Overview

Useful For
Diagnosing and monitoring myopathies or other trauma, toxin, or drug-induced muscle injury

Method Name
Photometric, Creatine Phosphate + ADP

NY State Available
Yes

Specimen

Specimen Type
Serum

Necessary Information
Patient’s age and sex are required.

Specimen Required
Container/Tube:
Preferred: Serum gel
Acceptable: Red top
Specimen Volume: 1 mL

Collection Instructions:
1. Serum gel tubes should be centrifuged within 2 hours of collection.
2. Red-top tubes should be centrifuged and aliquoted within 2 hours of collection.

Reject Due To
Gross hemolysis   Reject

Specimen Minimum Volume
0.25 mL

Specimen Stability Information

<table>
<thead>
<tr>
<th>Specimen Type</th>
<th>Temperature</th>
<th>Time</th>
<th>Special Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serum</td>
<td>Refrigerated (preferred)</td>
<td>7 days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Frozen</td>
<td>28 days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ambient</td>
<td></td>
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Clinical & Interpretive
Clinical Information

Creatine kinase (CK) is an enzyme that catalyzes the reversible phosphorylation of creatine (Cr) by adenosine triphosphate (ATP). Physiologically, when muscle contracts, ATP is converted to adenosine diphosphate (ADP), and CK catalyzes the rephosphorylation of ADP to ATP using creatine phosphate as the phosphorylation reservoir. The CK enzyme is a dimer composed of subunits derived from either muscle (M) or brain (B). Three isoenzymes have been identified: striated muscle (MM), heart tissue (MB), and brain (BB). Normal serum CK is predominantly the CK-MM isoenzyme.

CK activity is greatest in striated muscle (MM isoenzyme), heart tissue (MB isoenzyme), and brain (BB isoenzyme). Serum CK concentrations are reflective of muscle mass causing males to have higher concentrations than females. CK may be measured to evaluate myopathy and to monitor patients with rhabdomyolysis for acute kidney injury.

Reference Values

Males
< or =3 months: not established
>3 months: 39-308 U/L
Females
< or =3 months: not established
>3 months: 26-192 U/L

Reference values have not been established for patients that are less than 3 months of age.

Note: Strenuous exercise or intramuscular injections may cause transient elevation of creatine kinase (CK).

Interpretation

Serum creatine kinase (CK) activity may increase in patients with acute cerebrovascular disease or neurosurgical intervention and with cerebral ischemia as well as in nearly all patients when injury, inflammation, or necrosis of skeletal or heart muscle occurs, including:

- All types of muscular dystrophy particularly in progressive muscular dystrophy (particularly Duchenne sex-linked muscular dystrophy).
- Viral myositis, polymyositis, and similar muscle diseases
- Malignant hyperthermia, an inherited life-threatening condition characterized by high fever and brought on by administration of inhalation anesthesia
- Muscle trauma, which causes CK elevations within 12 hours of onset, peaking within 1 to 3 days, and declining 3 to 5 days after cessation of muscle injury
  --- Serum CK activities exceeding 200 times the upper reference limit may be found in acute rhabdomyolysis, putting the patient at great risk for developing acute renal failure.
- When given at pharmacologic doses, some drugs including statins, fibrates, antiretrovirals, and angiotensin II receptor antagonists
- Endocrine myopathy, for which hypothyroidism is a common cause, about 60% of hypothyroid subjects show an average elevation of CK activity 5-fold greater than the upper reference limit
- Normal childbirth causes a 6-fold elevation in maternal serum

For detection of myocardial infarction, changes in serum CK and its heart tissue (MB) isoenzyme have been largely replaced by the more cardiac-specific nonenzymatic markers, cardiac troponin I or T.

Cautions

Exercise, muscle trauma (contact sports, traffic accidents, intramuscular injections, surgery, convulsions, wasp or bee stings, and burns), and drugs such as cholesterol-lowering statins can damage muscle and increase serum creatine kinase (CK) concentrations.
CK concentrations have been found to be relatively higher in black race populations.

Clinical Reference

Performance

Method Description
Creatine kinase (CK) is determined by a coupled enzyme reaction where the rate of NADPH formation is measured photometrically and is directly proportional to the CK activity.(Package insert: Roche CK reagent. Indianapolis, IN, July 2016)

PDF Report
No

Specimen Retention Time
1 week

Performing Laboratory Location
Rochester

Fees & Codes

Test Classification
This test has been cleared, approved, or is exempt by the US Food and Drug Administration and is used per manufacturer's instructions. Performance characteristics were verified by Mayo Clinic in a manner consistent with CLIA requirements.

CPT Code Information
82550