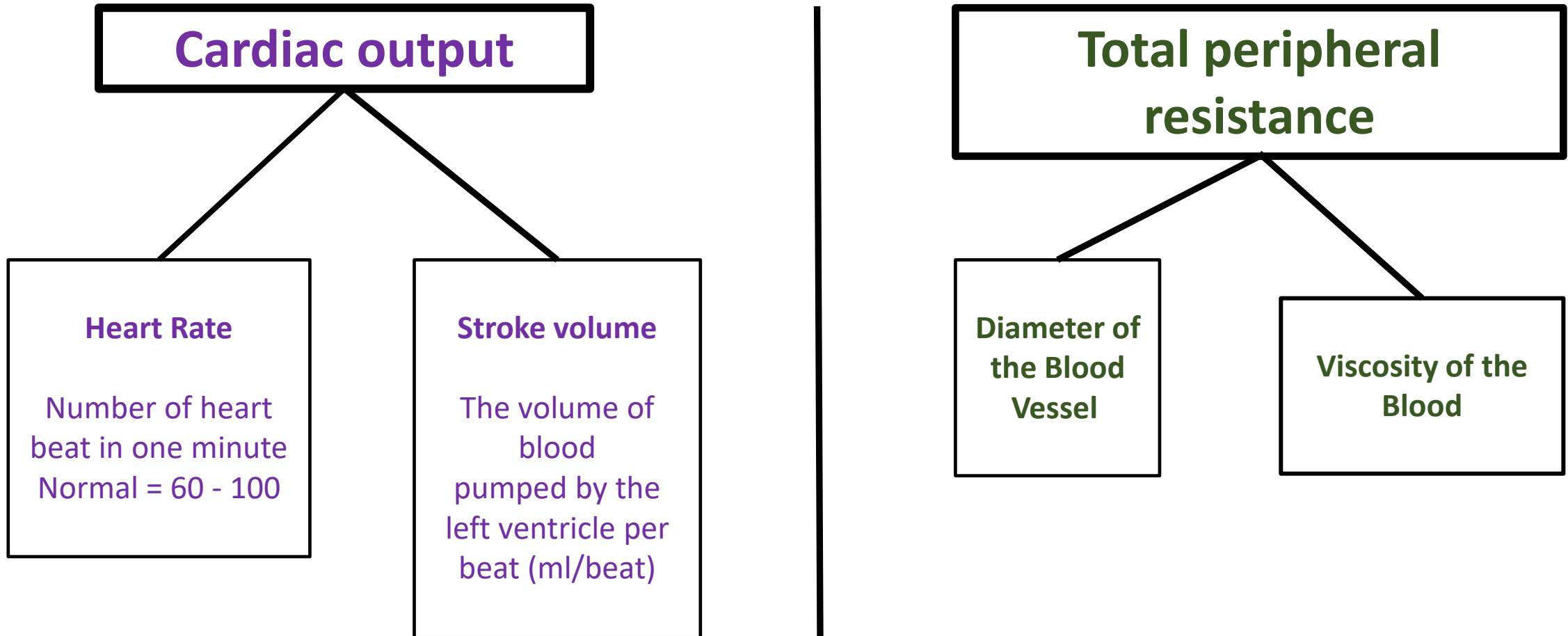
- **Mean Blood Pressure (MBP):** is the average pressure during a complete heart cycle.

It can be determined as follows:

$$\text{* (MBP) = Diastolic BP} + \frac{1}{3} (\text{Systolic BP} - \text{Diastolic BP})$$

Normal Value of **MBP = 96 – 100 mmHg**

Mean blood pressure



Factors affecting blood pressure

- **Age and gender**

Women upon aging have greater tendency to increase BP than men.

General women tend to develop high blood pressure than men.

- **Habits**

type of diet, smoking and drinking

- **Exercise**

during exercise there is a sharp rise in the systolic blood pressure that persists for several minutes

- **Gravity**

Gravity increase BP in vessels above heart level and vice versa.

Physiological Factors Affecting BP

- **A) Venous Return:** There are three mechanisms help promote venous return.

Constriction of Veins: veins contains smooth muscles.

The Skeletal Muscle Pump: effective for deep veins of the legs.

These veins are surrounded by skeletal muscles that contract and relax during walking.

Contraction of the leg muscles squeezes the veins to force blood towards the heart.

The Respiratory Pump: Affects the veins that pass through chest cavity.

Physiological Factors Affecting BP

- **B) Heart Rate and Force**
- **C) Peripheral Resistance:** refers to the resistance of the vessels to the flow of blood.
- **D) Elasticity of the Large Arteries:** normal elasticity, therefore, lowers systolic BP, raises diastolic BP and maintains a normal pulse pressure.
- **E) Viscosity of the Blood:** is maintained by number of RBCs and plasma proteins, mainly the albumin.
- **F) Blood Loss**

Physiological factors affecting BP

- **G) Hormones:** Hormones can affect blood pressure.

