

**HelmholtzZentrum münchen**

German Research Center for Environmental Health

# Pre-analytical sample quality: metabolite ratios as intrinsic marker for prolonged room temperature exposure of serum samples

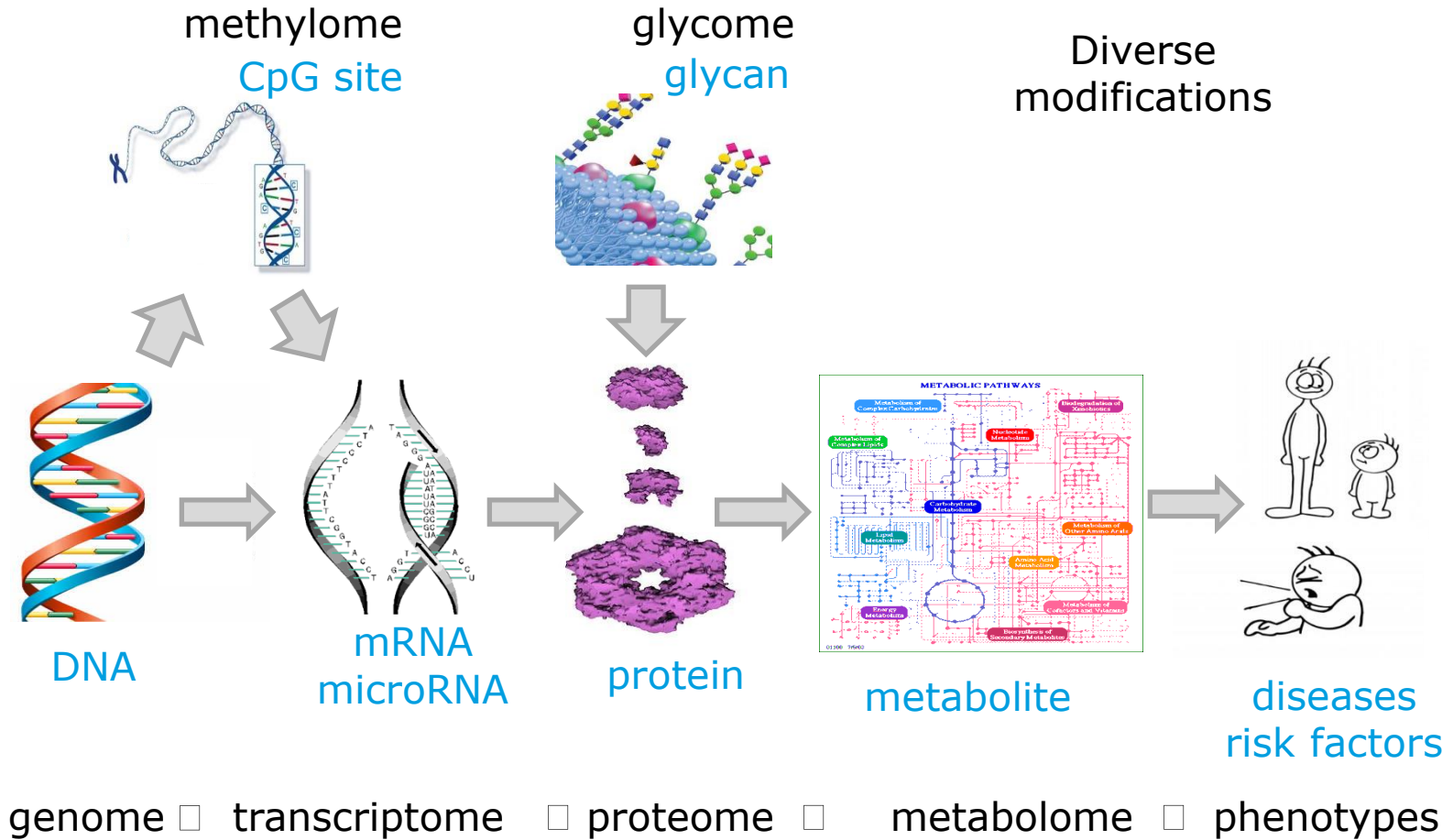
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Nationales Biobanken-Symposium  
Berlin, 09./10.12.2015



# OMICS era



# Importance of pre-analytical phase

Clin Chem Lab Med. 2006;44(4):358-65.

