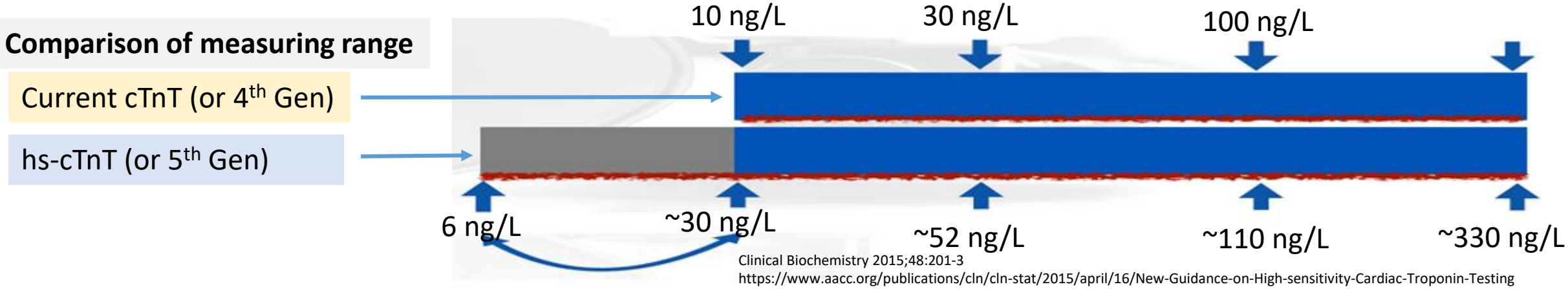
High Sensitivity Cardiac Troponin T (hs-cTnT)

How to use and comparison to existing troponin testing

Why do we need High sensitivity cardiac Troponin (hs-cTnT)?

- Current troponin assays cannot accurately measure low levels of troponin – we cannot detect trends at lower levels or increases warning of cardiac ischemia
- High sensitivity Troponin can accurately measure low levels of troponin

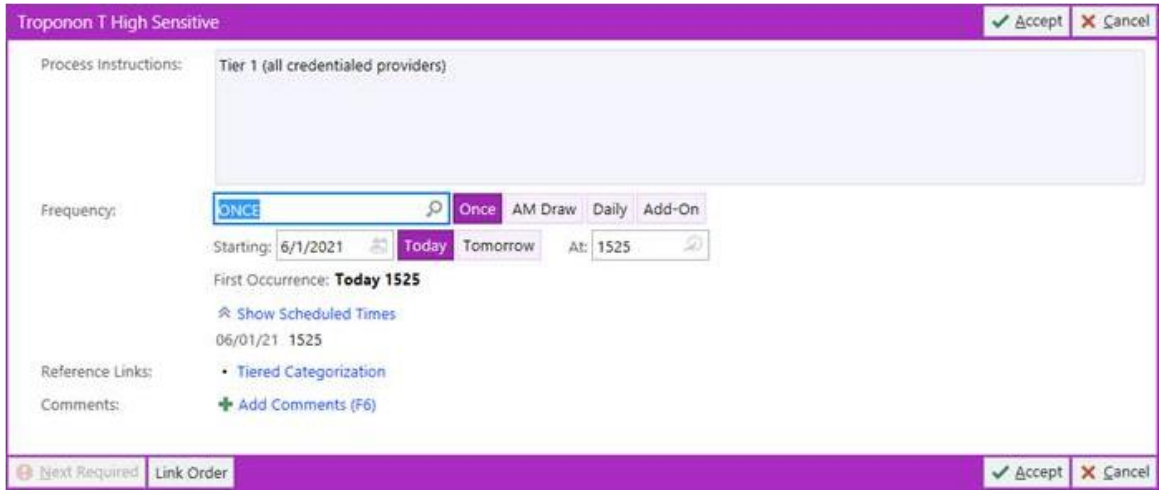
Comparison of measuring range



Clinical Biochemistry 2015;48:201-3
https://www.aacc.org/publications/cln/cln-stat/2015/april/16/New-Guidance-on-High-sensitivity-Cardiac-Troponin-Testing

