



Basic Physiological Parameters



Physiology Lab I

Dr.Essa Allahham

دؤشرات تدك
على حالة الجسم

Vital signs

- Vital signs reflect the **body's physiologic status** and provide information critical to evaluating homeostatic balance.
- Prior to measuring vital signs, the patient should have had the opportunity to sit for approximately **5 minutes**.
- All While patient is **seated**

It includes:

- ① - Temperature,
- ② - Respiratory rate
- ③ - Heart rate
- ④ - Blood pressure.

Purposes

- To obtain base line data about the patient condition
- for diagnostic purpose
- For therapeutic purpose

آنا لیه بشوف
Initial signs

Time to assess vital signs:

- On admission to obtain baseline data
- symptoms such as chest pain or fainting ^{اعمال}
- Before and after the administration of certain medications that could affect RR or BP (Respiratory s. and CVS)
↳ ex: anti cholinergic drugs
- Before and after surgery or an invasive diagnostic procedures

- ينشوف ال Vital Signs في ال emergency

- التمرينه ينشوف ال v.s كل 4 ساعات وبعد drug وبعد ال Surgery عشانه لا يجمع الـ complications

I. Temperature

- It is the hotness or coldness of the body.

It is the balance between heat production & heat loss of the body.

Normal body temperature using

oral 37 ° Celsius or 98.6 ° F

$$F = 1.8 \text{ }^{\circ}\text{C} + 32$$

Two types of body temp.:

1. Core temp.

Is the temperature of internal organs and it remains constant most of the time (37°C); with range of 36.5-37.5°C.

2. Surface Temperature:

- Surface body temperature: is the temperature of the skin, subcutaneous tissue & fat cells and it rises & falls in response to the environment
- (Ranges between 20-40°C).

اول ما يقيسها الانسان بتلك درجة حرارة 36,5 تقريباً

↑ Sweating temp ↓
↑ subcutaneous fat temp ↑
↑ metabolic rate ↑ temp
↑ muscle activity temp ↑

Factors affecting body temp.:

1. Age

2. circadian rhythm

3. Exercise → ↑temp

4. Hormones → thyroid
→ adrenaline

5. Stress → unknown mechanism
ممكن نزيد درجة الحرارة

6. Environment

تؤثر على surface مع الوقت
لا core

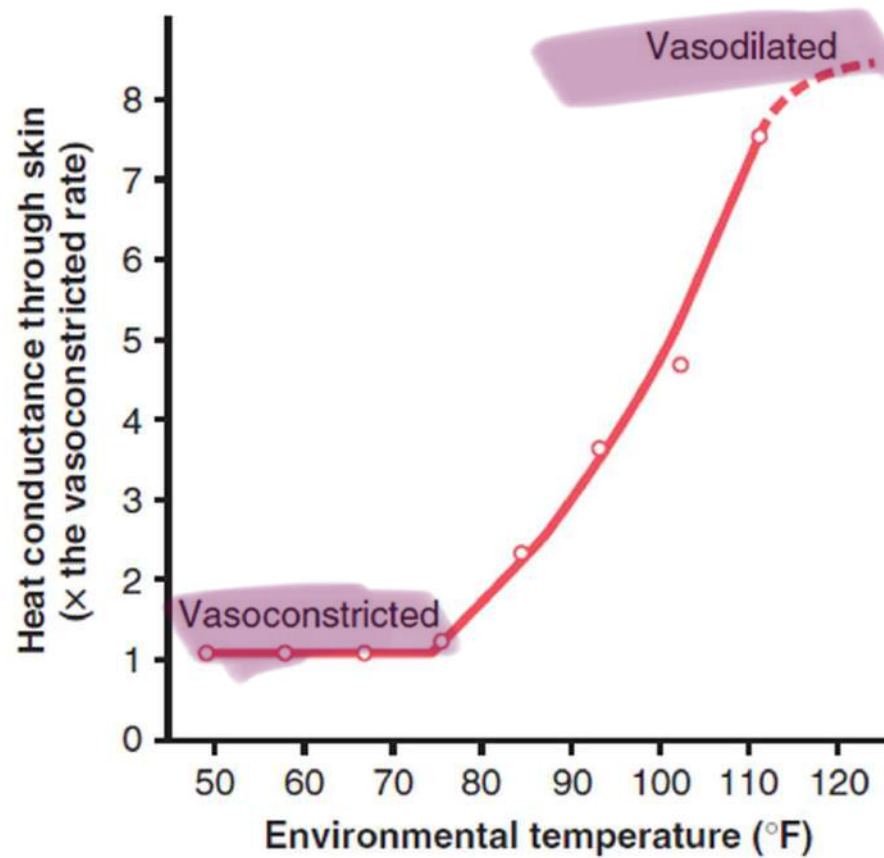


Figure 74-3. Effect of changes in the environmental temperature on heat conductance from the body core to the skin surface.

environmental temp = 25 room temp ← عندما يكون الوسط بارد تستقل الحرارة منه الحد اقل للخارج فينتقل درجة الحرارة 37 ←

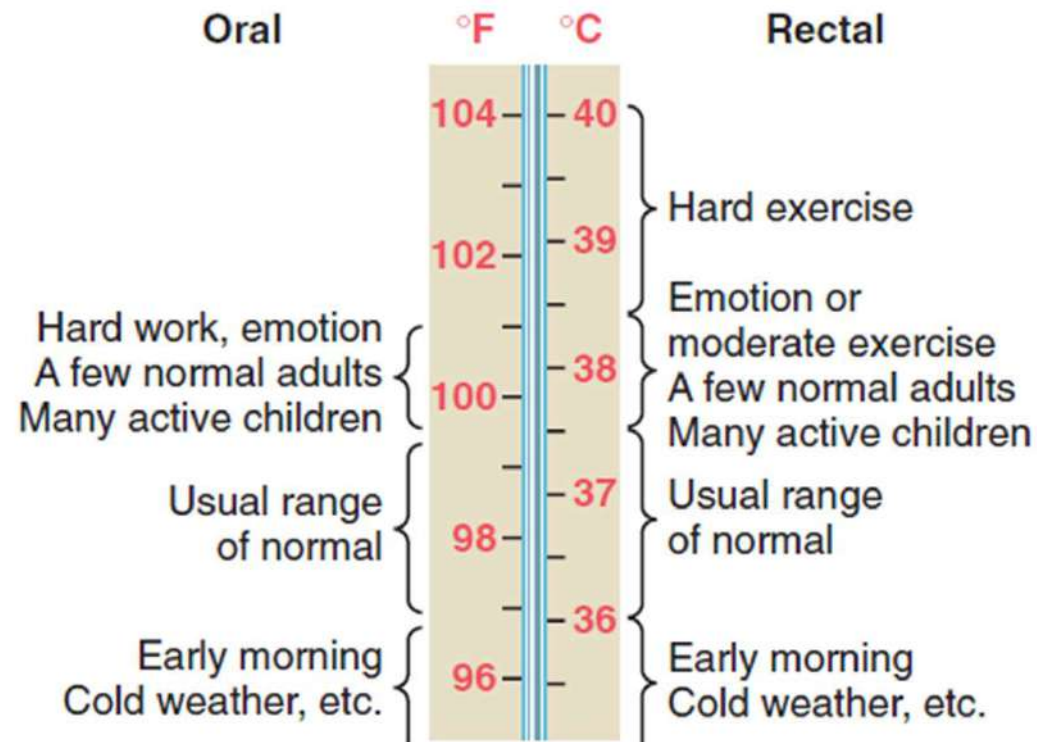


Figure 74-1. Estimated normal range of body "core" temperature.

