Tishk International University

Faculty of Applied Science

Anesthesia Department

Blood Pressure

Fall Semester

Course Name : Biophysics

Stage : First

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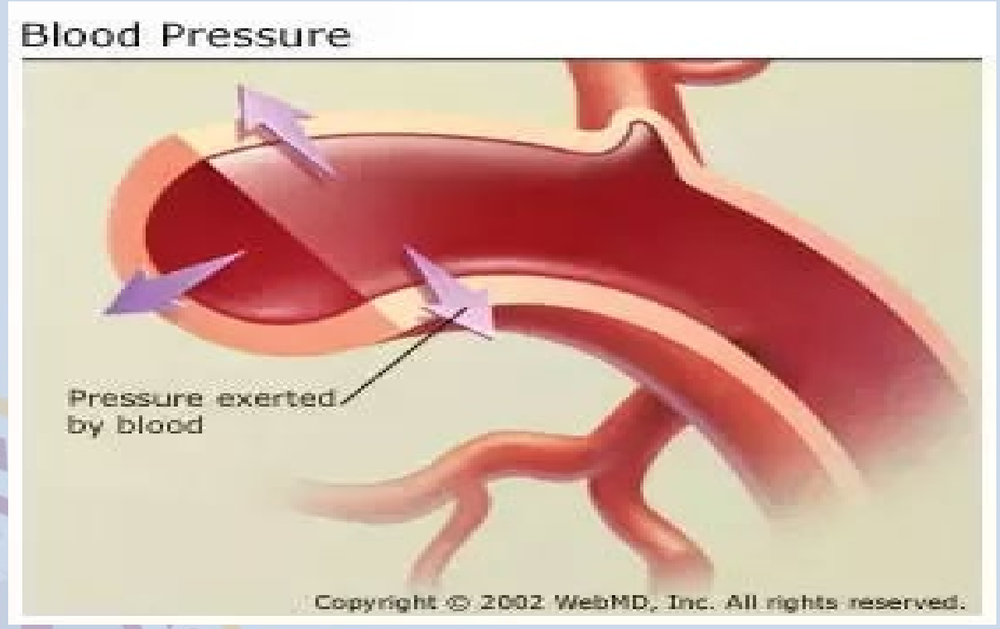
DEFINITION

Blood pressure (BP) is the lateral pressure exerted by the column of blood on the wall of the artery.



AIM

To determine the blood pressure of the given subject at rest and after moderate exercise.

APPARATUS

- Sphygmomanometer
- Stethoscope.

Sphygmomanometer

Stethoscope

Blood pressure (BP) is …….exerted by the column of blood on the wall of the artery.

a.the lateral stress
b.the lateral energy
c.the lateral intensity
d.the lateral pressure
e.the lateral force

What are apparatus that is used to measure blood pressure?

