# VALVULAR HEART DISEASE

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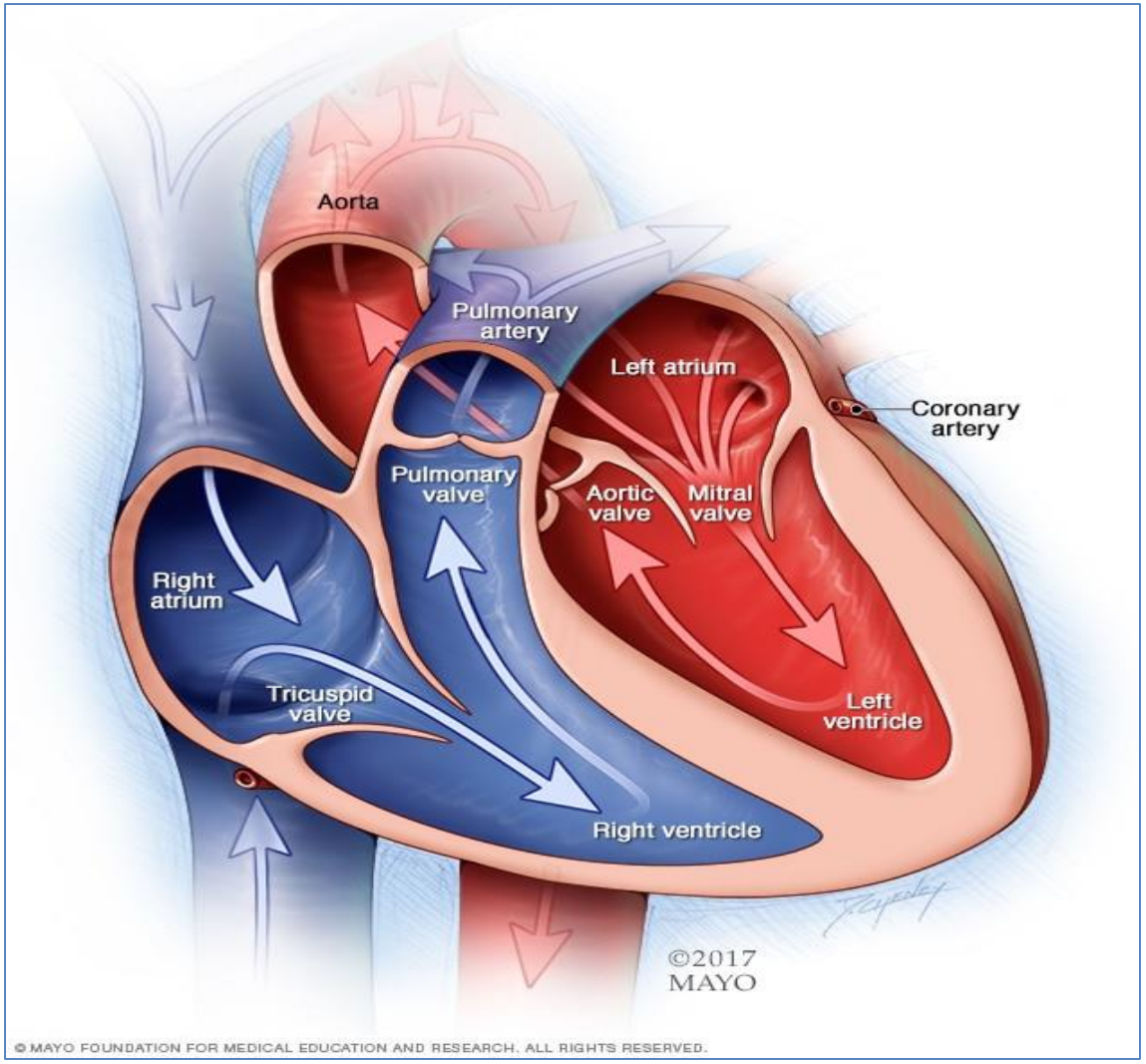
# Normal Heart Valves



# VALVULAR HEART DISEASE

- Valve **Stenosis***:*

- *failure of a valve to open completely, obstructing forward flow*

- due to a chronic process

- (e.g., calcification or valve scarring)

- **Valve Insufficiency**

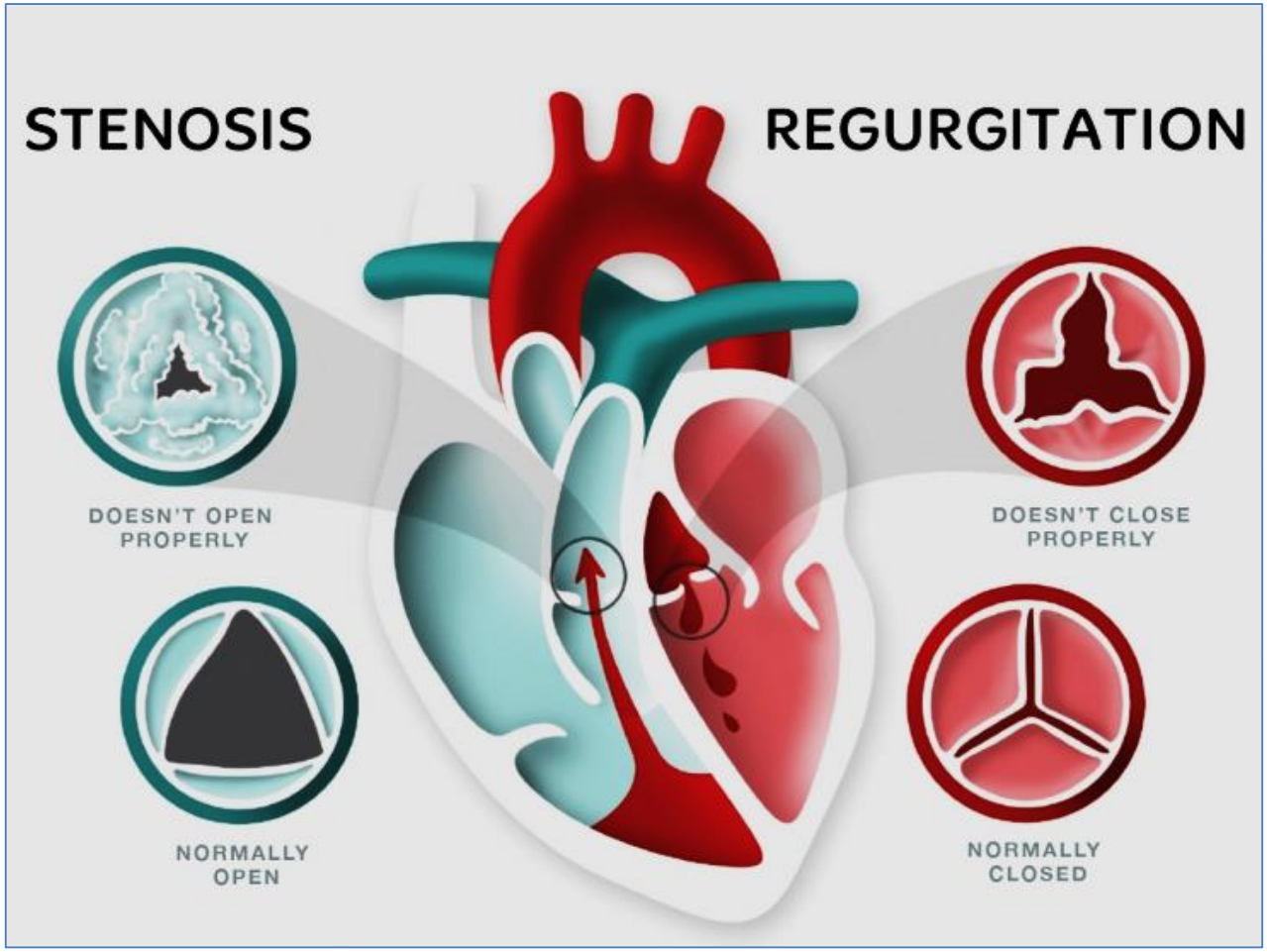
- *failure of a valve to close completely*
- *regurgitation (backflow) of blood*

