The Benefits of Accelerated Algorithms Using High-Sensitivity Troponin
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Disclosures

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- Research support / travel support / consulting fees from several diagnostic and pharmaceutical companies
Content

I. High-Sensitivity Cardiac Troponin (hs-cTn) for the Early Diagnosis of AMI

II. Rapid Rule-in / Rule-out Algorithms using hs-cTn
   a) 3-hours Algorithm
   b) 0/1-hour Algorithm

III. Clinical Impact of Rapid Rule-in / Rule-out Algorithms
Diagnostic Cornerstones in suspected ACS

Do not interpret hs-cTn in isolation

Hs-cTn is a quantitative marker

Not a pregnancy test

The lower hs-cTn, the better
**Hs-cTn: Quantitative marker of cardiomyocyte injury**

<table>
<thead>
<tr>
<th>P/NPV for AMI</th>
<th>ng/L</th>
<th>Differential Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPV &gt;95%</td>
<td>10'000</td>
<td><strong>Very large AMI</strong>, myocarditis</td>
</tr>
<tr>
<td>PPV 80%</td>
<td>1'000</td>
<td>Large AMI, myocarditis, Tako-tsubo, PE, critical illness</td>
</tr>
<tr>
<td>PPV 50%</td>
<td>100</td>
<td>Small AMI, early large AMI, myocarditis, Tako-tsubo, PE</td>
</tr>
<tr>
<td>NPV 90%</td>
<td>50</td>
<td>Algorithms may help to differentiate acute from chronic hs-Tn elevations</td>
</tr>
<tr>
<td>NPV 99%</td>
<td>5</td>
<td>99th percentile, healthy individuals</td>
</tr>
</tbody>
</table>

*Teerenbold R et al. Eur Heart J 2014*

**Content**

I. High-Sensitivity Cardiac Troponin (hs-cTn) for the Early Diagnosis of AMI

II. Rapid Rule-in / Rule-out Algorithms using hs-cTn
   a. 0/3-hour Algorithm
   b. 0/1-hour Algorithm

III. Clinical Impact of Rapid Rule-in / Rule-out Algorithms
Accelerated Diagnostic Protocols (ADP) over Time

3-hour Algorithm: hs-cTn hs-cTn
(ESC 2011)

Accelerated Diagnostic Protocols (ADP) over Time

ECG
1st blood draw

0h 1h 2h 3h 4h 5h 6h 7h

1st blood draw

2nd blood draw

2nd blood draw

3h Algorithm:
hs-cTn hs-cTn
(ESC 2011)

0/1h Algorithm:
hs-cTn hs-cTn
(ESC 2015)

Available for:
- Roche hs-cTnT Elecsys
- Abbott hs-cTn Architect
- Siemens hs-cTn Centaur

Submitted for:
- Beckman Coulter hs-cTn
- Singulex us-cTn Clarity
- ...

Mostly out-patients
(if other life-threatening disorders ruled-out)

Mostly invasive strategy
(for ACS, UAP, myocarditis, Tako Tsubo)

Further hs-cTn
resampling at 3h, echo, exercise stress testing

Assay-specific cutoffs are needed

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III. Benefits of Rapid Rule-in / Rule-out Algorithms
Benefit of rapid triage algorithms for …

I. the patients
- Management decision available after 1 hour in ≈ 75% of all patients
- Reduces anxiety/uncertainty
- Safe rule-out

II. the physicians
- Improved early risk stratification
- Earlier treatment

III. the healthcare system
- Save money
- Reduce duration of ED stay
- Improve allocation of limited resources

But are these hypothetical assumptions confirmed by real life data?
Impact of hs-cTnT on use of coronary angiography

No increase in coronary angiographies

Impact of hs-cTn on use of cardiac stress testing

34% reduction of subsequent cardiac stress testing
Impact of hs-cTnT on duration of stay in the ED

- 20% reduction of duration of stay in the ED
- 15% more out-patients

Impact of hs-cTnT on total costs

- 20% reduction of total costs in out-patients
How to make cardiologists happy

I. Use hs-cTn
- improves rule-in
- improves rule-out

II. in the right context
- suspected AMI
- no screening tool

III. embedded in an algorithm
- supported by local ED physicians, cardiologists and laboratorians.
- e.g. 0/1h, 0/2h, 0/3h algorithm, LoD, T-MACS, 2h-ADP
Summary on the 0/1-hour Algorithm using hs-cTn

Thank you very much for your attention!

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