They are:-

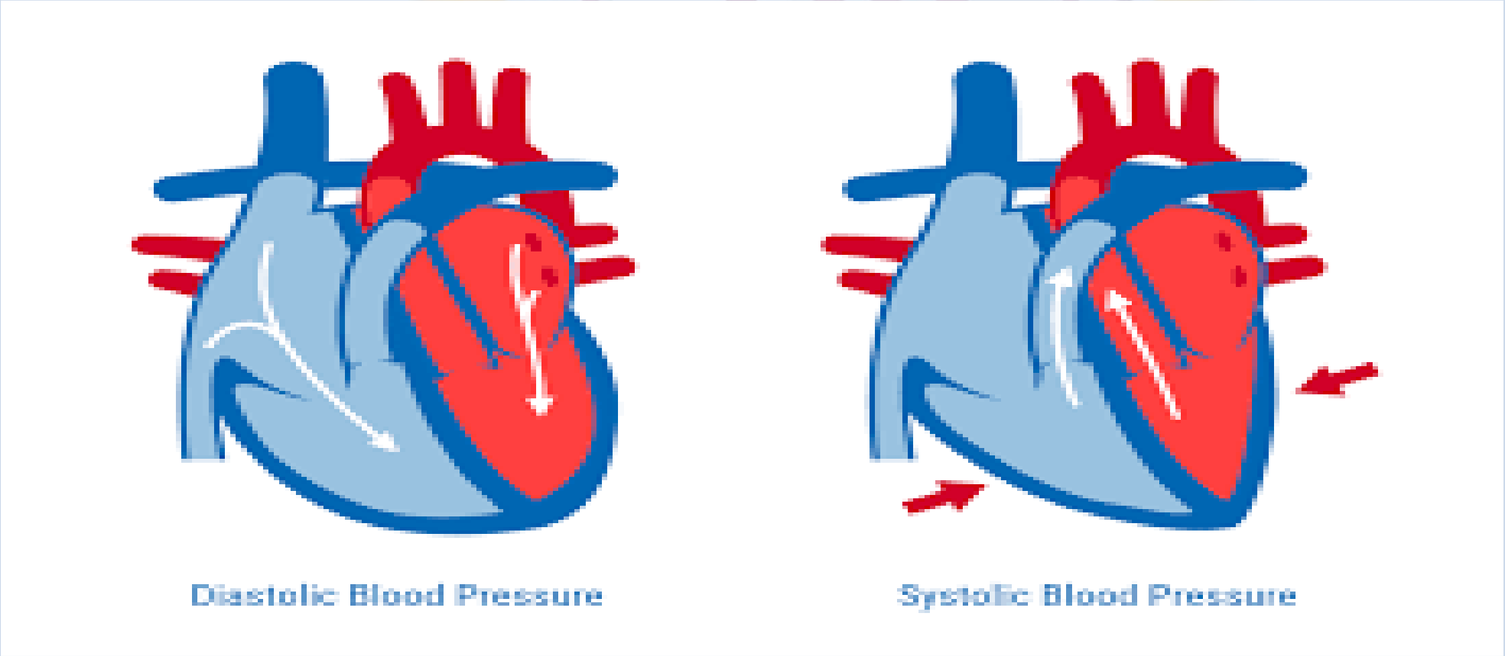
1. Sphygmomanometer
2. Stethoscope

Diastolic pressure:-

It is the minimum pressure at the end of ventricular diastole.
It is the measure of constant stretch to which walls of the arteries are subjected

Systolic pressure:-

It is the maximum pressure in the arteries during systole. It indicates:
a. The extent of work done by the heart
b. The force with which the heart is working
c. The degree of pressure which the arterial walls have to withstand.



The maximum pressure in the arteries is called……

a. Diastolic pressure
b. Normal pressure
c. Zero pressure
d. Systolic pressure
e. low pressure

Define the following:-

1- Diastolic pressure
2- Systolic pressure
3- Blood Pressure

General Guide to Blood Pressure Readings

- **140/90mmHg or higher indicates possible high blood pressure** (Hypertension)

- **120/80mmHg to 140/90mmHg indicates pre-high blood pressure**

- **90/60mmHg up to 120/80mmHg indicates ideal blood pressure**

- **90/60mmHg or lower indicates low blood pressure** (Hypotension)

140/90mmHg or higher indicates to …….

a. Hypertension
b. Hypotension
c. Normal pressure
d. Stable pressure
e. Unstable pressure

