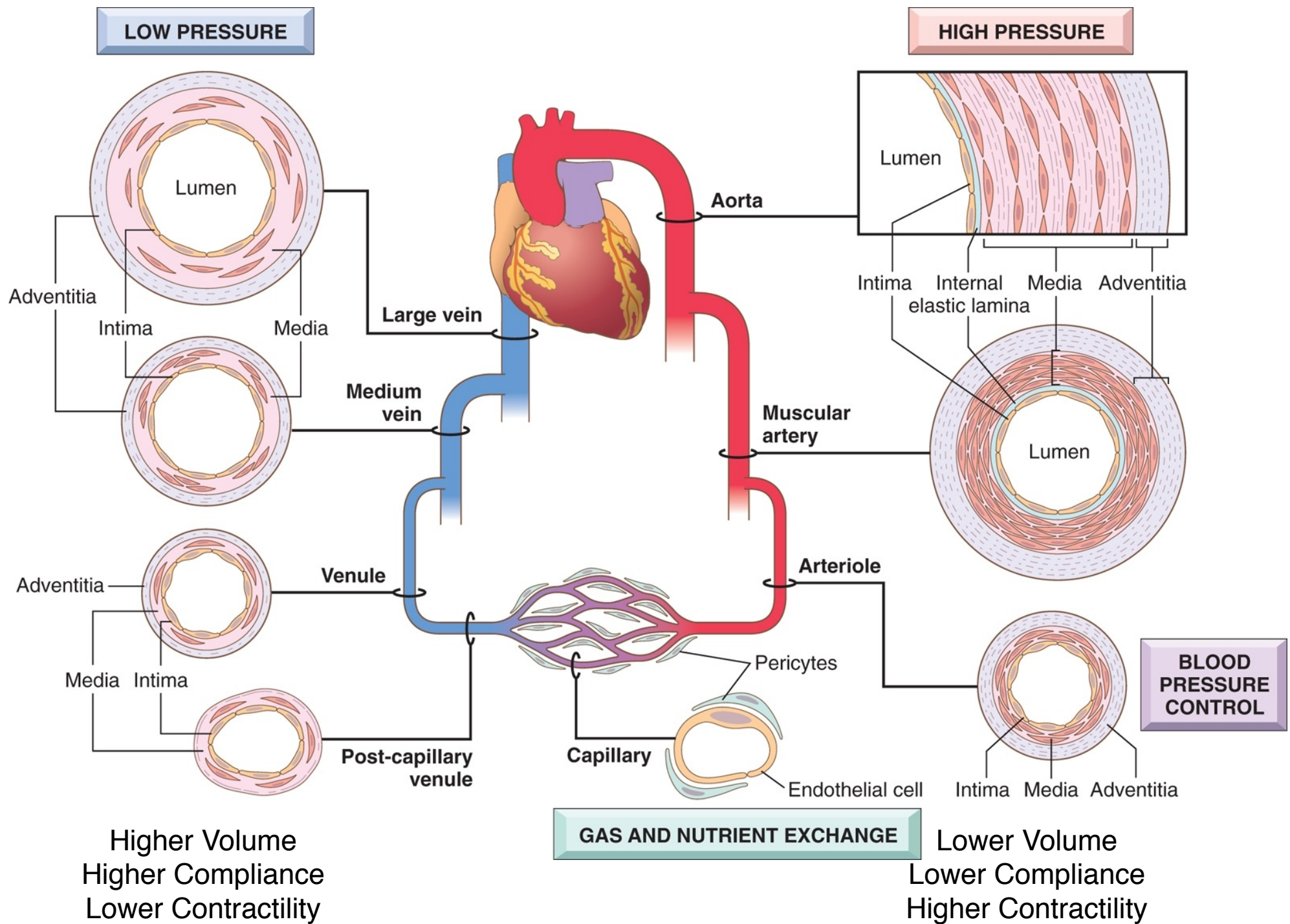
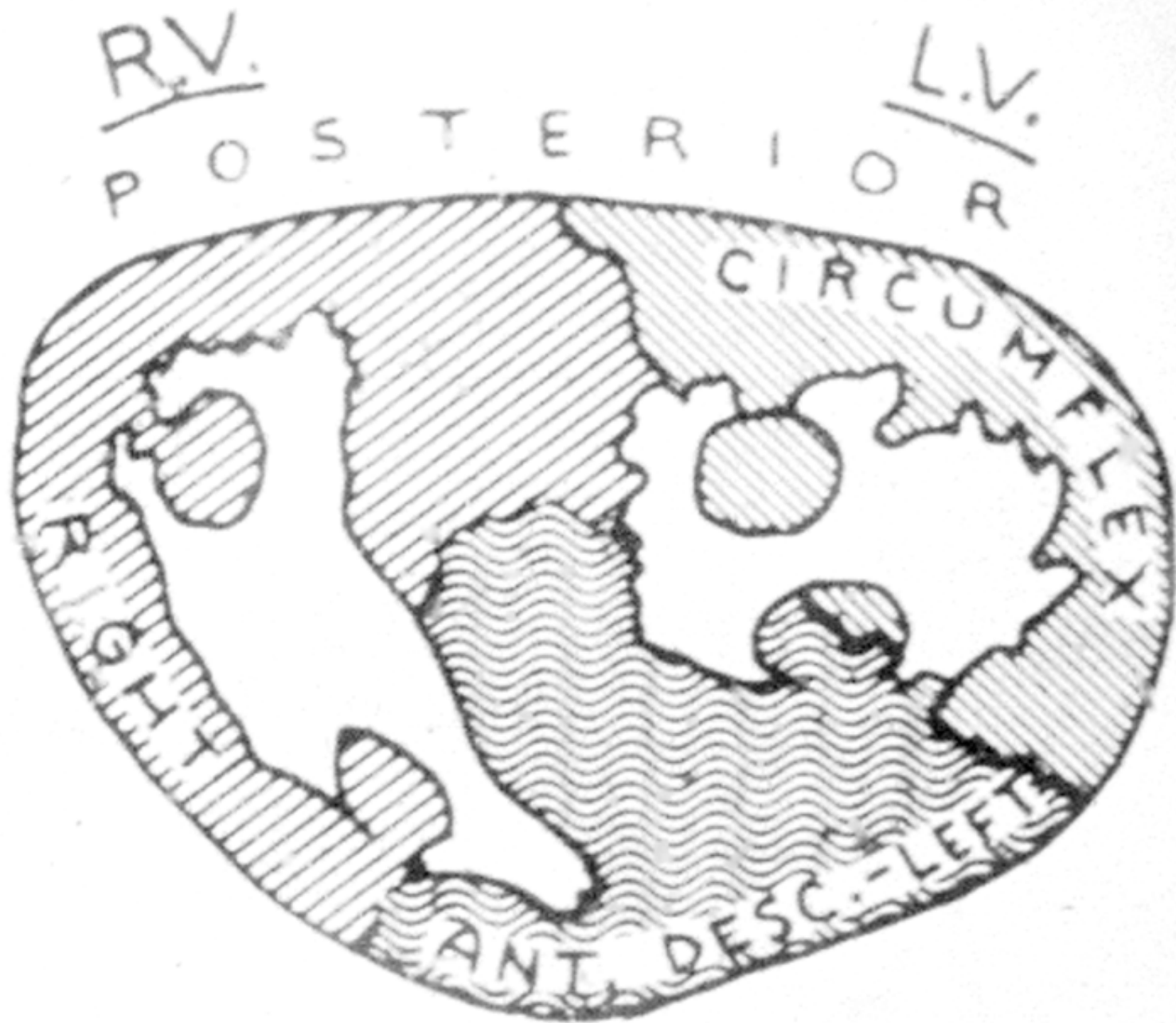


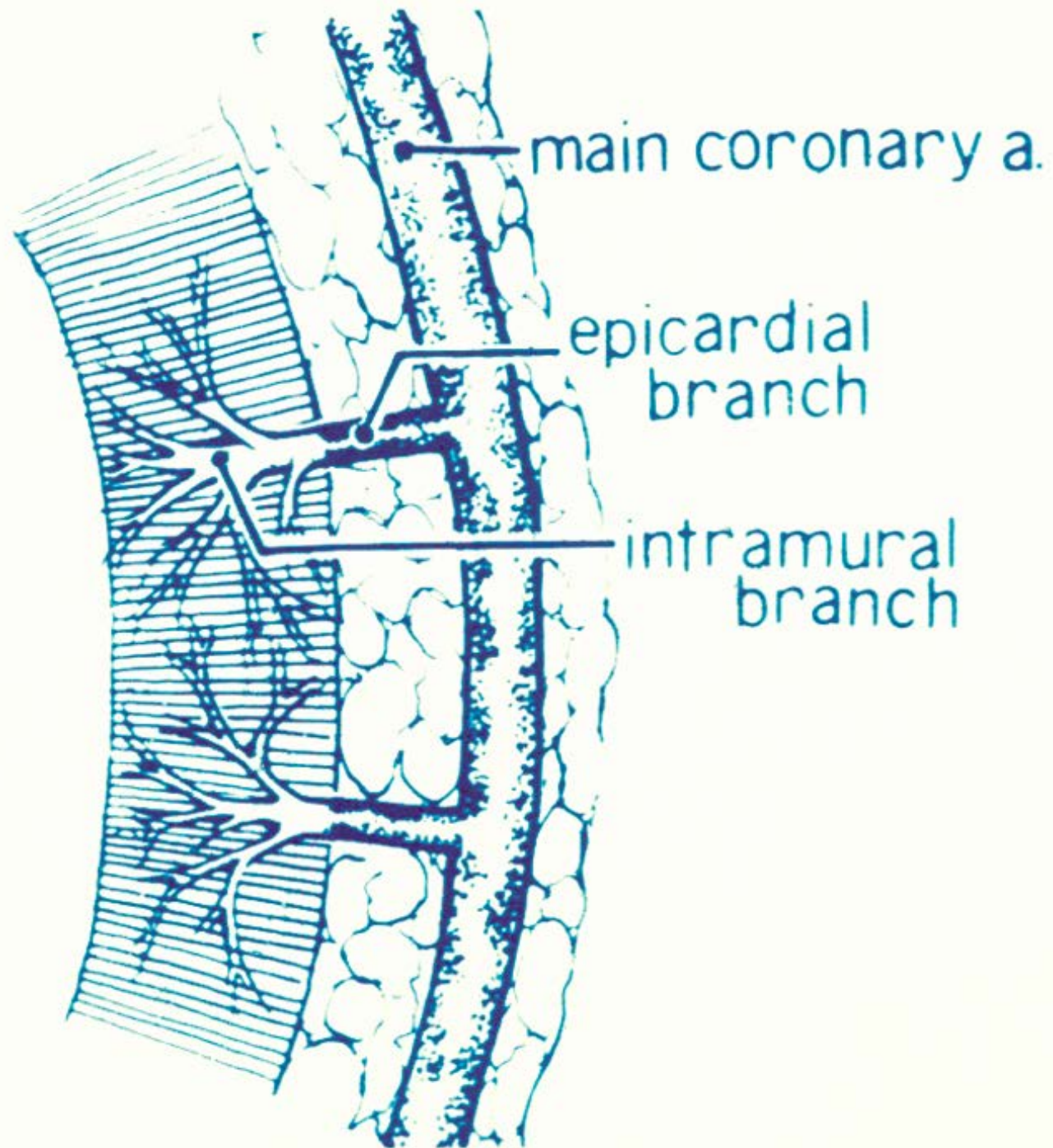
Cardiovascular Diseases II: Diseases of the Heart

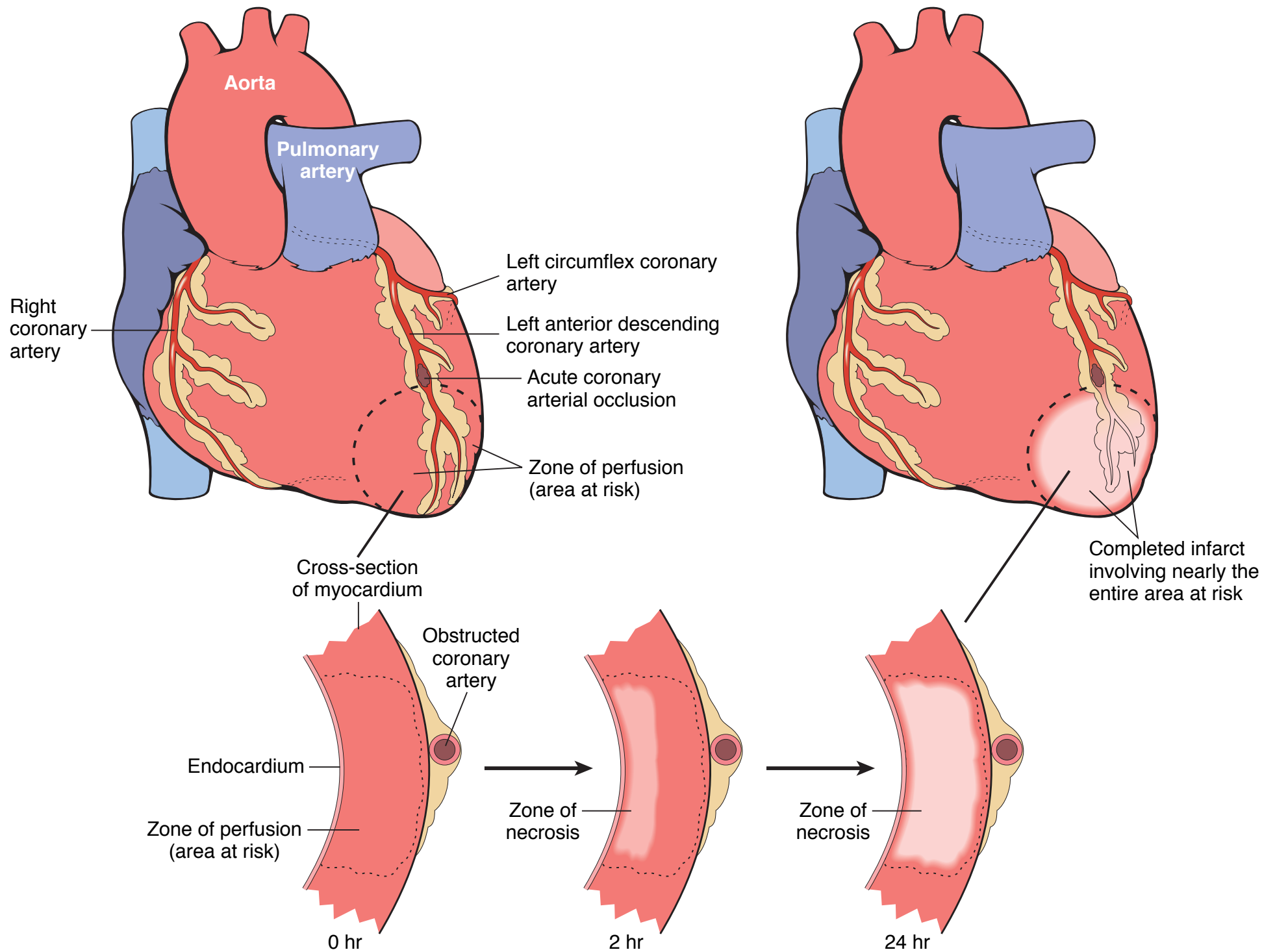
Henry Sánchez, M.D.

