Cardiovascular Disease: A Brief Introduction

Biomedical Engineering - URJC

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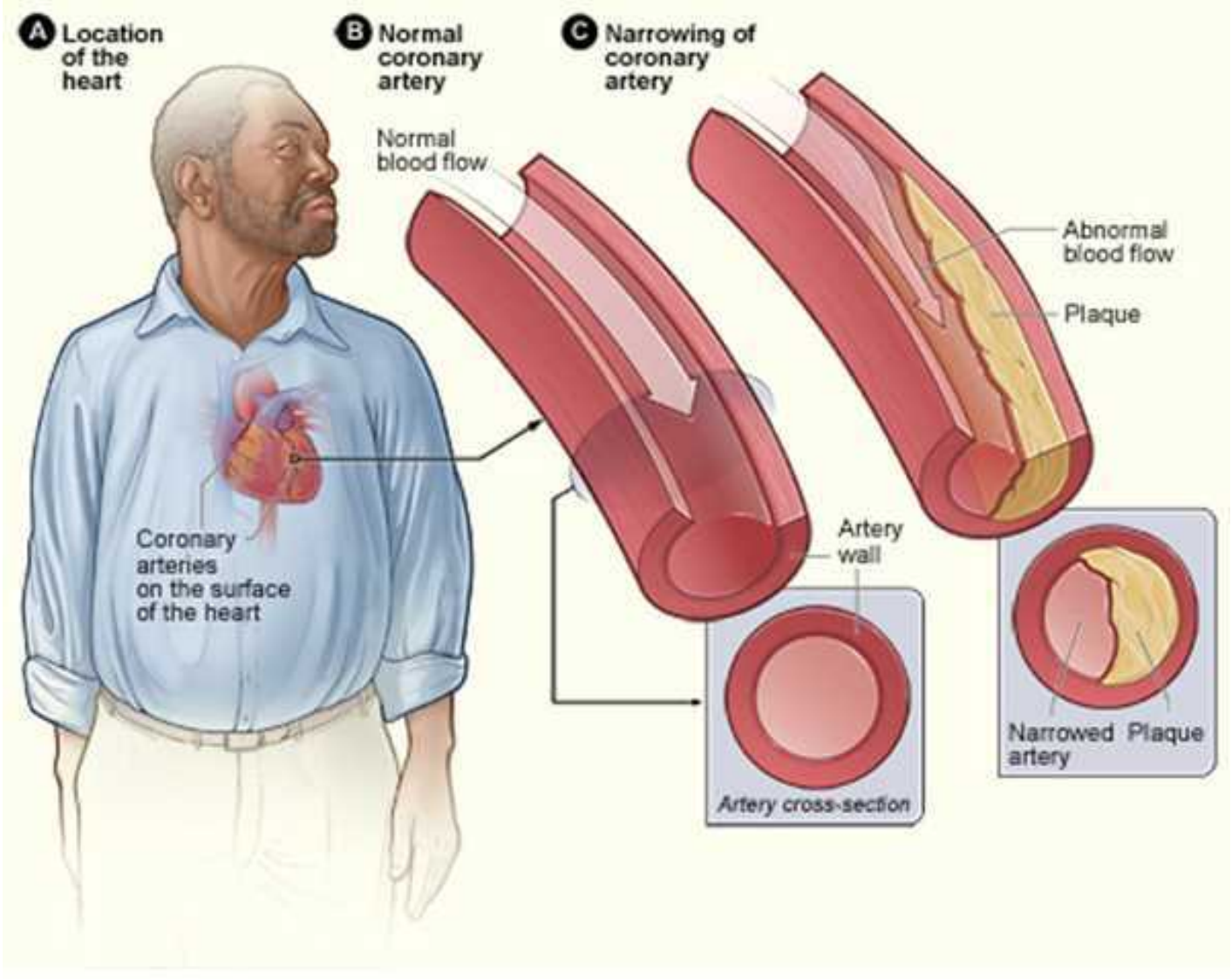
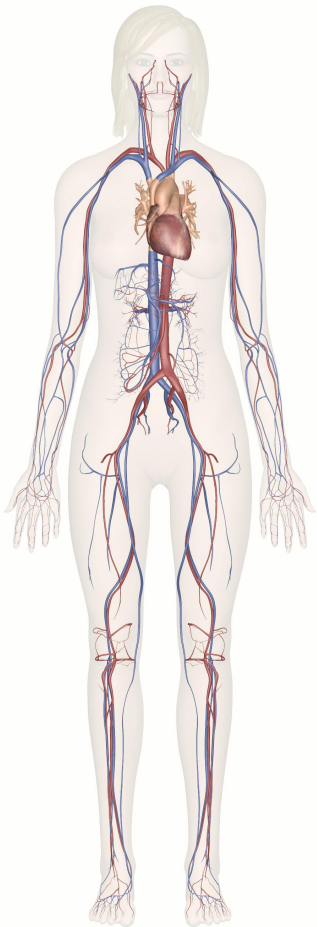
Introduction

