

# Introduction to MALDISTAR

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OurCon VII, St. Malo, France, 28.10.2019

**To prepare for the interactive poll  
during the workshop:**

→ Scan the QR code, or

→ Visit <http://etc.ch/8q2U>



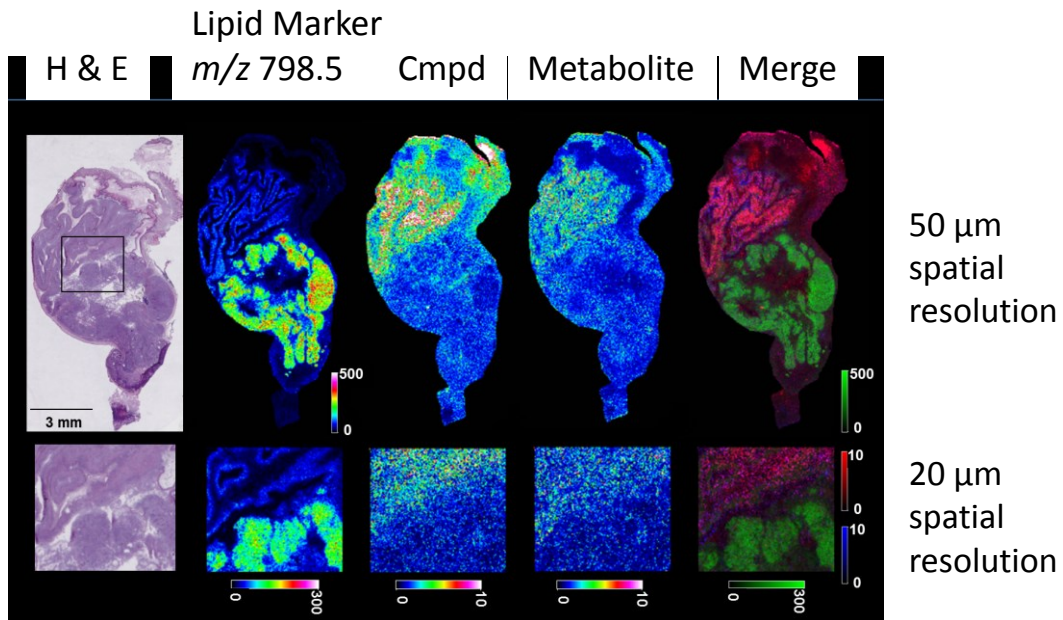
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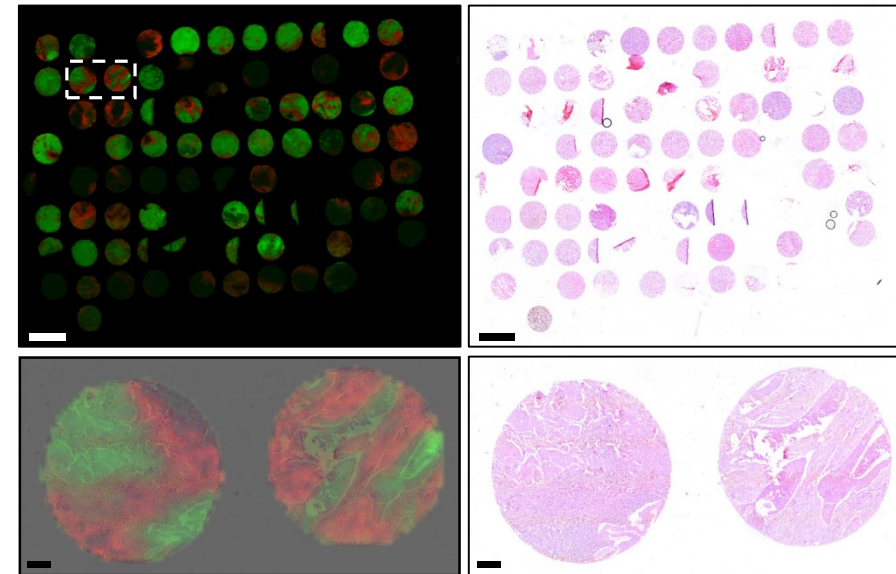
# Understand Technical Variability, in order to Understand Biological Variability