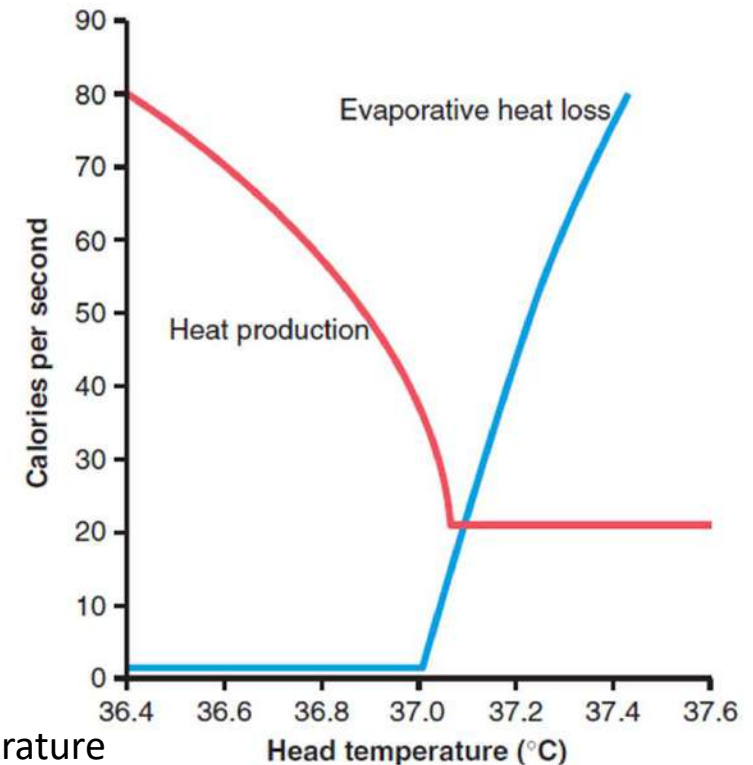
في مركز في hypothalamus مستجوب عن ارتفاع درجة الحرارة "set-point"

"SET POINT" FOR TEMPERATURE CONTROL

at a critical body core temperature of about 37.1°C (98.8°F), drastic changes occur in the rates of both heat loss and heat production.

At temperatures above this level, the rate of heat loss (e.g. sweating) is greater than that of heat production, so the body temperature falls and approaches the 37.1°C level.

At temperatures below this level, the rate of heat production (e.g. shivering) is greater than that of heat loss, so the body temperature rises and again approaches the 37.1°C level.



This crucial temperature level is called the "set point" of the temperature control mechanism—that is, all the temperature control mechanisms continually attempt to bring the body temperature back to this set point level.

لو زادة درجة الحرارة الحارة hypothalamus يتعادل تقيده temp عن طريق التغيرات التالية

- ↓ muscle activity
- ↓ metabolic rate
- ↑ sweating
- ↑ vasodilation

عندما ينفذ الحرارة وتبادلها مع الخارج الجوي

لو قلت درجة الحرارة يتعمل ال hypothalamus على زيادتها
 ↑ muscle activity
 ↑ Vasoconstriction
 ↑ metabolism etc

Resetting the Hypothalamic Temperature-Regulating Center in Febrile Diseases—Effect of Pyrogens

- toxins released from bacterial cell membranes, can cause the set point of the hypothalamic thermostat to rise. Substances that cause this effect are called *pyrogens*.
- When the set point of the hypothalamic temperature-regulating center becomes higher than normal, all the mechanisms for raising the body temperature are brought into play, including heat conservation and increased heat production. Within a few hours after the set point has been increased, the body temperature also approaches this level

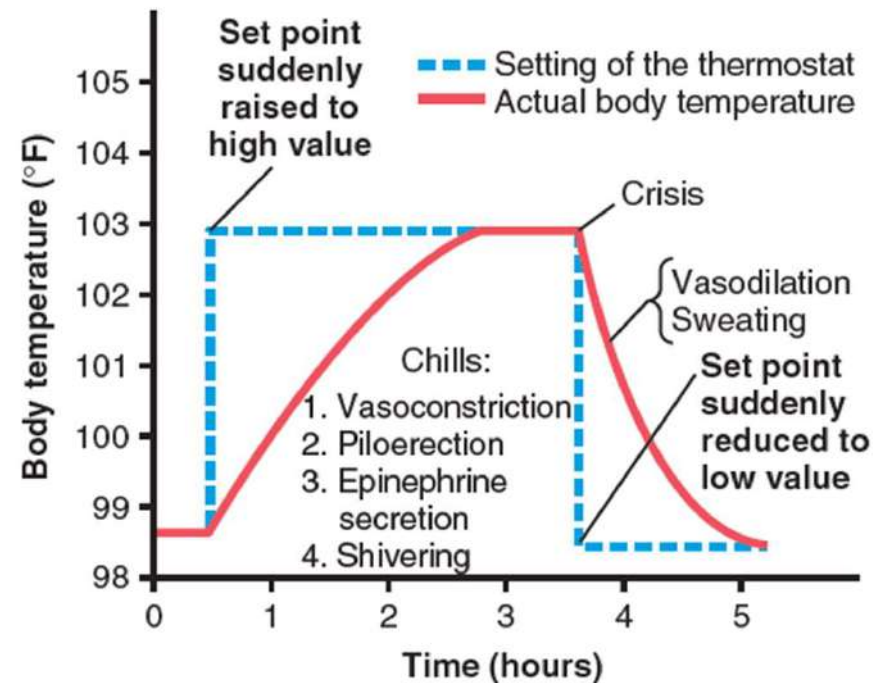
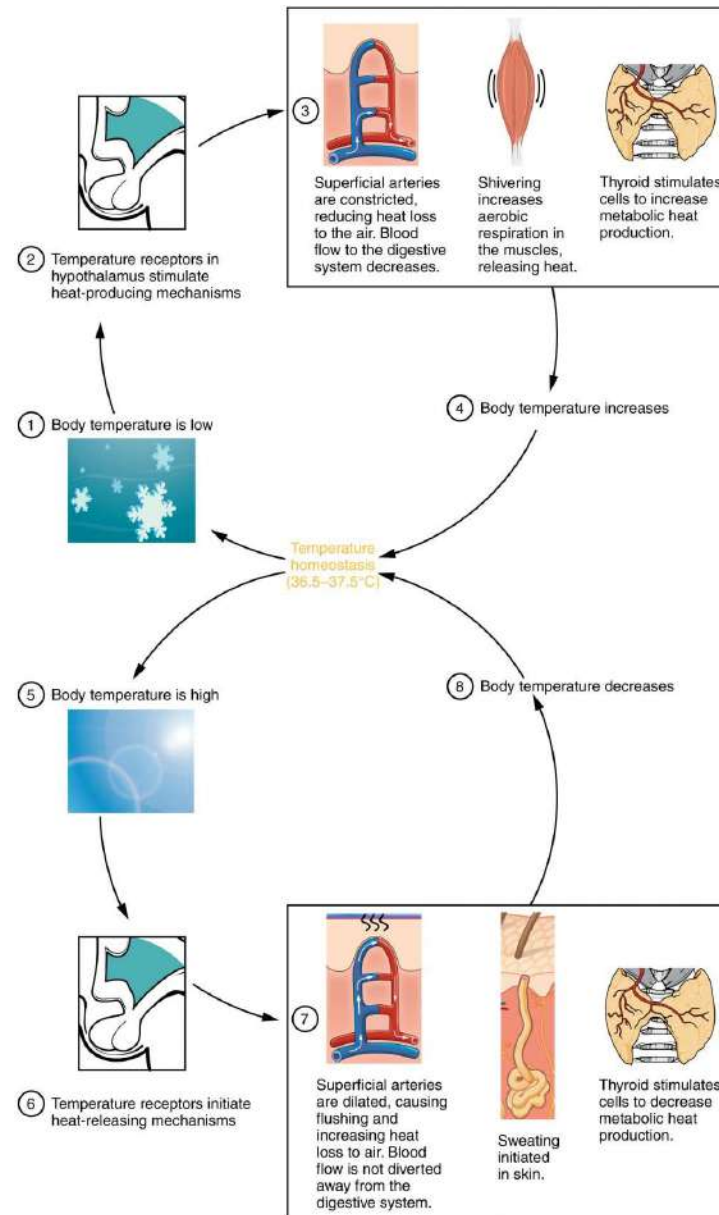