This increased sensitivity allows us to:

- Diagnose early MI
- Reduce the time to rule-in and rule-out acute MI
- Improve clinical accuracy of testing
- Improve MI patient outcomes
- Reduce turnaround time in the ED for MI rule-out patients



hs-cTnT provides greater sensitivity for MI in women

- Current Troponin assay has a single cut-off for both sexes (10ng/L) for suspicion of MI
- The increased sensitivity of hs-cTnT allows use of a lower cutoff for female patients
- Using hs-cTnT we can use sex-specific thresholds for risk of cardiac damage
  - Normal female patients have less than 14 ng/L of Troponin as measured by hs-cTnT
  - Normal male patients have less than 22 ng/L of Troponin as measured by hs-cTnT

➢To ensure that no MIs are missed, we use thresholds of 10 ng/L (females) and 15 ng/L (males) to rule out MI on the initial testing

➢As with current Troponin assay, patients are best evaluated with serial hs-cTnT testing

https://www.accessdata.fda.gov/cdrh_docs/pdf16/K162895.pdf

How to use hs-cTnT testing – Acute MI

For Rule Out/Rule In Patients Suspicious for Acute MI

Time 0 hs-cTnT Epic Code: LAB9290

< 10 ng/L Female
< 15 ng/L Male
AMI ruled out

> 10 ng/L Female
>15 ng/L Male
Draw 2nd hs-cTnT at 2 hours from time 0

Increase in hs-cTnT < 3 ng/L
AMI ruled out

Increase in hs-cTnT > 3 ng/L and < 10 ng/L
Draw 3rd hs-cTnT at 6 hours from time 0

