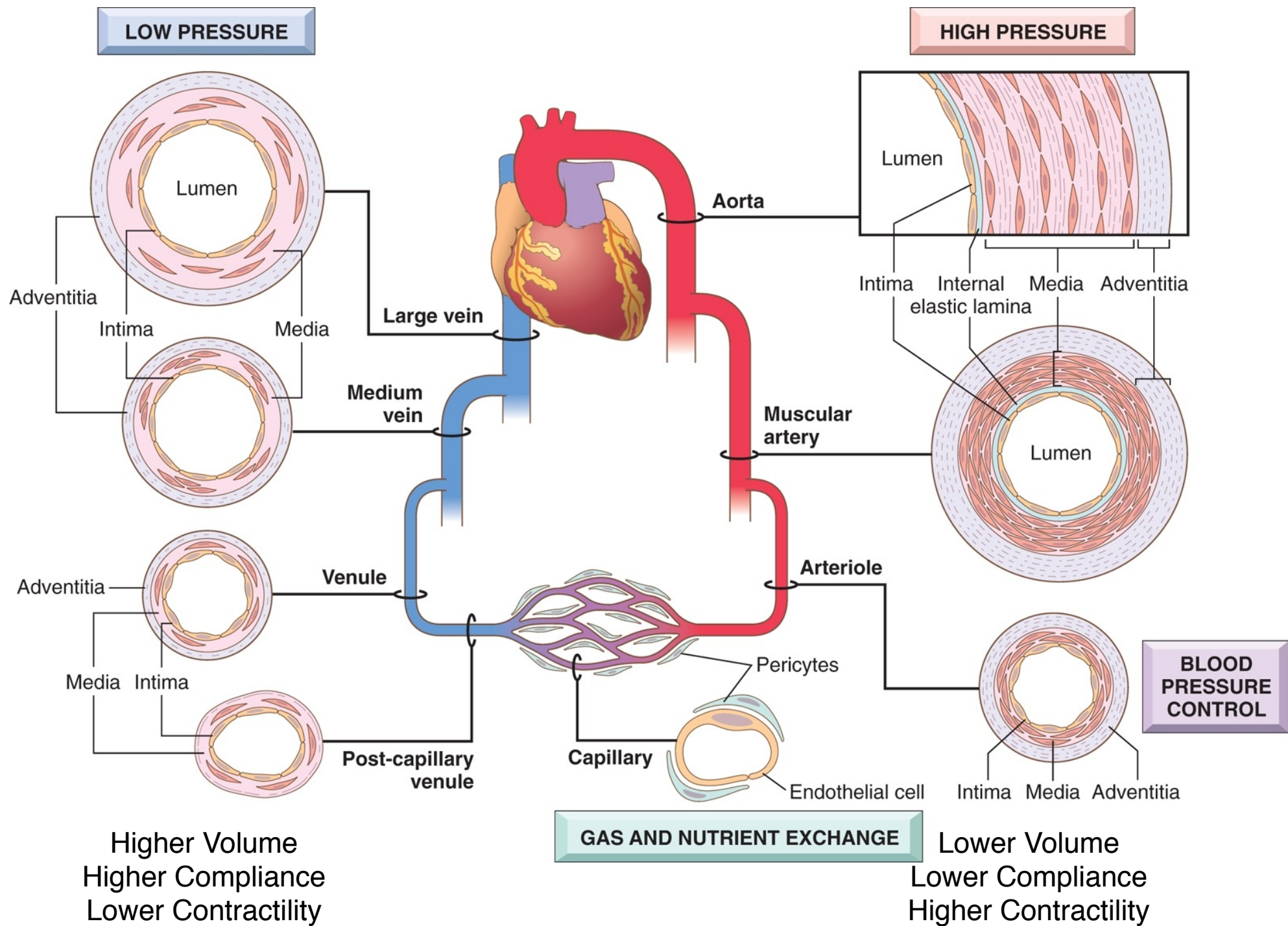


Cardiovascular Diseases I: Arteriosclerosis

Henry Sánchez, M.D.



Diseases of Systemic Blood Vessels

● Diseases of Arteries

- Inflammatory diseases of arteries
- Degenerative diseases of arteries
- Aneurysms
- Congenital malformations of arteries

● Diseases of Veins

- Varicose veins
- Phlebothrombosis and Thrombophlebitis

● Tumors of Blood Vessels

Arteriosclerosis

- Definition:

- Hardening of the arteries (*skleros* = hard)

- Types

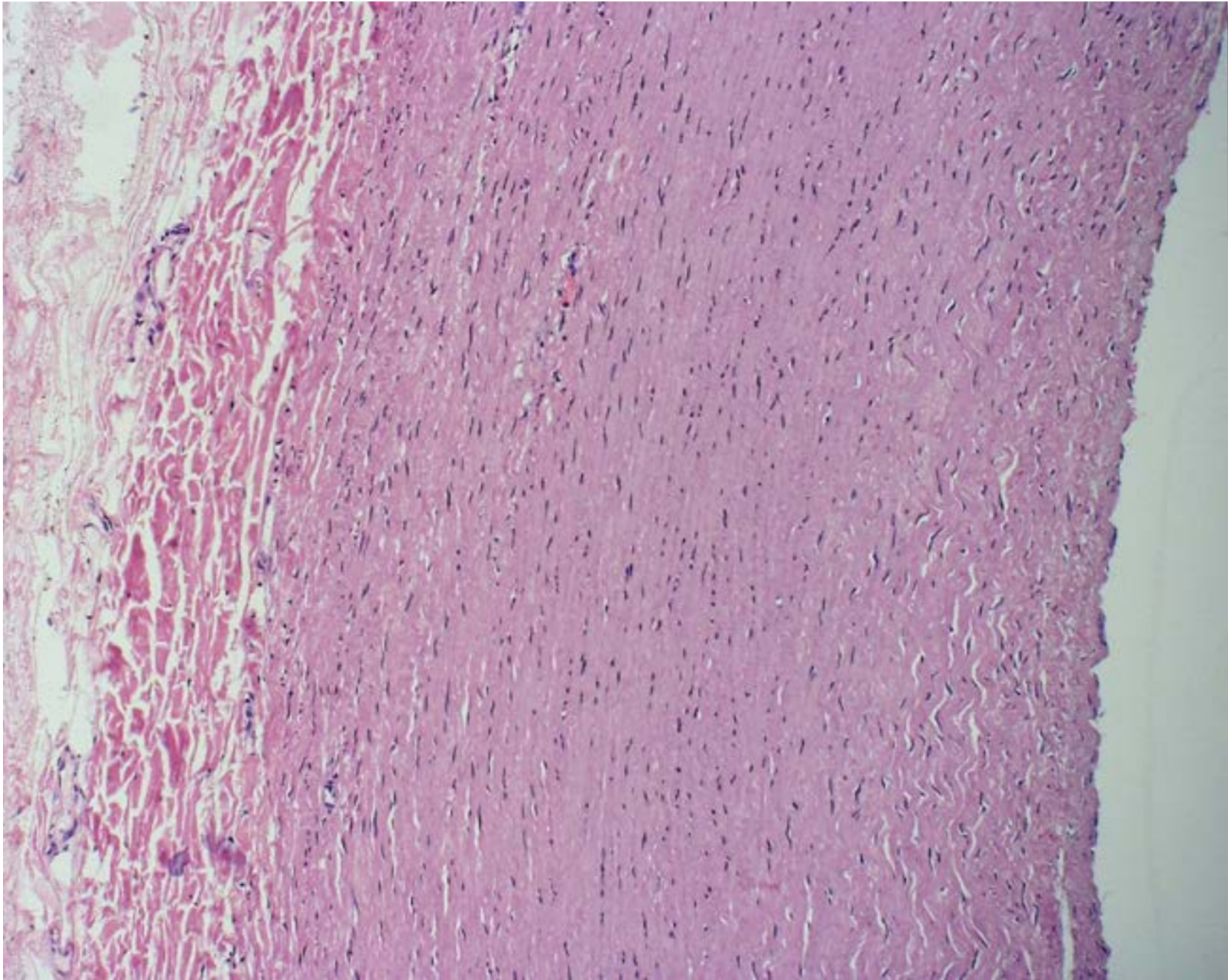
- Atherosclerosis (*athere* = soft; *skleros* = hard)
involves the intima of muscular and elastic arteries
 - Medial calcification or Monckeberg sclerosis
 - Arteriolosclerosis - degenerative changes in the arterioles