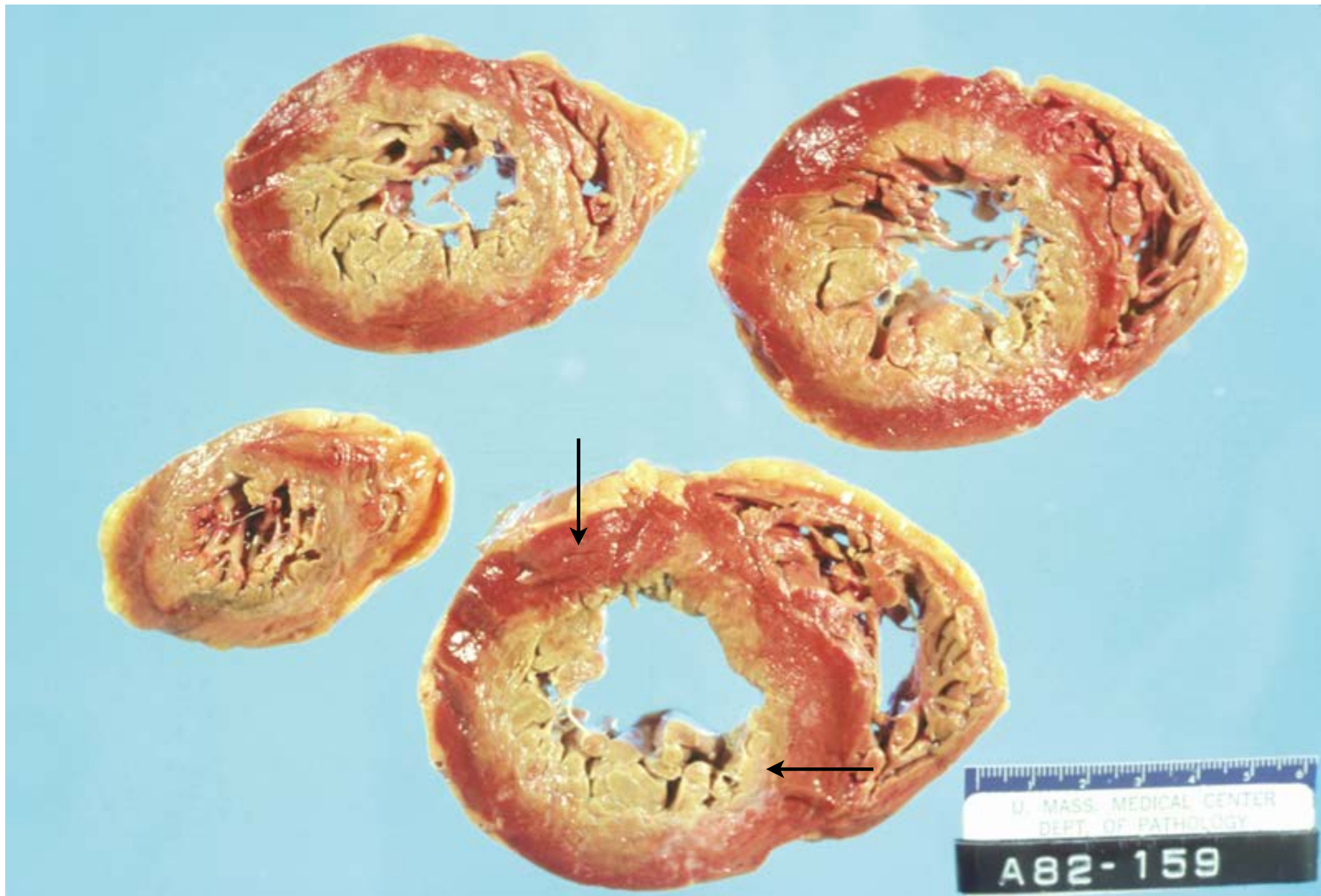


Ischemic Heart Disease



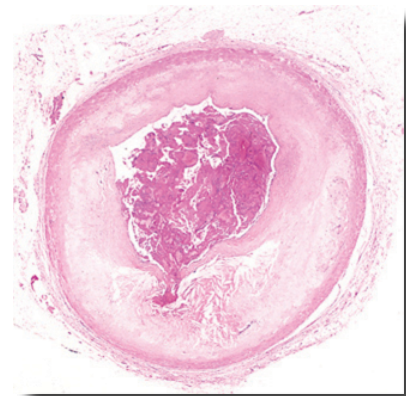
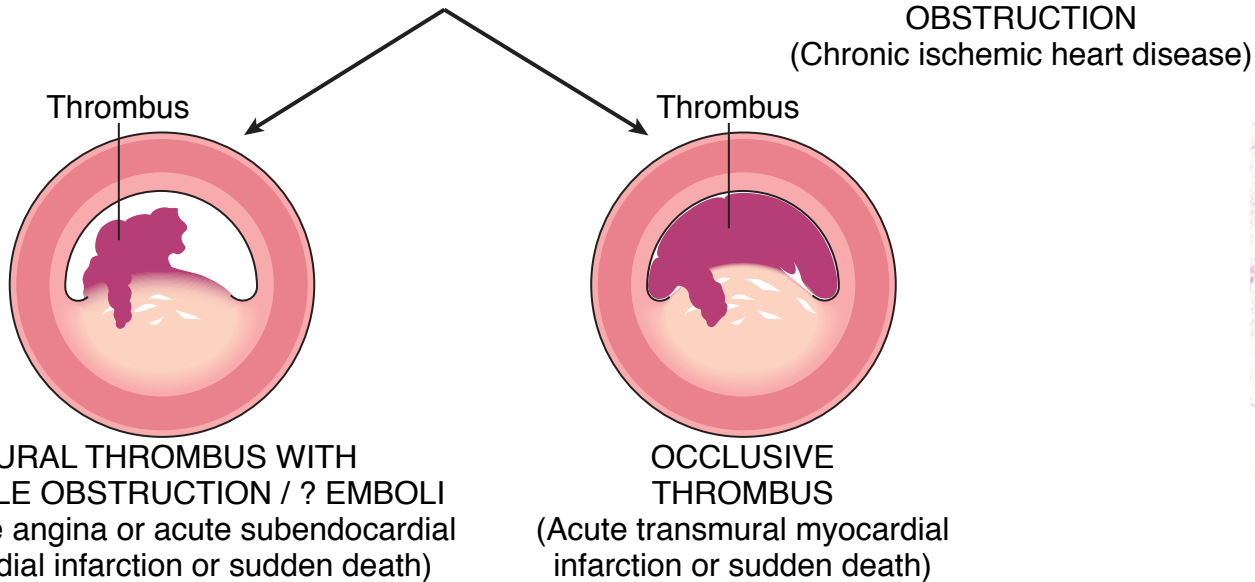
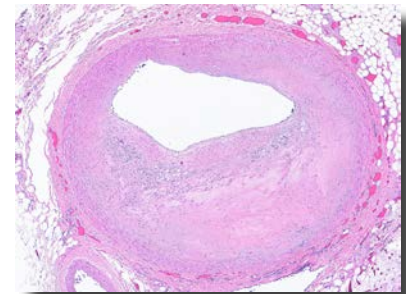
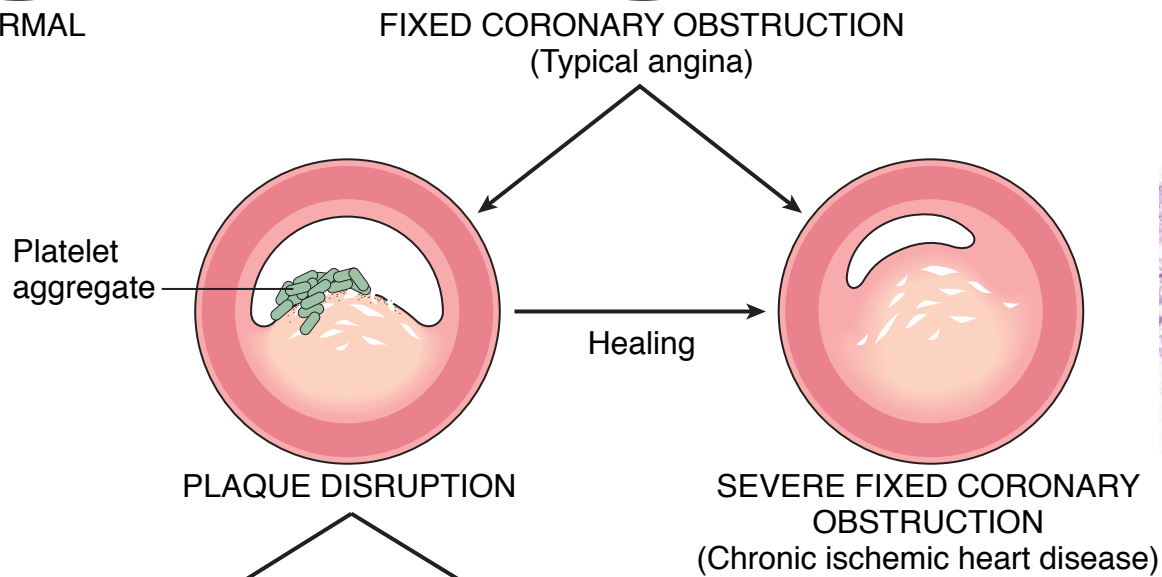
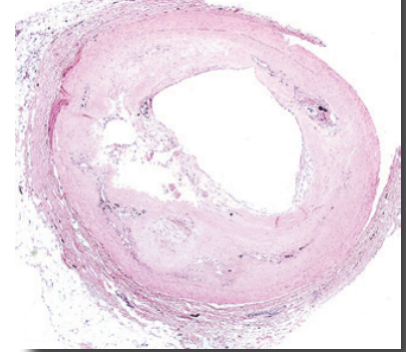
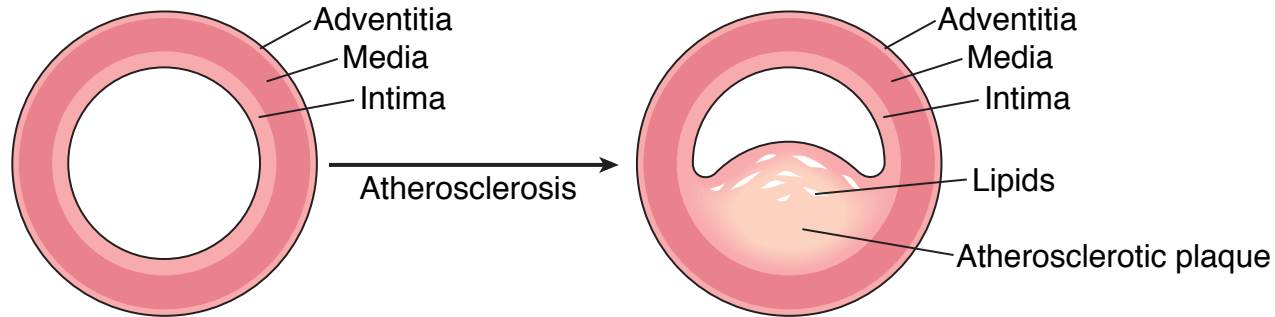






Ischemic Heart Disease

- Angina pectoris
- Myocardial infarction
- Chronic ischemic heart disease
- Sudden cardiac death

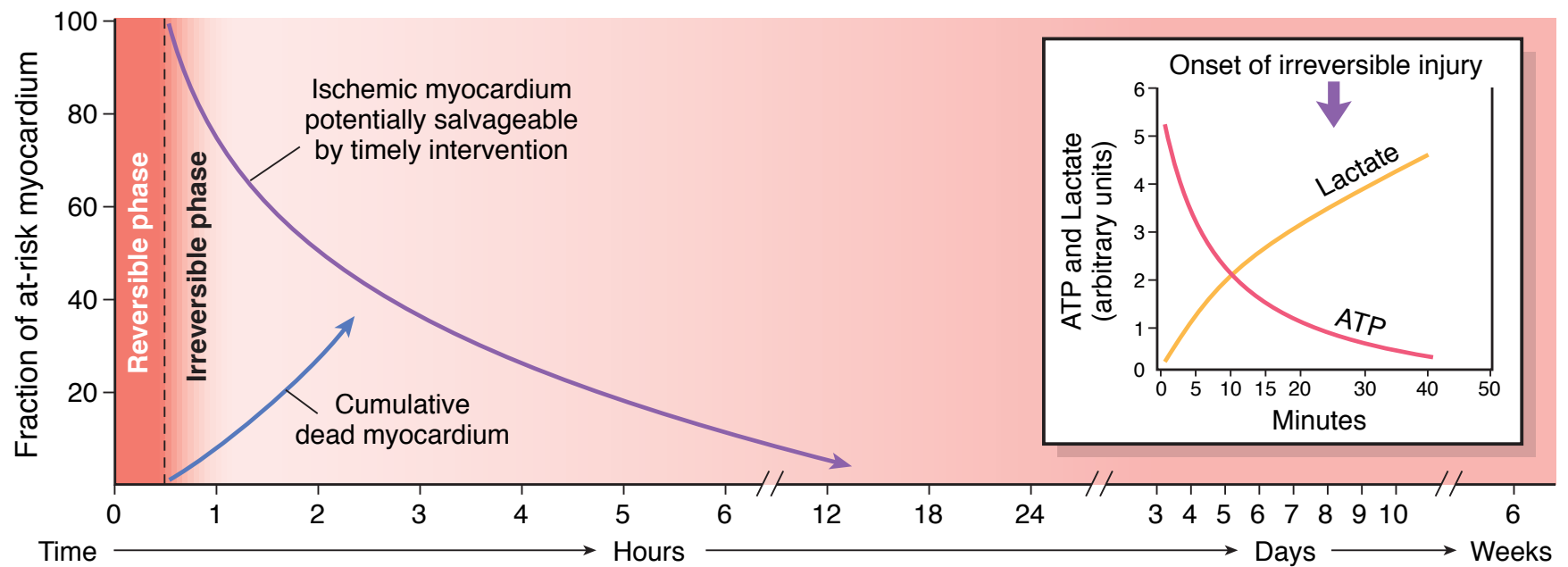


Ischemic Heart Disease

- Coronary blood flow is not reduced until 75% occlusion of the lumen
- Atherosclerotic plaque involves the epicardial coronary arteries
- Most common & most severe atherosclerotic plaque - proximal anterior descending artery
- 50% of myocardial infarcts involves a thrombus; transmural infarcts are associated with a transmural thrombus

Ischemic Heart Disease

- Clinical symptoms and laboratory findings for MI
 - Chest pain
 - Leukocytosis
 - Electrocardiographic changes
 - Elevated serum levels of serum cardiac enzymes (CPK-MB fraction, troponin I)
- Complications
 - Arrhythmias (90%)
 - Cardiogenic shock
 - Congestive heart failure

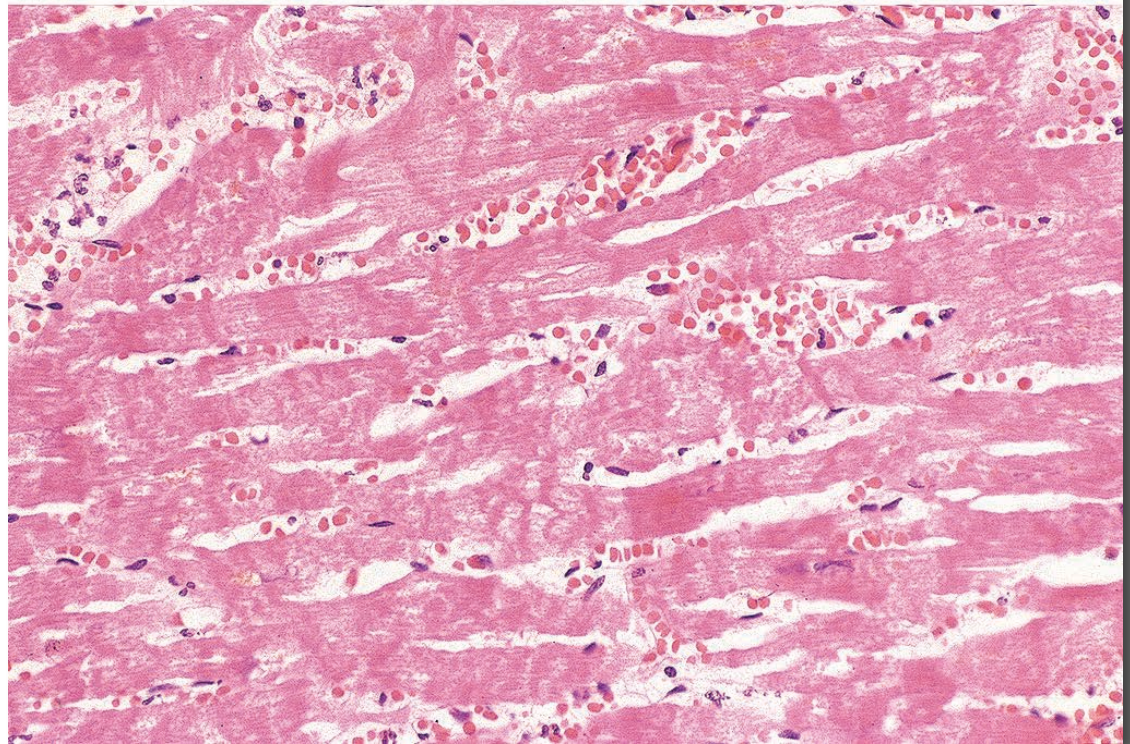


Electron microscopy	Reversible phase: Glycogen depletion; mitochondrial swelling and relaxation of myofibrils Irreversible phase: Sarcolemmal disruption; mitochondrial amorphous densities						
Histochemistry	TTC staining defect						
Light microscopy	Waviness of fibers at border	Beginning coagulation necrosis; edema; focal hemorrhage; beginning neutrophilic infiltrate	Continuing coagulation necrosis; pallor (shrunken nuclei and eosinophilic cytoplasm); myocyte contraction bands	Coagulation necrosis with loss of nuclei and striations; neutrophilic infiltrate	Disintegration of myofibers and phagocytosis by macrophages	Completion of phagocytosis; prominent granulation tissue with neovascularization and fibrovascular reaction	Mature fibrous scar
Gross changes			Pallor	Pallor, sometimes hyperemia; yellowing at periphery	Hyperemic border; central yellow-brown softening	Maximally yellow and soft vascularized edges; red-brown and depressed	