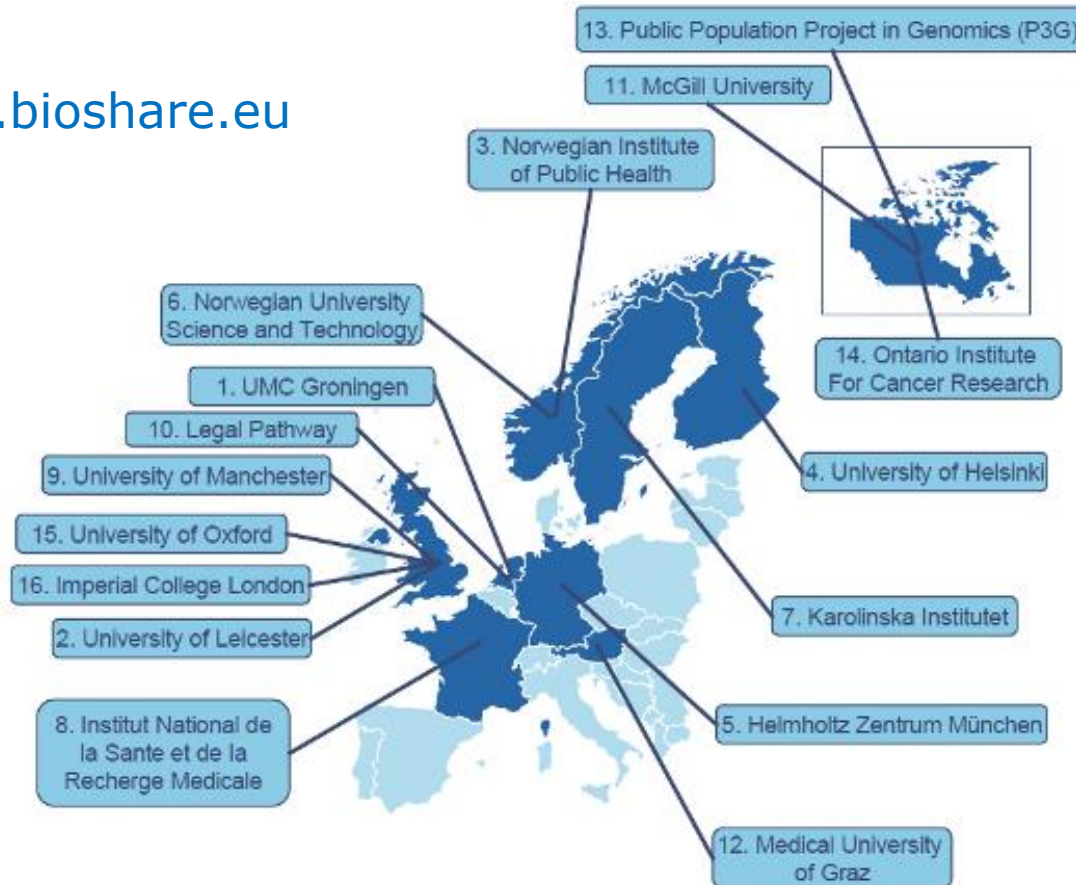
## **Preanalytical variability: the dark side of the moon in laboratory testing.**

Lippi G<sup>1</sup>, Guidi GC, Mattiuzzi C, Plebani M.