- Abnormality **of** either:
  - **valve cusps (e.g., endocarditis), or**
  - **supporting structures (e.g. mitral annulus, tendinous cords, papillary muscles)**

**•It can be ~~either~~ acute or chronic**

**e.g.chordal rupture** **e.g. scarring and retraction**

# VALVULAR HEART DISEASE



# Clinical Signs of Valve Disease:

- abnormal heart sounds (***murmurs)***
- palpated heart sounds (***thrills****)*
- specific clinical signs according to involved valve

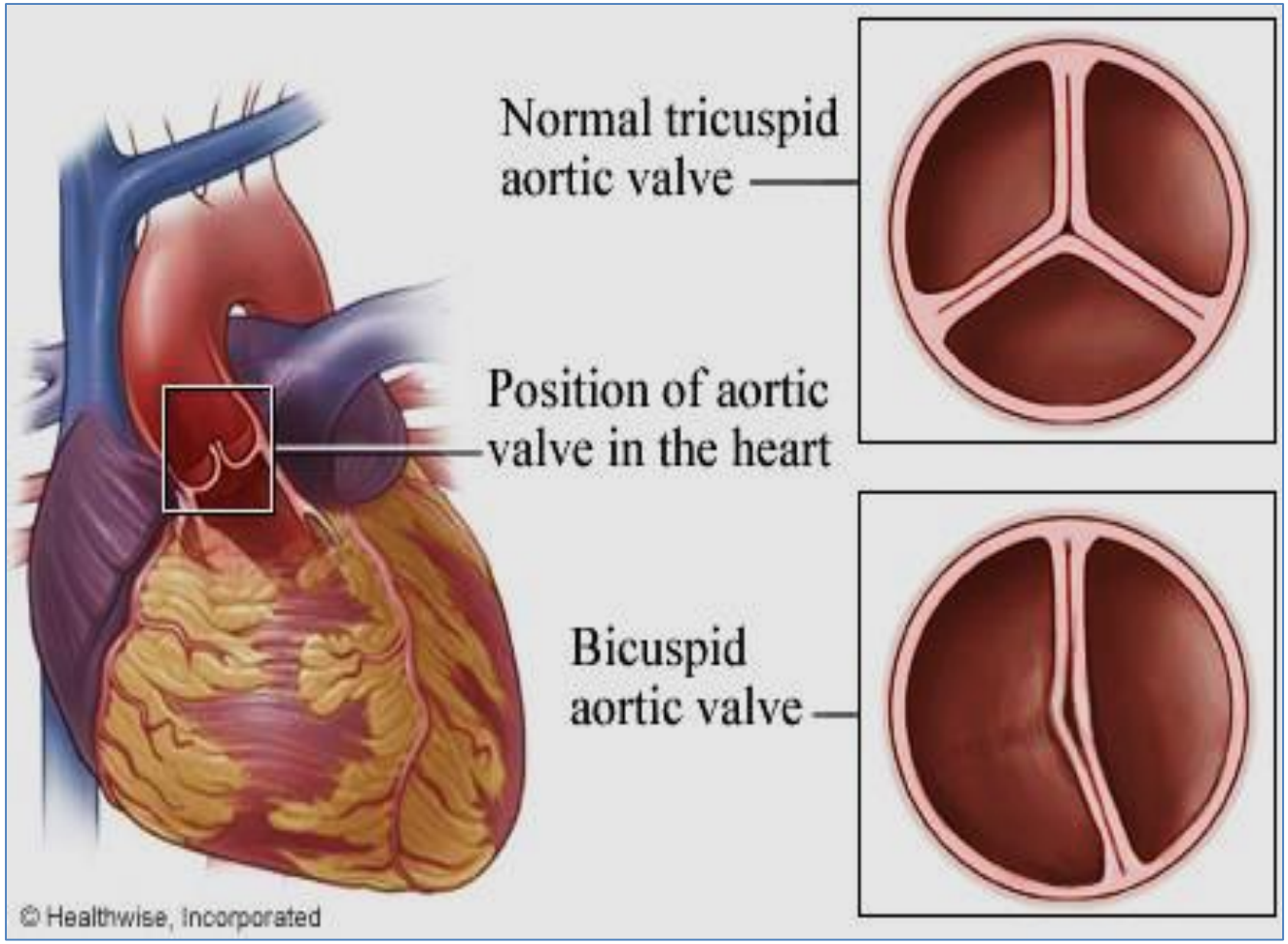
- Valvular abnormalities can be congenital or acquired

- The most common **congenital** valve lesion is ***bicuspid aortic valve***
- most important cause of **acquired** valve disease is ***rheumatic fever***

