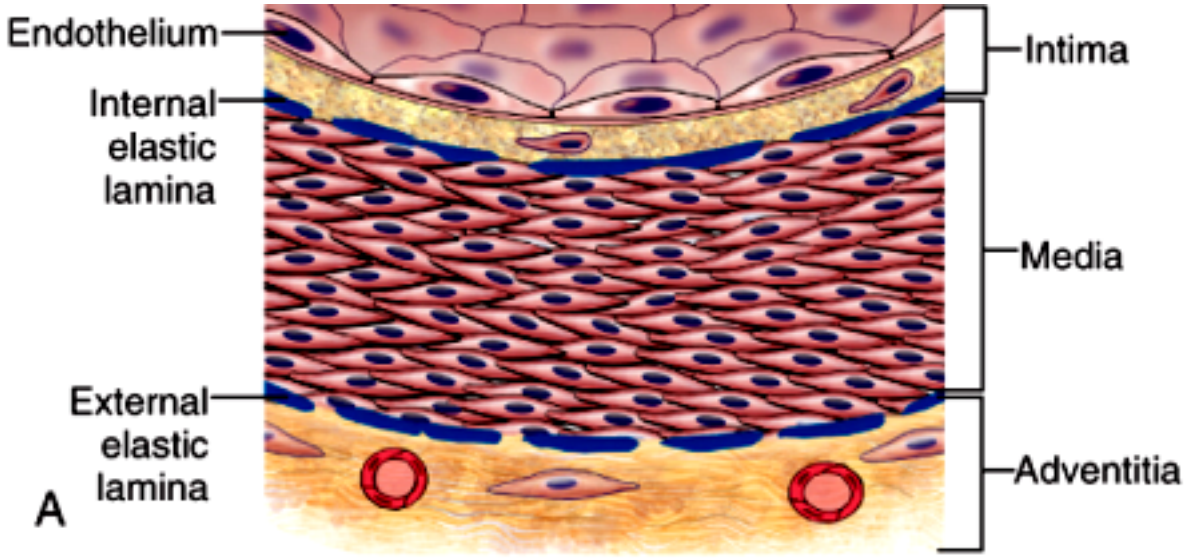
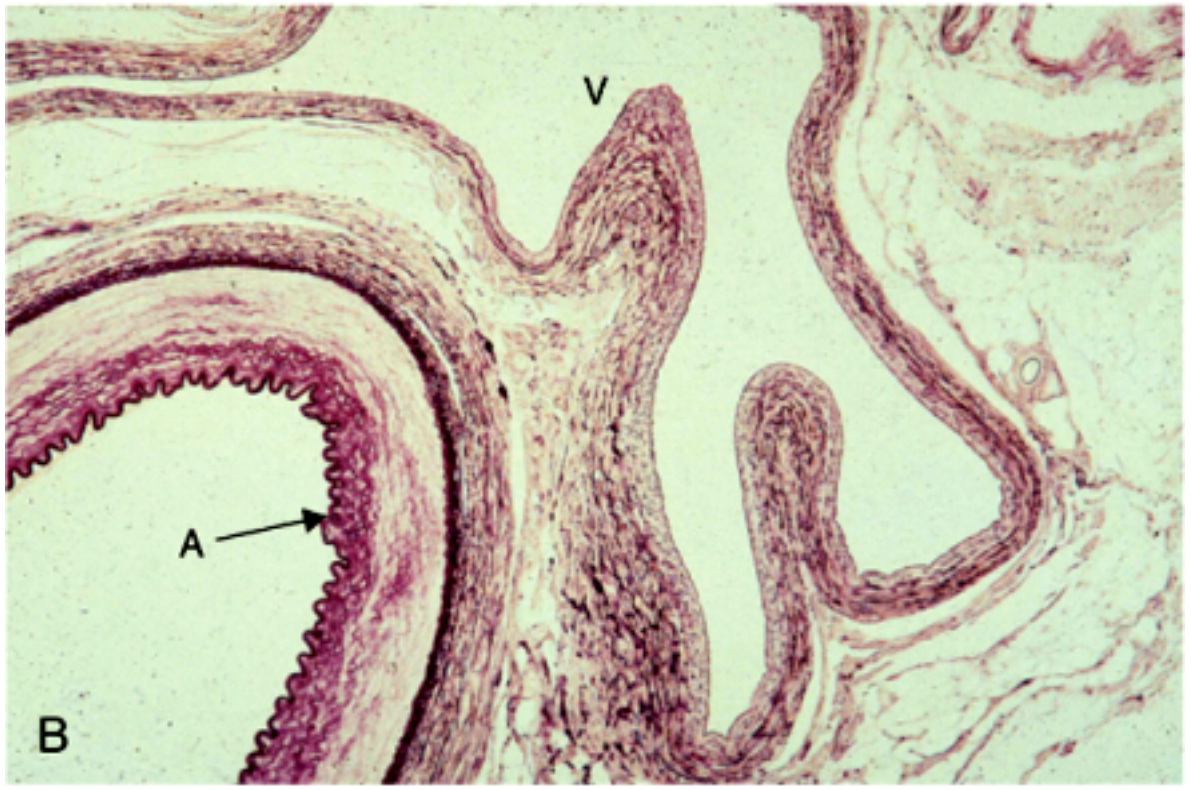