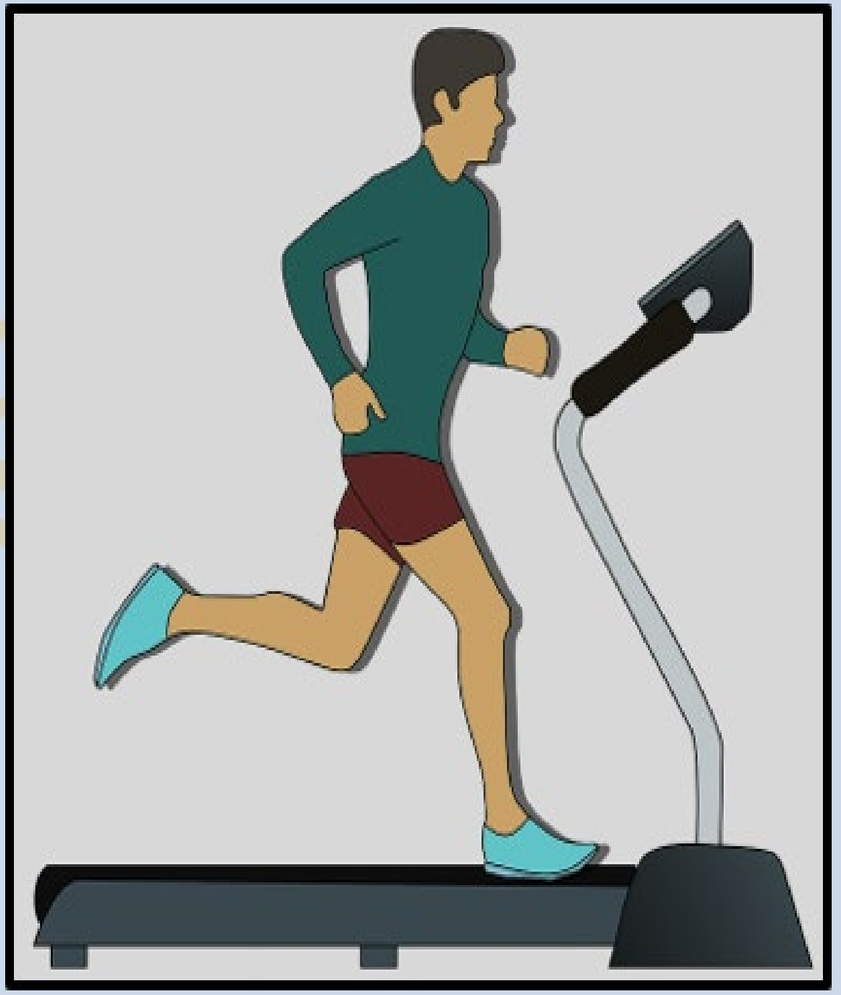
Hypotension and Hypertension

- Hypotension
  - –Low blood pressure
- Hypertension
  - –High blood pressure

Blood Pressure During Exercise

When we exercise:-

- **the heart has to work harder to pump more blood to the active muscle, delivering oxygen and nutrients and removing by-products**
- **To increase the blood pumped the heart will beat more rapidly and more forcefully**
- **This lead to increases blood pressure**



During exercises, why the heart pumps more blood to the active muscle?

- **To deliver oxygen and nutrients to living cells (to the active muscle)**
- **To Remove by-products (**like carbon dioxide**)**

