

For additional information on cardiac biomarker testing, please visit the following websites:

American Association for Clinical Chemistry: <https://www.aacc.org>

American Heart Association: <https://www.heart.org/>

American College of Cardiology: <https://www.acc.org/>

Lab Tests Online: <https://labtestsonline.org/>

## ASCLS Mission:

The mission of ASCLS is to make a positive impact in health care through leadership that will assure excellence in the practice of laboratory medicine.



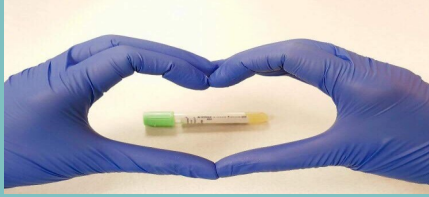
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# Laboratory Patient Safety Tips

## Cardiac Biomarkers For AMI: Diagnostic Information For Providers





When a patient presents with symptoms of Acute Myocardial Infarction (AMI), time is of the essence. Improper use of cardiac biomarker testing and failure to follow suggested guidelines for testing can lead to extended hospital stays, increased cost of medical care, improper diagnosis, and negative patient outcomes.

#### **What cardiac biomarker testing is recommended for diagnosis of AMI?**

Cardiac biomarkers are substances released into the blood when the heart is damaged or stressed. Cardiac biomarker testing is commonly used for diagnosis and risk stratification in patients presenting with symptoms of AMI. Some of the most common signs of AMI include: chest pain that doesn't get better with rest, shortness of breath, sweating, unexplained fatigue, nausea, as well as pain in the shoulder, arms, neck or jaw.

The American College of Cardiology (ACC) and the American Heart Association (AHA) recommend that **Troponin I or T** be utilized as the preferred cardiac biomarker for the diagnosis and prognosis of AMI. Most facilities offer either Troponin I or T testing. There is no clinical difference between Troponin I or T, therefore it is unnecessary to order both tests together.

#### **Why is Troponin the recommended test for diagnosis of AMI?**

Troponin tests are sensitive and specific for cardiac damage. Troponin testing can detect an AMI shortly after onset of symptoms, thereby making it possible to provide a more timely and accurate diagnosis in comparison to other biomarkers. Values can remain elevated for up to 10-14 days after cardiac injury.

#### **What does an elevated Troponin level mean?**

During an AMI, Troponin is released from the cytosolic pool of the myocytes. Troponin levels are normally too low for detection in the blood. If detected it could indicate acute coronary syndrome (ACS) or cardiac ischemia.

#### **At what time intervals should Troponin testing be performed?**

Serial testing of Troponin along with clinical assessment is recommended to differentiate chronic and acute elevations of Troponin. If initial Troponin levels are increased, the testing should be repeated in 3-6 hours if AMI is suspected. If a patient has a normal Troponin result upon initial collection, additional Troponin measurements (3-6 hours) are recommended when clinical presentation or electrocardiographic testing indicate possible AMI.

#### **How are Troponin results interpreted?**

Troponin levels begin to rise within 3-4 hours after cardiac injury. Those levels will peak at approximately 12 hours and can remain elevated for up to two weeks. Each clinical laboratory establishes reference intervals specific to their test methodology and patient population. Patient results will be accompanied by interpretive guidelines and reference intervals. Any "positive" Troponin results should be correlated with clinical and non-laboratory cardiac testing. Serial measurements of Troponin are utilized for diagnosis and prognosis of AMI. Initial Troponin values are used for risk stratification, while detecting a rise and/or fall in values during serial testing are used to confirm diagnosis when one value exceeds the upper reference limit. If you have questions regarding result interpretation, please contact your clinical laboratory.

#### **What is high-sensitivity Troponin testing?**

High-sensitivity Troponin is a new generation of testing that is more sensitive and becomes positive more quickly after a cardiac event. It allows for the detection of Troponin at very low levels and can signal a risk for future cardiac events in individuals with stable angina and those with no symptoms. It is important to note that this test has can be positive in conditions other than AMI.

#### **Can Troponin levels be elevated with any conditions other than AMI?**

Troponin levels can be elevated in conditions other than AMI, including chronic kidney disease, renal failure, heart failure and sepsis. It is important to note that there are several factors that can contribute to high troponin levels, including stress, hypothyroidism, diabetes, stroke, intestinal bleeding, and smoking.

#### **Are there any special patient preparation requirements for Troponin testing?**

No, but you should ask your patient about their family and medical history, as well as any medications or supplements they are currently taking.

#### **Do any substances interfere with Troponin tests?**

Yes. Gross hemolysis of blood samples, heterophile antibodies, and biotin can interfere with and lead to inaccurate results with some testing methodologies. If you have questions about interfering substances, please contact your clinical laboratory for information specific to their methodologies.

#### **Can Troponin results be compared?**

Yes, but only if performed on the same analyzer at a single facility. Troponin I and T results are not interchangeable. Testing performed at different locations and/or on different analyzers (e.g. point-of-care vs. central laboratory; facility-to-facility) are not interchangeable. If a patient is transferred from one facility to another and additional troponin testing is necessary, the original sample should be retested by the central laboratory at the patient's final location.

#### **What other common laboratory tests are used for diagnosis and/or prognosis of myocardial injury?**

- **BNP and NT-proBNP:** Recommended for the diagnosis and prognosis of acute congestive heart failure. It is not diagnostic for AMI but may indicate increased risk for individuals with ACS.
- **Creatine Kinase-MB (CKMB):** Current evidence suggests that this biomarker should not be used for diagnosis of AMI. CKMB may be most useful for the diagnosis of re-infarction after AMI.
- **Myoglobin:** This protein is released in cardiac or other skeletal muscle injury and offers low specificity for AMI.

#### **What laboratory tests are useful in risk assessment for AMI?**

- **Lipid Profile:** High levels of cholesterol and triglycerides can increase a persons risk for atherosclerosis and cardiovascular disease.
- **High Sensitivity C-Reactive Protein (hs-CRP):** This protein is an acute phase reactant that increases with inflammation. In combination with lipid profile testing and other cardiac biomarkers, hs-CRP can be useful in assessing risk for cardiovascular disease.