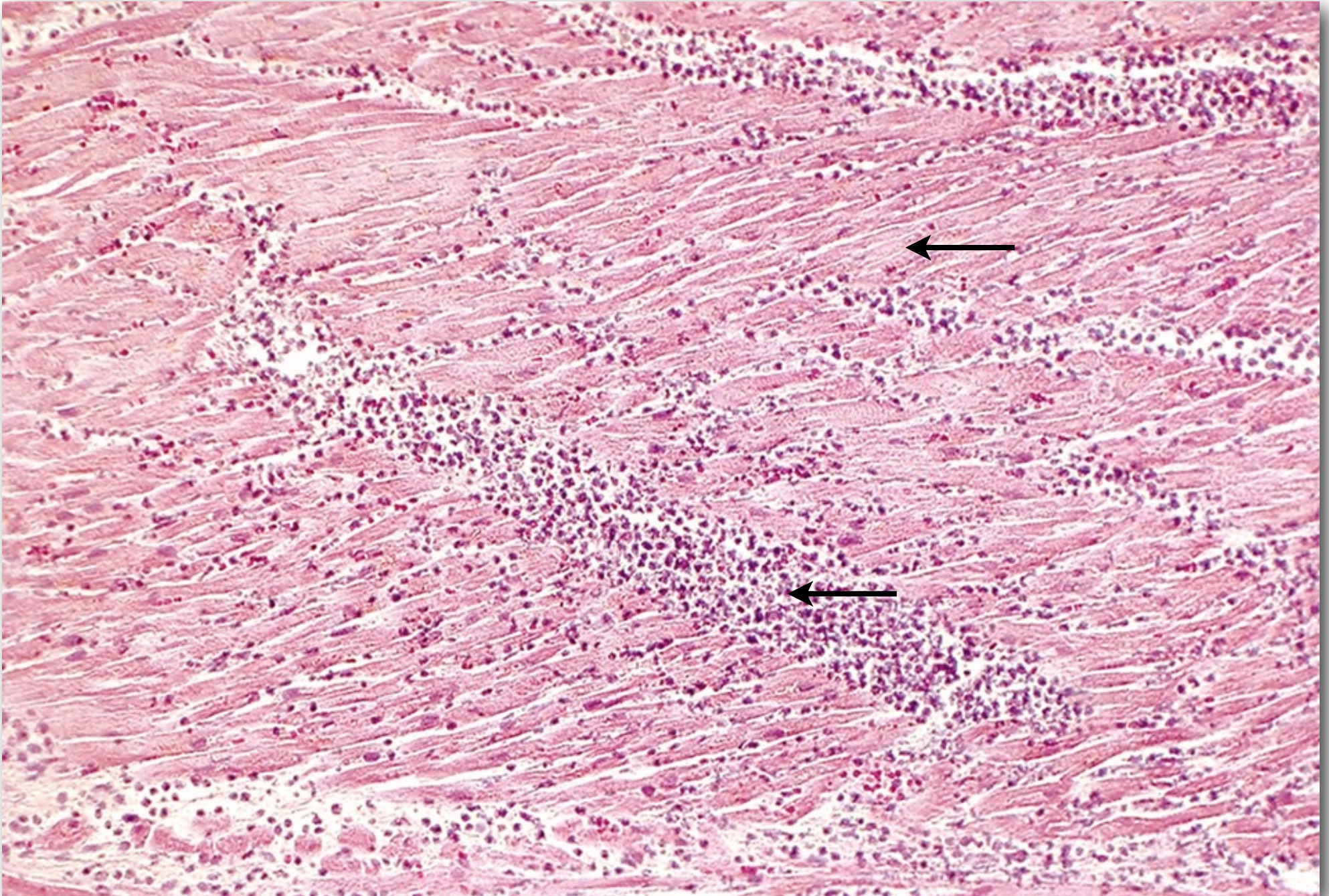
Wavy Fibers



Acute Myocardial Infarct



3-5 days Post-myocardial Infarction



Ischemic Heart Disease

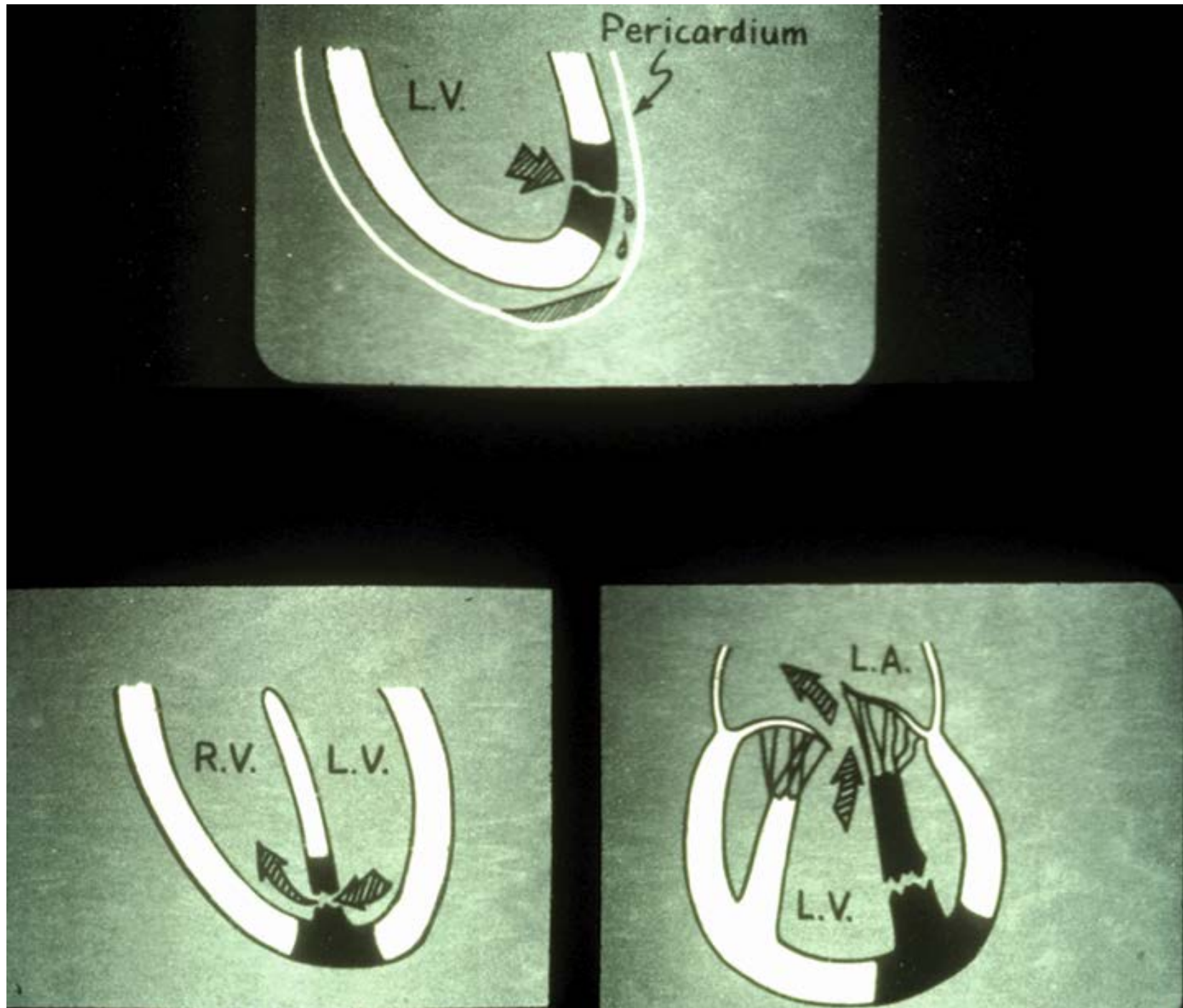
- Complications

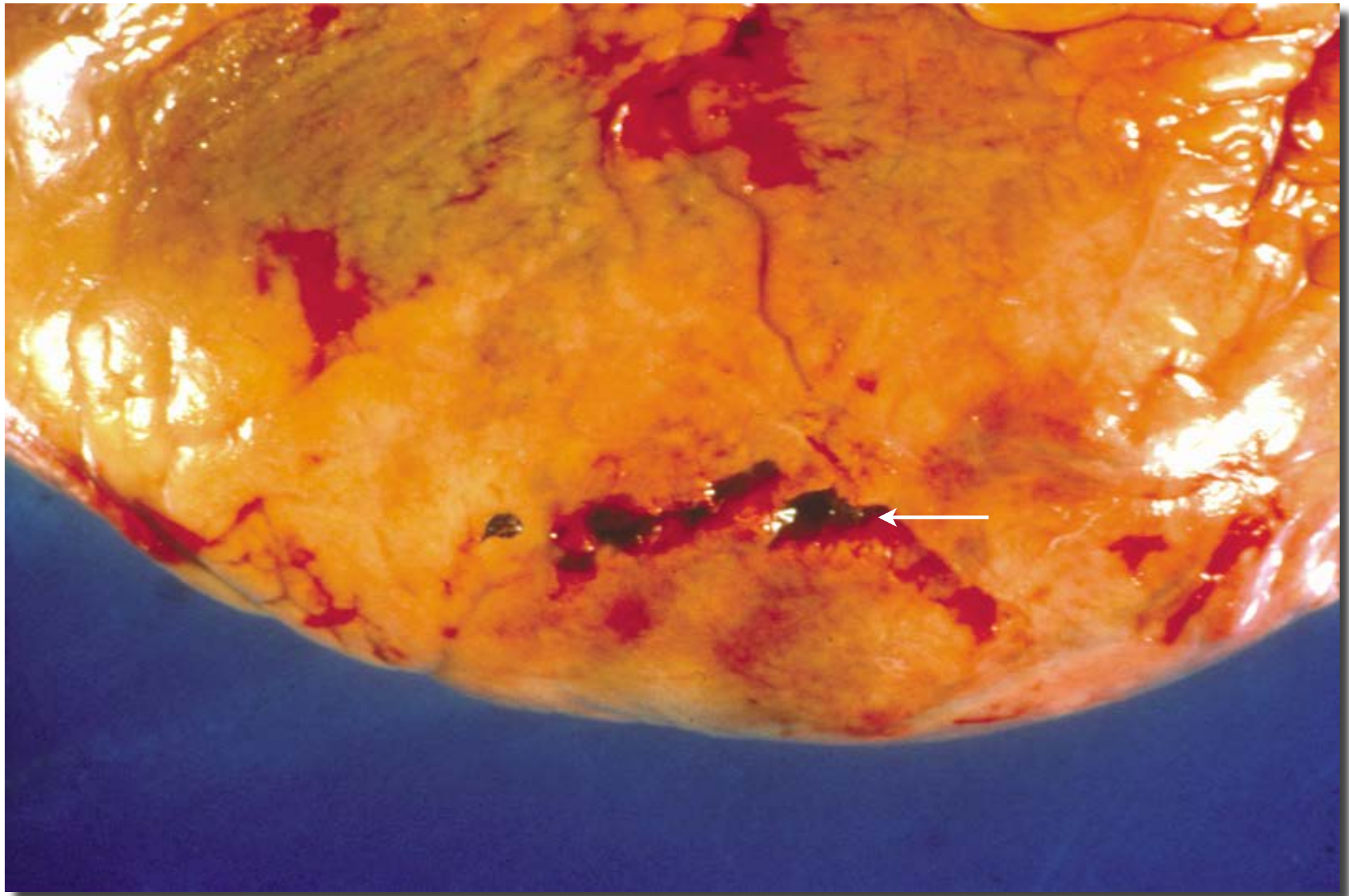
- Cardiac rupture

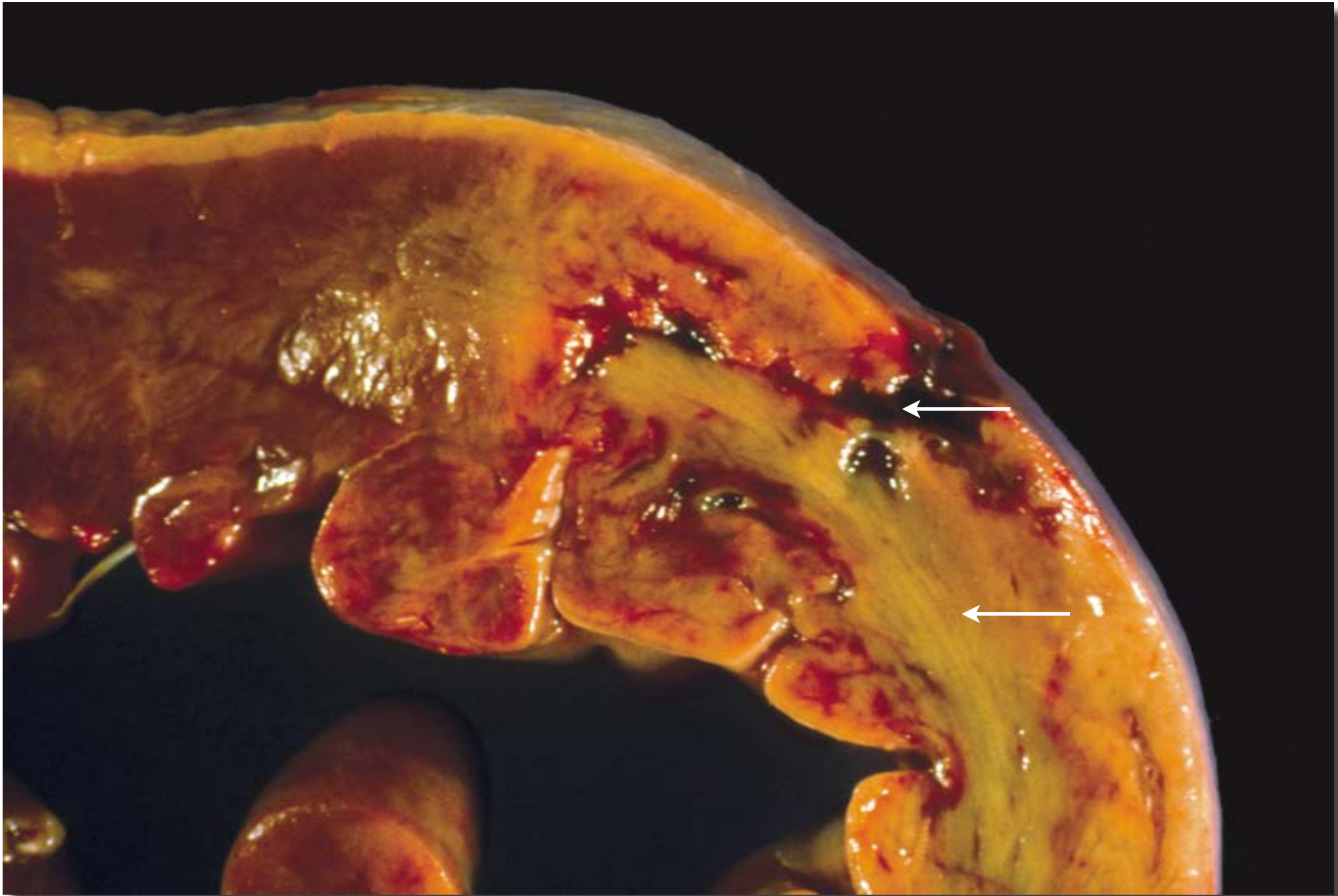
- Most likely within two weeks and greatest within one week following an acute infarct