Normal Aorta

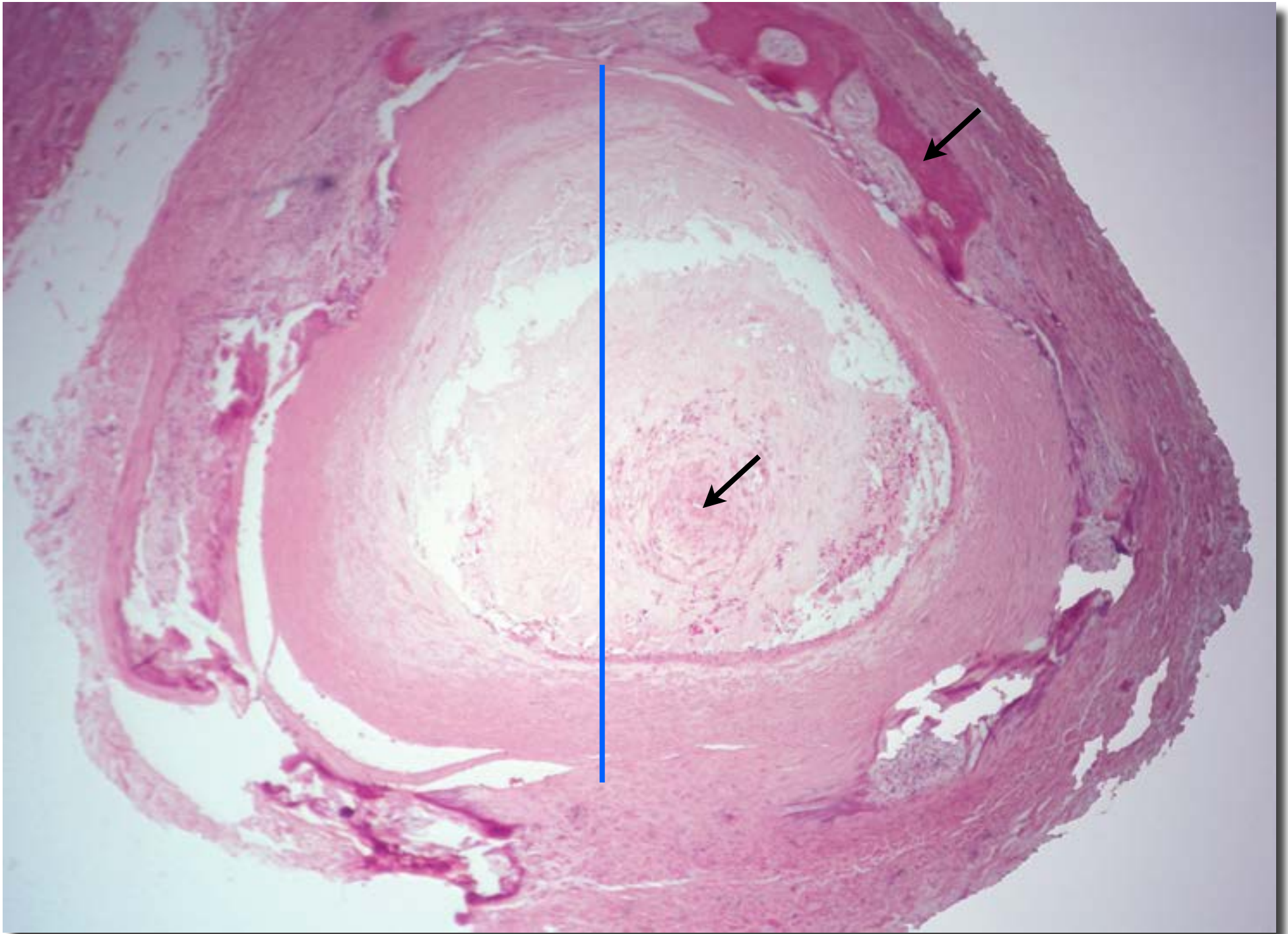
Adventitia

Media

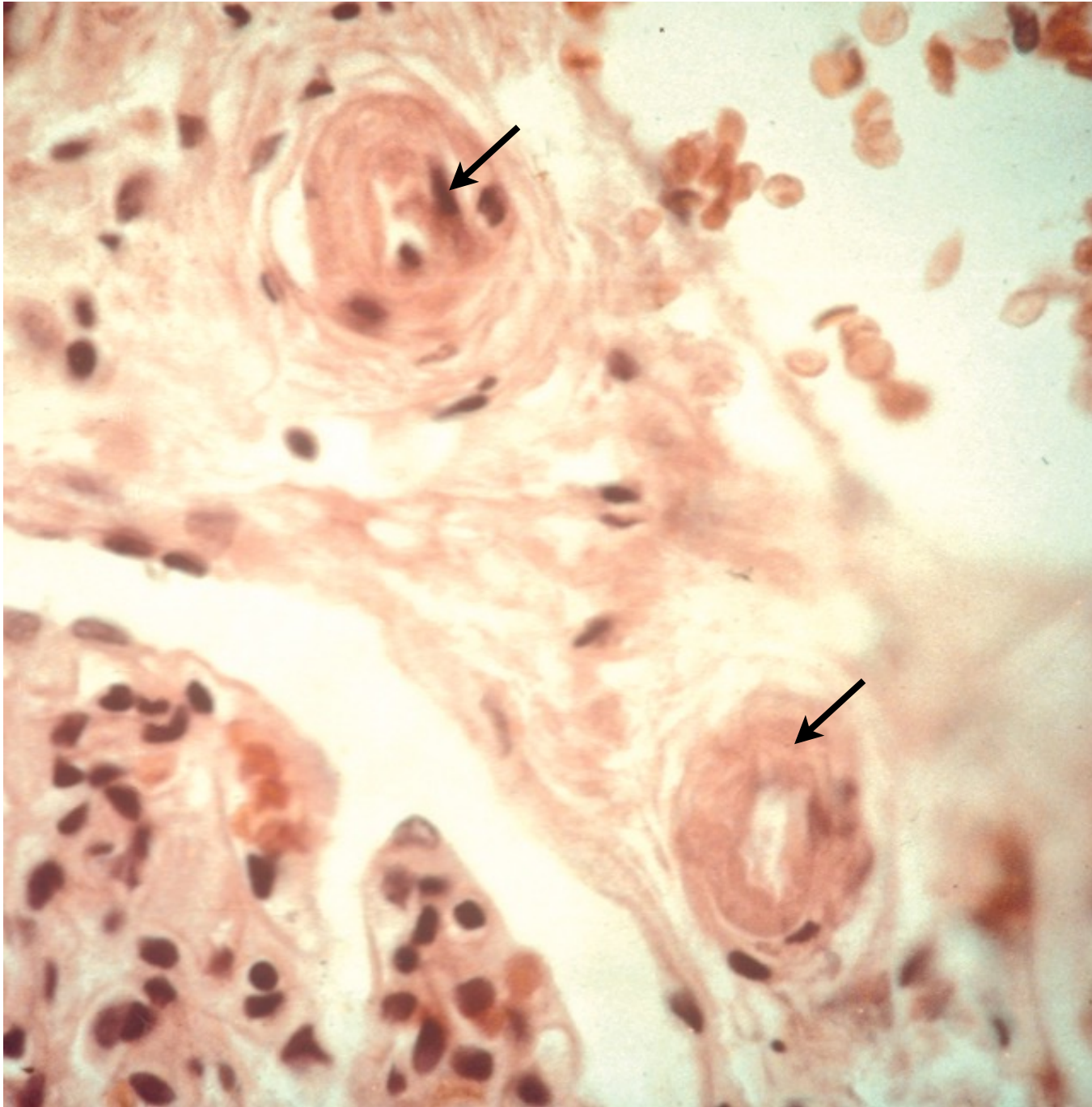
Intima



Atherosclerosis and Monckeberg Sclerosis



Hyaline Arteriolar Sclerosis

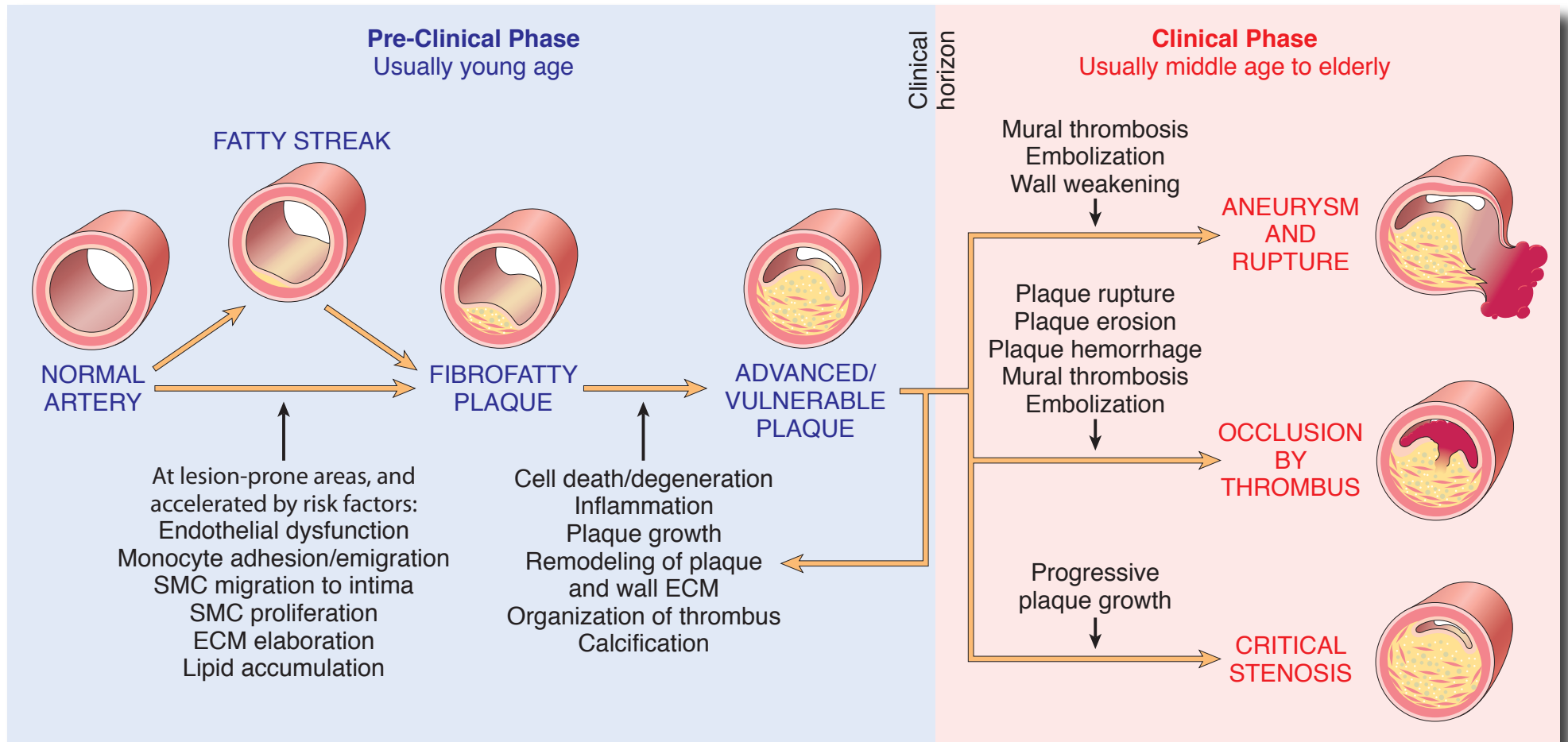


Atherosclerosis

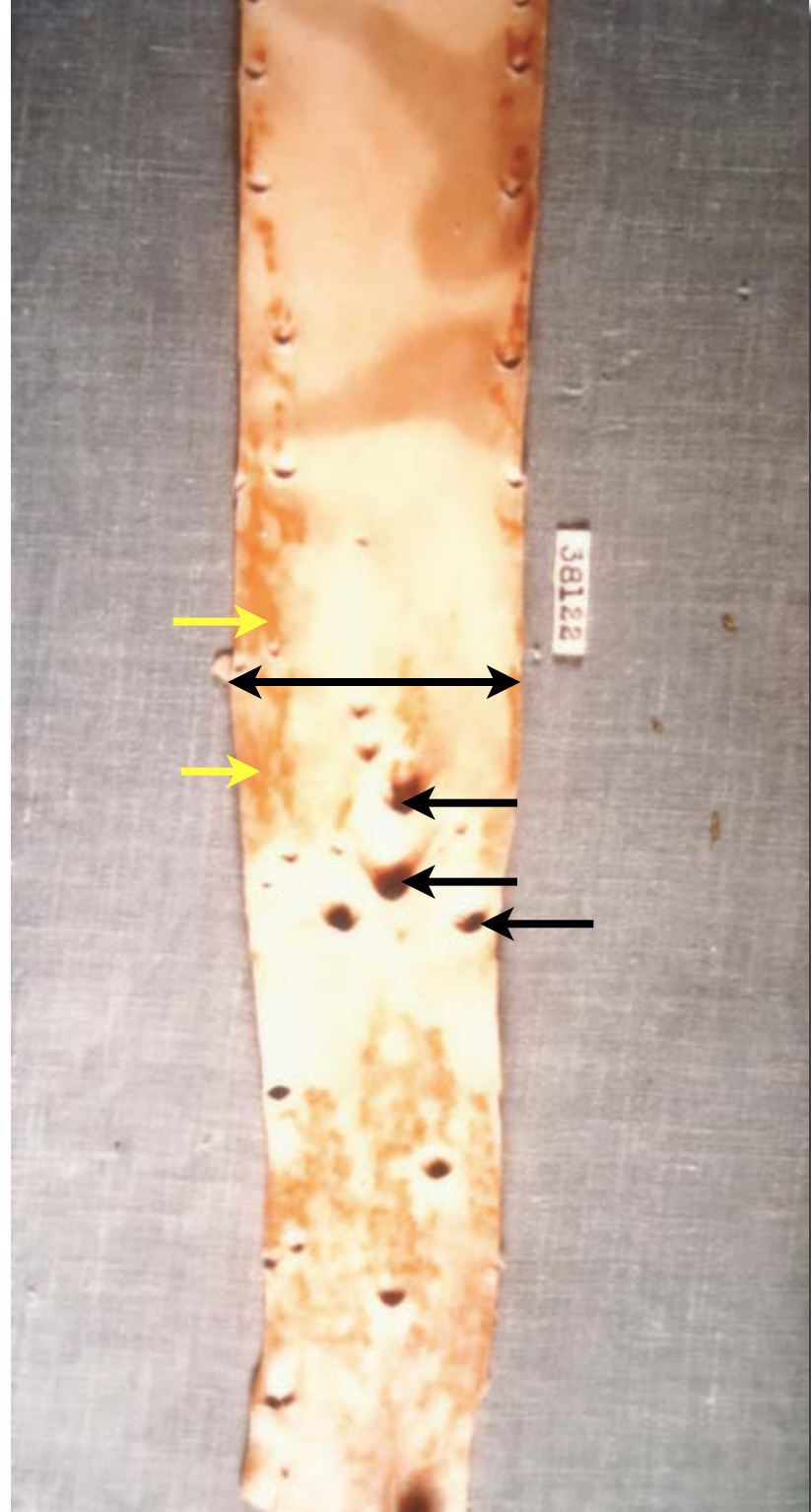
- Gross Pathology

- Fatty streaks - yellow lines in the intima
- Atheromas - soft, elevated, yellow plaques
- Fibrous plaques - firm, white
- Complicated atheromas - ulceration, thrombosis, aneurysm, necrosis, hemorrhage and dystrophic calcification

