Estimation of CK activity

Presented By

Assist.Lecturer

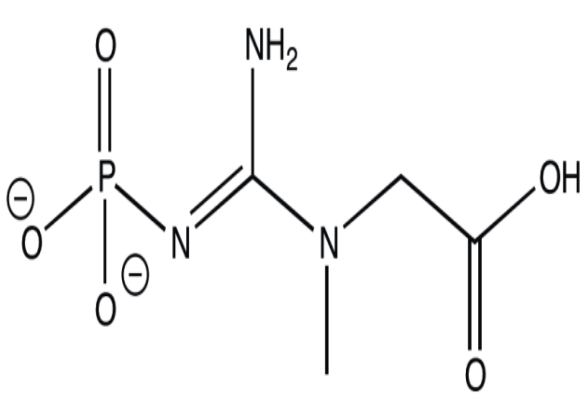
Aseel Ghassan Daoud

M.Sc. in Pharmacy/Clinical Laboratory Sciences

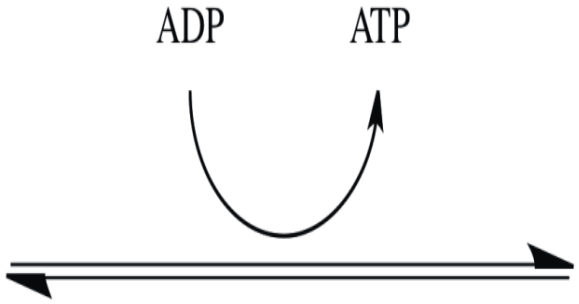
What is CK or CPK?

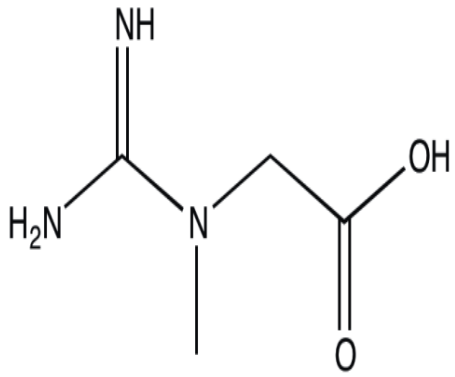
- **Creatine kinase (CK) or creatine phosphokinase (CPK) is an enzyme that present in various tissues and cells.**
- **It catalyses the conversion of creatine to phosphocreatine using ATP**
- **Its reaction is reversible**

Creatine phosphokinase enzyme reaction



Phosphocreatine





Creatine

What are tissues that consume ATP?

- **Skeletal muscles**
- **Brain**
- **Photoreceptor cells of the retina**
- **Hair cells of the inner ear**
- **Spermatozoa**
- **Smooth muscles**

What is the function of phosphocreatine?

- **Phosphocreatine serves as energy reservoir for the rapid buffering and regeneration of ATP and for intracellular energy transport by phosphocreatine**

Why creatine kinase blood test is done?

- **It is measured as a marker of:**

➢ **MI (heart attack)**

➢ **Rhabdomyolysis**

- **Muscular dystrophy**
- **Autoimmune myositis**
- **Acute renal failure**

What are CK isoenzymes?

- **Cytosolic CK enzymes consist of two subunits: B (brain type) and M (muscle type) therefore 3 isoenzymes:**

- **CK-MM**
- **CK-BB**
- **CK-MB**

- **CK-MM is expressed in skeletal and cardiac muscle**
- **CK-MB is expressed in cardiac muscle**
- **CK-BB is expressed in smooth muscle and most non-muscle tissues therefore have no significance in bloodstream**
- **Skeletal muscle expresses 98% CK-MM and 1% CK-MB**
- **The myocardium expresses 70% CK-MM and 25-30% CK-MB**

Laboratory test:

- **Ck is measured in :**

➢ **emergency patients**

➢ **Patients with chest pain**

➢ **Acute renal failure**

Normal values:

➢ **Men: at 30 C° (25-115 IU/L) at 37 C°(38-174 IU/L)**

➢ **Women: at 30 C (17-92 IU/L) at 37 C° (26-140 IU/L)**

- **One unit is the amount of enzyme that catalyzes 1 µmol of substrate per minute under specified conditions (temperature, pH, substrate concentration and activators)**

What are causes of high CK activity?

- **Artefactual:** **due to in vitro hemolysis**
- **Physiological:** **neonatal period, during parturition**
- **Marked increase:**

➢ **Shock and circulatory failure**

➢ **MI**

➢ **Muscle dystrophy and rhabdomyolysis**

- **Moderate increase:**

➢ **Muscle injury**

➢ **After surgery**

➢ **Physical exertion**

➢ **After IM injection**

➢ **Hypothyroidism**

➢ **Alcoholism**

➢ **CVA and head injury**

➢ **Malignant hyperpyrexia**

- **CK does not usually rise in neurogenic muscle diseases : poliomyelitis, myasthenia gravis, multiple sclerosis and parkinson**

Causes of low CK activity:

- **Alcoholic liver disease**
- **Rheumatoid arthritis**

➢ **CK isoenzymes are used for myocardial damage in heart attacks besides troponin**


Thank
you!