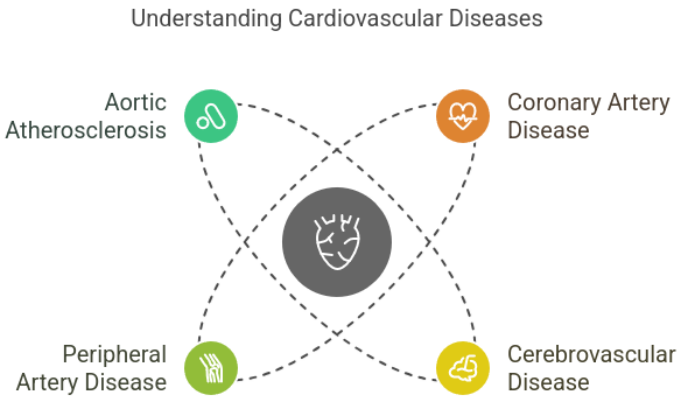


Introduction

- The cardiovascular system consists of the heart and blood vessels.



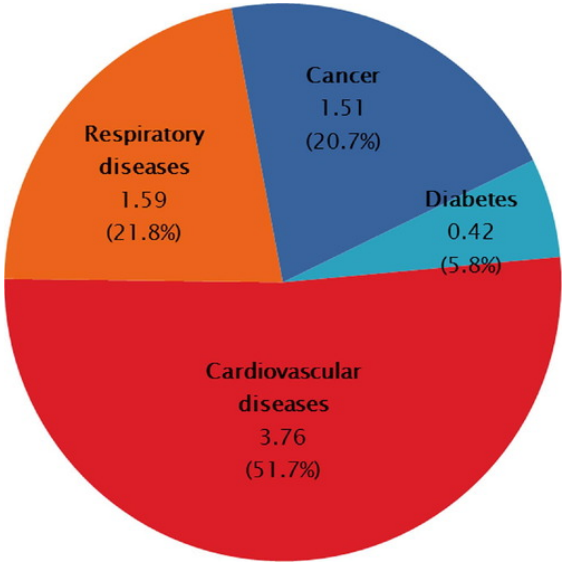
Introduction



Cardiovascular disease (CVD) includes:

1. Coronary artery disease (CAD)
2. Cerebrovascular disease (CVD)
3. Peripheral artery disease (PAD)
4. Aortic atherosclerosis

Epidemiology

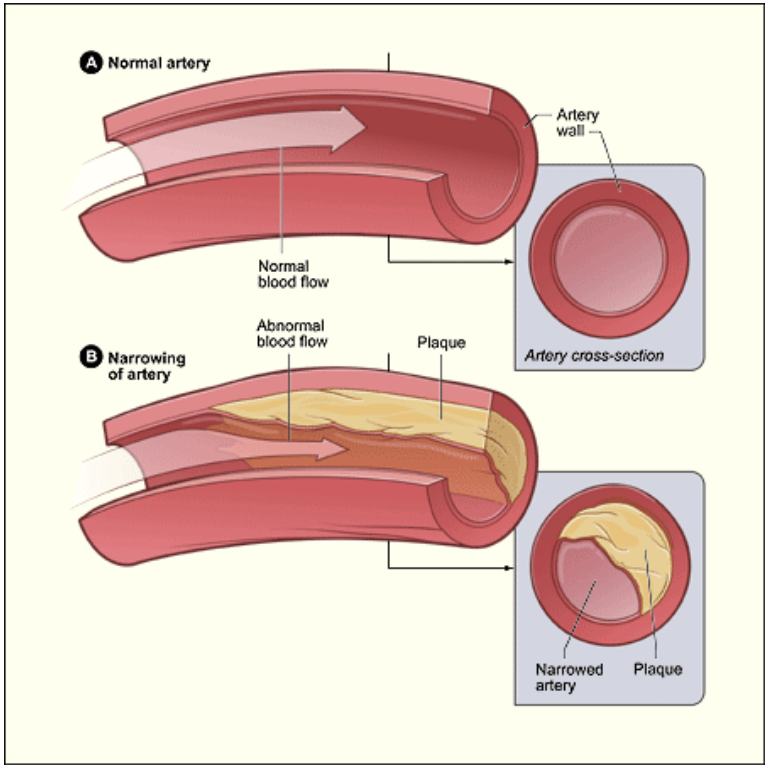


Cardiovascular disease (CVD) includes:

- CVD is a leading cause of death globally (WHO estimates 17.7 million deaths annually).
- Significant economic burden: $237 billion/year, projected to rise.
- Age-adjusted risk increases significantly after 45.
- Gender differences: **Men** at higher risk at younger ages; **women** post-menopause.