Pathogenesis of Atherosclerosis



Fatty Streaks Aorta



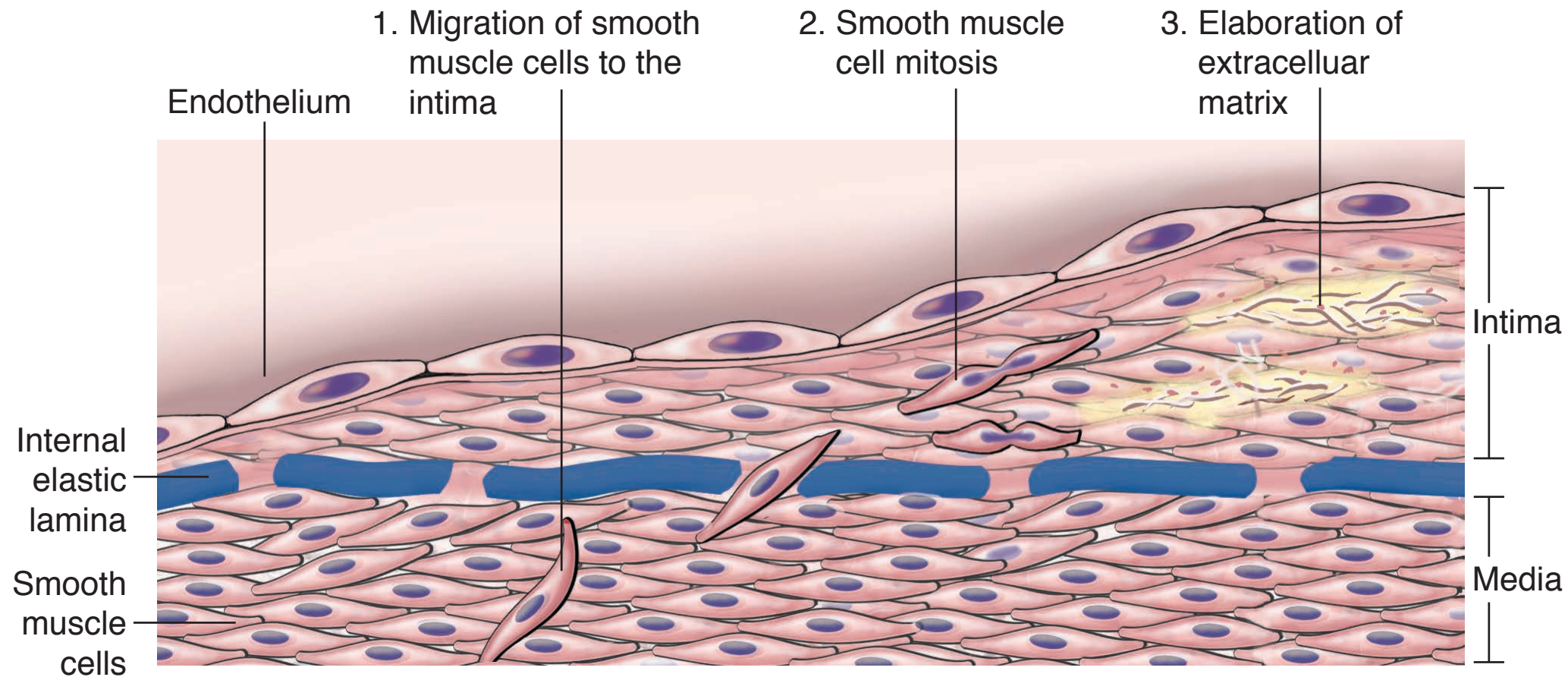
Severe
Atherosclerotic
Disease
Aorta



Atherosclerosis

- Histopathologic Features
 - Secondary inflammatory response leads to severe fibrosis tissue forming a cap over the released central core of lipid
 - Specialized smooth muscle cells have the ability to synthesize collagen accumulate lipid (cholesterol)
 - Numerous lipid-laden smooth muscle cells disintegrate releasing lipid into the intima

