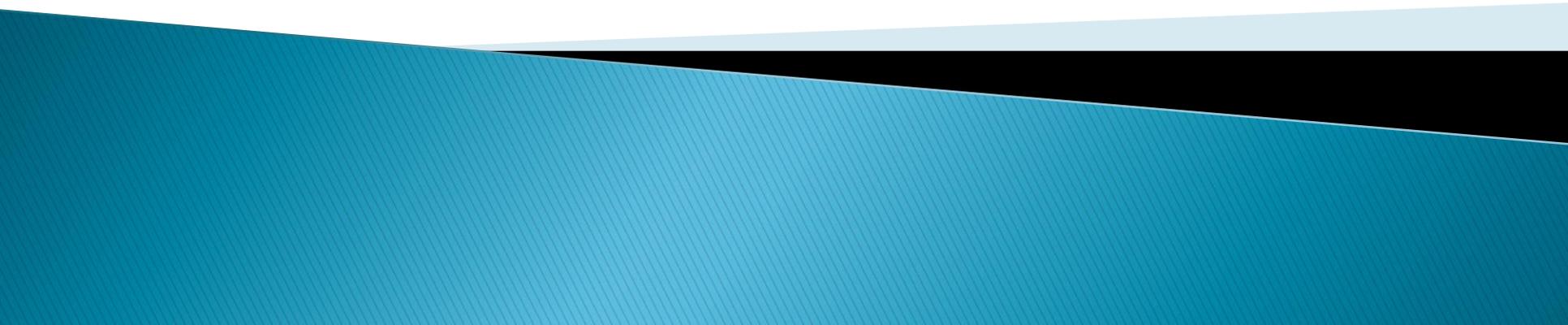


# **Ischemic heart disease**



- ▶ **Heart disease remains the leading cause of morbidity and mortality in industrialized nations.**
  - ▶ **It accounts for nearly 40% of all deaths in the United States, totaling about 750,000 individuals annually (nearly twice the number of deaths caused by all forms of cancer combined).**
  - ▶ **The yearly economic burden of ischemic heart disease (IHD) alone is in excess of \$100 billion.**
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# ISCHEMIC HEART DISEASE (IHD)

- ▶ IHD is also frequently called coronary artery disease (CAD)
- ▶ IHD is a generic description for a group of related syndromes resulting from myocardial *ischemia* (an imbalance between cardiac blood supply (perfusion) and myocardial oxygen demand).

# **Ischemia can result from:**

- 1- increased demand (e.g., tachycardia or hypertension)**
- 2- diminished oxygen-carrying capacity (e.g., anemia, carbon monoxide poisoning),**
- 3- reduction in coronary blood flow caused by obstructive atherosclerotic disease → 90 % of cases**

# There are four basic clinical syndromes of IHD:

## *1-Angina pectoris*

ischemia causes pain but is insufficient to lead to death of myocardium

# Types of angina :

***1-stable angina*** (occur after certain levels of exertion)

***2-variant angina or Prinzmetal angina*** (due to vessel spasm )

***3-Unstable angina***

occurring with progressively less exertion or even at rest.

## **2-Acute myocardial infarction (MI)**

**the severity or duration of ischemia is enough to cause cardiac muscle death**

## **3-Chronic IHD**

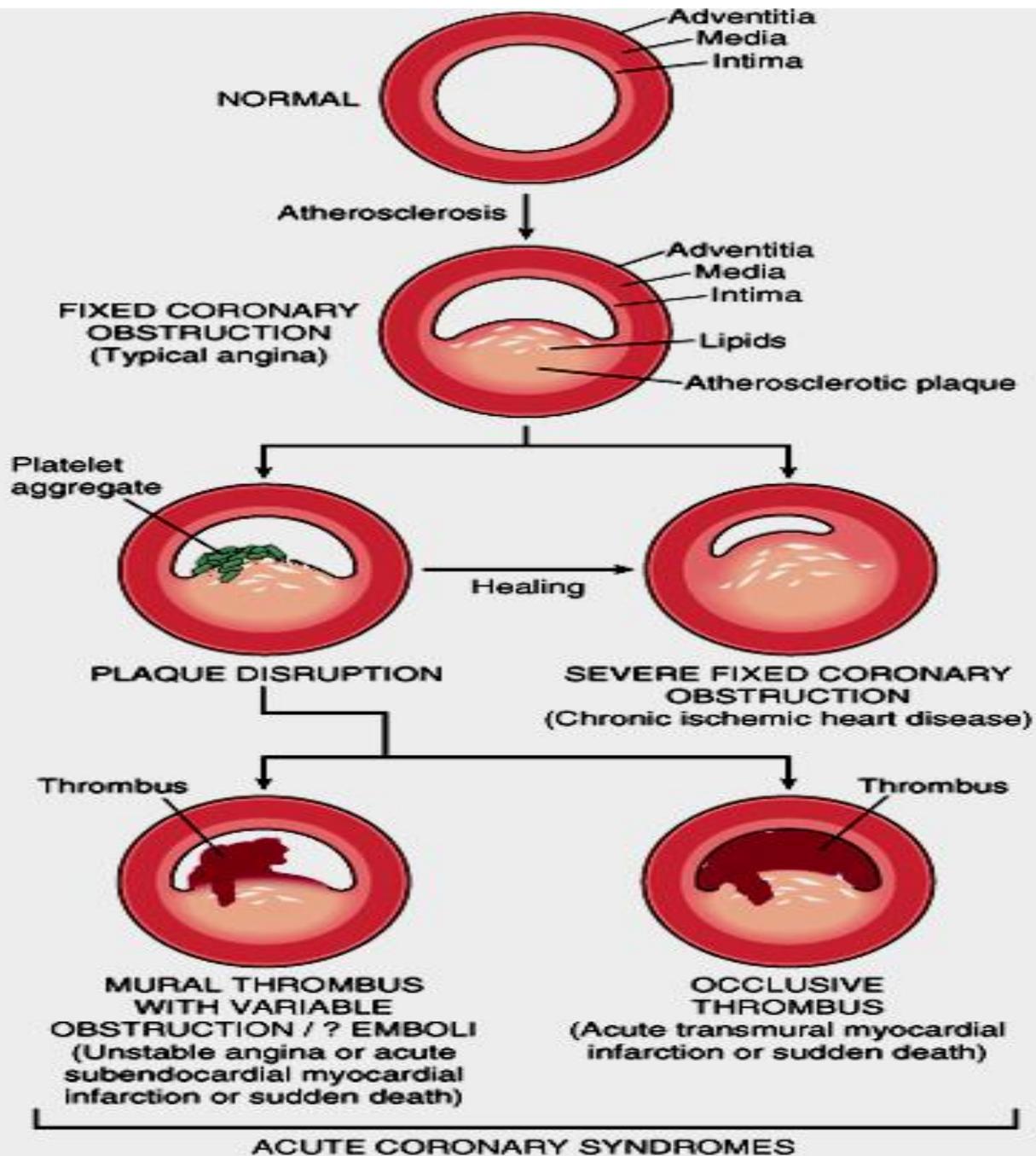
**progressive cardiac decompensation (heart failure) following MI**