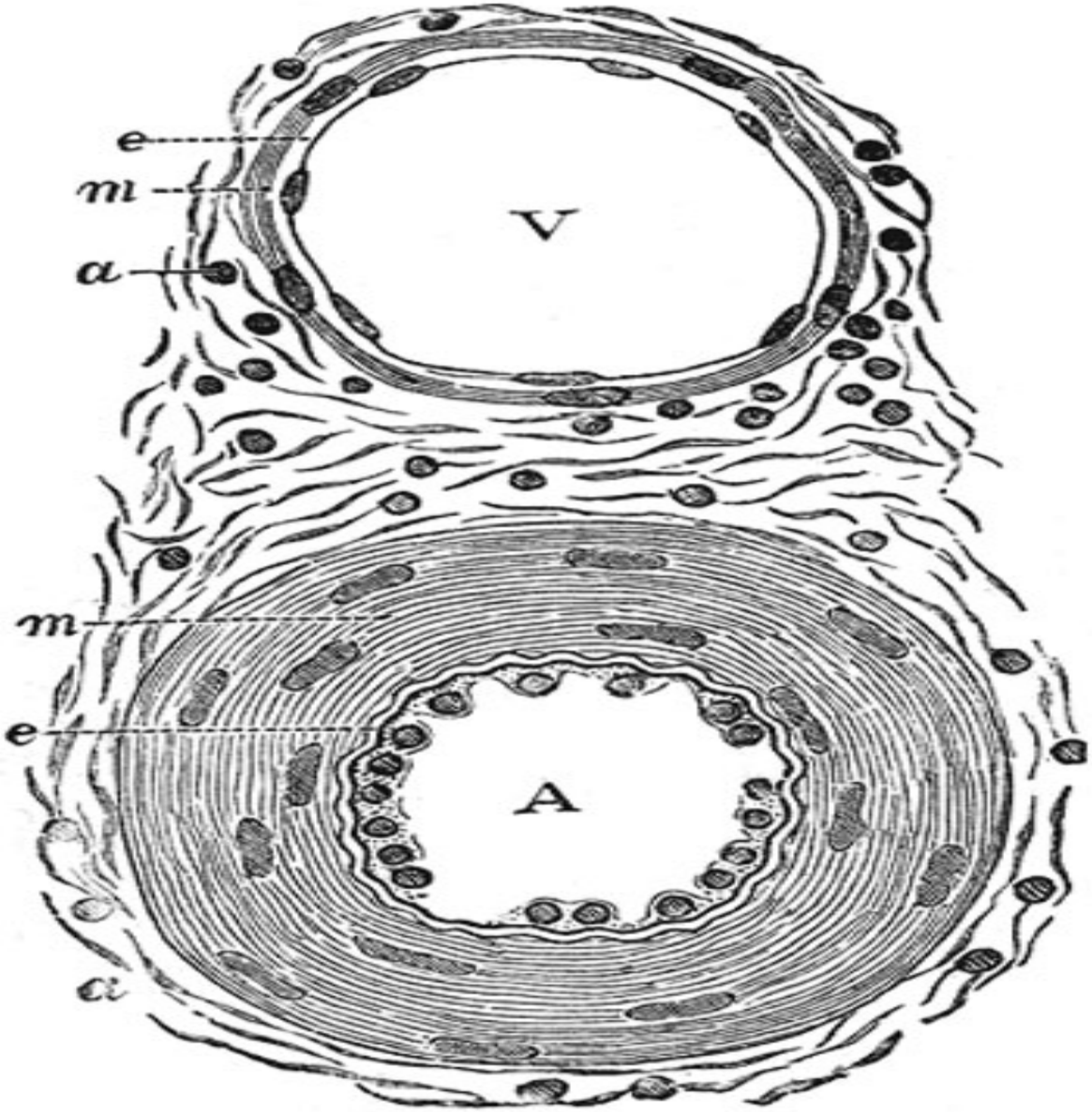
Normal
blood vessels
A= artery
V= vein