## Serial Pharmacology Studies



Hinsenkamp et al., *Neoplasia*, 2016

## Serial Clinical Studies



Ly et al., *Proteomics Clin. Applications*, 2018



# Standardized Reporting



GigaScience, 7, 2018, 1–13


doi: [10.1093/gigascience/giy102](https://doi.org/10.1093/gigascience/giy102)

Advance Access Publication Date: 14 August 2018

Review

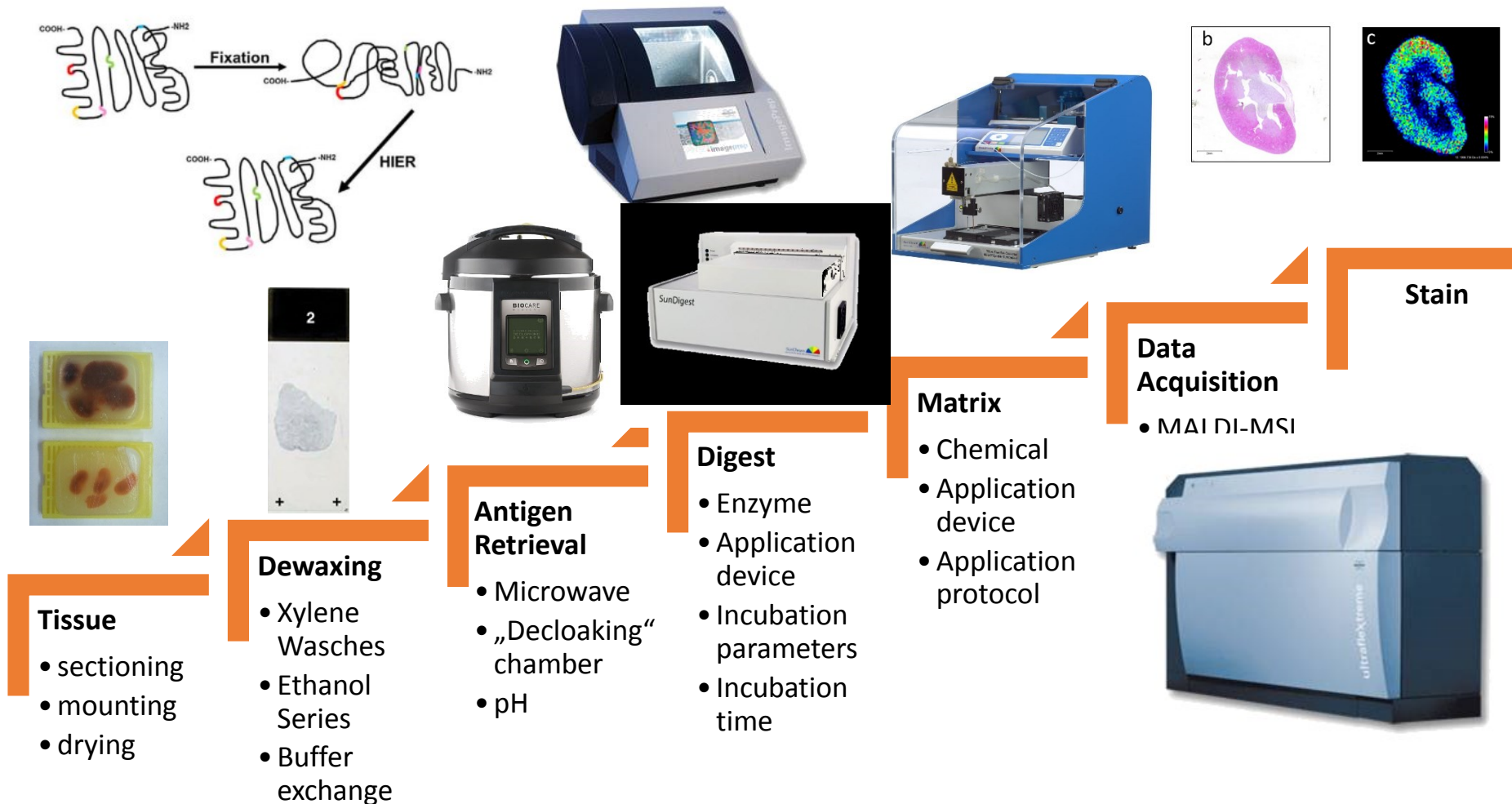
REVIEW

## Balancing sufficiency and impact in reporting standards for mass spectrometry imaging experiments

Ove J. R. Gustafsson <sup>1,2,\*</sup>, Lyron J. Winderbaum<sup>2</sup>, Mark R. Condina<sup>2</sup>,  
Berin A. Boughton<sup>3</sup>, Brett R. Hamilton<sup>4,5</sup>, Eivind A. B. Undheim<sup>5</sup>,  
Michael Becker<sup>6</sup> and Peter Hoffmann<sup>2</sup>

