

ATHEROSCLEROSIS

*PAD, CAROTID STENOSIS,
ACUTE LIMB ISCHEMIA*

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ATHEROSCLEROSIS

**PAD, CAROTID STENOSIS,
ACUTE LIMB ISCHEMIA**

OBJECTIVES:

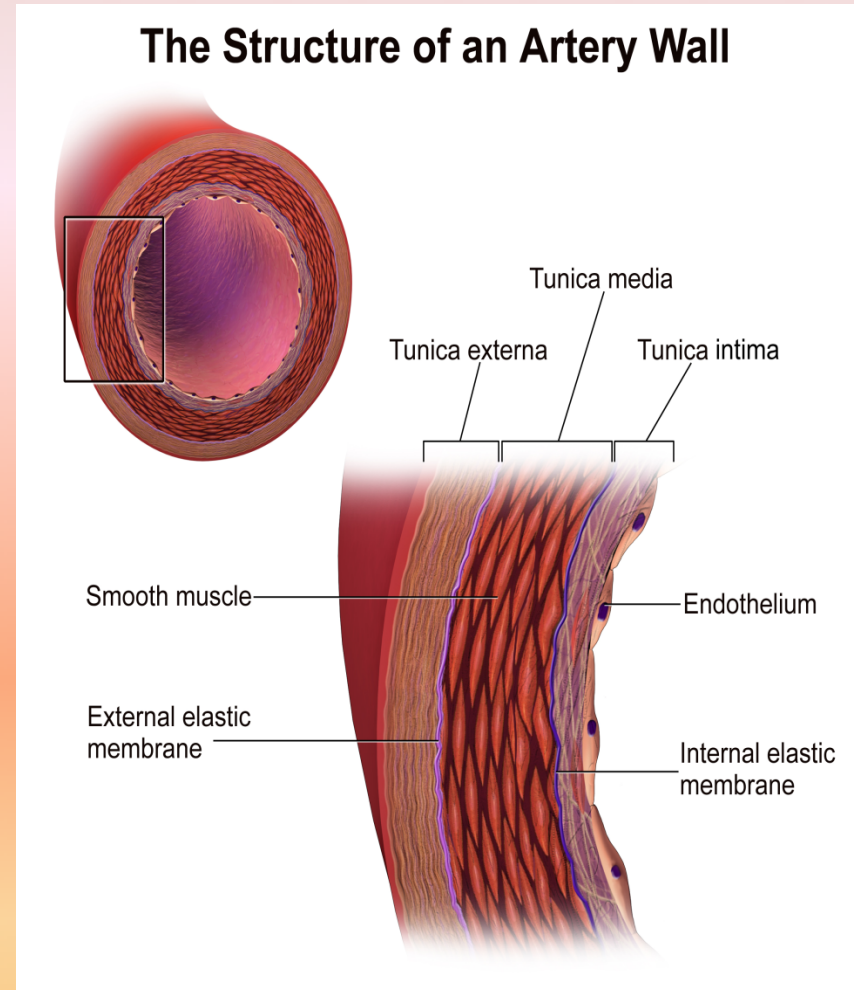
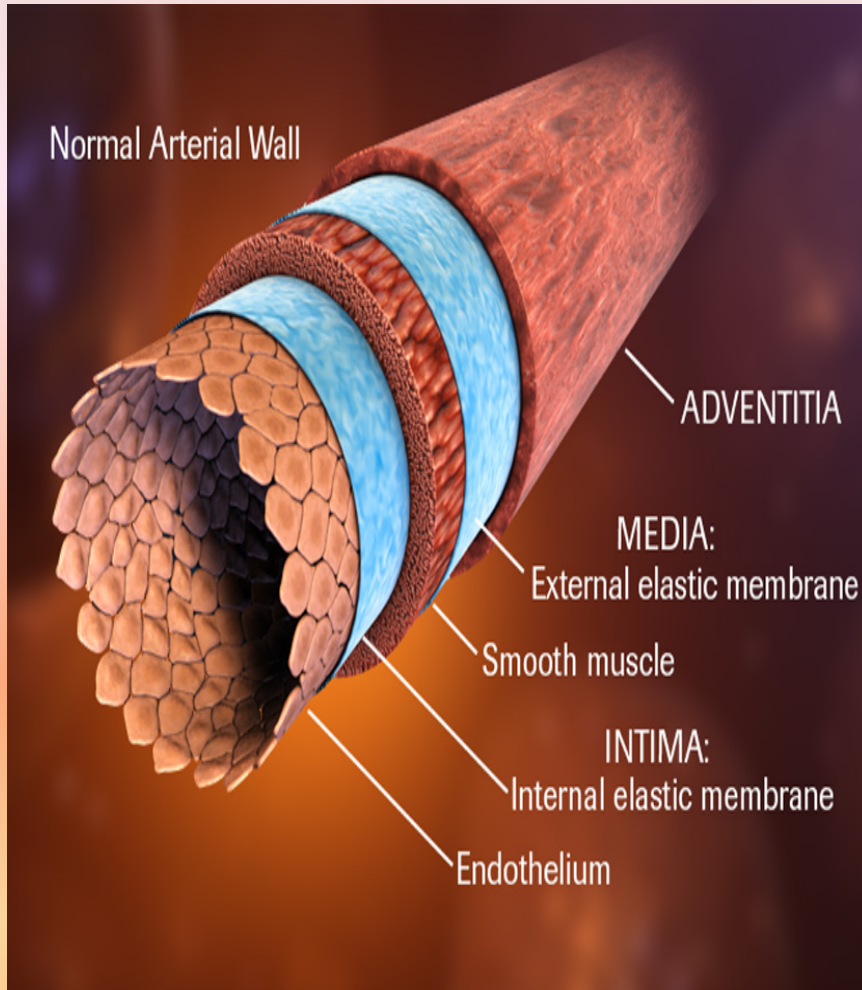
- ***Review of histo-anatomy of a blood vessel.***
 - layers of a blood vessel.***

