What is Infective Endocarditis?

- Infective endocarditis (IE) is a microbial infection of the inner lining of the heart (endocardium), most commonly affecting the heart valves.
- **Epidemiology**:
- Incidence: 11–15 cases per 100,000 persons per year
- Mean age: 60.8 years (> 50% are > 50 years of age)
- 3 times more common in men ♂

Clinical course

Acute infectious endocarditis:

- Onset and Progression: More **sudden** onset of symptoms → **Progresses more rapidly** → **Fatal** if not treated promptly
- Vegetations: **Larger** vegetations
- Organism virulence: **HIGH** (aggressive pathogens) → More commonly affects normal valves
- Most common cause is **S. aureus**
- Other causes include **Streptococcus pneumoniae, Streptococcus pyogenes (Group A Strep)**

Subacute infectious endocarditis:

More gradual onset of symptoms → Progresses **more slowly** (weeks to months) → Patients may survive for months untreated.
- **Smaller** vegetations
- Organism virulence: **LOW to MODERATE** → More commonly affects congenitally abnormal or diseased valves
- Most common cause is **S. viridans.**

Chronic infectious endocarditis

Onset: **Months to years**
- Organism virulence: **Very low, intracellular**
- Typical Organisms: **Coxiella burnetii**, **Bartonella species**

valve type

Native valve endocarditis:

Accounts for 78% of cases
- Further subdivided into:
- **Community acquired (most common)**
- **Healthcare associated**
- **IV drug use**
- Most often associated with: **Staphylococcus**, **Streptococcus**, and **HACEK** organisms

Prosthetic valve endocarditis

Early:
- < 60 days after valve placement
- Often from contamination during surgery
- **Intermediate**: 60–365 days after valve placement
- **Late**:
- > 1 year after valve placement
- Usually involves similar organisms to native valve endocarditis
- **Associated with a higher risk of complications and mortality**

By location

Left-sided endocarditis

Left-Sided IE is more common:
- **More turbulent flow** → more shear stress on valves → more endothelial microtrauma
- Most pre-existing **valve abnormalities** affect the left side
- **Mitral valve** > Aortic valve
- Complications: Left-sided IE leads to **systemic emboli**
- **Brain** → Stroke
- **Kidneys** → Renal infarcts, glomerulonephritis

Right-sided endocarditis

most common in **IV** drug use):
- **Tricuspid valve** (90%) > Pulmonic valve (10%)
- Right-sided IE risk factors:
- IV drug use – 70-80% of right-sided IE occurs in IV drug users
- Indwelling **venous catheters** (central lines)
- Complications: Right-sided IE leads to **pulmonary emboli** (not systemic)

Infective Endocarditis Etiology

Staphylococci

General features:
- Gram stain: Gram-positive cocci in clusters ("grape-like")
- Non-motile, non-spore forming
- Facultative anaerobe
- Catalase positive: differentiates from Streptococcus

A. Staphylococcus aureus (most common)
- Coagulase positive: differentiates from CoNS
- β-haemolytic (complete haemolysis)

B. Coagulase-negative staphylococci (cons)
- Main Species: **Staphylococcus epidermidis**
- Coagulase negative
- Non-hemolytic or weakly hemolytic

HACEK Group

Streptococci

General features:
- Gram-positive cocci in CHAINS or PAIRS
- Non-motile, non-spore forming
- **Catalase negative**

Viridans group streptococci
- **α-haemolytic** (partial haemolysis)
- Optochin Resistant: *Differentiates from S. pneumoniae (sensitive)*
- Bile solubility: **Negative** → *Differentiates from S. pneumoniae (positive)*

Streptococcus pneumoniae
- Optochin: Sensitive ✓
- Bile solubility: Positive ✓

HACEK organisms – a group of fastidious gram-negative bacteria that cause about 5% of IE cases.

Risk Factors

- **Cardiac Risk Factors:**
- Rheumatic heart disease
- Valvular abnormalities, Congenital defects
- Presence of a prosthetic valve
- Previous history of endocarditis
- **Patient Risk Factors:**
- Age > 60 years
- IV drug use (most commonly affects the tricuspid valve)
- Poor dentition
- Immunosuppression
- **Iatrogenic Risk Factors** → Implanted devices or catheters

Infective endocarditis: Pathophysiology

- Infective endocarditis: Predisposing factors:
- Endocardial abnormality or injury
- Bacteraemia
- Damaged endothelium → platelet and fibrin deposition → adherence by microorganisms
- Proliferation and invasion by organisms → inflammation → **vegetation development** → valve destruction
- Release of septic emboli → embolic complications and/or metastatic infection

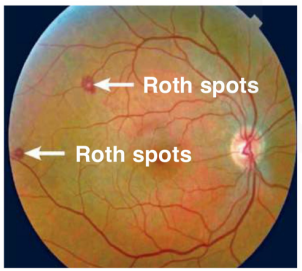
Clinical Presentation: General signs and symptoms

- Presentation and course depend on the etiology, location of vegetations, and severity.
- **Fever**: (endocarditis should be suspected in a patient with a fever of unknown origin)
- **Night sweats**
- **Fatigue**
- **Loss of appetite**
- **Weight loss**
- **Myalgias and arthralgias**

Clinical Presentation

Cardiac findings

- New or changed cardiac murmur:
- Mitral regurgitation, Tricuspid regurgitation, Aortic regurgitation
- **Tachycardia**
- Arrhythmia:
- Potentially due to spread of the infection
- Results in disruption of the atrioventricular conduction system → **conduction delay or heart block**



Extracardiac

- **Osler nodes:**
- Painful red nodules on pads of the fingers and toes
- Due to immune complex deposition and inflammation

- **Janeway lesions:**
- Small, painless, erythematous lesions on the palms or soles
- Due to septic emboli and microabscesses

- **Splinter haemorrhage:**
- Small areas of red discoloration under the nails
- Due to micro emboli in capillaries

- **Petechiae**: Small, pinpoint, non-blanching, red-purple spots on the skin or mucous membranes.

- **Roth spots:**
- Red spots with pale centers on fundoscopic exam
- Due to retinal haemorrhages
- **Conjunctiva haemorrhage**

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"من كنوز الجنة"