Artery (A) versus vein (V)

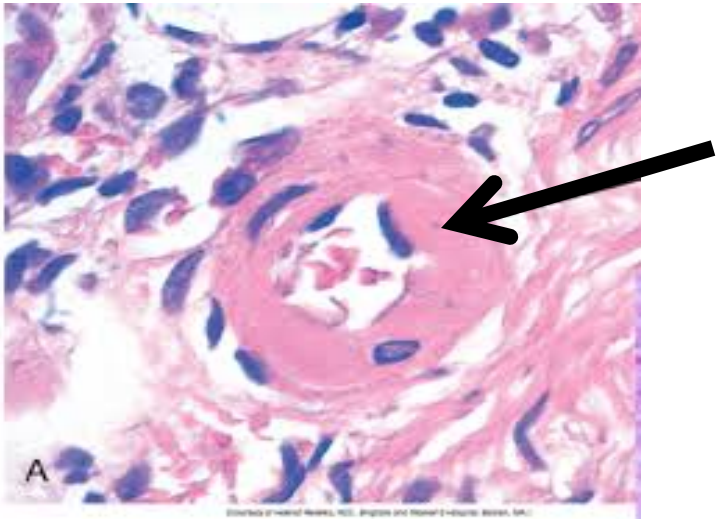


ARTERIOSCLEROSIS

- ***Arteriosclerosis*** **="hardening of the arteries"**
- **arterial wall thickening and loss of elasticity.**
- **Three patterns are recognized, with different clinical and pathologic consequences:**

1-Arteriolosclerosis

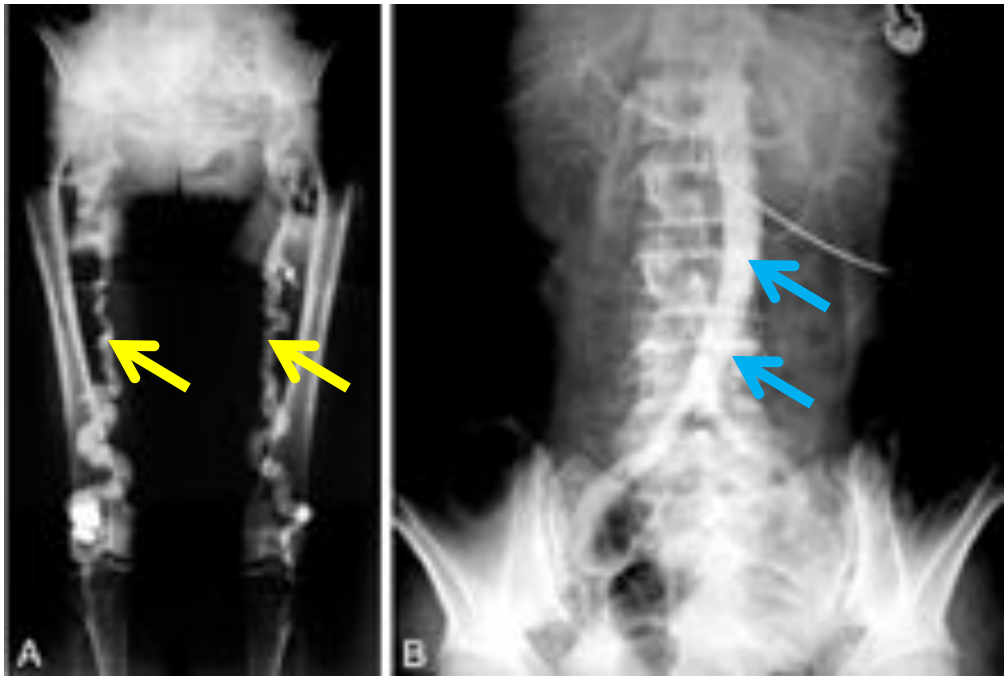
- **affects small arteries and arterioles**
- **associated with hypertension and/or diabetes mellitus**