- Incidence - 5-8% of infarcts

Acute Myocardial Infarct: Cardiac Rupture



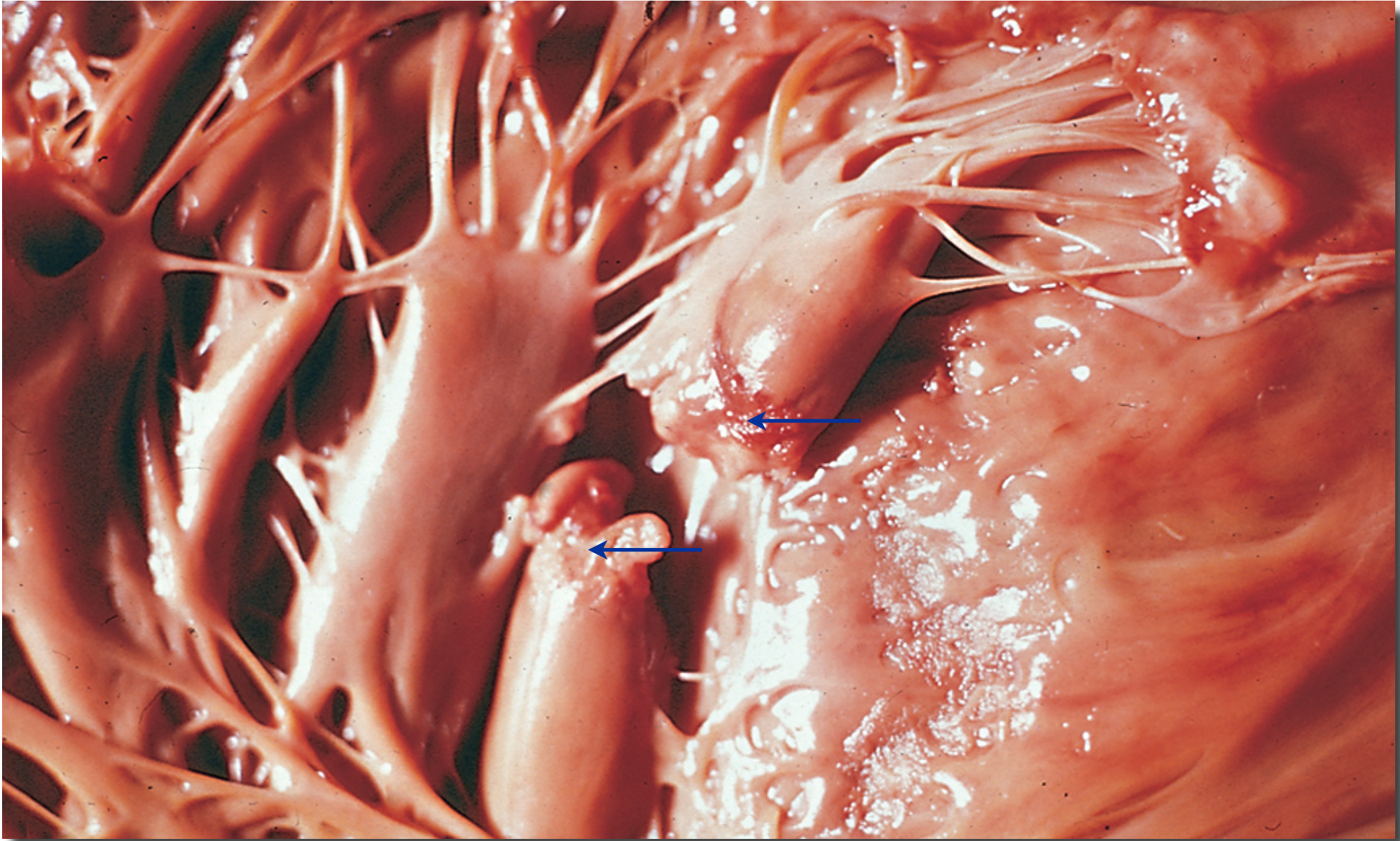




Acute Myocardial Infarct: Cardiac Rupture



Acute Myocardial Infarct: Papillary Muscle Rupture



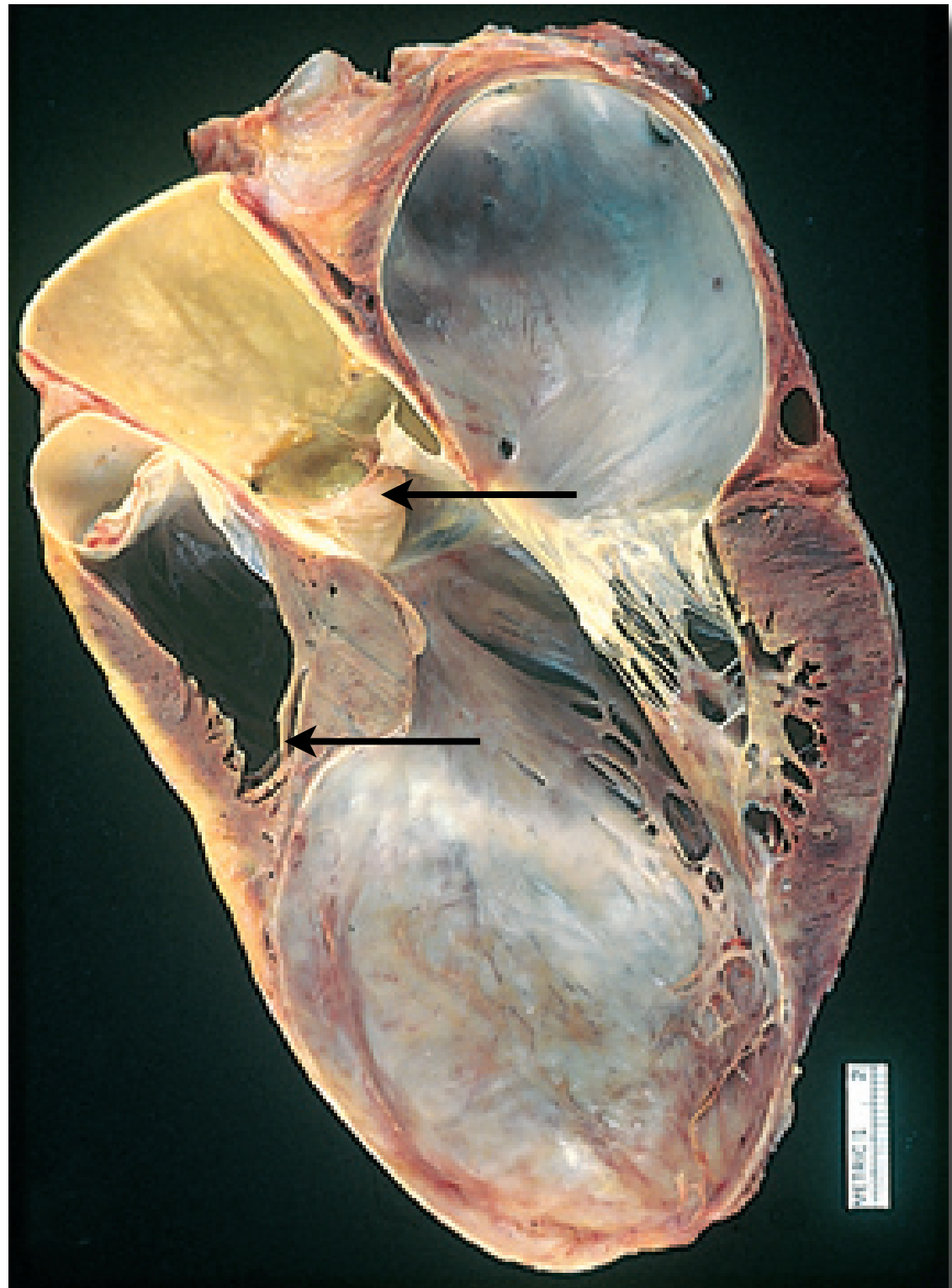
Ischemic Heart Disease

- Complications

- Ventricular aneurysm

- Incidence - varies from 5-35% of infarcts

Acute Myocardial Infarct: Ventricular Aneurysm



Ischemic Heart Disease

- Complications

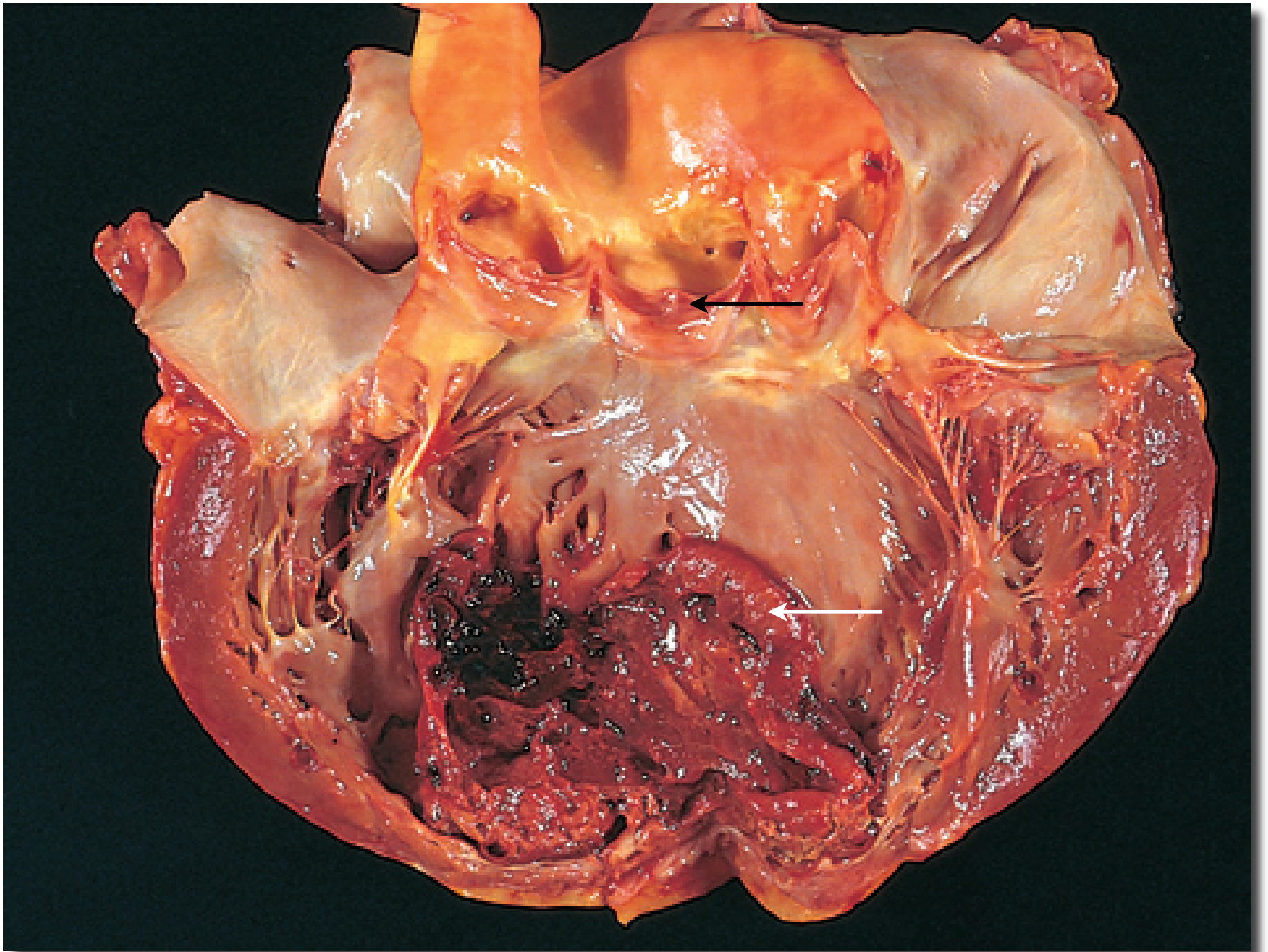
- Mural thrombus

- Predisposing factors - ventricular aneurysm, extension of the infarct to the endocardium, congestive heart failure

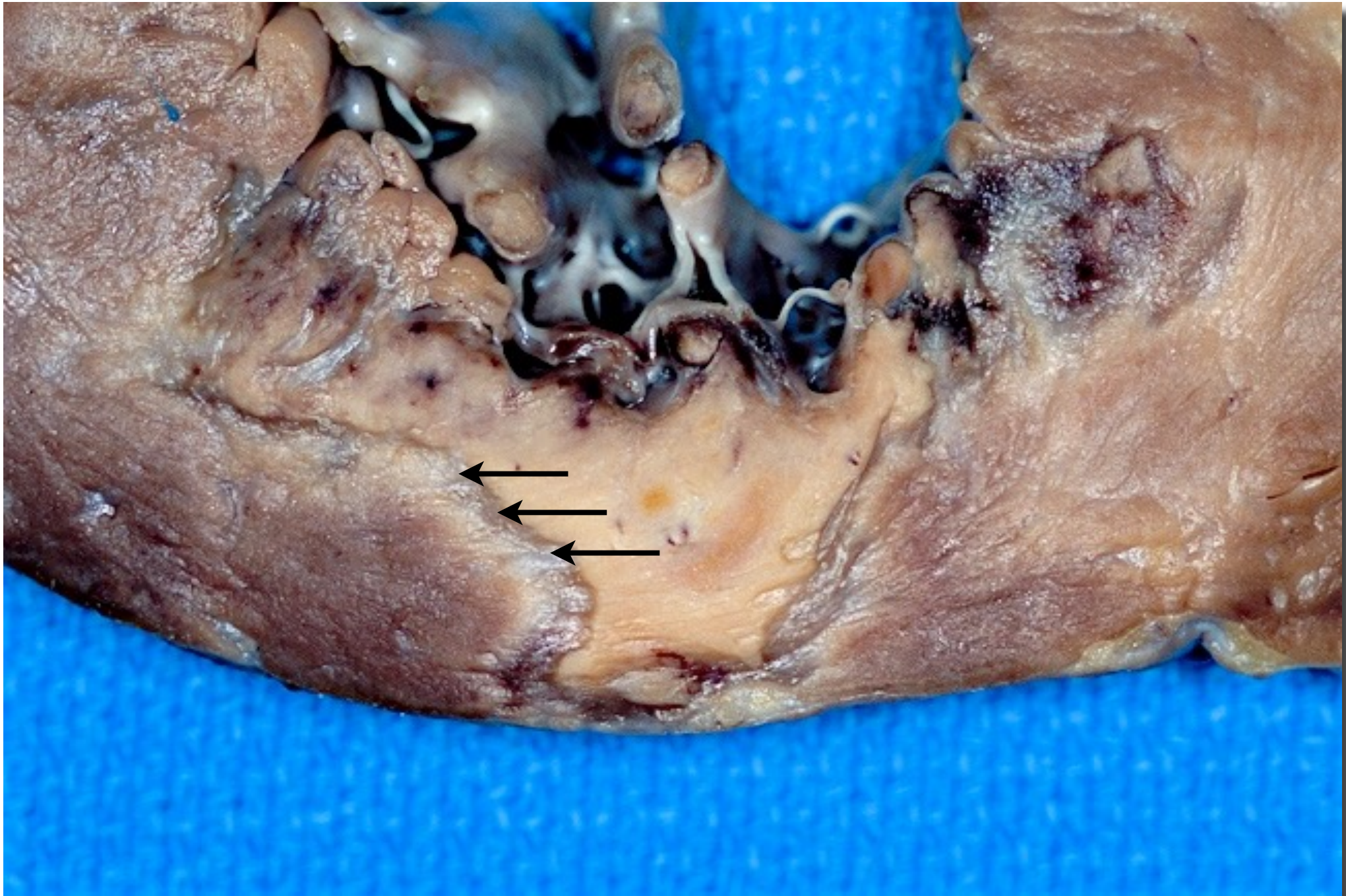
- Complication - increased risk of embolization after myocardial infarction (6%)

- Massive pulmonary embolism

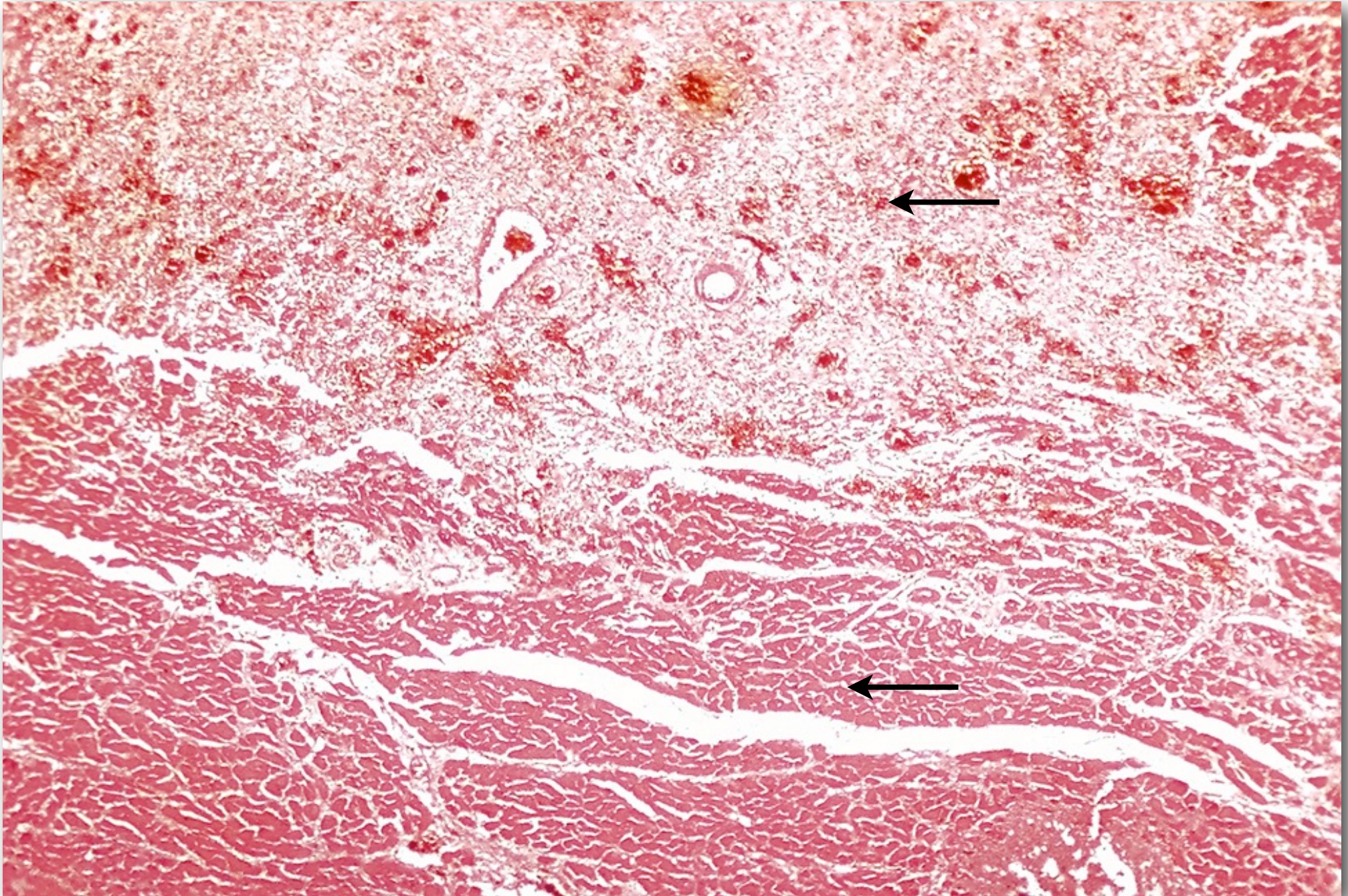
Acute Myocardial Infarct: Mural Thrombus



