ACC Accreditation Services™

GUIDELINES FOR TROPONIN TESTING:

AN EVIDENCE-BASED APPROACH TO DIAGNOSIS AND TREATMENT OF THE ACS PATIENT

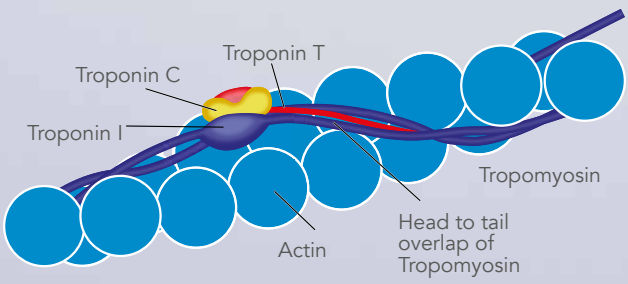
sponsored by Abbott

TROPONIN OVERVIEW

TROPONIN DETECTION IN NORMAL AND DISEASE STATES[1]

The detection of a rise and/or fall of cardiac troponin (cTn) plays a key role in the earlier diagnosis of myocardial infarction (MI). Cardiac troponins are markers of myocardial necrosis, and, because of their high cardiac-specificity, are the preferred biomarker for the diagnosis of MI. Troponin is a protein complex of three subunits (T, I, and C) involved in the contractile process of skeletal and cardiac muscle. Troponin T and I are expressed almost exclusively in the heart.[2] When cardiac injury occurs (from ischemia or various other causes), cardiomyocytes release cardiac troponin into the blood in proportion to the degree of damage.[1] Blood from healthy individuals with no evidence of cardiac disease also contains very low amounts of cardiac troponin.

Clinically, the most important use of troponin testing is to identify patients suspected of having an Acute Coronary Syndrome (ACS). ACS is defined as a spectrum of conditions caused by insufficient supply of oxygen to the myocardium by the coronary arteries. However, elevated cardiac troponin levels are not specific for the diagnosis of ACS or acute spontaneous myocardial infarction (MI) (type 1 MI)[2]. Individuals with non-ACS conditions can also have elevated cardiac troponin. Non-ACS conditions can include non-coronary causes (e.g., sepsis, congestive heart failure, myocarditis, drug toxicity, pulmonary embolism, hypoxia) and coronary causes from ischemic imbalance [i.e. increased demand in the setting of stable coronary artery disease (CAD) lesions] classified as type 2 MI[2]. Many symptoms associated with non-ACS conditions may overlap with symptoms of ACS (e.g., chest pain or dyspnea). This presents a diagnostic challenge to the clinician and often requires an extended evaluation before the clinician can make an accurate diagnosis.



THE 99TH PERCENTILE CUT POINT[1]

Given that troponin can be detected even among presumably healthy adults, guidelines have been set regarding what is considered an "elevated" level.

The European Society of Cardiology/American College of Cardiology/ National Association of Clinical Biochemistry and consensus guidelines define a clinically relevant increase in troponin levels as a level that exceeds the 99th percentile of a normal reference population.[2] However, because using a statistical cut-off means that some "normal" individuals will have an elevated value, and because other clinical conditions can cause an elevation, the interpretation of elevated troponin levels must be accomplished in the context of an intermediate-to-high pre-test probability of suspected ACS. Currently, there is no universally adopted 99th percentile value because there is no reference standard for detecting either Troponin T or I, as each
test manufacturer independently develops its own assays.

No consensus exists on how to define a reference population for the assays (in terms of age, gender, race/ethnicity, comorbidities, or number of participants), and many of the 99th percentile values come from diverse and poorly defined study participants. Current recommendations call for cardiac troponin assays to have a coefficient of variation (CV) less than or equal to 10 percent at the 99th percentile cut point. The Third Universal Definition of MI recommends current assays have a CV between 10 and 20 percent at the 99th percentile. [2]

It is important to understand that a positive troponin does not diagnose myocardial ischemia/infarction. A positive troponin risk stratifies a patient to an increased likelihood of ischemia or infarction but is not diagnostic. Currently, a positive troponin is defined as an elevation of troponin above the 99th percentile of normal (2012 Third Universal Definition of MI) [2, 7]

ACCREDITATION REQUIREMENTS

Relative to Troponin:

The American College of Cardiology (ACC) has developed an accreditation tool, a strategic planning document outlining processes for assessment of all ACS conditions. Iterations of the Chest Pain Center (CPC) Accreditation program, previously sequenced as "cycles," are now termed "versions" in an effort to provide updates in a timelier manner versus every three years. Each new version incorporates expectations from previous versions.

There is emphasis on annual reinforcement of education along with the requirement to provide metrics to validate ongoing performance improvement.

In the laboratory community, the term "Accreditation" beyond hospital accreditation is well known. The benefits of accreditation lead to standardized inter-facility processes, requiring accountability with the goal of breaking down silos and improving communication.

