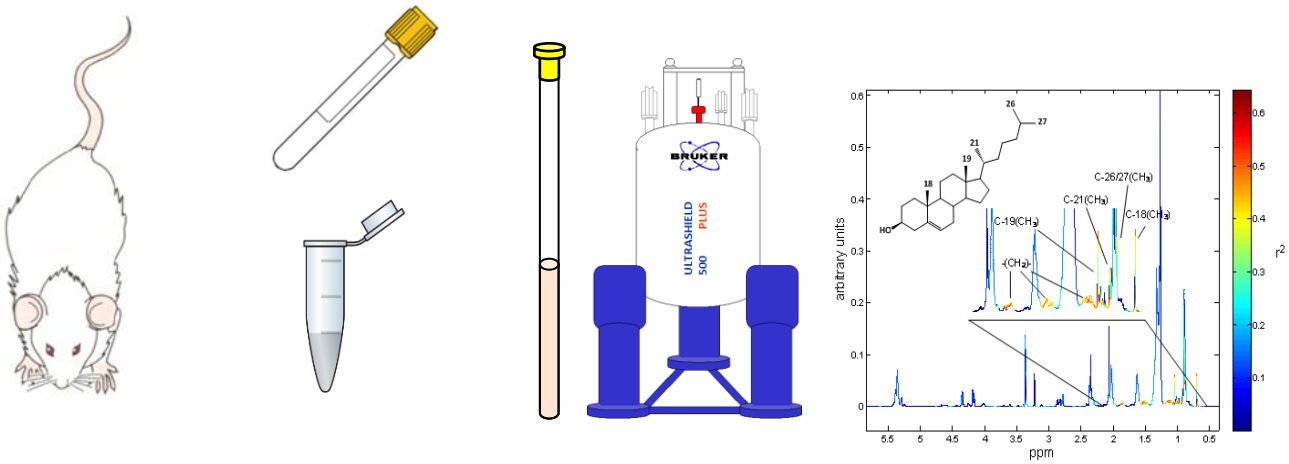
Serum/plasma metabolite profiling *in animal models is highly relevant since it allows simultaneous monitoring of up to several tens of metabolites in the same analysis. Thus, it represents a superb opportunity in the global assessment of the metabolic status in health and disease .*



Principle

Simultaneous identification and relative quantization of up to several tens metabolites in mouse/rat serum/plasma extracts using ^{1}H-NMR spectroscopy. **Proton nuclear magnetic resonance** may detect metabolites which are present at high concentrations (greater than **10 µM**).

Easy and Fast Sample Treatment/ High-throughput Analysis

500 µl of serum/plasma are submitted to dual (lypophilic ($CHCl_3$/MeOH) and hydrophilic (MeOH /H_2O)) extraction and ^{1}H-NMR spectra are recorded on each one of the extracts.

Wide range of metabolites covered

Serum/Plasma (aqueous extract)		Serum/Plasma (lipidic extract)	
2-Oxoisocaproate	Glutathione (Oxi)	ARA+EPA	Total Cholesterol
3-Hydroxybutyrate	Glycine	DHA	Total Phospholipids
3-Methyl-2-Oxovalerate	Isobutyrate	Diglycerides	Triglycerides
Acetate	Isoleucine	Esterified Cholesterol	
Alanine	Lactate	Free Cholesterol	
Alpha-glucose	Leucine	Linoleic acid	
Beta-glucose	Lysine	Lysophosphatidylcholine	
Beta-hydroxybutirate	Methionine	Monoglycerides	
Butyric acid (Nq)	Phenylalanine	MUFA	
Cholines	Pyruvate	Oleic acid	
Creatine	Serine	Omega 3	
Creatinine	Taurine	Phosphatidylcholine	
Formate (Nq)	Threonine	Phosphatidylethanolamine	
Free glycerol	Tryptophan	Phosphatidylserine	
Glucose	Tyrosine	Plasmalogen	
Glutamate	UTP/UDP/UMP	PUFA	
Glutamine	Valine	Sphingomyelin	

Raw Serum/Plasma	
3-hydroxybutyrate	Glycine
Acetate	Isobutyrate
Acetone	Isoleucine
Alanine	Lactate
Alpha-glucose	Leucine
Beta-glucose	O-acetylcarnitine
Cholines	Proline
Citrate	Serine
Creatine	Threonine
Creatinine	T-methylhistidine
Formate	Tyrosine
Glucose	Valine
Glutamine	

** The identification of the above list of metabolites will depend on the metabolic or pathologic status of the study samples as well as the quality of the extraction.*

Data Analysis

^{1}H-NMR spectra identification and interpretation. Semi-quantization of metabolites identified. Basic univariate statistical test. Use of advanced statistical, chemometric, multivariate and artificial intelligence algorithms to handle high-troughput metabolomics data sets and turn them into useful clinical information (PCA, PLS-DA, ANNs). Identify metabolic relationships, mechanism, functions and pathways in the experimental data and mapping of relevant pathways.

Advantages:

Semi-quantitative results, low cost per sample, high-throughput analysis.

Wide range of applications:

Phenotyping of genetically modified animals; Toxicology (drug toxicity and pre-clinical drug candidate safety assessment); Biomarker Discovery; Clinical studies (Diagnose and therapeutic efficacy); Monitoring of diet-related health phenotyping.

References:

Vinaixa, M. et al., J. Proteome Research. 2010; 9(5):2527-2538.

Samino, S. et al., Biochimie. 2013; 95(4):808-816.

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