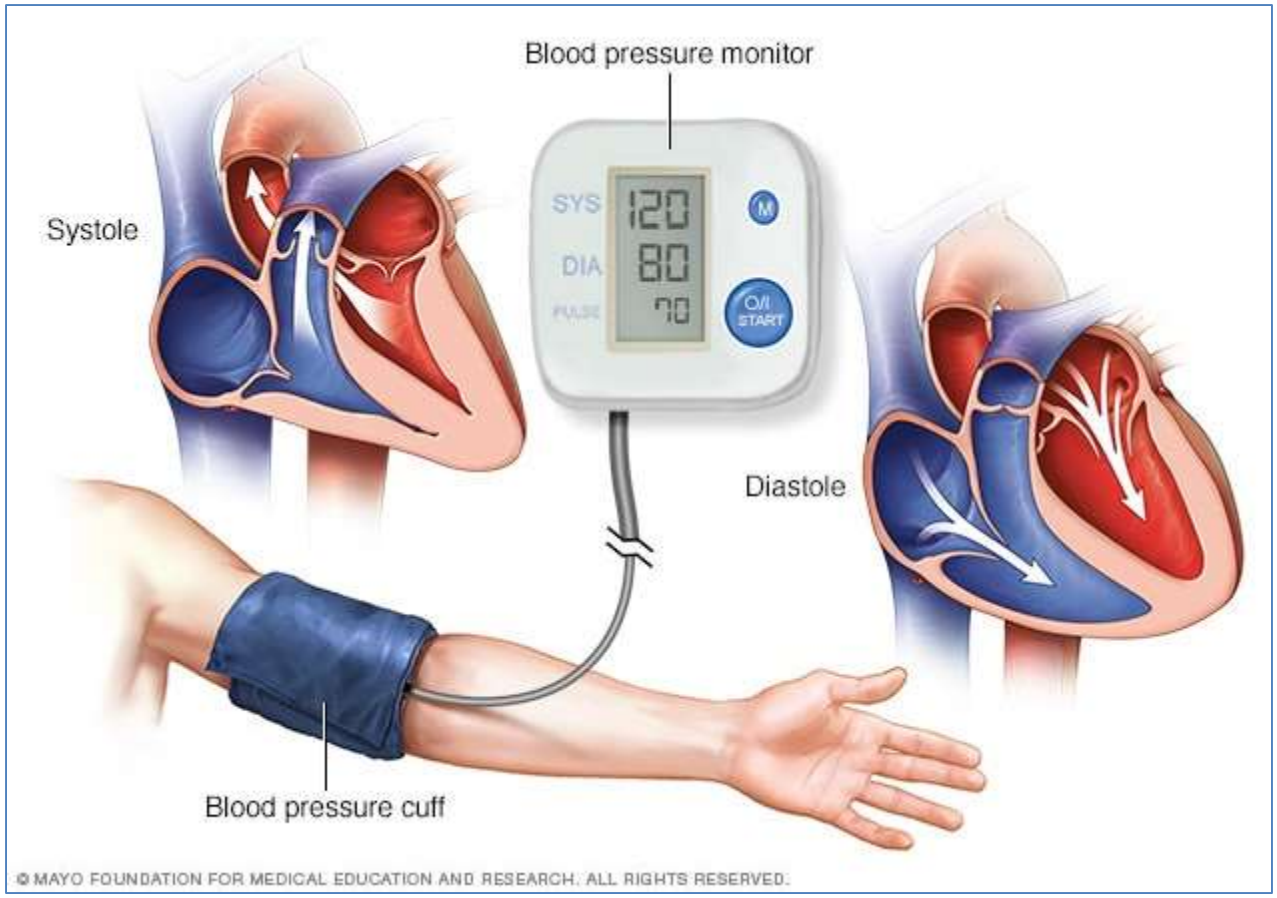
HYPERTENSIVE VASCULAR DISEASE

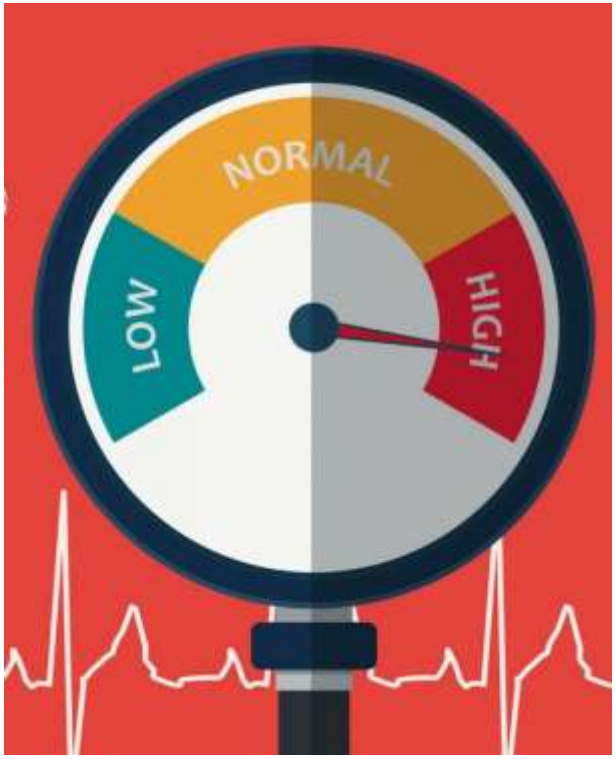
Arteriolosclerosis

Dr. Nisreen Abu Shahin
Professor of Pathology
Pathology Department
University of Jordan



A sphygmomanometer or a Digital blood pressure monitor is used to measure BP.

Blood pressure



- Currently, cutoffs in diagnosing hypertension in clinical practice: sustained diastolic pressures >80 mm Hg, and/or sustained systolic pressures >130 mm Hg