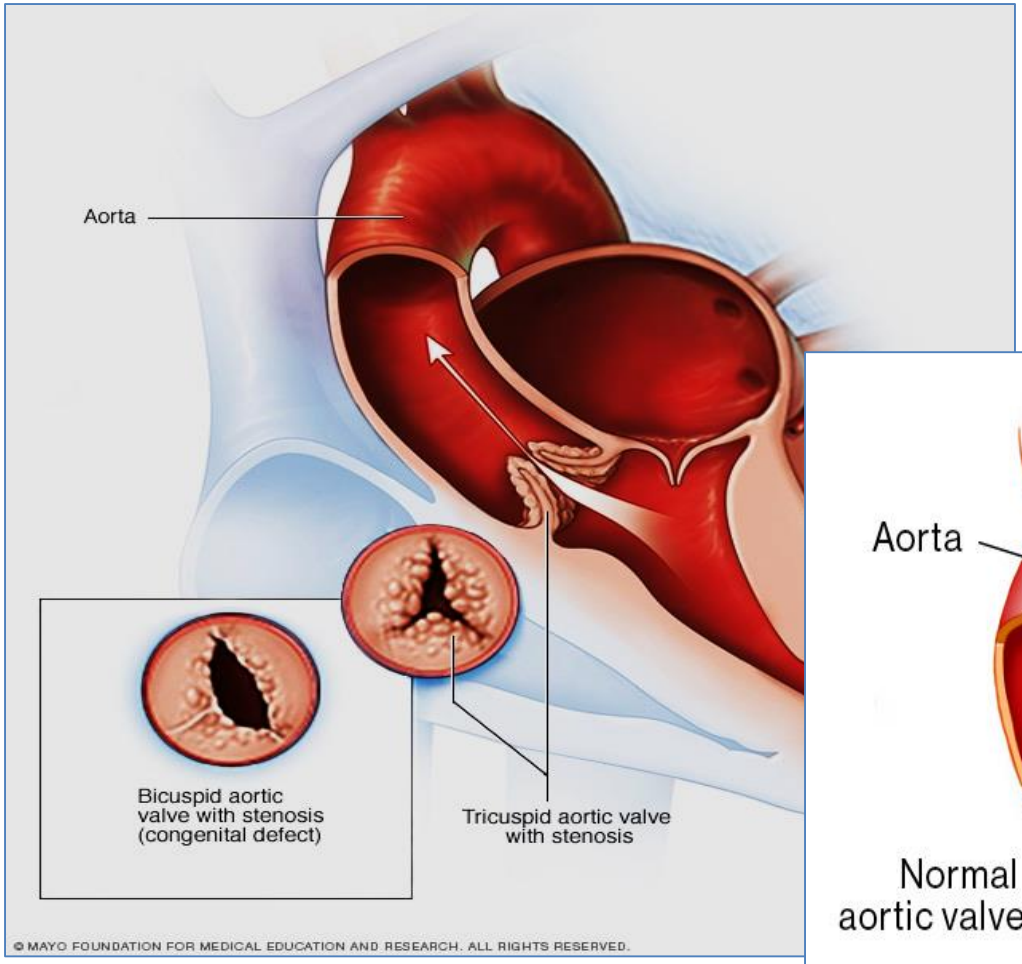
- **Bicuspid Aortic Valve**:

- only 2 functional cusps instead of 3
- 1% - 2% of live births
- Isolated or associated with genetic mutations
- early life →Asymptomatic
- Later → early & progressive degenerative calcification of aortic valve

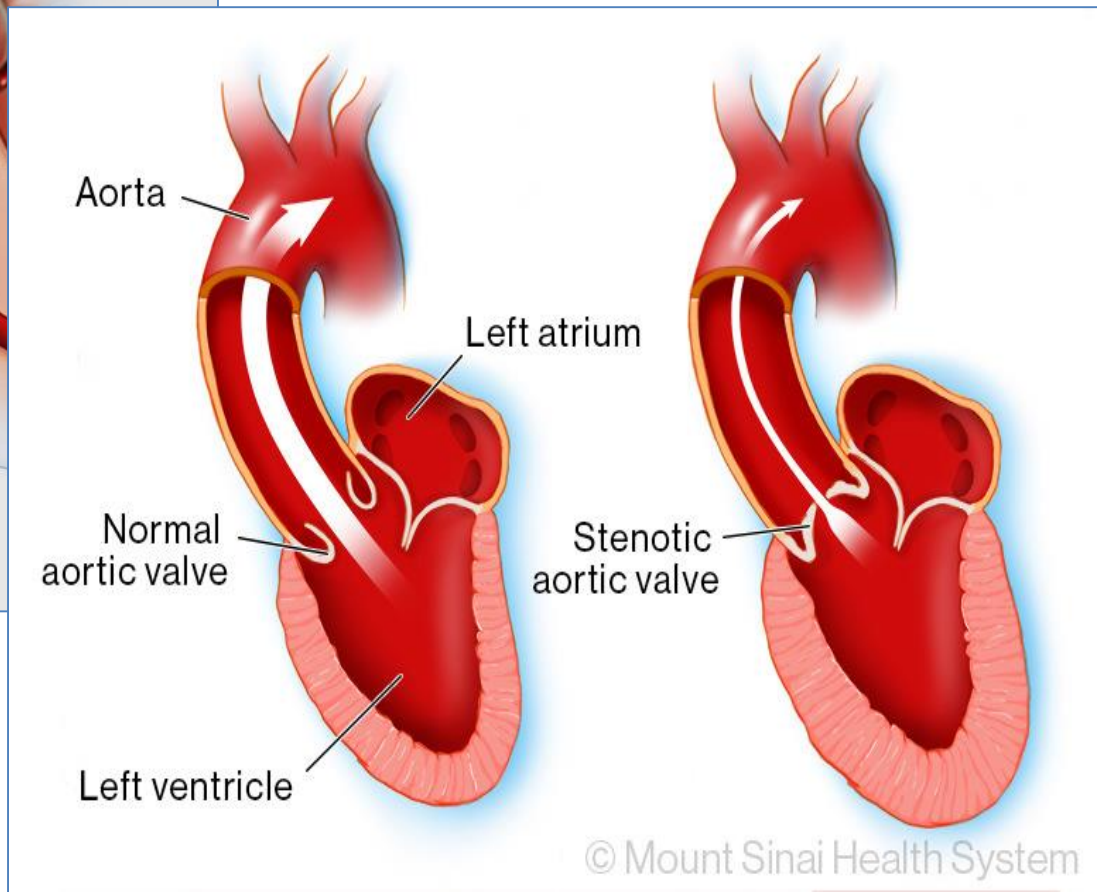
# Bicuspid Aortic Valve



# Aortic Valve Stenosis







- **Acquired Valve Diseases:**

- Mitral valve most common target of acquired valve diseases

- m/c cause of **acquired** valvular diseases is **post-inflammatory scarring** due to rheumatic fever (2/3)