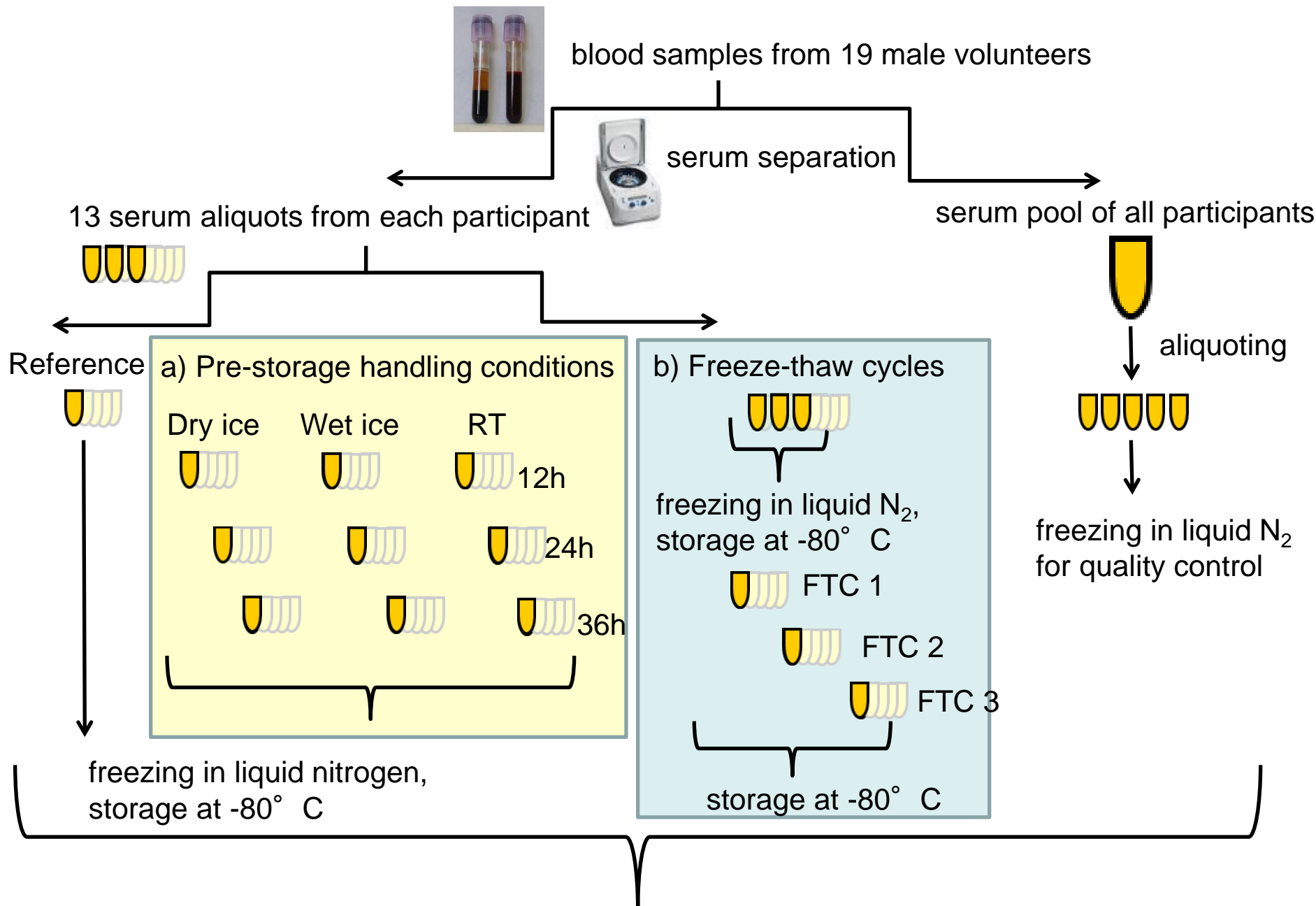
“lack of standardized procedures for sample collection, including patient preparation, specimen acquisition, handling and storage, account for up to **93% of the errors** currently encountered within the entire diagnostic process”

- consortium of leading biobanks and international researchers from all domains of biobanking science

[www.bioshare.eu](http://www.bioshare.eu)

