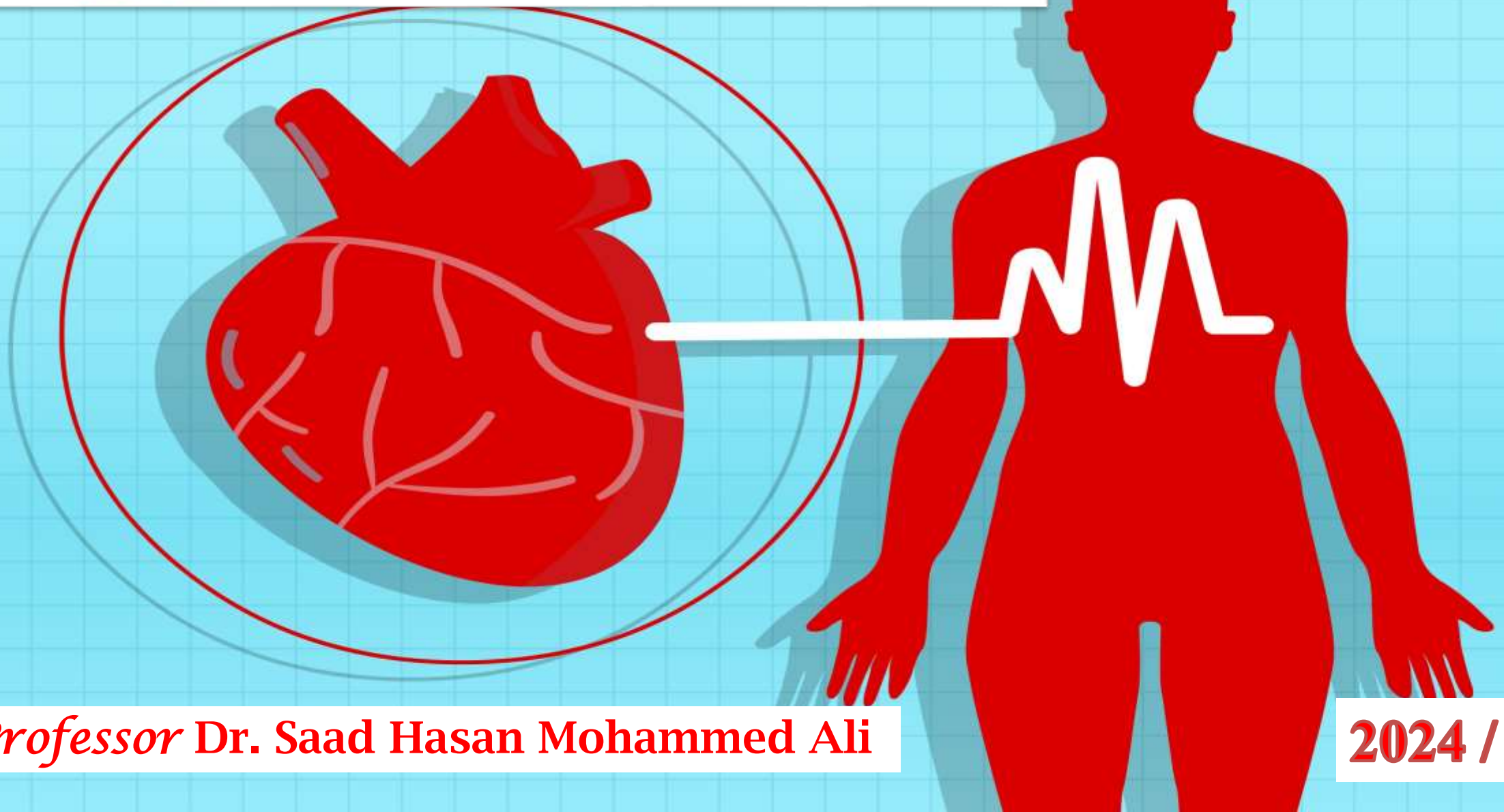
Hypertension



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Hypertension[HTN]

Definition:

- Sustained Elevation of Blood Pressure (BP)
- Means that blood is pushing too hard against artery walls.
- The force of blood can damage heart and delicate inner lining of the artery walls➔ lead to many Serious medical emergency problems.