Increase in hs-cTnT > 10 ng/L
AMI ruled in

Increase in hs-cTnT < 12 ng/L from time 0
AMI ruled out

Increase in hs-cTnT > 12 ng/L from time 0
AMI ruled in

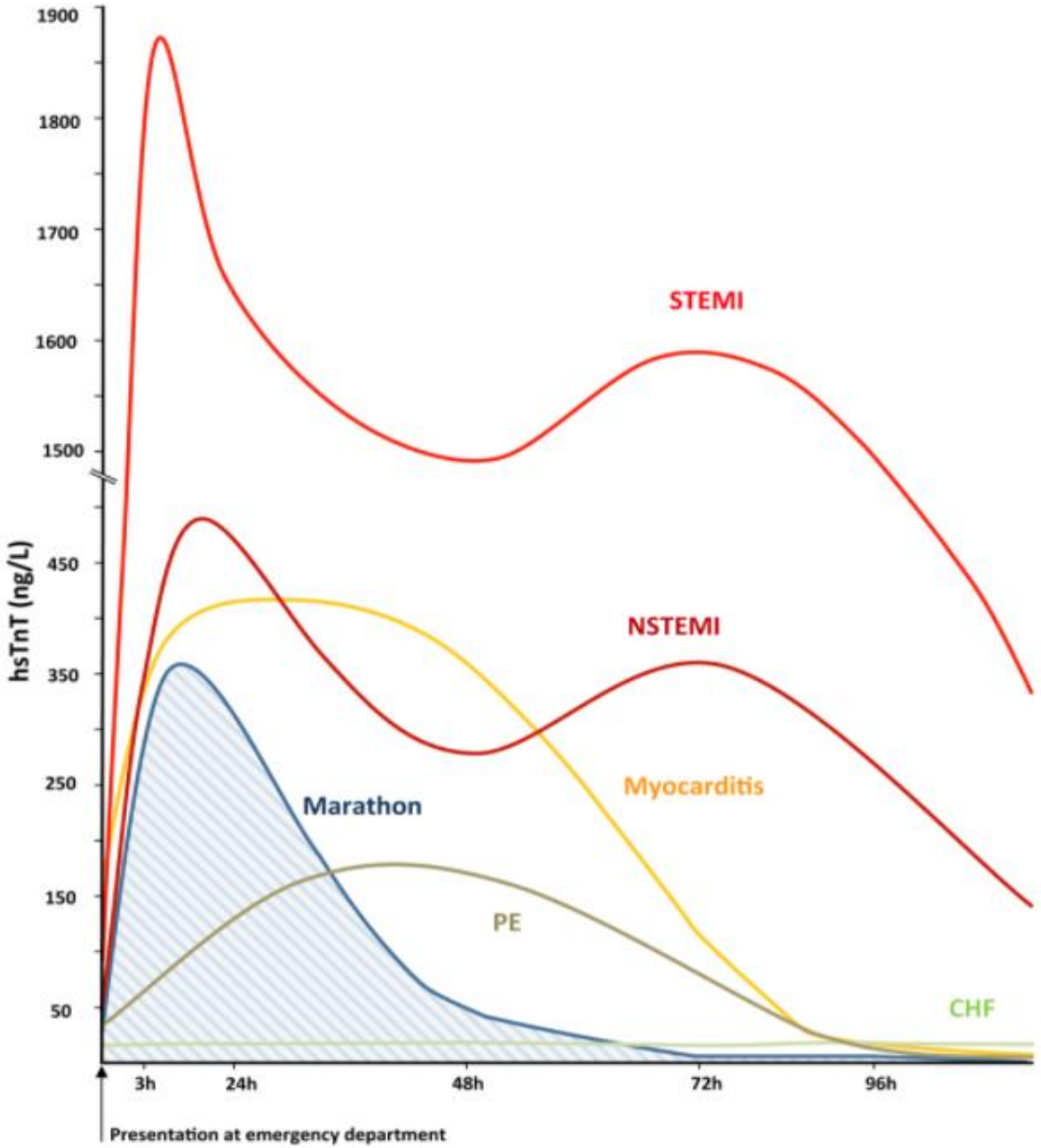
- **All rule-ins and rule-outs should be further stratified with history, EKG, age, and other risk factors**
- **Critical value** (called to clinical team by lab) **= 100 ng/L**

Circulation 2020; 141:1937-39.

How to use hs-cTnT values – Chronic MI

- Distinguish **acute** from **chronic** MI ➔ look for significant change (rise or fall) of hs-cTnT results
  - Troponin level changes from the time of ischemia and type of injury (see graph)*
  - "Significant change" (rise and/or fall) definition depends if initial hs-cTnT is >10 ng/L (females) or >15 ng/L (males)
    - If the initial result is **below** threshold: a change of at least **50%** is significant
    - If the initial result is **above** threshold: a change of at least **20%** is significant