Etiology (I)

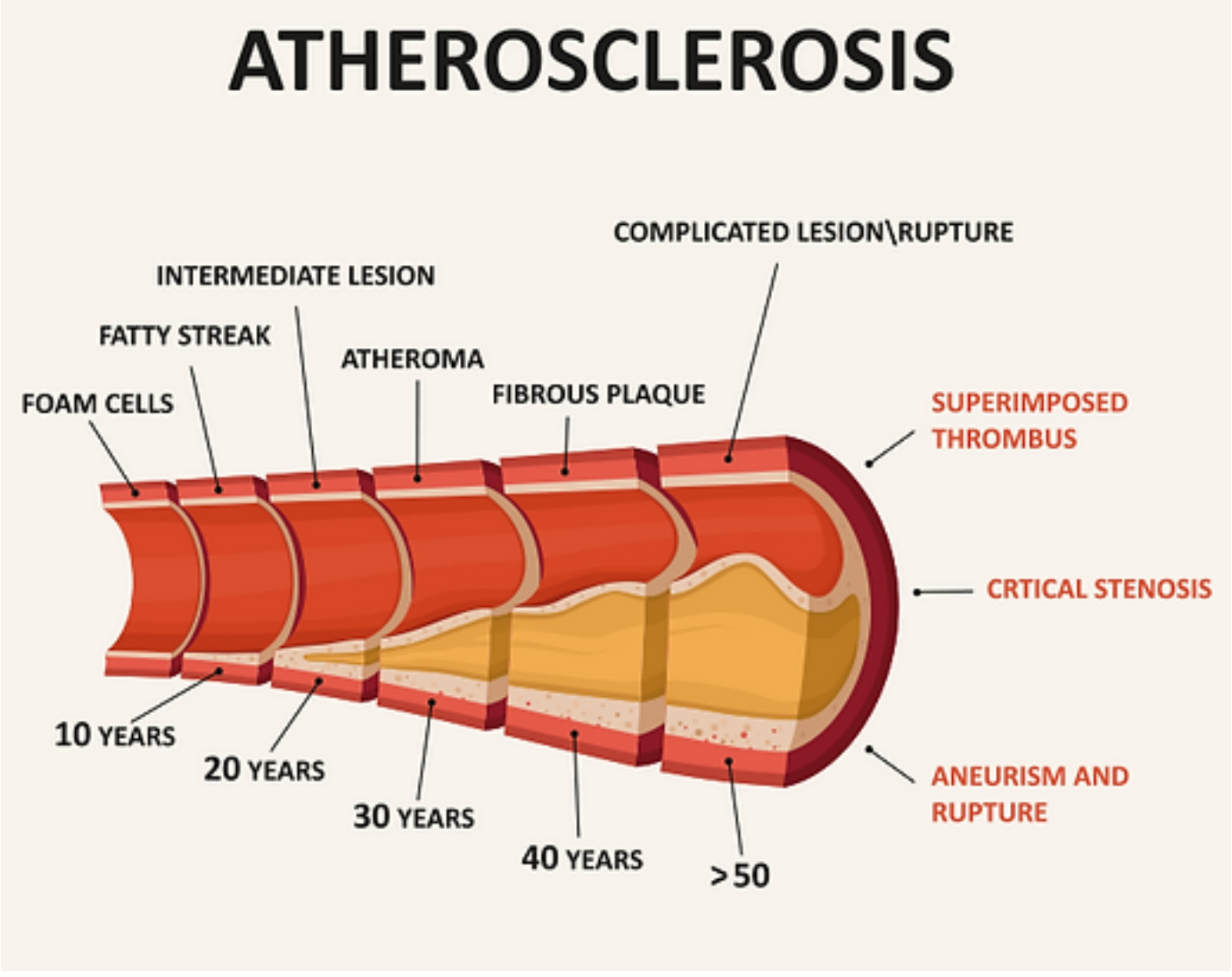
- **Atherosclerosis** is the leading cause of CVD.
- Major risk factors:
  - Smoking, dyslipidemia, hypertension, diabetes, obesity
  - Psychosocial factors, diet, alcohol, and physical inactivity
- Key studies: Framingham Heart Study, NHANES III