Normal Blood pressure=

110/60 mmHg - 130/80 mmHg

Hypotension:

- An Accepted Standard Hypotensive Blood Pressure:

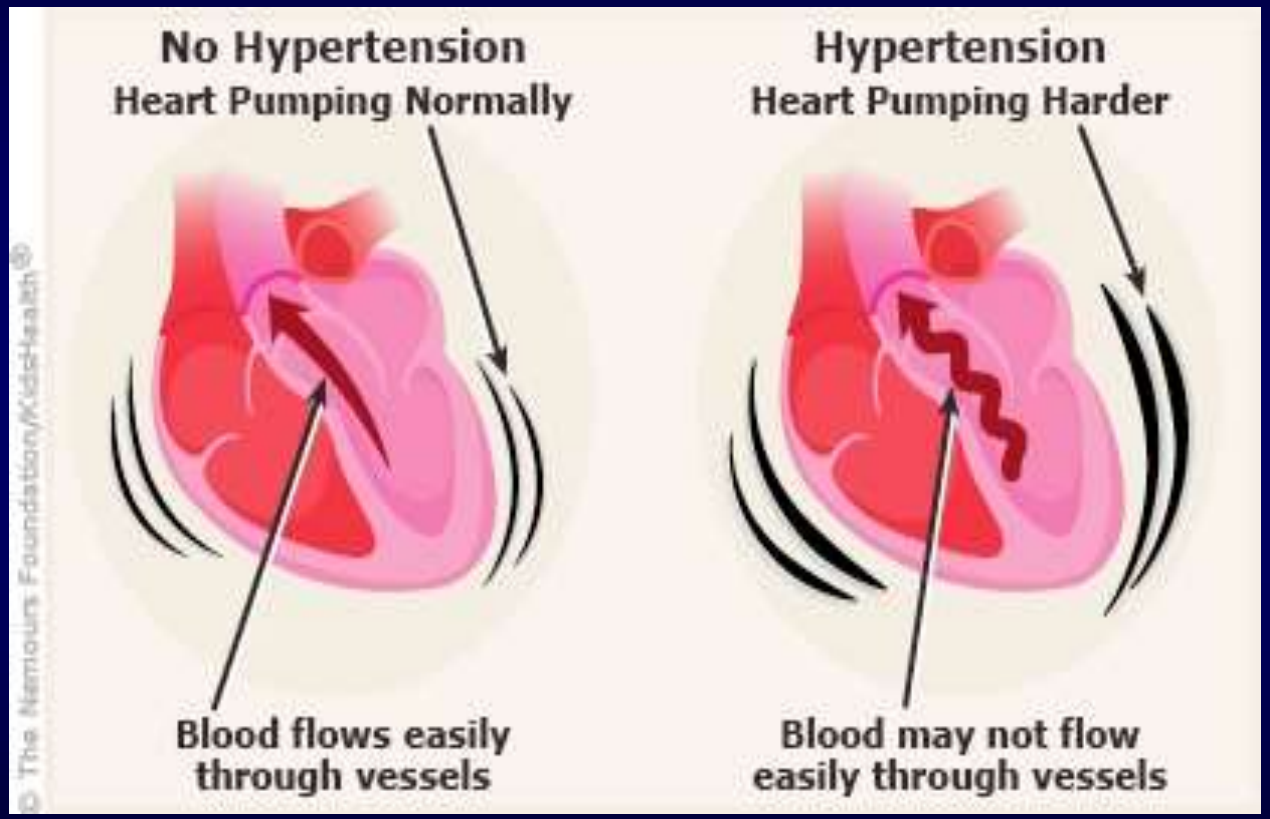
< 90/60 mmHg

Hypertension:

>140/90 mmHg

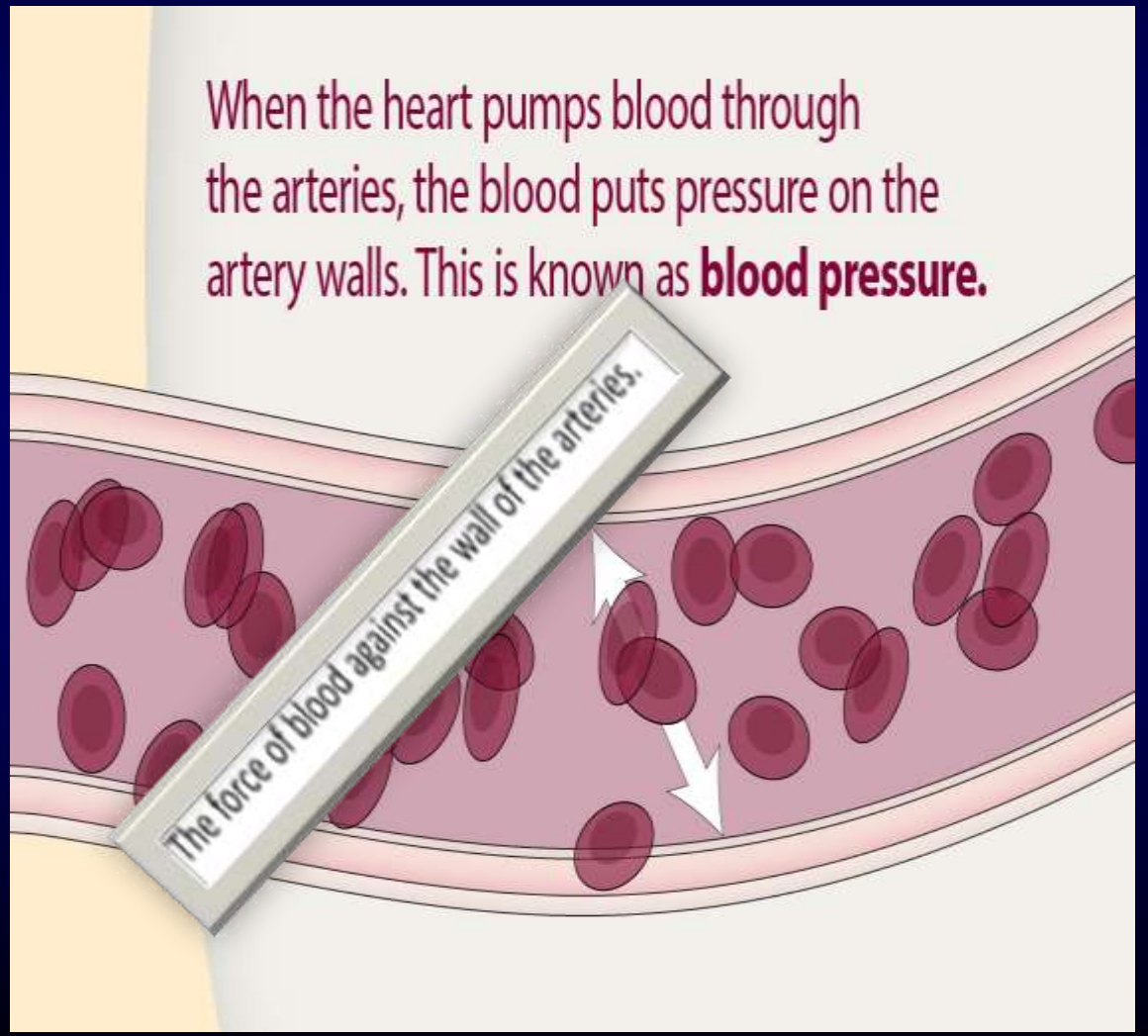
Hypertension

- ↑ Cardiac Output
- ↑ Systemic Vascular Resistance



Blood pressure is expressed by two measurements.

- Systolic- as the heart beats
- Diastolic - as the heart relaxes



7 factors influence blood pressure

1. Cardiac Output.
2. Peripheral Vascular Resistance.
3. Volume of Circulating Blood + Fluid volume

(((Renin – angiotensin + Aldosterone + Anti Diuretic Hormones)))

4. Viscosity of Blood.
5. Elasticity of Vessels Walls.=Vasoconstriction / Vasodilation
6. Heart Rate
7. State of Sympathetic nervous system (SNS) and Parasympathetic nervous system (PNS)

= (SNS) and (PNS)= both contain nerve fibers to provide sensory input and motor output to the central nervous system (CNS).

VARIATIONS IN CARDIAC OUTPUT

•PHYSIOLOGICAL CAUSES

1. Age- ↑ses with age
2. Sex- less in females more in males
3. Body build- ↑ses with body build
4. Exercise- ↑ses with exercise
5. High altitude- ↑ses
6. Pregnancy- ↑ses
7. Sleep-↓ses

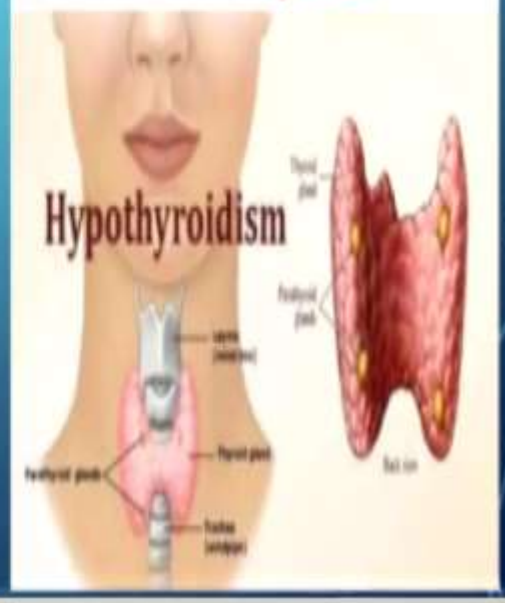
• PATHOLOGICAL CAUSE

❑INCREASE

1. Fever
2. Anemia
3. Hyperthyroidism

❑DECREASE

1. Hypothyroidsm
2. Shock
3. Hemorrhage
4. Congestive cardiac failure



Classification of Hypertension

1. Primary (Essential) Hypertension

- Elevated BP with unknown cause
- 90% to 95% of all cases

2. Secondary Hypertension

- Elevated BP with a specific cause
- 5% to 10% in adults

Primary Hypertension

Contributing factors:

1. **Age + Gender**=men have a higher incidence of hypertension compared with women of the same age until the sixth decade of life (> 55 for men; > 65 for women)
2. **Alcohol**
3. **Cigarette smoking**
4. **Diabetes mellitus**
5. **Elevated lipids**
6. **Excess sodium**
7. **Family history**
8. **Obesity (BMI ≥ 30)**
9. **Ethnicity (African Americans)**
10. **Sedentary lifestyle**
11. **Socioeconomic status**
12. **Stress**

Secondary Hypertension

Contributing factors:

1) Coarctation of aorta

تشوه خلقي يؤدي الى التواء الشريان الابهري

2) Renal disease

3) Endocrine disorders

4) Neurologic disorders

Rx:

Treating the underlying cause

Classification of Blood Pressure

BP Classification	SBP mmHg		DBP mmHg
Normal	< 120	and	< 80
Pre-hypertension* newly recognized= requiring lifestyle modifications	120-139	or	80-89
Stage 1 Hypertension	140-159	or	90-99
Stage 2 Hypertension	≥ 160	or	≥ 100
Stage 3 Hypertension= Hypertensive Crisis	≥ 180	and/or	≥ 120

Hypertension [HTN]

- **Over age 50 years =**
- **SBP is more important than DBP as a Cardio-Vascular Disease (CVD)risk factor.**
- **Starting from BP =115/75 mmHg and throughout all BP range=**
- **CVD risk [doubles] with each increase of SBP 20 and DBP 10 mmHg**

Clinical Manifestations of Hypertension

<<<< Frequently Asymptomatic>>>>>

until severe target organ disease has occurred

1. **Fatigue= مرهق**
2. **Reduced activity tolerance= قلة تحمله للاجهاد**
3. **Dizziness = دوخه بالراس**
4. **Palpitations = خفقان**
5. **Angina= chest pain ألم الصدر=ذبحه صدريه**
6. **Dyspnea= difficult breathing = ضيق التنفس**
7. **Vomiting**
8. **changes in vision**
9. **confusion or altered mental state**
10. **decreased urine output**
11. **numbness**

Complications of Hypertension:

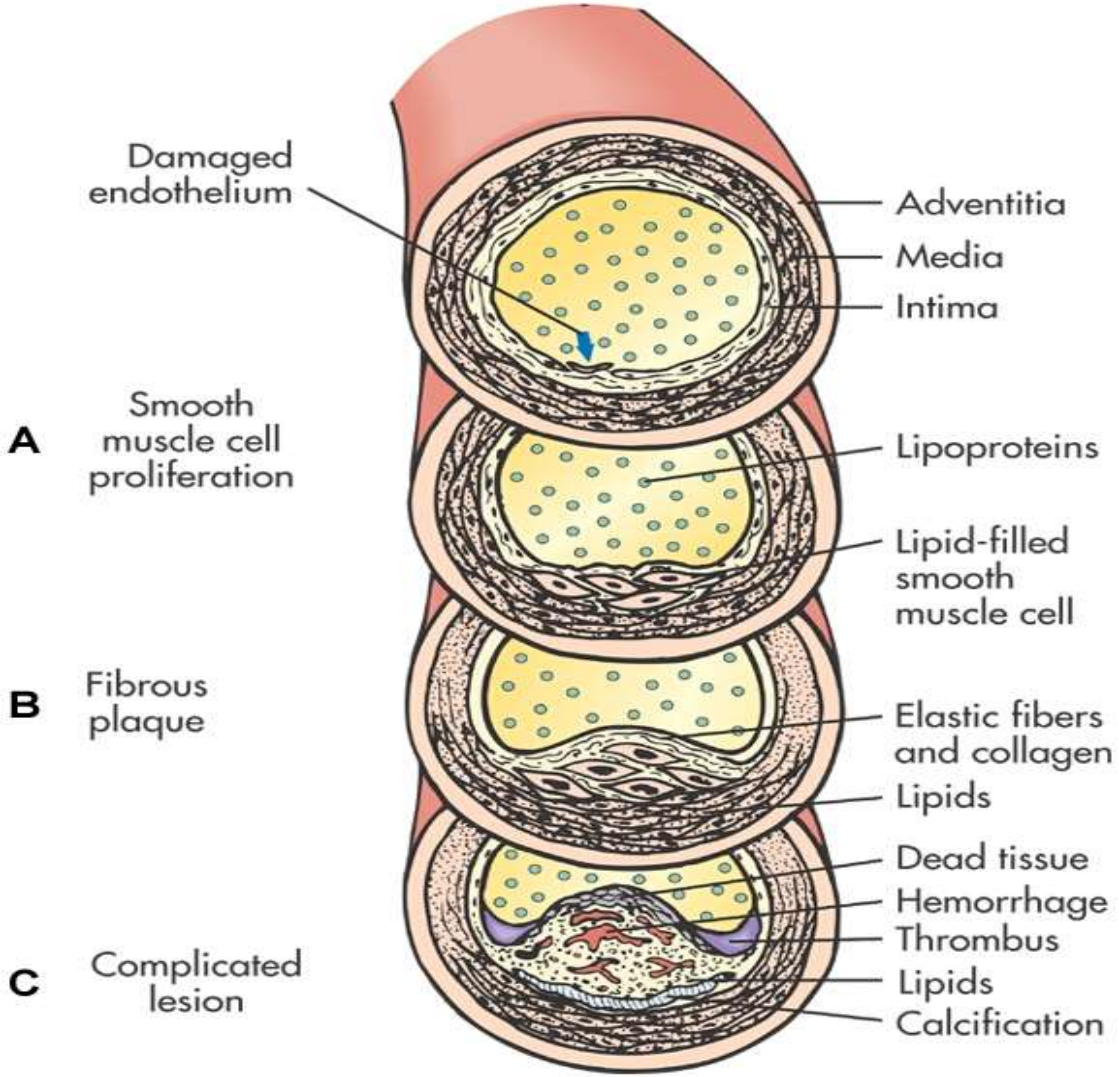
- **Primarily related to development atherosclerosis**

