α-amylase

AMYLASES

- *Are group of hydrolases that act on glycosidic bonds*
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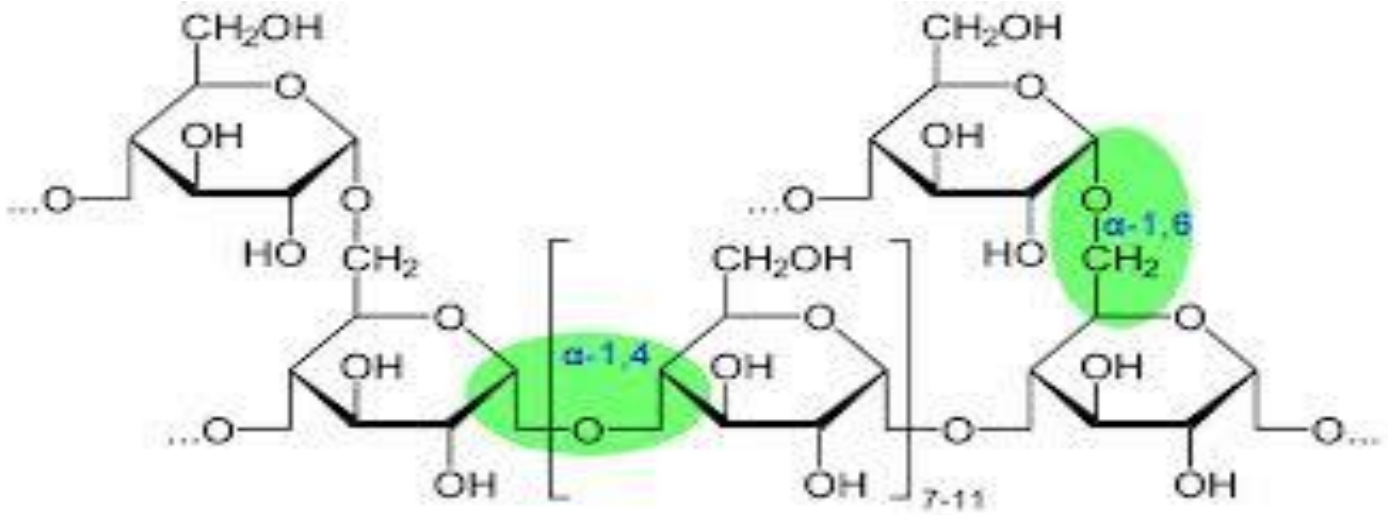

- *can convert or hydrolyze complex carbohydrtes (polysaccharides) such as starch and glycogen into sugars such as maltose or glucose.*

Classification:

- *α-amylase*
- *β-amylase*
- *γ-amylase*

α-amylase

- *Found in humans.*
- *Called calcium metalloenzyme (completely unable to function in absence of calcium).*
- *Acting at random location along the polysaccharide chain hydrolyzing α-١,٤- glycosidic bond anywhere on the substrate.*
- *They are activated by chloride and bromide.*
- *Optimum temp. = ٣٧*
- *Optimum PH = ٥.٦ - ٦.٩*

α-amylase

- *In human there are two types of α-amylase*
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P-type
Pancreatic amylase

- *Secreted by pancrease and through pancreatic duct it passesss into intestine*

S-type
Salivary amylase

- *Secreted by salivary gland in the mouth*

Clinical significance

Increased plasma levels of α-amylase

- *Salivary gland diseases (inflammation &trauma)*
- *Pancreatities*
- *Cancer of pancreas*
- *Renal failure (due to reducd excretion)*

Hypoamylesemia

- Hypoamylesemia is due to any damage in specific cells which synthesized amylase.

In acute pancreatitis

- serum amylase activity increased within ٢ to ١٢ hours of the onset of the disease.
- Peak in first ٤٨hr.
- Remain elevated ٣-٥ days before return to baseline.

In chronic pancreatitis

- both the serum and urine amylase activity is found to be subnormal.

Macroamylasemia

- *Is a case in which blood amylase levels Increased with normal or low urine amylase levels.*
- *This indicate the presence of macroamylase.*

MACROAMYLASE

- *Complex of α-amylase and other plasma proteins like IgG , IgA and other molecules*
- *So amylase size become larger than normal and can not filtered through gomerulus so increased in blood and decreased in urine.*

PRINCIPLE

- **CNP-GALG٢ ⟶ glucose polymers+ p-nitrophenyl oligosaccharide**

٢-chloro-٤-nitrophenyl
-١-galactopyranosyl
maltoside

↓

CNP

PROCEDURE

	Blank	Test
Reagent	١ ml	١ ml
Disstilled water	٢٥ µ	--------
sample	--------	٢٥ µ

- Mix and incubate for ١ min. at ٣٧ .
- Record initial absorbance and at ١ min intervals thereafter for ٣ min against reagent blank at ٤٠٥ nm.
- Calculate the difference between consecutive absorbances and the average absorbance difference per min

Calculation

- Alpha amylase concentration (U/L)= ΔA x ٣٠٦٠

Normal range

- *Normal value of alpha amylase in serum or plasma up to ١٠٠ U/L*

Clinical enzymology

- ALT = GPT

liver disease

- AST = GOT

heart and liver

- GGT

hepatobiliary disease

- Amylase

pancreatitis

- ALP

hepatobiliary disease

bone disease

- LDH

Liver disease

Heart disease

Tumor

- CK: heart disease

- **Case: ١**

GPT ↑ & GOT ↑ & LDH ↑ & CK –

- ∴ **Liver disease (fatty liver, hepatitis, alcoholic liver) or hepatotoxicity or liver cancer**

Case ٢

GPT ↑ & GOT ↑ & LDH ↑& ALP (-)

- ∴ **Liver disease (fatty liver, hepatitis, alcoholic liver) or hepatotoxicity or liver cancer**

Case :٣

GPT ↑ & GOT ↑ & GGT(-)

- liver disease

- Case:٤
- GPT ↑ & GOT ↑ & GGT↑
- hepatobiliary disease

- **Case:٥**
  - **GPT ↑ & GOT ↑ & ALP ↑**
    - ∴ **hepatobiliary disease**

- **Case:٦**

GPT (-) & GOT (-) & ALP (-)

- ∴ **Normal person**

- Case:∨
- GPT - & GOT - & ALP ↑& GGT (-)

∴ bone disease

(tumor marker so bone tumor)

- Case:∧

GPT - & GOT ↑ & CK↑

∴ muscle disease

Case:٩

GPT - & GOT ↑ & CK↑ , CK-MB↑

∴ Myocardial infarction (MI)

Case:١٠

GPT - & GOT - & LDH ↑

- ∴ Tumor (malignant disease)

- **Case:١١**

GPT (-) & GOT (↑) & LDH ↑ & CK (↑)

∴ Tumor in muscle

- **Case:١٢**
- **GPT - & GOT- & Ca ↓& P ↓&AlP↑**

If pregnant women

∴ Normal case

- **Case :١٣**

GPT (-) & GOT (-) & LDH ↑ AlP (↑) &GGT (-)

∴ **Bone cancer**

- **Case:١٤**

GPT- & GOT- & Serum Amylase ↑, urinary amylase ↑

∴ Acute **Pancreatitis**

- **case ١٥:**

Serum Amylase, urinary amylase with low conc.

Chronic pancreatitis

Case ١٦:

GPT- & GOT- & , urinary amylase ↓, Serum amylase ↑, IgA↑ , IgG↑

macroamylesemia