MAYO CLINIC LABORATORIES

Test Definition: CK

Creatine Kinase (CK), Serum

Overview

Useful For

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

Method Name

Photometric

NY State Available

Yes

Specimen

Specimen Type

Serum

Necessary Information

Patient's age and sex are required.

Specimen Required

Collection Container/Tube:

Preferred: Serum gel

Acceptable: Red top

Submission Container/Tube: Plastic vial

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 the serum aliquoted into a plastic vial within 2 hours of collection.

Specimen Minimum Volume

0.25 mL

Reject Due To

Gross hemolysis	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Refrigerated (preferred)	7 days	

	Ambient	48 hours	
	Frozen	28 days	

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 hpothyroidism 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

1. Tietz Clinical Guide to Laboratory Tests. Fourth edition. Edited by Wu AHB. St. Louis, Saunders Elsevier, 2006;306-307
2. Huerta-Alardin AL, Varon J, Marik PE: Bench-to-bedside review: Rhabdomyolysis -- an overview for clinicians. Crit Care 2005 Apr;9(2):158-169
3. Morandi L, Angelini C, Prelle A, et al: High plasma creatine kinase: review of the literature and proposal for a diagnostic algorithm. Neurol Sci 2006 Nov:27(5):303-311

Performance

Method Description

Creatine kinase (CK) is determined by a coupled enzyme reaction where the rate of reduced nicotinamide adenine dinucleotide phosphate (NADPH) formation is measured photometrically and is directly proportional to the CK activity.(Package insert: CK reagent, Roche Diagnostics; 12/2023)

PDF Report

No

Day(s) Performed

Monday through Sunday

Report Available

Same day/1 to 2 days

Specimen Retention Time

1 week

Performing Laboratory Location

Mayo Clinic Laboratories - Rochester Main Campus

Fees & Codes

Fees

- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their account representative. For assistance, contact Customer Service.

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

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
CK	Creatine Kinase (CK), S	2157-6

Result ID	Test Result Name	Result LOINC® Value
CK	Creatine Kinase (CK), S	2157-6