Figure 74-11. Effects of changing the set point of the hypothalamic temperature controller.

Pyrogens → حاجات ترفع درجة الحرارة
 toxins البكتيريا ترفع ال set point في الجسم

مثلا ال set point بتغير (39.5) ← الجسم ليعتبر دا

الدرجة الطبيعية بروج
 برفع درجة الحرارة حتى
 توصل لـ 39.5



4 sites to measure temp.:

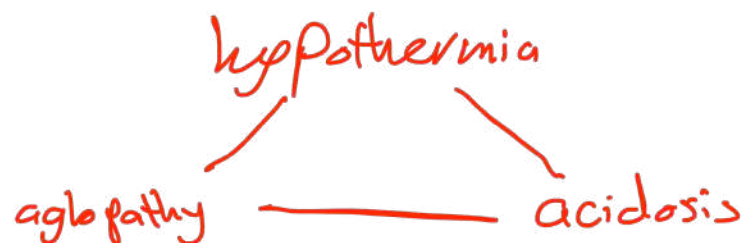
بالفم
بمنقصة ٥,٠
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بمنقصة ٥,٠
• rectally , orally , axillary or tympanic (ears) .

- **Oral** : The normal oral temperature for adults is about (37° C). The normal oral temperature for a child is between (36.4° and 37.4° C) using digital thermometer or mercury filled thermometer .
- **Rectally** : The normal rectal temperature (36.0 to 37.7° C) using mercury or digital thermometer .
(0.5-0.7 higher than orally)

- 
- **Axillary temperature** : A normal axillary temperature is between (35.9° C) and (36.7° C). The normal axillary temperature is usually **a degree lower than** the oral (by mouth) temperature. (0.3-0.4 lower)
 - **Tympanic** : a special thermometer can quickly measure the temperature of the ear drum , which reflects the body's core temperature ..

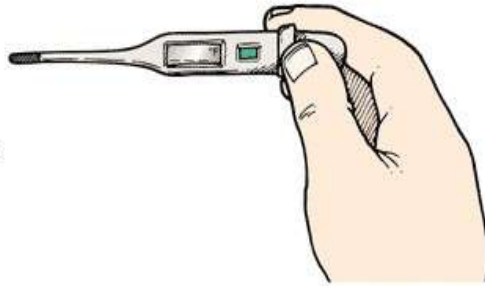
- Normal body temperature is 37°C (range is $36-38^{\circ}\text{C}$) ($96.8 - 100^{\circ}\text{F}$)
- Body temperature may be abnormal due to fever (high temperature) or hypothermia (low temperature).
- **Pyrexia, fever:** a body temperature above the normal ranges > 37.8 or $> 38^{\circ}\text{C}$
- **Hyperpyrexia:** a very high fever $> 41^{\circ}\text{C}$, $> 42^{\circ}\text{C}$ leads to death
- **Hypothermia:** temp. between $34-35^{\circ}\text{C}$, $< 34^{\circ}\text{C}$ leads to death

lethal triangle



How to Measure Body Temperature: Oral

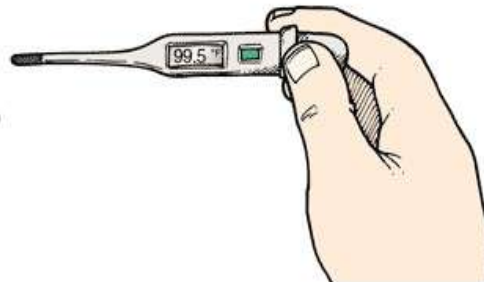
1. Turn on thermometer according to package directions.



2. Place the tip of the thermometer under one side of tongue toward the back. Close mouth and breathe through nose.



3. Remove the thermometer after you hear the signal (usually a series of beeps) and read the temperature on the screen.



A fever is a temperature over 99.5 °F.

How to Measure Body Temperature: Axillary

1. Turn on thermometer according to package directions.

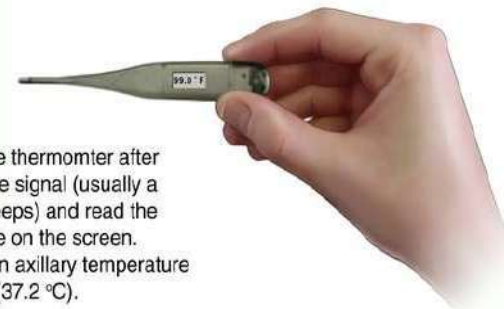


2. Place the thermometer in a dry armpit.

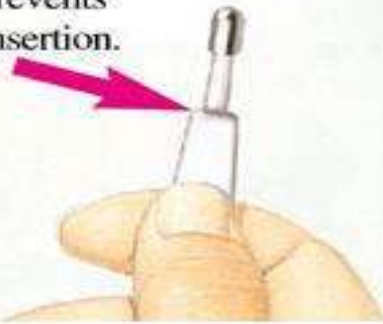


3. Close the armpit by holding the elbow against the chest.

4. Remove the thermometer after you hear the signal (usually a series of beeps) and read the temperature on the screen. A fever is an axillary temperature over 99 °F (37.2 °C).



**Rectal safety
stop prevents
over-insertion.**



**Digital
display**



Route	Normal Range °F / °C	Sites
Oral	98.6 °F / 37.0 °C	Mouth
Tympanic	99.6 °F / 37.6 °C	Ear
Rectal	99.6 °F / 37.6 °C	Rectum
Axillary	97.6 °F / 36.6 °C	Axilla (armpit)

2. Respiratory rate

- RR = the number of breaths a person takes per minute .
- Respiration is the process of taking in oxygen and expelling carbon dioxide
- 1 inspiration + 1 expiration = respiration

Normal respiratory rate

Age	Respiration rate
< 1 year	<u>30 - 40</u>
1 – 2 years	25 - 35
2 – 5 years	25 - 30
5 – 12 years	20 - 25
>12 years	<u>12 - 20</u>

RR

- Normal RR range from **12-20** breaths/minute ..
- RR over 20 breaths/minute or under 12 breaths/minute may be considered abnormal .