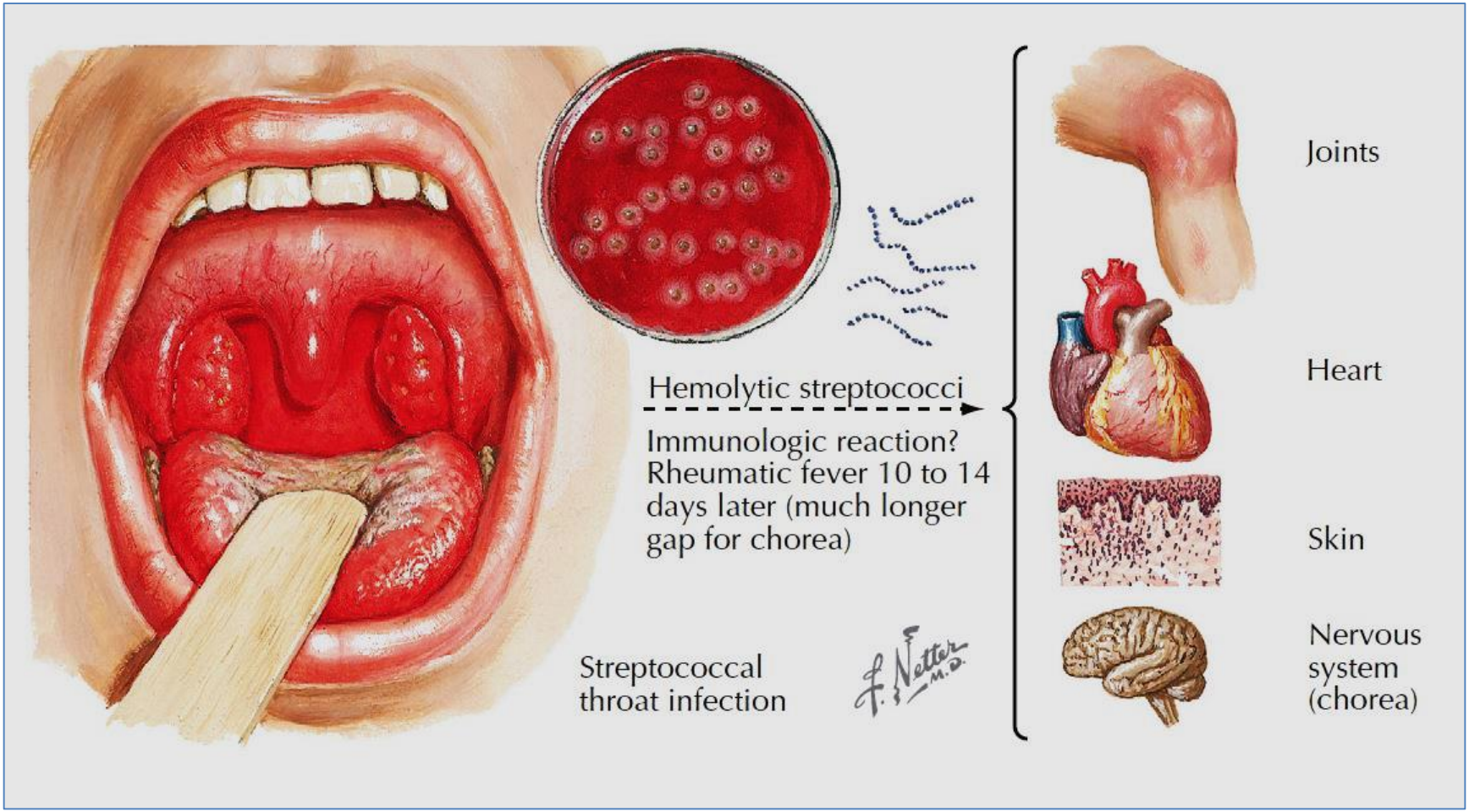
# Rheumatic fever (Rheumatic Valve Disease)

- immune- mediated inflammatory disease
- incidence↓ in Western world (improved socioeconomics, rapid diagnosis, and Rx of strept. pharyngitis)
- Still, important public health problem in developing countries

# Rheumatic Fever

- **PATHOGENESIS**:
- **hypersensitivity reaction due to antibodies against group A streptococcal antigens**
- **These antibodies are cross-reactive with host antigens (heart; brain; joints; skin)**

# Rheumatic Fever



# Rheumatic Fever

- Manifestations are seen  a few weeks after pharyngitis or skin infection

- Major organs involved: heart; joints; skin; and brain

# Rheumatic fever

- 2 phases:
- Acute: fever; arthritis; CNS symptoms; carditis
- Chronic: cardiac valve disease

# Acute rheumatic fever- clinical picture

- 80%  children
- fever; migratory polyarthritis; **carditis**
- Carditis= arrhythmias; myocarditis; cardiac dilation; functional mitral insufficiency and CHF.
- Elevated serum titers of streptococcal antigens (streptolysin O; DNA-ase)
- **cultures for streptococci (-) at time of symptom onset**

