Hypertension

Objectives

By the end of the session the learner should be able to;-

- Describe hypertension
- Describe the pathophysiology
- State the causes/ etiology
- Describe the management of HTN
- Define hypertensive crisis and its management

Blood Pressure

- Blood pressure is the force exerted by circulating blood on the arterial walls
- **Systolic pressure** – pressure in the artery when the left ventricle is contracting to force the blood into aorta and other arteries
- **Diastolic pressure** – pressure in the artery when the ventricles are relaxing and the heart is filling up, receiving blood from veins
- **Blood pressure= cardiac output * peripheral resistance**

Peripheral resistance

- As the blood flows from the arterial to the venous side of the circulation, it meets resistance because of the smaller caliber of the vessels and the viscous nature of the blood.
- This is called the **peripheral resistance.**
- It is an important factor in generating and maintaining the arterial blood pressure.

Peripheral resistance

- Peripheral vascular resistance (PVR) is the resistance to the flow of blood determined by blood vessel diameter & the tone of the vascular musculature
- Vasoconstriction of the small vessels increases the peripheral resistance, which in turn elevates the arterial blood pressure.
- Vasodilatation decreases the resistance and lowers the pressure.

Regulation of blood pressure

- **Baroreceptors** – changes in arterial pressure – medulla (brain stem)
  - Location : left and right carotid sinuses, aortic arch.
- **Renin – angiotensin system (RAS)**
  - Long – term adjustment of arterial pressure
  - Kidney - compensation
  - Endogenous vasoconstrictor – angiotensin I

Regulation of blood pressure

- **Aldosterone release (adrenal cortex)**
  - Stimulates sodium retention and potassium excretion by the kidney at the DCT
  - Increases fluid retention and indirectly arterial pressure

Hypertension

- It is defined as a persistent elevation of the systolic BP at a level of 140mmHg or higher & of diastolic pressure at a level of 90mmHg or higher.

- **Types of hypertension:**
  - Primary hypertension
  - Secondary hypertension
  - Malignant hypertension

Types of hypertension

- **Primary hypertension:**
- Also known as essential or idiopathic hypertension and the cause is unknown
- **Secondary hypertension:**
- Hypertension as a result of another cause
- Various specific disease states or problems are responsible for the elevation in BP & underlying cause may be correctable.
- adrenal cortex abnormalities (cushing's syndrome, pheochromocytoma)
- polycystic kidney disease – genetic disorder of the kidneys)

