

# آنزيم شناسي

# Transaminases

- GOT or AST
- GPT or ALT

# AST

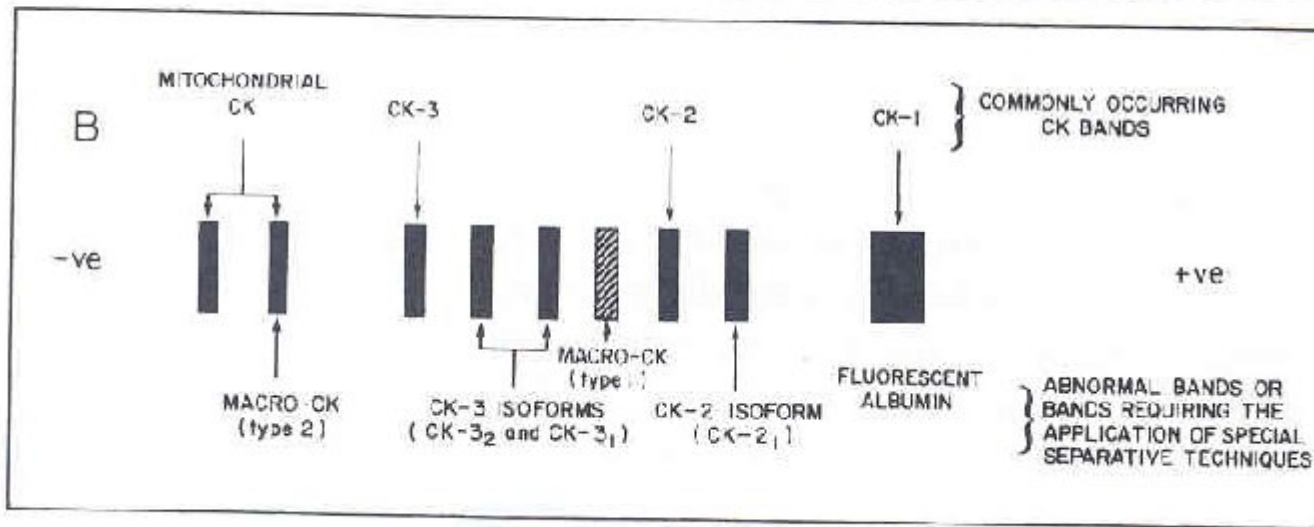
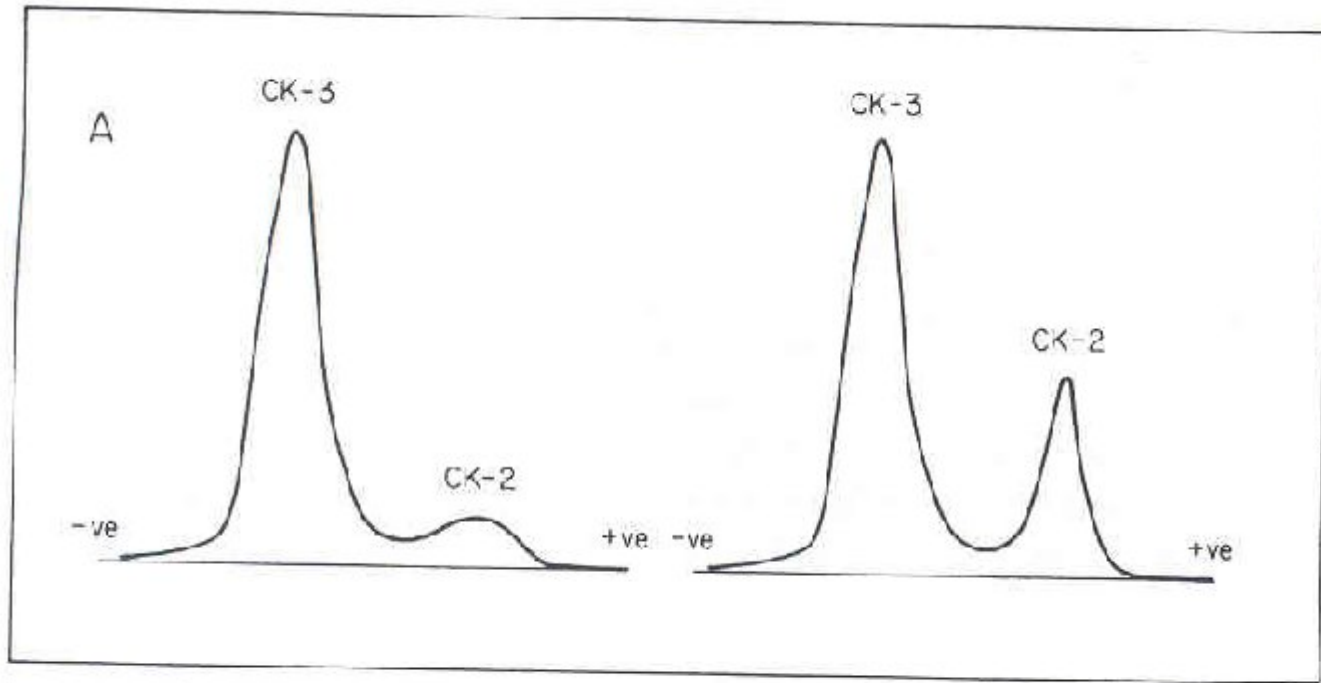
# ALT

