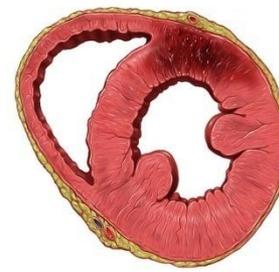


# Diagnosis of AMI

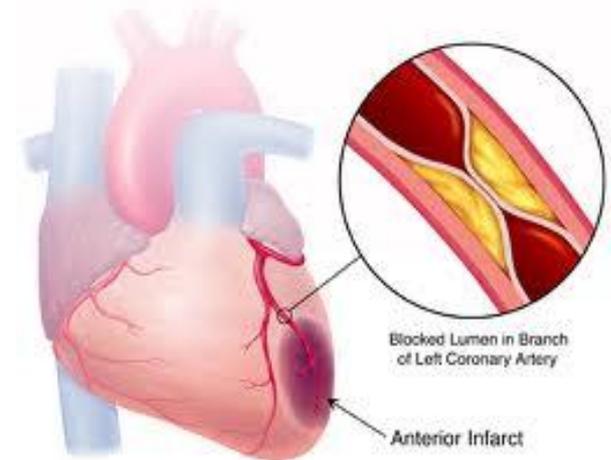


- The diagnosis of AMI is usually predicated on the WHO criteria of **chest pain, ECG changes, and increases in biochemical markers** of myocardial injury.
- Half of the patients with "typical" symptoms do not have AMI.
- The ECG is specific for AMI, but lacks sensitivity.
- In contrast, biochemical markers have excellent sensitivity for diagnosing AMI. By combining the most sensitive and the most specific tests, diagnostic accuracy can be enhanced.

# Serum enzymes in Acute Myocardial Infarction

Enzyme assays routinely carried out for the diagnosis of Acute Myocardial Infarction are-

- 1) Creatine Phospho kinase,
- 2) Aspartate transaminase and
- 3) Lactate dehydrogenase



Acceptable biochemical markers of ischemic heart disease are now considered to include **myoglobin, CK-MB, total CK, and cardiac troponins T and I.**

# Creatine Kinase (CK, CPK)

- **After myocardial infarction-** serum value is found to increase within 3-6 hours, reaches a peak level in 24- 30 hours and returns to normal level in 2-4 days (usually in 72 hours).
- **Normal Value-** serum activity varies from 10-50 IU/L at 30°C.
- CK is a **sensitive indicator** in the early stages of myocardial ischemia.
- No increase in activity is found in heart failure and coronary insufficiency.
- In acute MI, CPK usually rises faster than SGOT and returns to normal faster than the SGOT.

# CK/CPK Isoenzymes

- Normal levels of CK/CPK are almost entirely MM, from skeletal muscle.
- Elevated levels of CK/CPK resulting from acute myocardial infarction are about half MM and half MB.
- Myocardial muscle is the only tissue that contains more than five percent of the total CK activity as the CK2 (MB) isoenzyme.
- **Following an attack of acute myocardial infarction, this isoenzyme appears within 4 hours following onset of chest pain, reaches a peak of activity at approximately 24 hours and falls rapidly.**
- MB accounts for 4.5- 20 % of the total CK activity in the plasma of the patients with recent myocardial infarction and the total isoenzyme is elevated up to 20-folds above the normal.

## 2) Aspartate amino Transferase (AST)

- It is also called as Serum Glutamate Oxaloacetate Transaminase (SGOT).
- The level is significantly elevated in Acute MI.
- **Normal Value-** 0-41 IU/L at 37°C
- **In acute MI-** Serum activity rises sharply within the first 12 hours, with a peak level at 24 hours or over and returns to normal within 3-5 days.
- The rise depends on the extent of infarction. Re-infarction results in secondary rise of SGOT.

# Aspartate amino Transferase (AST)

**Prognostic significance-** Levels  $> 350$  IU/L are due to massive infarction (Fatal),  $> 150$  IU/L are associated with high mortality and levels  $< 50$  IU/L are associated with low mortality.

### 3) Lactate dehydrogenase (LDH)

- Lactate dehydrogenase catalyzes the reversible conversion of pyruvate and lactate.
- **Normal level-** 55-140 IU/L at 30°C. The levels in the upper range are generally seen in children.
- LDH level is 100 times more inside the RBCs than in plasma, and therefore minor amount of hemolysis results in false positive result.

# Lactate dehydrogenase (LDH)

- **In Acute MI**-The serum activity rises within 12 to 24 hours, attains a peak at 48 hours (2 to 4 days) reaching about 1000 IU/L and then returns gradually to normal from 8<sup>th</sup> to 14<sup>th</sup> day.
- The magnitude of rise is proportional to the extent of myocardial infarction.
- Serum LDH elevation may persist for more than a week after CPK and SGOT levels have returned to normal levels.

## 4) Cardiac Troponins

- They are not enzymes; however they are accepted as **markers of myocardial infarction**.
- The Troponin complex consists of 3 components; **Troponin C (Calcium binding), Troponin I (Actomyosin ATPase inhibitory element), and Troponin T (Tropomyosin binding element)**.
- **Troponin I** is released into the circulation within 4 hours of the onset of cardiac manifestations, peak is observed at 14-24 hours and remains elevated for 3-5 days post infarction.
- Serum level of **TnT increases within 6 hours of myocardial infarction, peaks at 72 hours and then remains elevated up to 7-10 days**. The TnT2 estimation is 100% sensitive index for myocardial infarction.

## 5) Myoglobin as cardiac marker

One of earliest markers is myoglobin, which is very sensitive but, in certain clinical settings, lacks specificity.

Its level rises within 4 hours of infarction

Falsely high levels may be observed in patients of Renal failure or patients having muscle injuries.

# Enzymatic activity changes in Acute MI