# Acute Rheumatic Fever- JONES criteria

## Signs & Symptoms

**J**oints (arthritis)

❤ Carditis

**N**odules (subcutaneous)

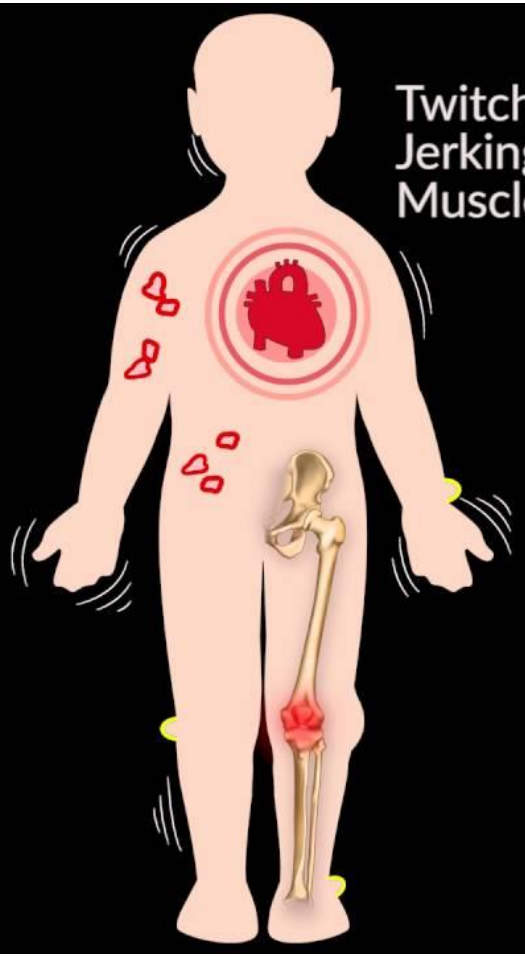
**E**rythema marginatum

**S**ydenham's chorea

-can present 3-4 months after GAS infection

-mean duration: 12-15 weeks

-episodes may last 6-12 months

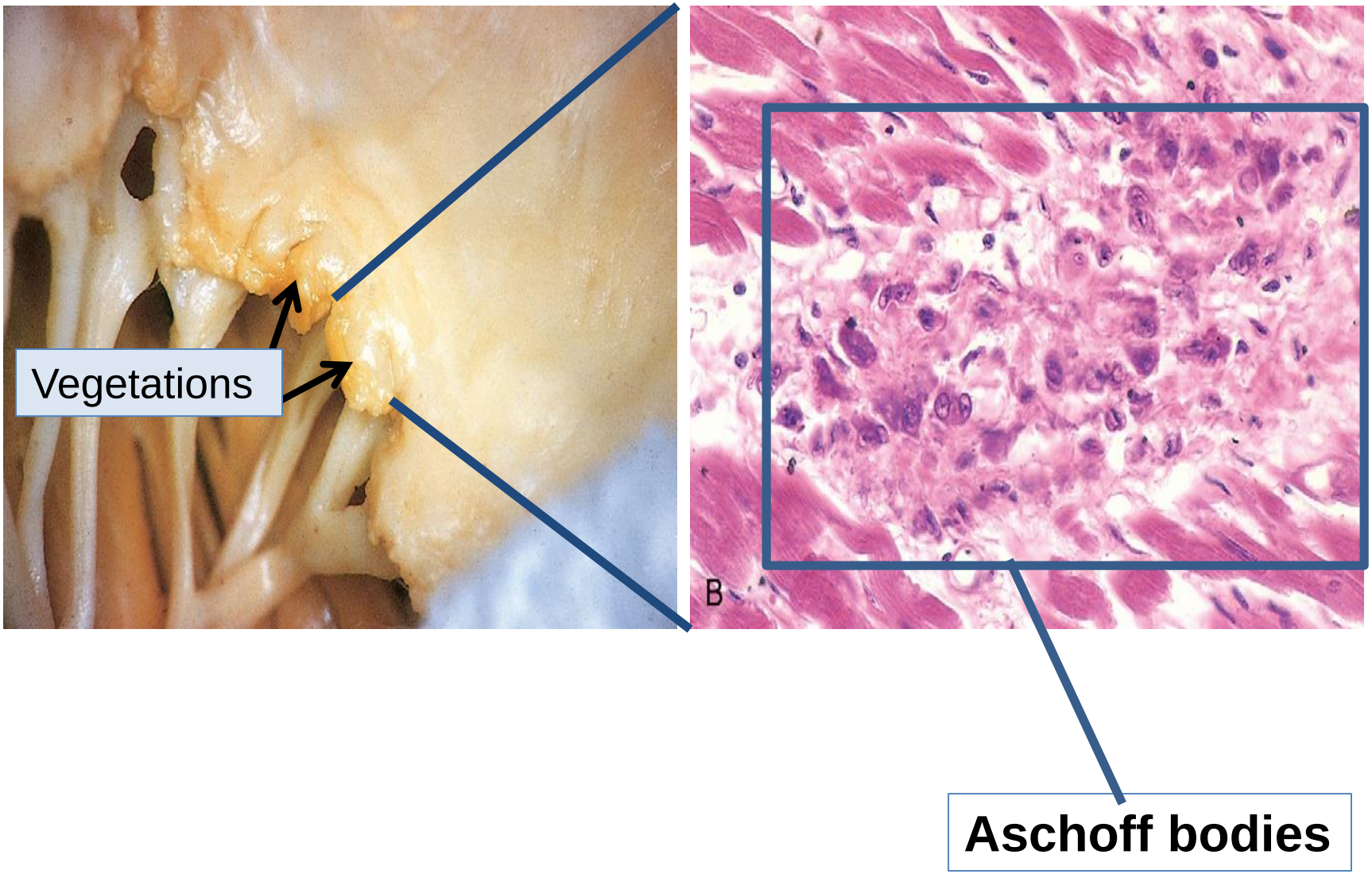


# Carditis
# Morphology- Acute Phase

- Valve vegetations
- discrete inflammatory lesions in affected tissues (called **Aschoff bodies )**

- **Aschoff bodies:**
- *pathognomonic (diagnostic)* for RF
- collections of T lymphocytes+ plasma cells+ activated macrophages

# Acute rheumatic heart disease



# Diagnosis of Acute Rheumatic Fever

## Major Criteria

| | |
|---|---|
| J | Joint Involvement |
| O | **O** looks like a heart = myocarditis |
| N | Nodules, subcutaneous |
| E | Erythema marginatum |
| S | Sydenham chorea |

## Minor Criteria

| | |
|---|---|
| C | CRP Increased |
| A | Arthralgia |
| F | Fever |
| E | Elevated ESR |

| | |
|---|---|
| P | Prolonged PR Interval |
| A | Anamnesis of Rheumatism |
| L | Leukocytosis |

