

**Endocarditis,
myocarditis,
pericarditis.
Cardiomyopathies**

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Endocarditis: inflammation of the endocardium, especially the valves

1. Infective endocarditis: (bacteria, fungi)

Predisposing factors:

- septicemia**
- valve malformations**
- deformed, calcified valves**
- arteficial valve implantation**
- previous rheumatic fever**
- peridontal, periapical foci!**

Most important causative agents:

Strcc. viridans

Enterococcus (Str. fecalis)

Staphylococcus aureus

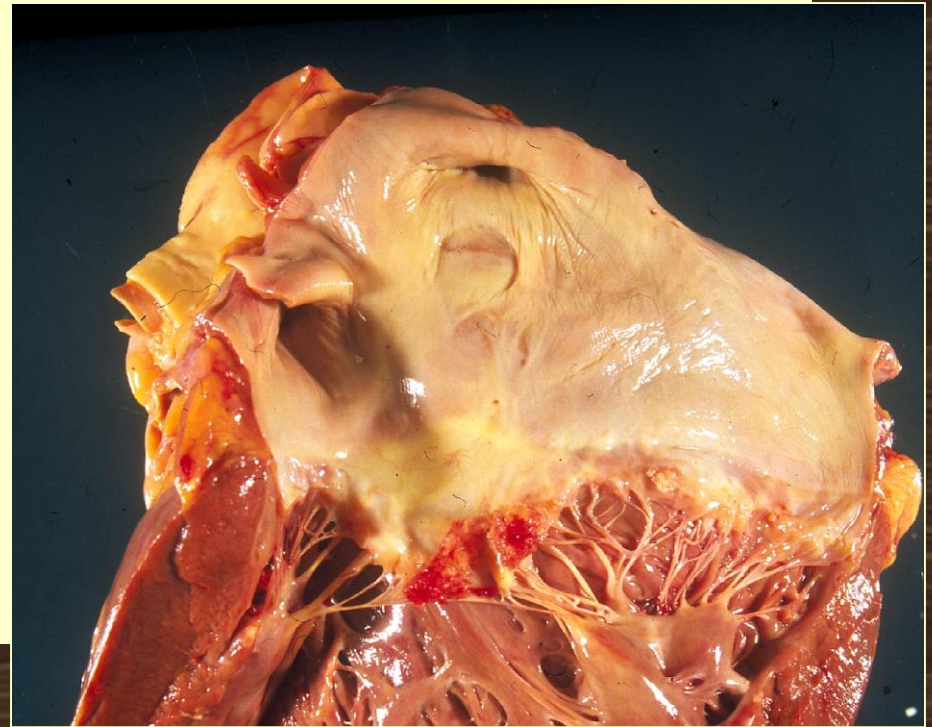
Candida species

Morphology:

Vegetations

Valve destruction

Both





Complications:

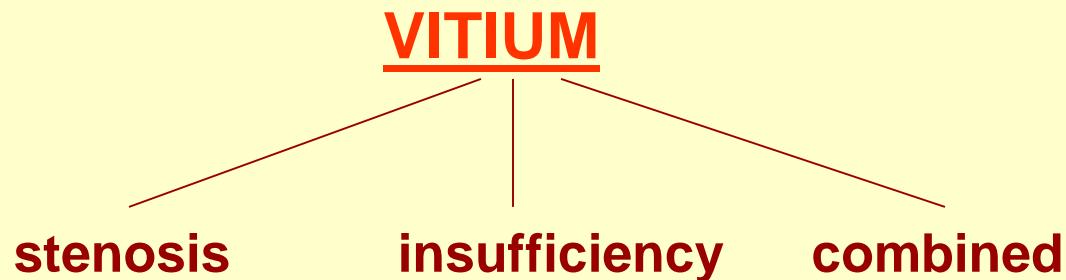
embolization (septic emboli, septic abscesses)

sepsis

„mycotic aneurysms”, subarachnoidal hemorrhage

acute left sided heart failure (regurgitation, chorda tendinea rupture)

healing by scarring and calcification

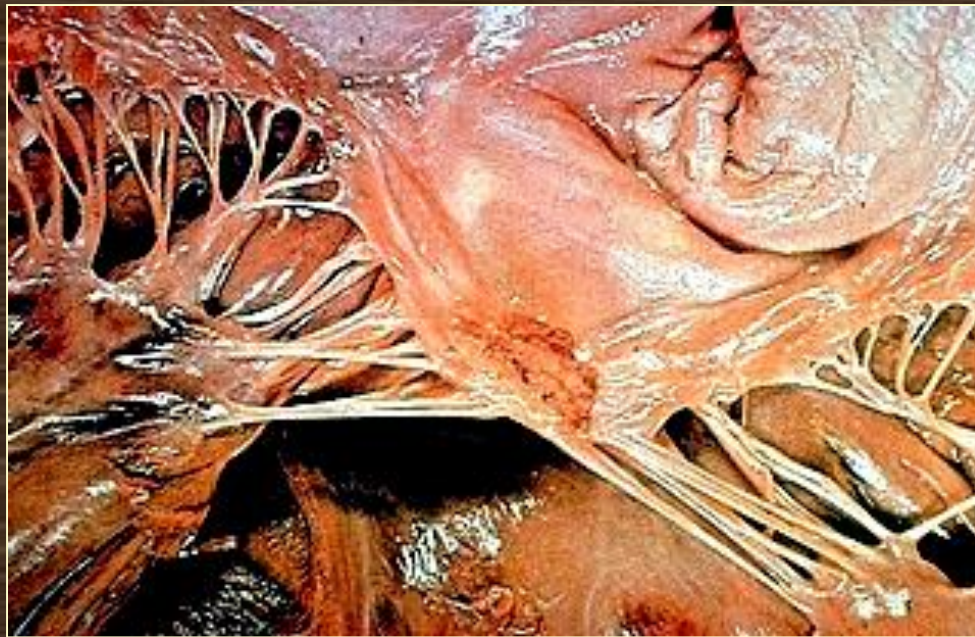


2. Non-infective endocarditis:

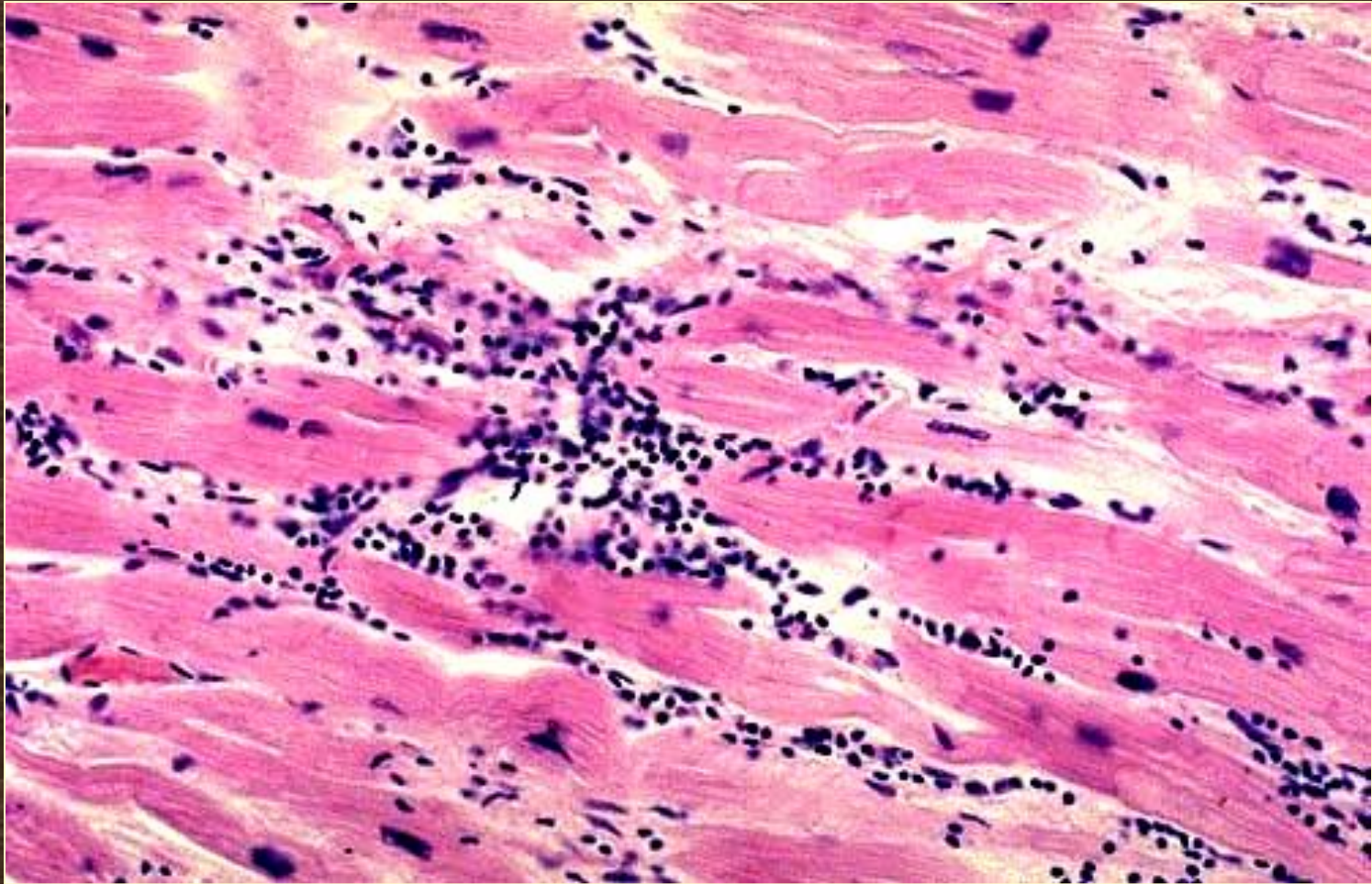
verrucous endocarditis (rheumatic fever)