or

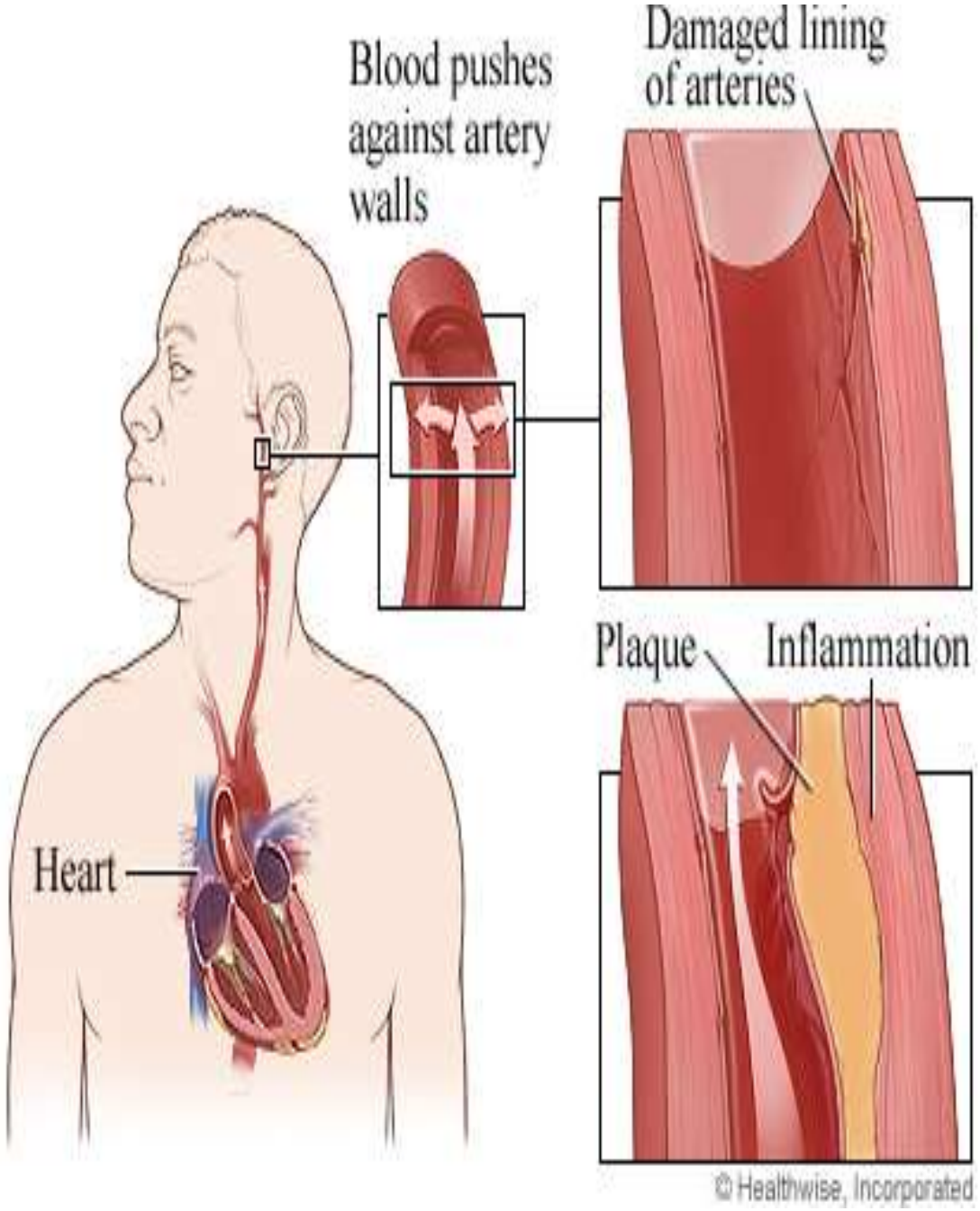
fatty deposits

Leading to

(“hardening of arteries”) that observed with increasing of the age



- Atherosclerosis or "hardening of the arteries."
- This problem happens when the inner lining of an artery is damaged.
- Fat and calcium can build up in the artery wall.
- This buildup is called plaque.
- Over time, plaque can cause problems throughout the body=
- Coronary artery disease
- Peripheral artery disease
- Heart attack
- Stroke.



Common Complications of Hypertension

= Hypertension is target organ disease >>>> Affecting the following organs:

1) Heart = **HHD=Hypertensive Heart Disease**
2) Brain **=Cerebrovascular Disease = Stroke**
3) Kidney **=Nephrosclerosis**
4) Eyes **=Retinal Damage**
5) Blood Vessels **=Peripheral Vascular Disease**

Hypertension Complications in the Heart

=

Hypertensive Heart Disease = HHD

1. Coronary Artery Disease = CAD = انسداد الشرايين التاجيه في القلب
2. Left Ventricular Hypertrophy = LVH = تضخم البطين الايسر
3. Heart Failure = HF = عجز القلب

Diagnosis of Hypertension

***Requires=

- Several Elevated Readings

== over several weeks

==(unless ≥ 180/110)

- BP measurement in both arms
  - Use arm with higher reading for subsequent measurements

- **Ambulatory BP Monitoring For :**
  1. "white coat" phenomenon
  2. hypotensive or hypertensive episodes
  3. apparent drug resistance

Hypertensive Emergency=

- Significant rise in blood pressure → Lead to organ dysfunction.

- **2 most common causes of hypertensive emergency include:**

1. Missing doses of blood pressure medication
