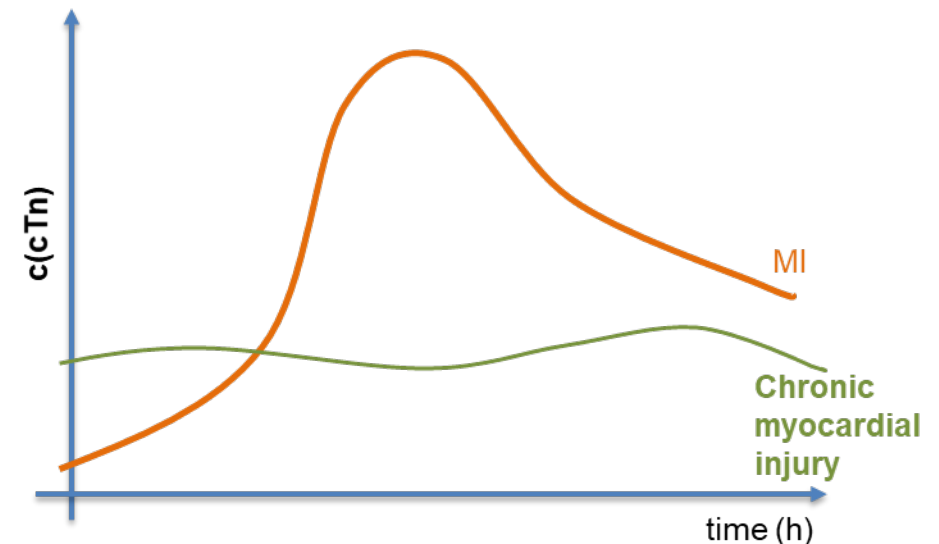


Sensitive Troponin Quantification by ICP-MS

M. Müller, D. Kuhfuß, C. Swart, G. O'Connor (EMPIR 18HLT10)

Background

- Myocardial infarction (MI) is responsible for a high percentage of annual deaths caused by non-communicable diseases
- Detection of changes in cardiac Troponin (cTn) concentration plays an important role in early diagnosis of MI



Background

- High variation between measurement results from different ELISA measurements, depending on ELISA manufacturer
- No certified reference material or reference measurement procedure currently available