***Diagnosis***

Elevated anti-streptolysin O titers

+

2 Major criteria

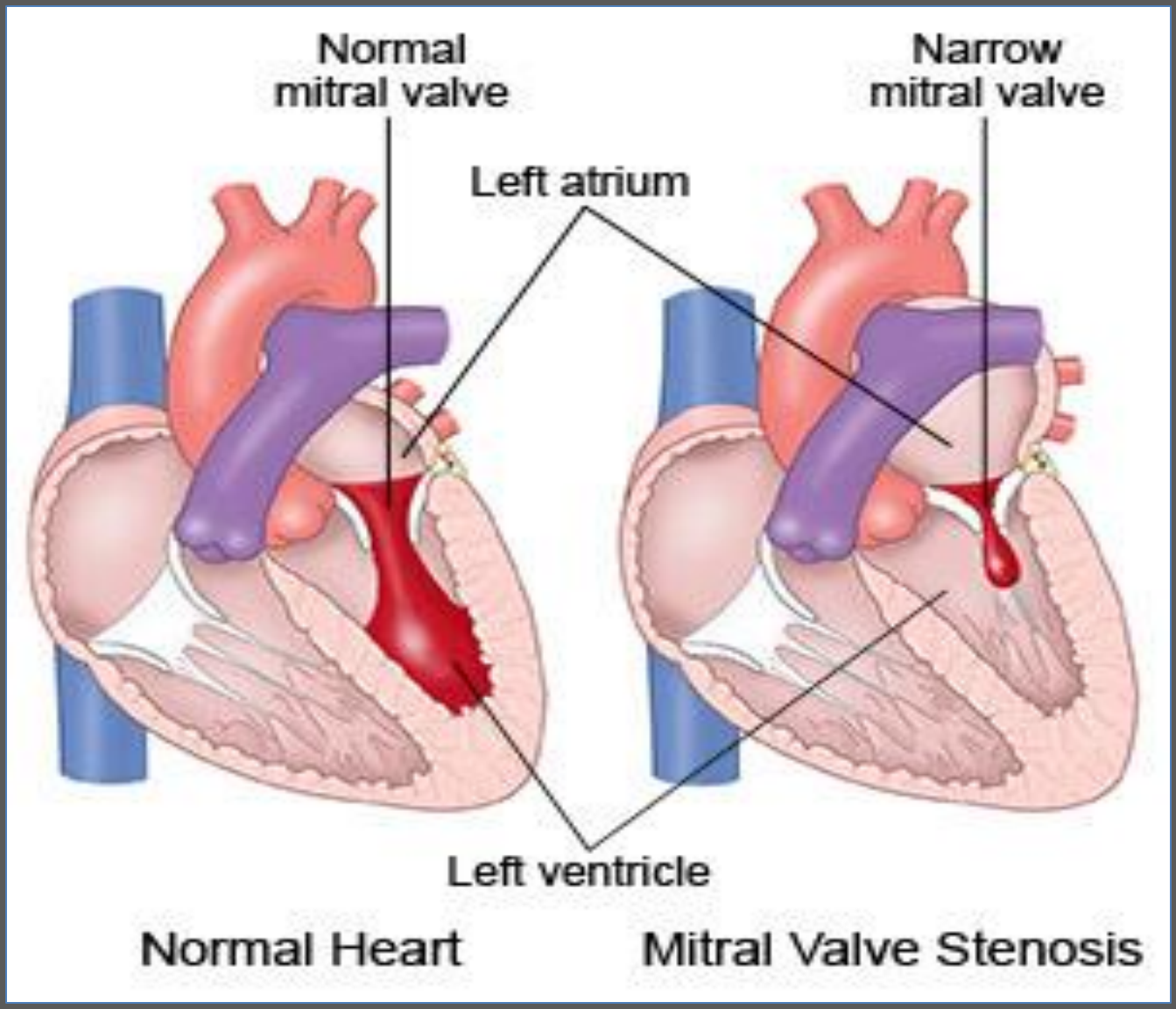
OR

1 Major criterion and 2 Minor criteria

* Anamnesis: a preliminary case history of a medical patient

# Chronic Rheumatic Carditis- Clinical Picture

- **Onset: years/ decades** after initial acute episode
- ***Chronic inflammation leads to scarring →valve stenosis***
- cardiac murmurs - CHF - arrhythmias (esp. A. fib.) - thromboembolism (mural thrombi).
- Prognosis: variable.
- Management: Surgical repair or replacement of diseased valves


Normal
mitral valve
Narrow
mitral valve
Left atrium
Left ventricle
Normal Heart
Mitral Valve Stenosis

