Creatine Kinase

General:

Creatine kinase (CK), also known as creatine phosphokinase (CPK) or phospho-creatine kinase, is an enzyme expressed by various tissues and cell types. CK catalyzes the conversion of creatine and consumes adenosine triphosphate (ATP) to create phosphocreatine and adenosine diphosphate (ADP). This CK enzyme reaction is reversible, ATP can also be generated from PCr and ADP.

In tissues and cells consuming ATP rapidly, especially skeletal muscle but also brain, photoreceptor cells of the retina, hair cells of the inner ear, spermatozoa and smooth muscle, phosphocreatine is used as an energy reservoir for the rapid buffering and regeneration of ATP in situ, as well as for intracellular energy transport by the phosphocreatine shuttle or circuit. Thus creatine kinase is an important enzyme in such tissues.

Clinically, creatine kinase is assayed in blood tests as a marker of myocardial infarction (heart attack), rhabdomyolysis (severe muscle breakdown), muscular dystrophy and in acute renal failure.

Drugs that can increase CK measurements: amphotericin B, ampicillin, anesthetics, anticoagulants, aspirin, clofibrate, dexamethasone, furosemide, morphine, alcohol, cocaine.

Indication:	Suspicion of heart attack, rhabdomyolysis, skeletal muscle diseases and monitoring their progression, screening for muscle dystrophy in newborns and infants, conductor search in muscle dystrophy of type Duchenne.
Material:	1 ml serum
Stability:	7 days at 2 to 8°C
TAT:	same day, FML
Method:	enzymatic
Units:	U/l
Ref.- range:	see report

- **CK-MB Mass**

General:

The CK-MB test is a cardiac marker and measures the CK-M and CK-B forms of phosphocreatine kinase. In some locations, the test has been superseded by the troponin test. Increased CK-MB can usually be detected in heart attack patients about 3-4 hours after onset of chest pain. The concentration of CK-MB peaks in 18-24 hours and then returns to normal within 72 hours.

If the value of CK-MB is elevated and the ratio of CK–MB to total CK (relative index) is more than 2.5–3 (> 6%), it is likely that the heart was damaged. A high CK with a relative index below this value suggests that skeletal muscles were damaged.

Material:	1 ml serum
TAT:	same day, FML
Stability:	8 hours at 2-8°C
Method:	ECL
Units:	ng/ml
Ref.- range:	<5.0

CREATINE KINASE ISOENZYMES

General:

CK isoenzyme tests are performed if the total CK level is elevated. Isoenzyme testing can help to differentiate the source of the damaged tissue. CK is an enzyme found predominantly in heart, brain, and skeletal muscle. CK is composed of 3 isoenzymes that differ slightly in structure. CKBB: is concentrated in the brain and lungs, CK-MB: is found mostly in the heart, CK-MM is found mostly in skeletal muscle. Damages to either of these organs (for example, stroke or lung injury due to a pulmonary embolism) are associated with elevated levels of this isoenzyme.

The following tests are available:

- **CK-MB (Isoenzyme)**

General:

The isoenzyme MB (muscle-brain) of creatine kinase is relatively cardiac muscle specific.

CK-MB levels rise 3-6 hours after a heart attack. If there is no further damage to the heart muscle,

the peak level is found 12-24 hours and returns to normal 12-48 hours after cell death. CK-MB levels do not usually rise with chest pain caused by angina, pulmonary embolism (blood clot in the lung), or congestive heart failure.

Indication:	Suspicion of myocardial infarct
Material:	1 ml serum
TAT:	CK-MB isolated as marker for myocardial infection is done at FML, same day. Together with the other CK isoenzymes: 5-7 days, Germany
Method:	Gel electrophoresis
Units:	%
Ref.- range:	<3.0
Note:	The determination of troponin in serum is recommended for all cases suspicious of heart attack. Follow up values are important!
Comment:	CK-MB increases can be – rarely - triggered by increases of CK-BB or CKMiMi (e.g. in tumors), by macro-CK (immune complex formation with IgG: occurrence in 1% of aged persons, without pathogenic significance); others: myocarditis, electrical injuries, trauma to the heart, defibrillation, open heart surgery;

- **CK-BB (Isoenzyme)**

Material:	1 ml serum
TAT:	5 - 7 days*
Method:	Gel electrophoresis
Units:	%
Ref.- range:	0.0

- **CK-MM (Isoenzyme)**

Material:	1 ml serum
TAT:	5-7 days*
Method:	Gel electrophoresis
Units:	%
Ref.- range:	97 - 100

- **Macro-CK (Isoenzyme)**

General:

Macro-CK are CK-variants with a high molecular mass resulting in falsely high CK-concentration. Macro-CK-type 1 results from a bond between CKBB and specific antibodies, however, Macro-CK is without clinical significance. Macro-CK type 2 is a mitochondrial CK in oligomeric form which is often associated with severe disorders, e.g. tumors, liver-cirrhosis, Lyell's-syndrome.

Material:	1 ml serum
TAT:	5-7 days*
Method:	Gel Electrophoresis
Units:	%
Ref.- range:	0.0

For complete list of laboratory test offered at Freiburg Medical Laboratory, please visit http://www.fml-dubai.com/parameter-listings/