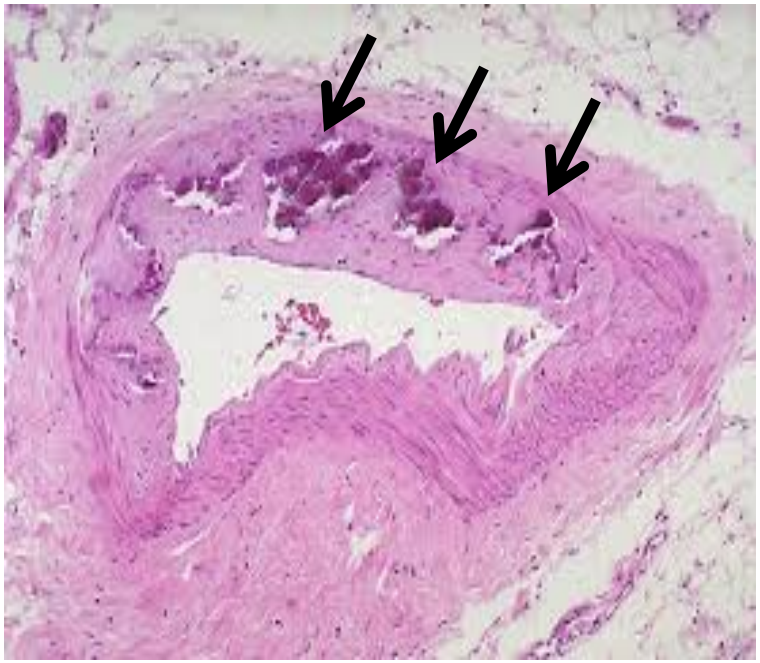


2- Mönckeberg medial calcific sclerosis

- **calcific deposits in muscular arteries**
- **typically in persons > age 50**
- **radiographically visible (x-rays, etc…)**
- **palpable vessels**
- **do not encroach on vessel lumen and are usually not clinically significant**

2-Mönckeberg medial calcific sclerosis





3-Atherosclerosis

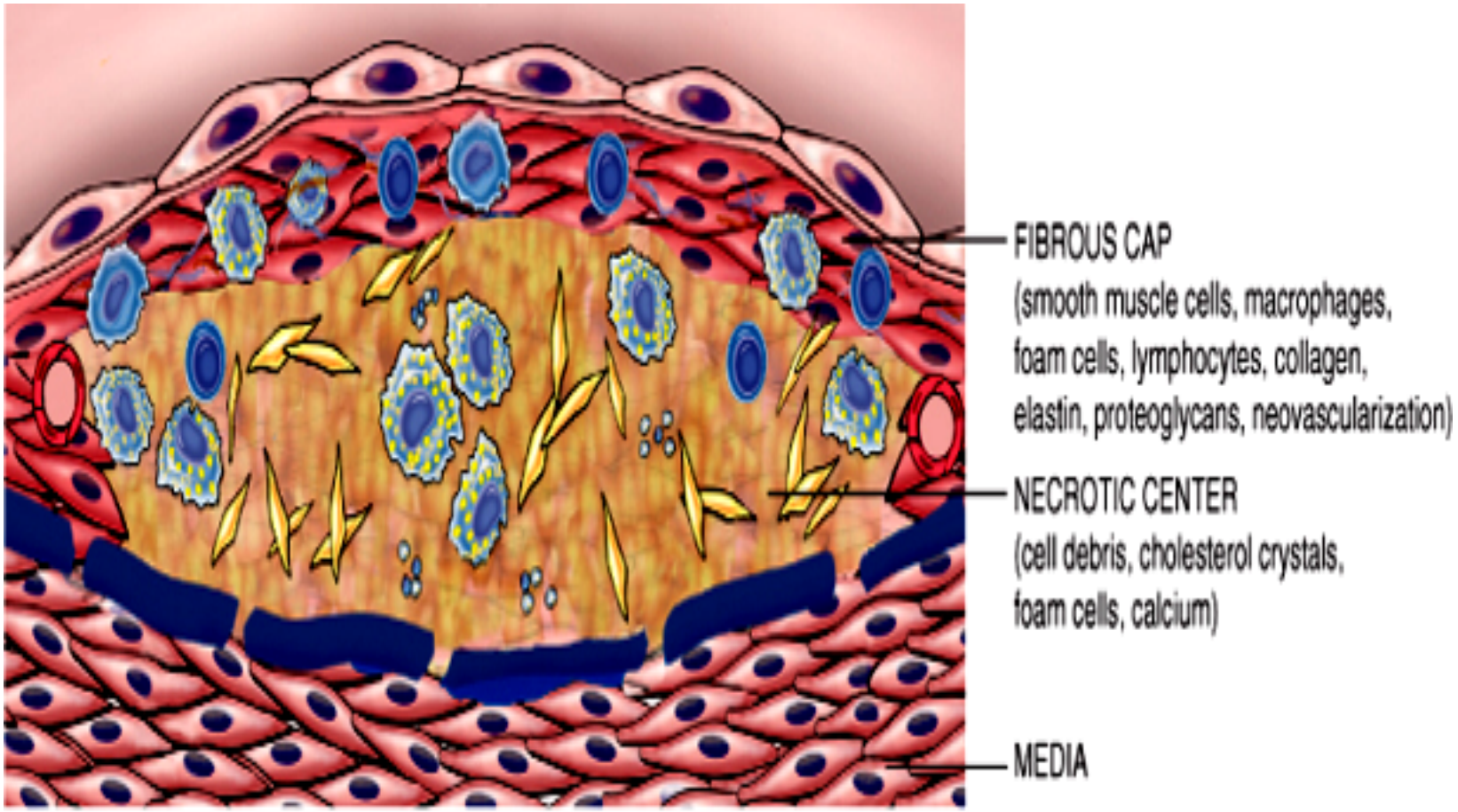
- **Greek word="gruel" ,"hardening,"**
- **most frequent and clinically important pattern of arteriosclerosis**
- **characterized by intimal lesions =*atheromas* (a.k.a. *atherosclerotic plaques*)**
- **atheromatous plaque = raised lesion with a core of lipid (cholesterol and cholesterol esters) covered by a firm, white fibrous cap**