SLE (Libman-Sacks endocarditis) – atypical

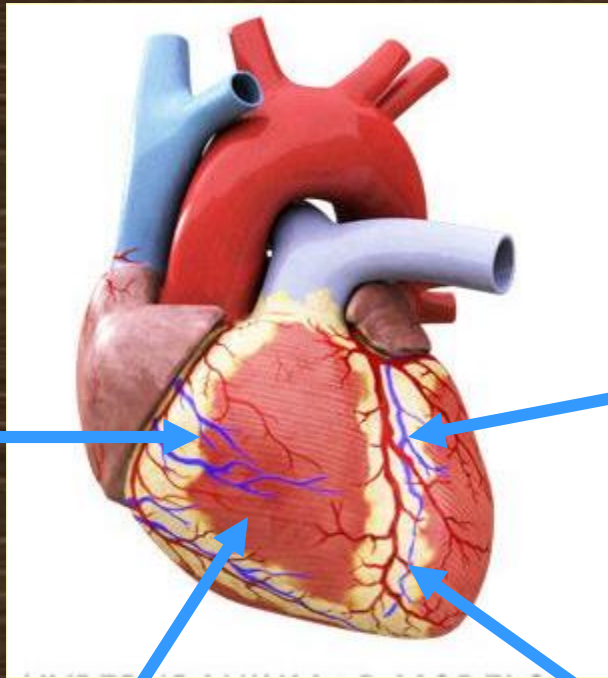
„marantic” endocarditis - paraneoplastic



Myocarditis: an inflammatory infiltrate (helper T-cells, macrophages) of the myocardium with necrosis and/or degeneration of adjacent myocytes



Genetic and environmental disposition + causative mechanisms



Direct cytotoxic effect of infectious causative agents

Aberrant induction of apoptosis

Secondary autoimmune mechanisms

Cytokine expression in the myocardium (TNF-alpha, NOS)

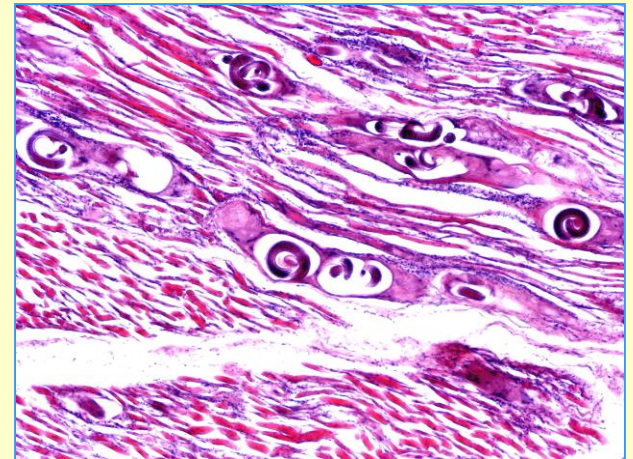
Etiology of the myocarditis - I.

Infectious origin

- **VIRUSES** (Coxsackie B, enterovirus, influenza, CMV, EBV, HSV...
Coxsackie A9 – self limiting disease;
Coxsackie B3 – severe, sometimes lethal)
- bacteria (Diphtheria, tbc, clostridia, staphylococci, streptococci)
- spirocheta (syphilis, Lyme disease)
- fungi (Candida, Aspergillus, coccidioidomycosis)
- protozoa (Toxoplasma – in immunocompromised host)
- helminths (Echinococcus, Trichinella spiralis)

Autoimmune-mediated origin

- rheumatic fever
- sarcoidosis
- SLE
- rheumatoid arthritis



Etiology of the myocarditis - II.

Drugs (usually causing hypersensitivity myocarditis)

**Chemotherapeutics (cytostatics), antibiotics, sulfonamides, antihypertensives,
AZT**

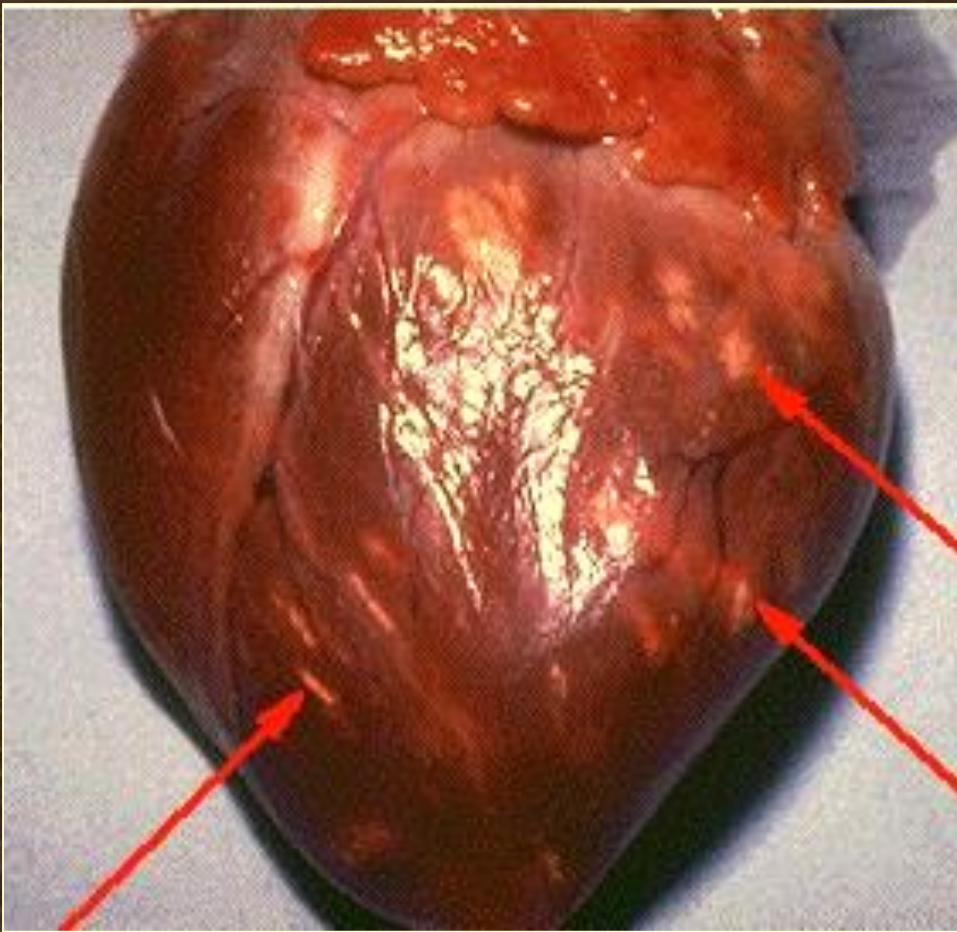
- blood eosinophilia + eosinophilic infiltrate of the myocardium -