- ***Pathophysiology of atherosclerosis.***
 - definition of atherosclerosis.***
 - hemodynamic facts.***
 - risk factors of atherosclerosis.***
 - steps of atherosclerosis.***

- ***Peripheral ischemia.***
 - definition.***
 - signs & symptoms of acute ischemia.***
 - signs & symptoms of chronic ischemia.***
 - anatomical landmarks of peripheral pulses.***

- ***Carotid artery disease.***
 - anatomy.***
 - risk factors.***
 - history taking.***
 - definition of TIA.***

HISTO/ANATOMY



ATHEROSCLEROSIS

PATHOPHYSIOLOGY

Definition..

- A process of **progressive** thickening and hardening of the walls of medium-sized and large arteries as a result of fat deposits on their inner lining.

Heamodynamic facts..

- The endothelial cells that line blood vessels provide an active, dynamic interface between the blood stream and the arterial wall.
- provide a semi-permeable barrier that regulates the exchange of fluid, nutrients, gases, and waste between the blood and tissues.
- provide unique surface that generally allows the cellular elements of blood to flow with adhering to the vessel lining .

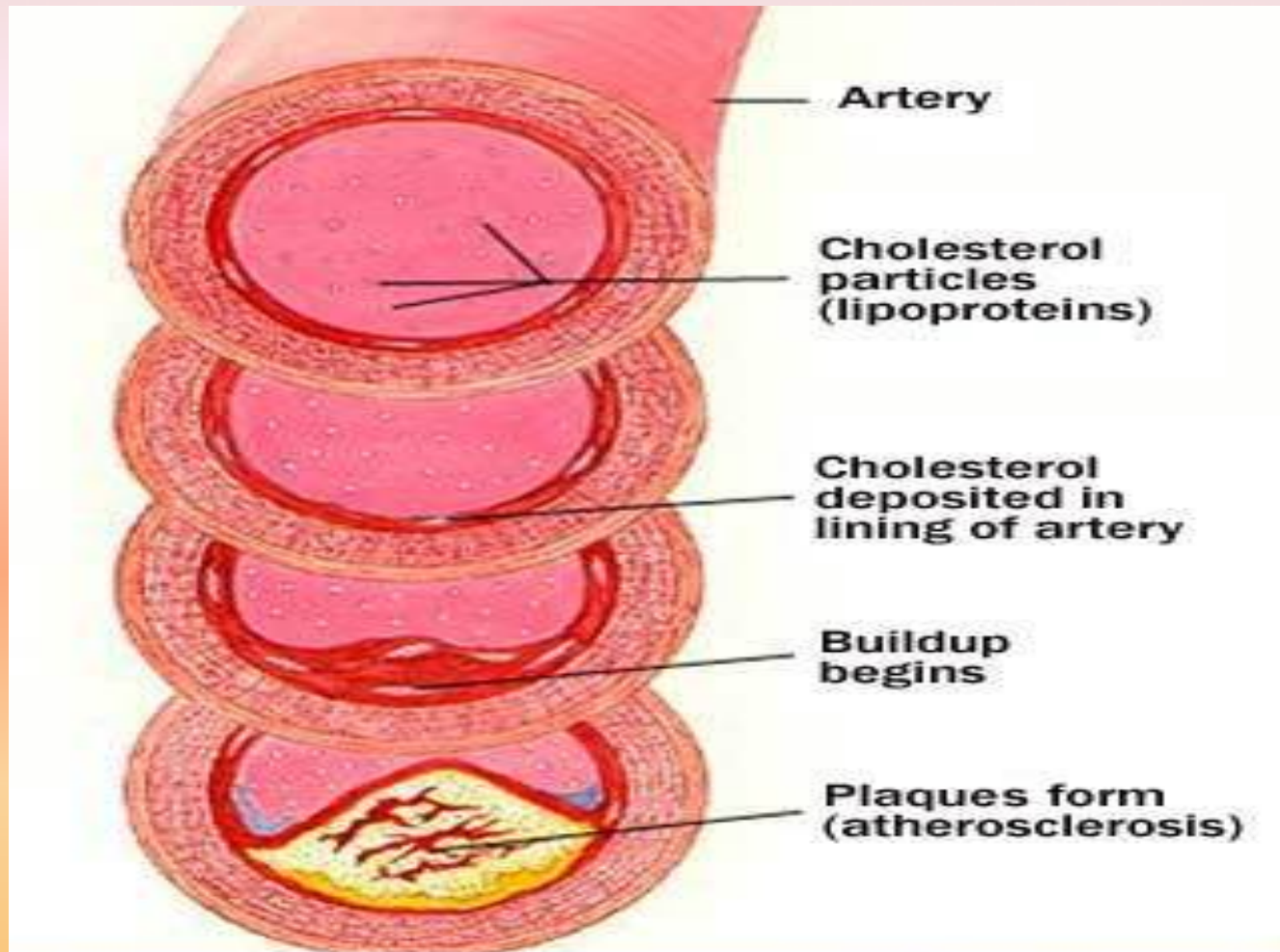
- Endothelial cells also regulate constriction and relaxation of vessels by releasing vasodilatory molecules (e.g., nitric oxide (NO) and prostacyclin (PGI₂) and vasoconstrictive molecules (endothelin and angiotensin-II).
- When injury occurs, endothelial cells secrete cytokines that trigger and maintain an inflammatory response.

RISK FACTORS OF ENDOTHELIAL INJURIES..

- Physical injury or stress as a result of direct trauma or **hypertension** .
- Turbulent blood flow, for example, where arteries branch.
- Circulation of reactive oxygen species (free radicals), e.g., from **smoking** or air pollutants.
- **Hyperlipidemia** (high blood concentrations of LDL or VLDL).
- Chronically **elevated blood glucose** levels.
- **Homocysteinemia**, which results from an inherited metabolic defect that leads to very high levels of the homocysteine, a metabolite of methionine; high concentrations are toxic to the endothelium.

