

**Plasma enzyme pattern**  
**in Acute Myocardial infarction, Liver Diseases and Muscle Disorders**

**Objectives:**

1. To study the patterns of plasma enzymes in acute myocardial infarction.
2. To study the patterns of plasma enzymes in liver diseases.
3. To study the patterns of plasma enzymes in muscle disorders.

**Enzyme Diagnosis in**  
**Acute Myocardial Infarction (Acute MI)**

**Enzymes used are:**

1. CK-MB
2. CK
3. AST
4. LDH1

**These enzymes are useful in:**

1. Confirming the diagnosis of MI.
2. Assessing MI severity.
3. Following the progress of MI.

**CK-MB** is the most sensitive and specific indicator of myocardial damage. It is the first enzyme start to rise in the plasma soon after the occurrence of acute MI

**PRACTICALLY, CK-MB is the most useful plasma enzyme used in the diagnosis of acute MI.**

**Creatine Kinase- MB (CK-MB):**

ONSET ( hours):        2 - 6

PEAK ( hours ):        16 – 20

DURATION ( days ):    2 – 3

**ENZYME PATTERNS IN LIVER DISEASE**

**In Parenchymal liver disease ( Hepatocellular damage ) :**

**Release of soluble cytoplasmic enzymes, and to a lesser extent, mitochondrial enzymes:**

**AST , ALT**

**AST:** has cytoplasmic and mitochondrial isoenzymes

**ALT:** has cytoplasmic isoenzymes

**In Cholestatic liver disease ( Cholestasis) :**

**Release of membrane associated enzymes:**

1. Alkaline Phosphatase.
2. Gamma – Glutamyl Transferase.
3. 5`– Nucleotidase.

**In Cholestatic liver disease ( Cholestasis) :**

**These enzymes ( Alkaline Phosphatase, Gamma – Glutamyl Transferase, and 5`– Nucleotidase ) are elevated in hepatobiliary disease. They are increased slightly in intrahepatic cholestasis. However, their levels are markedly elevated in extrahepatic cholestasis.**

**( Hepatocellular and Cholestatic LFTs )**

<u>Pattern</u>	<u>AST</u>	<u>ALT</u>	<u>GGT</u>	<u>ALP</u>	<u>5`N</u>
Hepatitis	↑↑↑	↑↑↑	↑	↑	↑
Cholestasis	↑	↑	↑↑↑	↑↑↑	↑↑

↑ : Mild elevation (< twice normal )

↑↑ : Moderate elevation ( 2-5 times normal )

↑↑↑ : Marked elevation ( > 5 times normal )

**Plasma ENZYME pattern In Muscle disorders**

**1. Creatine phosphokinase-3 ( CPK-3 )**

**A. It is greatly elevated in:**

1. Dystrophies  
(e.g. Duchenne muscular dystrophy)
2. Inflammatory muscle disorders  
( e.g. Polymyositis, dermatomyositis )

**B. It is mildly to moderately elevated in:**

1. Acute muscle injury
2. Post operatively
3. After heavy exercise
4. Following I.M. injection

**C. It remain normal in:**

1. Myasthenia gravis
2. Lambert - Eaton myasthenic myopathic syndrome (LEMS)
3. Myotonias
4. Chronic partial denervation

## **2. Lactate dehydrogenase-5 ( LDH-5 )**

**IT IS ELEVATED IN THE FOLLOWING MUSCLE CONDITIONS:**

- |                         |                   |
|-------------------------|-------------------|
| 1. Acute muscle injury  | 2. Myositis       |
| 3. Vigorous exercise    | 4. I.M. injection |
| 5. Muscular dystrophies | 6. Post operative |

## **3. Aspartate aminotrasferase ( AST )**

**(Serum glutamate oxaloacetate transaminase "SGOT")**

**IT IS ELEVATED IN THE FOLLOWING MUSCLE CONDITIONS:**

- |                         |                   |
|-------------------------|-------------------|
| 1. Acute muscle injury  | 2. Myositis       |
| 3. Vigorous exercise    | 4. I.M. injection |
| 5. Muscular dystrophies | 6. Post operative |