Heart	7800	450
Liver	7100	2850
Sk-muscle	5000	300
Kidneys	4500	1200
Pancreas	1400	130
Spleen	700	80
Lungs	500	45
RBC	15	7
serum	1	1



CPK

# CK

	Ck activity	Ck3-MM %	Ck2-MB %	Ck1- BB %
SK- muscle	2500	98.9	1.1	0.06
brain	555	0	2.7	97.3
heart	473	78.7	20	1.3
liver	~ 1	0	0	100



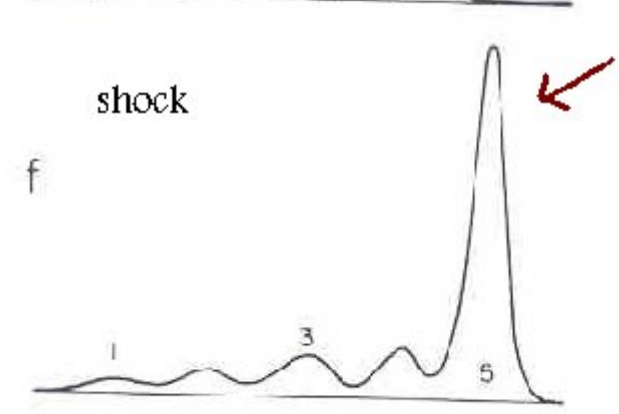
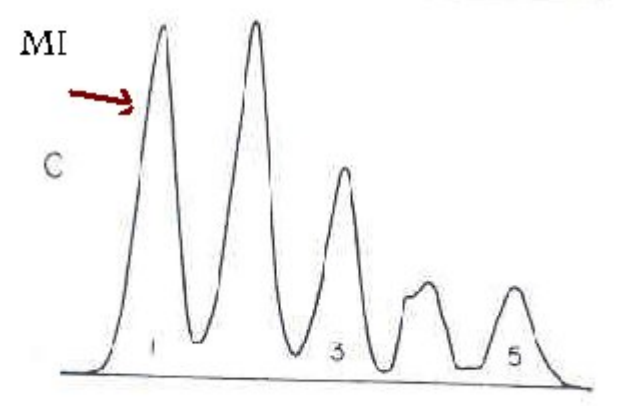
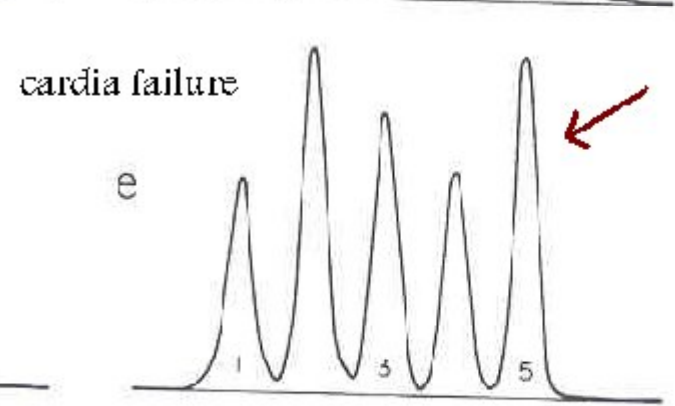
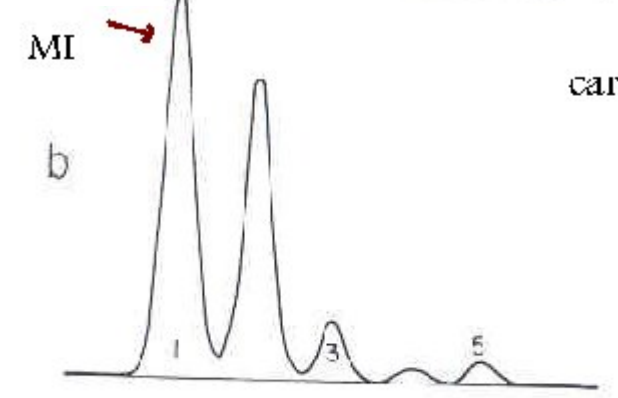
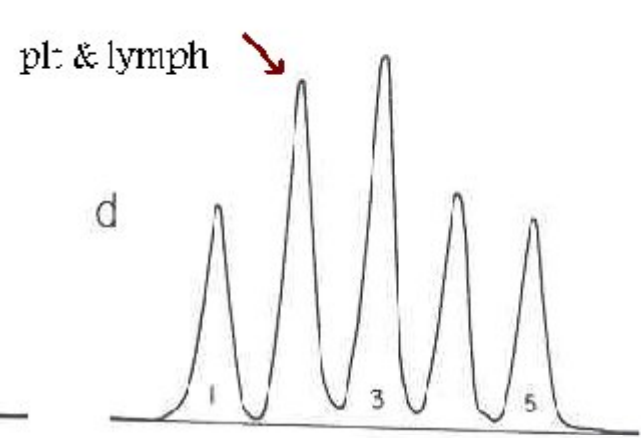
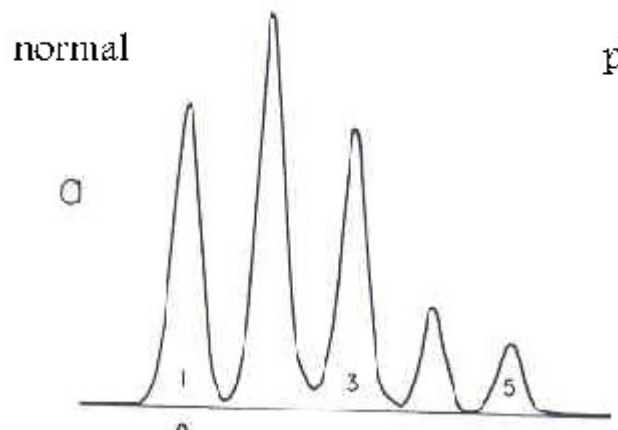
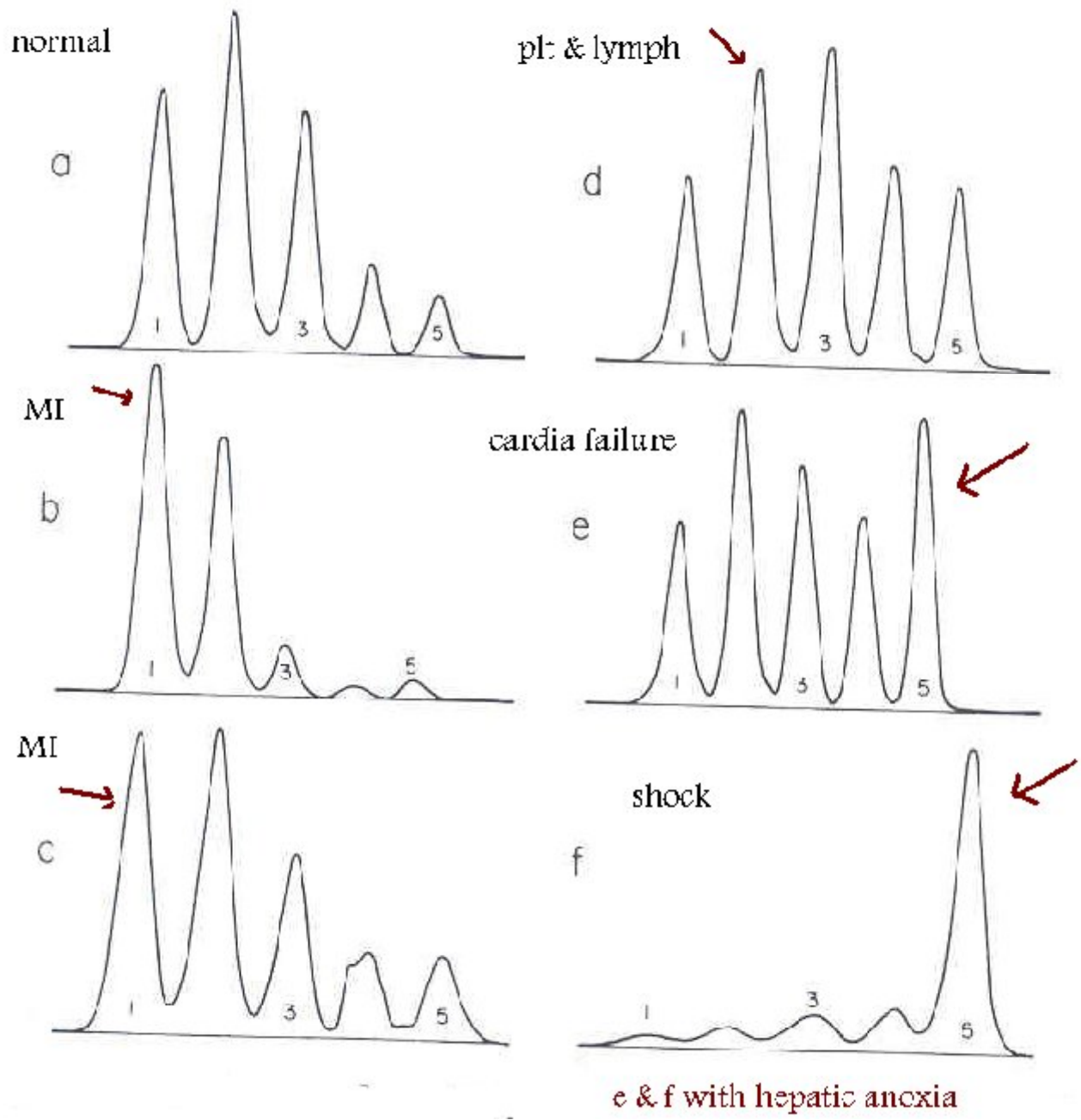
# Aldolase