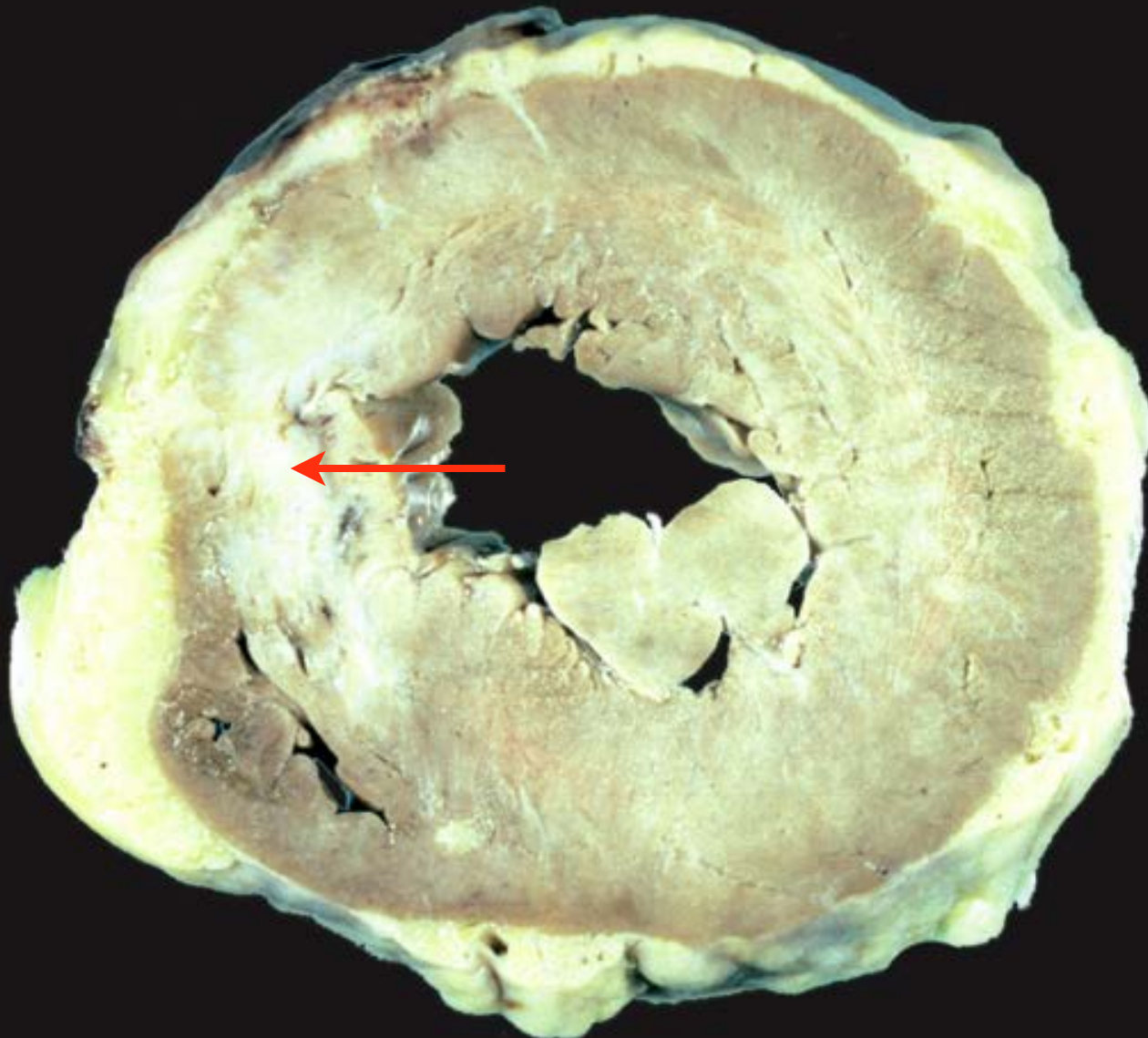
14 days Post-Myocardial Infarction



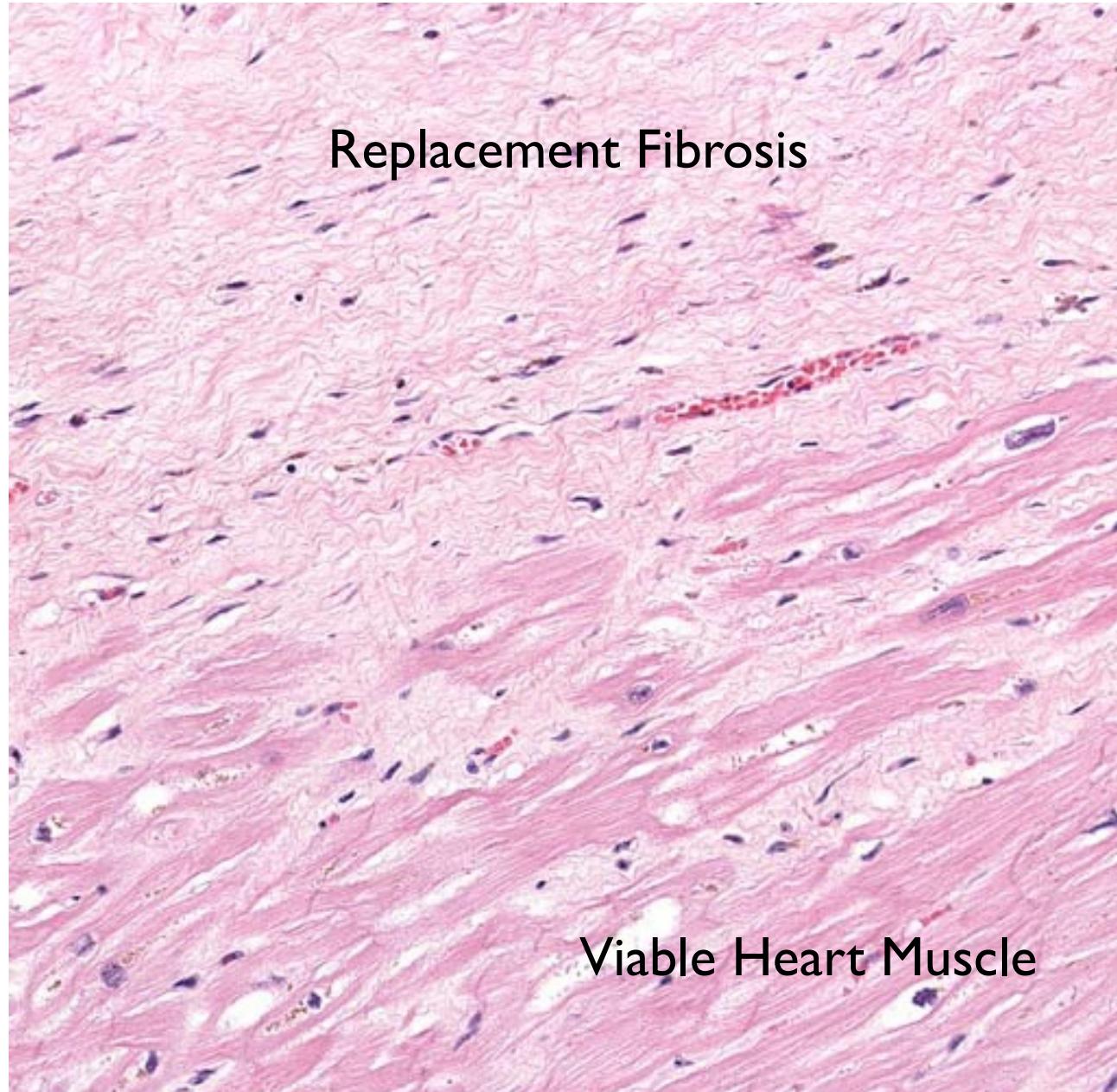
14 days Post-myocardial Infarction



Remote Myocardial Infarct



Remote Myocardial Infarct



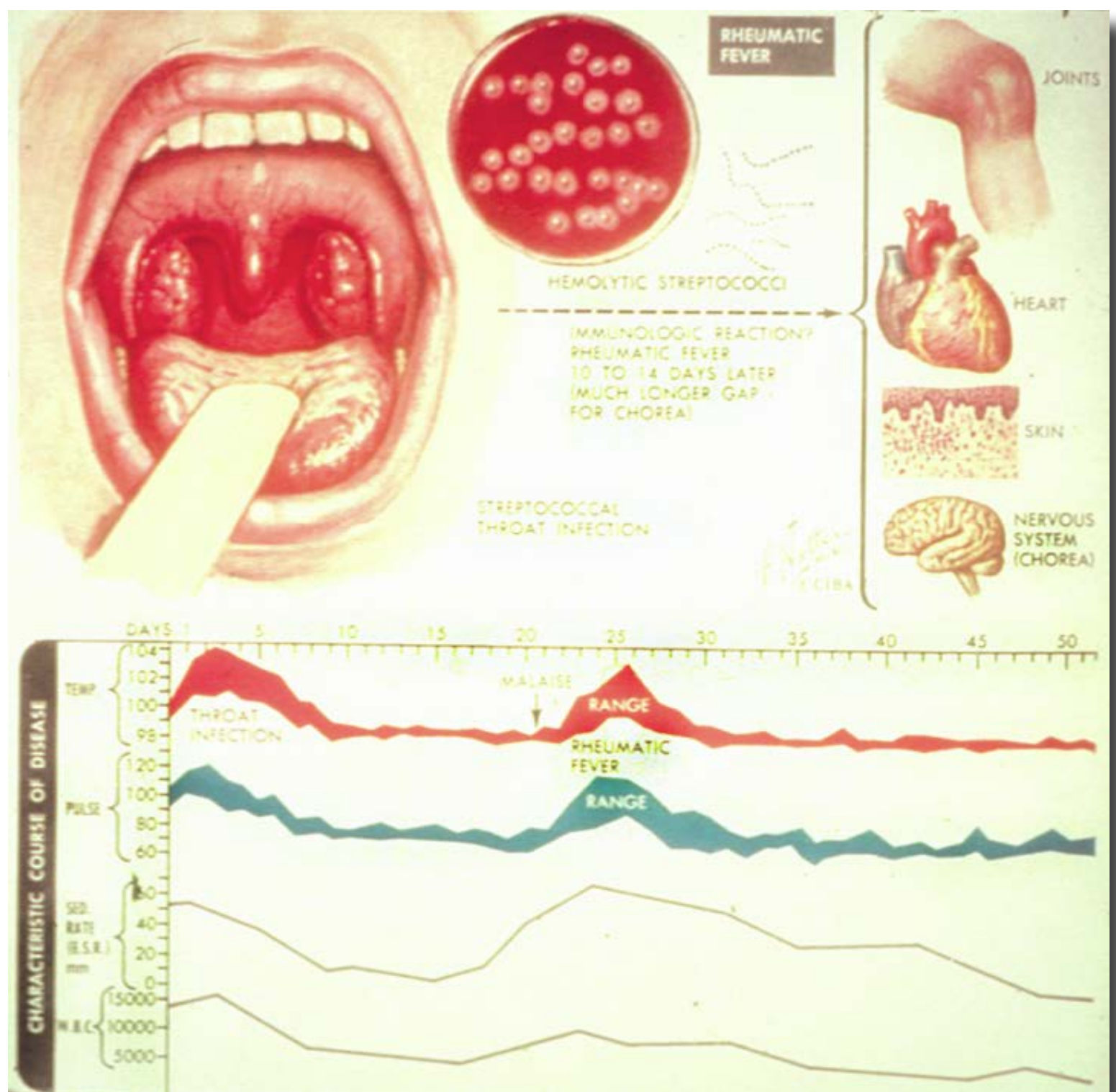
Rheumatic Heart Disease

Rheumatic Heart Disease

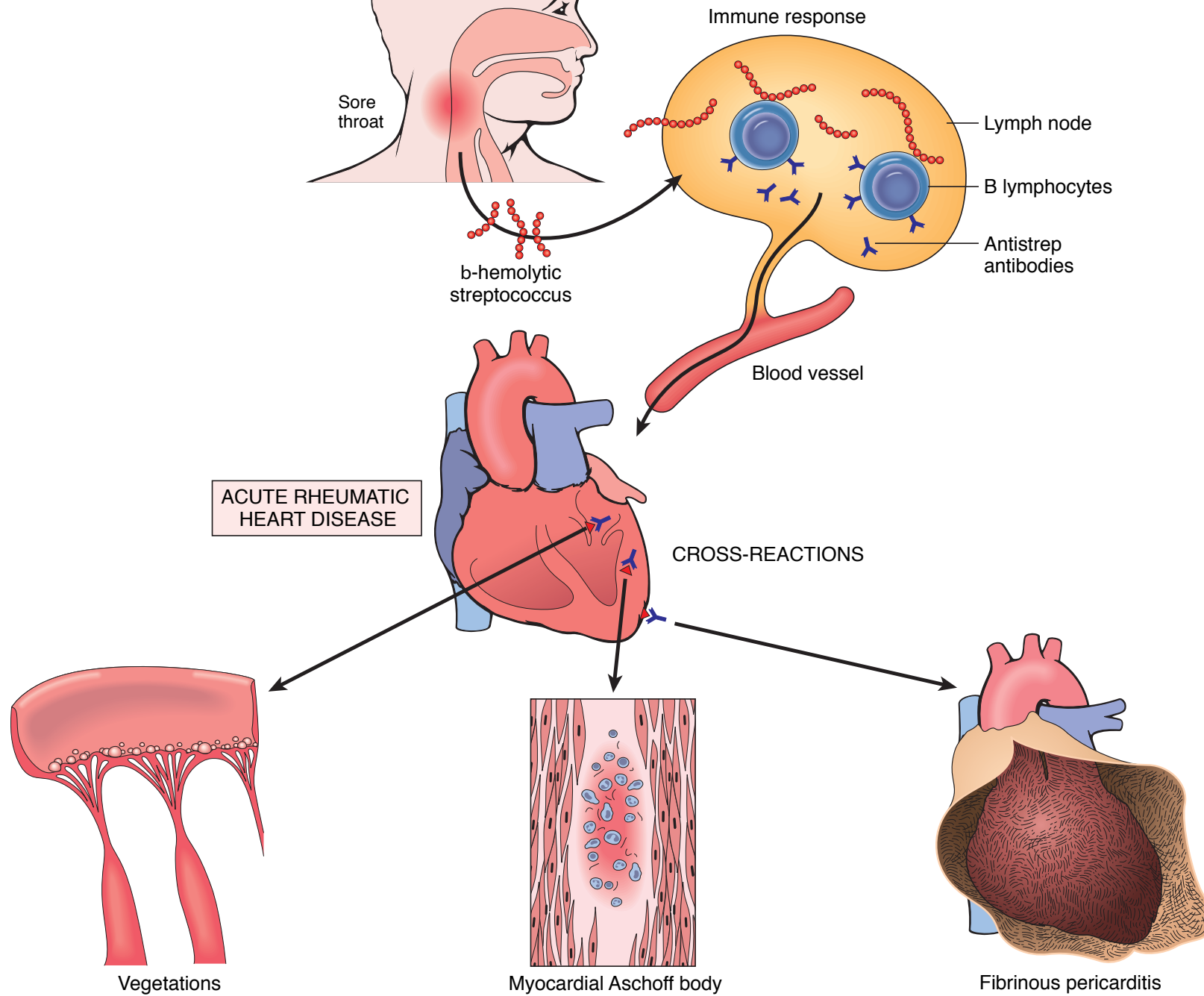
● Definition

- An acute, recurrent, inflammatory disease that follows a pharyngeal infection due to beta hemolytic Group A streptococci
- Over period of years, the mitral or mitral and aortic valves may become permanently damaged (fibrosis)