 **CardioMet**

18HLT10

WP2

EURAMET 

Aim

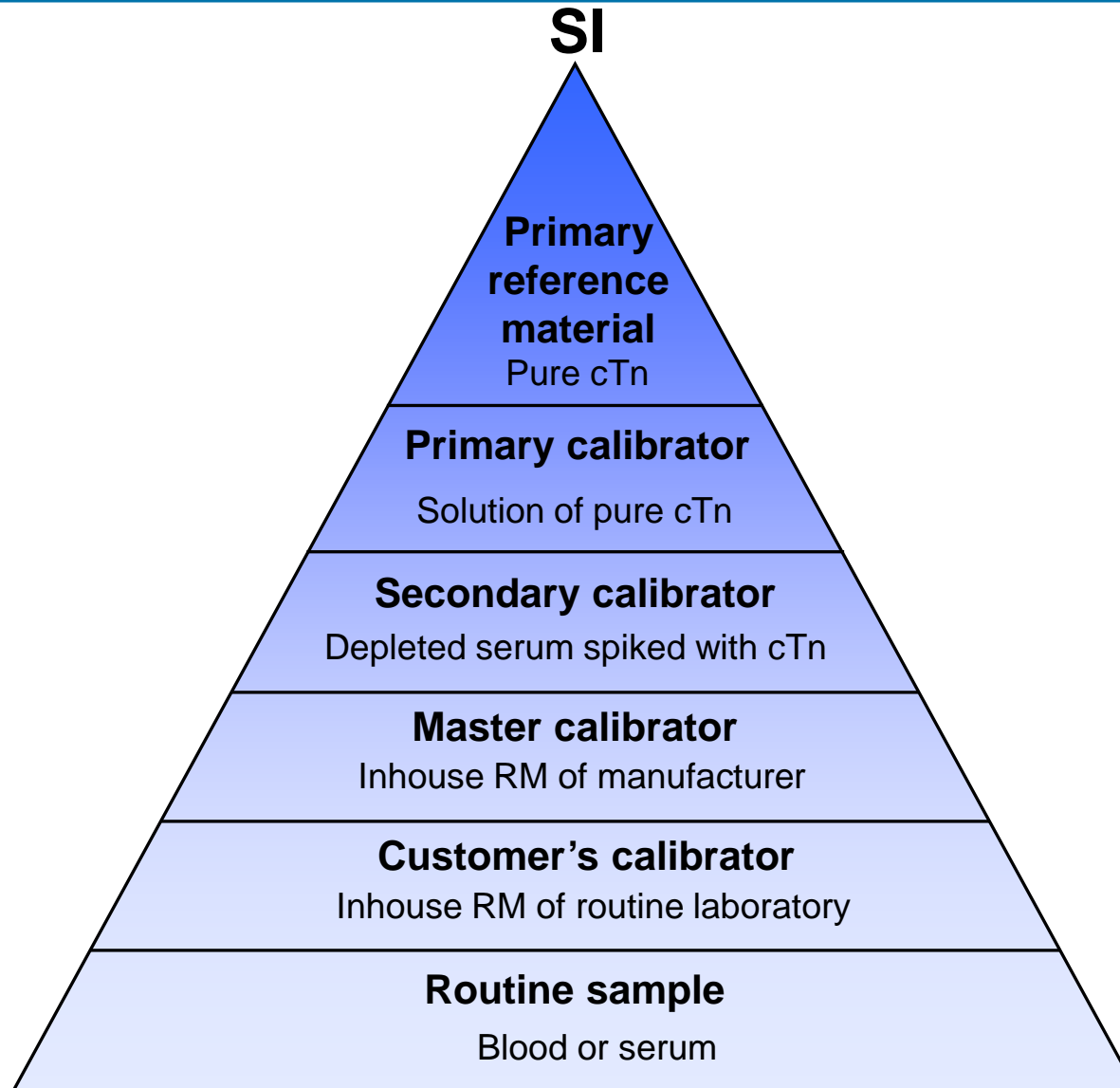
- Development of reference measurement procedures for quantification of cTn, traceable to the SI using **ICP-MS**



18HLT10
WP2



Traceability chain



Sensitive Troponin Quantification by ICP-MS

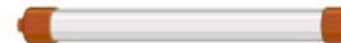
Approaches



whole protein quantification...

1

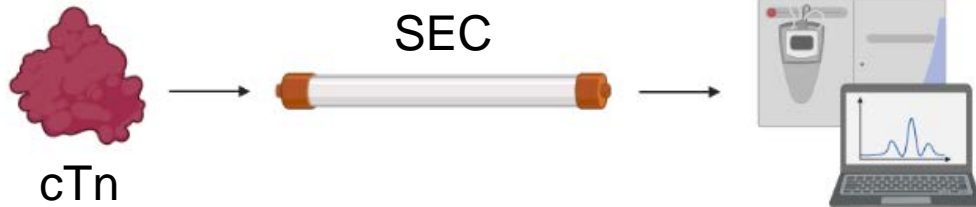
...by addition of a metal tag



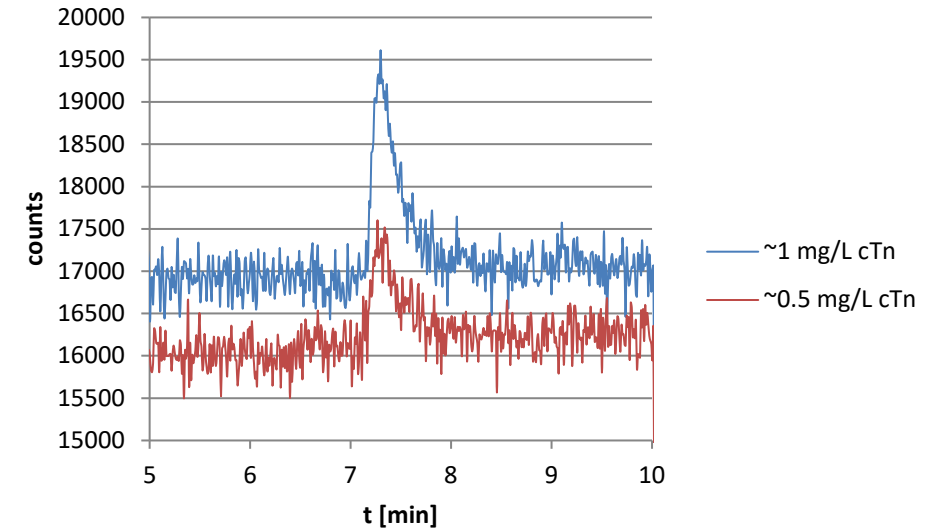
quantification of specific peptides...