- ALD A : FDP
- ALD B : F1P
- ALD C : ?
- Disease of Skeletal muscle 10-50 times
- Duchenne disease 
- Myasthenia gravis & MS 
- In MI 5-8 times
- Pattern parallel AST
- Injection of cortisone & ACTH 10-18 times

# LDH

- Hydroxy butyrate dehydrogenase (HBDH)
- HBDH assay= LD1 assay





e & f with hepatic anoxia

# ALP

- Isoenzyme: liver, bone, intestinal, placental, renal

# Gamma-glutamyl transferase (GGT)

- GGT present in all cells except muscle
- Small in cytosol & large fraction in cell membrane
- GGT elevated in all liver disease
- GGT more sensitive than ALP, GOT, GPT in obstructive jaundice
- Normal: skeletal disease, children older than 1 y, pregnancy

# Comparison of GGT, ALP & NTP

	ALP	NTP	GGT
Biliary tract disease	4.0	6.2	11.9
Acute & chronic hepatitis	1.5	1.1	2.3

# Amylase

- Amylase hydrolased  $\alpha$ -1,4 linkage
- Types of amylase:
  - Beta: plant & bacterial. Terminal reducing, splits a maltose at a time
  - Alpha: animal & human. Random hydrolased  $\alpha$ -1,4 linkage

# Human amylase

- MW= 55000 – 60000
- Electrophoresis:  $\beta$  &  $\gamma$  globulins

# Types of human amylase

- P – type & S – Type (ptyalin)
- Macroamylase : usually S-type with IgA, IgG or other normal proteins

# Causes of hyperamylasemia

- Pancreatic disease (P)
- Renal insufficiency (mixed)
- Mumps (s)
- Diabetic ketoacidosis (M)
- Acute alcoholism (M)
- Medicinal opiates (p)
- Heroin lung (s)



# Lipase

- Glycoprotein
- MW = 54000
- Concentration lipase in pancreas ~ 20000  
serum
- alpha position carbons
- Lipase activated by NaCl

# Cholinesterase

- Choline esterase I = true cholinesterase
  - RBC, lung, spleen, nerve endings, gray matter of the brain
- Choline esterase II = pseudocholinesterase
  - Serum, Liver, pancreas, heart, white matter of the brain

# Cholinesterase

- Liver function
- Insecticide poisoning
- Normal range
  - 4000-12000 U/L
  - Level at birth =  $\frac{1}{4}$  adults
  - In 2 month = adults

# Cholinesterase

- 30-50% decrease
  - Acute & chronic hepatitis
- 50-70% decrease
  - Advanced cirrhosis & carcinoma
- Decrease slightly in pregnancy

# Acid phosphatase

- Prostatic isoenzyme