Radiation

Rejection in the posttransplant heart

Idiopathic

Macroscopic

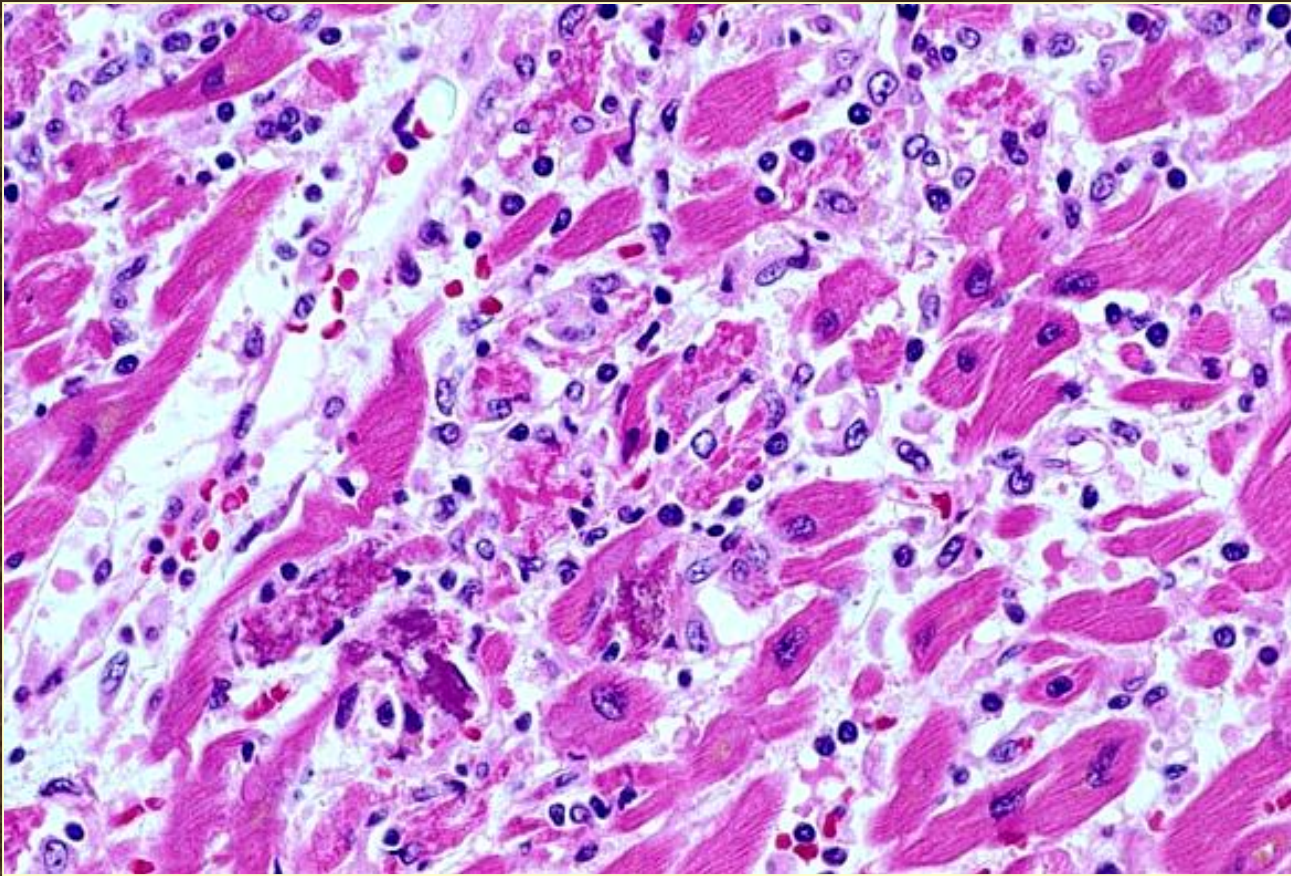


Flabby

**often with four chamber dilatation
(sometimes mural thrombi)**

**patchy or diffuse hemorrhagic
mottling**

Microscopic



Edematous interstitium, lymphocytes, macrophages, degeneration and necrosis of the myofibers

Later stage: disseminated fibrosis

Purulent myocarditis



Suppurative infection (mainly: *S. aureus*, fungi)

Polymorphonuclear leukocytes

Abscess formation

Source of infection:

**bacterial endocarditis, infected
prosthetic valves**

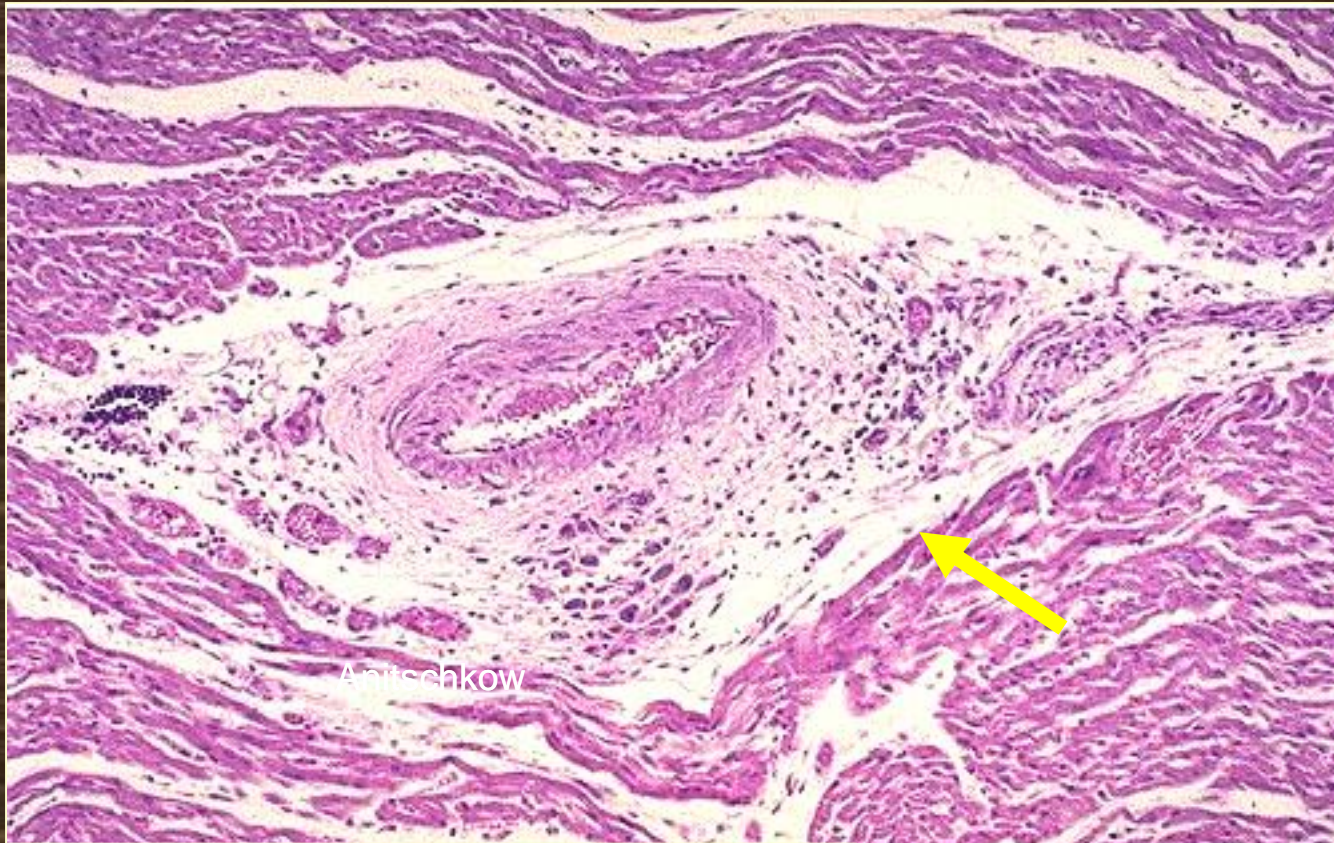
**sepsis (bronchopneumonia, GU-tract,
organ transplantation)**

iv. drug-abuse

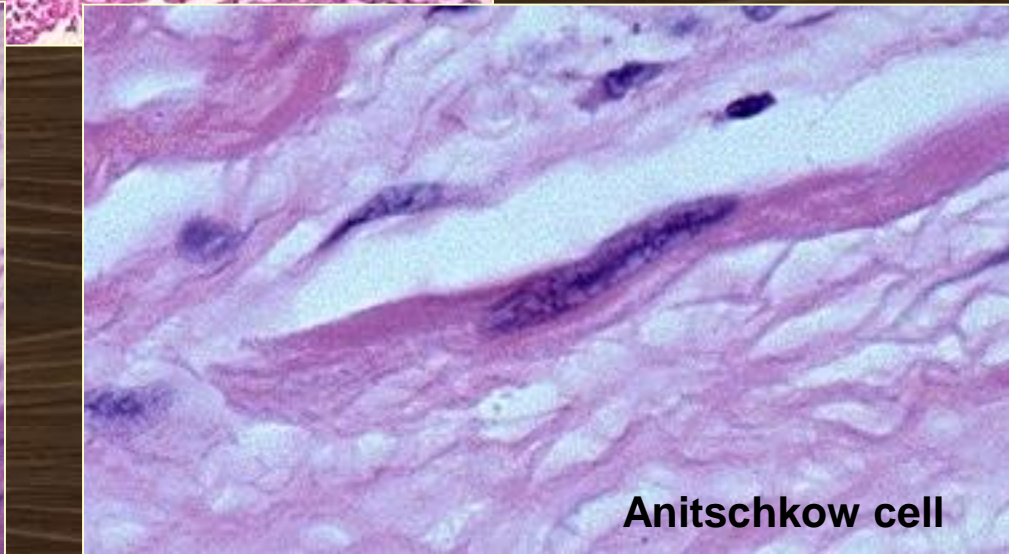
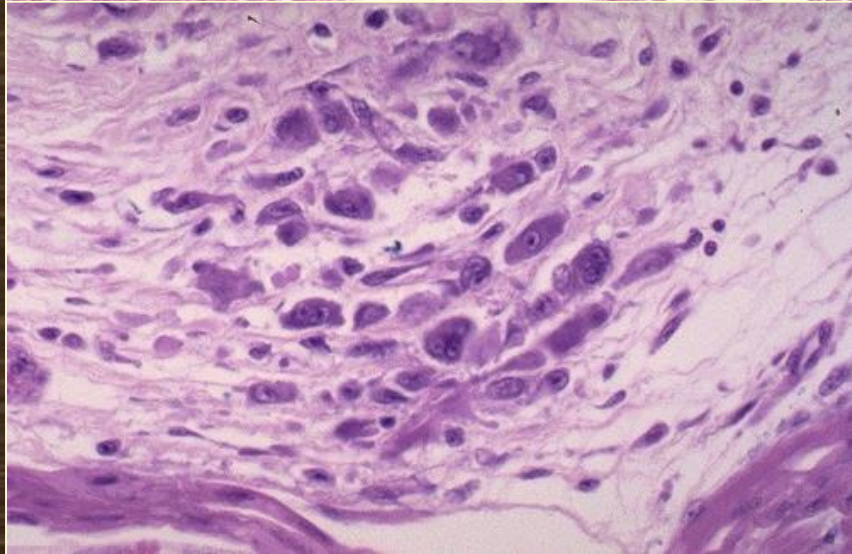
iatrogenic (catheter, stent)

