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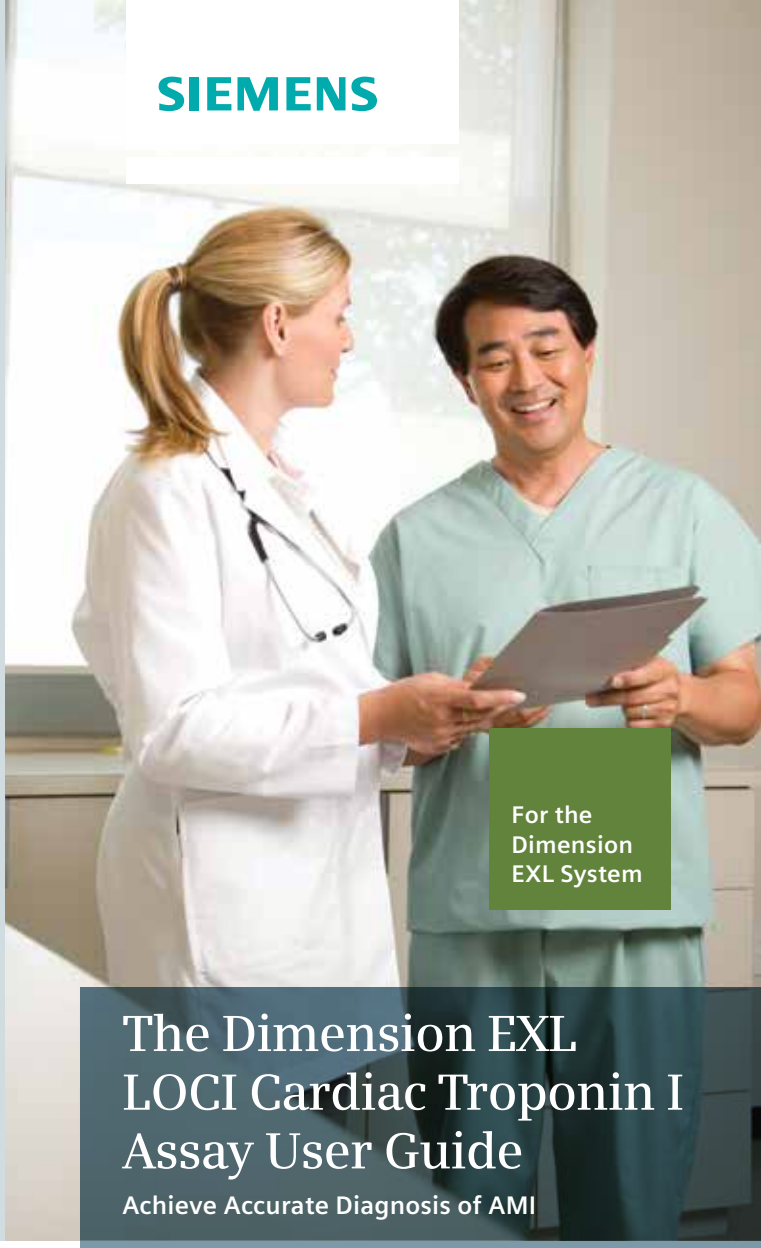

For the Dimension EXL System

The Dimension EXL LOCI Cardiac Troponin I Assay User Guide

Achieve Accurate Diagnosis of AMI

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Answers for life.

Using the Dimension EXL LOCI Cardiac Troponin I Assay for Accurate Diagnosis of AMI

On the basis of sensitivity and myocardial specificity, cardiac troponin (cTnI) is the preferred biomarker for diagnosis of acute myocardial infarction (AMI).[1] Conventional cTnI assays require 4–8 hours for levels to become abnormal, peaking at 12–16 hours and declining over the subsequent 5–9 days.[2,3] Newer, sensitive cTnI assays now allow earlier detection, supporting more rapid triage of chest-pain patients. Use of a sensitive cTnI assay facilitates expeditious detection and assessment of change—important in the differentiation of an AMI related to myocardial ischemia from other causes of myocardial necrosis.

Diagnosis of Acute Myocardial Infarction

- The 99th percentile of a normal population is recommended by the NACB/IFCC as the value above which a troponin level is considered elevated.
- Assays for cardiac biomarkers should strive for a total imprecision (%CV) of ≤10% at the 99th percentile of the reference population.[4,5]

On the basis of imprecision and other performance characteristics, the Dimension® EXL™ LOCI® Cardiac Troponin I assay is a sensitive assay for troponin I.[6]