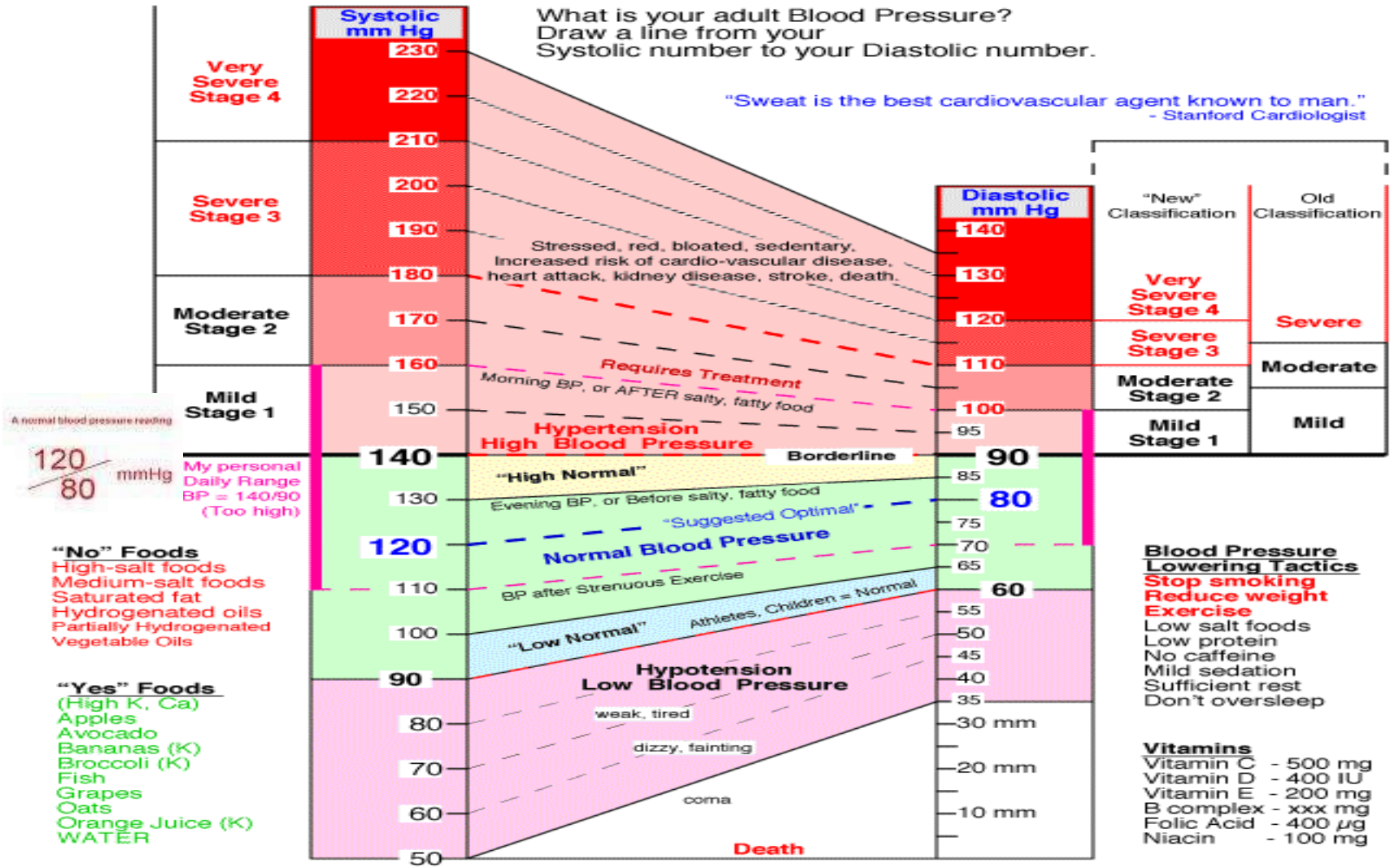
Types of hypertension

- **Malignant hypertension:**
- Persistent severe hypertension characterized by a **diastolic pressure above 110 - 120mmHg**
- It results when hypertension is left untreated or is unresponsive to treatment and becomes a severe emergency as the pressure continues to rise unchecked, combined with end - organ damage.

Classification of hypertension

Category	**Blood Pressure, mm Hg**
Normal	SBP 90-119 and 60-79
Prehypertension	SBP 120-139 or DBP 80-89
Stage 1 HTN	SBP 140-159 or DBP 90-99
Stage 2 HTN	SBP ≥160 or DBP ≥100
DBP = diastolic blood pressure; SBP = systolic blood pressure	

Blood Pressure Chart



A normal blood pressure reading

120 / 80 mmHg

My personal Daily Range
BP = 140/90
(Too high)

"No" Foods
High-salt foods
Medium-salt foods
Saturated fat
Hydrogenated oils
Partially Hydrogenated Vegetable Oils

"Yes" Foods
(High K, Ca)
Apples
Avocado
Bananas (K)
Broccoli (K)
Fish
Grapes
Oats
Orange Juice (K)
WATER

Blood Pressure Lowering Tactics
Stop smoking
Reduce weight
Exercise
Low salt foods
Low protein
No caffeine
Mild sedation
Sufficient rest
Don't oversleep

Vitamins
Vitamin C - 500 mg
Vitamin D - 400 IU
Vitamin E - 200 mg
B complex - xxx mg
Folic Acid - 400 µg
Niacin - 100 mg

Amino Acids
Co-Q10 - 120 mg
l-carnitine - 1000 mg

Foods
Flax oil - 1 tbl
Fish oil- EPA 600 mg
- DHA 400 mg

Herbs
Hawthorne Berry - 1.5 g
Garlic - lots (selenium)