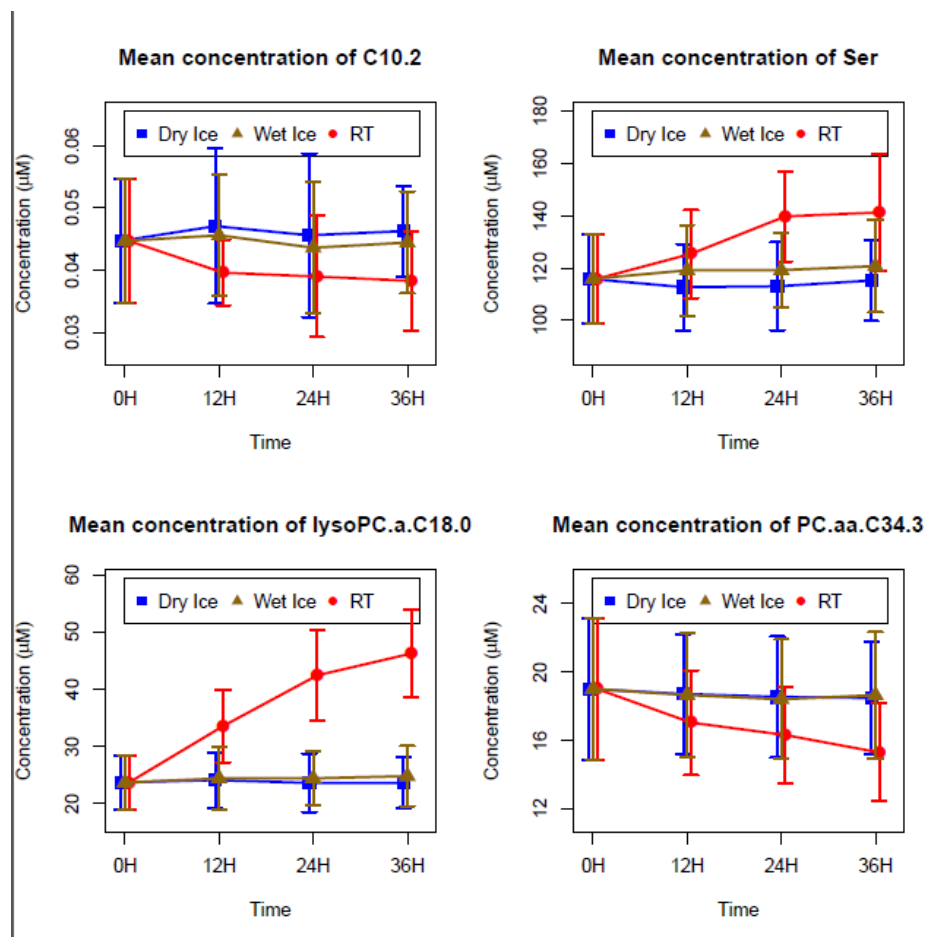


Anton et al (2015)  
PLoS ONE 10 (3)