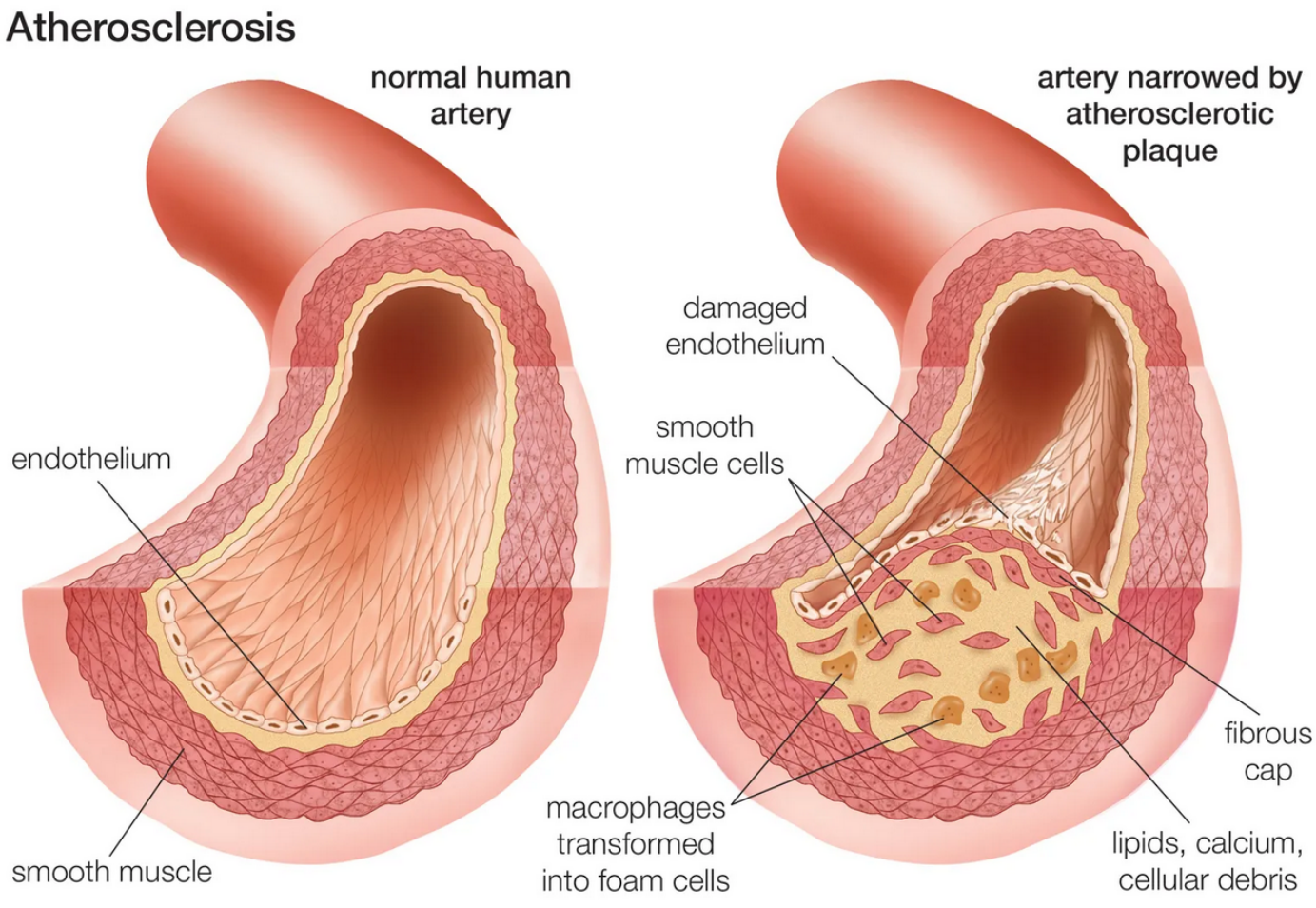
Etiology (II)

- Atherosclerosis leads to plaque formation, vessel stenosis. It involves:
  - Dyslipidemia, inflammation, endothelial dysfunction.
  - Formation of fatty streaks and atheroma plaques.
- Endothelial dysfunction and inflammatory responses contribute.
- Plaque rupture can cause acute events (e.g., myocardial infarction, stroke).

Etiology (III)



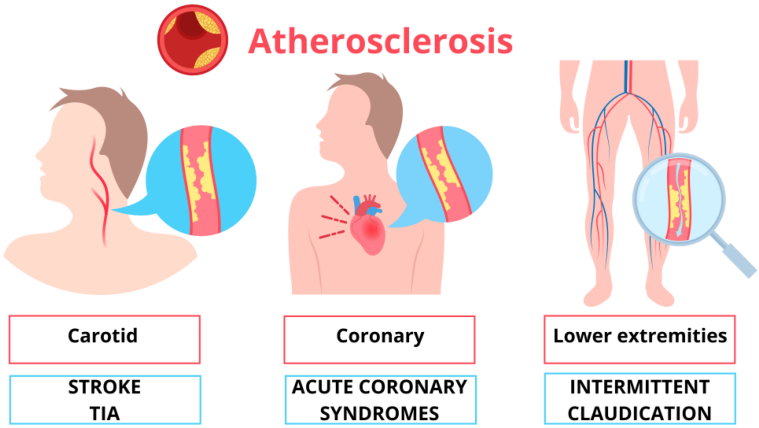
Etiology (IV)


Atherosclerosis
normal human artery
artery narrowed by atherosclerotic plaque
endothelium
smooth muscle
damaged endothelium
smooth muscle cells
macrophages transformed into foam cells
fibrous cap
lipids, calcium, cellular debris