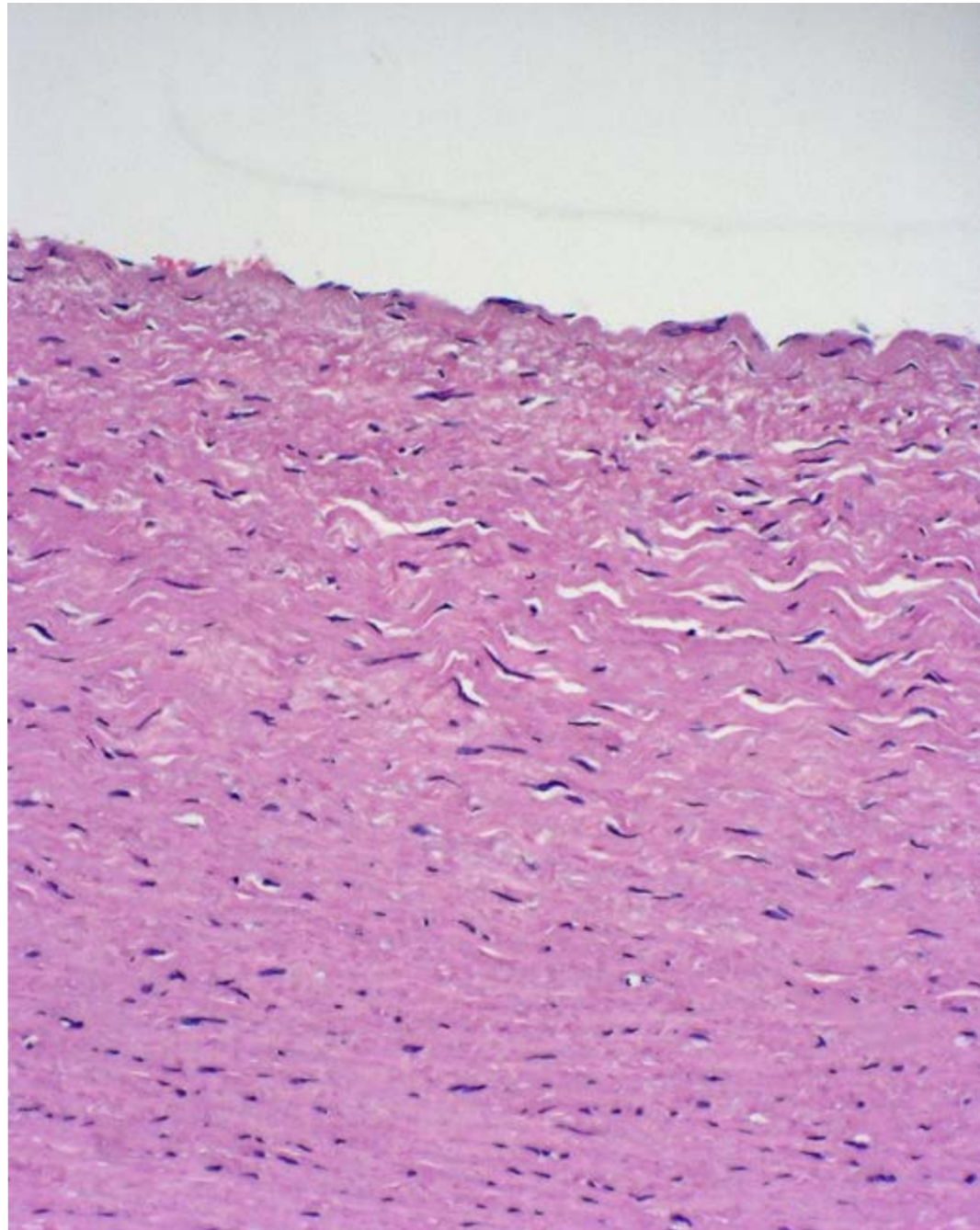
Atherosclerosis: Early Histologic Changes