Minerals
calcium - 666 mg
magnesium- 266 mg
potassium- 2500 mg

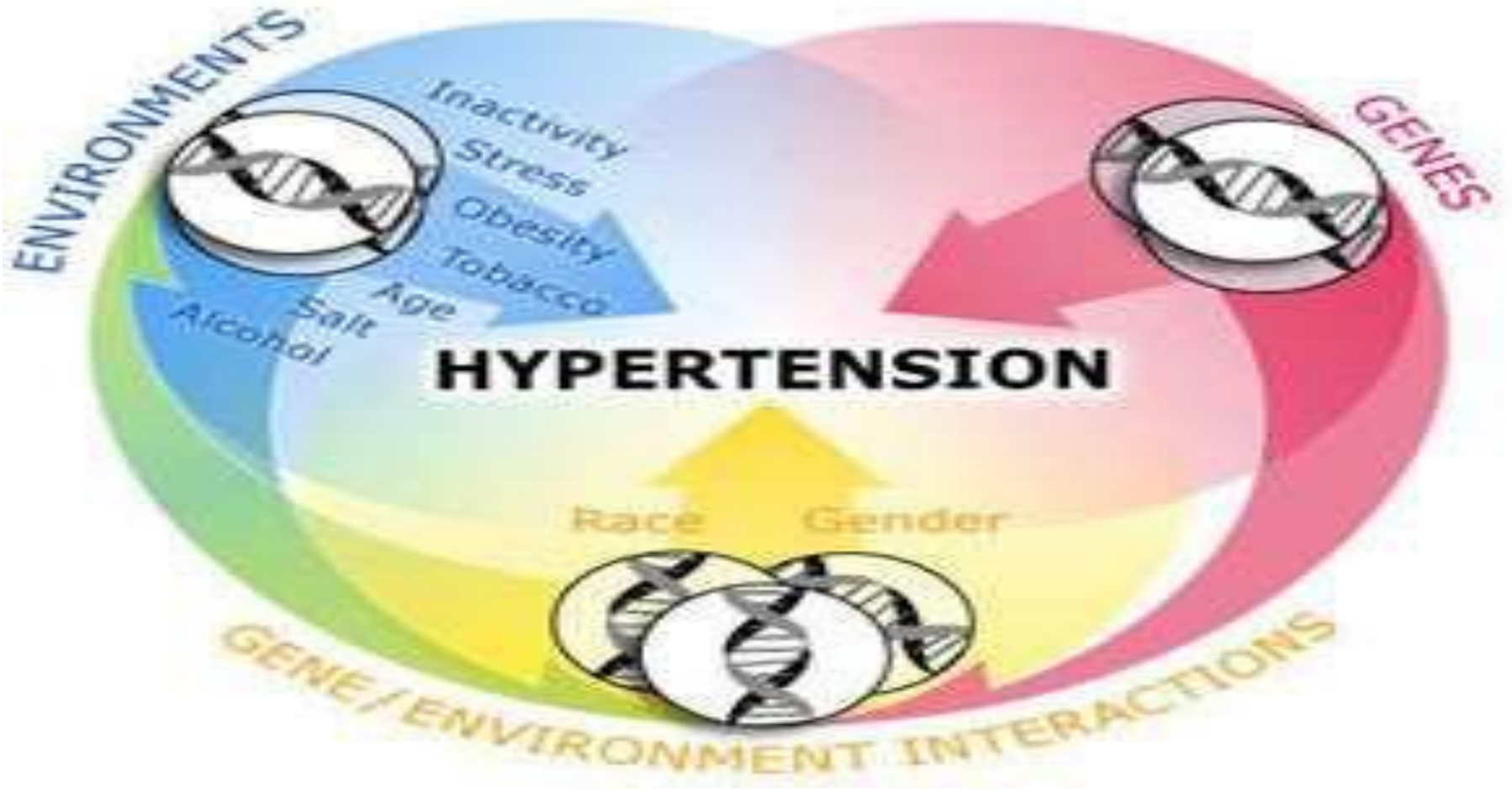
Epidemiology

- Hypertension is the single most important risk factor for stroke, heart disease & kidney disease
- Hypertension is a silent killer
- Primary (essential) hypertension constitute more than 90% of all cases of hypertension.
- Less than 5% - 8% of adult hypertensive clients have secondary hypertension.

Risk factors of hypertension

- Sedentary lifestyle
- Obesity (body mass index greater than 25)
- Salt (sodium) sensitivity
- Alcohol, smoking
- Family history