Terminology

- **Dyspnea**: difficult or labored breathing
- **Apnea**: absence of respirations, usually temporary
- **Tachypnea**: respiratory rate above 25 respirations per minute.
- **Bradypnea**: slow respiratory rate, usually below 10 respirations per minute
- **Orthopnea**: severe dyspnea in which breathing is very difficult in any position other than sitting erect or standing

ما يقدر ينفس
وهو نائم على
ظهره

بيجي المريض يقول ما يعرف أنام
في قهري بحد مضاعف أو بنام
وانا قاعه
بتكون موجودة في heart failure

Evaluate for ...

• Rhythm of respirations

Refers to the regularity or equal spacing between breaths

Described as regular (or even) or irregular

• Character of respirations

Refers to the depth and quality of respirations

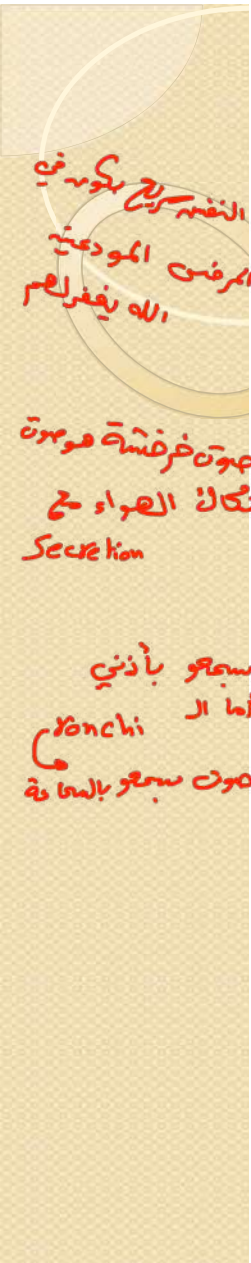
• Type of respirations

Female → Thoracoabdominal

male → Abdominothoracic

Abnormal Respirations

- **Cheyne-Stokes:** periods of dyspnea followed by periods of apnea; frequently noted in dying patient
- **Rales:** bubbling or noisy sounds caused by fluids or mucus in the air passages
- **Wheezing:** Difficult breathing with a high pitched sound during expiration caused by narrowing of bronchioles (as seen in asthma) and/or an obstruction or mucus accumulation in the bronchi
- **Kussmaul breathing** is an abnormal respiratory pattern that is characterized by deep and rapid breathing. This is often seen in patients with metabolic acidosis.



Cyanosis

Central →

كيف بدني أعرف؟ إذا بهيئة الزرقاء تحت اللسان

- Bluish discoloration of the skin, lips, and/or nail beds, as a result of increased the deoxygenated blood



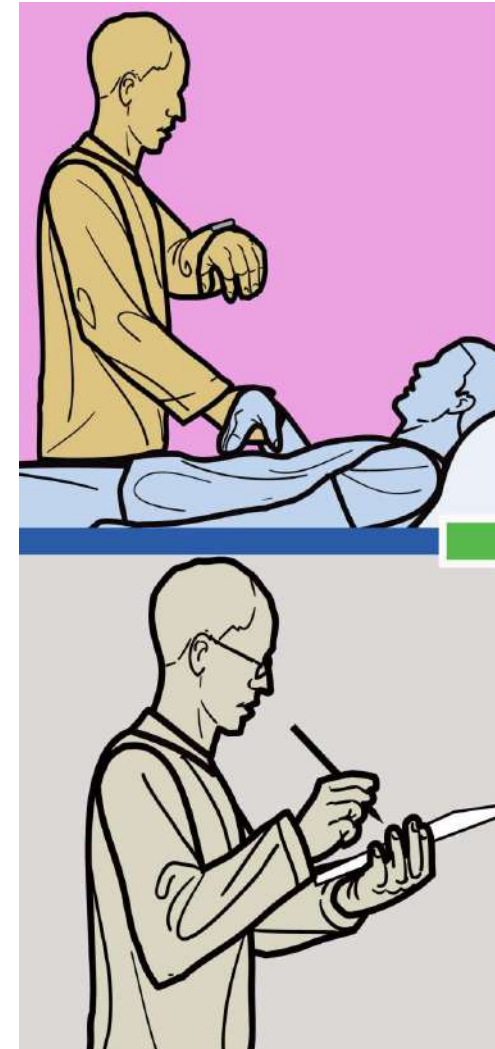
RR assessment:

- Respirations are partially under voluntary control
- **Do not** tell a patient you are counting respirations
- Keep your hand on pulse site while measuring respirations so the patient will think you are still counting pulse and will not be as likely to alter respiration

RR assessment:

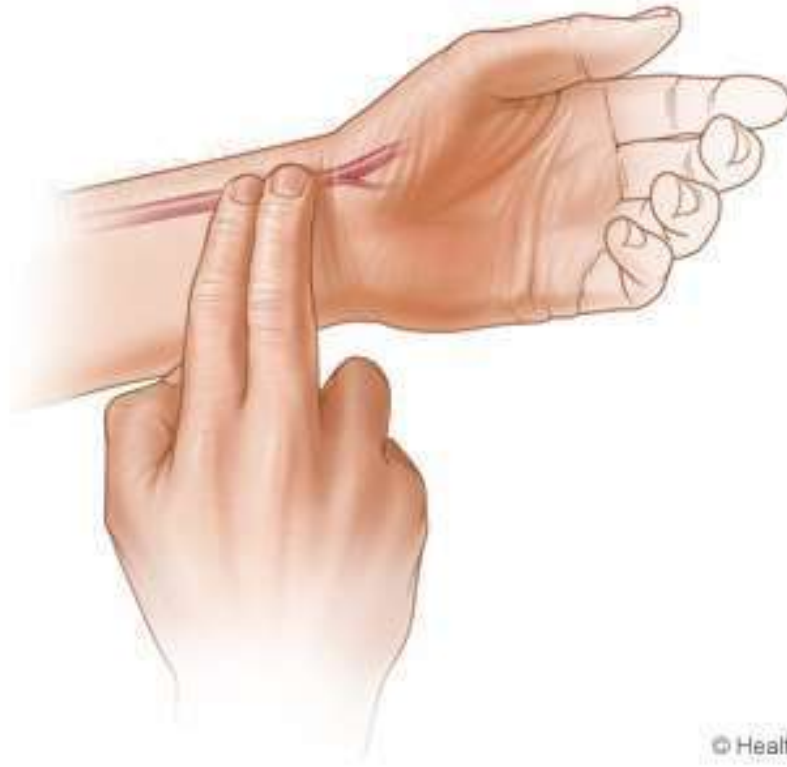
- The patient should be at rest
- Assessed by watching the movement of chest or abdomen
- They should be counted for at least 30 (if regular) sec then multiplied by 2.

$$30 \text{ sec} \times 2 = \boxed{60 \text{ sec}}$$



3. Pulse rate

- pulse is a wave of blood created by contraction of left ventricle



Normal range of pulse and heart rate

Age	Pulse/heart rate
Newborn	100-170 beats per minute
1 year	80-170 beats per minute
3 years	80-130 beats per minute
6 years	70-115 beats per minute
10 years	70-110 beats per minute
14 years	60-110 beats per minute
18 years	60-100 beats per minute

- The normal pulse for healthy adults range from **60-100** beats/minute .
- The pulse rate may be **increased** with exercise , illness , injury, fever and emotions .
- **Athlete's** , such as runners , may have heart rates in the 40's and experience no problems .