Normal Aorta

Intima

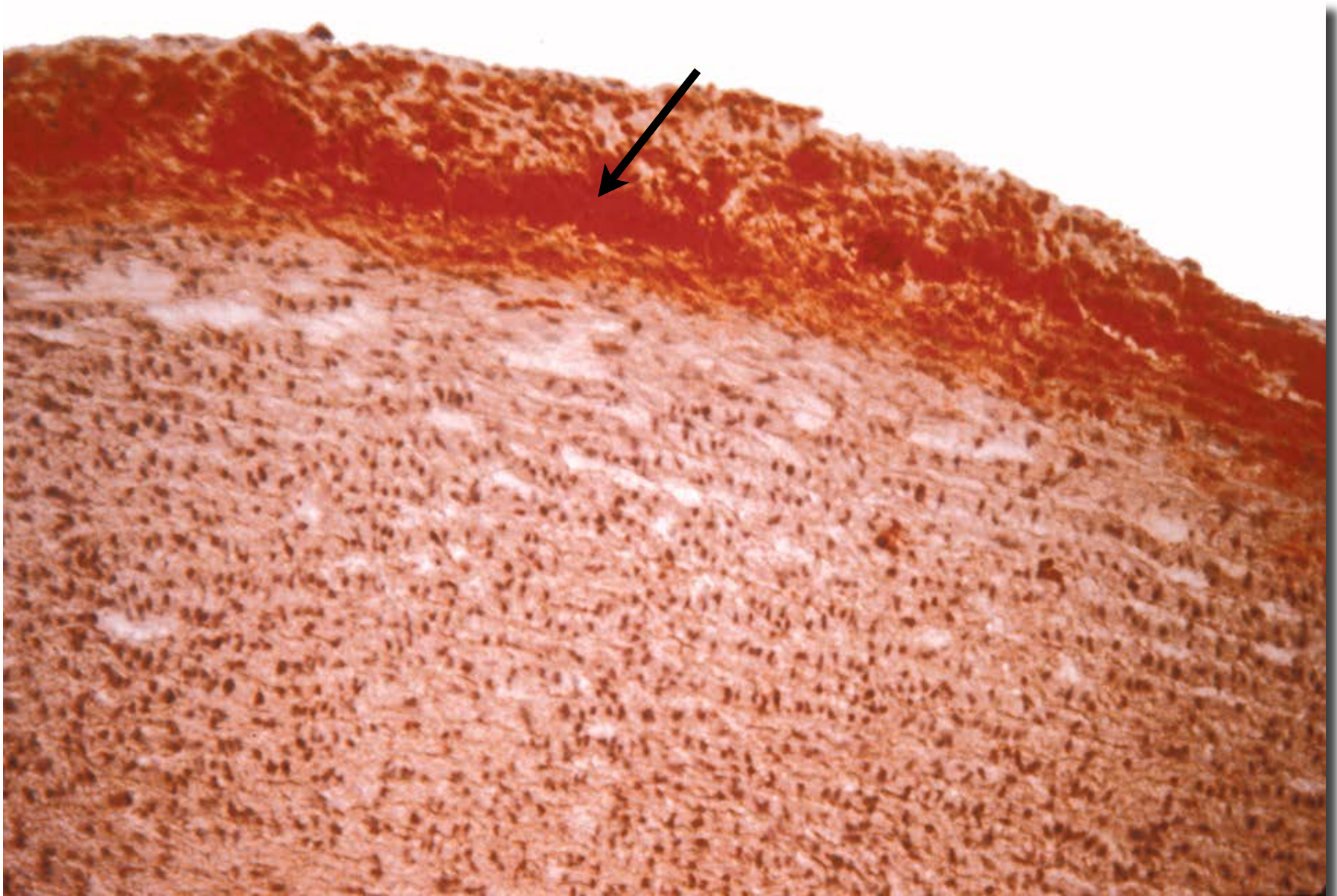
Media



Fatty Streak with Intimal Lipid Deposition

Intima

Media

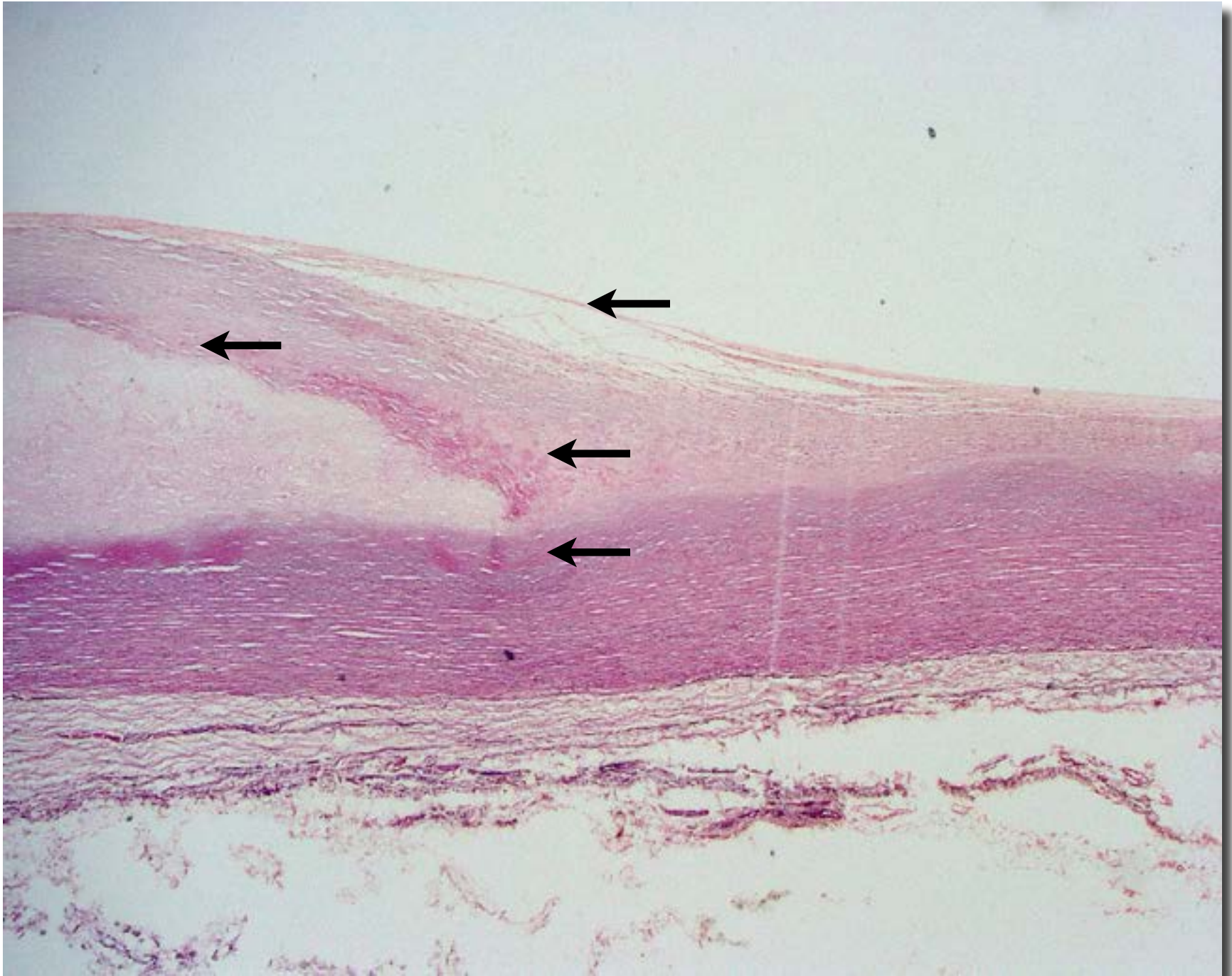


Atherosclerosis

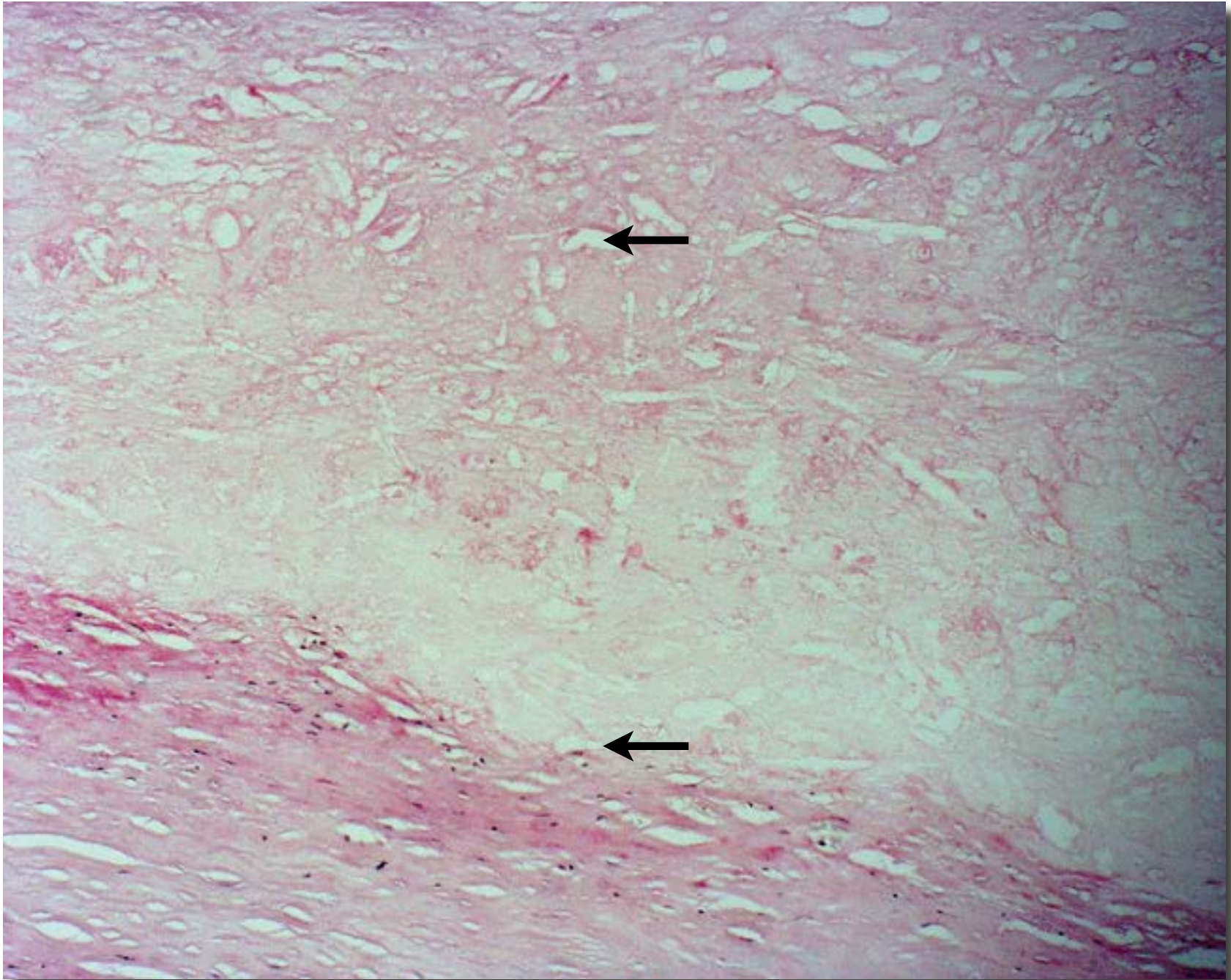
● Histopathologic Features

- A localized collection of lipid and necrotic debris forms leading to:
 - Narrowing of the lumen
 - Ulcerate and give rise to thrombus formation
 - Encroach on the media leading to decreased structural integrity and aneurysm formation
 - Rupture and release atherosclerotic emboli