ATHEROSCLEROSIS PATHOPHYSIOLOGY cont.

Atherosclerosis is a disease process which is triggered by sometimes subtle physical or chemical insults to the endothelial cell layer of arteries.



(1) TOXIC INSULT

(modified LPL, hemodynamic insults, infectious agents, oxidative stress)



(2) ENDOTHELIAL DYSFUNCTION

(increase adherence, permeability, hypercoagulability, expression of adhesion molecules, release of chemokines)

(3) INFLAMMATORY RESPONSE

(adhesion to endothelium, migration to subendothelium, release of cytokines, platelet activation)



(8) THROMBUS FORMATION

(rupture of fibrous cap or ulceration of plaque, continuing influx & activation of macrophages)



(5)



(4) FOAM CELL FORMATION

(engulfing of LDL by macrophages)

FATTY STREAKS

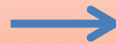
(aggregation of lipid-rich macrophages & T-lymphocytes)

(6) INTERMEDIATE LESION

(layers of macrophages & smooth muscle cells)

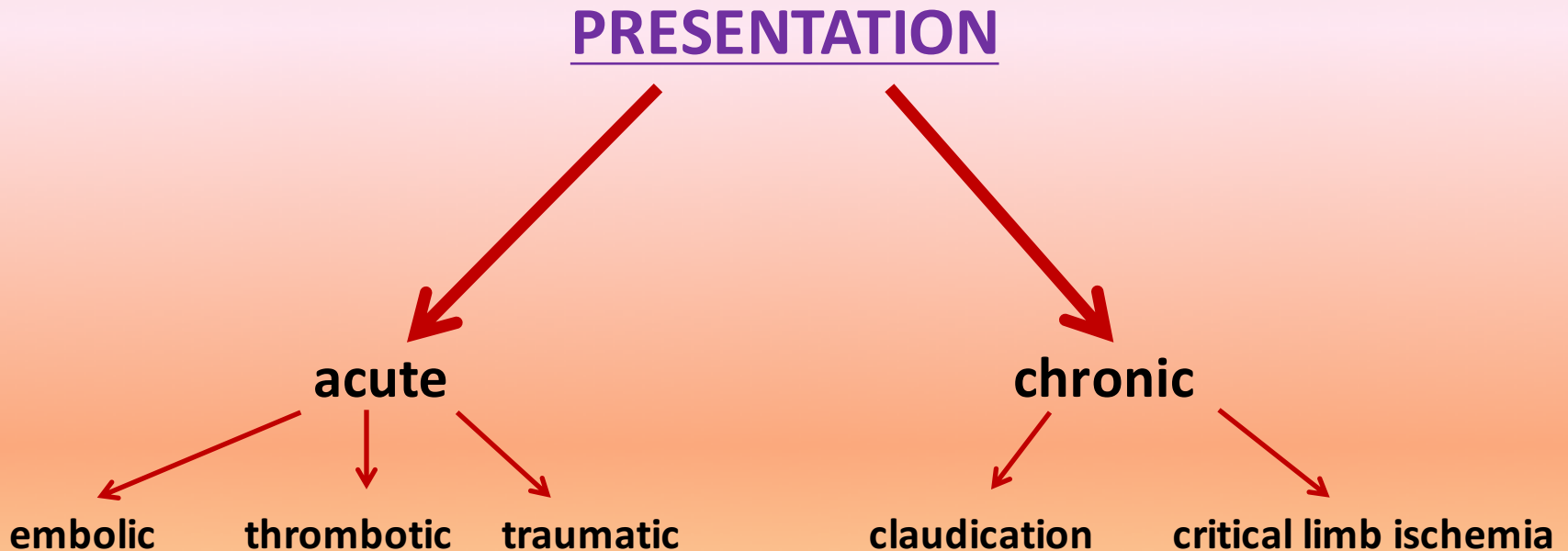
(7) FIBROUS PLAQUE

(progression of intermediate lesion with fibrous cap formation, mixture of inflammatory & smooth muscle cells, intra. & extracellular lipid, increase matrix proteins & necrotic cellular debris)



PERIPHERAL ARTERIAL DISEASE

It is the sequence of atherosclerosis of peripheral vessels excluding the carotids and coronaries..