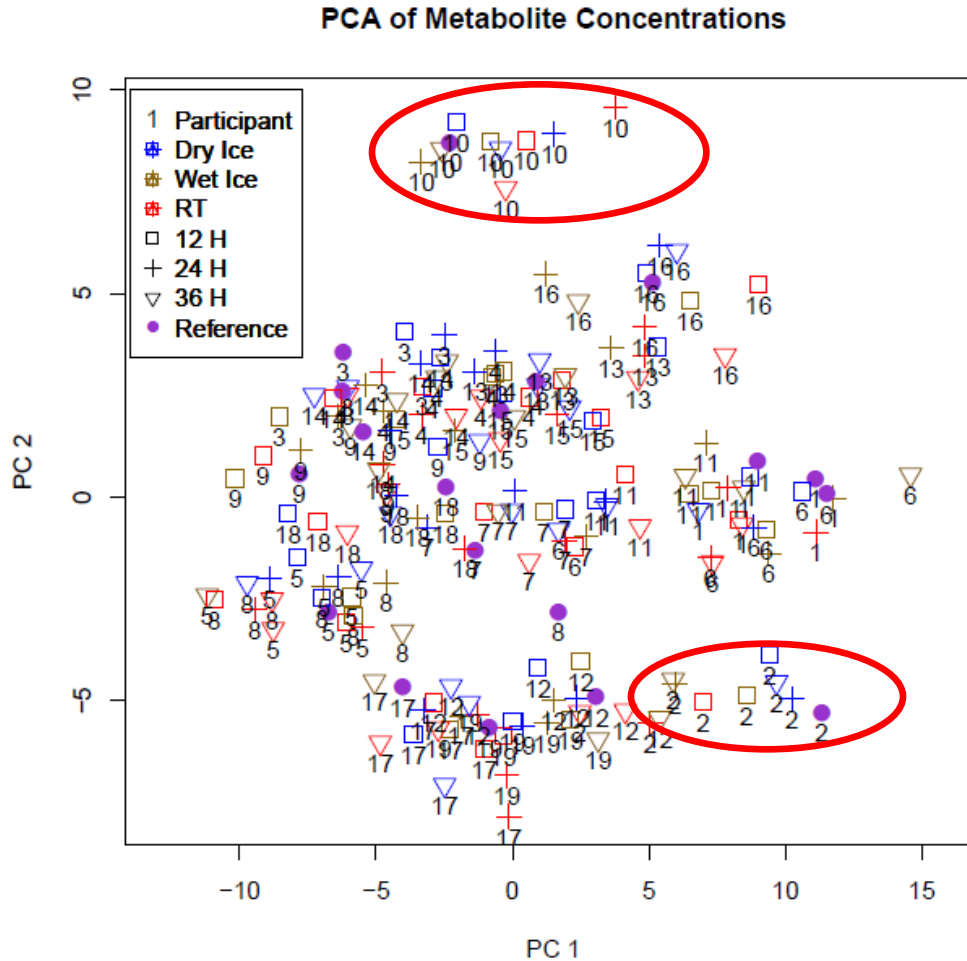
Thawing for metabolomic analysis (targeted approach, Biocrates p150)

# Effect of handling conditions on single metabolites



24 out of 127  
metabolites with  
significant  
concentration  
changes

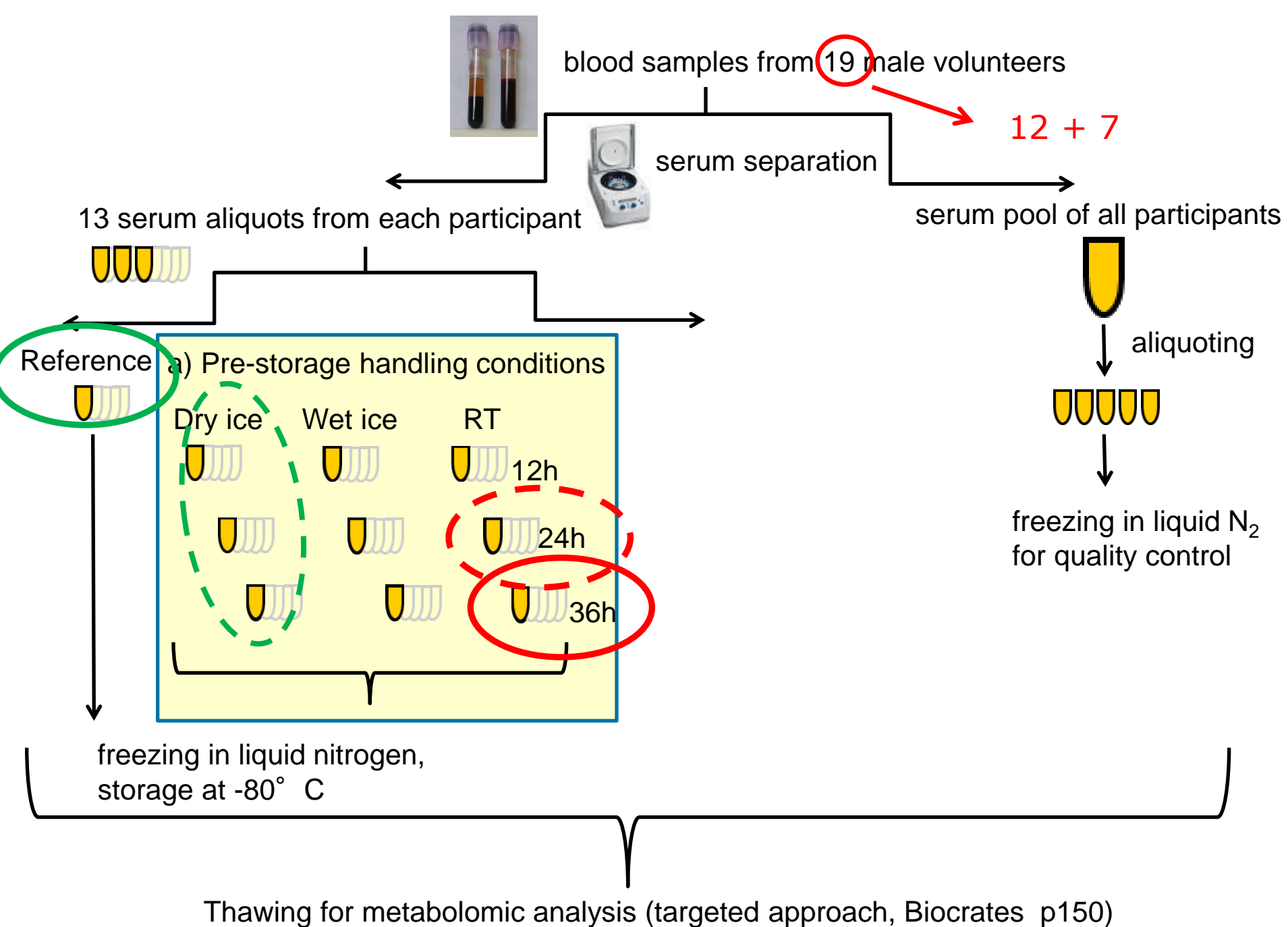
# PCA: Samples cluster according to donor