الرياضيين زينا مثلاً
بجمل 40
normal

Major Arterial/Pulse Sites

- **Carotid**: side of the neck
- **Brachial**: inner aspect of forearm at the antecubital space (crease of elbow), used for blood pressure
- **Radial**: inner aspect of wrist, above thumb, most common site for measuring pulse
- **Femoral**: inner aspect of upper thigh
- **Popliteal**: behind knee
- **Posterior Tibial**: behind the medial malleolus
- **Dorsalis pedis**: top of foot arch



How to check pulse ..

Radial pulse

- Place the tips of your **index and middle fingers** just proximal to the patients wrist on **the thumb side**, orienting them so that they are **both over the length of the vessel**.



Carotid pulse

- Palpate carotid pulse with the pt lying on a bed / couch
- Never compress both carotid arteries simultaneously.
- Use your left thumb for right carotid pulse & vice versa.
- Place tip of thumb b/w larynx & ant.border of sternocleidomastoid.



Brachial pulse

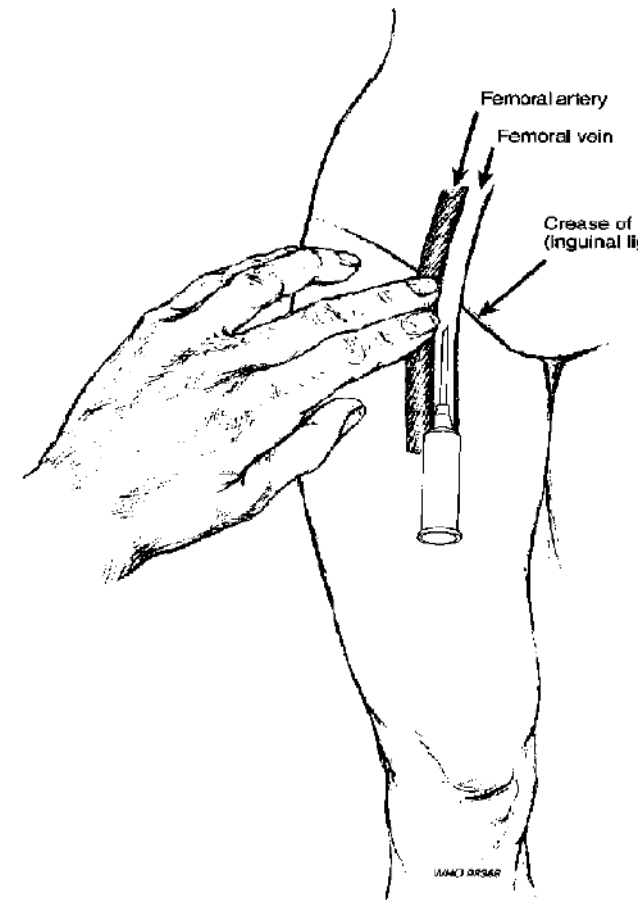
- Use your thumb (rt thumb for rt.arm & vice versa) with your fingers cupped round the back of the elbow.
- Brachial pulse – felt in front of the elbow just medial to tendon of biceps.



2cm distal
med inguinal point

Femoral pulse

- Is felt at groin just below inguinal ligament midway b/w ant.sup.ilic.spine & symphysis pubis.



Popliteal pulse

- Knee to be flexed 40 deg. Heel resting on bed
- Place fingers over lower part of popliteal fossa & fingers are moved sideways to feel pulsation of Popliteal. A against post. aspect of tibial condyles.



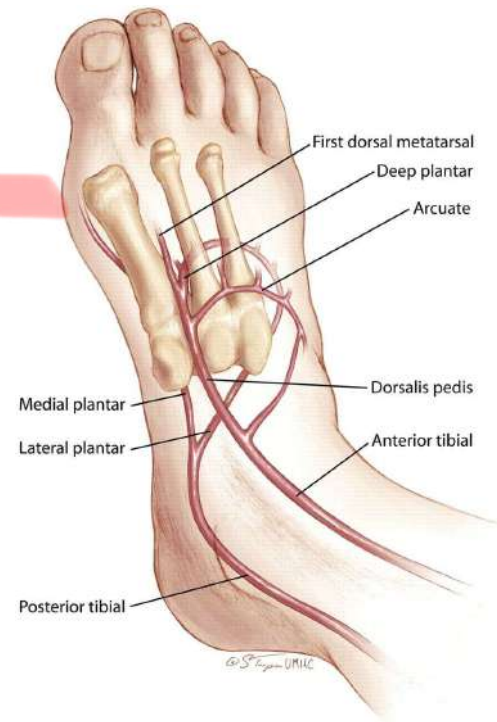
Posterior Tibial pulse

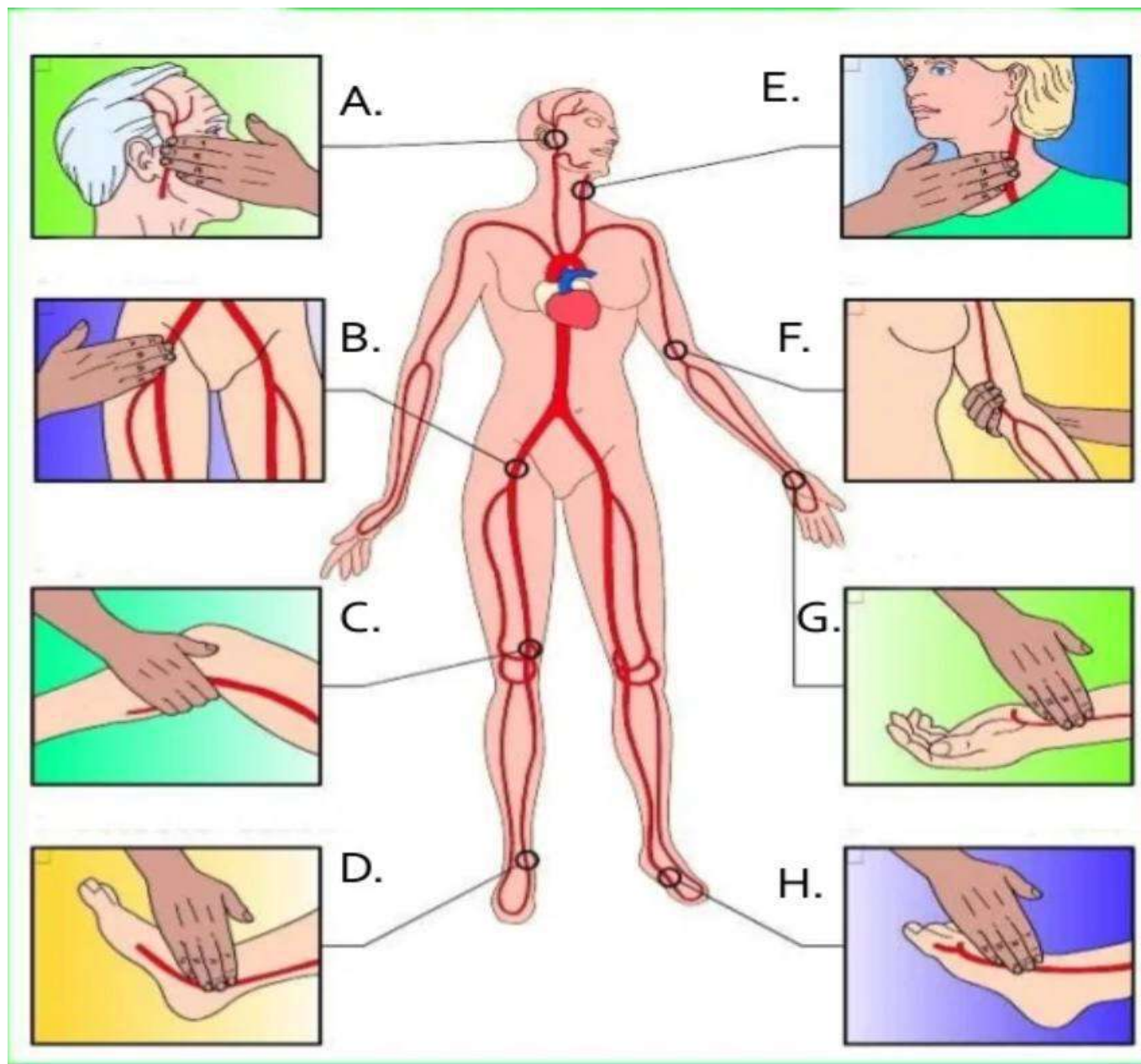
- The posterior tibial pulse can be felt behind and below the medial malleolus.