PERIPHERAL ARTERIAL DISEASE

Risk Factors..

- Hypertension.
- Diabetes.
- Hyperlipidemia.
- Smoking.
- Familial tendency.
- Obesity.
- Gender.



PERIPHERAL ARTERIAL DISEASE

HISTORY..

- ✓ Pain..
 - location..
 - precipating & aggrevating factors..
 - frequency & duration..
- ✓ Rule out other causes of pain of lower limb..
- ✓ Patients with co-morbid conditions and can not walk, present late with rest pain or gangrene..
- ✓ Drug/medical history..
- ✓ Surgical history..
- ✓ Family history: first degree relative with abdominal aortic aneurysm..

PERIPHERAL ARTERIAL DISEASE



Claudication, defined as reproducible ischemic muscle pain, is one of the most common manifestations of peripheral vascular disease



Rest pain

PERIPHERAL ARTERIAL DISEASE

Relationships between pain location and site of occlusion

- Buttock & hip----Aortoiliac disease..
 - *Lericq syndrome triad (claudication, absent femoral pulses, and erectile dysfunction)
- Thigh---Aortoiliac or common femoral artery..
- Upper two-thirds of the calf---Superficial femoral artery..
- Lower one-third of the calf---Popliteal artery..
- Foot claudication---Tibial arteries..

PERIPHERAL ARTERIAL DISEASE

HISTORY..

❖ Vascular review of symptoms..

- TIA..
- Difficulty in speech or swallowing..
- Dizziness / drop attacks..
- Blurred vision..
- Arm fatigue..
- Pain in abdomen after eating..
- Renal insufficiency (poorly controlled DM+/- HTN)
- Impotence..
- Claudication/rest pain/tissue loss..

PERIPHERAL ARTERIAL DISEASE

PHYSICAL EXAMINATION..

- Inspection:
 - Change in color..
 - Signs of ischemia..
 - Burger's test..
 - Capillary filling..
 - Venous refilling..
 - Pregangrenous /gangrenous part examination..



PERIPHERAL ARTERIAL DISEASE

General Physical Examination

Atrophy of calf muscles, loss of extremity hair, and thickened toenails are clues to underlying peripheral arterial occlusive disease (PAOD).



PERIPHERAL ARTERIAL DISEASE

6 Ps

- **Paresthesia**

- **Pain**

- **Pallor**

- **Pulselessness**

- **Poikilothermia**

impaired regulation of body temperature, with the temperature of the limb usually cool, reflecting the ambient temperature

- **Paralysis**

PERIPHERAL ARTERIAL DISEASE

PHYSICAL EXAMINATION..

➤ Palpation:

- Skin temperature..
- Venous refilling..
- Peripheral pulses..
- Joint movements /muscle strength..
- Sensation..

➤ Auscultation:

- Bruits..

PERIPHERAL ARTERIAL DISEASE



Pulses

Palpation of pulses from the abdominal aorta to the foot,
Auscultation for bruits in the abdominal and pelvic regions
Absence of a pulse signifies arterial obstruction proximal
to the area palpated.