Pathogenesis

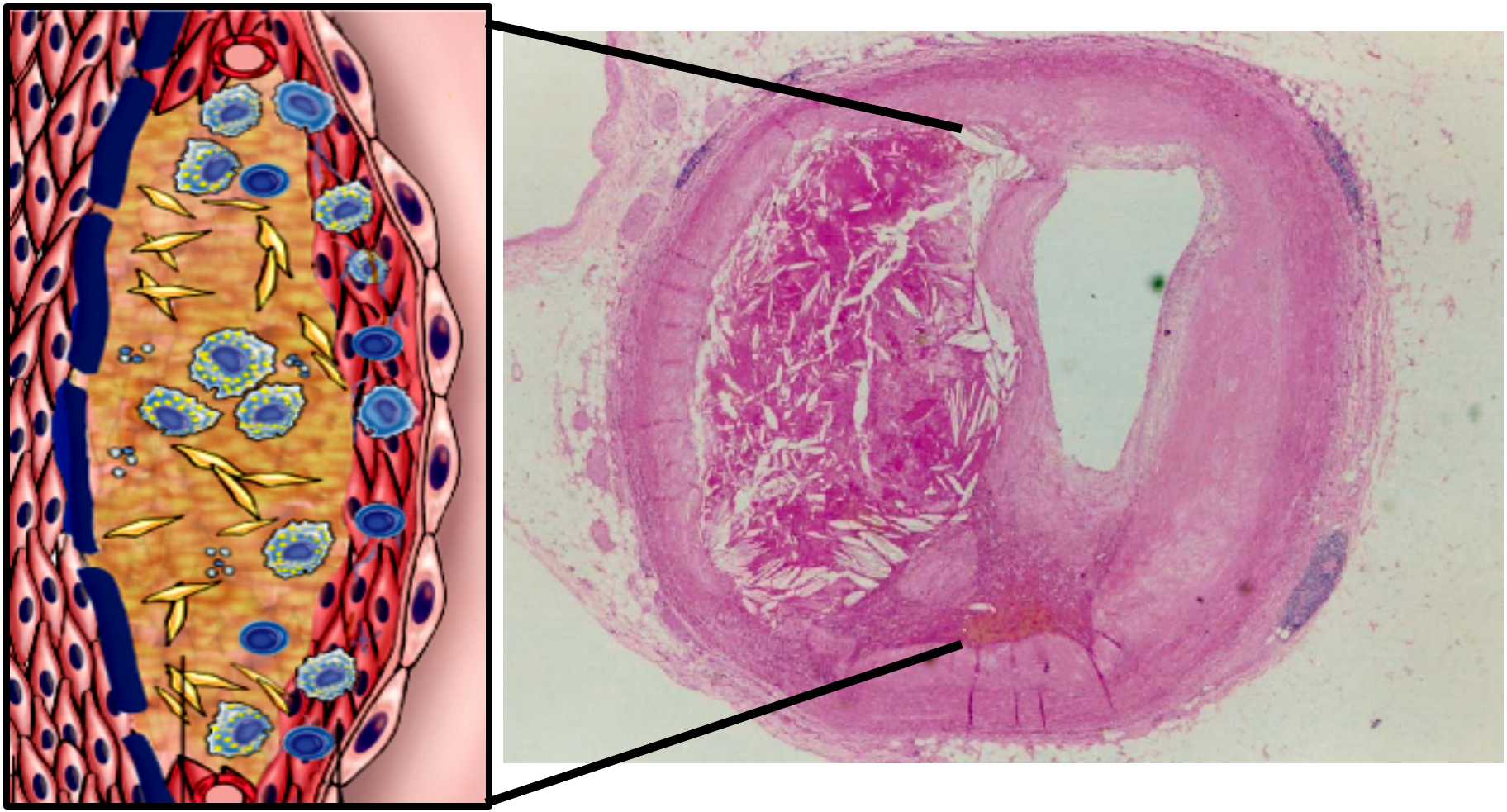
- **not fully understood**
- **? inflammatory process in endothelial cells of vessel wall associated with retained low-density lipoprotein (LDL) particles→ ? a cause, an effect, or both, of underlying inflammatory process**