Dorsalis pedis pulse

- The dorsalis pedis pulse is palpable on the dorsum of the foot in the first intermetatarsal space just lateral to the extensor tendon of the great toe.





Assessment of pulse

- Features the examiner should note :

1. Rate
2. Rhythm(regular\irregular)
3. Volume
4. Synchronicity
5. Radio-femoral delay

Rate

- Count the pulse for 1 minute

1. Normal : 60-100/min
2. Tachycardia : $> 100/\text{min}$
3. Bradycardia : $< 60/\text{min}$

- Sinus tachycardia :

داعادي ← Physiological : infants , children , emotion , exertion .

Pathological : anemia , overactive thyroid (hyperthyroidism) , medication side effects .

- Sinus bradycardia :

Physiological : athletes , sleep .

Pathological : severe hypoxia , hypothyroidism, hypothermia
, drugs : beta blockers .

↳ anticholinergic drugs

Rhythm = Regularity

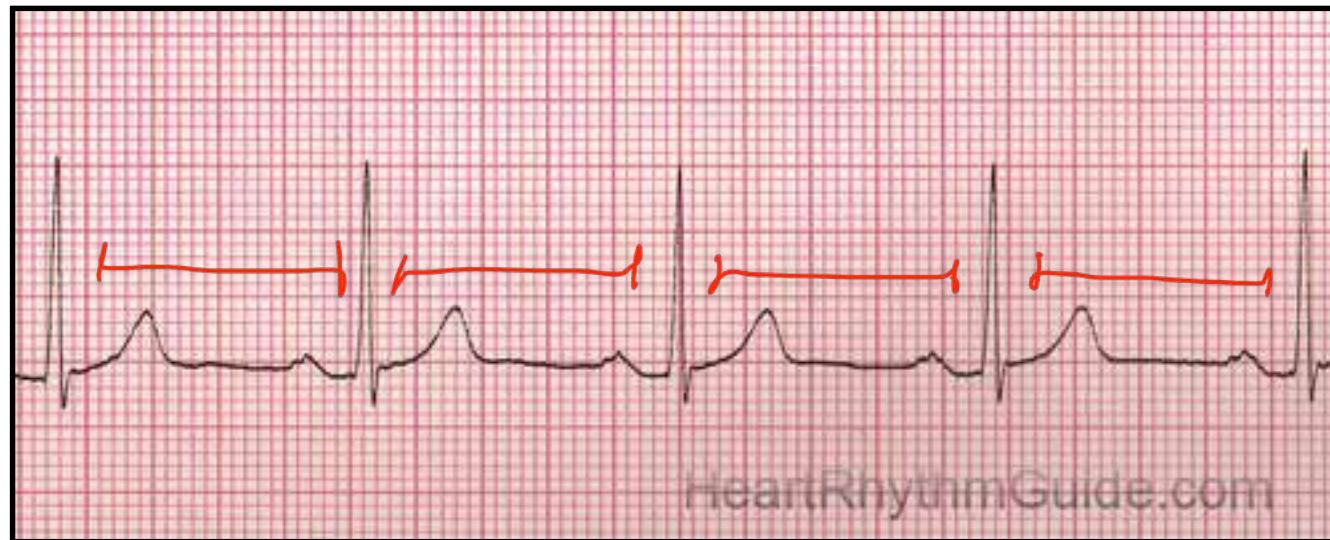
- Is the time between beats constant?. Irregular rhythms, are quite common

1. Regular pulse

2. Irregular pulse

- Irregular regularity

- Irregular irregularity (AF)



Regular pulse



Irregular pulse

Pulse volume

- It is the amount of blood pumped with each beat.
- Described by words such as high , strong , weak or bounding pulse

Synchronicity

- Comparison between artery on both sides of the body .

التزامن بالنضف →



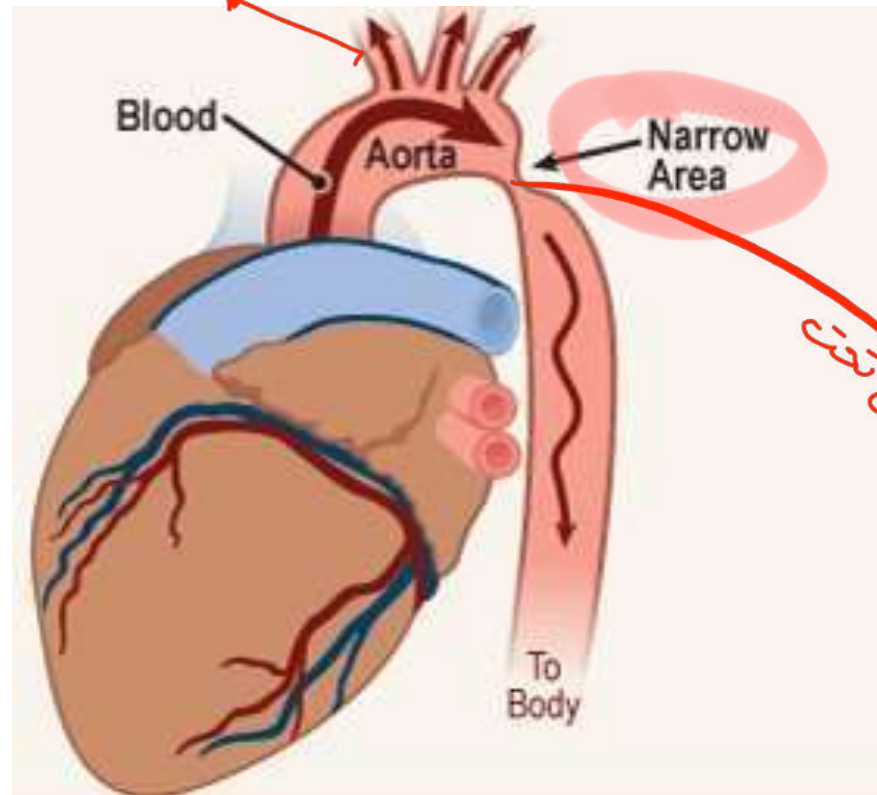
Radio-femoral delay

بتحسس النبض في
Radial قبل ال
Femoral

- A delay between the upstroke of the radial pulse and a femoral pulse whose presence indicates coarctation of the aorta



