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Letter to Editor

# High Sensitivity Troponin I. What is the Advantage?

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The rapidity of diagnosis of acute coronary syndrome is improved by high sensitivity (hs) cardiac troponin (cTn) in the emergency department. HscTn assays measure cTn concentrations 5 - 100 fold less than the conventional cTn assays [1]. HscTn values are reported in pg/ml as opposed to ng/ml reported in conventional cTn assays (which converts it to whole numbers instead of decimals at lower range) to avoid confusion of multiple decimal places.

Guidelines recommend using hscTn assays when feasible. The new standard for hscTn is that the test has the ability to detect cTn concentrations with imprecision measured as the coefficient of variation (CV) <10% at or below the 99% percentile of the upper limits of normal in more than 50% of the normal individuals.1 This was rarely achievable in the conventional assays but accepted to be essential with high-sensitivity assays. With conventional cTn assays, the levels are undetectable below the 99 percentile of upper limits of normal and any detectable cTn is considered abnormal. With the use of hsTn assays many normal individuals will have detectable cTn. Currently there are five hscTn assays that meet these criteria [2]. Of these, only Siemens Healthineers, Beckman Coulter and Roche offer hscTn assays that are available for sale in the U.S. There is debate whether the Roche fifth-generation hs-cTnT meets the above criterion for a highly sensitive assay [3].

For the hscTn assays approved in Unites States partial harmonization between fourth and fifth generation assays is present. For a cTnT value of more than 0.1 ng/ml, the number is multiplied by 1000 to obtain a hscTnT valve. For values below 0.1, this does not hold true. The value of 0.01 comports to a hscTnT value of 30 pg/ml. A value of 0.03 comports to a value of 53 pg/ml [4]. Undetectable values (i.e. below the limit of detection of the assay, which is between 3 and 5 ng/L) can safely rule out MI using a single determination in low-risk patients [5]. The US Food and Drug Administration does not allow reporting values below 6 pg/ml, making this strategy difficult to be employed in United States.

Latest guidelines state that serial cTn levels are critical for the diagnosis of acute myocardial infarction (AMI) "The term acute myocardial infarction should be used when there is acute myocardial injury with clinical evidence of acute myocardial ischaemia and with detection of a rise and/or fall of cTn values with at least one value above the 99th percentile URL" [6].

**Rapid rule-out of AMI:** Experts advocated a two-hour approach [4]. The majority of patients can be effectively triaged within 2 hours. Patients who have normal but increasing cTn values that do not meet criteria for AMI at 2 hours need to be monitored longer. A serial hscTnT measurement at 0 and 2 hours to evaluate those patients with possible AMI is being suggested. With hscTnT, the following most often can rule out AMI:

1. Values less than or equal to the sex-specific 99th percentile that we advocate (10 ng/L for women and 15 ng/L for men)
2. The absence of a delta of 4 ng/L or greater when integrated with the ECG, patient's history, and validated risk scores.

**Ruling in AMI:** The authors in the expert analysis [4] proposed a cut-off value of 100 ng/L as diagnostic for acute myocardial injury (ruling in AMI) in the absence of end-stage renal disease and AMI in ischemic patients. If one uses this cut-off in chest-pain patients, it accurately predicts AMI with a positive predictive value of 90% and the specificity > 99% [7].

With the hscTn assays, the frequency of Type 2 AMI (myocardial oxygen supply and/or demand in the coronary circulation) is increased compared to type 1 AMI (atherosclerotic plaque rupture). This is related to increased sensitivity of detection. A rise and/or fall of cTn values on serial testing may or may not be useful in differentiating AMI type 1 from type 2 [8].

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