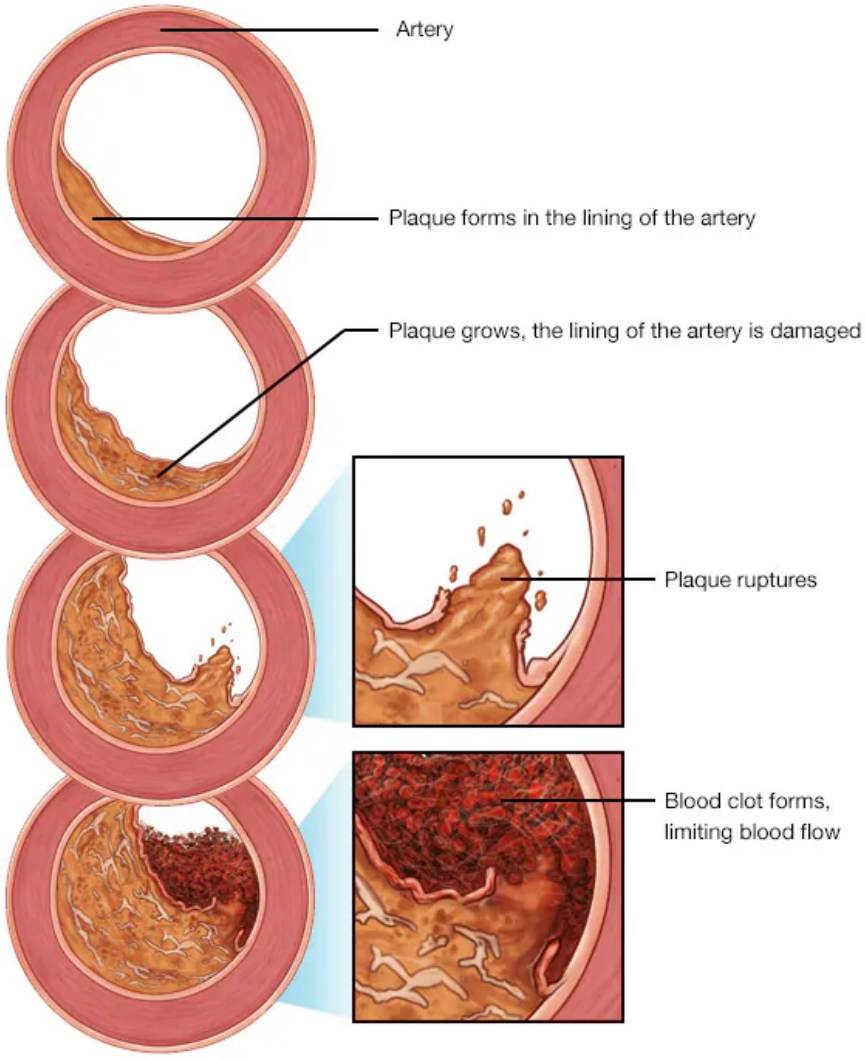
Clinical Presentation (I)

Clinical Presentation

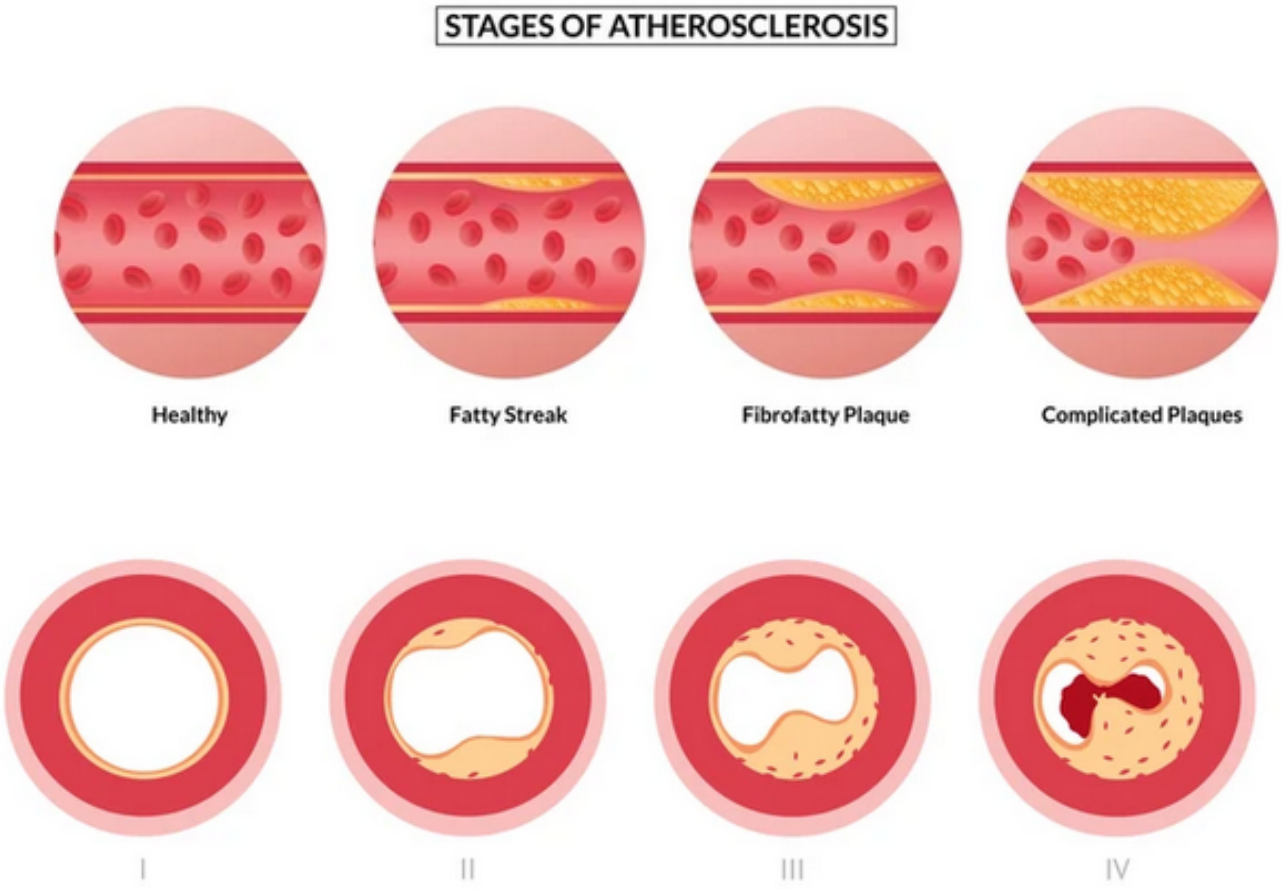
- CAD: Angina, MI, heart failure
- CVD: Stroke, transient ischemic attack
- PAD: Claudication, limb ischemia
- Aneurysms: Often asymptomatic, may rupture