High rate of mortality





**Rheumatic fever –
Aschoff's nodule**



Anitschkow cell

Complications of the myocarditis

Congestive heart failure

Pulmonary edema

Cardiogenic shock

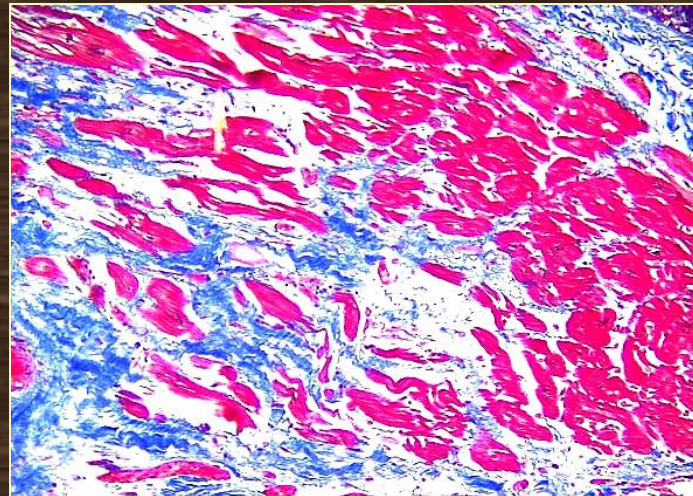
Cardiac failure

Congestive cardiomyopathy

Dysrhythmias

Recurrent myositis

Healing: fibrosis



Pericarditis

Acute



Chronic

Sterile

Infective

Adhesive

Constrictive

rheumatic fever

viruses

SLE

bacteria

uremia

tbc

AMI

surgery

According to the exsudate

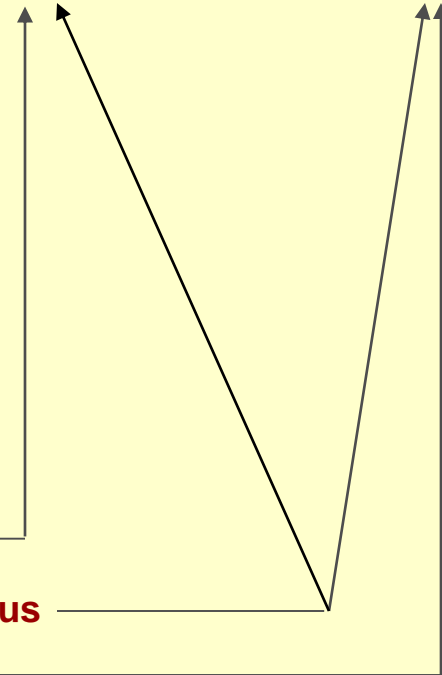
Serous – fluid accumulation (effusion)
(may lead to tamponade)

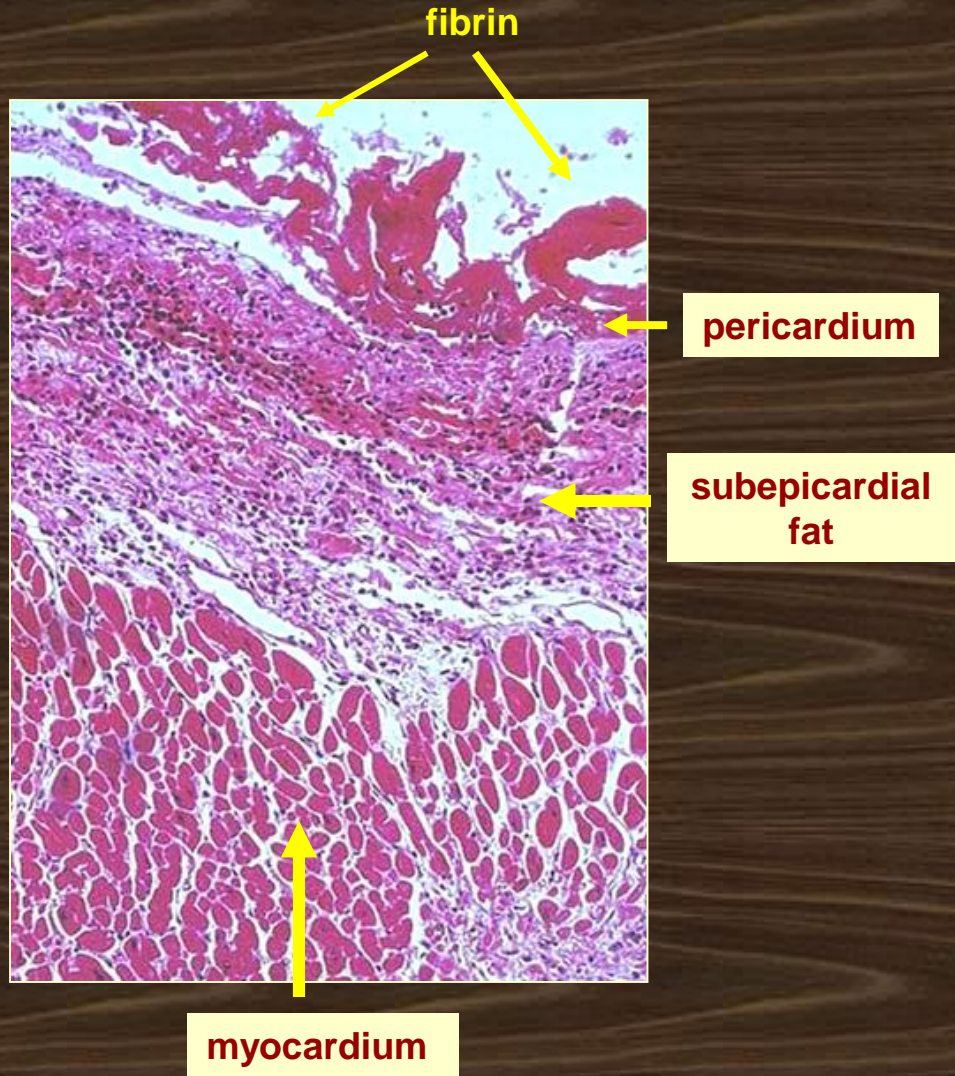
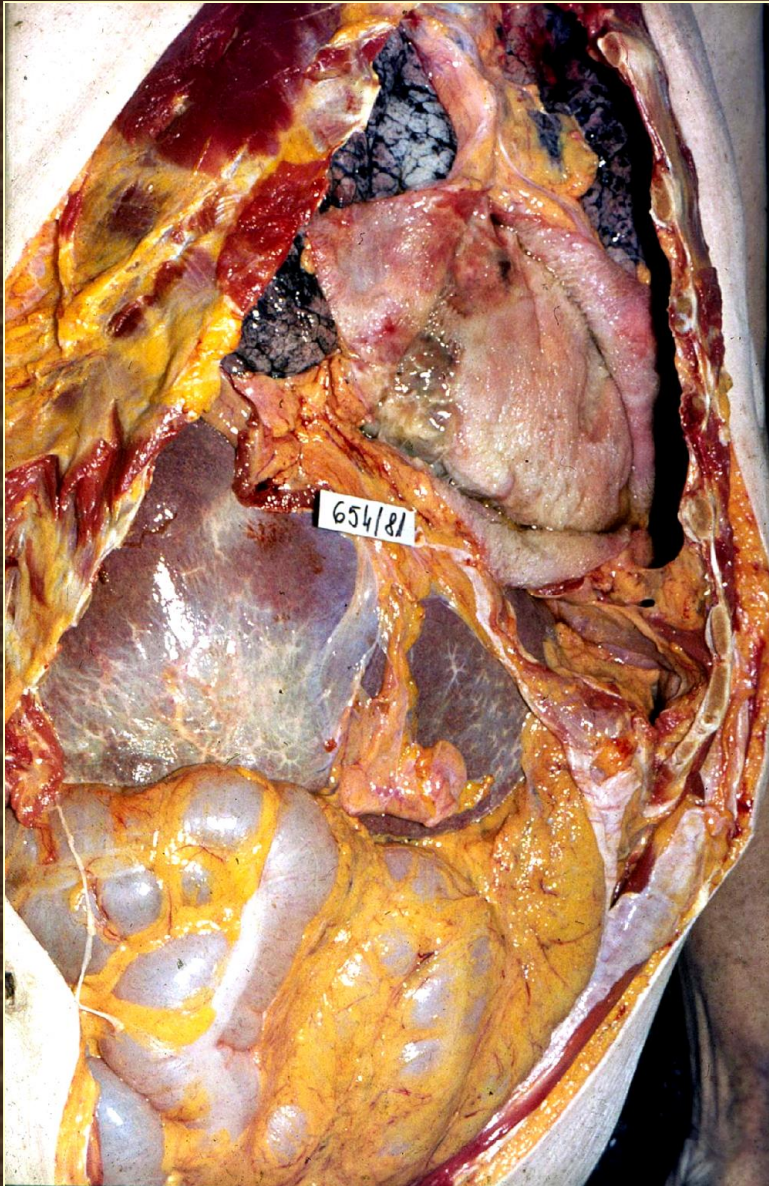
Fibrinous –