1-Epinephrine: Secreted from adrenal medulla and sympathetic nervous system → Increase BP.

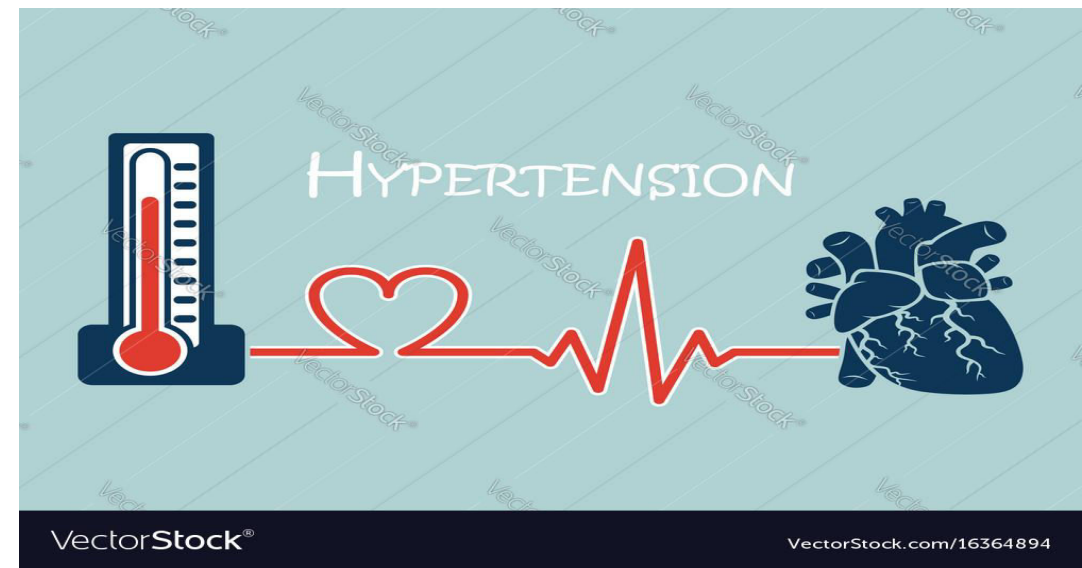
2-Atrial Natriuretic Peptide (ANP): Secreted from the atria of the heart to counter the increase in BP. → decrease BP.

3-Anti-diuretic Hormone (ADH): Secreted from the posterior pituitary gland. → increase BP.

4-Aldosterone: secreted from the adrenal cortex. → increase BP

Types of hypertension

- **Primary Hypertension:** The exact cause to this type of hypertension is not fully understood.
- There are multiple risk-factors that can contribute into it:
 - A) Smoking
 - B) Previous family history
 - C) Obesity
 - D) Drinking alcohol
 - E) Lack of exercise
 - F) Type of diet



Types of hypertension

- **Secondary hypertension**

About 1 in 20 people with high blood pressure have secondary hypertension. It means the condition can be linked to a recognized cause.

It may be a symptom of another underlying disease or factor such as:

1-Kidney disease

2-Endocrine disease

3-Narrowing of aorta

4-Steroid medicines

5-Contraceptive pills

6-Pregnancy

Measurement of Blood pressure:

- **Objective (aim):**
- Provides information about the heart pumping efficiency and the condition of blood vessels
- Effect of physical exercise of the heart rate and blood pressure Ability to read the blood pressure through sound detection

Type of Measurement

- **Direct Method:**

A cannula is inserted into the artery and the direct head-on pressure of the blood is measured with a transducer or mercury manometer

