


CLINICAL INQUIRIES

Evidence-based answers from the
Family Physicians Inquiries Network 

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Q / When you suspect ACS, which serologic marker is best?

EVIDENCE-BASED ANSWER

A / MEASUREMENT OF TROPONIN LEVELS provides the most sensitive and accurate serologic information in evaluating a patient with acute coronary syndrome (ACS); troponin elevations are more sensitive than elevations of creatine kinase-MB (CK-MB). Isolated elevation of troponin levels increases the likelihood of myocardial infarction (MI) or death, whereas iso-

lated elevation of CK-MB levels doesn't. (Strength of recommendation [SOR] for all statements: **A**, multiple, large prospective cohort studies.)

Repeated measurement of troponin levels at presentation and then 3 and 6 hours afterward increases the diagnostic sensitivity for acute myocardial infarction (AMI) (SOR: **A**, multiple, small prospective studies).

Evidence summary

Troponin I and T proteins are specific to cardiac myocytes and, unlike CK-MB, aren't elevated by damage to skeletal muscle.

Measuring troponin levels increased the number of patients diagnosed with AMI

A multinational prospective cohort study of patients with suspected ACS (N=10,719) found that measuring troponin levels in addition to CK-MB levels improved the diagnosis of AMI.¹ Investigators used elevation of any biomarker (CK, CK-MB, or troponin I or T) above the upper limit of normal as their diagnostic criterion. They found that measuring troponin increased the number of patients diagnosed with AMI by 10.4% over patients diagnosed using CK and CK-MB levels. Elevated troponin levels were associated with an inpatient mortality rate 1.5 to 3 times higher, regardless of the patient's CK-MB status.

Troponin levels are more sensitive and specific than CK-MB

A prospective cohort study of 718 patients with suspected AMI calculated the area under curve (AUC) of the receiver operator curve—a measure of diagnostic accuracy in which an AUC value of 1 indicates 100% sensitivity and

specificity—for troponin and CK-MB levels at initial presentation.² Two independent cardiologists reviewed all available medical records and made the final diagnosis. The AUCs for troponin levels ranged from 0.94 to 0.96 compared with 0.88 for CK-MB.

Troponin levels and odds of MI or death

A prospective study of 1852 patients with suspected ACS from 3 trial populations evaluated the prognostic value of increased troponin levels vs CK-MB levels at initial presentation, compared with a reference group with normal troponin and CK-MB levels.³ Patients with isolated troponin elevation had an increased odds of MI or death at 24 hours (odds ratio [OR]=5.2; 95% confidence interval [CI], 2.2-11.9) and 30 days (OR=2.1; 95% CI, 1.4-3.0), whereas patients with isolated CK-MB elevations didn't. At 30 days, patients with isolated CK-MB elevations equaled the reference group odds for MI and death (OR=1.0; 95% CI, 0.6-1.6).

Serial troponin assessment boosts diagnostic sensitivity

A prospective cohort study found that serial measurements of troponin increased the diagnostic sensitivity for AMI.⁴ Investigators evaluated 1818 consecutive patients with new-

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onset chest pain in 3 German chest-pain units with troponin levels on admission and at 3 and 6 hours later. The gold standard was diagnosis of AMI by 2 independent cardiologists. Troponin measurement produced an AUC of 0.96 at admission, increasing to 0.98 and 0.99 at 3 and 6 hours after admission, respectively.

Recommendations

The American College of Cardiology and

American Heart Association recommend measuring biomarkers of cardiac injury in all patients who present with chest discomfort consistent with ACS.⁵ A cardiac-specific troponin is the preferred marker and should be measured in all patients. If troponin is not available, CK-MB is the best alternative. Cardiac biomarkers should be repeated 6 to 9 hours after presentation and, in patients with a high clinical suspicion of AMI, at 12 to 24 hours.^{6,7}

JFP

References

1. Goodman SG, Steg PG, Eagle KA, et al; GRACE Investigators. The diagnostic and prognostic impact of the redefinition of acute myocardial infarction: lessons from the global registry of acute coronary events (GRACE). *Am Heart J*. 2006;151:654-660.
2. Reichlin T, Hochholzer W, Bassetti S, et al. Early diagnosis of myocardial infarction with sensitive cardiac troponin assays. *N Engl J Med*. 2009;361:858-867.
3. Rao SV, Ohman EM, Granger CB, et al. Prognostic value of isolated troponin elevation across the spectrum of chest pain syndromes. *Am J Cardiol*. 2003;91:936-940.
4. Keller T, Zeller T, Peetz D, et al. Sensitive troponin I assay in early diagnosis of acute myocardial infarction. *N Engl J Med*. 2009;361:868-877.
5. Anderson JL, Adams CD, Antman EM, et al. American College of Cardiology, American Heart Association Task Force on Practice Guidelines (Writing Committee, American College of Emergency Physicians, Society for Cardiovascular Angiography and Interventions, Society of Thoracic Surgeons, American Association of Cardiovascular and Pulmonary Rehabilitation, Society for Academic Emergency Medicine). ACC/AHA 2007 guidelines for the management of patients with unstable angina/non-ST-elevation myocardial infarction: a report of the American College of Cardiology. *J Am Coll Cardiol*. 2007;50:e1-e157.
6. Morrow DA, Cannon CP, Jesse RL, et al; National Academy of Clinical Biochemistry. National Academy of Clinical Biochemistry Laboratory Medicine practice guidelines: clinical characteristics and utilization of biochemical markers in acute coronary syndromes. *Clin Chem*. 2007;53:552-574.
7. Thygesen K, Alpert JS, White HD, et al. Universal definition of myocardial infarction. *Circulation*. 2007;116:2634-2653.



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