2

1) Whole Protein Approach



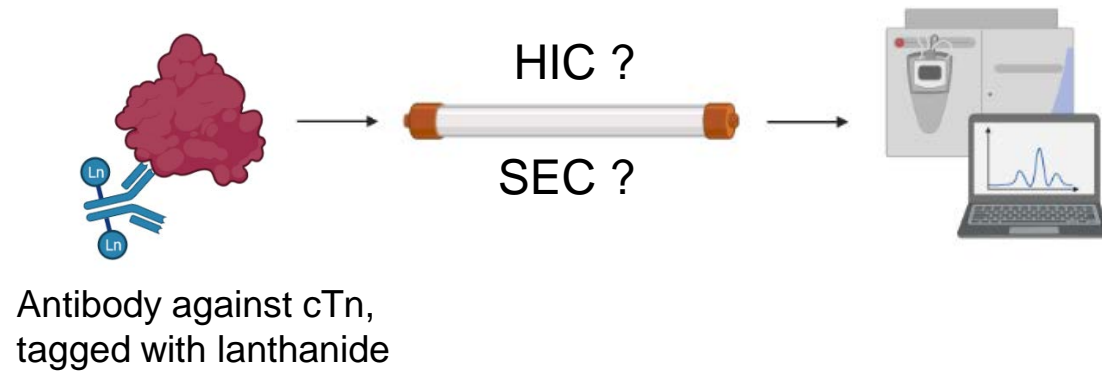
Quantification via sulfur



➤ Quantification lacks desired sensitivity

1) Whole Protein Approach

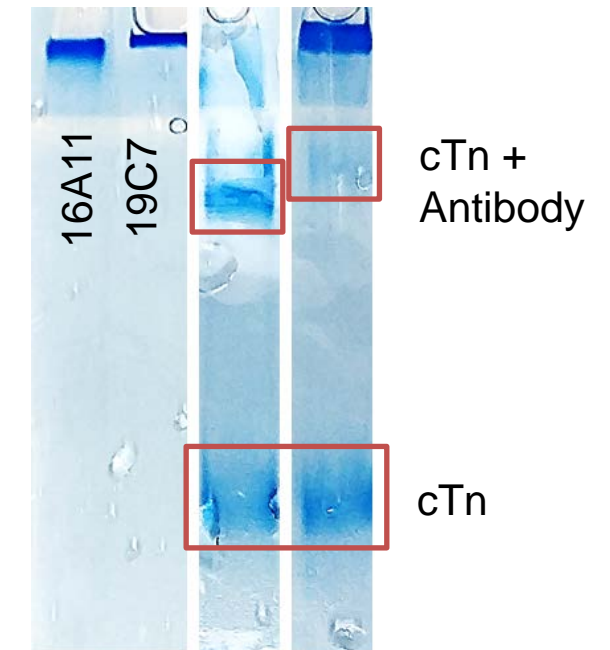
Quantification via labeled antibodies