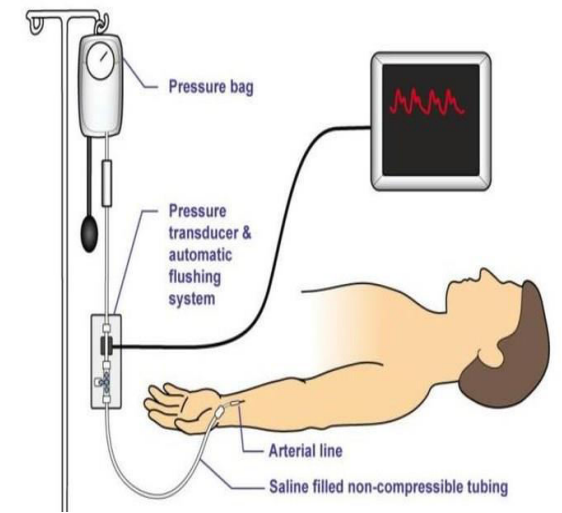
- **Indirect method:**

- **A) Palpatory method:**

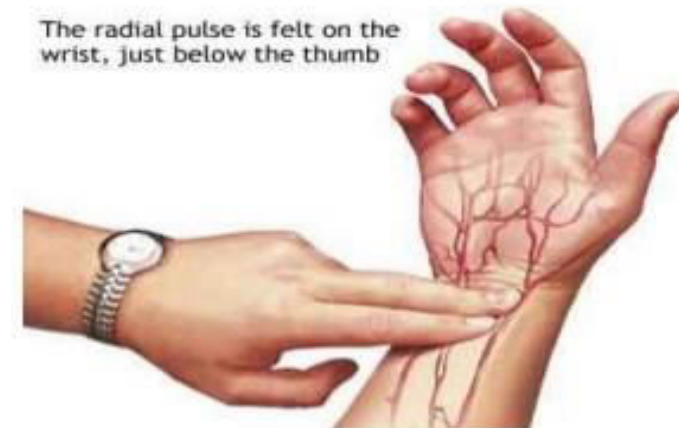
Old method, Less accurate.

Feels the pulse as pressure is applied externally to the radial artery in the wrist.

Major disadvantage: Cannot measure the diastolic blood pressure.



The radial pulse is felt on the wrist, just below the thumb



Type of Measurement

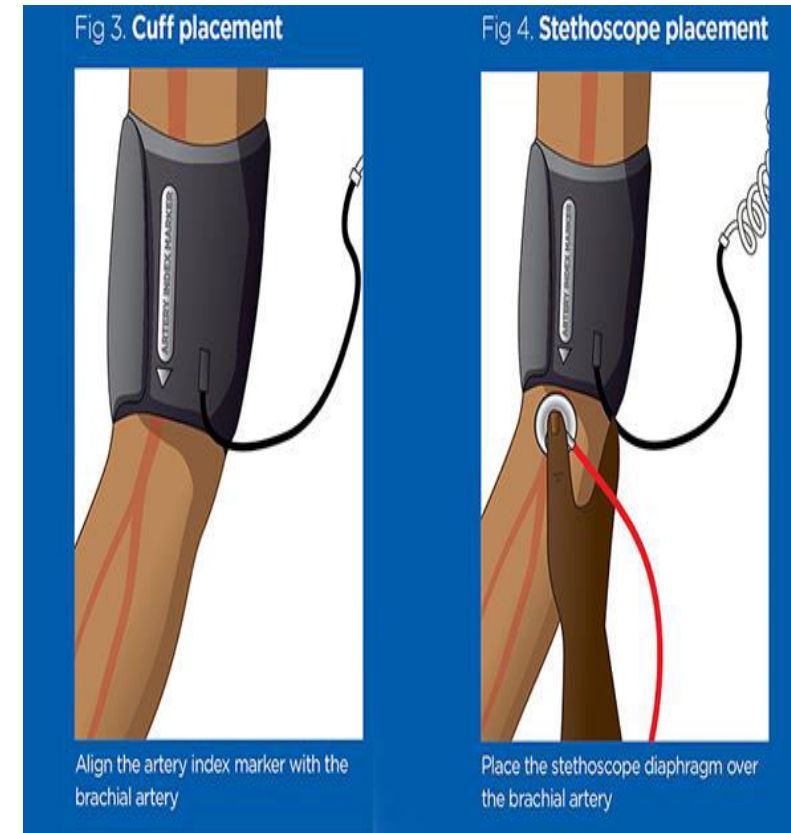
- **Auscultatory Method:**
- Most accurate method
- Called this way because blood pressure is recorded by the detection of sounds
- Those sounds are called (Korotkoff sounds), discovered in 1905.

Auscultatory Method

- **Basic requirements for this method:**
- Device called **sphygmomanometer** and it consists of the **followings:**
 - 1-Inflatable rubber bag (Cuff)
 - 2-Rubber bulb for introducing air into the Cuff
 - 3-Mercury manometer for the measurement of the pressure in the Cuff
 - 4-Stethoscope

Auscultatory Method Procedure

- It is called that way because blood pressure is recorded by the detection of sounds.
- Have the subject seated with her/his arm rested on the table
- Wrap the pressure Cuff around the bare upper arm, making sure that the inflatable bag within the Cuff is placed over the inside of the arm where it can exert pressure on the brachial artery.
- Place the stethoscope bell below the Cuff and over the brachial artery where it branches into the radial and ulnar arteries