Risk Factors of hypertension



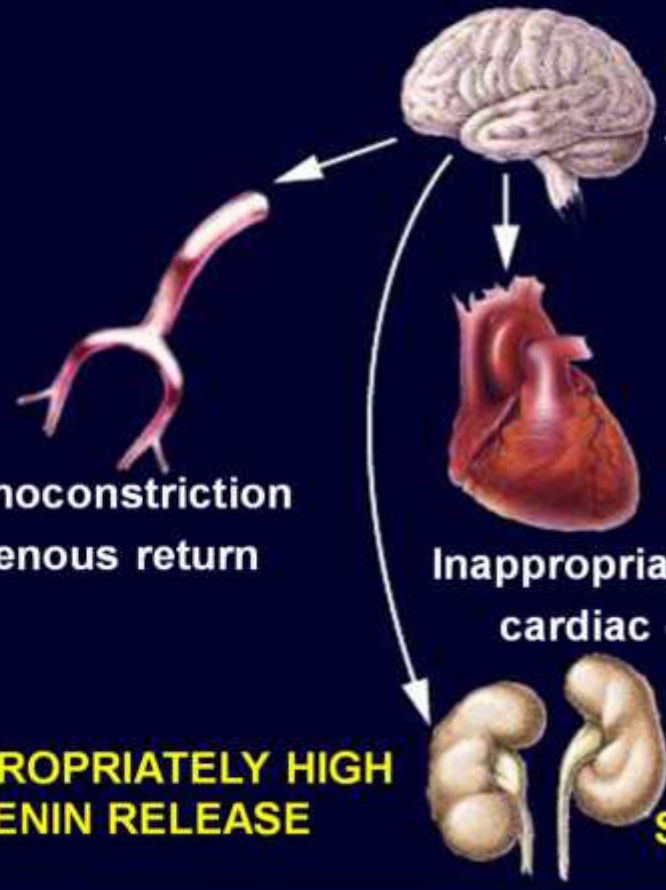
Risk factors of hypertension

- Renal conditions:
  - Diabetic nephropathy
- Endocrine conditions:
  - Acromegaly, hypothyroidism, hyperthyroidism
- Neurological disorders:
  - Raised intra-cranial pressure, tumour,
- Pregnancy induced hypertension
- Burns
- Acute stress after surgery

Pathophysiology of hypertension

- Inability of the kidneys to excrete sodium
- An overactive renin – angiotensin system, vasoconstriction and retention of sodium and water – hypertension
- An overactive sympathetic nervous system

Pathophysiology of hypertension



INAPPROPRIATELY HIGH SYMPATHETIC OUTFLOW

Increased large arterial stiffness

Abnormal venoconstriction and high venous return

Inappropriately high cardiac output

Increased systemic resistance

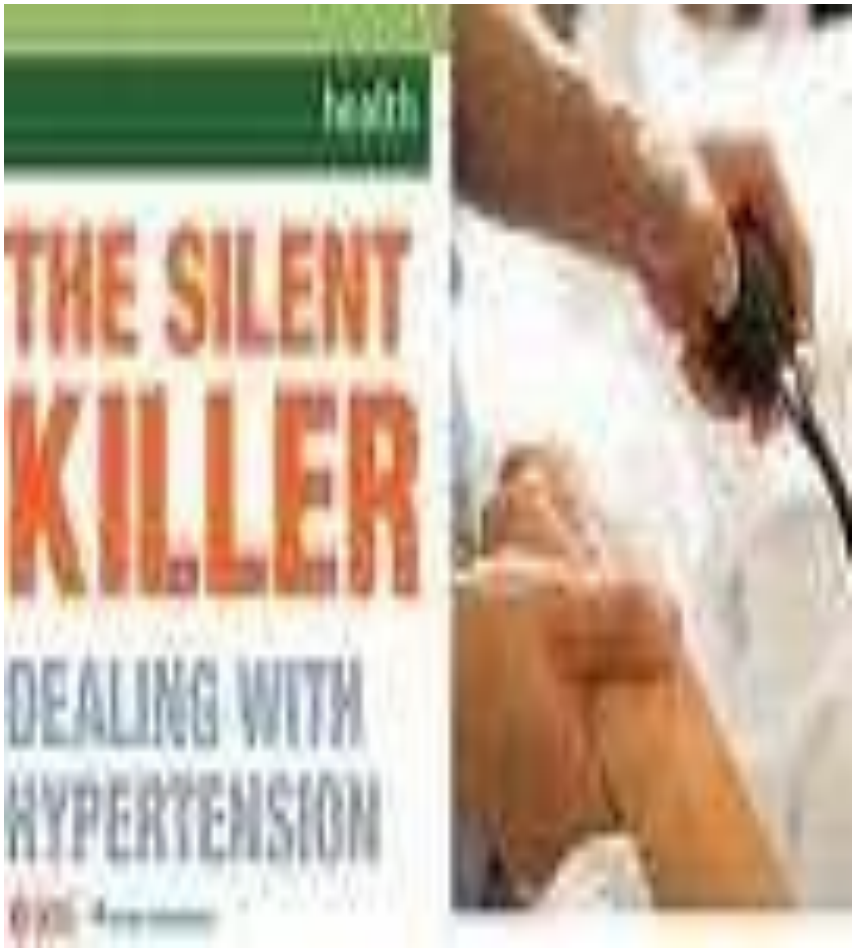
INAPPROPRIATELY HIGH RENIN RELEASE

ABNORMAL RENAL SALT/WATER HANDLING

Courtesy of JL Izzo Jr, MD.