## **4-Sudden cardiac death (SCD)**

**can result from a lethal arrhythmia following myocardial ischemia.**

# *Pathogenesis*

- ▶ **atherosclerotic occlusion of coronary arteries and new superimposed thrombosis and/or vasospasm**
- lesion obstructing 70% to 75% or more of a vessel lumen = **critical stenosis** → cause angina only in the setting of increased demand
- a fixed 90% stenosis can lead to inadequate coronary blood flow even at rest.



# *Pathogenesis*

- **Chronic coronary occlusion**

when a coronary artery develops atherosclerotic occlusion at a sufficiently slow rate, it may be able to stimulate collateral blood flow from other major epicardial vessels → protection against MI even in the setting of a complete vascular occlusion.

- **Acute coronary occlusions**

cannot spontaneously recruit collateral flow and will result in infarction

# *Clinical Features of IHD*

- 1) Severe, crushing substernal chest pain
- 2) Discomfort that can radiate to the neck, jaw, epigastrium, or left arm.
  - ▶ angina pectoris → pain < 20 minutes and relieved by rest or nitroglycerin
  - ▶ MI → pain lasts from 20 minutes to several hours and is not relieved by nitroglycerin or rest.
- ▶ 3) MIs can be entirely asymptomatic in 10% to 15% of the **cases (silent infarcts)** → particularly common in patients with:
  - 1- underlying diabetes mellitus (with peripheral neuropathies) .
  - 2- in the elderly.

# Clinical Features of IHD

- 4- the pulse is rapid and weak
- 5- patients nauseated particularly with posterior-wall MIs.
- 6- dyspnea is common (impaired myocardial contractility and dysfunction of the mitral valve apparatus, with resultant pulmonary congestion and edema).
- 7- massive MIs (>40% of the left ventricle) → cardiogenic shock .

# *Stable angina pectoris*

- Angina pectoris is intermittent chest pain caused by transient, reversible myocardial ischemia.
- There are three variants:

## *1-Typical or stable angina*

- is **episodic chest pain associated with exertion** or some other form of increased myocardial oxygen demand (e.g., tachycardia or hypertension due to fever, anxiety, fear).
- pain → a crushing or squeezing substernal sensation,
- radiate down the left arm or to the left jaw (*referred pain*).

# *Stable angina pectoris*

- is usually associated with critical atherosclerotic narrowing ( $\geq 75\%$ ) of one or more coronary arteries.
- the myocardial oxygen supply may be sufficient under basal conditions but cannot be adequately augmented to meet any increased requirements (exertion, emotional stress..etc)

# *Stable angina pectoris*

- The pain is **relieved by rest** (reducing demand) or by administering agents such as nitroglycerin;
- such drugs cause peripheral vasodilation and thus reduce venous blood delivered to the heart → reducing cardiac work.
- in larger doses, nitroglycerin also increases blood supply to the myocardium by direct coronary vasodilation

## ***2-Prinzmetal, or variant angina***

- Is angina **occurring at rest** due to **coronary artery spasm.**
- completely normal vessels can be affected.
- The etiology is not clear.
- Treatment: administration of vasodilators such as nitroglycerin or calcium channel blockers.

# ***3-Unstable angina (crescendo angina)***

- characterized by increasing frequency of pain, precipitated by progressively less exertion.
- the episodes also tend to be more intense and longer lasting than stable angina.
- associated with plaque disruption; superimposed partial thrombosis; distal embolization; vasospasm.
- an indication of more serious, potentially irreversible ischemia ( if complete luminal occlusion by thrombus) → **called**
- ***pre-infarction angina***