# Metabolite ratios – statistical analysis

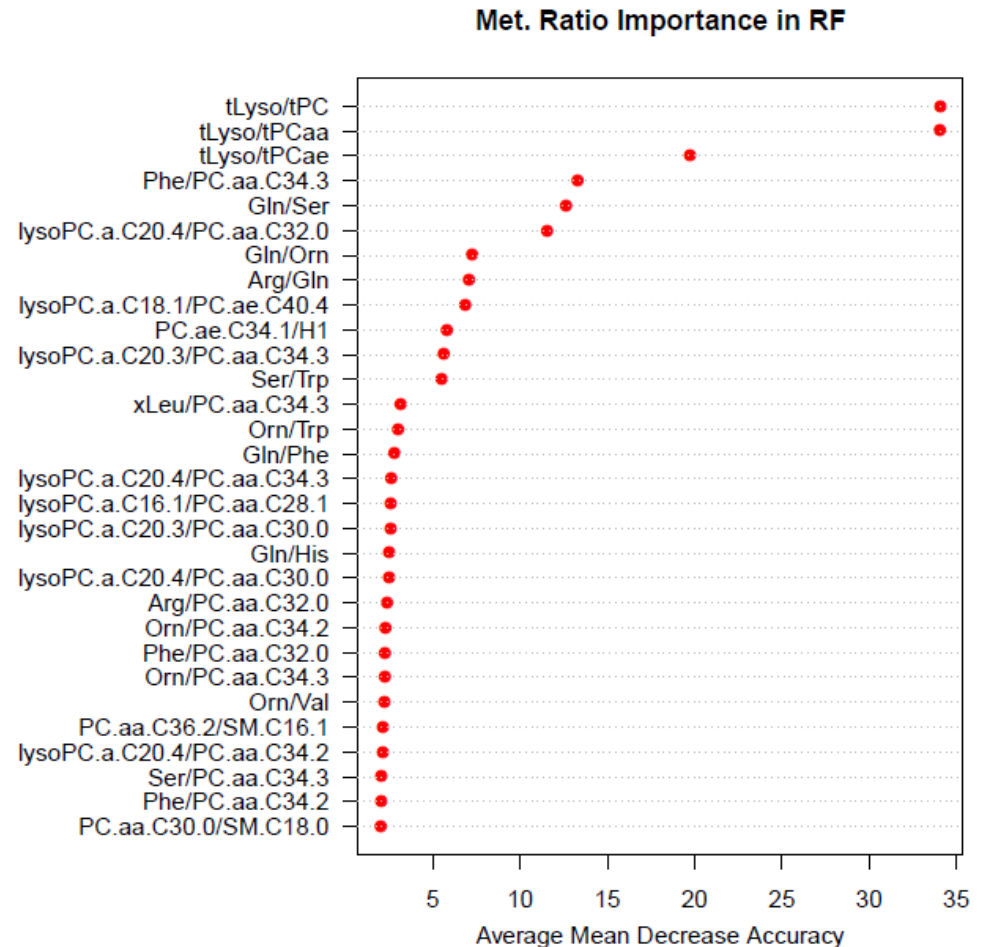
- metabolite ratios to account for individual differences
- p-gain: change in p-value of ratio compared to smaller of the individual p-values
  - 235 ratios with significant p-values and p-gains + 4 sum ratios
- Definition of “good” and “bad” quality samples
- Training set (12 probands) and test set (7 probands)