2. Consuming sympathomimetic substances= medications, caffeine, and other stimulants.

American College of Physicians (ACP) + American Academy of Family Physicians (AAFP):

- Now recommend to start treatment of healthy adults aged 60 and older if their systolic blood pressure persistently reads 150 mm Hg or higher
- in order to reduce the risk of

1. death
2. stroke
3. cardiac events.

1) Hypertension Lifestyle Modifications

1) - Weight reduction
2) - Dietary changes (DASH diet)
3) - Limitation of alcohol intake
4) - Regular physical activity
5) - Avoidance of tobacco use
6) - Stress management

2) Hypertension Nutritional Therapy:

- **DASH Diet = Dietary approaches to Stop HTN=**

1. Restriction of **Sodium**
2. Restriction of **Calorie** [if overweight].
3. Diet More Rich in **vegetables, fruit, whole grains, lean protein**, and **non-fat dairy products**

3) Hypertension Drug Therapy

1- Reduce SVR= Systemic vascular resistance (SVR), is the amount of force exerted on circulating blood by the vasculature of the body.

2- Decrease volume of circulating blood

Hypertension Drug Therapy

1) Diuretics
2) Alpha - Adrenergic blockers = AB
3) βeta - Adrenergic blockers= BB
4) ACE Inhibitors= ACEI
5) Calcium channel blockers=CCB

Drug Therapy

1.. Thiazide-type Diuretics

=Inhibit (NaCl) Re-Absorption

Side effects=

1. **Electrolytes imbalance**
2. **Depletion of Fluid volume**
   (= orthostatic hypotension)
3. **Impotence**

2.. Alpha-Adrenergic Blockers =Alpha-Blockers=AB

- **Prazosin and Terazosin**

- **= effectively blocking effects of sympathetic activity on blood vessels = reducing the blood pressure.**