التفرعات دي بتغذي فوق



ما يعمل تحت

4. Blood pressure



Instructions

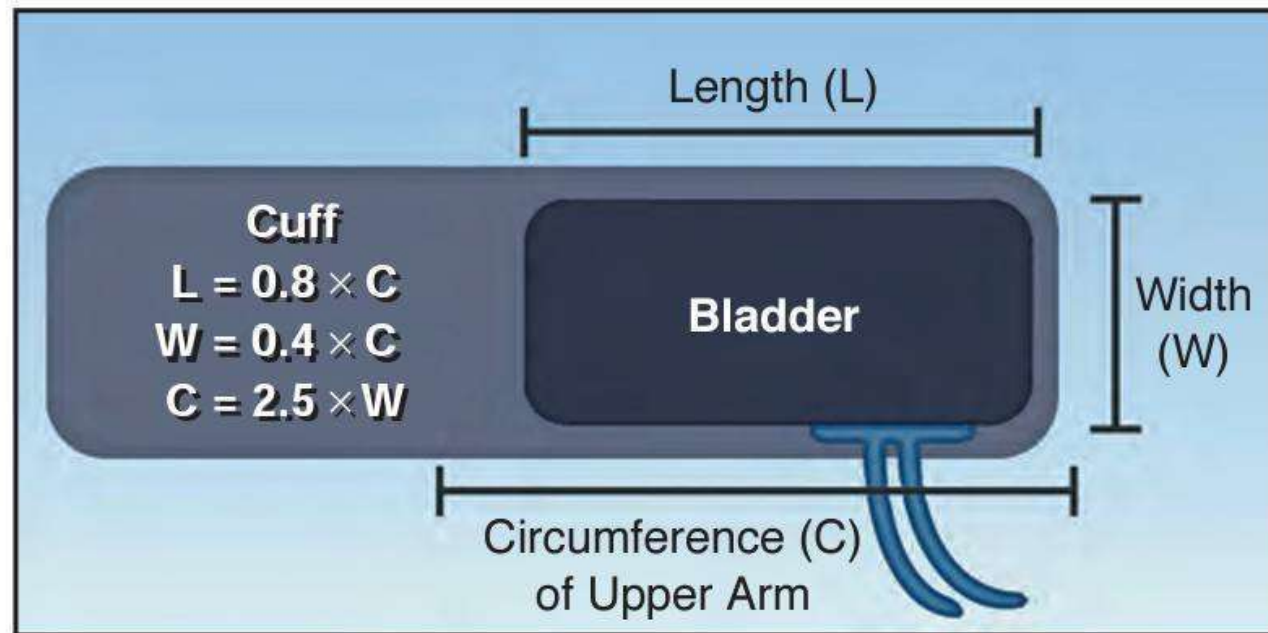
- **Don't eat or drink** anything **30 minutes** before you take your blood pressure.
- **Empty your bladder** before your reading.
- **Sit in a comfortable chair with your back supported** for **at least 5 minutes** before your reading.
- **Put both feet flat on the ground** and keep your legs uncrossed.
- **Rest your arm with the cuff on a table at chest height.**
- **Make sure the blood pressure cuff is suitable .**
- **The cuff should be against your bare skin,** not over clothing.
- **Do not talk** while your blood pressure is being measured.