Types of hypertension

- **According to severity:**

Benign (95%) versus malignant (5%)

- **According to cause:**

Primary (essential) (95%) versus secondary (5%)

- Another way to classify:

Systolic vs diastolic

- ***Malignant hypertension***

→ 5% (also known as accelerated HTN)

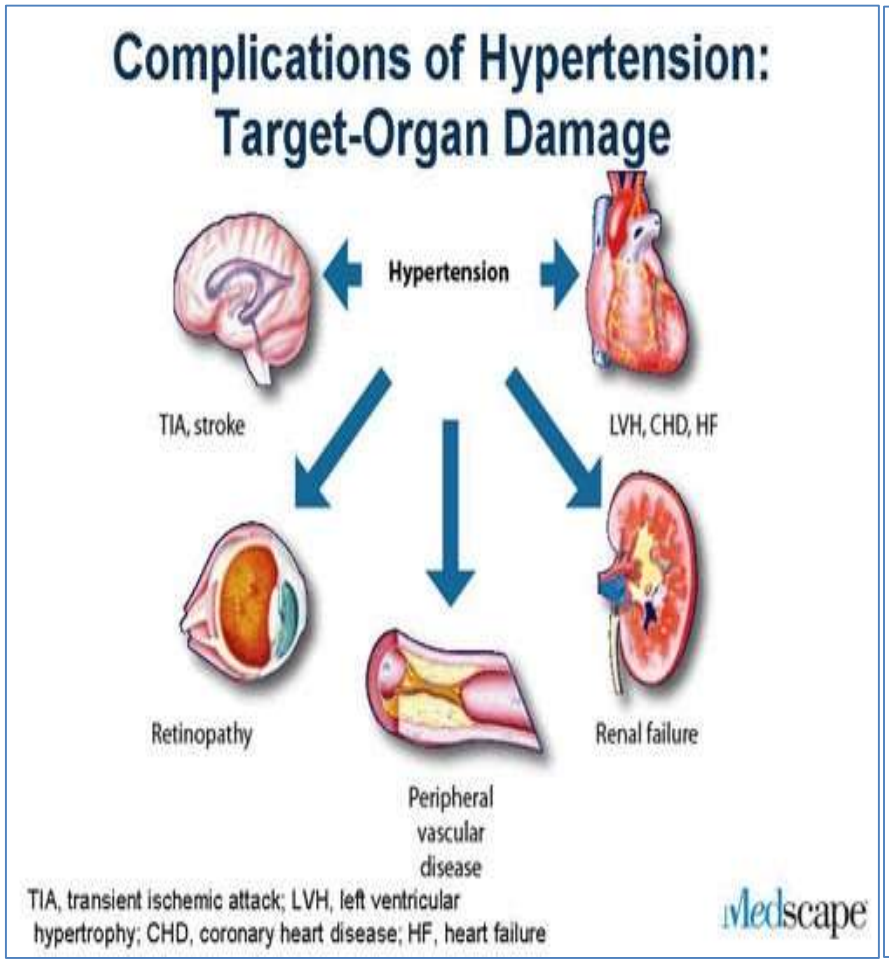
→ a rapidly rising blood pressure that, if untreated, leads to death within 1 to 2 years