Signs and Symptoms

- **No symptoms** – many people are unaware they have hypertension unless accidentally found



Signs and Symptoms

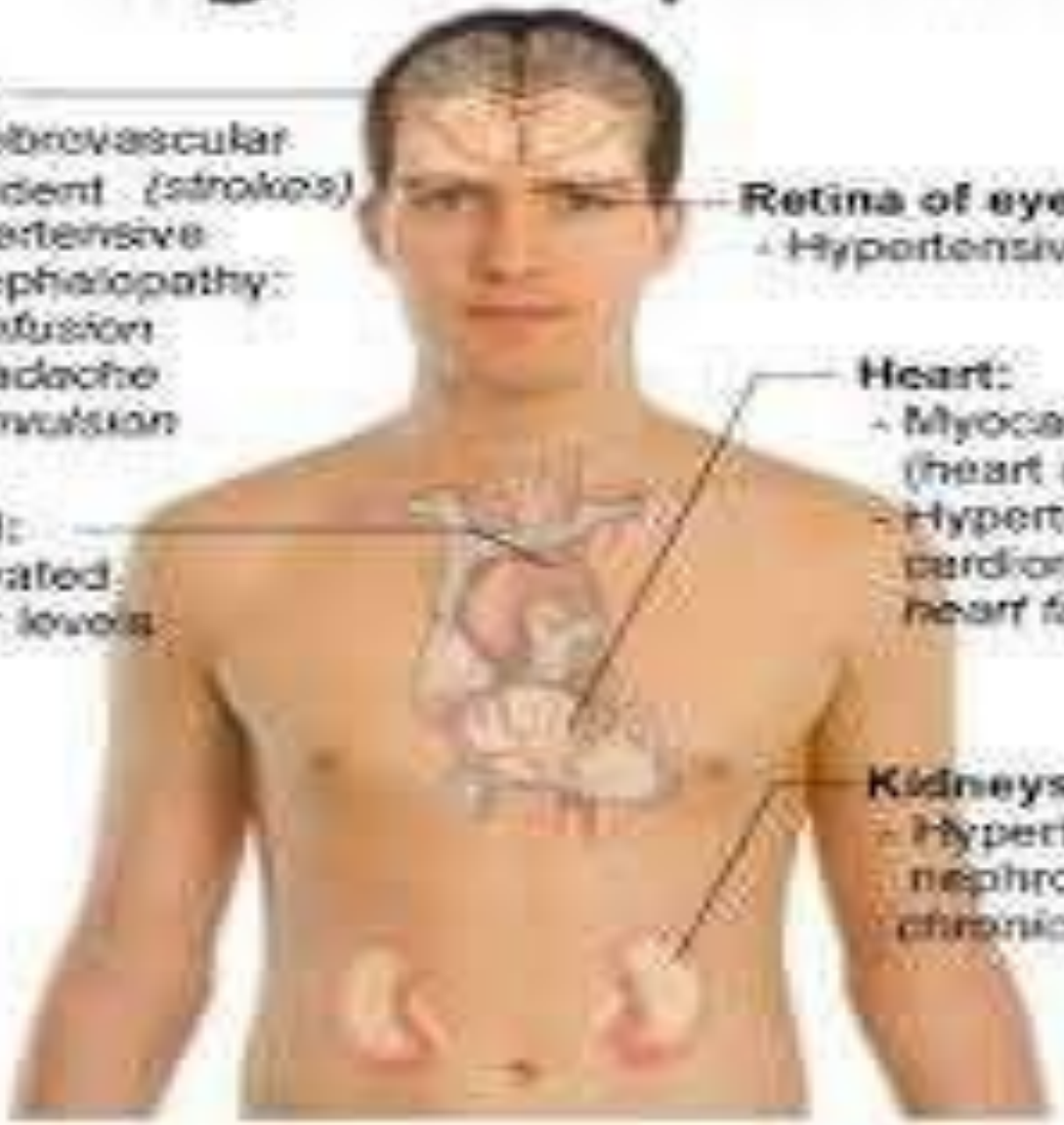
- **Non–specific symptoms – mild symptoms**
- Headache
- Tinnitus
- Dizziness
- Confusion
- Fatigue
- Shortness of breath
- Blurred vision
- Nausea
- Anxiety
- Nose bleeds/Epistaxis
- Heart palpitations
- Flushed skin
- Pale skin
- Chest pain
- Rapid bounding pulses