Auscultatory Method Procedure

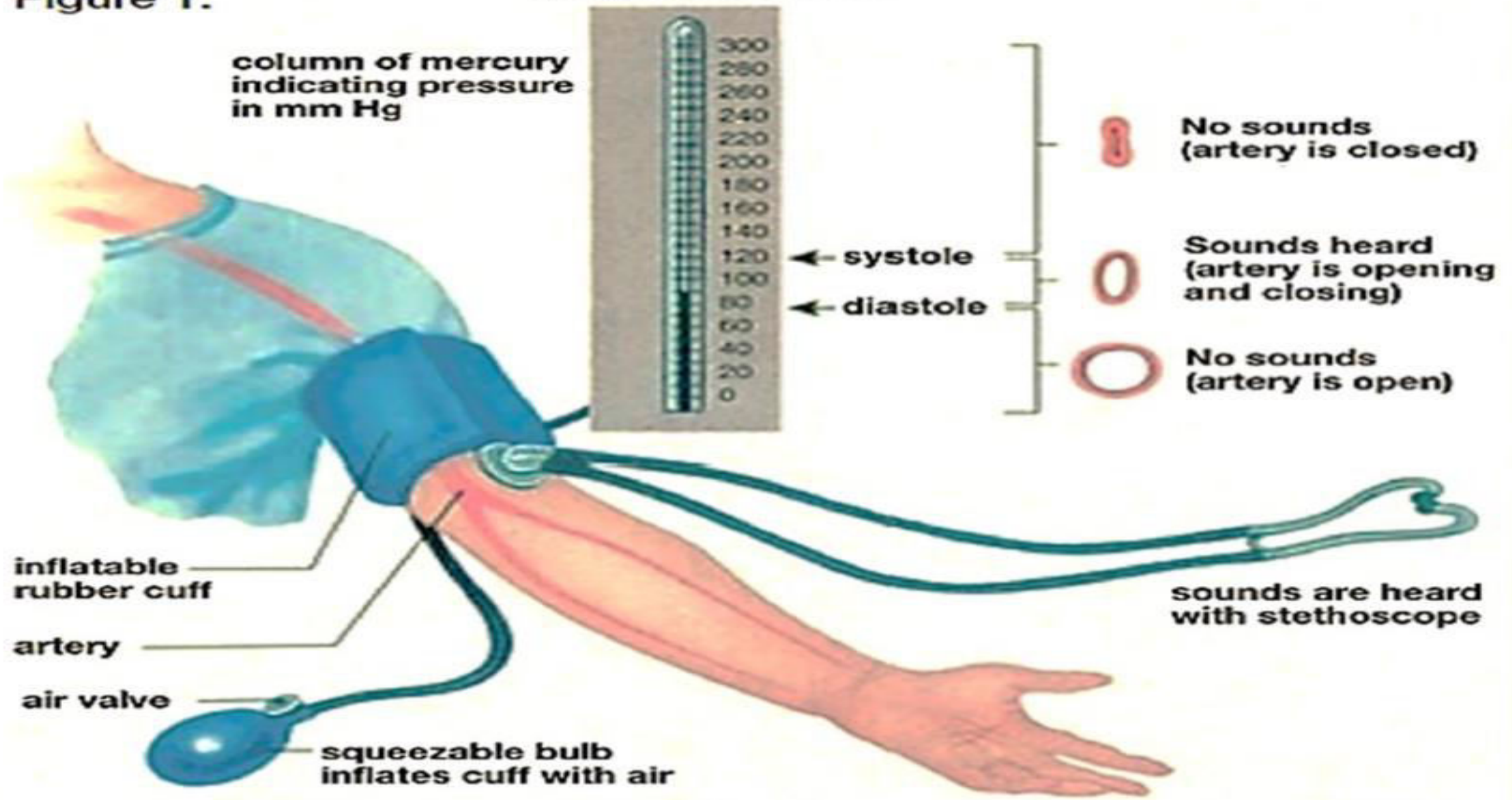
- Place the stethoscope ear piece in your ears.
- Inflate the Cuff so the pressure is above diastolic (80 – 90 mmHg).
- Increase the Cuff pressure to around 160 mmHg.
- Open the valve and begin slowly to lower the pressure in the Cuff.
- As the pressure decreases you will be able to hear four phases of sound change

korotkoff sound

- **Phase 1:** appearance of fairly sharp thudding sound that increase in intensity in the next 10 mmHg of drop in pressure. The pressure when the sound first appears is the systolic pressure.
- **Phase 2:** the sound become a softer murmur during the next 10 – 15 mmHg of drop in pressure
- **Phase 3:** the sounds become louder again and have a sharper thudding quality during the next 10 – 15 mmHg of drop in pressure
- **Phase 4:** the sound suddenly becomes muffled and reduced in intensity. The pressure at this point is termed diastolic pressure. This muffled sound continues for another drop in pressure for 5 mmHg, after which all sounds disappears. The point where the sound ceases completely is called the end of diastolic pressure.

Figure 1.

Sphygmomanometer



WHEN I REALIZE THAT

2ND SEMESTER IS HERE