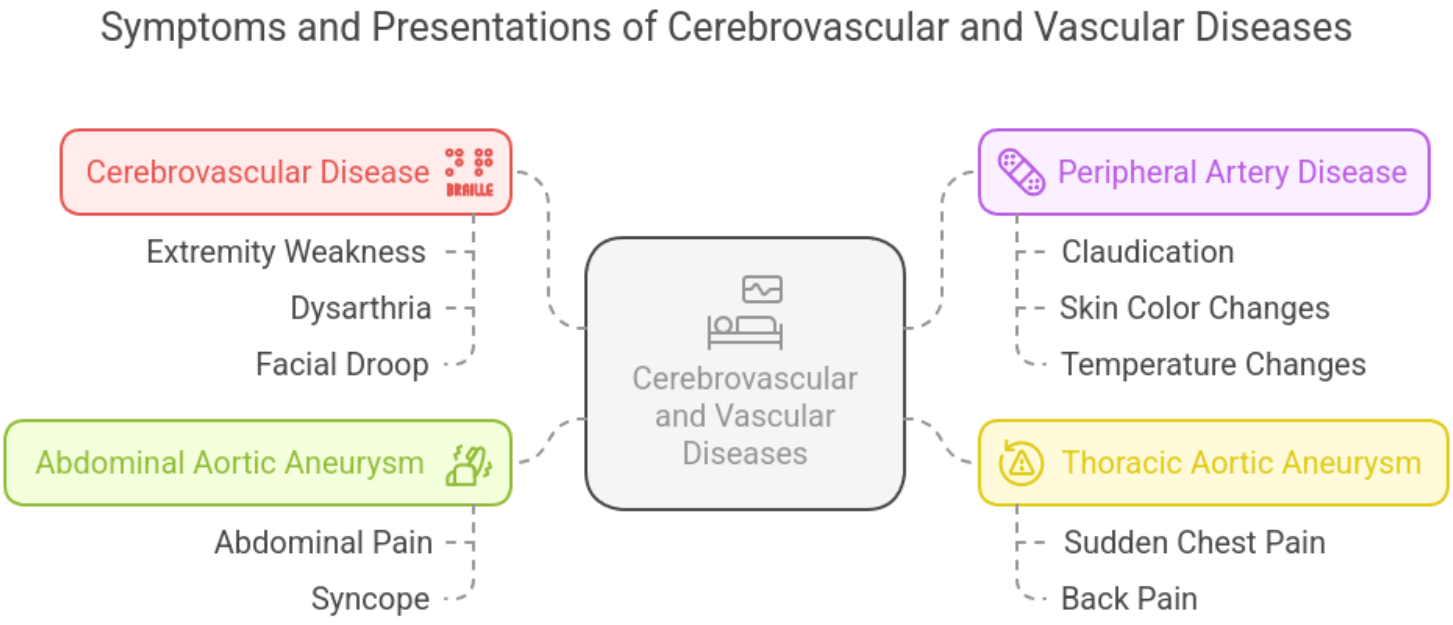
Clinical Presentation (II)



Clinical Presentation (III)