- **initiation of inflammatory process→ LDL particles and their content are susceptible to oxidation by free radicals→ endothelial activation**

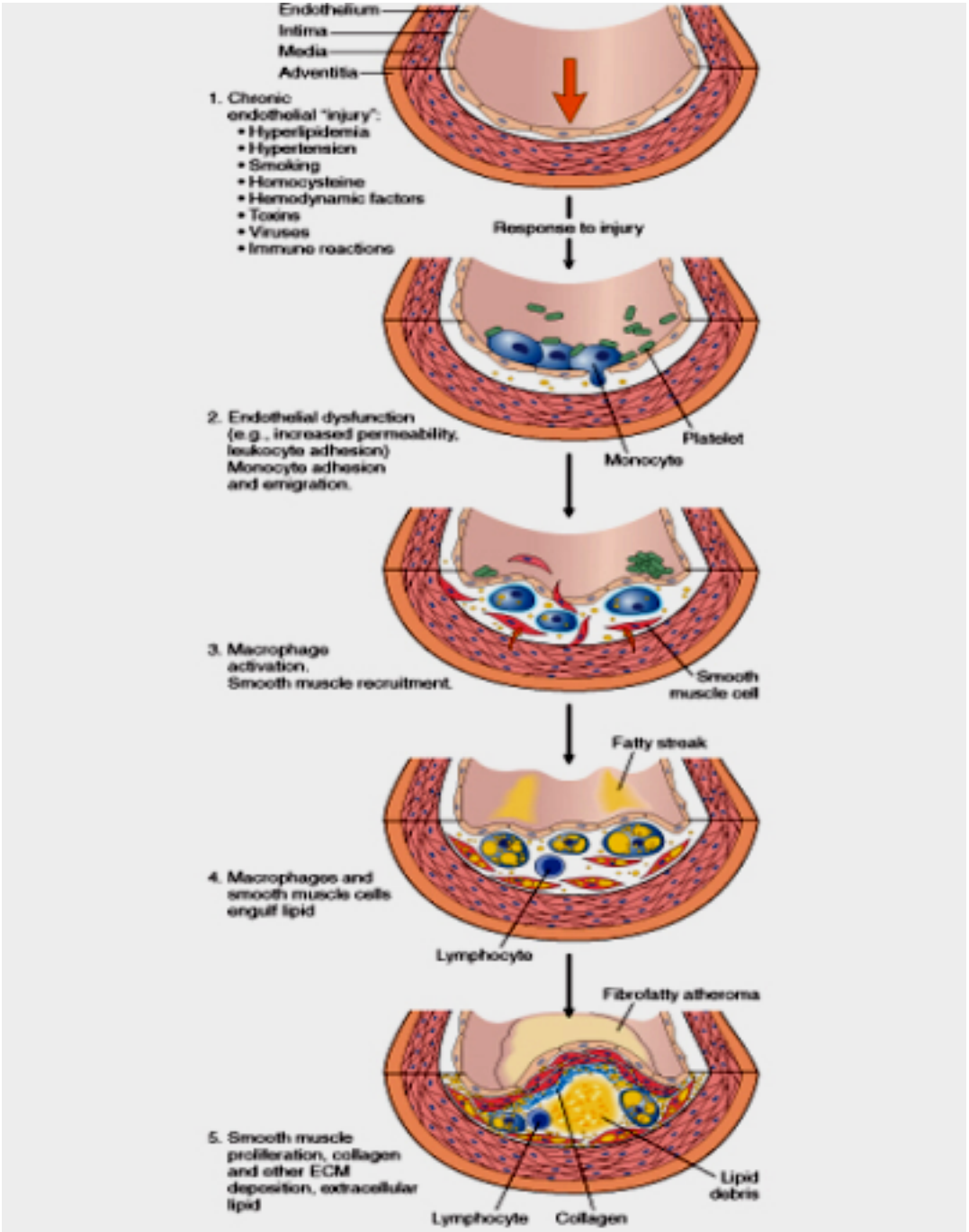
The major components of a well-developed intimal atheromatous plaque