Purulent – Staphylococcus, Streptococcus, Pneumococcus

Caseous –

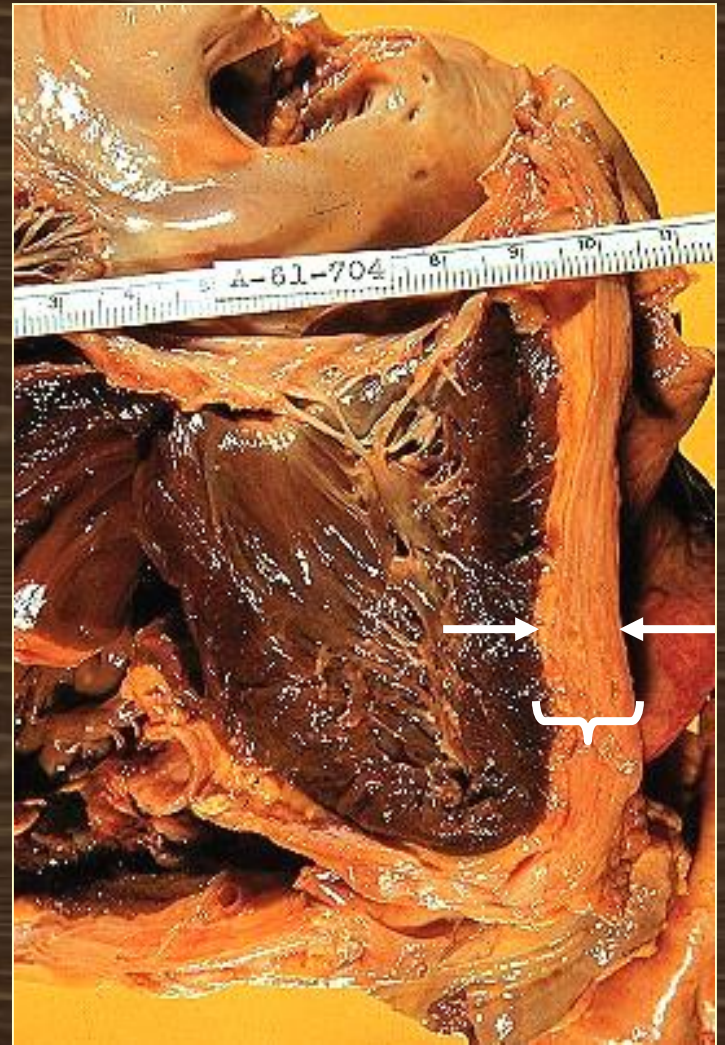
Hemorrhagic – tbc, neoplasm (carcinosis!)







Hemorrhagic pericarditis



Constrictive pericarditis

Cardiomyopathy: diseases of the myocardium associated with cardiac dysfunction

Exclude!: hypertension, valve diseases, congenital heart diseases, coronary artery diseases

Heterogeneous diseases

a./ PRIMARY:

b./ SECONDARY

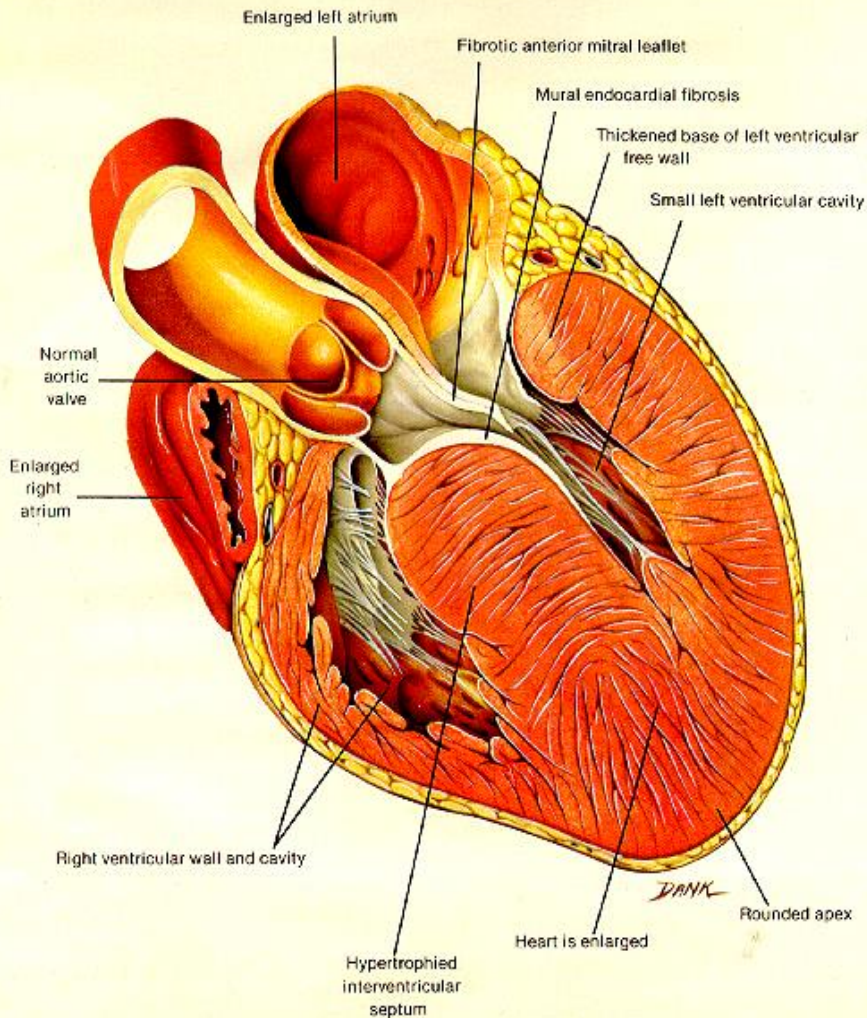
Hypertrophic -

Dilatative (congestive)-

Restrictive -

Arrhythmogenic right ventricular dysplasia / cardiomyopathy

Hypertrophic cardiomyopathy (HCM)



Synonyms:

hypertrophic obstructive cardiomyopathy,

idiopathic hypertrophic subaortic stenosis (IHSS)