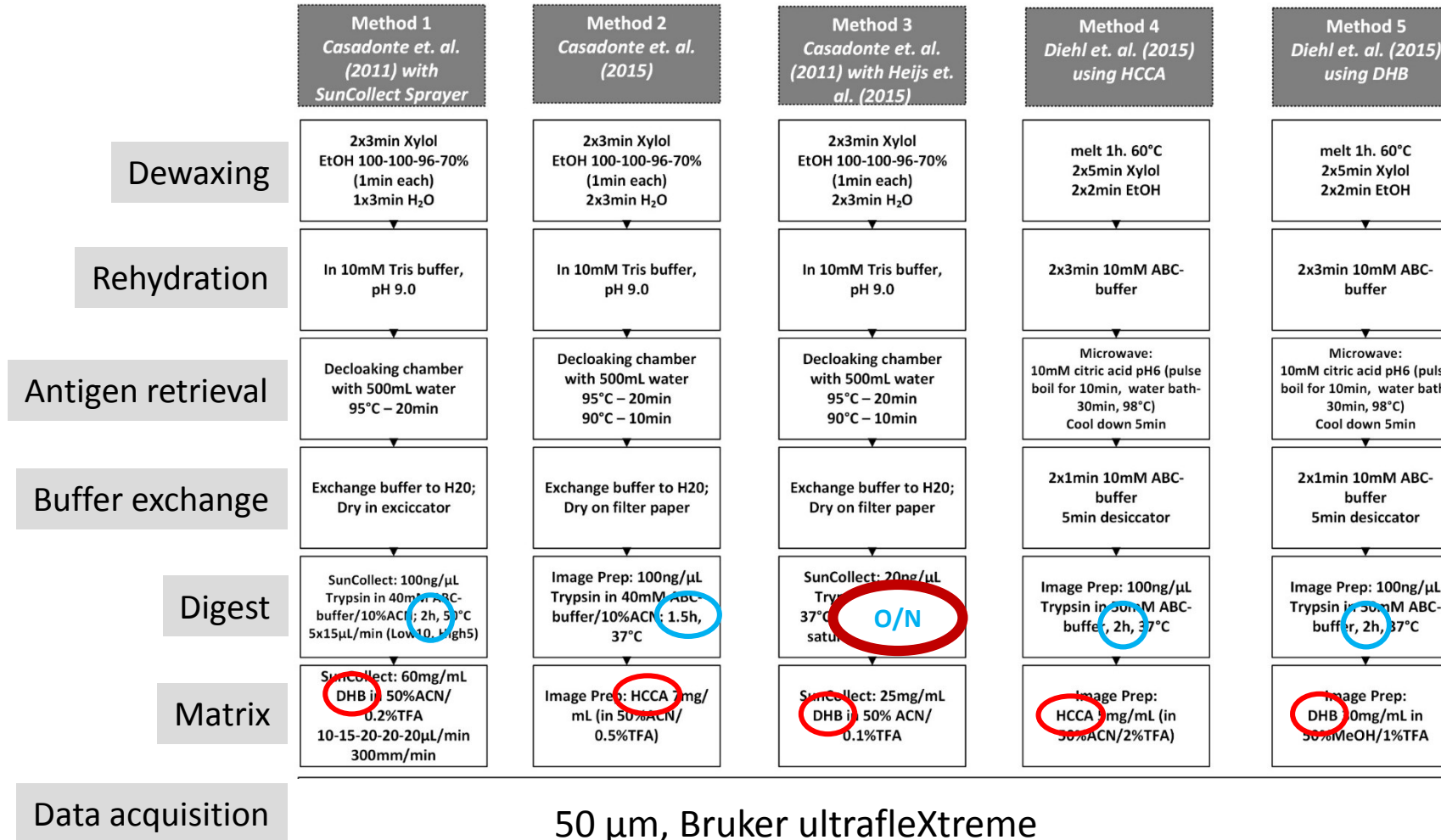


# Standardized Workflows in the Wet Lab (Standard Operating Procedures; SOPs) to avoid Error Propagation





# 5 Published Workflows for Peptide MSI of FFPE Tissue (2 $\mu\text{m}$ )







- Standardized reporting
- SOPs for wet lab
- Quantitative Quality Metrics for Method Development in the Wet- and Dry Labs (Carsten Hopf)
