Does a high baseline high sensitivity cardiac troponin T allow for the early diagnosis of acute myocardial infarction?

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Background: Guidelines suggest that the diagnosis of acute myocardial infarction (MI) is likely when high concentrations of high-sensitivity cardiac troponin (hs-cTn) are present in the initial sample. These concentration thresholds are much higher than the 99th percentile and are said to provide a high positive predictive value (PPV) for acute MI.

Purpose: Evaluate the PPV of recommended baseline hs-cTnT thresholds (>52 and >100 ng/L) for the diagnosis of acute MI from our multi-center United States (US) experience.

Methods: Retrospective, multicenter (n=22), observational biomarker study involving consecutive, adult patients presenting to the emergency department (ED) in whom at least 1 hs-cTnT measurement was obtained within 12 hours of presentation (CV DataMart Biomarker cohort). The primary endpoint was also evaluated in an adjudicated cohort of consecutive patients presenting to the ED with at least 1 hs-cTnT >99th percentile (ACTION cohort). These cases were adjudicated based on the Fourth Universal Definition of MI by trained physicians. The primary efficacy endpoint was the PPV of acute MI (type 1 or 2), type 1 MI and type 2 MI during index hospitalization using baseline hs-cTnT thresholds of >52 ng/L and >100 ng/L.

Results: The CV DataMart Biomarker cohort consisted of 143,709 patients, amongst whom 3,003 (2.1%) were diagnosed with acute MI using ICD codes. In the CV DataMart Biomarker cohort, baseline hs-cTnT concentrations of >52 ng/L and >100 ng/L resulted in PPVs of 12% (95% CI: 11, 12) and 17% (95% CI: 17, 19) for acute MI, respectively. In patients with chest pain and baseline hs-cTnT concentrations >52 ng/L, PPV for acute MI was 17% (95% CI: 15, 18), and in those with hs-cTnT concentrations >100 ng/L, PPV was 22% (95% CI: 19, 25). The adjudicated ACTION cohort consisted of 2,107 patients, amongst whom 155 (7.4%) were diagnosed with acute MI including 64 (41%) with type 1 MI and 91 (59%) with type 2 MI. In the ACTION cohort, baseline hs-cTnT concentrations of >52 ng/L and >100 ng/L resulted in PPVs of 46% (95% CI: 40, 53) and 62% (95% CI: 53, 70) for acute MI, respectively. In patients with chest pain and baseline hs-cTnT concentrations >52 ng/L, PPV was 67% (95% CI: 57, 76) for acute MI, 52% (95% CI: 41, 62) for type 1 MI and 15% (95% CI: 8.4, 24) for type 2 MI. In those with chest pain and baseline hs-cTnT concentrations >100 ng/L, PPV was 77% (95% CI: 65, 87) for acute MI, 64% (95% CI: 51, 75) for type 1 MI and 14% (95% CI 6.4, 24) for type 2 MI (Figure).

Conclusion: Using previously recommended high-risk hs-cTnT thresholds of 52 and 100 ng/L in US patients provides reasonable performance to rule-in acute MI when used in patients with chest pain. When used more broadly across all-comers, the diagnostic performance is poor.