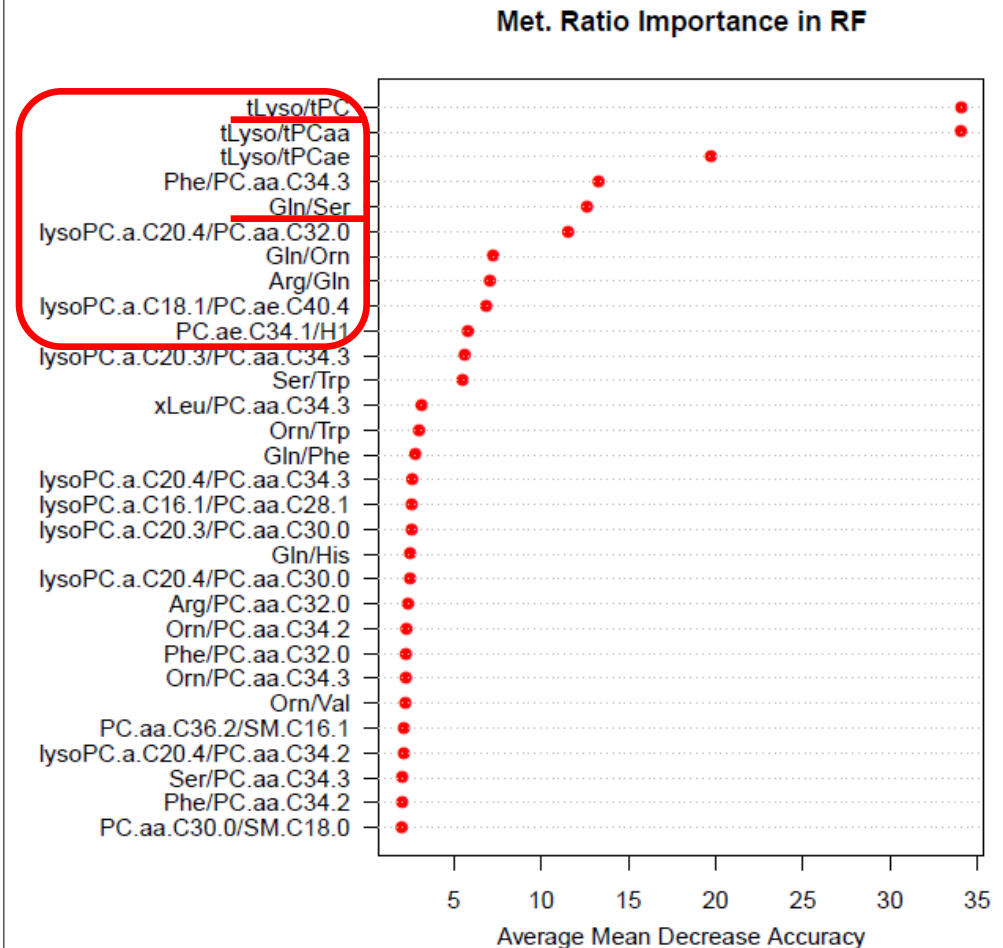
# 1st step: Metabolite Ratios for group distinction