Side effects=

Hypotension

3.. βeta – Adrenergic Blockers = βeta – Blockers= BB

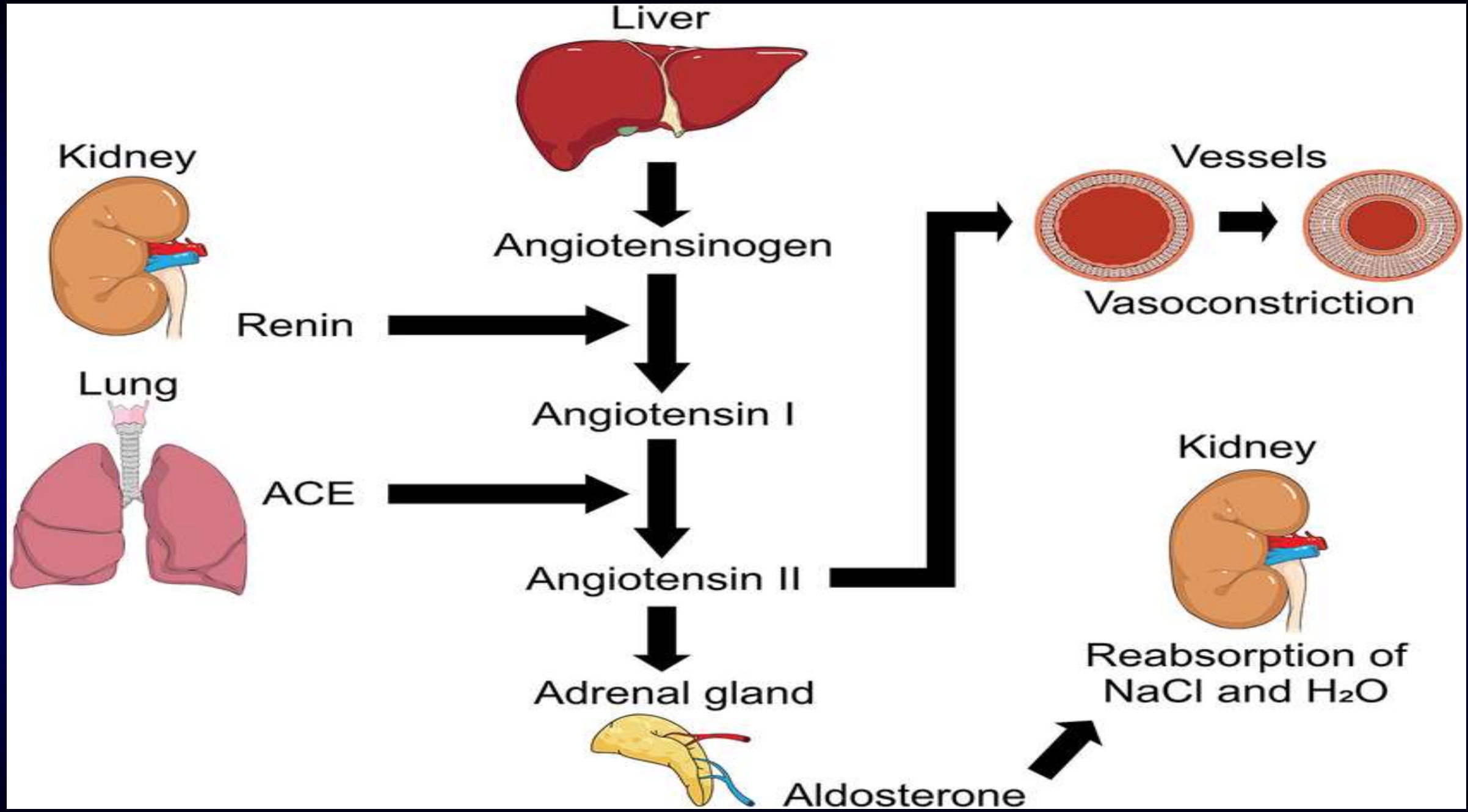
(Metoprolol / Propranolol)

Action= Block β – adrenergic receptors:

1. = Reduces Heart Rate
2. = Reduces Force of C ontraction
3. =Reduces vasoconstriction

Side effects

1. Bradycardia
2. Hypotension
3. Heart failure
4. Impotence


Liver
Kidney
Angiotensinogen
Renin
Lung
Angiotensin I
ACE
Angiotensin II
Vessels
Vasoconstriction
Kidney
Reabsorption of
NaCl and H₂O
Adrenal gland
Aldosterone

4.. ACE Inhibitors=ACEI (Enalapril / Captopril)

– **Inhibit the enzyme which convert angiotensin I to angiotensin II**

➔ **Prevent angiotensin II production**

➔ **prevent the vasoconstriction** done by angiotensin II.