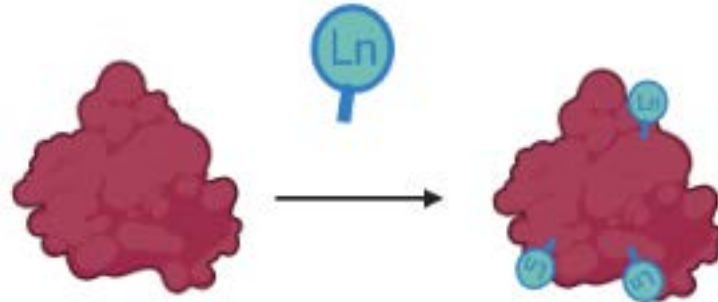
➤ Method in development

Native-SDS-PAGE, 0.01 % SDS
in MOPS-buffer

Antibodies

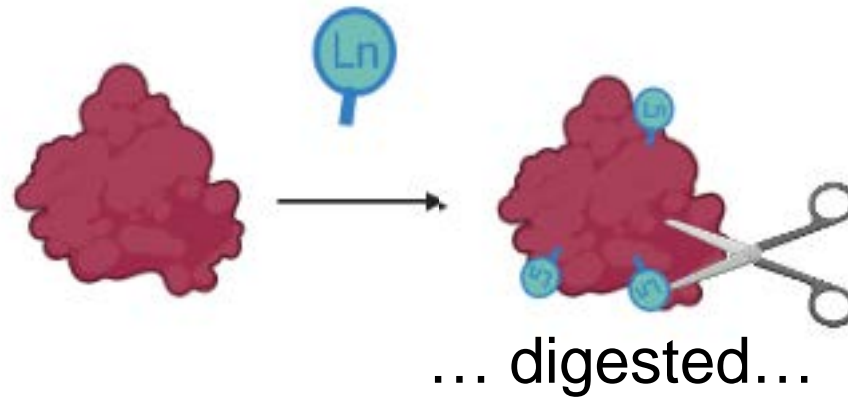


2) Peptide Approach

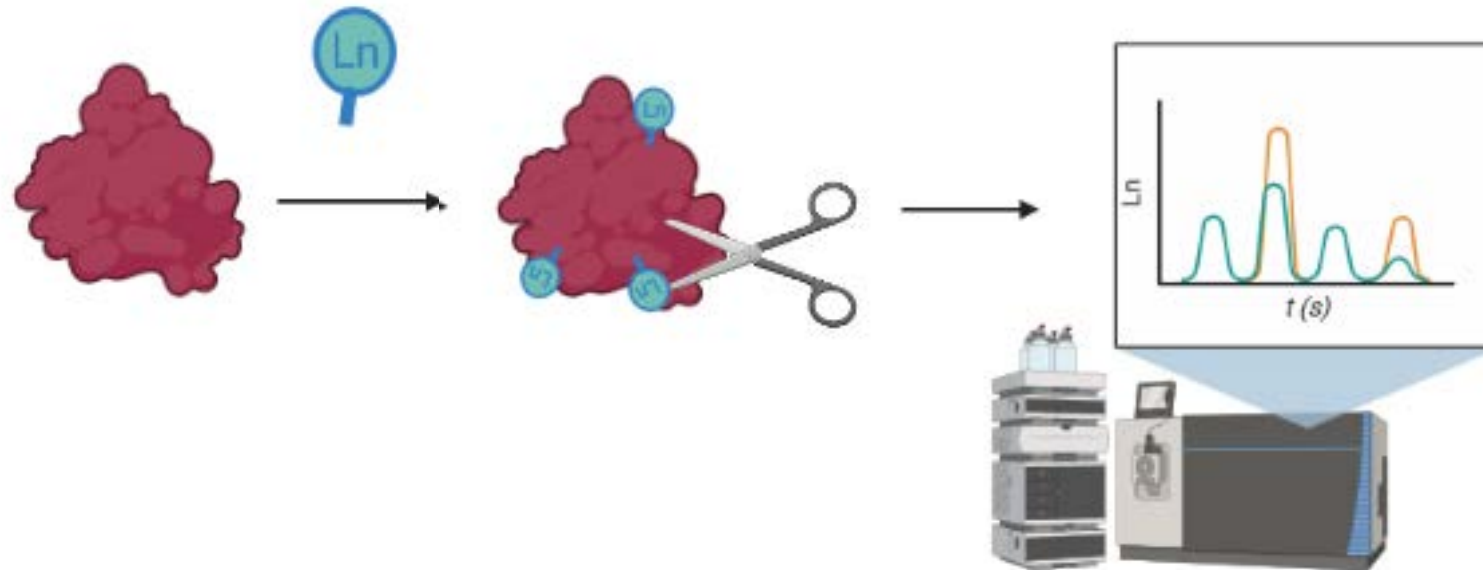


cTn is labeled by metal-
complex ...