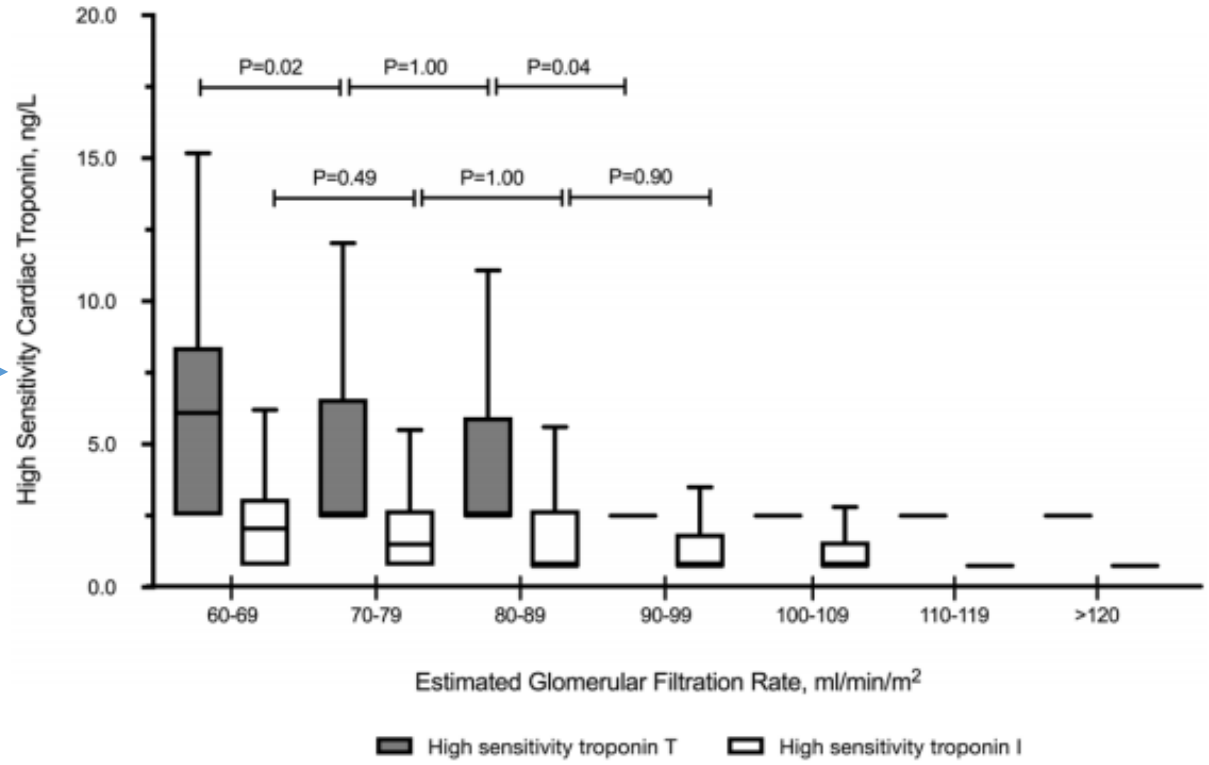
- Collect 2nd sample 2 hrs after 1st sample to determine the pattern of hs-cTnT change (and additional samples if indicated)
- Always interpret hs-cTnT results along with clinical picture (History, ECG, HEART Score, etc.)



*Journal of the American College of Cardiology, August 2018, http://www.onlinejacc.org/content/accj/72/18/2231.full.pdf

What are clinical conditions that can cause ***chronic hs-cTnT elevations*** ?

- Ischemic or non-ischemic heart failure patients with different forms of cardiomyopathy
- Myocarditis,
- Heart contusion,
- Pulmonary embolism
- Stroke
- Subarachnoid hemorrhage
- Hypertensive crisis
- Renal failure
- Sepsis
- Diabetes
- Drug-induced cardiotoxicity
- Critical illness



Differential Dx between acute and chronic hs-cTnT elevations,

- A serial sampling to observe a rise/fall of hs-cTnT above threshold (14 ng/L for females, 22 ng/L for males) **AND**
- Consistent with the clinical assessment, including ischemic symptoms and electrocardiographic changes

Heart Views. 2018;19:54–7; Thygesen et al. 2012.

hs-cTnT vs cTnI on iSTAT

- The point-of-care iSTAT device cardiac troponin test is a **conventional** troponin test.
- The testing results between the iSTAT and the laboratory hs-cTnT are **not** equivalent and should **not** be used interchangeably or as part of the trending to determine acute vs chronic cardiac damage.
- iSTAT POC troponin testing should **only** be used when there is not time to obtain the hs-cTnT testing from the core laboratory.
- If a patient result(s) of iSTAT disagree with result of hs-cTnT tested at core-laboratory, the hs-cTnT result should be used for patient care interpreted with other signs/symptoms.

Apple et al. 2021; Christenson et al. 2017

If testing results do not match patient presentation or for any other questions, contact the Chemistry Laboratory directors for assistance at: 315-464-9175

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