Clinical Presentation



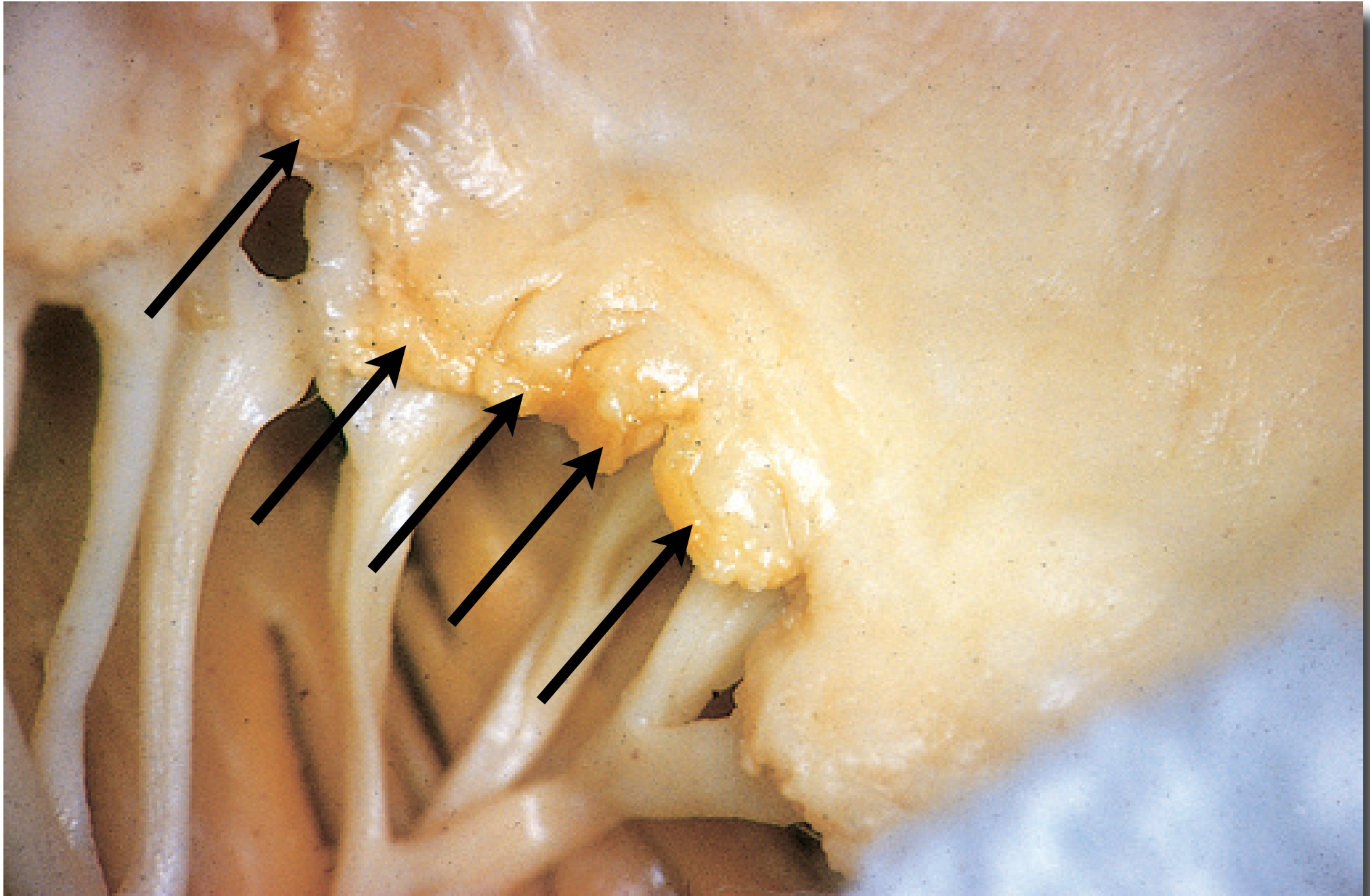
Pathogenesis



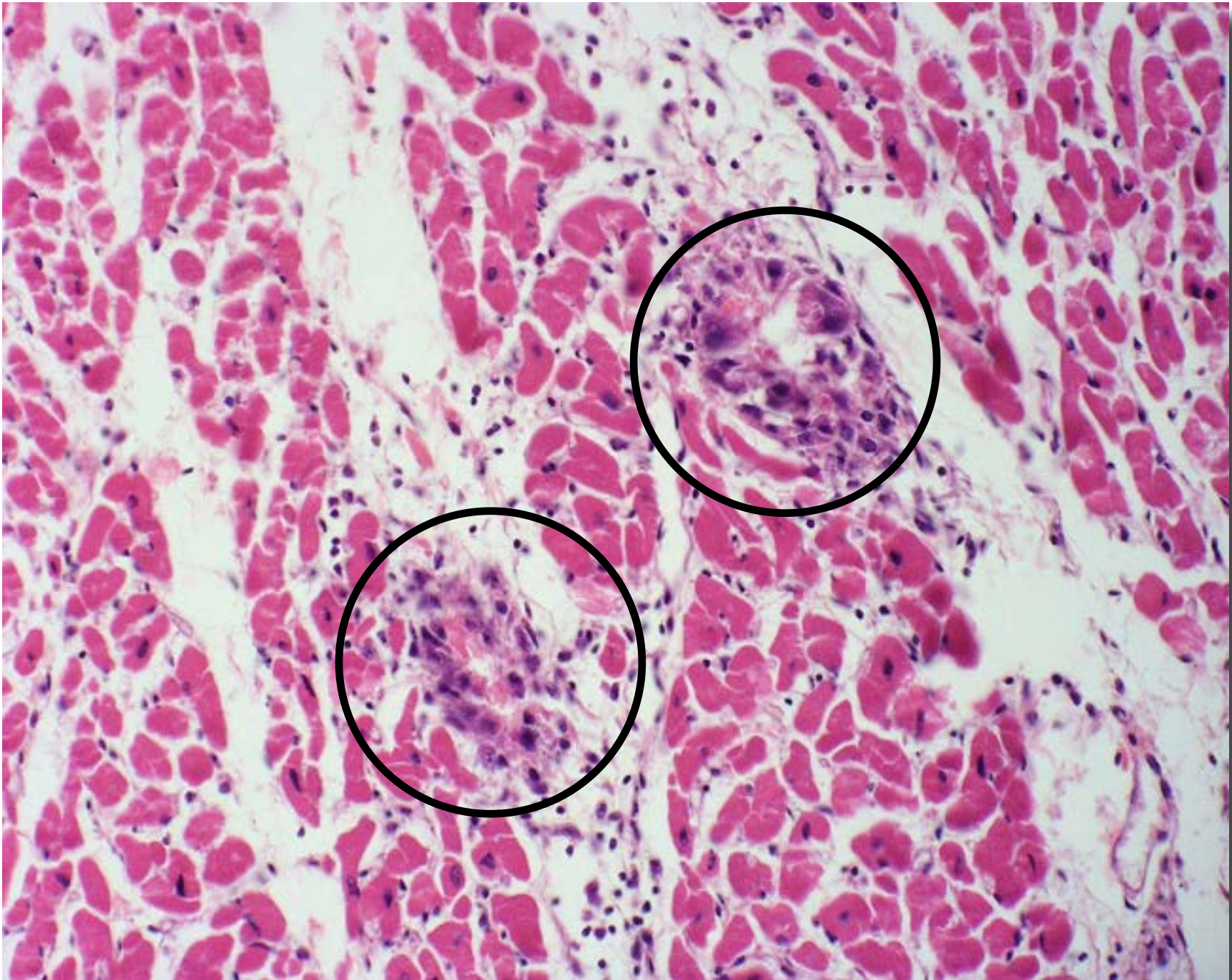
Rheumatic Heart Disease

- Acute Rheumatic Fever
 - Heart - foci of fibrinoid necrosis surrounded by lymphocytes and macrophages are called Aschoff bodies
 - Involve all three layers of the heart including valves
 - Joints - acute nonspecific arthritis, large joints, especially the knees
 - Skin - subcutaneous nodes (erythema marginatum)
 - Arteries - angiitis

Acute Rheumatic Heart Disease



Acute Rheumatic Heart Disease: Aschoff Bodies

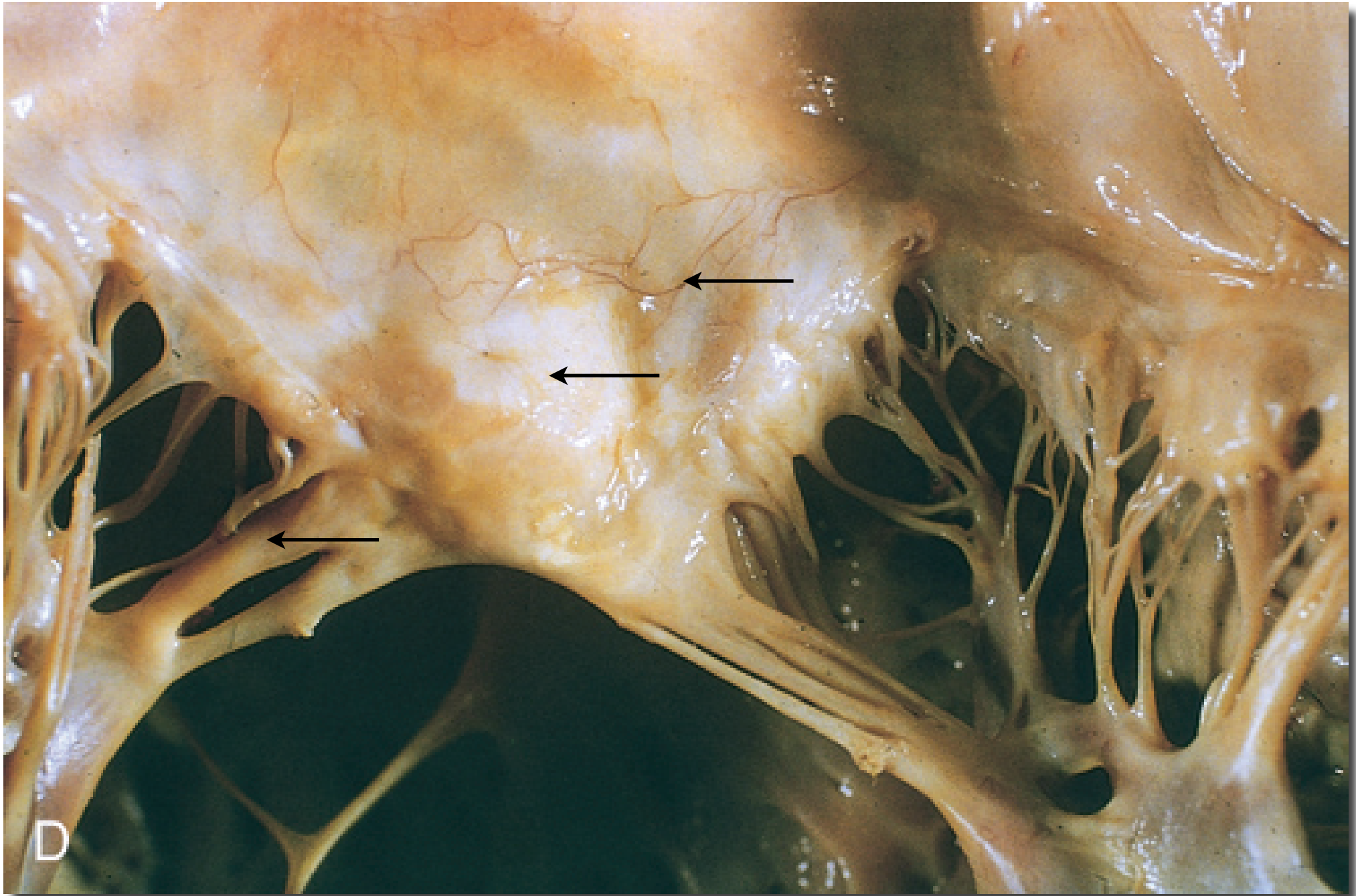


Rheumatic Heart Disease

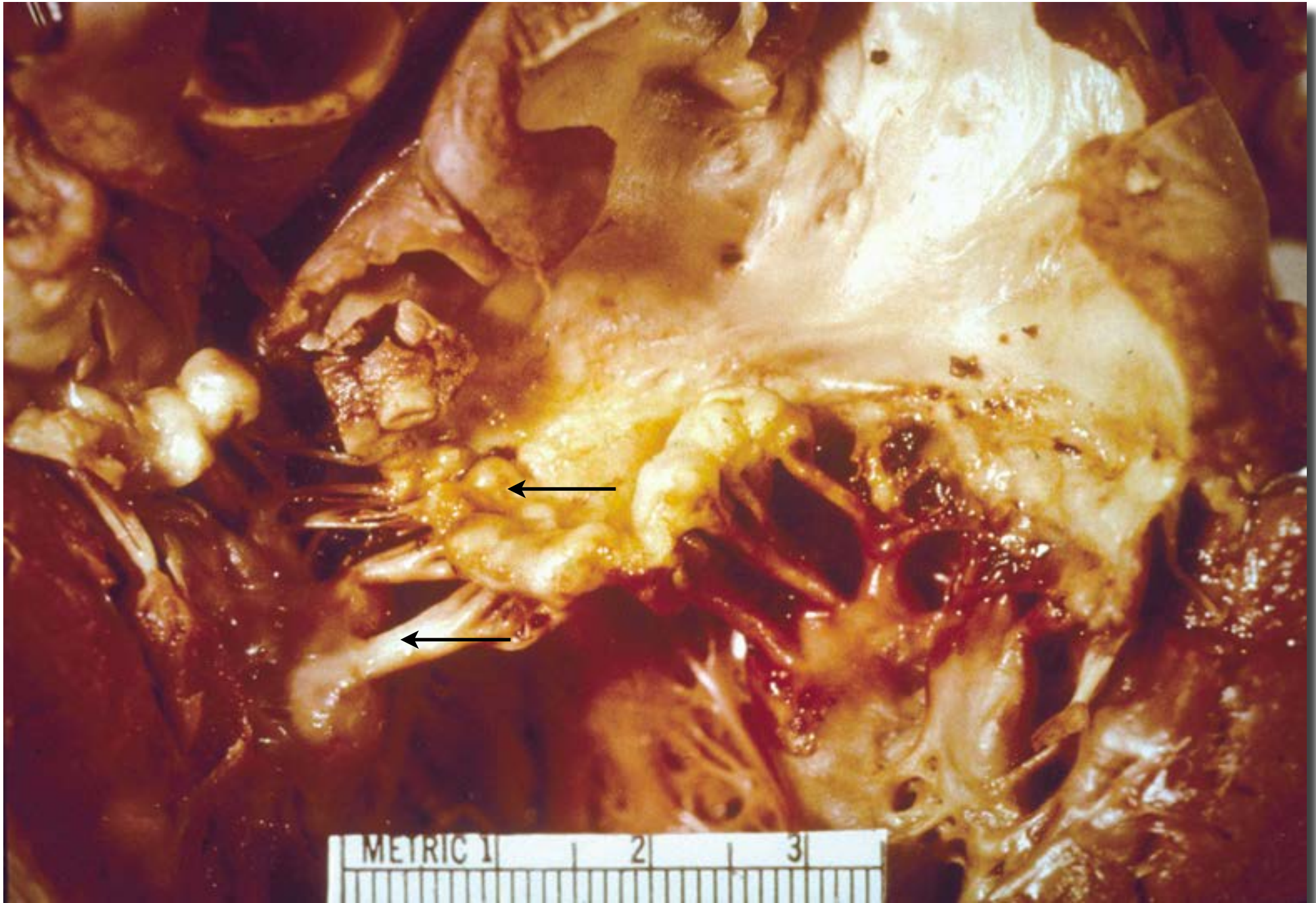
● Mitral stenosis

- Fibrous adhesion between the free edges of the cusps, & thickening and fusion of mitral valve leaflets
- Shortening, thickening and fusion of chordae tendineae
- Dilatation of left atrium
- Mural thrombosis of left atrium
- Increased risk for bacterial endocarditis

