

LAB TESTS IMPROVE DIAGNOSIS OF HEART ATTACK

Patients go to the emergency room more than 6 million times each year because of chest pain. But because heart attack can be difficult to diagnose—

- ✓ ...roughly 2-10% of patients who are actually experiencing a heart attack are sent home.
- ✓ ...some \$12 billion is spent every year on inappropriately hospitalizing patients who are not actually experiencing a heart attack.
- ✓ ...the costs of cardiac lab tests are miniscule compared to the total costs of misdiagnosis.

Studies show that cardiac lab tests help physicians diagnose heart attack accurately and promptly. Accurate diagnosis means more appropriate care, earlier discharge for patients who are at no risk, and cost-savings. The following table summarizes several studies.

	Tests used in study	Results for patient	Cost Savings	
			Length of stay reduced...	Total costs reduced...
	More frequent use of CK, CK-MB, myoglobin, and troponin tests ¹	Better accuracy, faster diagnosis	33%	29%
	CK-MB tests ²	More accurate diagnosis	44%	
	More frequent CK-MB tests for complicated cases ³	Earlier discharge from hospital	8.3%	"The potential impact is tremendous when the difference [in LOS] is multiplied by the millions of cardiac patients seen in the US each year."
	Troponin ⁴	More accurate diagnosis	2 days	
	Troponin ⁵	Earlier discharge	<ul style="list-style-type: none"> ✓ 8.5% increase in number of patients who did not have a heart attack discharged the day after admission ✓ 50% increase in number of patients diagnosed with confirmed heart attack 	Earlier discharge for patients=107 saved hospital bed days
	Troponin ⁶	Diagnoses concluded no heart attack or low-risk		Lower drug, lab, hospitalization costs

Sources:

1. Caragher, TE, et.al., "Long-Term Experience With an Accelerated Protocol for Diagnosis of Chest Pain," *Archives of Pathology and Laboratory Medicine*, Vol. 124, October, 2000, 1434-1439.
2. Bholasingh, R, et.al., "Safe Discharge from the Cardiac Emergency Room with a Rapid Rule-out Myocardial Infarction Protocol Using Serial CK-MB Mass," *Heart*, Vol 85, 143-148, 2001.
3. Wu, AH, et.al., "Impact of CK-MB Testing Policies on Hospital Length of Stay and Laboratory Costs for Patients with Myocardial Infarction or Chest Pain," *Clinical Chemistry*, Vol 43, No. 2, 326-332, 1997.
4. Cavanagh, N, "The Effect of a Change from Conventional Cardiac Enzymes to Troponin I on Overall Hospital Costs in Patients with Suspected Myocardial Infarction," *Irish Medical Journal*, Vol. 95, No. 1, 16-17, 2002.
5. Jishi, F, et.al., "Troponin I, Laboratory Issues, and Clinical Outcomes in a District General Hospital: Crossover study with 'Traditional' Markers of Myocardial Infarction in a Total of 1990 Patients," *Journal of Clinical Pathology*, Vol. 57, 1027-1032, 2004.
6. Scullin, C, et.al., "Cost Implications of the Use of Troponin I [cTnI] Measurement to Diagnose Heart Conditions," *The International Journal of Pharmacy Practice*, R-68, September, 2001.

CREATINE KINASE (CK)

- ✓ *CK is an enzyme released by dying cells in the heart, brain, or skeletal muscle.*
- ✓ *Increased CK often indicates the severity of damage to the heart.*
- ✓ *CK levels begin to rise within the first 4 to 6 hours after heart attack symptoms begin and reach their highest level after about 18 to 24 hours.*
- ✓ *Test results may distinguish a heart attack from unstable angina and other chest pain inducers.*
- ✓ *CK levels can also be used to tell whether heart attack treatments such as clot-busting drugs are working.*

MYOGLOBIN

- ✓ *Myoglobin is a protein in heart and skeletal muscles that is released into the bloodstream when the muscle is damaged.*
- ✓ *A high level of myoglobin, or an increase in the level between the first and subsequent tests, indicates injury.*
- ✓ *Myoglobin levels are generally checked every two to three hours.*
- ✓ *May be used in addition to Troponin test to help rule out a heart attack.*

Sources:

- Bholasingh, R, et al., "Safe Discharge from the Cardiac Emergency Room with a Rapid Rule-Out Myocardial Infarction Protocol Using Serial CK-MB Mass," *Heart*, 2001, Volume 85, Number 2, 143-148.
- Bianco, C, "How Heart Disease Works," at <http://health.howstuffworks.com/heart-attack2.htm>.
- Caragher, T, et al., "Long-Term Experience with an Accelerated Protocol for Diagnosis of Chest Pain," *Archives of Pathology and Laboratory Medicine*, Volume 124, October, 2000.
- Cavanagh, N, et al., "The Effect of a Change from Conventional Cardiac Enzymes to Troponin I on Overall Hospital Costs in Patients with Suspected Myocardial Infarction," *Irish Medical Journal* Volume 95, Number 1, 2002.
- Elsaesser, Albrecht, et al., "Acute Coronary Syndrome: The Risk of Being Female," *Circulation*, 2004; Volume 109: 565-567, February 10, 2004.
- Graff, LG, et al., "Delay in the Diagnosis of Acute Myocardial Infarction: Effect on Quality of Care and Its Assessment," *Academic Emergency Medicine*, Volume 13, Number 9, September, 2006, 931-937.
- Jaffe, A, "Troponins, Creatine Kinase, and CK Isoforms as Biomarkers of Cardiac Injury," Up To Date, Rose, BD(Ed), Up to Date, Waltham, MA, 2007
- Jishi, F, et al., "Troponin I, Laboratory Issues, and Clinical Outcomes in a District General Hospital: Crossover Study with 'Traditional' Markers of Myocardial Infarction in a Total of 1990 Patients," *Journal of Clinical Pathology*, 2004, Volume 57, 1027-2032.
- Kahn, SE, "The Challenge of Evaluating the Patient with Chest Pain," *Archives of Pathology and Laboratory Medicine*, Volume 124, 1418-1419, October, 2000. Lab Tests Online at www.labtestsonline.org
- Roberts, R, "Management of Acute Coronary Syndromes Based on Risk Stratification by Biochemical Markers," *Circulation*, 1998, Volume 98, 1831-1833.
- Schreiber, D, "Use of Cardiac Markers in the Emergency Department," June 26, 2006, E-Medicine from Web, MD, at <http://www.emedicine.com/emerg/topic932.htm>
- Scullin, C, et al., "Cost Implications of the Use of Troponin I (cTnI) Measurements to Diagnose Heart Conditions," *The International Journal of Pharmacy Practice*, R-68, September 2001.
- Wu, AH, et al., "Impact of CK-MB Testing Policies on Hospital Length of Stay and Laboratory Costs for Patients with Myocardial Infarction or Chest-Pain," *Clinical Chemistry*, Volume 43, Number 2, 326-332, 1997.