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ST VINCENT'S PATHOLOGY

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CREATINE KINASE (CK) INFORMATION SHEET

PHYSIOLOGY

Creatine Kinase (CK) is an enzyme found in myocytes which catalyses the transfer of high energy phosphate groups from creatine phosphate to ADP in order to produce ATP. The enzyme is a dimer with two subunits which may be of the M or B type making three common isoforms: CK-MM, CK-MB and CK-BB. The molecular weight is about 50,000 dalton and the Enzyme Commision number is EC 2.7.3.2.

PATHOLOGY

CK is released from muscle cells in response to injury to the cells. Such injury may be of any type such as traumatic, hypoxic or toxic. The enzyme is measured in serum as a marker of muscle damage. Note that measurement of serum aldolase is very rarely required as CK provides a test with high sensitivity and specificity for muscle damage.

CAUSES OF ELEVATED SERUM CK

Any cause of muscle damage, skeletal, cardiac or other.

SKELETAL MUSCLE DAMAGE

Largely CK-MM. Serum cardiac-specific troponin not elevated.

- Trauma (eg MVA, surgery)
- Rhabdomyolysis (may reach very high levels, up to over 100,000 U/L)
- Myositis (Note: CK not elevated in neurogenic myopathy, eg MS)
- Muscular dystrophy
- Hypothyroidism
- Convulsions
- Hyper / hypothermia
- Dermatomyositis
- Injections (up to 2 - 4 x upper limit of normal)
- Drugs: lignocaine, digoxin
- Cardioversion

CARDIAC MUSCLE DAMAGE

5 - 15% CK-MB. Cardiac troponin elevated.

- Acute myocardial infarction
- Myocarditis / pericarditis
- Trauma (cardiac compression, cardiac surgery)
- Multi-organ failure
- Cardiac arrest

OTHER

- Stroke
- Neonates
- Some malignancies (prostate, large bowel)
- Macro-CK (Type 1 - CK-immunoglobulin complex; type 2 - mitochondrial CK)

CREATINE KINASE ELECTROPHORESIS

CK electrophoresis can be used to identify the CK isoenzymes (MM, MB, BB) and well as macro-CK (types 1 and 2). Testing can only be performed on samples with elevated total CK. CK isoenzyme testing may be indicated if the source of an elevated total CK is not apparent.