PERIPHERAL ARTERIAL DISEASE

Ischemic ulcer



Venous ulcer



Neuropathic ulcer

Gangrene



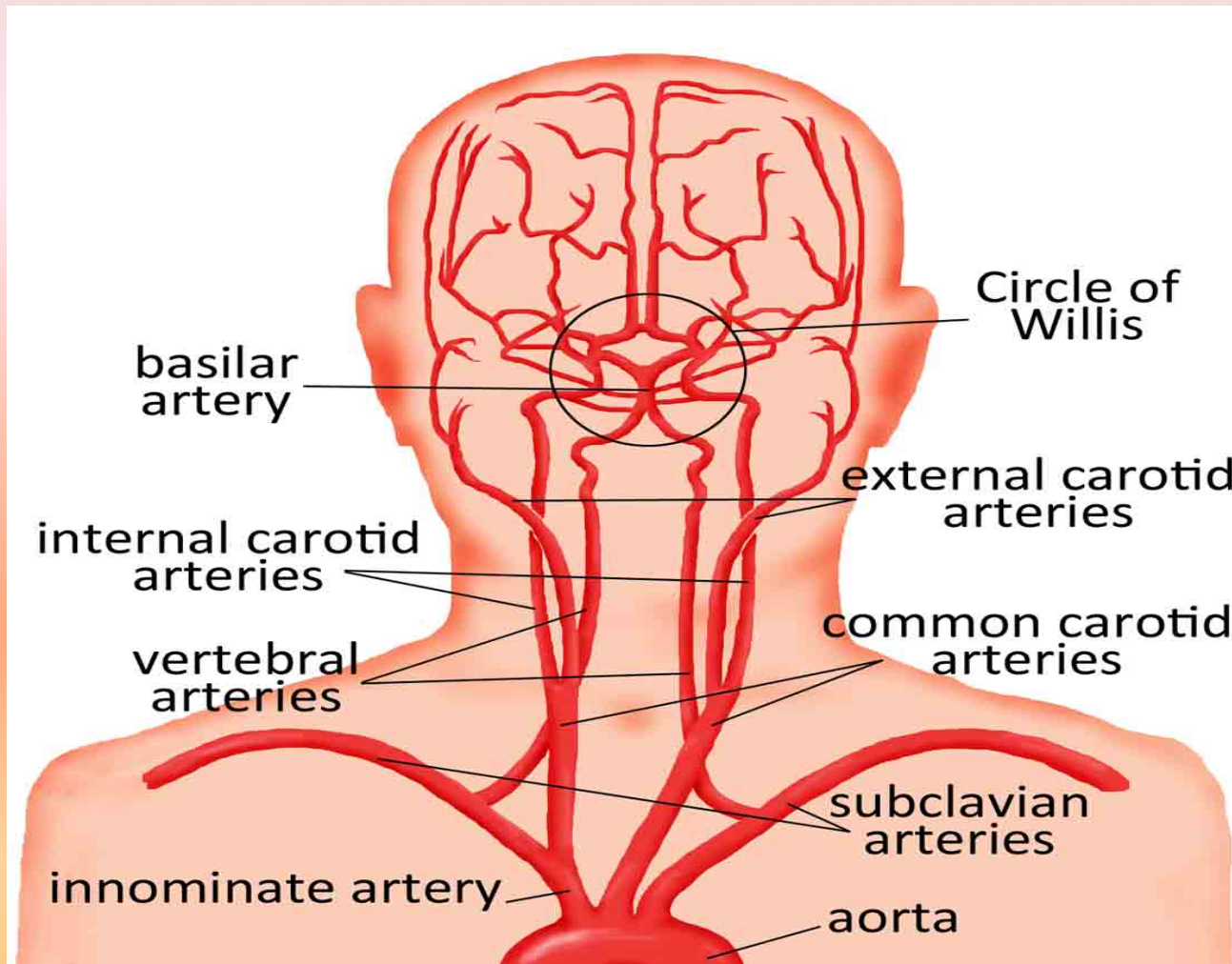
PERIPHERAL ARTERIAL DISEASE

Clinical presentation

Fontaine classification

Stage	Clinical
I	Asymptomatic
IIa	Mild claudication
IIb	Moderate to severe claudication
III	Critical limb ischemia
IV	

CAROTID ARTERY DISEASE



CAROTID ARTERY DISEASE

- *Risk factors..*
- *History..*
- *Symptoms & signs..*

QUESTIONS?