Blood pressure during different activities

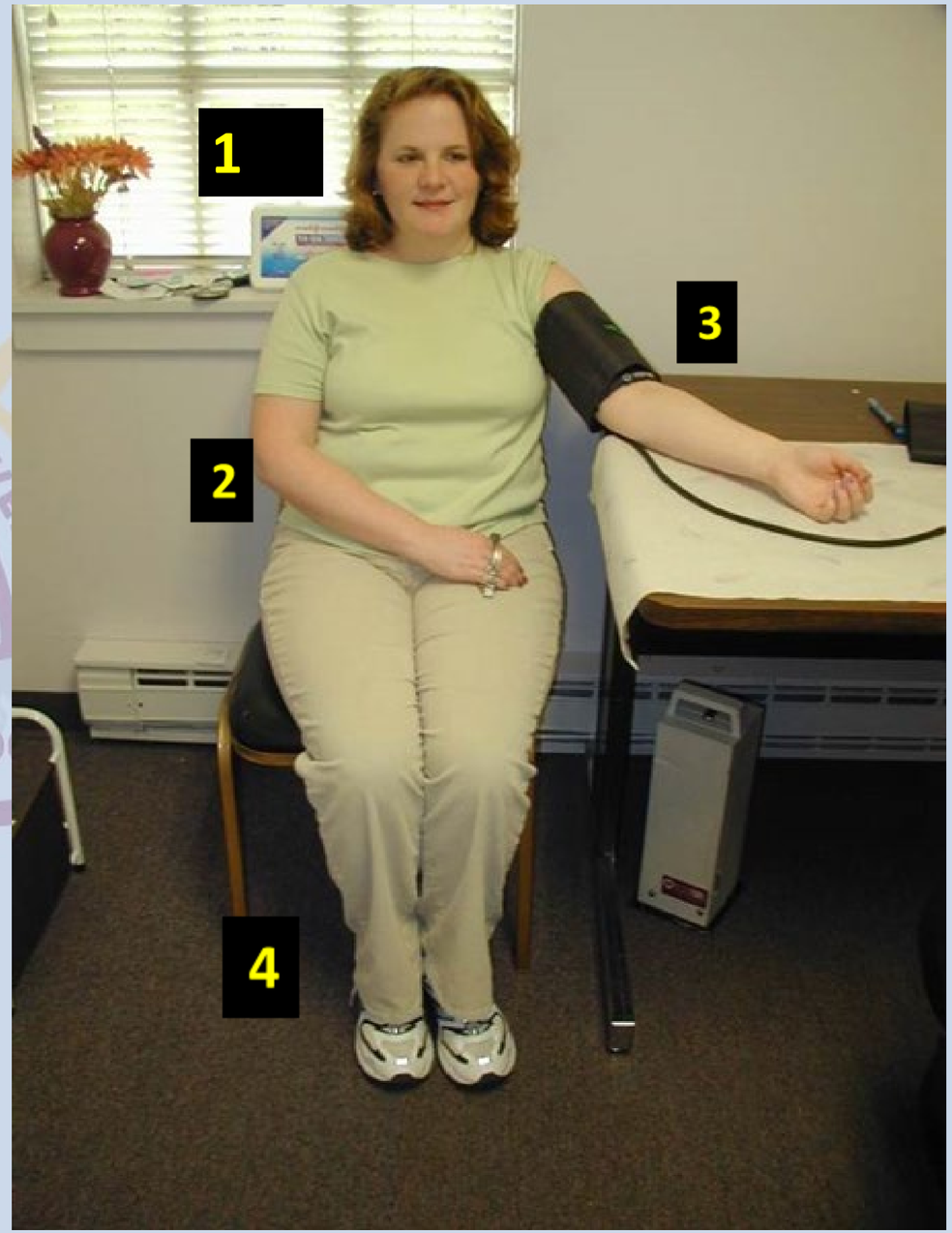
Patient Posture

Patients should be seated quietly in a chair