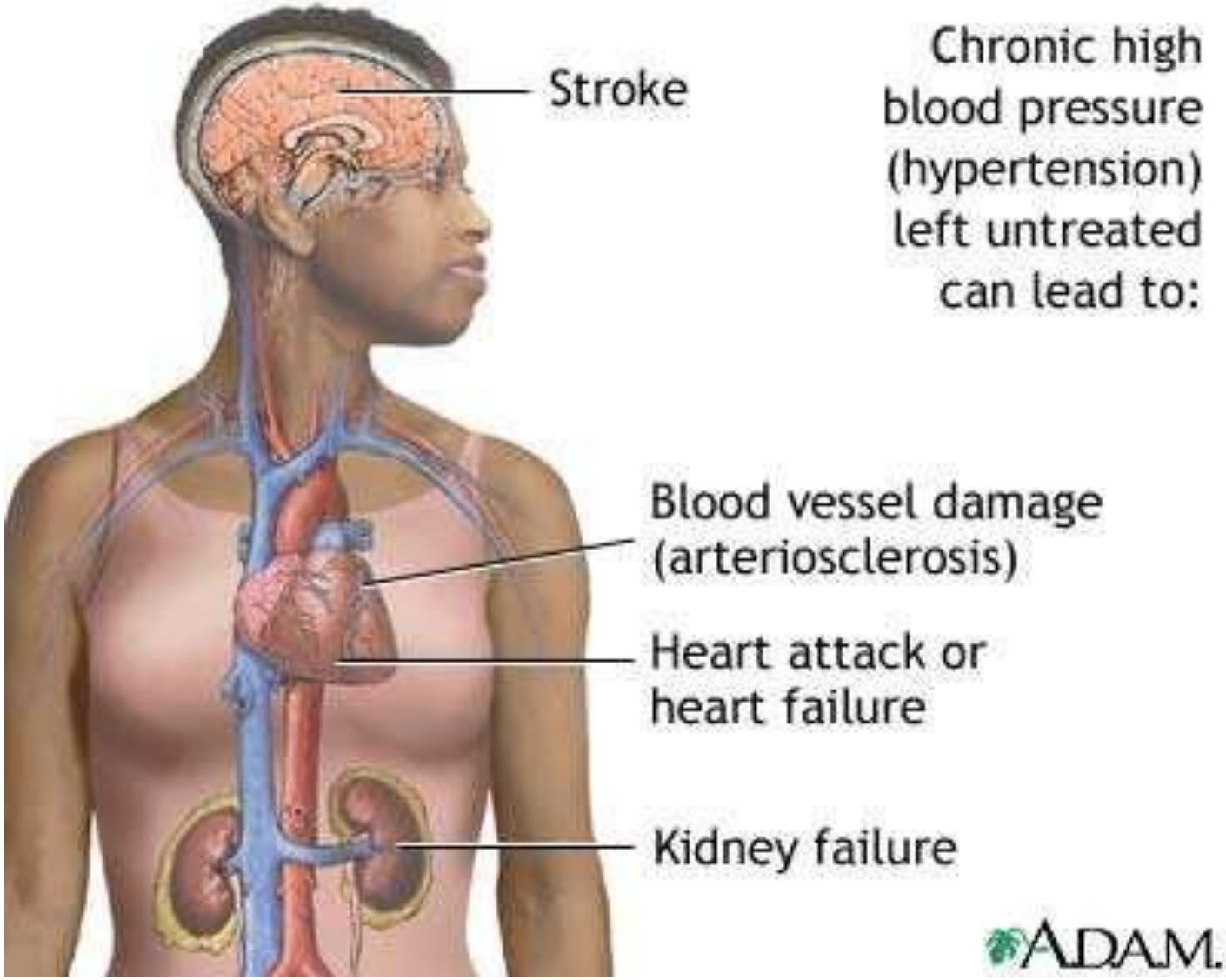
Complications of hypertension

- The target organs are the:
  - Brain- stroke
  - Eyes- retinopathy
  - Heart- heart failure
  - Blood vessels- arteriosclerosis
  - Kidneys- kidney failure