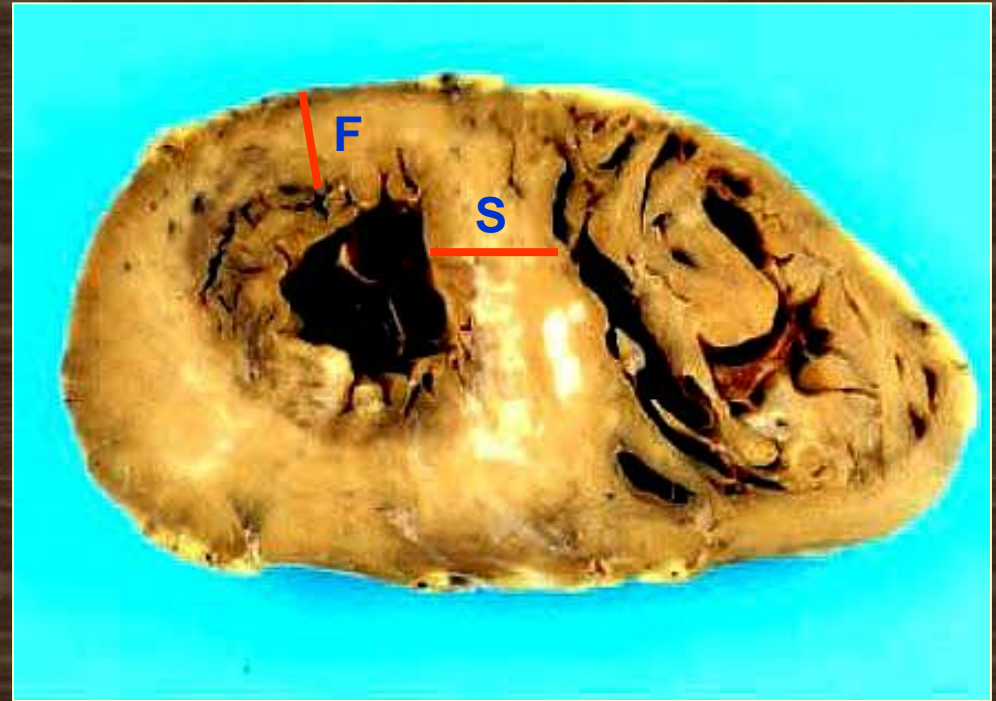
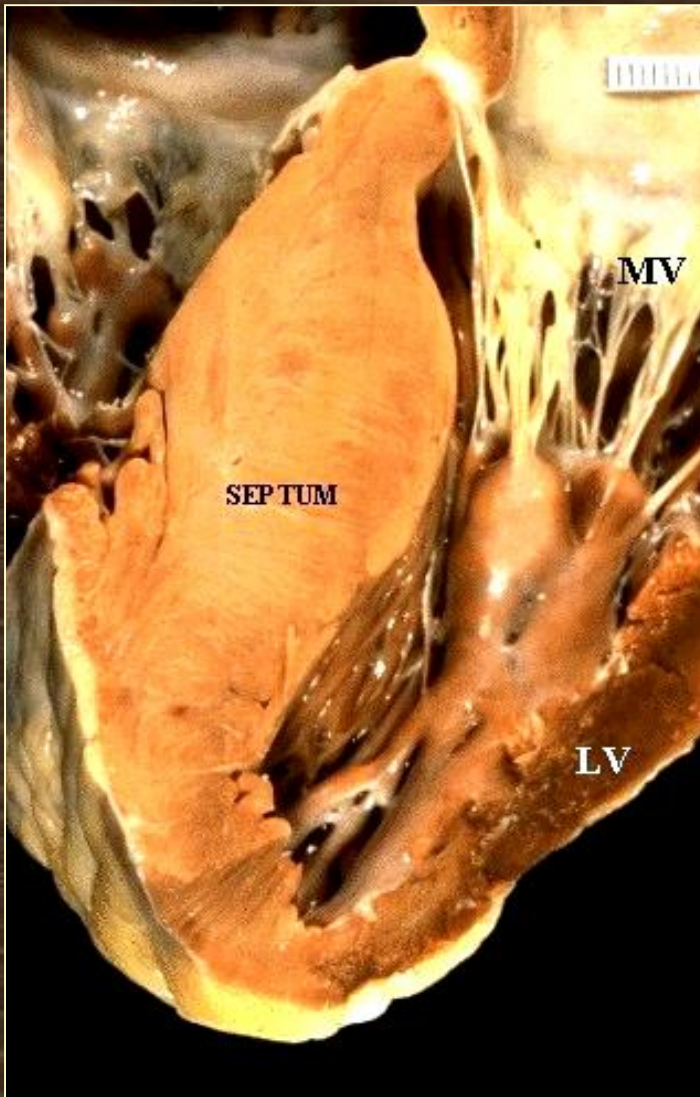
muscular subaortic stenosis,

asymmetric septal hypertrophy (ASH)

Molecular basis:

defects in several genes encoding for the sarcomeric proteins

50 %: autosomal dominant

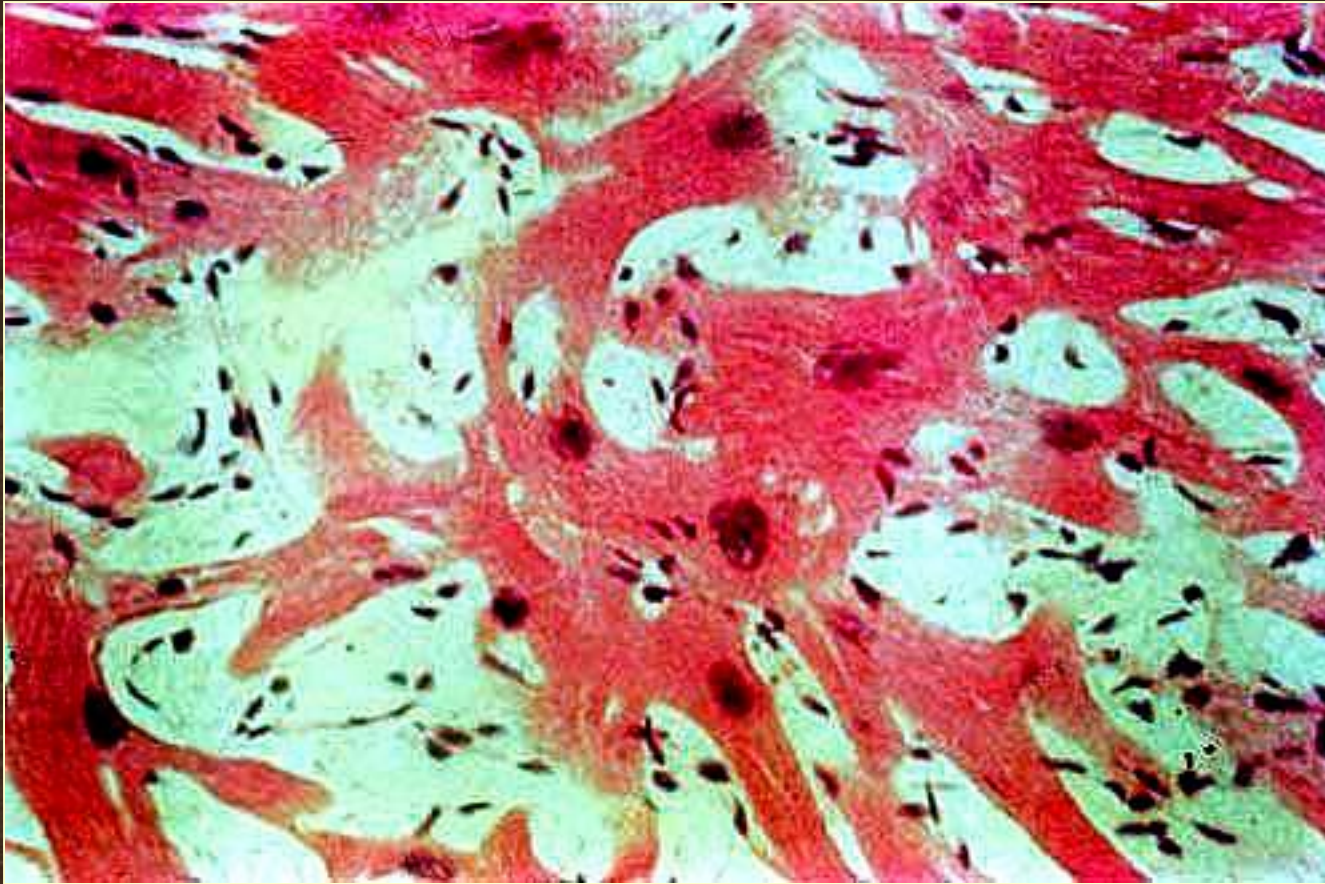


Free wall : Septum thickness: $\geq 1 : 1.3$

Characteristic scarrings

Mainly young adults are involved

Prone to sudden death



Dysorganized myocardial architecture

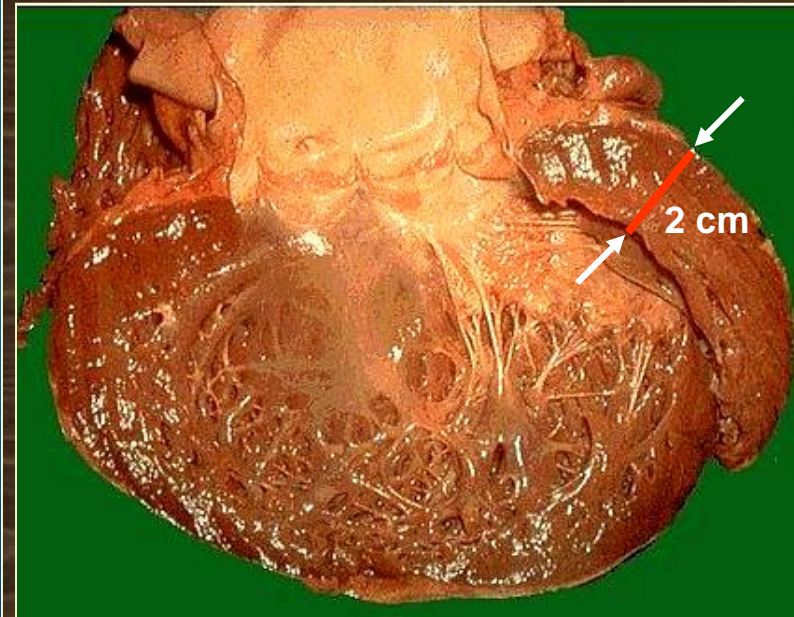
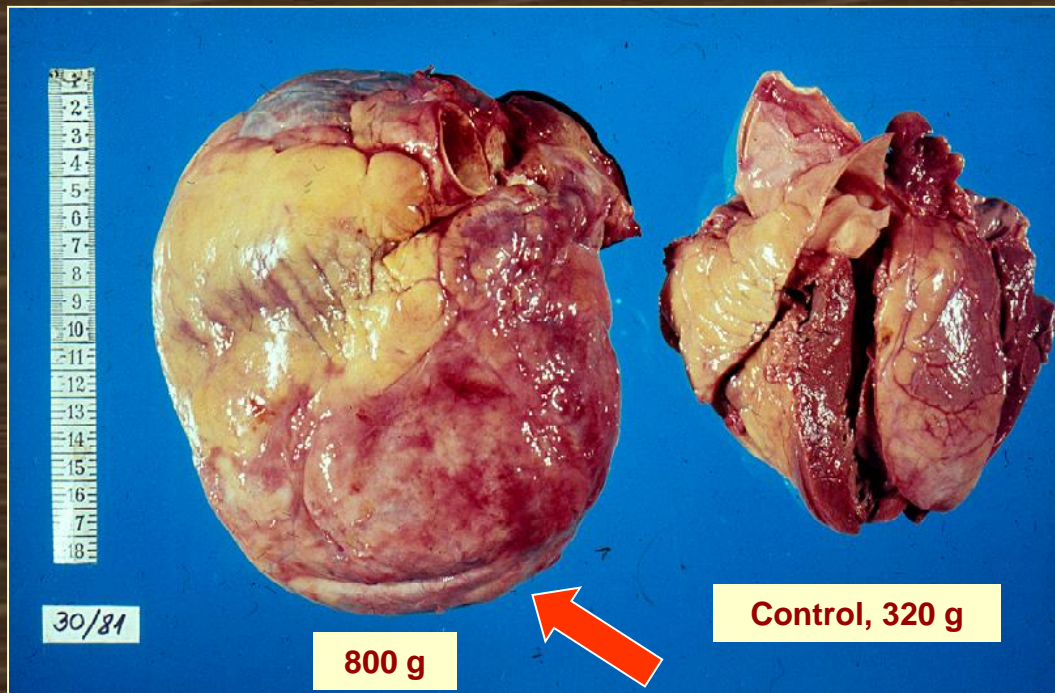
Dilatative (congestive) cardiomyopathy

Most frequent CMP form

Significantly enlarged heart; all cavities are dilated (cardiomegaly; cor bovinum)

Slow blood flow, turbulence \Rightarrow mural thrombi, embolization

Progressive, biventricular cardiac insufficiency



Etiology of congestive cardiomyopathy

Infectious, postinfectious conditions

Coxsackie virus Q and B

Alcoholism!

Endocrine/vitamin disorders

Hypothyroidism

Thyreotoxicosis

vitamin E deficiency

Cytostatic drugs (anthracyclin, cyclophosphamide)

Genetic causes

Glycogen storage disease IV (McAndersen)

Mucopolysacharidosis type I (Hurler)

X-linked muscular dystrophies (Duchenne)

Familial

Peripartum cardiomyopathy

Idiopathic

Restrictive cardiomyopathy

Rare (accounts for approximately 5% of all cases of primary heart muscle disease).

It is characterized by restrictive filling and reduced diastolic volume of either or both ventricles, but the systolic function remains normal. The myocardium is stiff, because it is infiltrated with a material that results in impaired ventricular filling.

(Clinically closely mimics constrictive pericarditis!)

Decreased diastolic filling: → reduced cardiac output

→ pulmonary congestion

Endocardial fibroelastosis

Endomyocardial fibrosis

Eosinophilic endomyocarditis (Loeffler's syndrome)

Amyloidosis

Hemochromatosis

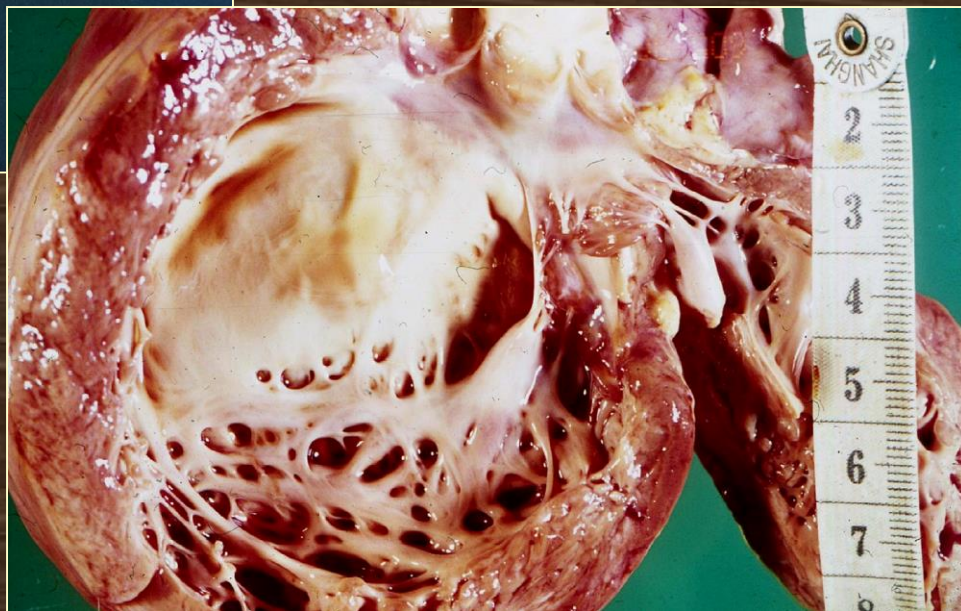
Glycogen storage diseases (Pompe,...)