Chronic Rheumatic Valvular Disease: Mitral Valve



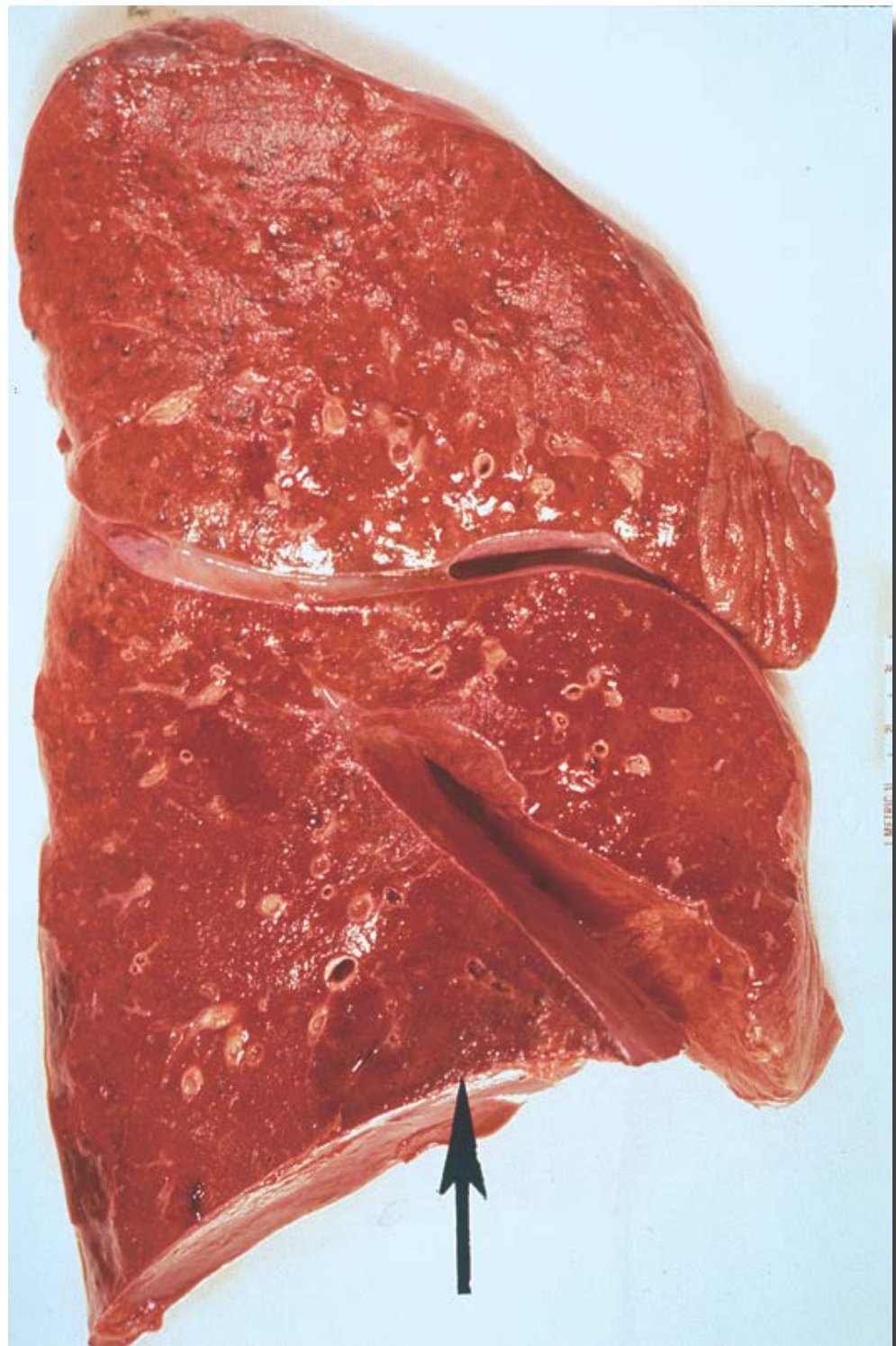
Chronic Rheumatic Valvular Disease: Mitral Valve



Rheumatic Heart Disease

- Pathologic changes in the lungs
 - Congestion and edema
 - Hemorrhages and infarct(s)
 - Hemosiderosis
 - Hyperplasia of pulmonary arteries
 - Fibrosis of alveolar septa
 - Right ventricular hypertrophy and failure

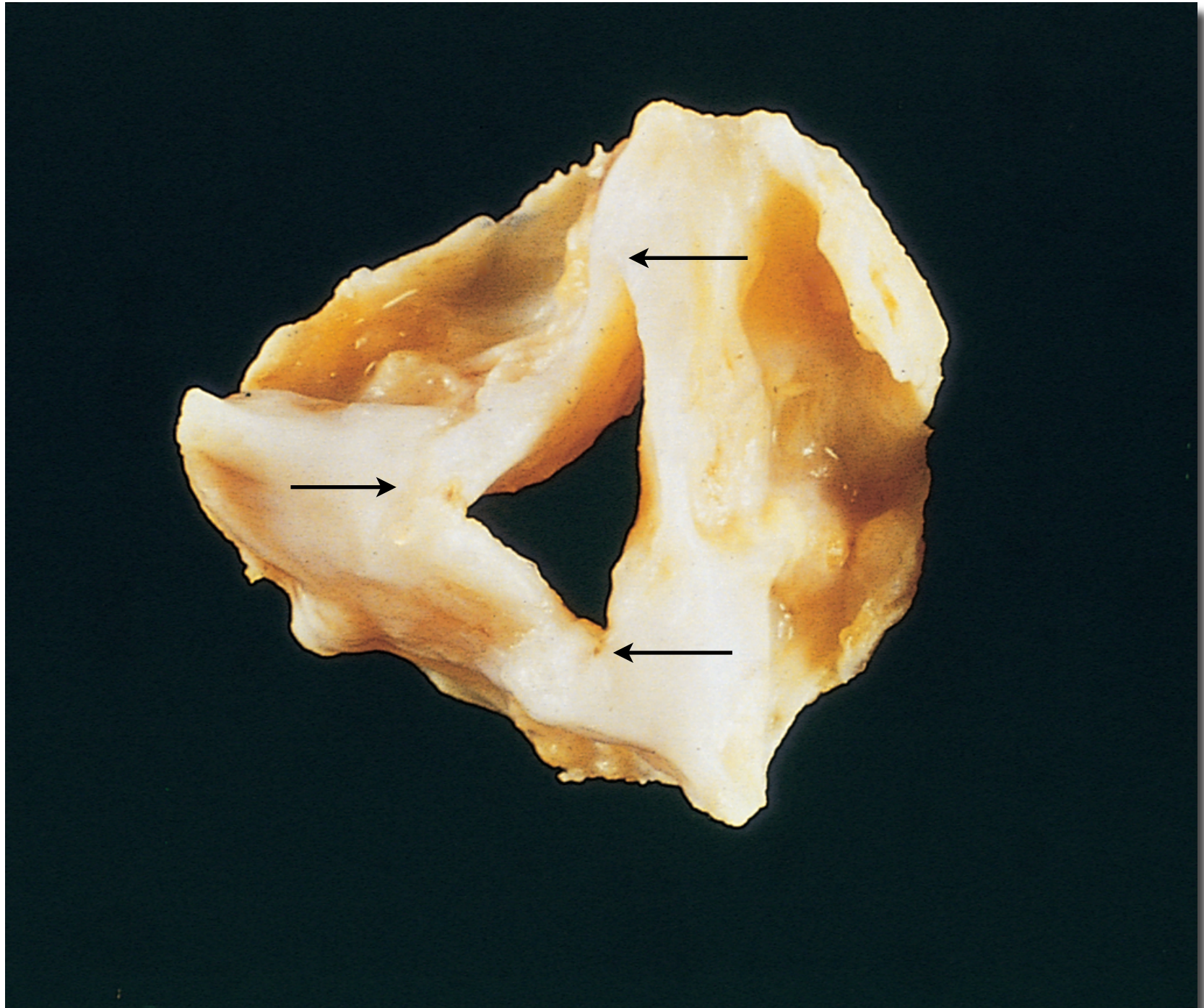
Chronic Rheumatic Valvular Disease



Rheumatic Heart Disease

- Mitral insufficiency (regurgitation)
- Aortic stenosis
- Aortic insufficiency

Chronic Rheumatic Valvular Disease: Aortic Valve Stenosis



Infective Endocarditis

- Definition
 - Acute infective endocarditis
 - Subacute infective endocarditis

Infective Endocarditis

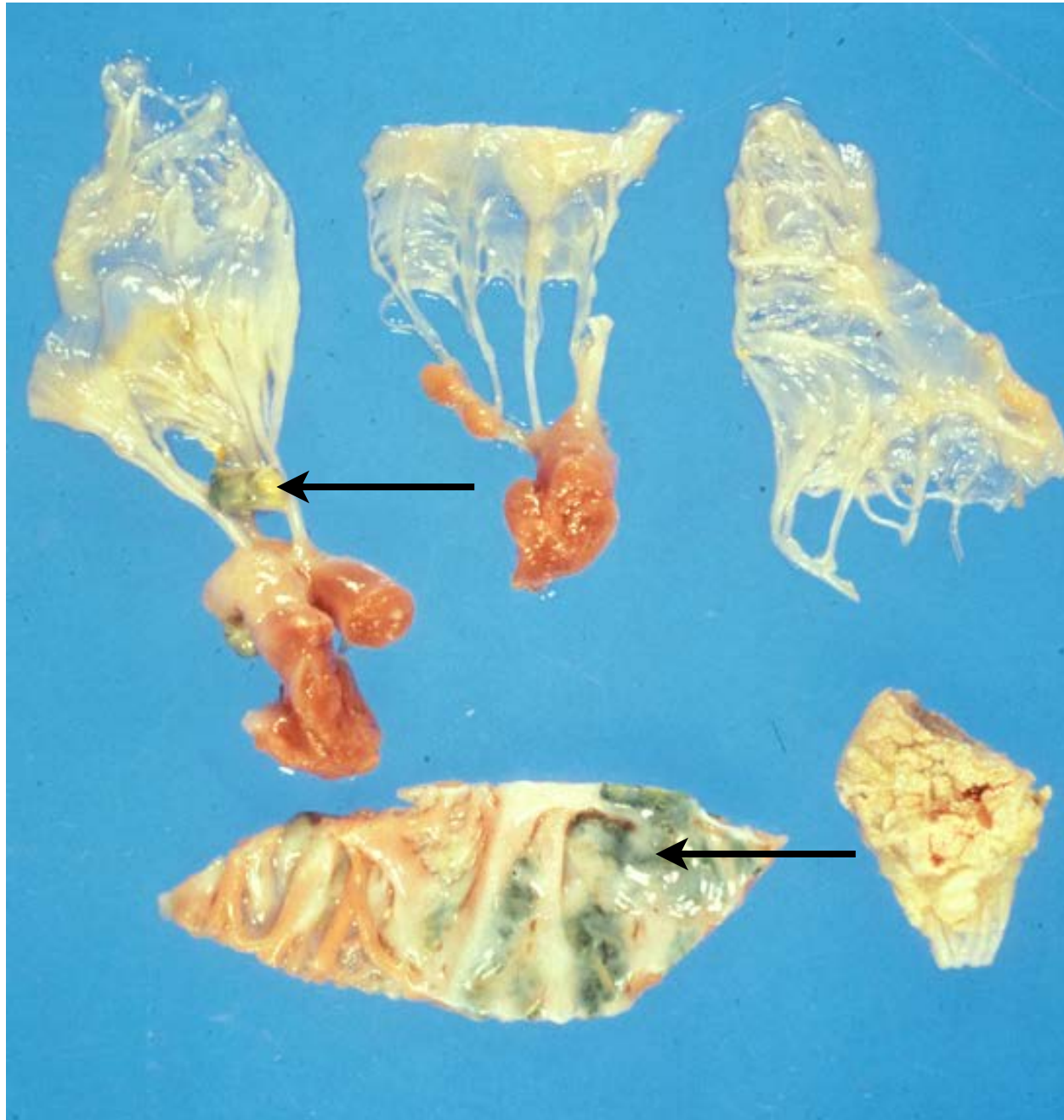
● Risk factors

- Chronic rheumatic heart disease
- Congenital heart disease
- Mitral valve prolapse
- Degenerative calcific valvular stenoses
- Bicuspid aortic valve and artificial valves
- Indwelling pulmonary catheters
- Neutropenia and immunodeficiency
- IV drug abuse

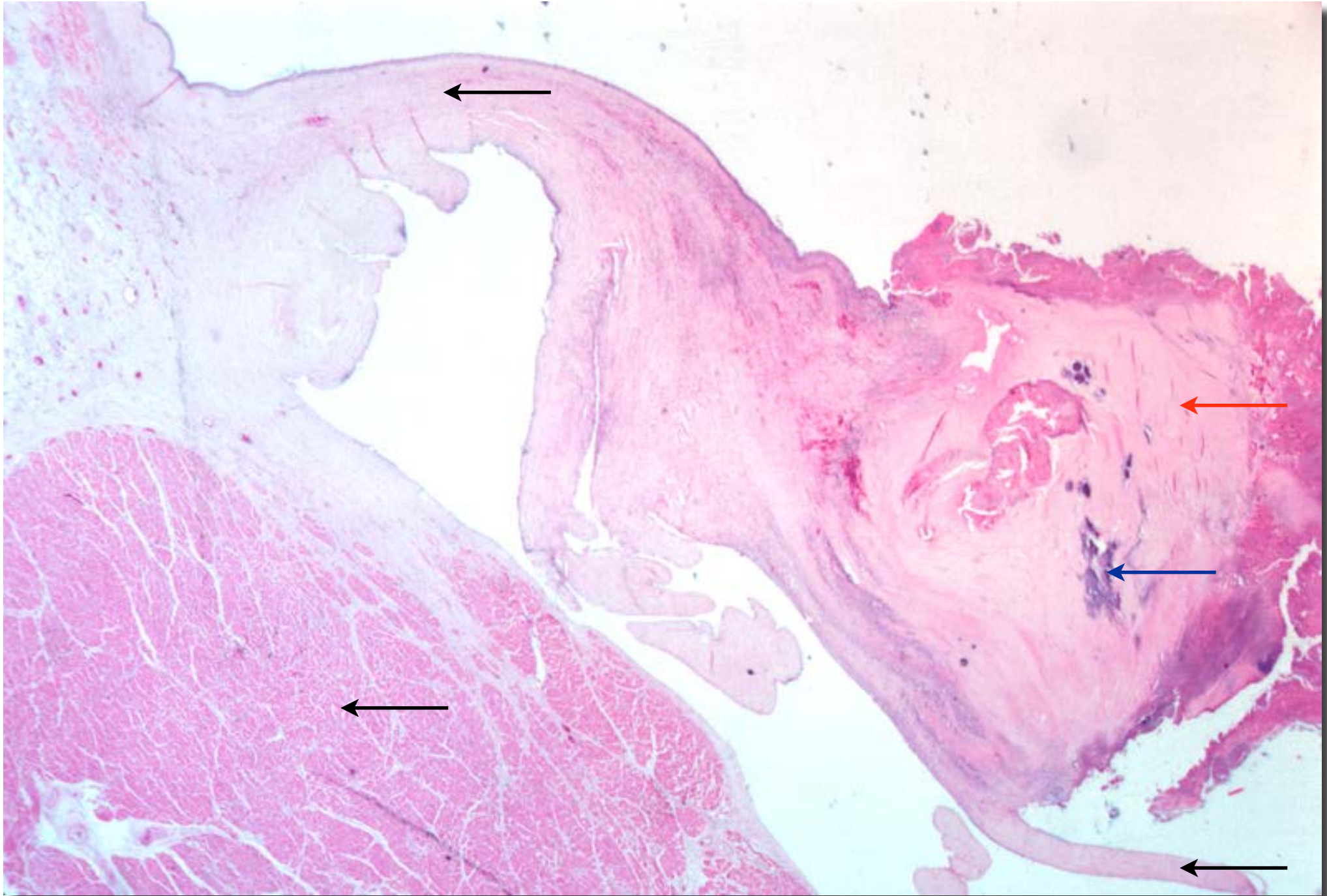
Infective Endocarditis

- Acute infective endocarditis
 - *Staphylococcus aureus* (high virulence) is the most common cause
 - Pathology
 - Large vegetations (fibrin, platelets, PMNs, bacteria) on previously normal valves
 - 35-50% mortality with antibiotic therapy

Acute Infective Endocarditis: Tricuspid Valve



Acute Infective Endocarditis: Mitral Valve



Infective Endocarditis

- Subacute infective endocarditis
 - Various *Streptococci viridans* group (low virulence) accounts for the majority of cases
 - Pathology
 - Smaller vegetations (fibrin, platelets, PMNs, bacteria) on abnormal or diseased valves
 - 10% mortality with antibiotic therapy

Infective Endocarditis

- Cardiac Complications
 - Valvular insufficiency or stenoses with cardiac failure
 - Myocardial abscesses
 - Suppurative pericarditis
 - Dehiscence of artificial valves

Infective Endocarditis

- Embolic complications
 - Left-sided lesions - brain, spleen, kidneys, skin, eyes
 - Osler nodes - tender, red, raised punctate lesions of the hands and feet
 - Janeway lesions - painless hemorrhagic raised areas on the palms and soles
 - Roth spots - round white retina spots surrounded by hemorrhage
 - Right-sided lesions - lungs