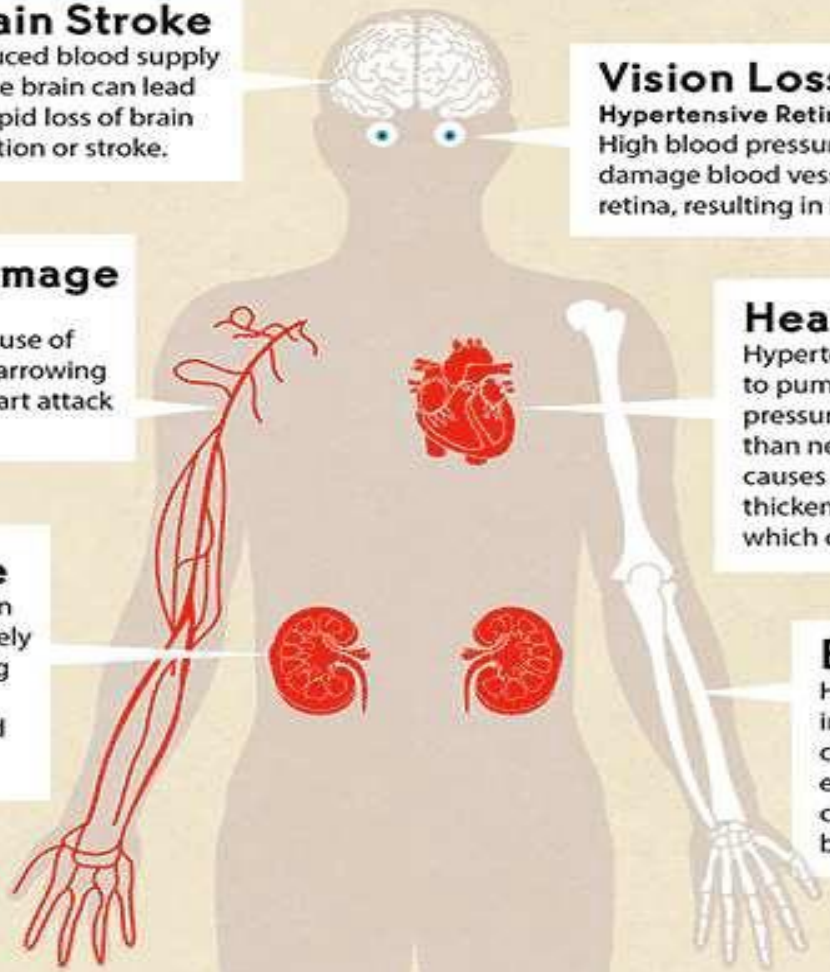
Main complications of persistent

High blood pressure




Stroke
Chronic high blood pressure (hypertension) left untreated can lead to:
Blood vessel damage (arteriosclerosis)
Heart attack or heart failure
Kidney failure
A.D.A.M.

Complications of Hypertension



Brain Stroke
Reduced blood supply to the brain can lead to rapid loss of brain function or stroke.

Vision Loss
Hypertensive Retinopathy
High blood pressure can damage blood vessels in the retina, resulting in loss of vision.

Blood Vessel Damage
Atherosclerosis
Hypertension is a leading cause of atherosclerosis, the artery-narrowing process that can result in heart attack and stroke.

Heart Attack
Hypertension causes the heart to pump against high blood pressure, making it work harder than necessary. Over time, this causes the heart muscle to thicken, restricting blood flow which can lead to heart failure.

Kidney Failure
Damaged blood vessels in the kidneys can't effectively filter your blood, resulting in a dangerous accumulation of fluid and waste.

Bone Loss
High blood pressure may increase the amount of calcium in your urine. That excessive elimination of calcium may lead to loss of bone density (osteoporosis).

FASTMED URGENT CARE

Diagnosis

1. History taking
2. Physical examination
3. Laboratory studies

- TBC
- Urinalysis
- K+, Na+ levels
- Fasting blood glucose level
- Serum cholesterol level
- BUN
- Serum creatinine levels

- 4. ECG
- 5. CXR

Diagnosis

- **Hemoglobin/hematocrit**: assesses relationship of cells to fluid volume (viscosity) and may indicate risk factors such as hypercoagulability, anemia.
- **Blood urea nitrogen (BUN)/creatinine**: Provides information about renal perfusion/function.
- **Glucose:** Hyperglycemia (diabetes mellitus is a precipitator of hypertension) may result from elevated catecholamine levels (increases hypertension).

Diagnosis

- **Lipid profile:** Elevated level may indicate predisposition for/presence of atheromatous plaques.
- **Urinalysis:** May show blood, protein, or white blood cells; or glucose suggests renal dysfunction and/or presence of diabetes.