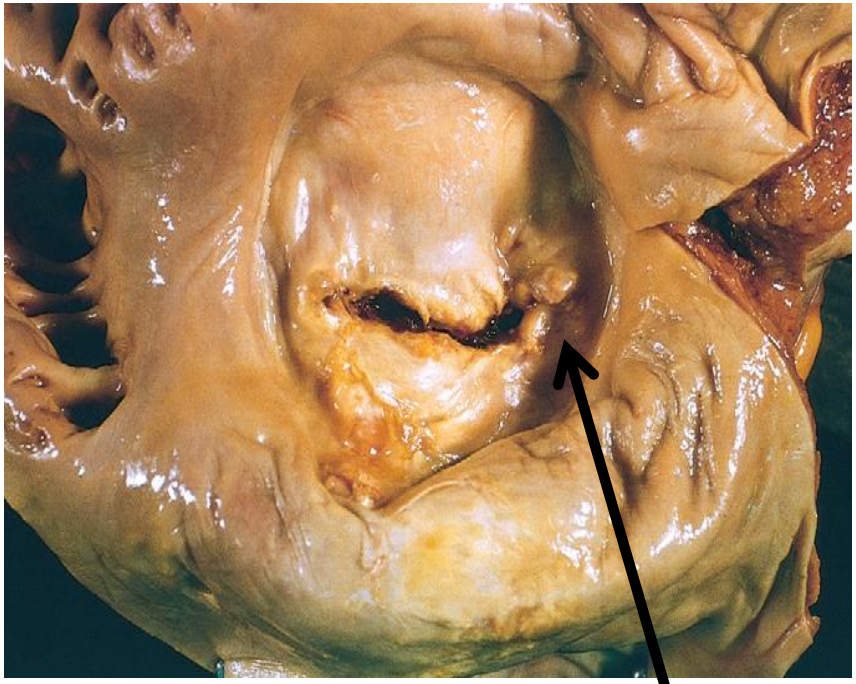
# Chronic phase- morphology

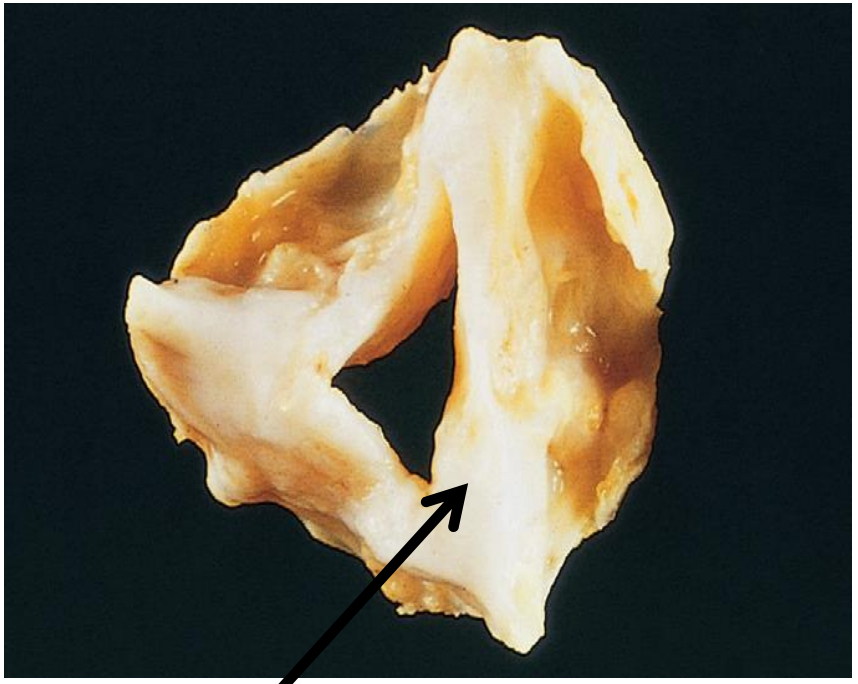
- Inflammation is followed by **scarring**
- Aschoff bodies **rarely** seen now

- **Valve stenosis (**most important functional consequence of chronic RHD )
  - **mitral** valve (most common)
  - aortic disease
  - tricuspid valve
  - **pulmonary** valve (very rare)

↓ frequency

# Chronic rheumatic heart disease



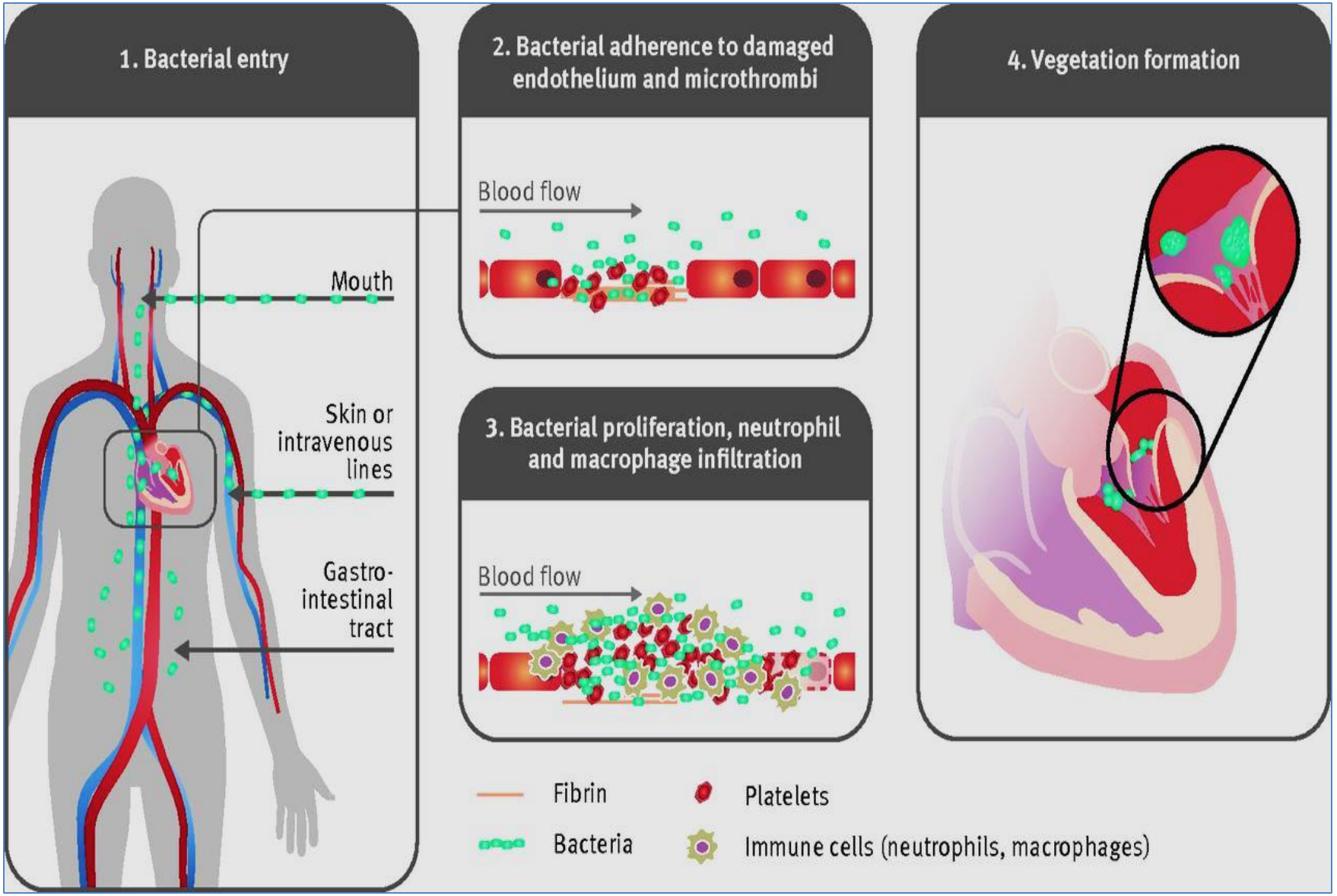


Scarring and calcifications

# Infective Endocarditis

= Infection of heart valves and endocardium

# Infective Endocarditis



# Infective endocarditis (IE)

- Microbial (mostly bacterial*) invasion of heart valves and endocardium

- bulky, friable ***vegetations*** (necrotic debris+ thrombus+ organisms).