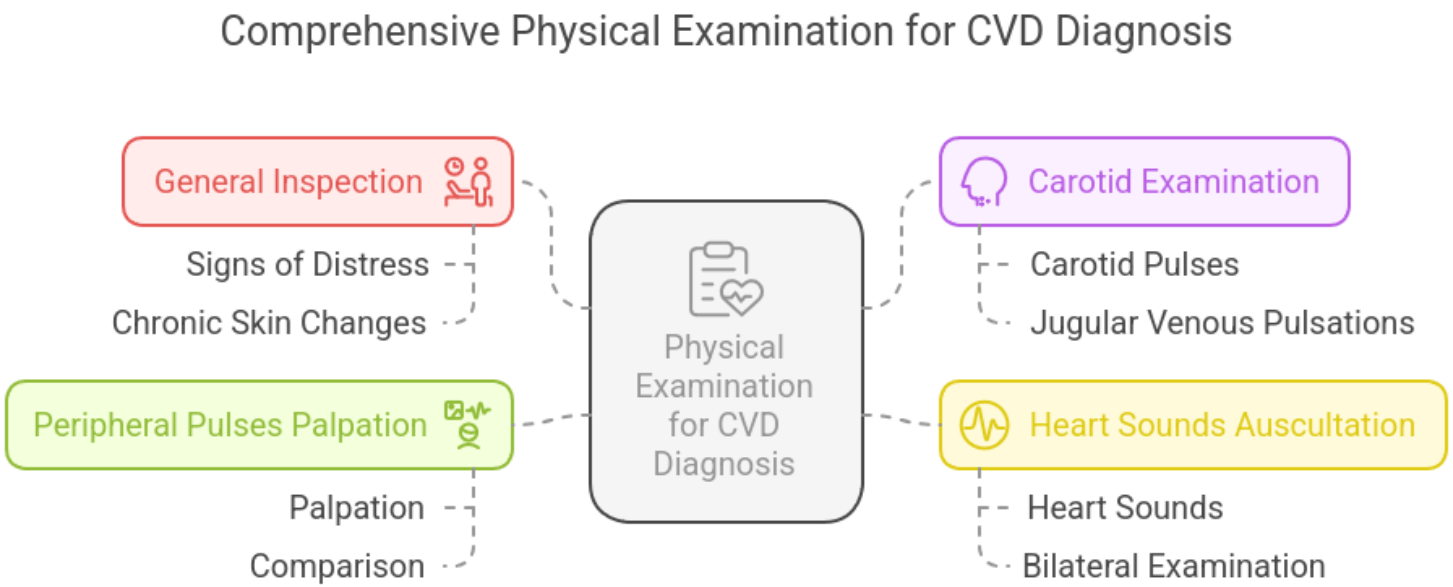
Clinical Presentation (IV)



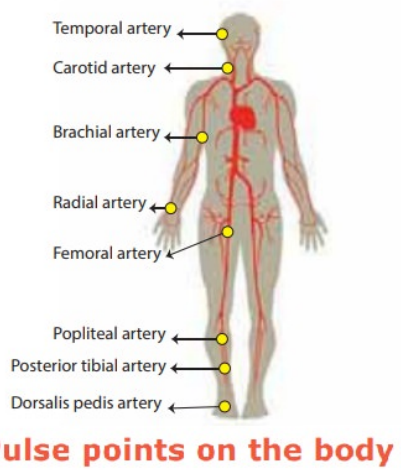
Physical Examination (I)

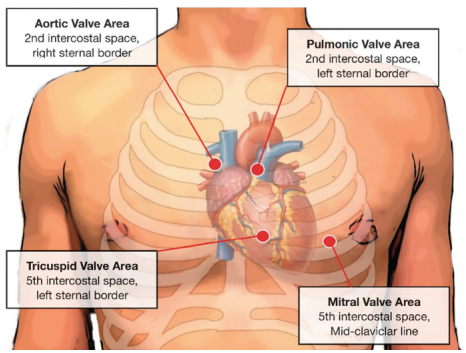
- General inspection: Signs of distress, skin changes.
- Carotid examination: Palpation, auscultation.
- Heart sounds and peripheral pulses.

Physical Examination (II)



Physical Examination (III)



