

enzyme	locations	indications	time	con	N.B
CPK	heart and skeletal muscles, less in brain	AMI No increase in heart failure and coronary insufficiency	increase within 3-6 hours  returns to normal in 2-4 days	Normal: 10-50 U/L mostly MM isoenzyme  In AMI: 20 times the normal, half MM and half MB.  In skeletal muscle diseases: 1-increase in neurogenic muscular dystrophies,  2-highest values are seen in Deuchenne	Has three isoenzymes made of two protomers, M and B  MM: skeletal and heart MB: heart BB: Brain
LDH	Heart muscles, RBCs, brain, liver and skeletal muscles	AMI anemias, hepatocellular damage, muscular dystrophies, carcinoma, leukemia and necrosis	rises within 12 to 24 hours  normal from 8 - 14 day.	Normal: 55-140 U/L (higher con in children)  AMI: 1000 U/L	Has 5 tertameric isoenzymes made of H and M chains  Highest con from RBC isoenzyme (H3M1) followed by heart and brain isoenzymesh  Heart isoenzyme is H4
BNP	Brain but more in heart ventricles	ventricular function  congestive heart failure along with ANP			
Troponin I	Heart and skeletal muscles	AMI	Rises within 3-6 hours Return to normal in 4-7 days		
TnT	Heart and skeletal muscles	AMI	increases within 4-6 hours return to normal in 10-24 days.		TnT2 is 100% sensitive

Myoglobins		AMI, renal failure and skeletal muscle injury	rises within 1 hour		Lacks specificity
Aminotransferases	<p>AST:liver, cardiac muscle, skeletal muscle and others</p> <p>ALT: only liver</p>	AMI, and liver diseases	<p>AST in AMI: Rises within 12 hours Returns to normal 3-5 days</p> <p>Aminotrans In viral hepatitis: Rises faster than bilirubin</p>	<p>AST in AMI: &gt;350 masiive(fatal) &gt;150 high mortality &lt;50 low mortality</p> <p>In liver diseases: aminotransferases &gt; 1000 U/L in: 1-viral hepatitis, (2) ischemic liver injury 3-drug induced injury</p> <p>acute hepatic disorder : ALT is higher than or equal to the AST</p> <p>alcoholic liver disease: AST&gt;ALT AST rarely&gt;300 ALT normal</p> <p><i>alcohol-induced deficiency of Pyridoxal phosphate: low ALT</i></p> <p><i>obstructive jaundice: normal con of aminotrans</i></p>	AST is aka SGOT
ALP	liver, bone, placenta and less commonly small intestine	<p>Physiological: In Over 60 years olds, children and adolescents. Blood types, O and B Fatty meal and pregnancy</p>		<p>less than threefold elevation in any liver disease</p> <p>greater than four times normal in</p>	<p>The level of ALP doesn'tt help in distinguishing extra and intrahepatic cholestasisp</p> <p>Has 6 isoenzymes:</p>

		<b>Pathological:</b> <b>1-intra and extrahepatic cholestasis</b> <b>2-GI disorders</b> <b>3-Regan isoenzyme :carcinoma of lung, liver or gut. Also, in chronic smokers</b> <b>4-nagao isoenzyme: carcinoma of pleural surfaces and adenocarcinoma of pancreas and bile duct</b> <b>5-bone isoenzyme: Rickets, osteomalacia, hyperparathyroidism and in Paget's disease. Also in primary and secondary cancer</b>		<b>cholastatic disorders, liver cancer and amyloidosis</b>	<b>Hepatic, placental, intestine, regan (resembles placental ALP) and nagao ( a type of regan isoenzyme)m</b>
<b>GGT</b>	<b>biliary ducts of the liver, kidney and pancreas.</b>	<b>infective hepatitis , obstructive jaundice, liver neoplasms, alcohol induced liver disease , and in liver cirrhosis.</b> <b>prostate cancers</b>		<b>Normal: 6-45 U/L in male and 5-30 U/L in female.</b> <b>Increases by some drugs especially alcohol</b>	
<b>5' nucleotidase</b>	<b>in or near the bile canalicular membrane</b>			<b>Moderately ↑ in hepatitis</b> <b>highly elevated in biliary obstruction.</b>	
<b>Acid Phosphatase</b>	<b>semen</b>	<b>bony metastasis of carcinoma prostate,</b>			<b>Used in rape investigations</b>
<b>Aldolase</b>		<b>dermatomyositis, muscular</b>		<b>Normal: 1.5-7 U/L</b>	<b>Highest values in deuchenne</b>

		dystrophies, and deuchenne			
Amylase		Acute pancreatitis, perforated peptic ulcer and intestinal obstruction.	Acute pancreatitis : peak in 24 hours	Normal: 50- 120 U/L Acute pancreatitis: >1000	
Lipase		Mumps, acute pancreatitis, perforated duodenal and peptic ulcers and intestinal obstruction.	Acute pancreatitis: persists for 7-14 days	Normal: 0.2-1.5 U/L. acute pancreatitis: 2800 U/l	
NSE		<i>small cell lung cancer, neuroblastoma, pheochromocytoma, medullary carcinoma of thyroid</i>			
PSA	semen	Prostate neoplasm		Normal: 1 -5 µg/L  Benign tumor: 4-10 µg/L  Cancer: above 10 µg/l	
Cholinesterase	nerve endings and in RBCs.	Decreases in: chronic hepatic dysfunction, pregnancy, organophosphate poisoning.		Normal: 2-12 U/ml	