* others include: fungi, rickettsiae; and chlamydia

# Infective endocarditis (IE)

- classified into ***acute*** and ***subacute*** based on:

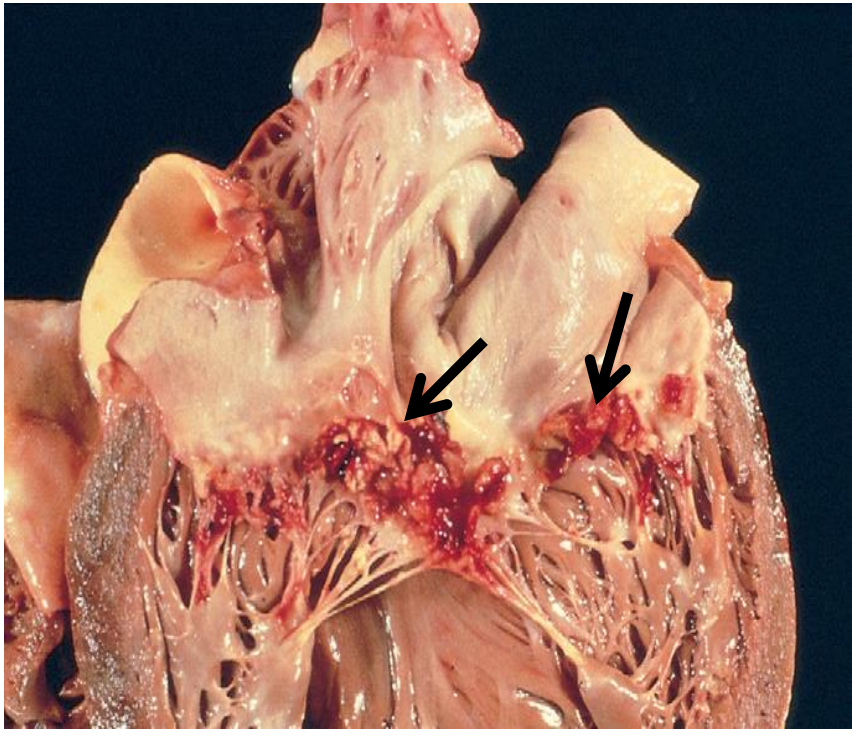
1- the virulence of microorganism

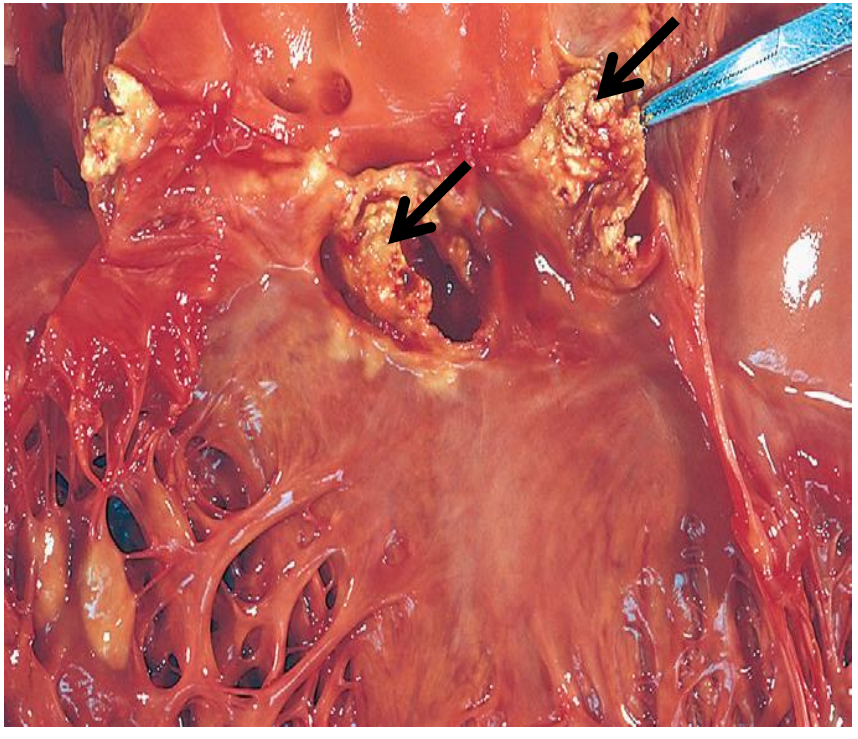
2- presence of underlying cardiac disease

| Feature | Acute endocarditis | Subacute endocarditis |
|---|---|---|
| Virulence | highly virulent organism | low virulent organism |
| Most common organism | Staph. aureus | Streptococcus viridans |
| underlying cardiac disease | previously normal valve | previously abnormal valve (scarred or deformed) |
| Clinical course | rapidly developing | Insidious disease |
| Outcome | High morbidity and mortality | most patients recover after appropriate antibiotic therapy |

# Infective endocarditis- Morphology

- **friable, bulky, and destructive vegetations** on heart valves
- most common: aortic and mitral valves
- tricuspid valve common in I.V. drug abusers





# Clinical Features

- fever, chills, weakness, and murmurs
- **Valve vegetations can cause emboli** in different target tissues
- **Diagnosis* = (positive blood cultures + <u>echocardiographic</u> (echo) findings)**
- **Treatment**: long-term (≥ 6 weeks) I.V. antibiotic therapy and/or valve replacement

- * depends on certain criteria….

Complications of IE vegetations:

1- **emboli**

2- **abscesses**

3- **septic infarcts**

4- **mycotic aneurysms**

# Infective Endocarditis: Diagnosis

## Duke Criteria

- 1994 a group at Duke University standardised criteria for assessing patients with suspected endocarditis
- **Definite**
  - 2 major criteria
  - 1 major and 3 minor criteria
  - 5 minor criteria
  - pathology/histology findings
- **Possible**
  - 1 major and 1 minor criteria
  - 3 minor criteria
- **Rejected**
  - firm alternate diagnosis
  - resolution of manifestations of IE with 4 days antimicrobial therapy or less

## Modified Dukes' criteria

**Major-**

- 2 positive blood cultures, for an organism known to cause IE
  or
  persistent bacteremia- 2 +ve 12 hours apart or 3 of 4 +ve drawn over 1 hour
- ECHO evidence-
  oscillating mass on valve or supporting structures
  or abscess
  or new valvular regurgitation or partial dehiscence of prosthetic valve

**Minor-**

- Predisposing factor- cardiac lesion, IVDU
- Fever >38 °C
- Vascular phenomenon
- Immunologic phenomenon
- +ve blood culture
- +ve ECHO