Patient back and feet should be supported

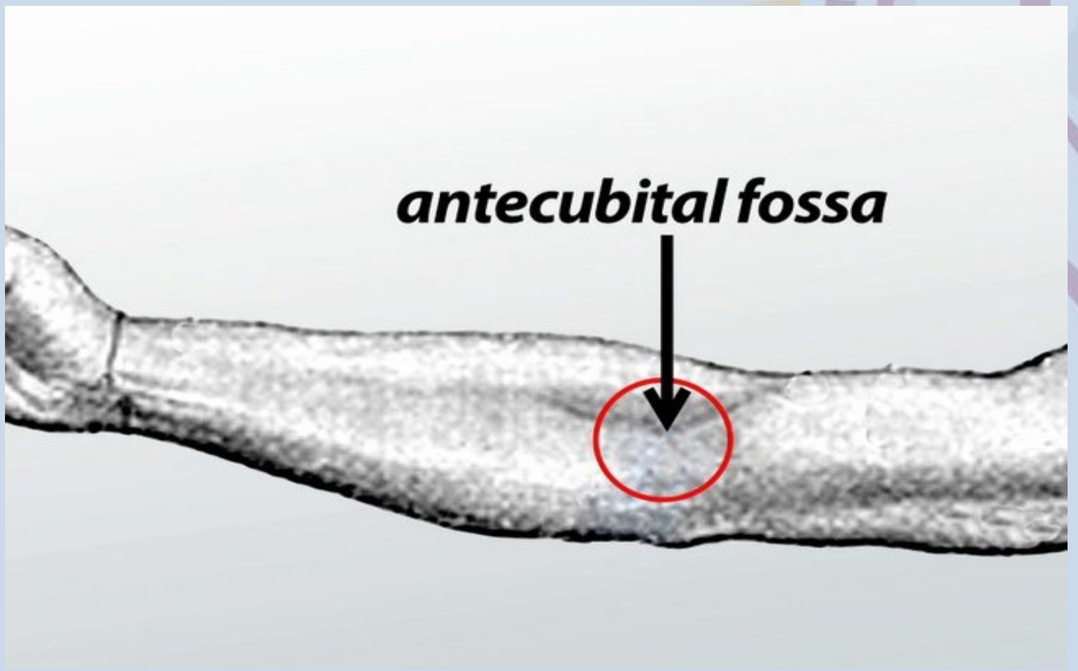
Patient’s arm should be supported at the level of the heart, and palm of the hand should be turned upward