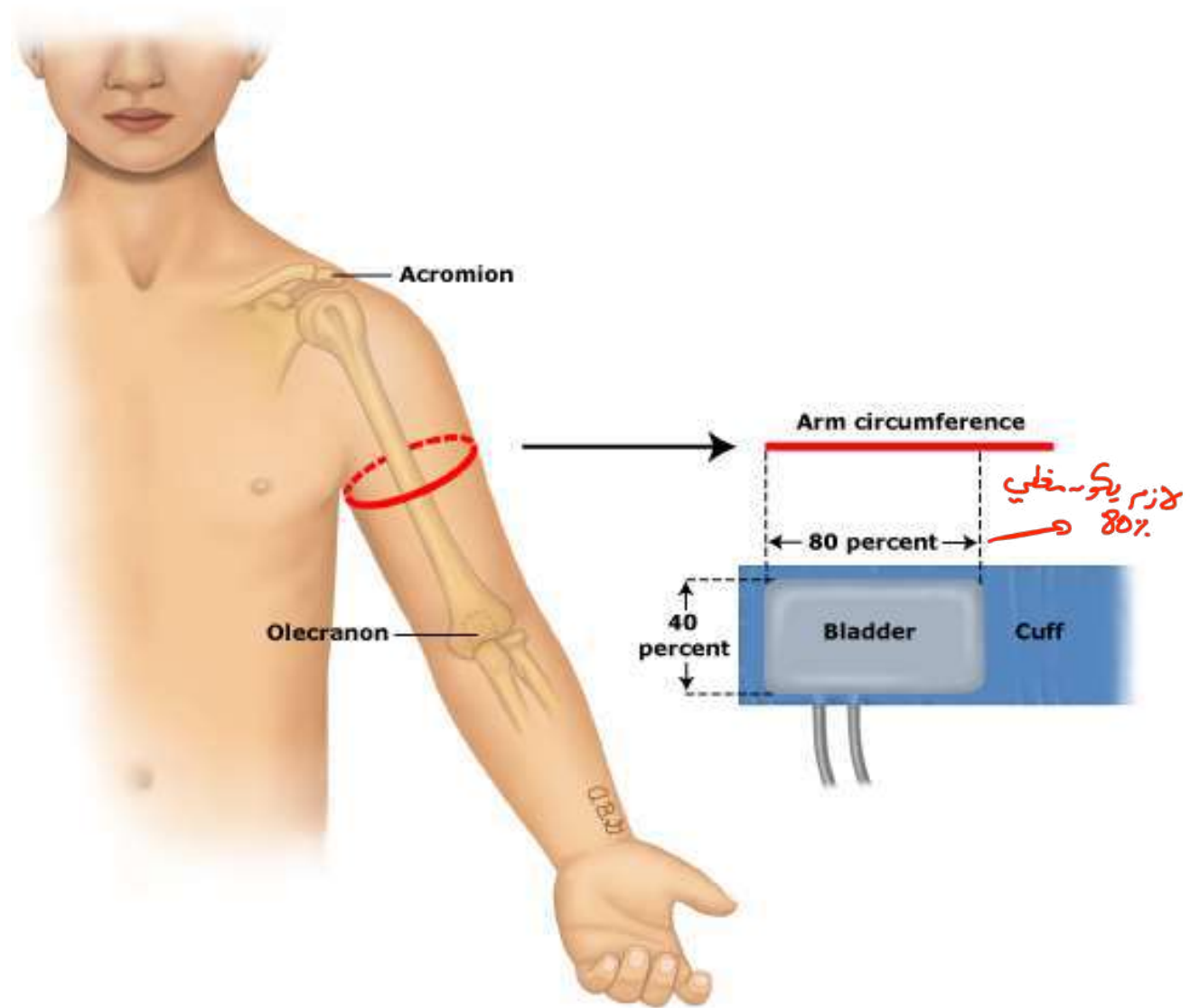


Equipment

- Stethoscope
- blood pressure cuff of appropriate size
- Sphygmomanometer







- **Cuff position :**
- Cuff applied directly over skin ,
- Position lower cuff border 2.5 cm above antecubital fossa .
- Center of inflatable bladder over brachial artery .

use Si bladder JI
brachial artery



- Feel for a pulse from the artery coursing through the inside of the elbow (antecubital fossa).
- Wrap the cuff around the patient's upper arm .
- With your left hand place the stethoscope head directly over the artery you found. Press in firmly but not so hard that you block the artery.



- Use your right hand to pump the squeeze bulb several times and Inflate the cuff until you can no longer feel the pulse to level above suspected SBP .
- If you immediately hear sound, pump up an additional 20 mmHg and repeat



- Deflate cuff slowly at a rate of **2-3 mmHg per second** until you can again detect the pulse
- Listen for auditory vibrations from artery "bump, bump, bump" (Korotkoff sounds)



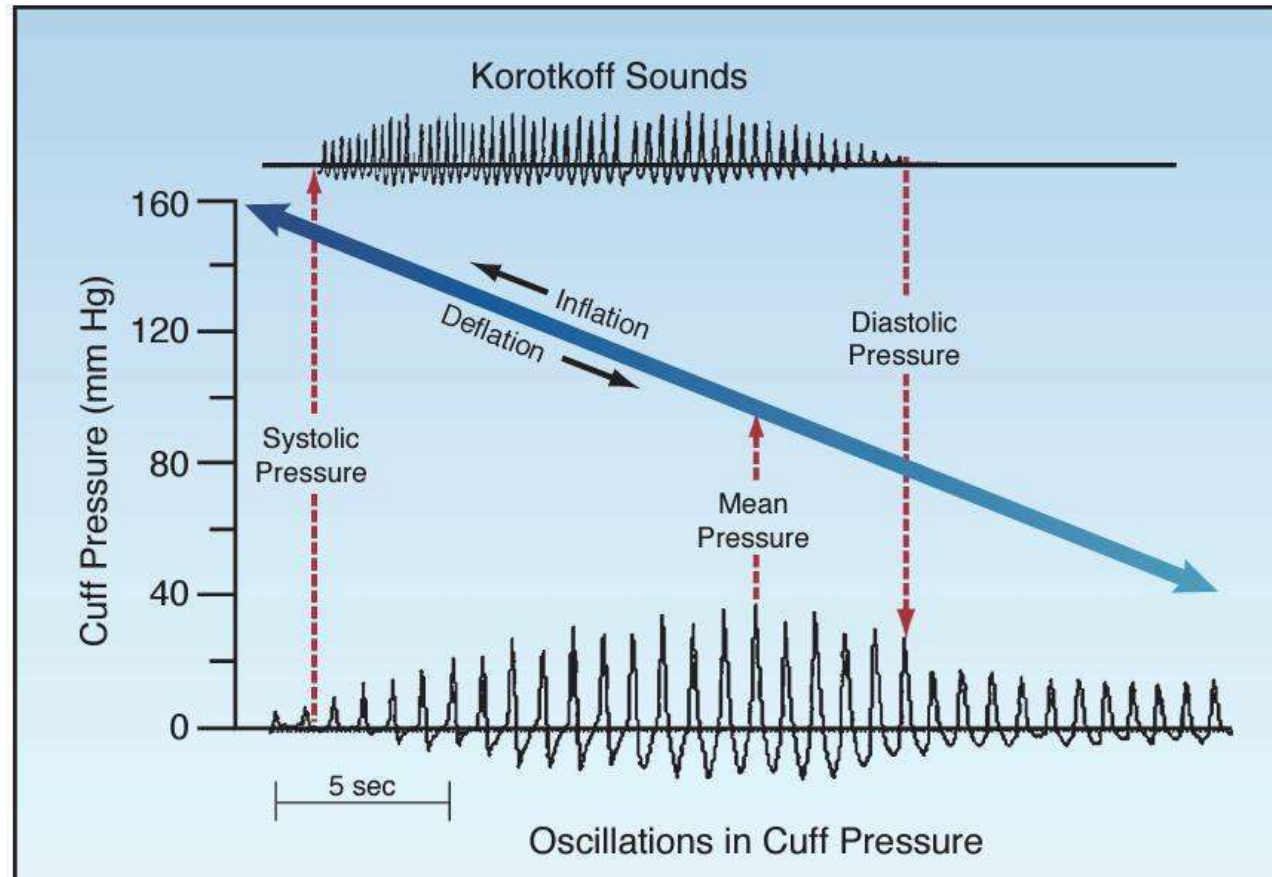
- Systolic blood pressure is the pressure at which you can first hear the pulse.

- Diastolic blood pressure is the last pressure at which you can still hear the pulse.



- اختلاف 10-15
بین
- The two arm readings should be within 10-15 mm Hg. Differences greater than 10-15 imply differential blood flow.





Blood Pressure Terminology

- Hypotension (low BP): <90 mm Hg/ <60 mm Hg
 - Heart failure, dehydration, depression, severe burns, hemorrhage & shock
 - Orthostatic: postural hypotension that occurs when a person is moving from lying to sitting or standing
- PreHypertension: indicated when pressures are between 120-139 mm Hg/80-89 mm Hg. Warning for high blood pressure
- Hypertension (High BP): 140 mm Hg/ 90 mm Hg
 - Stress, anxiety, obesity, high salt intake, aging, kidney diseases, thyroid deficiencies, and arteriosclerosis.
 - Often called the "silent killer"

Hypertension

Category	SBP	DBP
Normal	<120	<80
Elevated BP	120-129	<80
Hypertension- <u>stage 1</u>	130-139	80-89
Hypertension- <u>stage 2</u>	>140	>90

- 
- Hypotension : (BP below normal) when SBP less than 90 or a pressure 25 mmHg lower than usual .. **Causes?**

- **Orthostatic hypotension?**

Reduction of 20 mmHg in SBP or reduction of 10 mmHg in DBP

بیماریه بقیه اضاغله خیر اضاغله
بیماریه عالی سیرده بقیه اضاغله
normal
صنادر

white coat syndrome

- White coat syndrome, or white coat hypertension, is the term for when you get a high blood pressure reading in a doctor's office and a normal reading at home. The anxiety of being around doctors in white coats can make your blood pressure rise. Most people don't need treatment if their blood pressure is normal at home.





Thank you