# Tests for biomarker may help determine diagnosis of heart attack within hours

December 27 2011

For patients admitted to an emergency department with chest pain, use of a contemporary or highly sensitive test for levels of troponin I (a protein in muscle tissue) may help rule-out a diagnosis of heart attack, while changes in the measured levels of this biomarker at 3 hours after admission may be useful to confirm a diagnosis of heart attack, according to a study in the December 28 issue of *JAMA*.

One of the most common reasons patients seek care in an emergency department is for acute chest pain. "Early identification of individuals at high and intermediate risk for myocardial ischemia [insufficient blood flow to the heart muscle] is crucial because they benefit the most from early and aggressive treatment. According to international consensus and task force definitions of myocardial infarction [(MI; heart attack], the diagnosis of MI is based mainly on an elevated cardiac troponin level exceeding the 99th percentile and demonstrating an increase or decrease over time," the authors write. Highly sensitive troponin assays have been developed recently that reliably assess troponin levels in more than 50 percent of the general population. "The reliable detection of very low troponin concentrations using these new highly sensitive assays in the acute setting might pose a challenge in everyday clinical practice."

Till Keller, M.D., of the University Heart Center Hamburg, Germany, and colleagues evaluated the diagnostic performance of the newly developed highly sensitive troponin I (hsTnI) assay compared with a contemporary troponin I (cTnI) assay and their serial changes in the diagnosis of heart attack. The study included a total of 1,818 patients

with suspected acute coronary syndrome (condition such as heart attack or angina) who were enrolled at chest pain units in Germany from 2007 to 2008. Twelve biomarkers including hsTnI and cTnI were measured on admission and after 3 and 6 hours.

Of the patients in the study, 413 (22.7 percent) had a final discharge diagnosis of acute MI. For discrimination of acute MI, both hsTnI and cTnI were superior to the other evaluated diagnostic biomarkers. Using the 99th percentile cutoff, hsTnI on admission had a sensitivity of 82.3 percent and negative predictive value (NPV) of 94.7 percent; hsTnI determined after 3 hours had a sensitivity of 98.2 percent with NPV of 99.4 percent. Compared with hsTnI, the cTnI assay (using the 99th percentile as cutoff) had comparable sensitivity and NPV: 79.4 percent sensitivity and 94.0 percent NPV on admission, and 98.2 percent sensitivity and 99.4 percent NPV after 3 hours.

"Combining the 99th percentile cutoff at admission with the serial change in troponin concentration within 3 hours, the positive predictive value (for ruling in AMI) for hsTnI increased from 75.1 percent at admission to 95.8 percent after 3 hours, and for cTnl increased from 80.9 percent at admission to 96.1 percent after 3 hours," the authors write.

"The shortcoming of conventional troponin assays with low sensitivity within the first hours after chest pain onset led to the evaluation of various so-called early biomarkers in the diagnosis of MI. In our study, the diagnostic information of hsTnI was superior to all other evaluated biomarkers alone."

"Use of hsTnI and cTnI assays in patients with suspected MI provides useful diagnostic information," the researchers write. "Determination of hsTnI and cTnI values 3 hours after admission to the emergency department with use of the 99th percentile cutoff provides an NPV

greater than 99 percent, potentially allowing a safe rule-out of MI. Application of the relative change in hsTnI or cTnI concentration within 3 hours after admission in combination with the 99th percentile diagnostic cutoff value on admission improves specificity and may facilitate an accurate early rule-in of MI."

**More information:** *JAMA*. 2011;306[24]:2684-2693.

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