- Systematic Within-center and Between-center Ring Studies (Benjamin Balluff)
- Systematic Quality Assessment of Cross-Normalization (Tobias Boskamp)
- Metainformation Management (Denis Abu-Sammour)



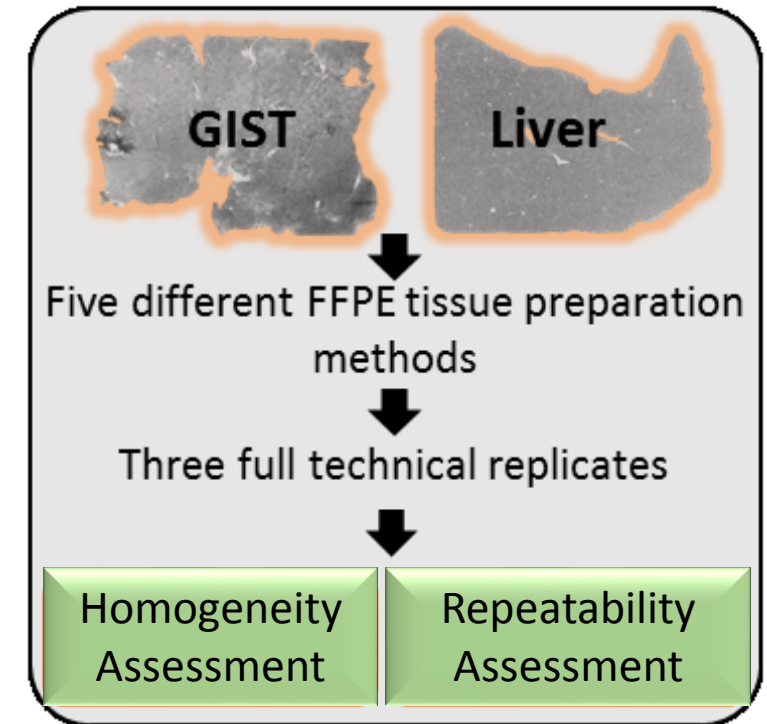
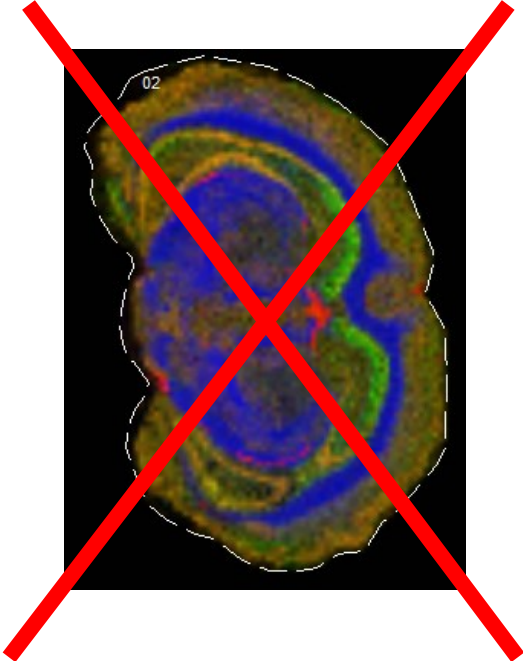
# Analysis of „Homogeneous“ Tissue for Assessment of Technical Variability not Mouse Brain

