## Introduction

Creatine Kinase (CK) is found primarily in skeletal and cardiac muscle. It has been superseded by other cardiac markers in the diagnosis of myocardial infarction, but remains a valuable means of assessing neuromuscular disorders and can provide clues to assist in the diagnosis of some non-muscular conditions.

## Causes of an Elevated Creatine Kinase

Reference range (York and Scarborough Hospitals): 40-320 IU/L (males); 25-200 IU/L (females).

| Cause | Explanation |
|---|---|
| **Non-Caucasian ethnicity** | CK values are typically higher in patients of Afro-Caribbean ethnicity and muscular build |
| **Recent exercise** | Serum CK levels may increase to as much as 30 times the upper limit of normal within 24 hours of strenuous physical activity or manual labour. Rises are greatest in untrained individuals |
| **Endocrine Disorders** | Severe hypothyroidism, acromegaly, Cushing's syndrome, hyperparathyroidism, hyperthyroidism (rare). |
| **Electrolyte Imbalance** | Low sodium, potassium or phosphate |
| **Drugs** *(list not exhaustive)* | Statins, fibrates, anti-retrovirals, beta blockers, clozapine, angiotensin II receptor blockers, hydroxychloroquine, isotrentoin, colchicine, MDMA/cocaine/amphetamines, some recent intra-muscular injections. |
| **Muscular disorders** | Inflammatory myopathies, motor neurone disease, sarcoid myopathy, compartment syndrome, congenital or chromosomal syndromes with muscular involvement, muscular dystrophies, metabolic myopathies, Pompe Disease |
| **Autoimmune disease** | SLE, rheumatoid arthritis, polymyalgia rheumatic, coeliac disease, dermatomyositis, polymyositis |
| **Miscellaneous non-muscular causes** | Viral illness, denervation, seizures, malignancy, surgery, pregnancy, thiamine deficiency (alcohol excess), connective tissue disease, cardiac or renal disease, rare forms of CK |

**Symptomatic Patients with suspected myocardial infarction, rhabdomyolysis, grossly elevated CK or acute kidney injury (AKI) should be referred to AMU without delay.**

## Investigation of asymptomatic patients with elevated Creatine Kinase Levels

- Identify any factors in the history which may be contributing to raised CK and avoid if possible (e.g. drugs, recent injection, surgery, exercise or trauma, ethnicity or build)
- Repeat in 1 week to rule out transient elevations and assess trend
- Persistently raised or increasing (change >100 U/L in 1 week): Check UE, TFT and bone profile. Also consider Coeliac Screen and ANA.
- Persistent, unexplained CK >1000 U/L (>5x ULN) OR ongoing elevation in patients with symptoms such as exercise intolerance, or weakness: Refer to rheumatology
- Persistent, unexplained CK <1000 U/L in an asymptomatic patient: phone the Duty Biochemist (01904 726366) to discuss further tests.

*References:*
*Moghadam-Kia S et al (2016) Cleve Clin J Med;83(1):37–42.*
*Kim EJ et al (2021) BMJ;373:n1486*