Metastatic infiltrate

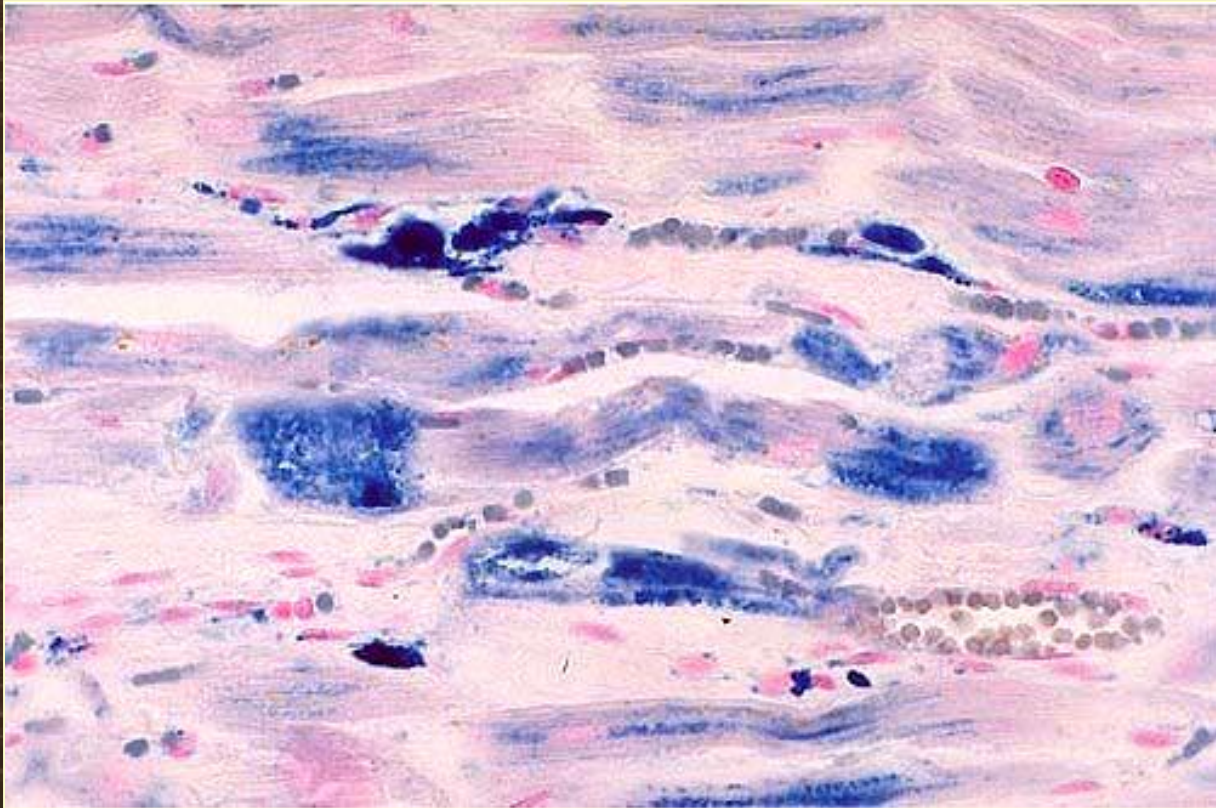
Sarcoidosis

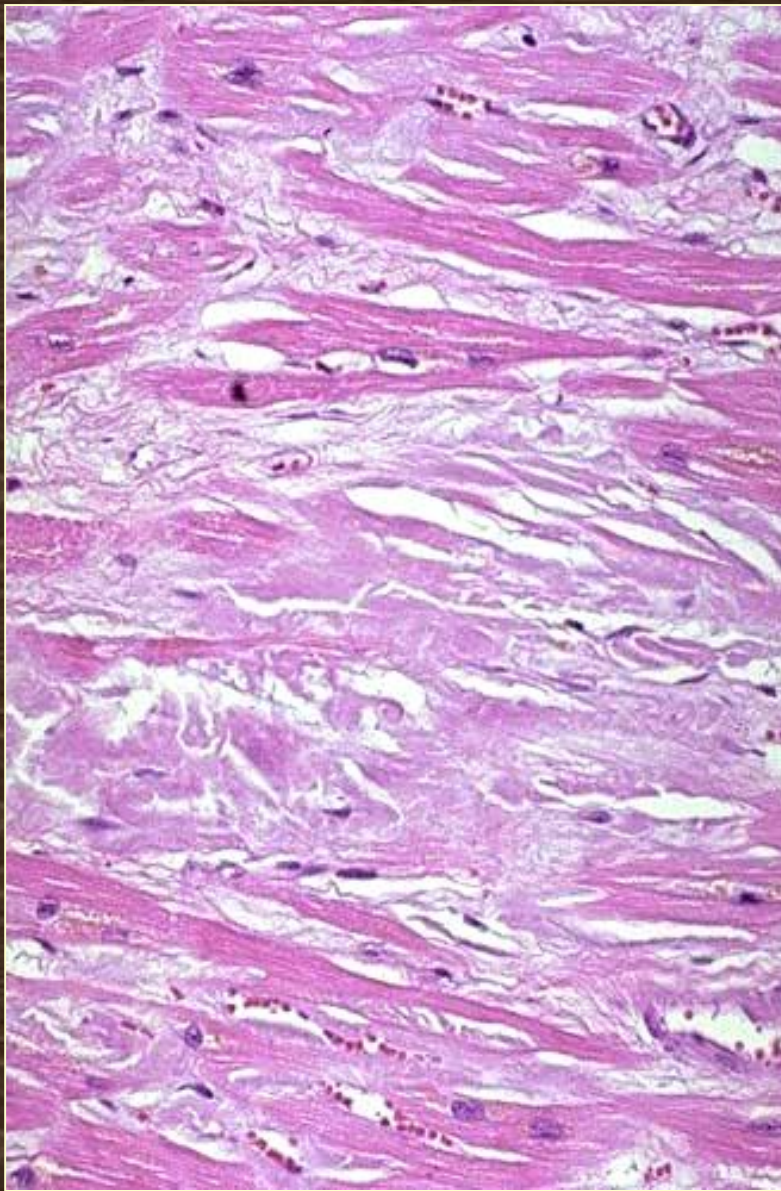
Following mediastinal irradiation

Endocardial fibroelastosis



Hemochromatosis (Prussian blue)





Heart amyloidosis (HE)

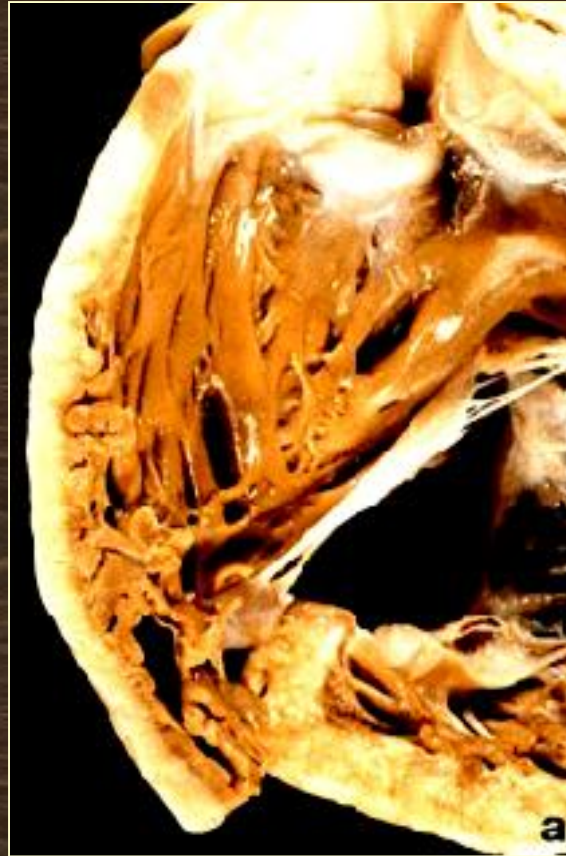


Heart amyloidosis (congo red + polar)

Arrhythmogenic right ventricular dysplasia / cardiomyopathy

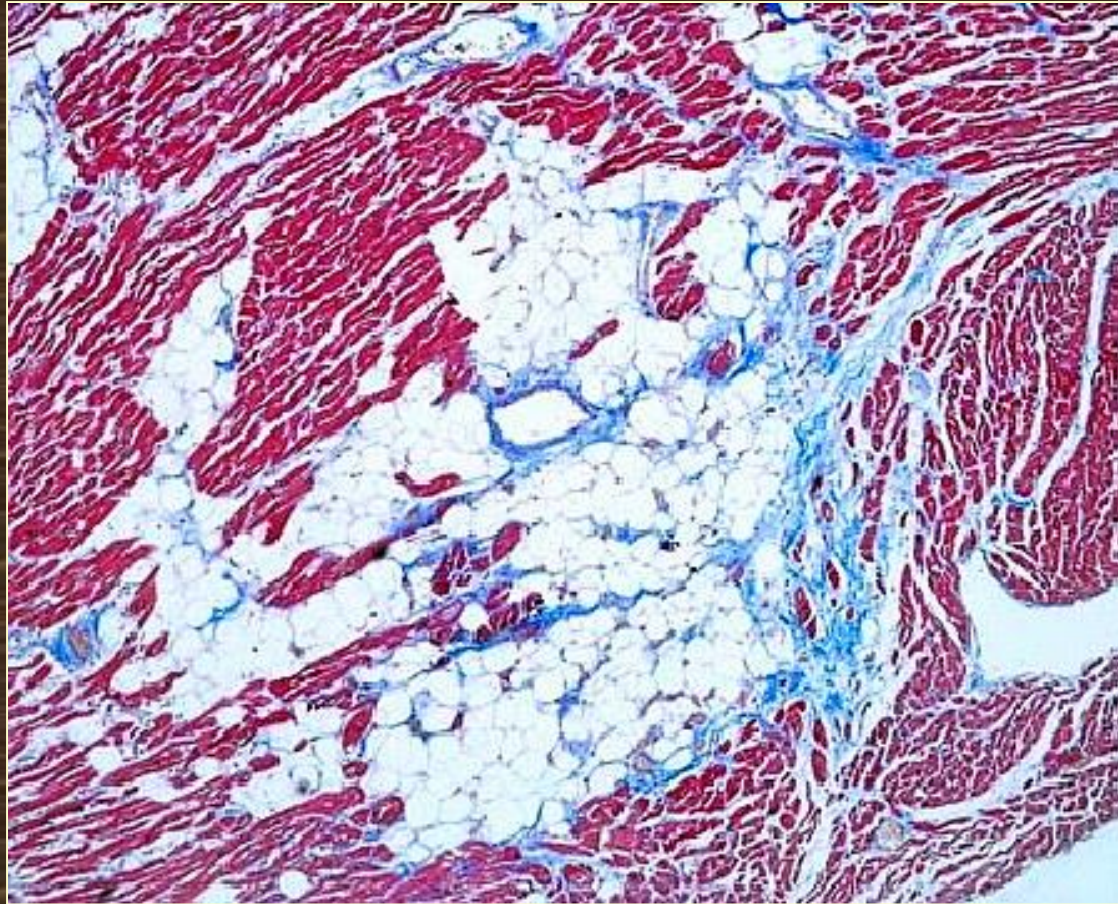


Normal right ventricle



Arrhythmogenic right ventricular cardiomyopathy

Arrhythmogenic right ventricular dysplasia / cardiomyopathy





Normal



DCM



HCM



RCM