➤ **Repeatability** of MALDI-MSI data  
for 5 published FFPE tissue  
processing methods

➤ **2 human FFPE tissues**  
(gastrointestinal stromal tumor  
(GIST) and liver)

○ >98% homogeneous

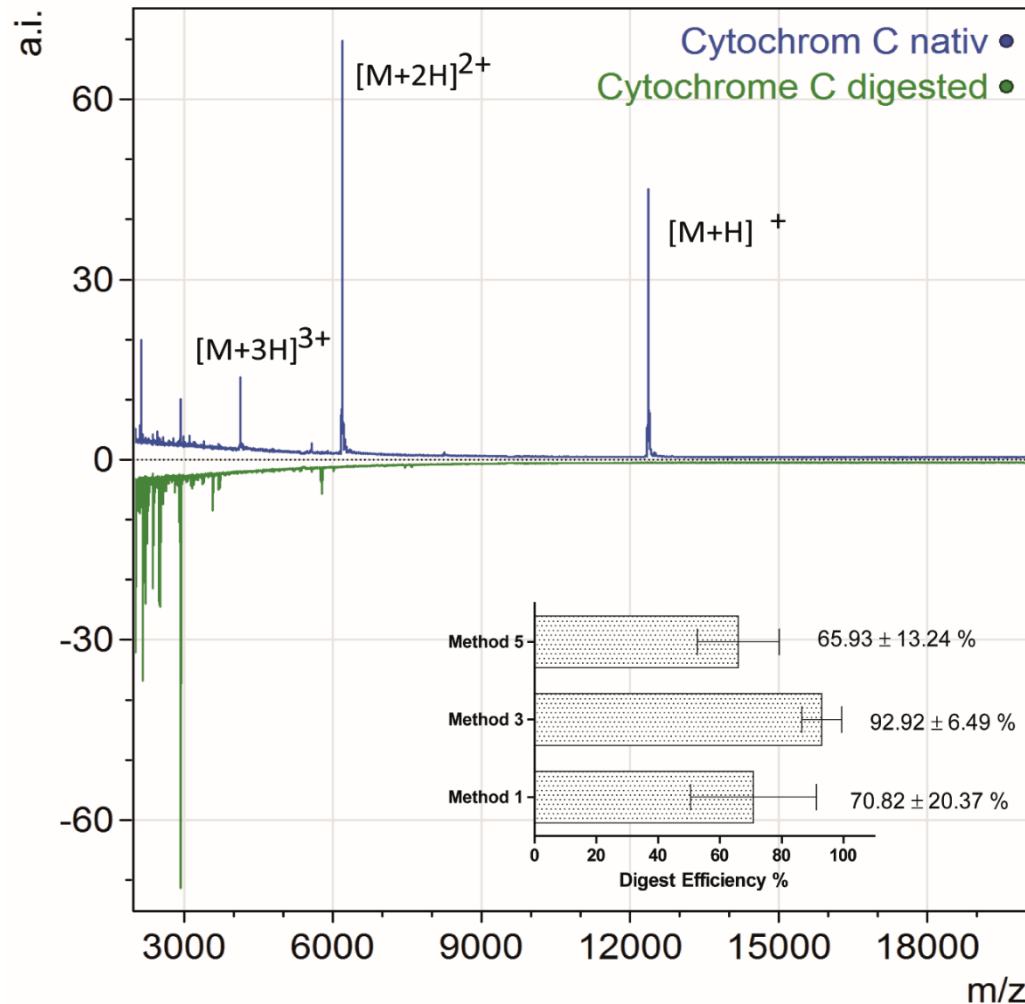
➤ **3 full technical replicates** each