2) Peptide Approach

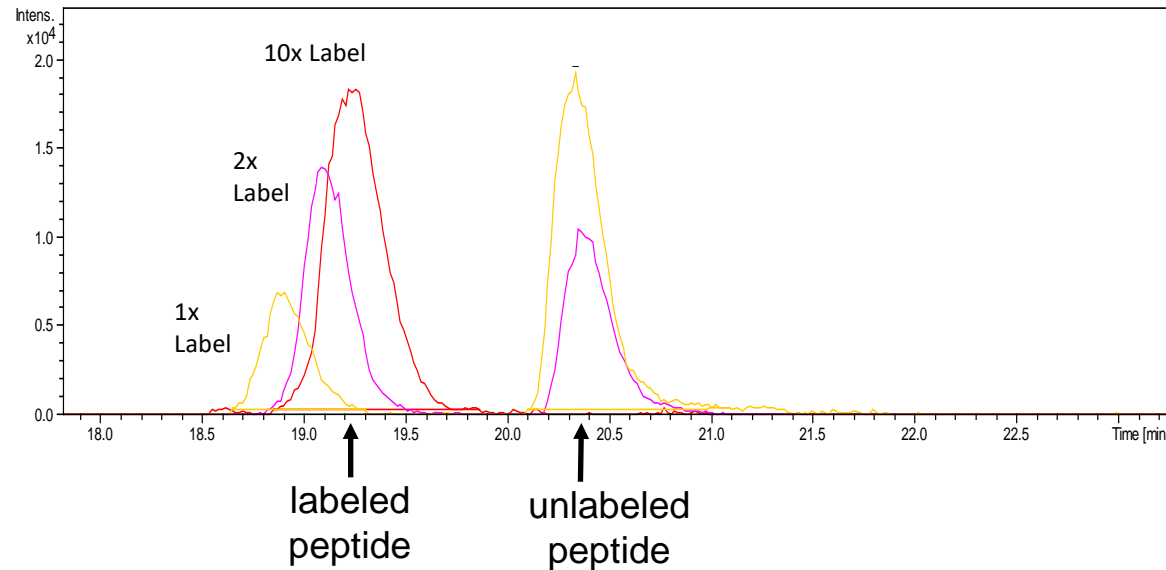


2) Peptide Approach

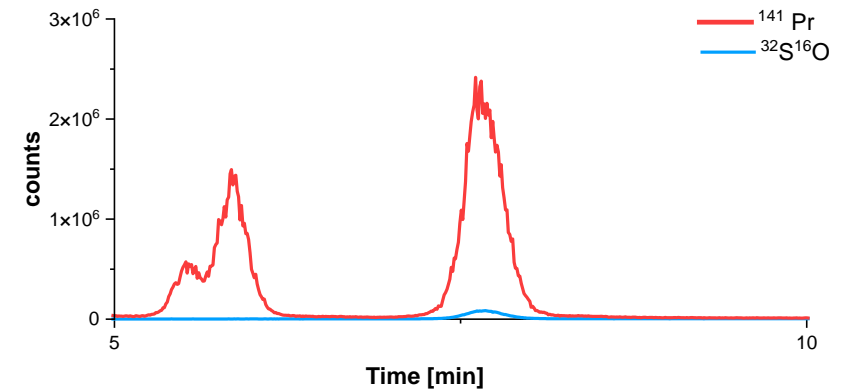


... peptides are quantified
via Ln-massflow

2) Peptide Approach - Results



➤ Labeling efficiency ~100% by LC-ESI-MS



➤ Sensitivity of Ln-measurement by ICP-MS is ~**100** times higher than for sulfur

Sensitive Troponin Quantification by ICP-MS

Conclusions

- Sensitivity of sulfur in ICP-MS too low to reach desired LOD
- Metal labeling is more promising



This project 18HLT10 CardioMet has received funding from the EMPIR programme co-financed by the Participating States and from the European Union's Horizon 2020 research and innovation programme.