- A third universal definition of myocardial infarction was published in 2012 by the joint European Society of Cardiology/American College of Cardiology Foundation/American Heart Association/ World Heart Federation (ESC/ACCF/AHA/WHF) that integrates new knowledge and takes into account that a very small degree of myocardial injury or necrosis can be detected by cardiac troponin and/or imaging.[7]
- Clinical introduction of the sensitive assays significantly increases the number of chest-pain patients presenting at admission with cTnI values exceeding the 99th percentile as a result of causes other than AMI. This complicates the appropriate triage of patients.[8,9,10]
- To assist with such triage, sensitive assays are useful for assessing cTnI kinetics upon serial testing in the clinical evaluation of chest-pain patients. A fast-track rule-out protocol (3 hours instead of 6 hours) recommended by the European Society of Cardiology in the 2011 guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation advises cardiac troponin measurement at admission and then 3 hours after the time of presentation.[11]
- The diagnostic superiority of absolute changes over relative changes has been recognized, and absolute rather than relative cTnI changes should therefore be used in the assessment of patients with suspected AMI.[12]
- Dynamic changes are not specific for AMI, but are rather indicative of active myocardial injury with necrosis. Cardiac troponins are markers of myocardial necrosis and not just myocardial infarction.[12,13]
- Elevations of cardiac troponins outside of an ischemic context should not be perceived as "false positive"; they reflect various levels of myocardial necrosis and present a high prognostic value relative to morbidity and mortality.[13–15]

Discriminating between AMI and Cardiac Noncoronary Artery Diseases (CN-CAD)

- **Chest pain more than 6 hours** with a first cTnI measurement below the upper limit of normal (ULN) (i.e., below the 99th percentile of healthy controls; LOCI Cardiac Troponin I = 56 ng/L myocardial necrosis can be excluded).
- **Chest pain less than 6 hours**
  - A first measurement below the 99th percentile in patients with suspicion of AMI requires a second measurement 3h later. It may be repeated 6h later after admission in patients whose 3h values are unchanged but for whom AMI is still highly suspected. If the second cTnI value is above the 99th percentile and the absolute serial change is above the cutoff established for the assay, AMI is highly suspected.[14,16,17]
  - After a first measurement above the 99th percentile in patients with unsuspected AMI, the second measurement 2 to 3h later serves to differentiate acute from chronic necrosis for which the serial change value will be below the established AMI delta change value.[14,16,17]

Additional Information:

Elevations of Cardiac Troponin Values Due to Myocardial Injury[13,15,18]

Injury Related to Primary Myocardial Ischemia

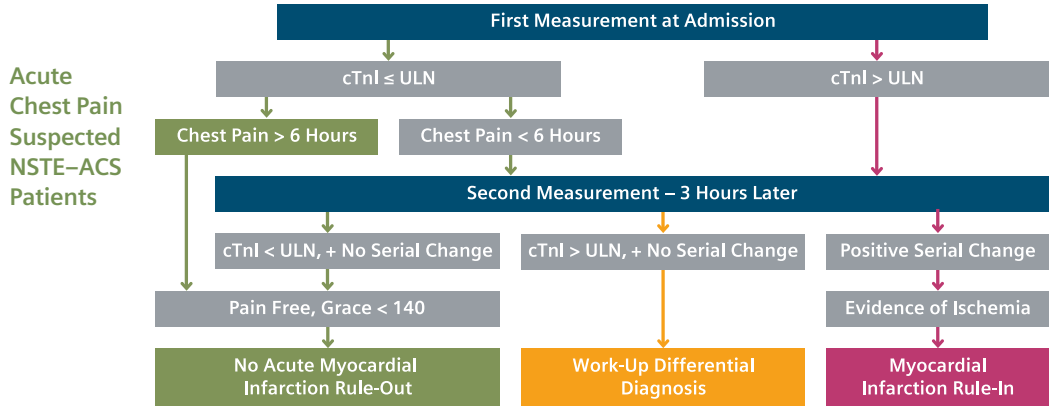
- Plaque rupture
- Intraluminal coronary artery thrombus formation

Injury related to supply/ demand imbalance of myocardial ischemia

- Tachy-/bradyarrhythmias
- Aortic dissection or severe aortic valve disease
- Hypertrophic cardiomyopathy
- Cardiogenic, hypovolemic, or septic shock
- Severe respiratory failure
- Severe anemia
- Hypertension, with or without LVH
- Coronary spasm
- Coronary embolism or vasculitis
- Coronary endothelial dysfunction without significant CAD
- Injury not related to myocardial ischemia
- Cardiac contusion, surgery, ablation, pacing, or defibrillator shocks
- Rhabdomyolysis with cardiac involvement
- Myocarditis
- Cardiotoxic agents (Herceptin,® anthracyclines)

Multifactorial or Indeterminate Myocardial Injury

- Congestive heart failure: acute and chronic
- Stress cardiomyopathy
- Severe pulmonary embolism or pulmonary hypertension
- Sepsis and critical illness
- Renal failure
- Acute neurological disease, including stroke, or subarachnoid hemorrhage
- Infiltrative diseases (amyloidosis, hemochromatosis, sarcoidosis, and scleroderma)
- Strenuous exercise



Dimension EXL LOCI Cardiac Troponin I Assay Decision Cutoffs:

ULN = upper limit of normal or 99th percentile of a healthy population: **56 ng/L (0.056 µg/L)**

Absolute AMI serial change (2h)[16] **>15 ng/L (0.015 µg/L)**