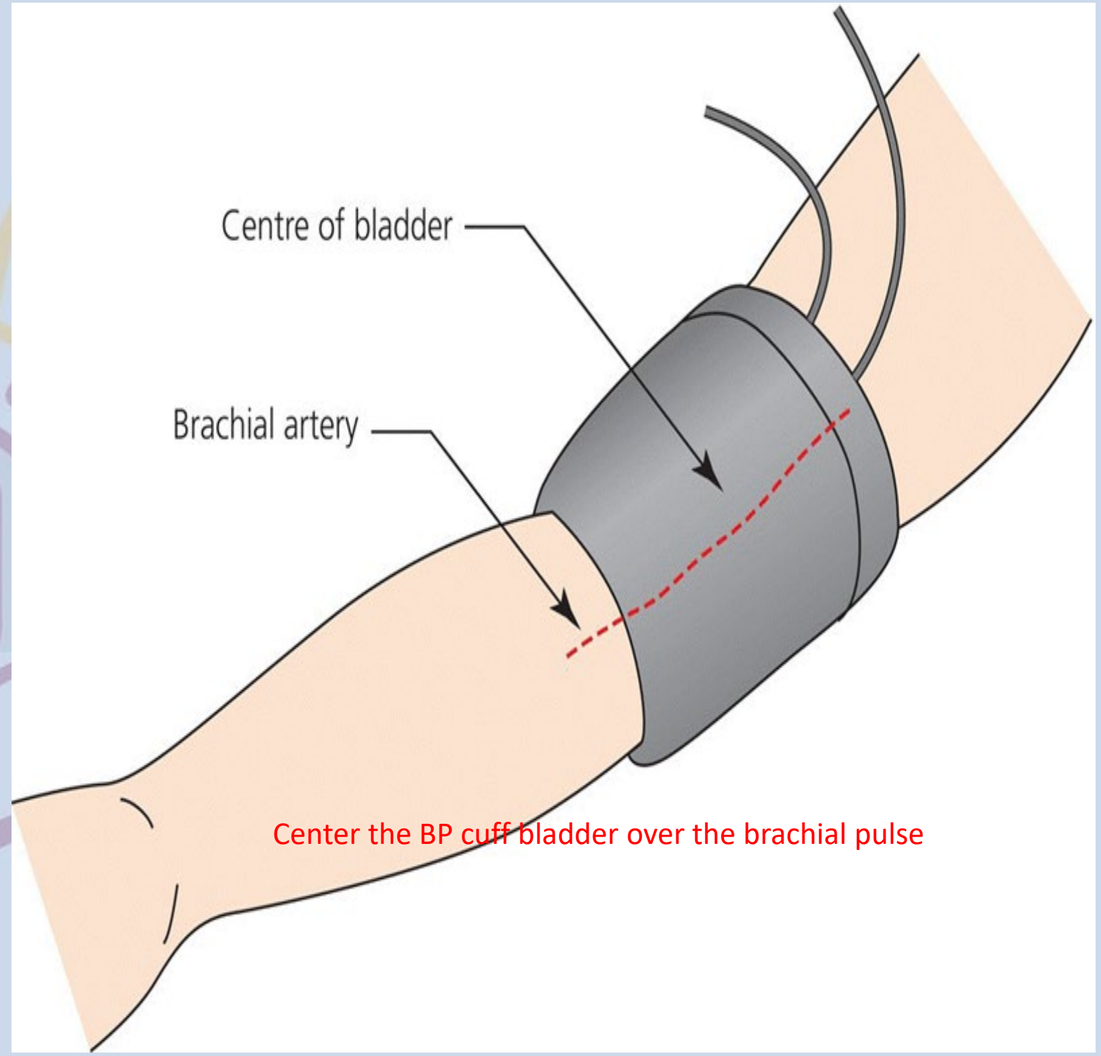
Patient legs should not be crossed



Explain Patient Posture during blood pressure measurement .

- Locate the brachial pulse
- Center the BP cuff bladder over the brachial pulse
- Position the middle of the cuff on the patient's upper arm (at the level of the right atrium
- Cuff bladder should encircle 80% of the arm
- The lower end of the BP cuff should be about 2 to 3 centimeters above the antecubital fossa