Erich\*, Sammour\* et al., Biochim. Biophys. Acta 2016 Sep 6



# Digestion Efficiency for spotted Cytochrome C >90%



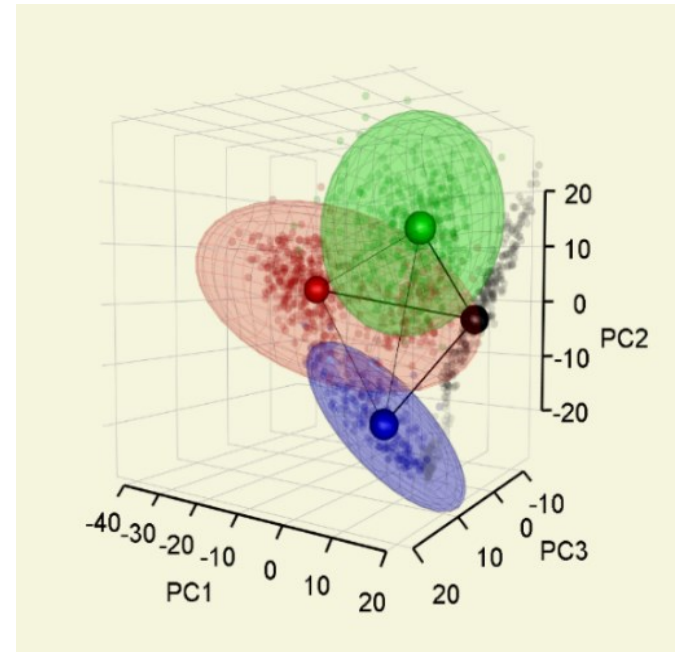
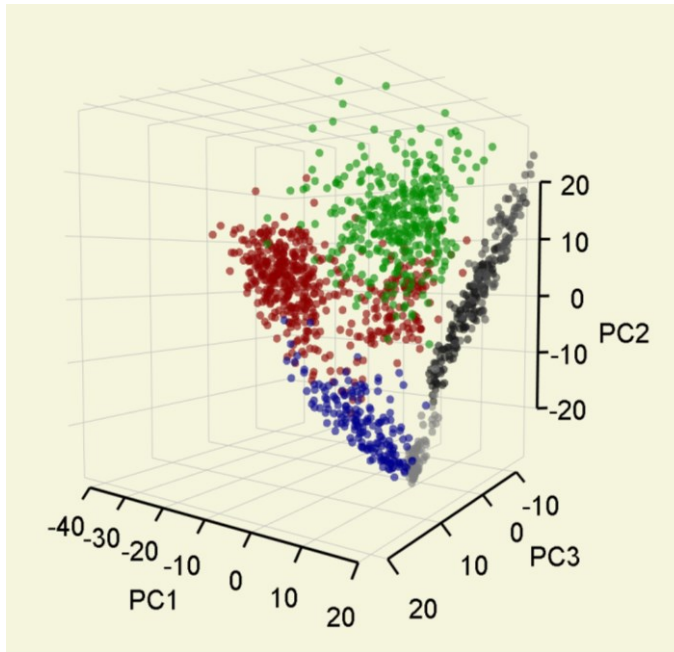
Erich\*, Sammour\* et al., Biochim. Biophys. Acta 2016 Sep 6