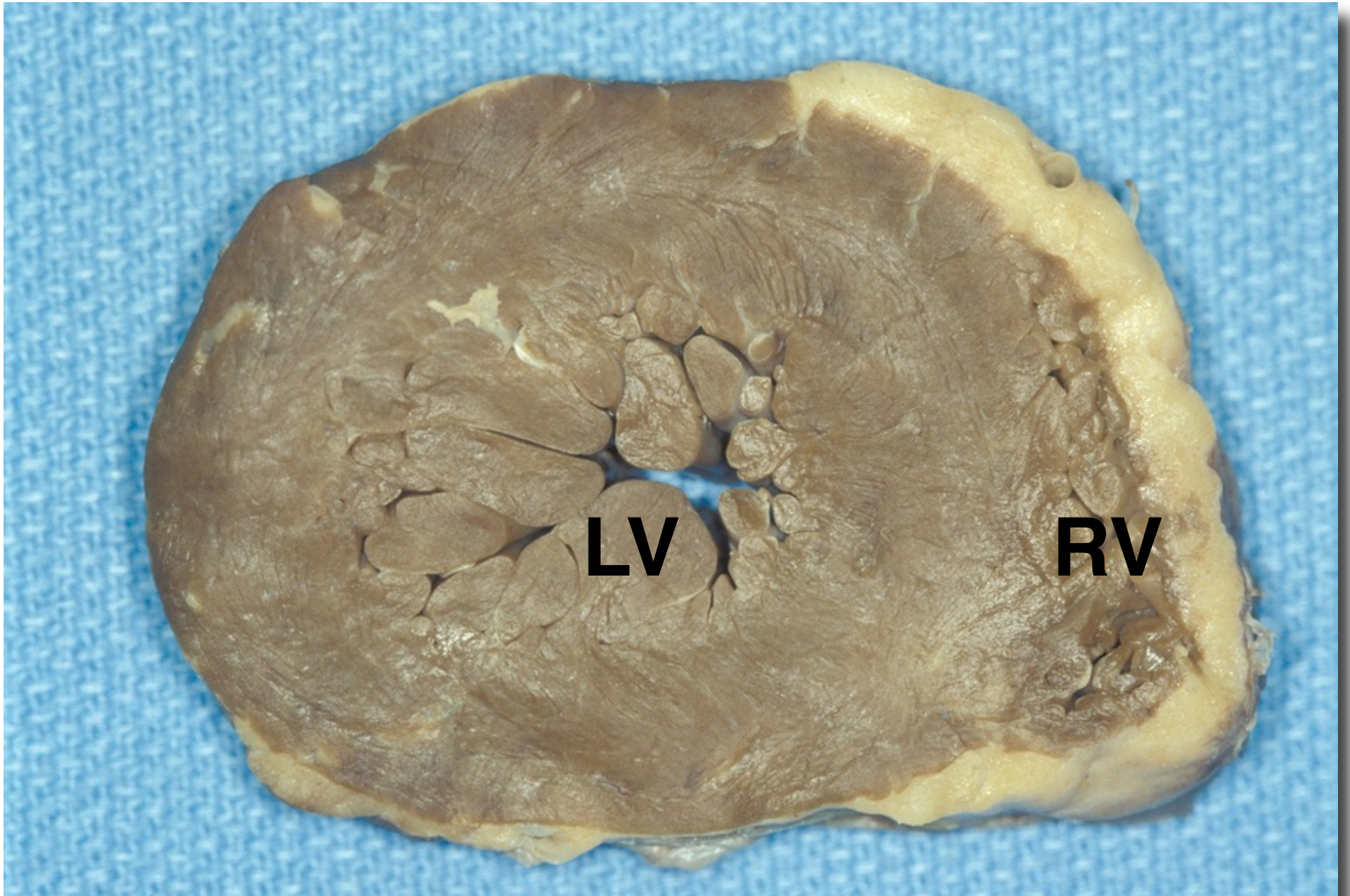
Infective Endocarditis

- Metastatic infections
 - Widespread abscesses with acute infective endocarditis
 - Rare with subacute infective endocarditis
- Renal complications
 - Embolic infarct(s)
 - Focal glomerulonephritis
 - Diffuse glomerulonephritis
 - Multiple abscesses

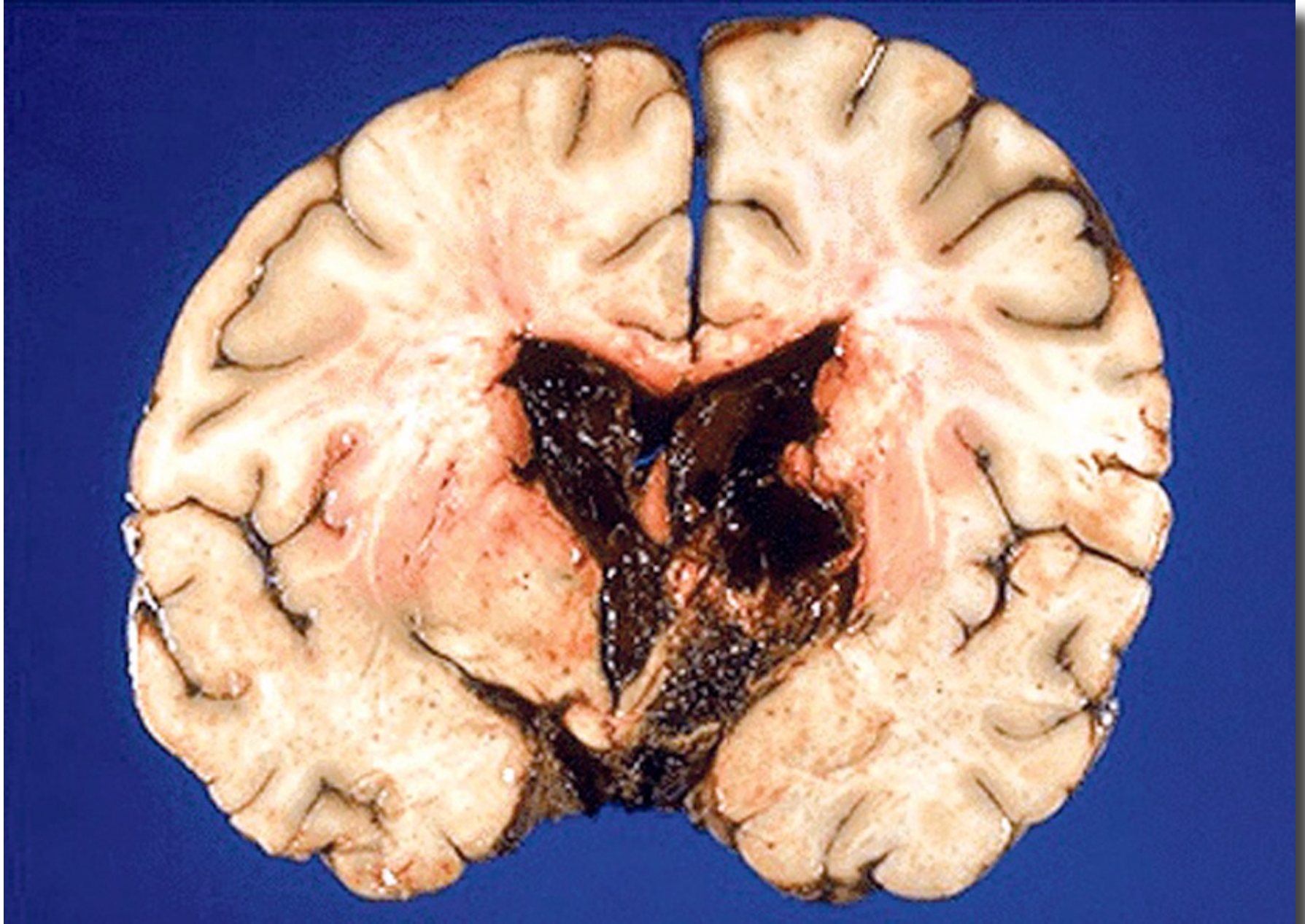
Hypertension

- Defined as an elevated blood pressure leading to end-organ damage
- A sustained diastolic pressure greater than 90 mm Hg and/or systolic pressure greater than 140 mm Hg
- Hypertension is very common
- Complications of hypertension can be devastating and usually remains asymptomatic until late in the course of the disease
- No organ is spared

Left Ventricular Hyertrophy



Hemorrhagic Stroke



Hypertension

- Causes

- Essential (idiopathic or primary) hypertension - 90-95%
- Benign
- Malignant (accelerated)

Hypertension

- Secondary hypertension (5-10%)

- Renal

- Acute glomerulonephritis

- Chronic pyelonephritis

- Polycystic disease

- Renal vascular disease

- Renal amyloidosis

- Urinary tract obstruction

Hypertension

- Secondary hypertension (5-10%)

- Endocrine

- Pheochromocytoma

- Primary aldosteronism

- Cushing syndrome

- Exogenous hormones (glucocorticoids, estrogen, etc)

- Pituitary adenoma

Hypertension

- Secondary hypertension (5-10%)
 - Cardiovascular
 - Coarctation of the aorta
 - Polyarteritis nodosa
 - Pregnancy-induced (pre-eclampsia)
 - Neurogenic (psychogenic)

Hypertension

- Pathology of Benign Hypertension

- Gross

- Kidneys are either normal or small in size
- Cortical surfaces have a fine granular texture (leather grain)

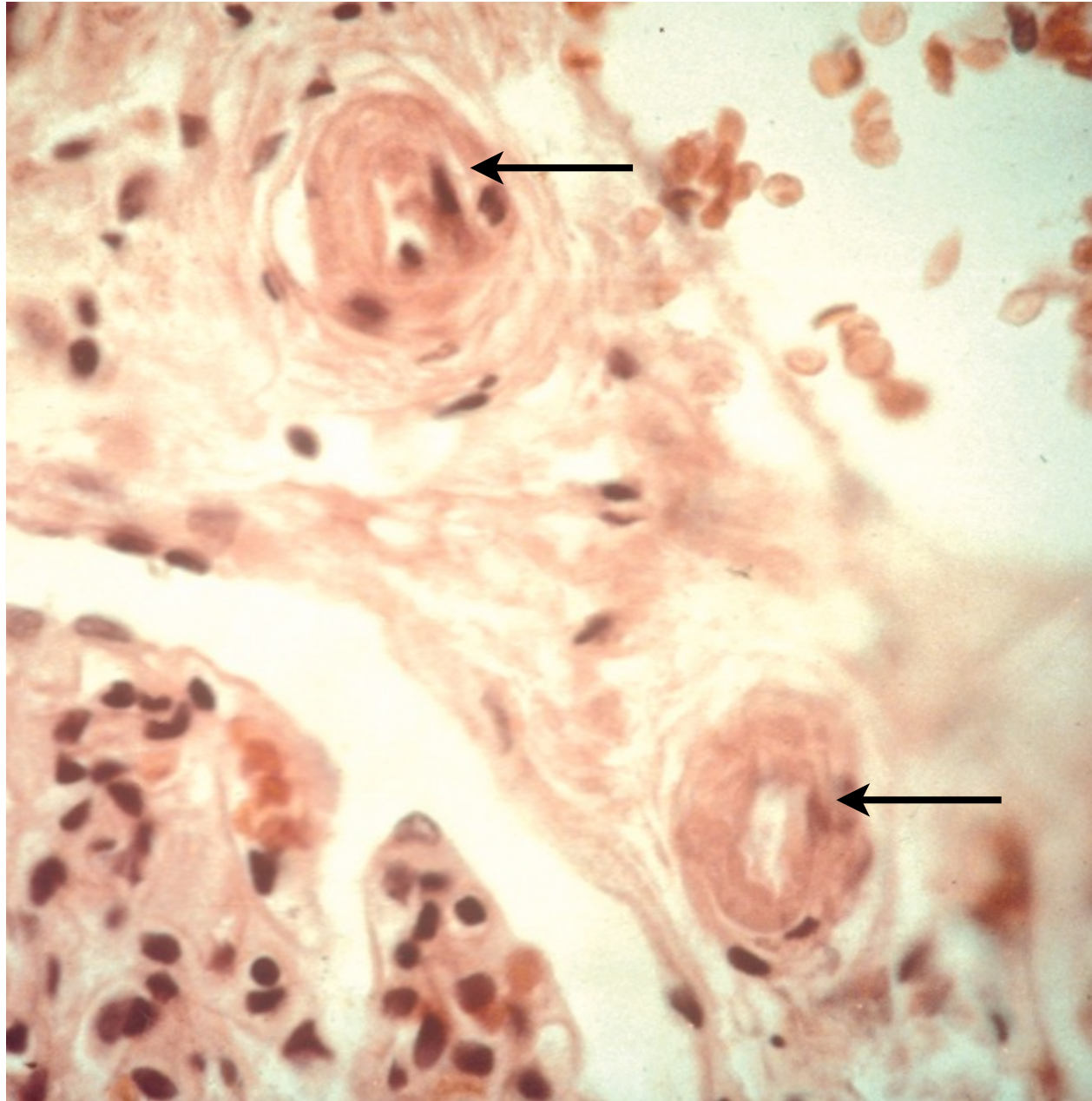
- Light microscopy

- Hyaline arteriolosclerosis - narrowing of the lumina of arterioles and small arteries due to thickening and hyalinization of the walls
- Hyaline material within the vessel wall is composed of plasma proteins, lipids and basement membrane material

Kidney: Benign Hypertension



Kidney: Benign Hypertension



Hypertension

● Pathology of Malignant Hypertension

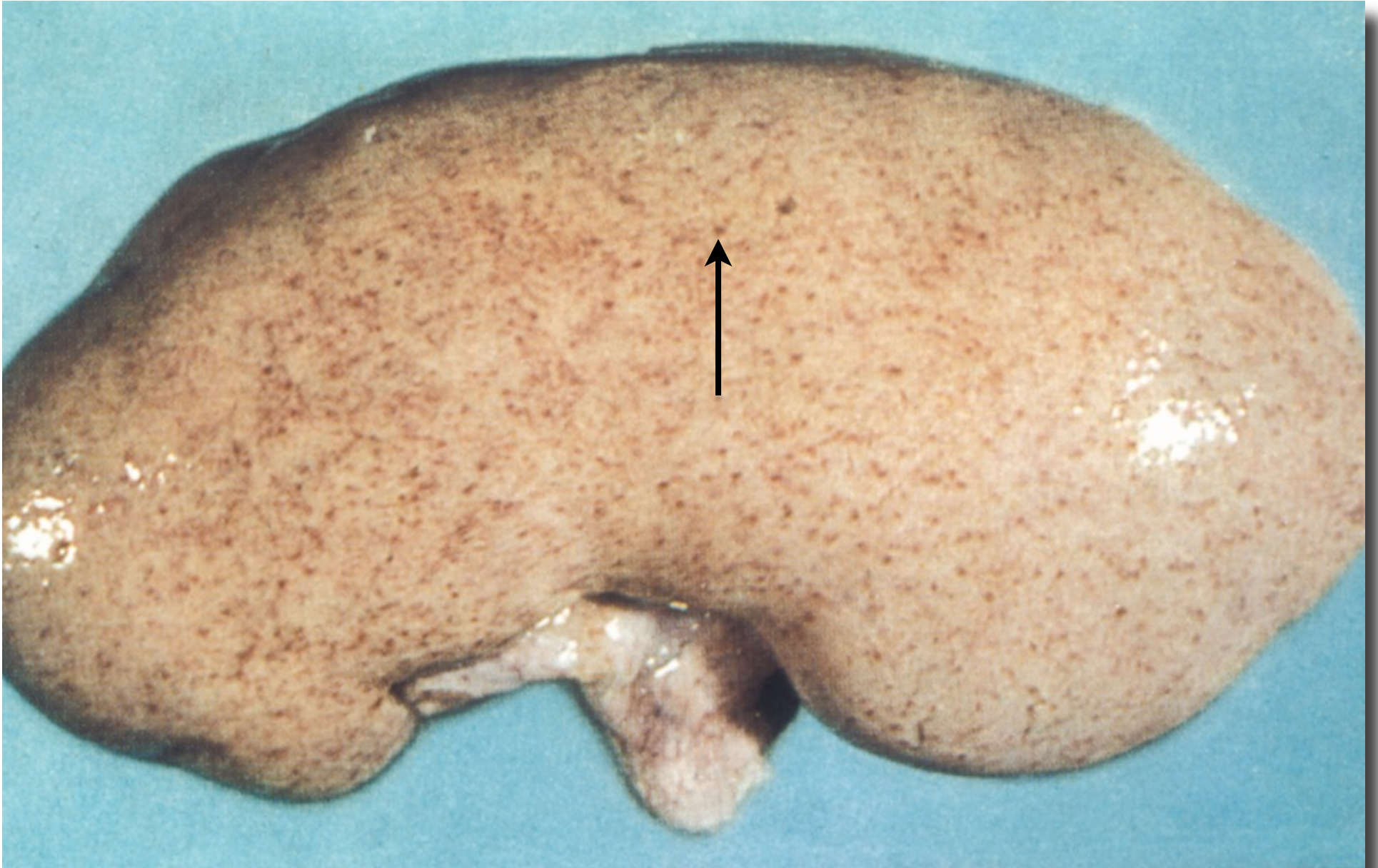
● Gross

- Size is dependent upon the duration and severity of the hypertensive disease
- Cortical surfaces may have small, pinpoint hemorrhages (petechiae) that represent rupture of the arterioles or glomerular capillaries (“flea-bitten” appearance)

● Light microscopy

- Hyperplastic arteriolosclerosis (“onionskinning”) is the proliferation of concentrically arranged smooth muscle cells
- Fibrinoid necrosis of the arterioles

Kidney: Malignant Hypertension



Kidney: Malignant Hypertension