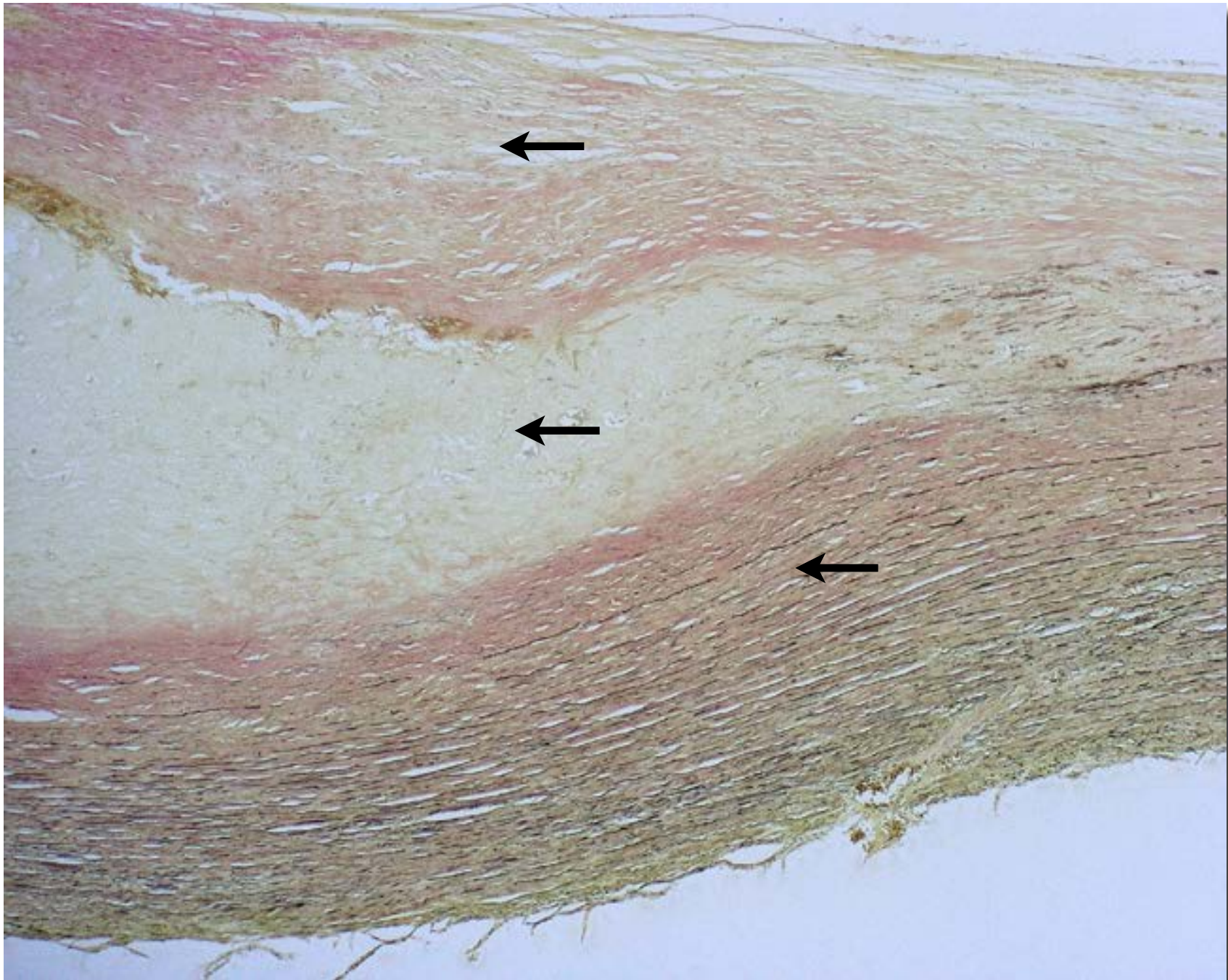
Advanced Atherosclerotic Plaque



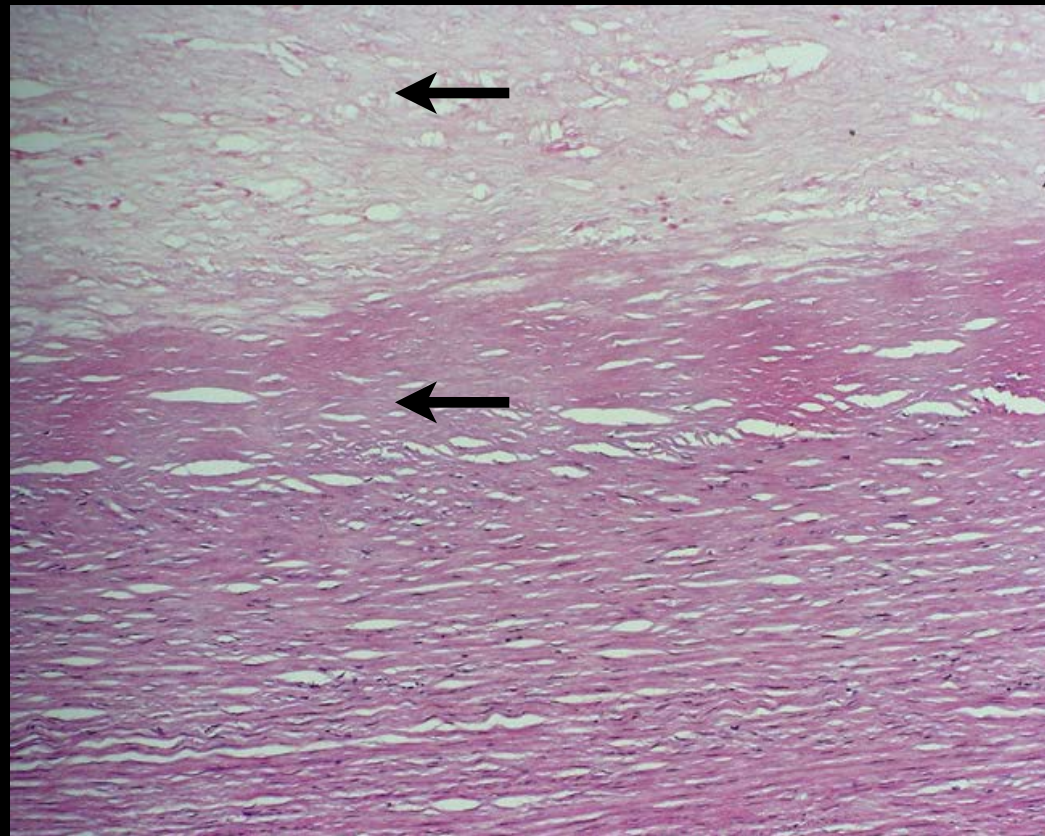
Advanced Atherosclerotic Plaque



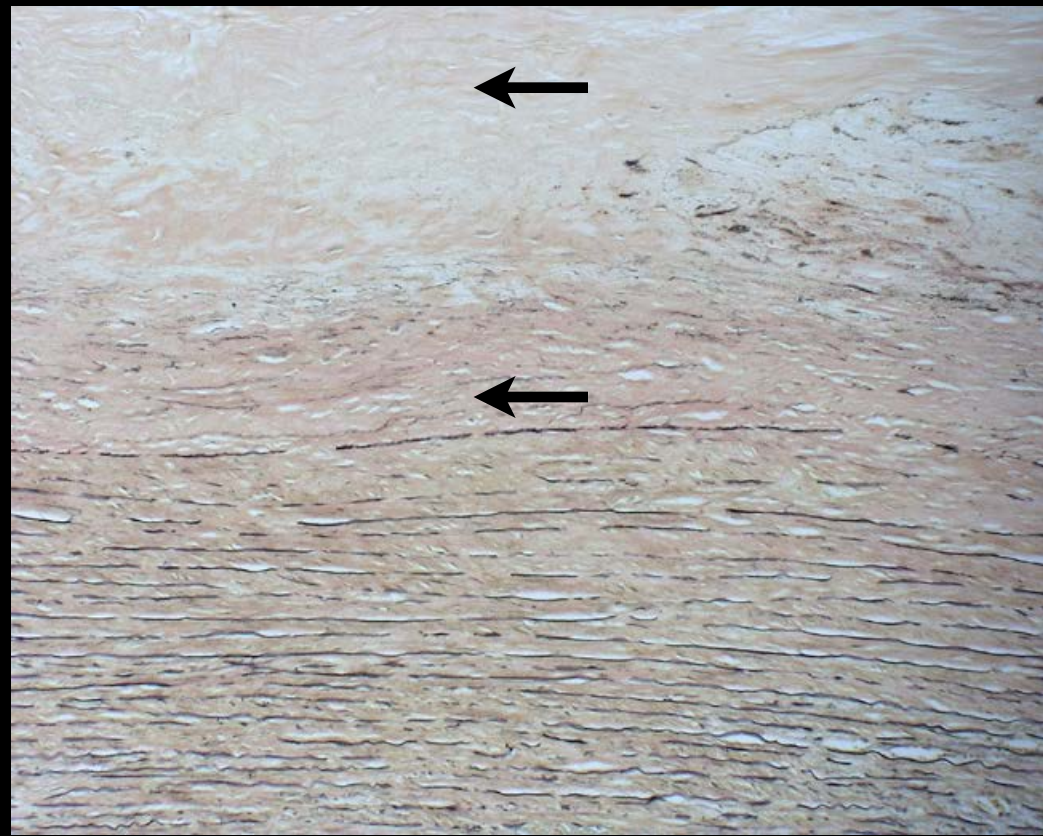
Advanced Atherosclerotic Plaque (Elastin Stain)