# Mean Absolute Deviation (MAD) to the Class Centroid

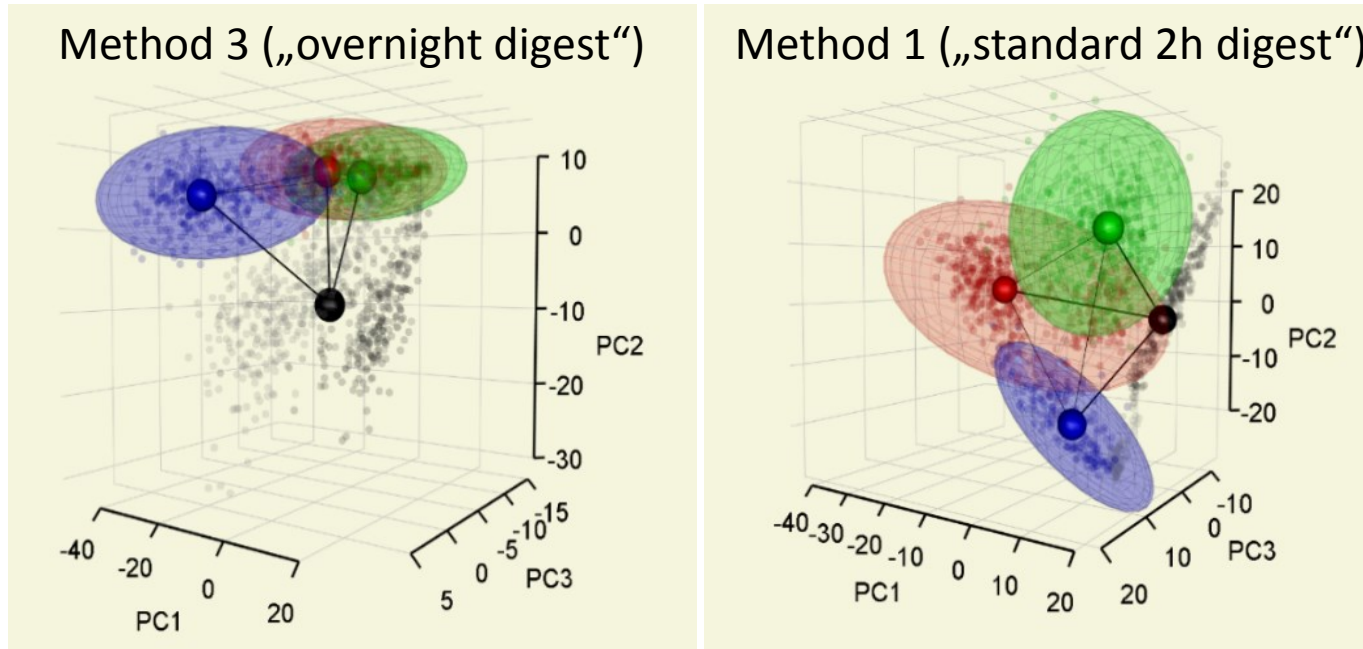
- MAD is a measure of spread in PCA space
- MAD is a homogeneity measure



Erich\*, Sammour\* et al., Biochim. Biophys. Acta 2016 Sep 6

# Interclass Overlap ( $J_{\text{overlap}}$ ) Measures Overlap between Replicate Data „Clouds“

- $J_{\text{overlap}}$  is a measure of similarity of results in PCA space
- $J_{\text{overlap}}$  is a measure of repeatability



Erich\*, Sammour\* et al., Biochim. Biophys. Acta 2016 Sep 6



# Quality in MSI is a Community Effort

Scientific Advisory Board (= Donors of Published Datasets):

- Pierre Chaurand (Montreal, Canada)
- Benjamin Balluff (M4I, Maastricht, The Netherlands)
- Ferdinand von Eggeling (Jena, Germany)
- Our Host Charles Pineau (Rennes, France)

**MALDISTAR results will  
be published and Code  
will be made publically  
available**



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