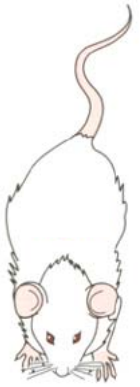
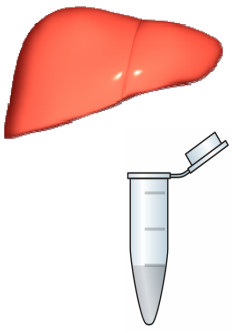
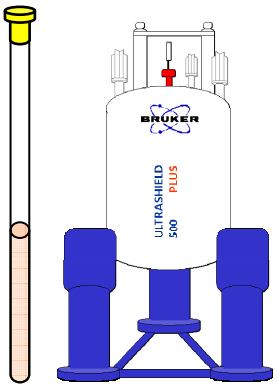
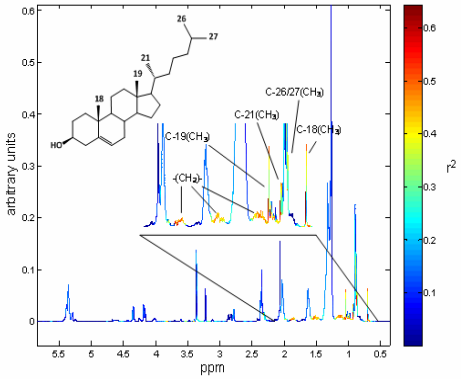
^{1}H-NMR METABOLITE PROFILING ON MOUSE/RAT LIVER EXTRACTS

Liver 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 of the liver.









Principle

Simultaneous identification and relative quantization of up to several tens metabolites in mouse/rat liver tissue extracts using ^{1}H-NMR spectroscopy.

A wide range of metabolites covered

Lipid-soluble metabolites: Total Cholesterol; Free Cholesterol; Esterified Cholesterol; Triglycerides; Diglycerides; Monoglycerides; Total phospholipids; Phosphatidylcholine; Phosphatidylethanolamine; Phosphatidylinositol; Phosphatidylserine; Phosphatidylglycerol; Lysophosphatidylcholine; Sphingomyelin; Plasmalogen; Polyunsaturated fatty acids (PUFAs): ω-3(DHA+ EPA+ linolenic); ARA+EPA; DHA; oleic, linoleic.

Watter-soluble metabolites: Glucose-6-Phosphate; Glucose-1-Phophate; UDPG; Pyruvate; 3-hidroxybutyrate; Lactate; Fumarate; Free glycerol; NAD/NADP/NADPH; ATP/ADP/AMP; UTP/UDP/UMP; Uracil; Carnitine; Cholines; Acetates; Ascorbic acid; Leucine; Valine; Alanine; Isoleucine; Lysine; Glutamine; Glutamate; Methionine; Phenylalanine; Threonine; Tyrosine; Histidine; Taurine; Glutathione (oxidized); Creatine; Creatinine

Easy and Fast Sample Treatment/ High-throughput Analysis

50 mg of fresh liver tissue are submitted to dual (lypophilic ($CHCl_3$/MeOH) and hyrohphilic (CH_3CN/H_2O)) extraction and ^{1}H-NMR spectra are recorded on each one of the extracts.

Data Analysis: Move Beyond the Statistical Analysis to Novel Biological Insights

^{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.

Reference:

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

METABOLOMICS platform

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