Management of hypertension

- Antihypertensive drugs – act by lowering blood pressure
- Groups of antihypertensive drugs:
    - ACE inhibitors (captopril, lisinopril)
    - Angiotensin II receptor antagonist (losartan)
    - Calcium channel blockers (amlodipine)
    - Diuretics (hydrochlorothiazide, furosemide)
    - Alpha blockers (prazoscin, teraszocin)
    - Beta blockers (atenolol, propranolol)

Nursing management of hypertension

- **Nursing priorities:**
- Maintain/enhance cardiovascular functioning.
- Prevent complications.
- Provide information about disease process

Nursing interventions

- Monitor and record BP
- Provide calm, restful surroundings
- Minimize environmental activity and noise.
- Limit the number of visitors and length of stay
- Monitor response to medications to control blood pressure.
- Administer medications as indicated
- Assist patient to identify specific stressors and possible strategies for coping with them.

Patient education

- Weight reduction
- Aerobic exercises (e.g. walking)
- Reducing sugar intake
- Reducing sodium (salt)
- Fruits, vegetables
- Low fat or fat free food
- Stop smoking
- Reducing stress (relaxation therapy – meditation)

Hypertensive Crisis

Definition

- A hypertensive crisis is a sudden elevation in blood pressure to 180/120 or higher.
- It is also known as acute hypertension or malignant hypertension.
- A hypertensive crisis is a medical emergency.
- It could lead to organ damage or be life-threatening.

Types of hypertensive crises

1. **Hypertensive emergencies**

2. **Hypertensive urgencies**.

Types of hypertensive crises

1. **Hypertensive emergencies (SBP >180 mm Hg, DBP >120 mm Hg)** pose a risk of end organ damage & are life-threatening. The target organ can be the heart (acute MI), the brain (stroke) or kidneys (renal failure)

- Conditions associated with hypertensive emergencies are:
  - Pregnancy induced hypertension
  - Intracranial hemorrhage
  - Pheochromocytoma

Types of hypertensive crises

2. **Hypertensive urgencies (SBP <180 mm Hg, DBP <120 mm Hg)** are characterized by a serious elevation in BP but DO NOT put the patient at risk for end-organ damage.

- Hypertensive urgencies may present with:
  - Severe headache
  - Nose bleed
  - Shortness of breath
  - Severe anxiety

Etiology

- Hypertensive crises are precipitated by noncompliance with or inadequate drug therapy.
- In a patient with no known history of HTN causes can be due to;-
  - Acute renal failure
  - Acute CNS events e.g. SAH, ICH or a stroke
  - Eclampsia
  - Pheochromocytoma
  - Drug induced HTN; illegal drugs, cocaine, amphetamine

Clinical manifestation

- Blurred vision
- Increasing confusion
- Seizure
- Chest pain
- Dyspnea
- oedema

Management

- **Hypertensive Urgencies:**
- Optimize (or restart) their current treatment regimens
- Consider oral short-acting agents (e.g. captopril, labetalol, clonidine)
- Do not treat aggressively with intravenous drugs or oral loading
- Ensure that the patient has a follow-up appointment within a few days

Management

- **Hypertensive emergencies:**
- Reduce BP immediately with intravenous drugs
- Monitor BP continuously in an ICU (invasively)
- Drug therapy:
  - Vasodilators: sodium nitroprusside, nicardipine, fenoldopam mesylate, nitroglycerin, enalapril, hydralazine
  - Adrenergic blockers: labetalol, esmolol, phentolamine

Management

- **Hypertensive emergencies:**
- Aim to decrease BP gradually to avoid cerebral, coronary & renal ischemia.
- Aim for 25% reduction of the mean arterial blood pressure within minutes to 1 hour
- Then if the patient is stable, reduce BP to 160/100-110 mm Hg over 2-6 hours and normalize within 24-48 hours.
- Careful monitoring of neurological deterioration related to the lower BP is mandated in all situations

Nursing Diagnoses

1. Anxiety related to patient's current condition
2. Activity intolerance related to imbalance between oxygen supply & demand
3. Impaired tissue perfusion related to increased afterload/ ventricular hypertrophy
4. Knowledge deficit regarding condition, medical regimen, recommended change in lifestyle related to lack of information

Summary

- Described hypertension
- Described the pathophysiology
- Stated the causes/ etiology
- Described the management of HTN
- Defined hypertensive crisis and its management

THE END!!