- determination of most important metabolite ratios for group distinction ("good" vs. "bad") by Random Forest Analysis

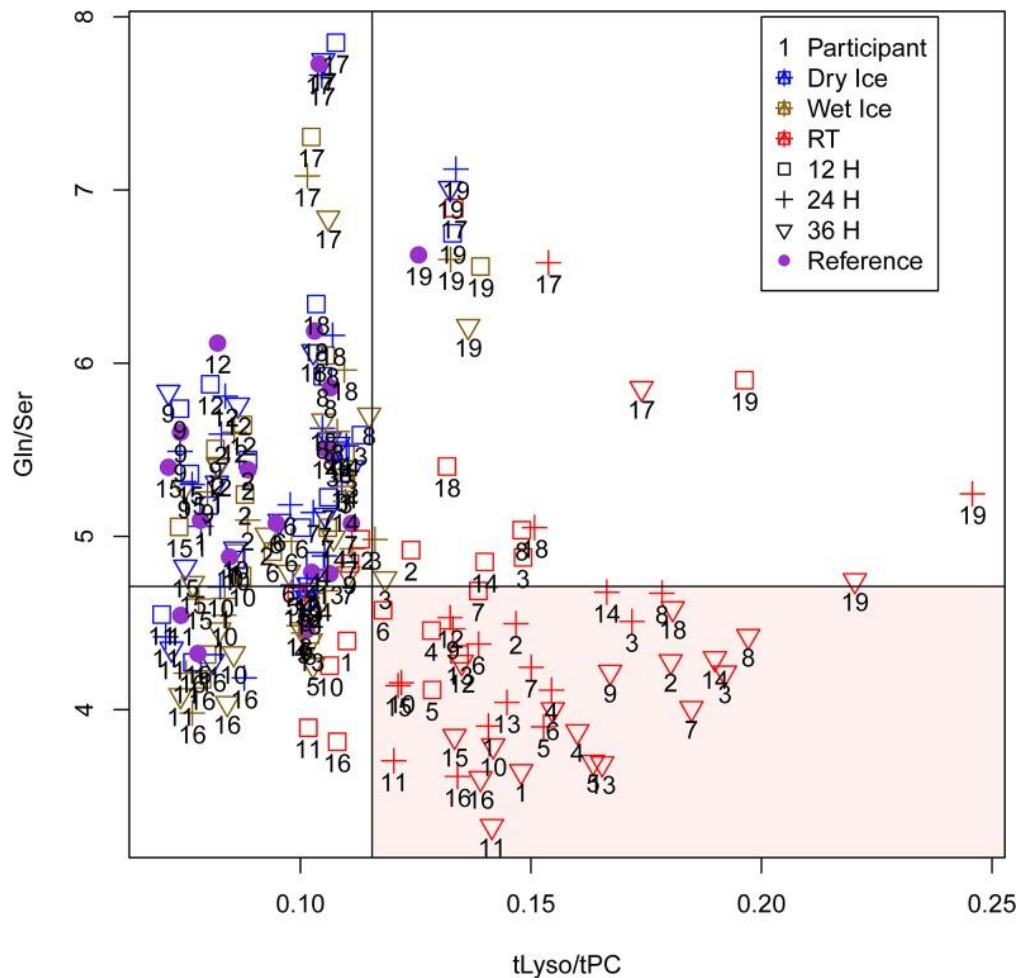


# 2st step: classification tree using top ten variables

- Classification tree uses only tLyso/tPC and Gln/Ser as branching points → two different metabolic pathways



# tLyso/tPC and Gln/Ser as intrinsic markers for sample quality



cut-off-values for prolonged RT storage:

$$\begin{aligned} tLys/tPC &\geq 0.12 \\ Gln/Ser &\leq 4.71 \end{aligned}$$

Misclassification rates:

0.042 (3/72) - training set  
0.048 (2/42) - test set

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Thank you!!!