Advanced Atherosclerotic Plaque



H&E Stain

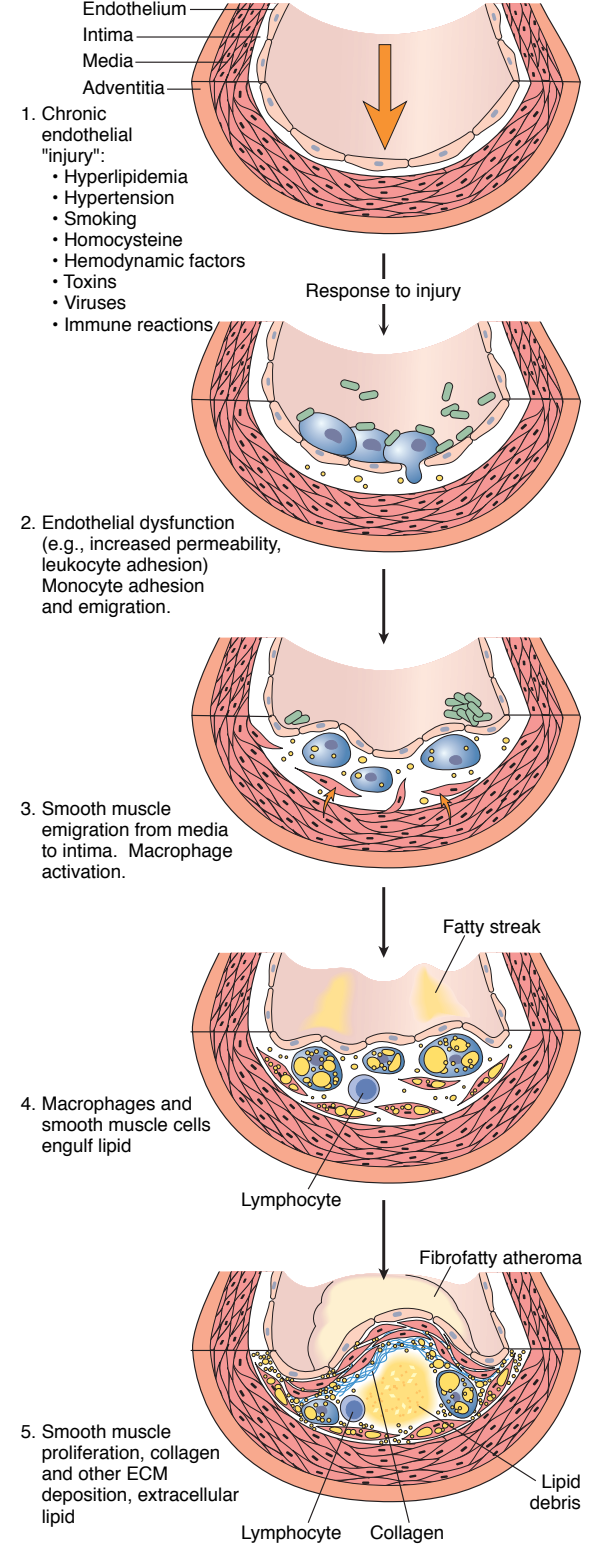


Elastin Stain

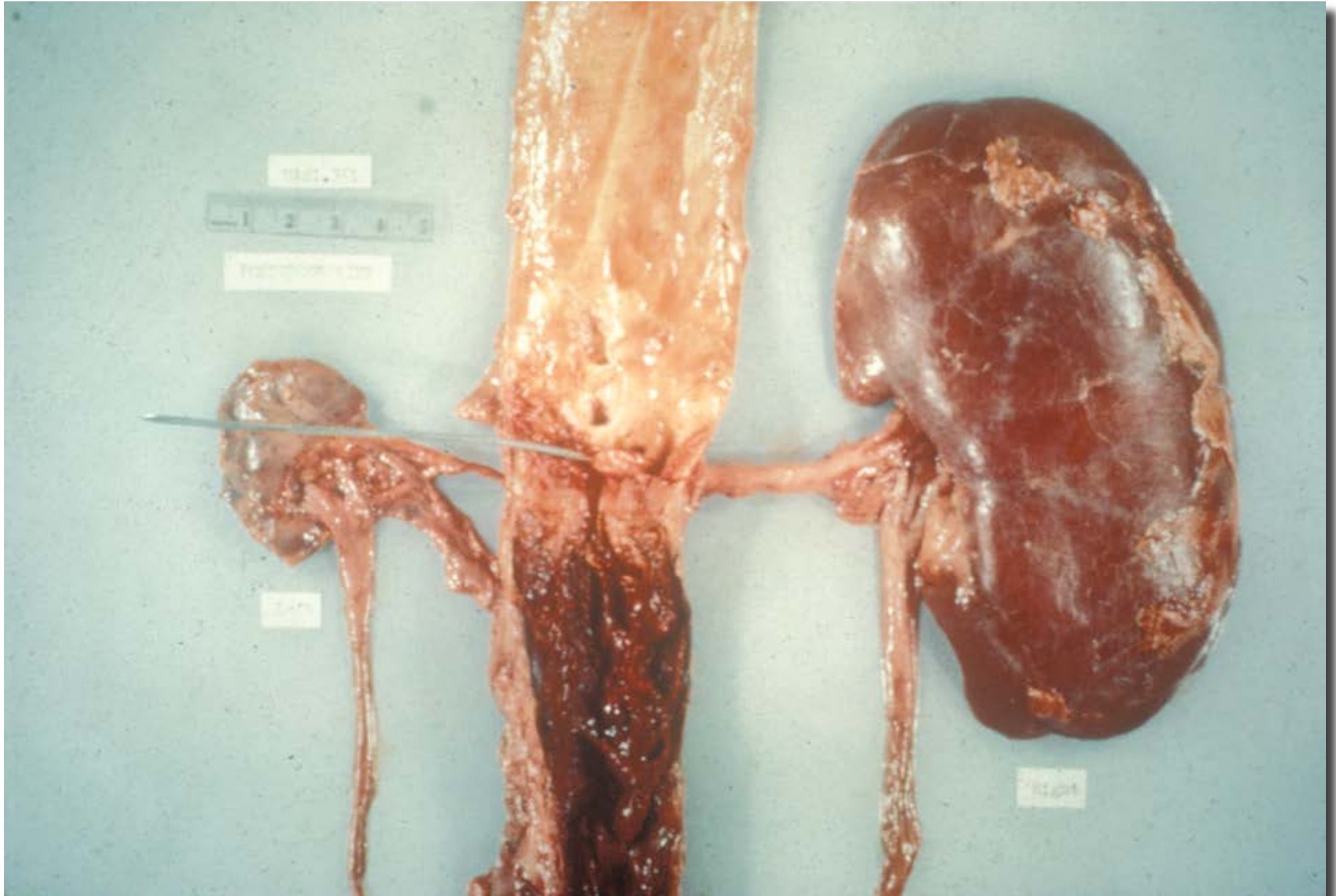
Atherosclerotic Disease Progression

Nomenclature and main histology	Sequences in progression	Main growth mechanism	Earliest onset	Clinical correlation
Type I (initial) lesion Isolated macrophage foam cells	<pre> graph TD I((I)) --> II((II)) II --> III((III)) III --> IV((IV)) IV --> V((V)) V --> VI((VI)) IV --> VI </pre>	Growth mainly by lipid accumulation	From first decade	Clinically silent
Type II (fatty streak) lesion Mainly intracellular lipid accumulation				
Type III (intermediate) lesion Type II changes and small extracellular lipid pools				
Type IV (atheroma) lesion Type II changes and core of extracellular lipid		Accelerated smooth muscle and collagen increase	From third decade	Clinically silent or overt
Type V (fibroatheroma) lesion Lipid core and fibrotic layer, or multiple lipid cores and fibrotic layers, or mainly calcific, or mainly fibrotic			From fourth decade	
Type VI (complicated) lesion Surface defect, hematoma-hemorrhage, thrombus		Thrombosis, hematoma		