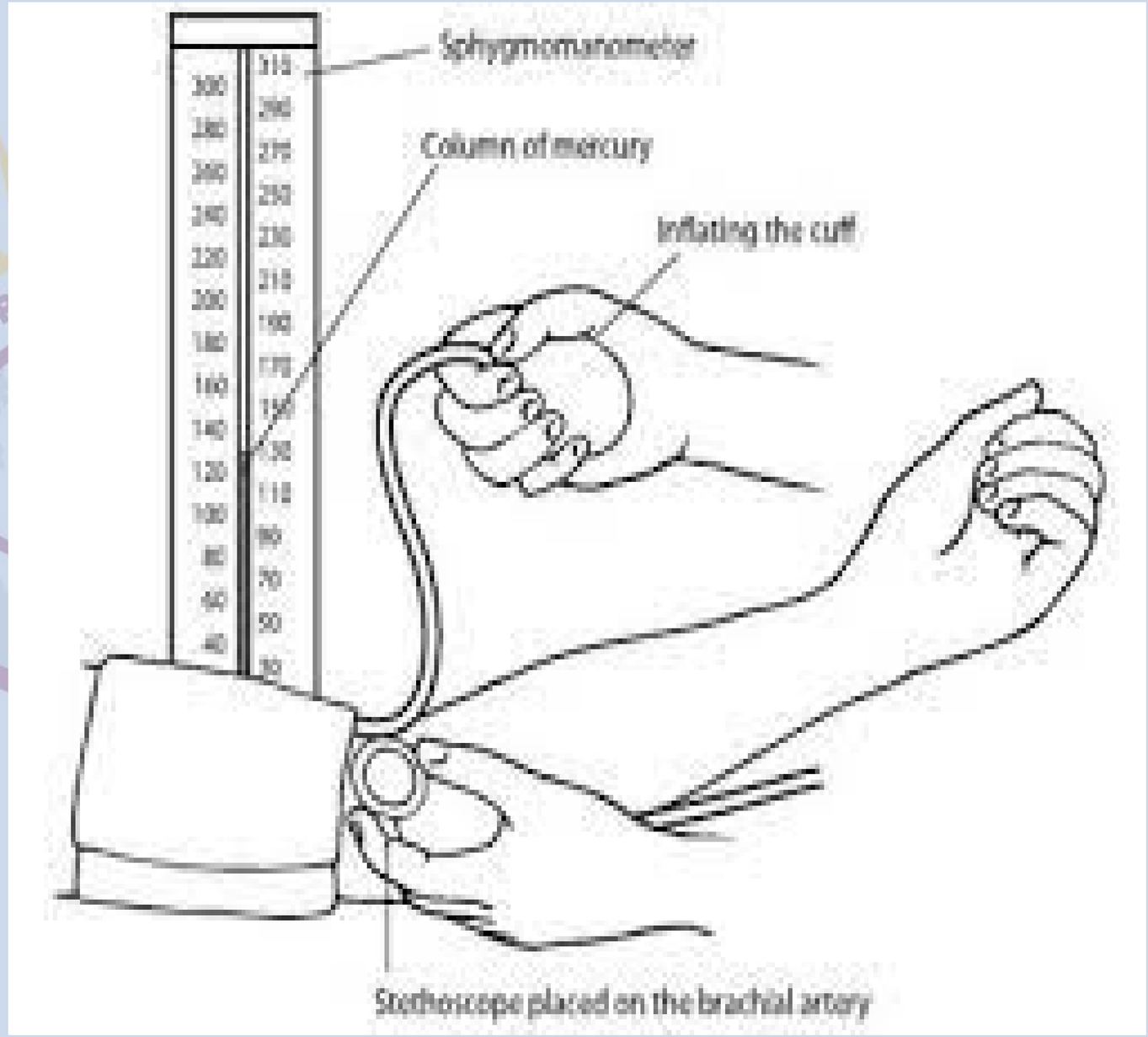


The lower end of the BP cuff should be about 2 to 3 centimeters above the antecubital fossa

- Cuff should fit snugly and allow 1 finger between arm and cuff

- Lightly press the stethoscope's bell over the brachial artery just below the cuff's edge (Some health care workers have difficulty using the bell in the antecubital fossa, so we suggest using the bell or the diaphragm to measure the blood pressure)

- Rapidly inflate the cuff to 180mmHg. Release air from the cuff at a moderate rate (3mm/sec).



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- **Listen with the stethoscope and simultaneously observe the sphygmomanometer.**

- **The first knocking sound (Korotkoff) is the subject's systolic pressure.**

- **When the knocking sound disappears, that is the diastolic pressure.**

- **Record the pressure in left arm .**

Cuff should fit snugly and allow 1 finger between……..

a. arm and the stethoscope
b. tissue and cuff
c. arm and valve of air bulb
d. heart and cuff
e. arm and cuff

When the knocking sound……., that is the diastolic pressure.

a.very low
b.Disappears
c. Very high
d.Normal
e.Very strong

Discussion

1-the differences between BP at rest and after exercise, and why?

2- Why measure the pressure in left arm .

1- Blood Pressure at Rest vs. After Exercise

Feature	At Rest	After Exercise	Reason
Systolic BP	~120 mmHg	↑ (can reach 160–200 mmHg)	Heart pumps more blood per beat to supply muscles
Diastolic BP	~80 mmHg	Slight change or small ↑/↓	Peripheral vessels dilate, reducing resistance
Mean Arterial Pressure (MAP)	Normal	Slightly ↑	Overall blood flow increases

Why?

* During exercise, **cardiac output increases** (heart rate × stroke volume).
* **Systolic pressure rises** because the left ventricle pumps more forcefully.
* **Diastolic pressure stays similar** because arterioles in muscles dilate, reducing resistance.
* This ensures **more oxygen and nutrients** reach active tissues without excessive pressure rise..

2- The left arm is commonly used to measure blood pressure because it is at roughly the same level as the heart, giving an accurate estimate of central arterial pressure.

- Measuring at heart level avoids errors caused by gravity.
- The left arm is preferred in clinical settings to standardize readings.

Thank you