→ **systolic pressures > 200 mm Hg or diastolic pressures > 120 mm Hg**

→ renal failure and retinal hemorrhages

→ usually superimposed on preexisting **benign** hypertension (either essential or secondary)

Hypertension (HTN) has the following potential complications:



- stroke (CVD) &multi-infarct dementia
- atherosclerotic coronary heart disease
- cardiac hypertrophy and heart failure (*hypertensive heart disease*)
- aortic dissection
- renal failure
- retinal hemorrhages

Types of hypertension- according to etiology

1- essential (idiopathic) hypertension (95%)

2- **secondary hypertension:**

- Most common of secondary: renal disease or renal artery narrowing **(renovascular hypertension)**

- Other less common: many other conditions….

Essential Hypertension
Accounts for 90% to 95% of all cases
Secondary Hypertension
Renal
Acute glomerulonephritis Chronic renal disease Polycystic disease Renal artery stenosis Renal vasculitis Renin-producing tumors
Endocrine
Adrenocortical hyperfunction (Cushing syndrome, primary aldosteronism, congenital adrenal hyperplasia, licorice ingestion) Exogenous hormones (glucocorticoids, estrogen [including pregnancy-induced and oral contraceptives], sympathomimetics and tyramine-containing foods, monoamine oxidase inhibitors) Pheochromocytoma Acromegaly Hypothyroidism (myxedema) Hyperthyroidism (thyrotoxicosis) Pregnancy-induced (pre-eclampsia)
Cardiovascular
Coarctation of aorta Polyarteritis nodosa Increased intravascular volume Increased cardiac output Rigidity of the aorta
Neurologic
Psychogenic Increased intracranial pressure Sleep apnea Acute stress, including surgery

Most common of all

Most common of secondary causes

- ***Pathogenesis of essential HTN***
- **? Genetic factors**

? familial clustering of hypertension

- angiotensinogen polymorphisms and angiotensin II receptor variants; polymorphisms of the renin-angiotensin system.

- ? Susceptibility genes for essential hypertension: genes that control renal sodium absorption, etc…

- **Environmental factors** modify the impact of genetic determinants

stress, obesity, smoking, physical inactivity, ↑ salt consumption

Blood vessels in HTN- Morphology

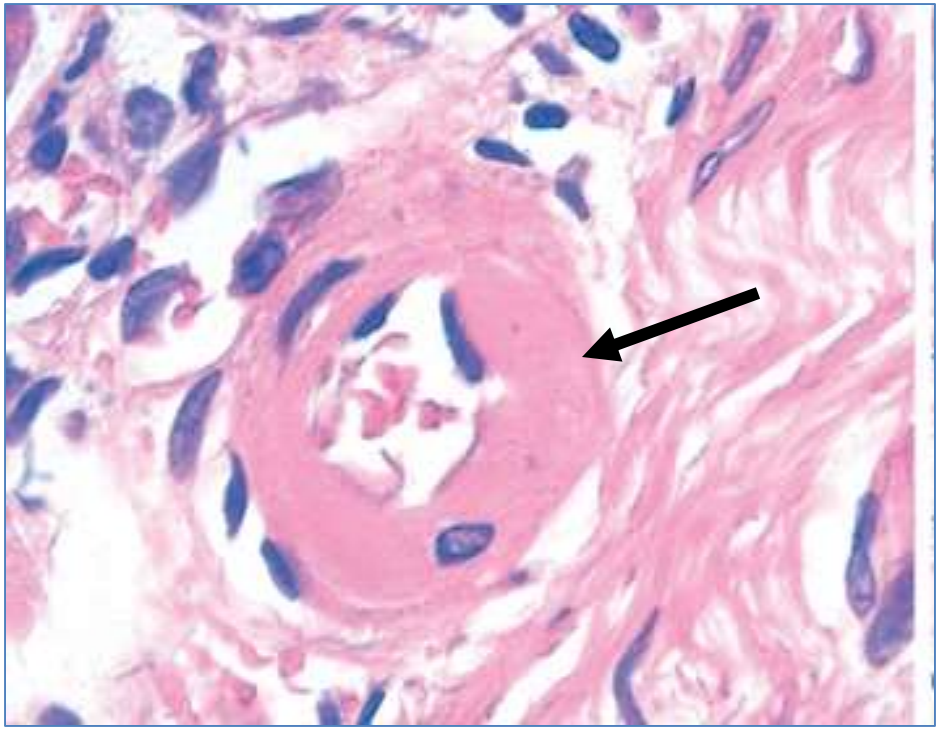
- **HTN is associated with arteriolosclerosis (small arterial disease)**