ACCREDITATION SUPPORTS IMPROVEMENTS IN MULTIPLE AREAS TO INCLUDE:

- Defined pathways for prompt identification and recognition of signs and symptoms for Acute Coronary Syndrome patients, specifically those with acute myocardial infarctions
- Consistent approach to risk stratification which leads to standardization of care
- Improved performance on quality indicators
- Improved overall care across the acute coronary care continuum

ACC ACCREDITATION DRIVES:

- Evidenced-based processes
- Improved quality outcomes
- Greater cost efficiency
- Improved patient satisfaction

Updates to the "Third Universal Definition of Myocardial Infarction" released in August 2012 [2] are extremely important as this is the first worldwide expert consensus document endorsed by the European Society of Cardiology (ESC), the American College of Cardiology Foundation (ACCF), the American Heart Association (AHA), and the World Heart Federation (WHF). This has now been adopted by the World Health Organization (WHO). Many of these recommendations have been endorsed by the National Academy of Clinical Biochemistry - Laboratory Medicine Practice Guidelines.

2012 THIRD UNIVERSAL DEFINITION OF MYOCARDIAL INFARCTION (MI) [2]

- TROPONIN (I or T) – is the preferred biomarker overall and the only biomarker assessed for accreditation purposes.
- Detection of a rise and/or fall of cardiac biomarker values [Troponin (cTnI)] with at least one value above the 99th percentile upper reference limit
- The 99th percentile, which is designated as the decision level for the diagnosis of MI
- Assays with CV >20% at the 99th percentile upper reference limit should not be used.
- Blood samples for the measurement of cTn should be drawn on first assessment or arrival, and repeated 3 to 6 hours later
- Updated definitions are provided for five different types of MI to include post-PCI and research
- Use of outdated markers such as CK-MB and Myoglobin should no longer be used

2014 AHA/ACC GUIDELINES FOR THE MANAGEMENT OF PATIENTS WITH NON–ST-ELEVATION ACUTE CORONARY SYNDROMES: [3, 4]

- Class I: Cardiac-specific troponin (Troponin I or T when a contemporary assay is used) levels should be measured at presentation and 3 to 6 hours after symptom onset in all patients who present with symptoms consistent with ACS to identify a rising and or falling pattern. (Level of Evidence: A)
- Class I: Additional troponin levels should be obtained beyond six hours after symptom onset in patients with normal troponins on serial examination when electrocardiographic changes and/or clinical presentation confer an intermediate or high index of suspicion for ACS. (Level of Evidence: A)
- Class I: If the time of symptom onset is ambiguous, the time of presentation should be considered the time of onset for assessing troponin values. (Level of Evidence: A)
- Class III: No Benefit - With contemporary troponin assays, creatinine kinase myocardial isoenzyme (CK-MB) and myoglobin are not useful for diagnosis of ACS. (Level of Evidence: A)

TROPONIN TURN-AROUND-TIME (TAT) DATA SUBMISSION REQUIREMENTS

In accordance with the current requirements of ACC's Chest Pain Center Accreditation, facilities must demonstrate troponin TAT data collection.

While measuring TAT has been a guideline-driven recommendation for years, no organizations were requiring accountability nor were there any requirements for the laboratory to share TAT information with other departments such as ED and Cardiology. One of the major differences is that ACC assesses patient-level data for various indicators, as well as risk stratification and serial testing protocols, along with TAT for troponin. The assessment will be for the continuum of time from "arrival-to-result".

Facilities must establish protocols to assess the entire continuum of care where troponin TAT is concerned and include goals and percentage yields. These laboratory-specific assessments were added to the ACC Accreditation tool to ensure that communication and evaluation take place.

POCT & CENTRAL LAB REQUIREMENTS

For both Point-of Care Testing (POCT) and Central Lab the following information will be required for troponin: [6]

- Troponin assay type
- Manufacturer
- Analyzer
- Troponin 99th percentile
- Troponin Coefficient of Variation at 99th percentile
- Serial troponin strategy: ensuring documented protocols/policies are standardized

Measured through the Chest Pain Center Accreditation Conformance Database (ACD), as well as validated by hospital metrics:

- Metrics of trends for troponin TAT - arrival to result for ACS patients beyond STEMI
- Assessment of percent compliance TAT arrival to result in 60 minutes

Additional requirements:

- Participation requirement by Lab personnel in Chest Pain Center meetings with a compliance standard of 50% participation in CPC (or appropriate) committee meetings
- Definition requirements of baseline timing for serial strategy through defined protocols and policies
- Educational requirements for nursing staff whose focus is on the ACS patient (STEMI/NSTE-ACS/ LOW-RISK) includes annual education on cardiac biomarkers (CBM)
- Lab should be engaged in working collaboratively in developing CBM educational presentations. Facilities are encouraged to utilize the current guidelines and include specific information relative to hospital compliance to the guidelines

The creation of the items in the Accreditation Tool concerning CBM is based on the most current National Academy of Clinical Biochemistry (NACB) and the Laboratory Medicine Practice Guidelines (LMPG) recommendations, as well as the ACC/AHA guidelines.[4] Committees formed to create the tool criteria for this section were comprised of key thought leaders in the area of laboratory diagnostics.