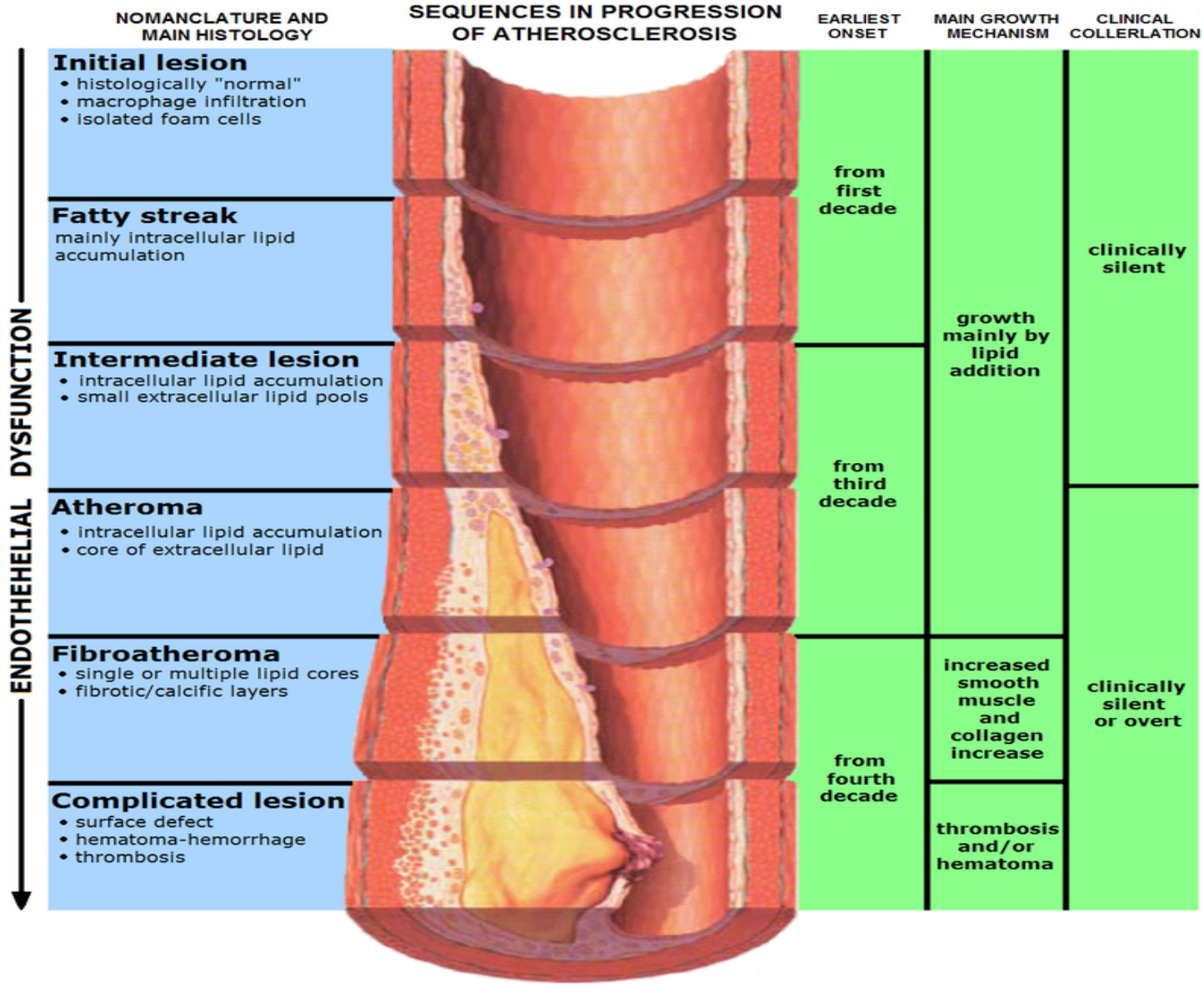


Atheromatous plaque

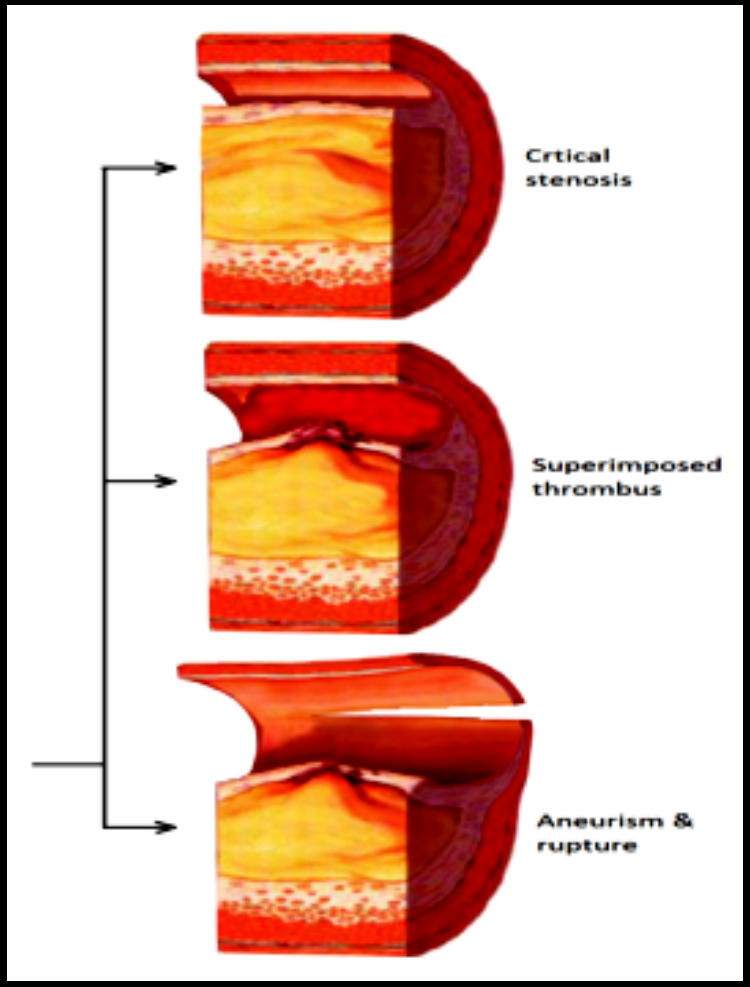


Formation of atheromatous plaque





Atherosclerosis progression



- **Epidemiology ….**
- ***Multiple risk factors have a multiplicative effect:*** **2 risk factors increase the risk 4X.**
- **E.g. if 3 risk factors are present (e.g., hyperlipidemia, hypertension, and smoking), the rate of myocardial infarction is increased 7X.**

Risk Factors for Atherosclerosis

Major Risks	Lesser, Uncertain, or Non-quantitated Risks
Non-modifiable	Obsesity
Increasing age	Physical inactivity
Male gender	Stress ("type A personality)
Family history	Postmenopausal estrogen deficiency
Genetic abnormalities	High carbohydrate intake
	Lipoprotein(a)
Potentially Controllable	Hardened (trans)unsaturated fat intake
Hyperlipidemia	
Hypertension	Chlamydia pneumoniae infection
Cigarette smoking	
Diabetes	
C-reactive protein	

Major Constitutional Risk Factors for atherosclerosis

- **Major Risks (*Nonmodifiable):***

*Increasing age

*Male gender

*Family history

*Genetic abnormalities

- ***Potentially Controllable/modifiable:***
- Hyperlipidemia
- Hypertension
- Cigarette smoking
- Diabetes
- C-reactive protein

1-age

- **ages 40 to 60, incidence of MI in men increases 5 x**
- **Death rates from IHD rise with each decade**

2-Gender

- **Premenopausal* → protected against atherosclerosis compared with age-matched men.**
- *** = unless they are otherwise predisposed by diabetes, hyperlipidemia, or severe hypertension.**
- **After menopause→ incidence of atherosclerosis-related diseases increases**

3-Genetics

- **familial predisposition is multifactorial.**
- **Either :**

1- familial clustering of other risk factors

- e.g. HTN or DM

or :

2- well-defined genetic derangements in lipoprotein metabolism

- e.g. familial hypercholesterolemia

Additional Risk Factors for atherosclerosis

- **20% of all cardiovascular events occur without any major risk factor**

1-Inflammation as marked by C-reactive protein

2-Hyperhomocystinemia

3-Lipoprotein a

4-Factors Affecting Hemostasis

- **Other Risk Factors**

1-lack of exercise

2-competitive, stressful lifestyle ("type A" personality)

3-obesity

4-Postmenopausal estrogen deficiency

5-High carbohydrate intake