Side effects

1. **Hypotension**
2. **Cough**

5.. Calcium Channel Blockers= CCB

–Block movement of calcium into cells

>>>>> lead to vasodilation

Side effects:

1. Bradycardia تباطىء بضربات القلب
2. Heart block أحصار القلب الحزيمي

Benefits of Lowering BP

	Percent of Reduction
Myocardial infarction	20–25%
Brain Stroke incidence	35–40%
Heart failure	50%

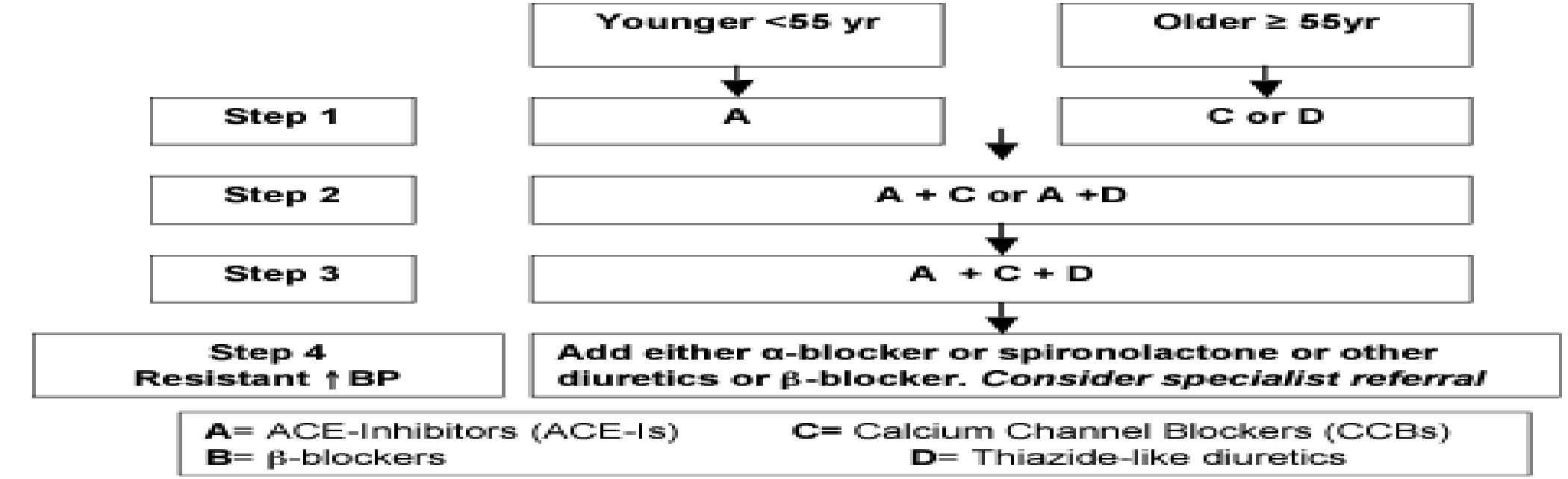
Algorithm for Treatment of Hypertension

Lifestyle Modifications

- Not at Goal Blood Pressure (<140/90 mmHg)
- (<130/80 mmHg for those with diabetes or chronic kidney disease)

Initial Drug Choices

A/CD rule



A= ACE-Inhibitors (ACE-Is) **C**= Calcium Channel Blockers (CCBs)
B= β-blockers **D**= Thiazide-like diuretics

Hypertensive Crisis

- **Severe Abrupt Elevation in BP**

- **The Rate of ↑ in BP more important than the Absolute Value of BP**
- **Most common in patients who :**

1) **Failed to comply with medications**
2) **Being Under-Medicated**

Clinical Manifestations of Hypertensive Crisis

1) **Hypertensive Encephalopathy** تأثيرات الضغط على وظائف الدماغ = >>>>
   gradually worsen and followed by non-localizing neurologic symptoms= =change in mental state +loss of memory + difficulty in concentration + drowsiness +seizures ,صرع**confusion** ,لخبطة بالوعي والادراك
   coma >>>>>>>>>>>>> اغماء وهذا عكس ما يحدث في الجلطه الدماغيه او النزيف الدماغي
   <<<<<<<<<<<< كما مذكور في ادناه
2) **Ischemic stroke or intra-cerebral hemorrhage.** >>>> **the abrupt and focal neurologic symptoms**
3) **Renal Failure** عجز الكليتين
4) **Heart Failure** عجز القلب
5) **Pulmonary Edema** وذمة<سوائل داخل> الرئتين

The Purpose of Hospitalization of Hypertensive Crisis Patients

1. - IV drug therapy
2. - Monitoring Neurologic, Cardiac and Renal functions
3. - Find the Cause of Crisis
4. - Instruction to Avoid Future Crises


Thank You!