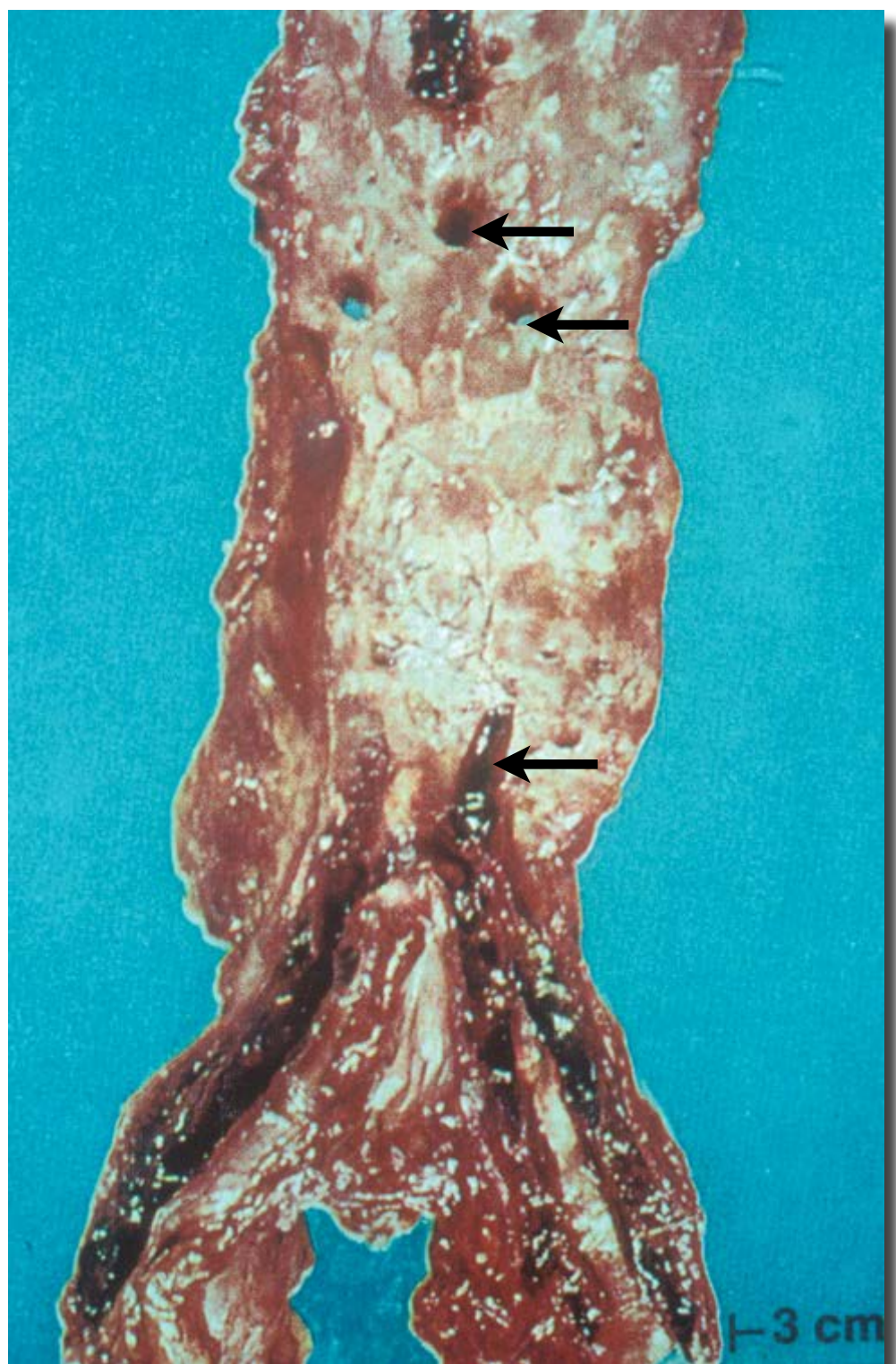
Overview of Atherosclerosis



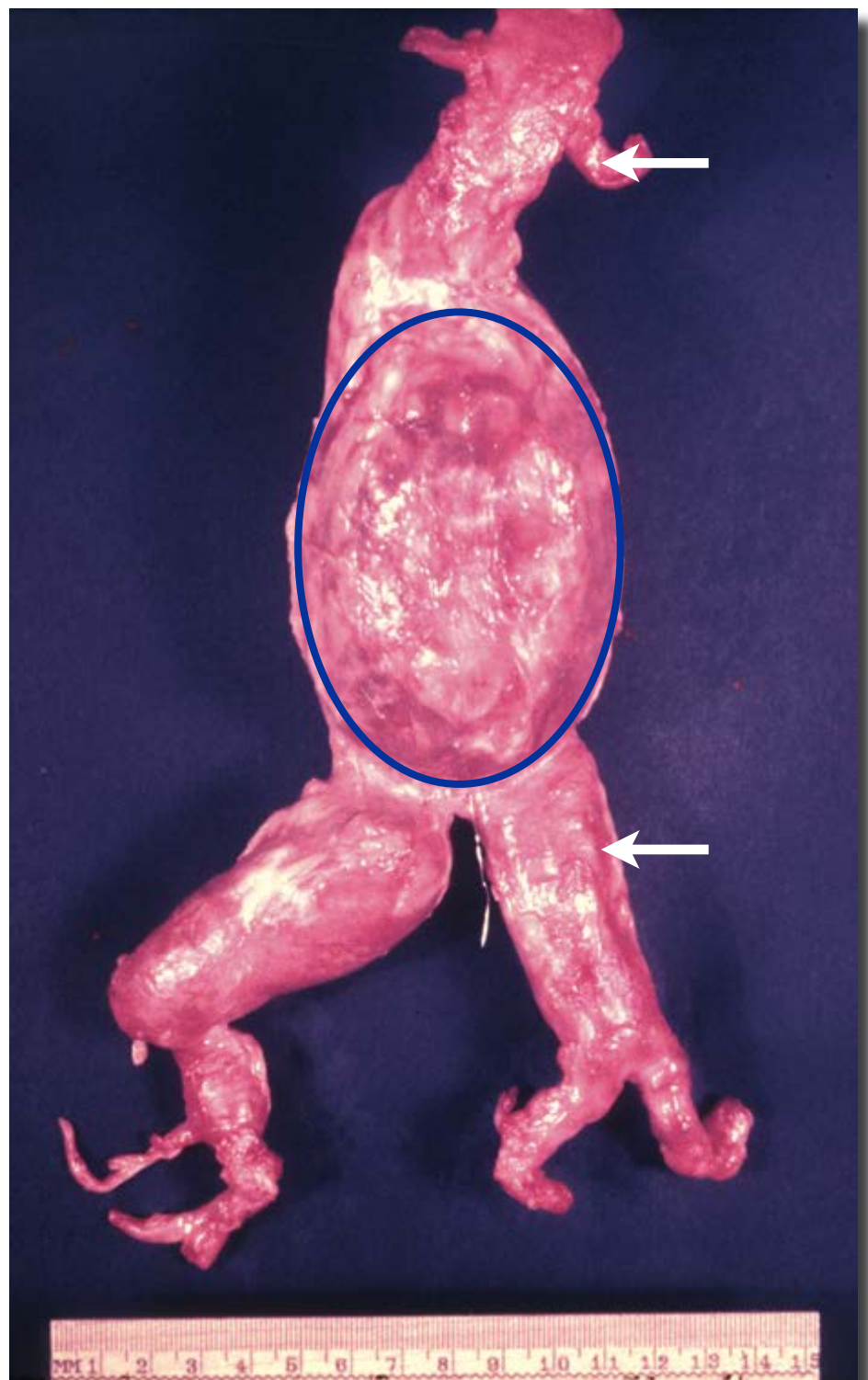
Atherosclerosis: Consequences of Stenosis



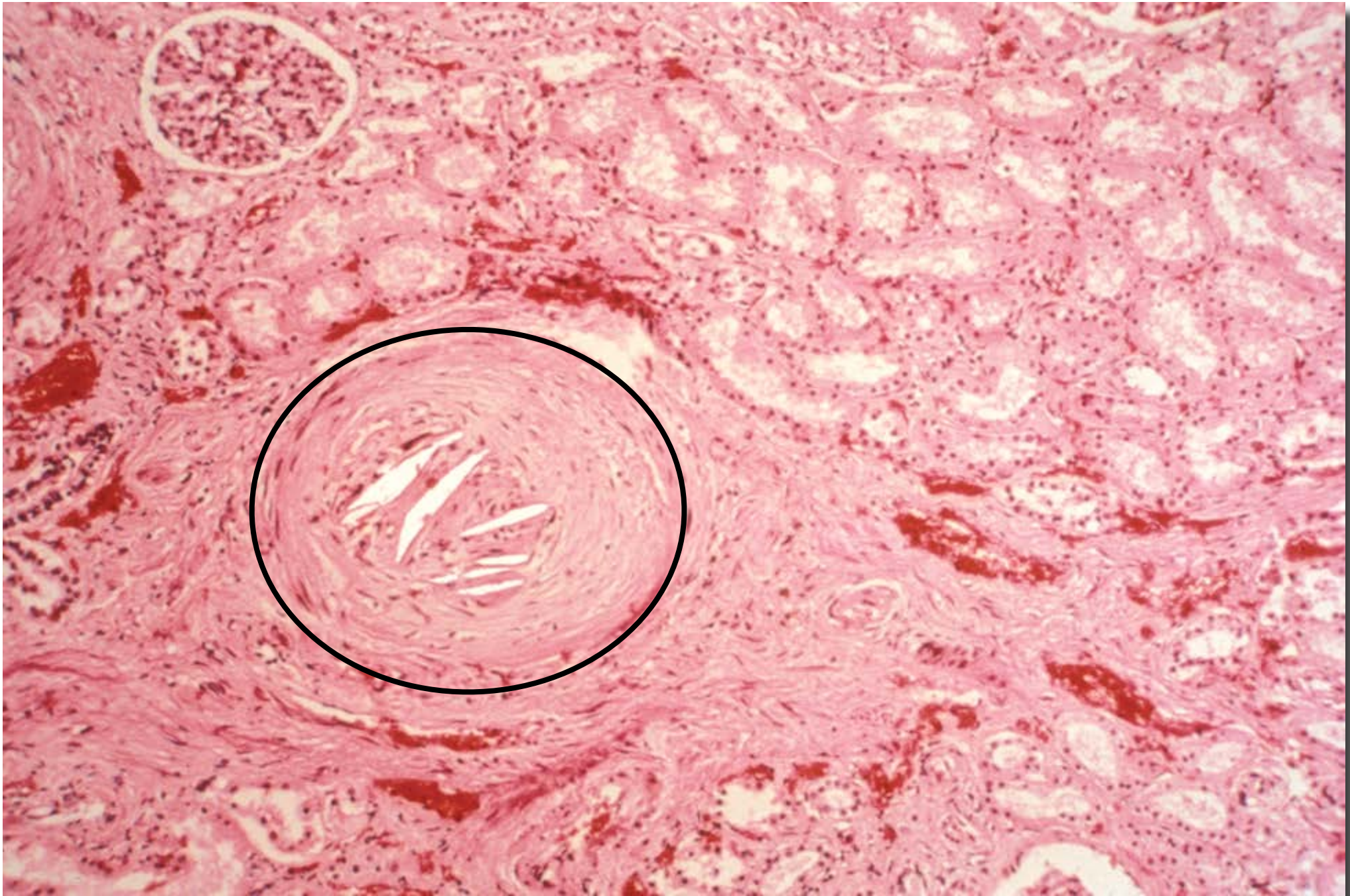
Atherosclerosis: Thrombosis



Atherosclerotic Aortic Aneurysm



Atherosclerotic Embolus



Atherosclerosis

- Age and Sex
- Primary Risk Factors
 - Diabetes mellitus
 - Hyperlipidemia
 - Hypertension
 - Smoking
 - Obesity

Atherosclerosis

- Secondary Risk Factors
 - Lack of exercise
 - Aggression (competitiveness)
 - Diet
 - Elevated levels of homocystiene
 - Bacteremia from oral flora

Atherosclerosis

● Clinical Significance

- Cerebrovascular accidents (stroke) leading to infarction
- Ischemic heart disease
- Aortic aneurysms with or without rupture
 - Renal failure
 - Cholesterol embolization
- Peripheral vascular disease - lower extremities

Atherosclerotic Basal Artery Aneurysm



Atherosclerotic Coronary Artery Disease



Atherosclerotic Peripheral Artery Disease



Atherosclerosis

● Summary

- A chronic inflammatory disease involving the intima of elastic and muscular arteries
- Silent and preventable disease
- Catastrophic clinical consequences