- **Two forms of small blood vessel disease are hypertension-related:**

1- hyaline arteriolosclerosis

2- hyperplastic arteriolosclerosis

1- Hyaline arteriolosclerosis



- Ass. with benign hypertension
- homogeneous pink hyaline thickening of arteriolar walls
- luminal narrowing
- leakage of plasma components across injured endothelial cells into vessel walls
- increased ECM production by smooth muscle cells in response to chronic hemodynamic stress

- **Hyaline arteriolosclerosis: Complications**

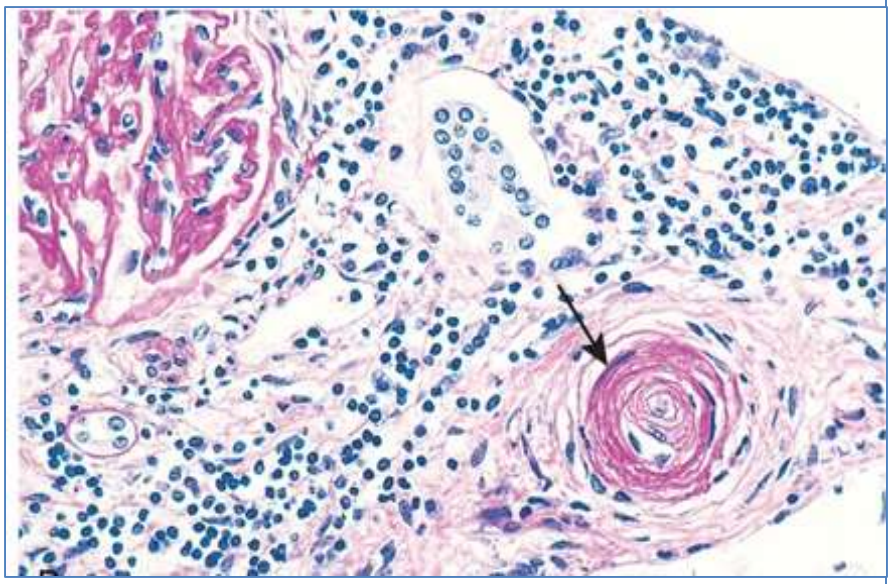
- **Most significant in kidneys➔ nephrosclerosis (glomerular scarring)**

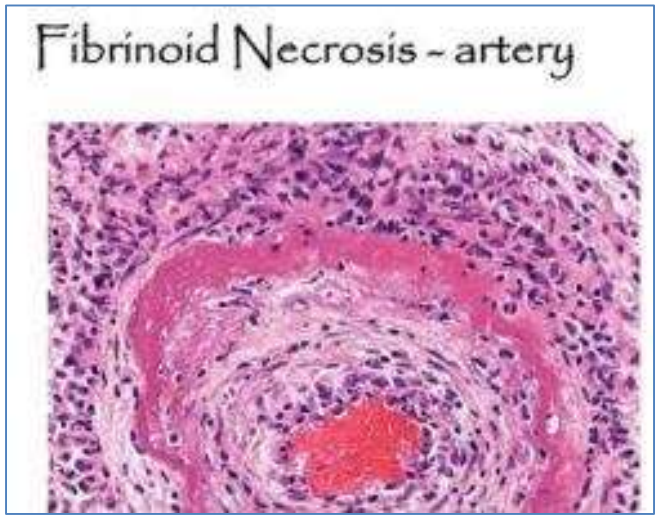
- **Other causes of hyaline arteriolosclerosis:**

1- elderly patients (normo-tensive)

2- diabetis mellitus

2- Hyperplastic arteriolosclerosis





- With **severe (malignant)** hypertension
- "**onionskin**" concentric laminated thickening of arteriolar walls
- luminal narrowing
- reduplicated basement membrane
- fibrinoid vessel wall necrosis (**necrotizing arteriolitis**)

Q: What does (reduplicated basement membrane) mean ?

A: It means that the basement membrane will have multiple layers instead of the normal one, so it becomes thicker than normal and is functionally considered abnormal and results in reduced blood flow to the tissue.

The presence of these multiple layers will give the appearance of the onion when it is cut. This is termed (onion skin) appearance.