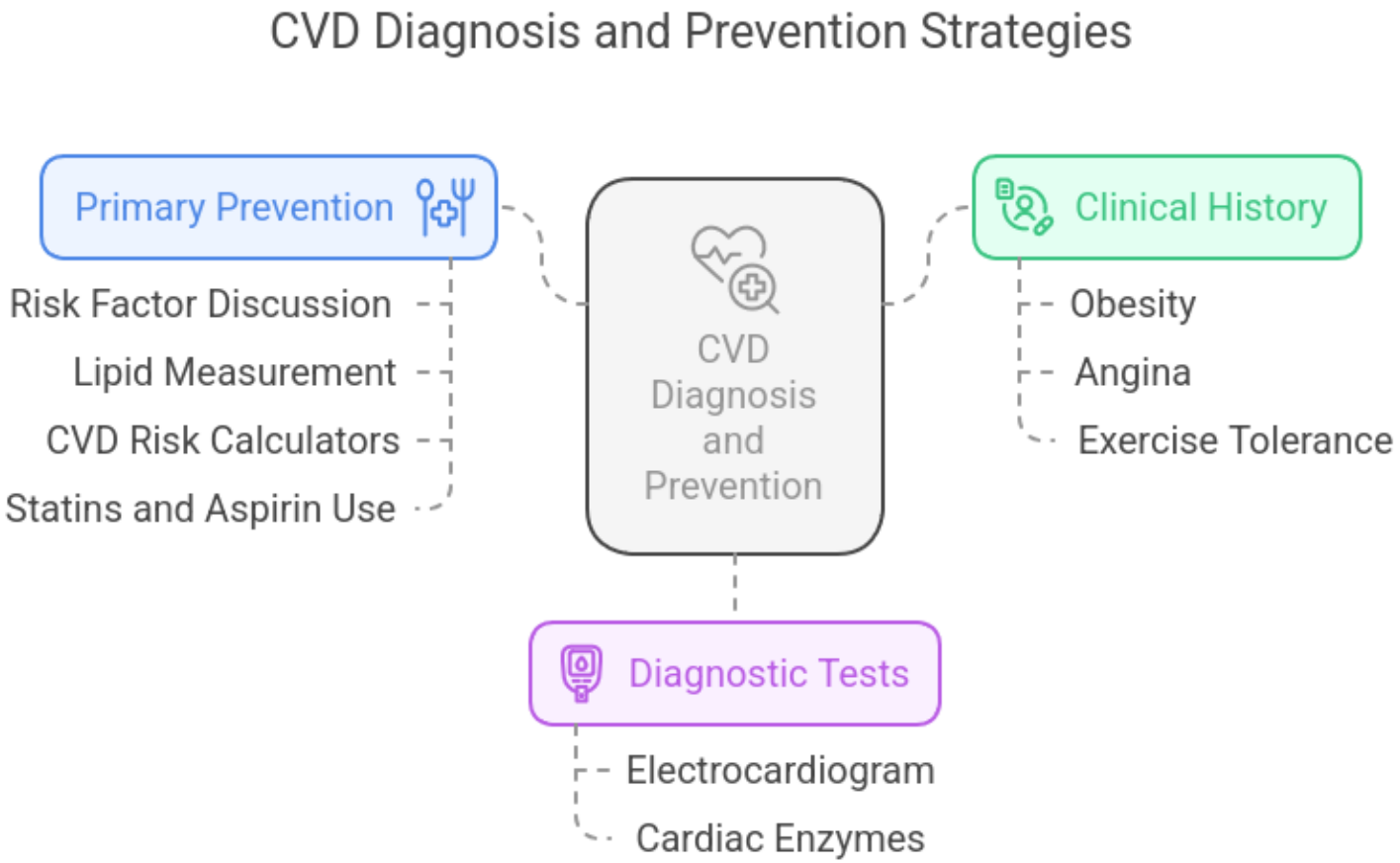


Evaluation at Physician's Office (I)

Global assessment

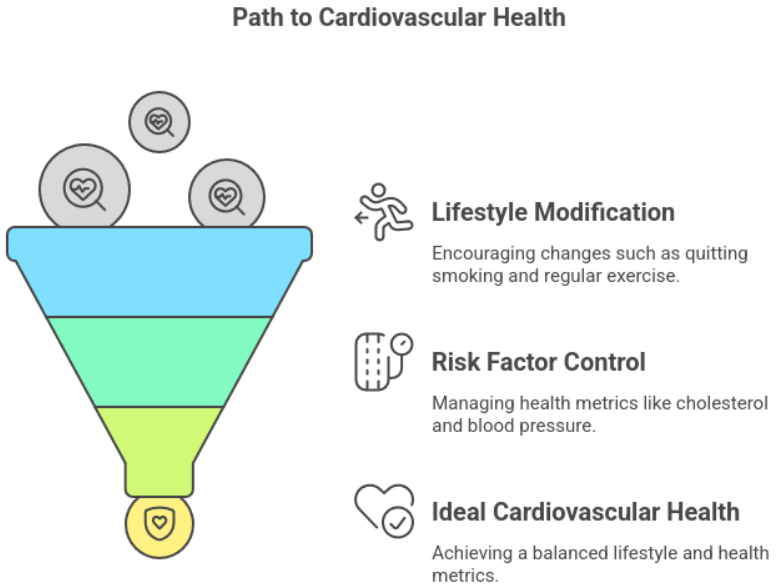
- Detailed clinical history and physical exam are essential.
- Diagnostic tests: ECG, cardiac enzymes, lipid profiles.
- Risk assessment tools: LDL, HDL levels, diabetes screening.
- Primary prevention is key: early risk factor identification: Lifestyle changes, risk factor modification.
- Ideal cardiovascular health: Nonsmoking, BMI < 25, physical activity, healthy diet.

Evaluation at Physician's Office (II)



Prevention Strategies

- Lifestyle modifications:
  - Smoking cessation, healthy diet, exercise
  - Maintaining normal BMI, cholesterol, and blood pressure
- Targeting high-risk populations (diabetes, obesity, hypertension).



Summary

1. CVD includes CAD, CVD, PAD, and aortic atherosclerosis.
2. It is the leading cause of death worldwide.
3. Prevention through lifestyle and risk factor management is crucial.