SERIAL STRATEGIES FOR TROPONIN TESTING

The Accreditation requirements are designed to ensure standardization in patient care. The goal is to work toward consistency and an agreed-upon serial strategy for all patients. This standard was implemented to reduce variability where one clinician would order an accelerated protocol (say 0-3-6 or 0-2-4) versus another clinician deciding to use a more delayed protocol which could potentially increase the length-of-stay or delay diagnosis. If a physician wanted to exert his/her clinical decision-making power, he/she can. All patients should benefit through standardization. Facilities should strive for consistency and agreed-upon strategies.

A facility can choose any serial strategy except a serial strategy with time between serial troponin of greater than six hours. The current guidelines allow for more accelerated diagnostic protocols, for example, 0-3-6.

For CPC Accreditation requirements, as well as future requirements, ACC will continue to recommend that facility protocols established for serial marker testing be consistent with the assay used and adhere to standardized documented protocols and policies for risk stratification and serial testing.

ACC POSITION STATEMENT: LABORATORY TESTING [6]

- ACC does not promote or endorse lab-based testing or point-of-care testing; rather ACC's Chest Pain Center Accreditation focuses on processes and protocols for the identification and management of the Myocardial Infarction (MI) and Acute Coronary Syndrome (ACS) care.
- ACC provides guidance and education with the disclaimer that each facility is responsible for determining vendor partnerships that best align with their hospital-specific processes, protocols, and goals.
- Each hospital should be well versed in the latest guideline recommendations and
ensure that they have reviewed their protocols for troponin, consistent with the assay being used.
- Hospitals are responsible to ensure all appropriate policies and protocols for correlations, validations, and assay concordance are in place per laboratory regulatory requirements (e.g. CLIA, CAP, TJC, and DNV).

REFERENCES:

1. AHRQ Publication No. 14-EHC030-EF. Rockville, MD: Agency for Healthcare Research and Quality. August 2014.: Executive summary based on the following document: Michos ED, Berger Z, Yeh HC, Suarez-Cuervo C, Wilson LM, Stacy S, Bass EB. Cardiac Troponins Used as Diagnostic and Prognostic Tests in Patients With Kidney Disease. Comparative Effectiveness Review No. 135. (Prepared by the Johns Hopkins University Evidence-based Practice Center under Contract No. 290- 2012-00007-I.)

   www.effectivehealthcare.ahrq.gov/ reports/final.cfm.

2. Third Universal Definition of Myocardial Infarction (MI), Kristian Thygesen, Joseph S. Alpert, Allan S. Jaffe, Maarten L. Simoons, Bernard R. Chaitman and Harvey D. White, Circulation 2012;126:2020-2035 www.scpc.org/resources/PDFs/ThirdUniversalDefinitionofMyocardialInfarction_CIRC2012.pdf

3. Amsterdam EA, Wenger NK, Brindis RG, et al. 2014 AHA/ACC Guideline for the Management of Patients With Non–ST-Elevation Acute Coronary Syndromes: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines.J Am Coll Cardiol. 2014;64(24):e139-e228. doi:10.1016/j.jacc.2014.09.017.

4. 2014 AHA/ACC Guideline for the Management of Patients With Non–ST-Elevation Acute Coronary Syndromes Amsterdam EA, Wenger NK, Brindis RG,Casey DE Jr, Ganiats TG, Holmes DR Jr, Jaffe AS, Jneid H, Kelly RF, Kontos MC, Levine GN, Liebson PR, Mukherjee D,Peterson ED, Sabatine MS, Smalling RW, Zieman SJ. 2014 ACC/AHA guideline for the management of patients with non–ST-elevation acute coronary syndromes: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines.

   Circulation published online September 2014

   www.scpc.org/resources/PDFs/2014AHA-ACCNSTEMIGuidelines.pdf

5. Christenson, RH, ed. American Association for Clinical Chemistry, Inc.: The National Academy of Clinical Biochemistry (NACB) Presents Laboratory Medicine Practice Guidelines (LMPG): Biomarkers of Acute Coronary Syndromes and Heart Failure (References to these guidelines are hereinafter referred to as "NACB/LMPG Guidelines.").

6. ACC Accreditation Services (formerly Society of Cardiovascular Patient Care)

7. http://emlyceum.com/2013/06/04/troponin-testing-answers/

ACC Accreditation Services™

Working together as a TEAM, we strive to eliminate heart disease as the number one cause of death worldwide *Because Every Heart Matters.*™

For more information about ACC Accreditation Services, please visit our website.

accreditation.acc.org

ACC Accreditation Services • 6161 Riverside Drive, Dublin, OH 43017

SCPC Troponin Brochure 045782A 03/16