

# Groupe de RMN Biomédicale



## **Coordinator:**

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## **Permanent staff:**

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## **International collaborations:**

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## **National collaborations:**

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**The group belongs to the Metabolomics  
& Fluxomics Platform MetaToul**  
[www.metatoul.fr](http://www.metatoul.fr)

## **Research topics:**

Three key-words define our research: NMR, drugs and biomarkers. Three main topics are developed:

▫ **NMR-based metabolomics to find biomarkers by the means of conventional and HR-MAS NMR**

- **Matrixes: biofluids (plasma, CSF), cells, animal or human tissues**
- **Pathologies: glioblastoma, Alzheimer's disease, melanoma, leukemia**

▫ **Quality control of drugs with conventional and DOSY NMR**

▫ **Metabolism and toxicity of fluorinated or phosphorated drugs by  $^{19}\text{F}$  or  $^{31}\text{P}$  NMR**

## **Selection of recent publications :**

Two-Dimensional DOSY experiment with Excitation Sculpting water suppression for the analysis of natural and biological media  
S. BALAYSSAC, M.A. DELSUC, V. GILARD, M. MALET-MARTINO, Y. PRIGENT  
[Journal of Magnetic Resonance, 196, 78-83 \(2009\)](#)

Combining two-dimensional Diffusion-Ordered Nuclear Magnetic Resonance spectroscopy, Imaging Desorption Electrospray Ionization Mass Spectrometry and Direct Analysis in Real Time Mass Spectrometry for the integral investigation of counterfeit pharmaceuticals  
L. NYADONG, G. HARRIS, S. BALAYSSAC, A. GALHENA, M. MALET-MARTINO, R. MARTINO, R. PARRY, M. WANG, F. FERNANDEZ, V. GILARD  
[Analytical Chemistry, 81, 4803-4812 \(2009\)](#)

2D and 3D DOSY  $^1\text{H}$  NMR, a useful tool for analysis of complex mixtures: application to herbal drugs or dietary supplements for erectile dysfunction  
S. BALAYSSAC, S. TREFI, V. GILARD, M. MALET-MARTINO, R. MARTINO, M.A. DELSUC  
[Journal of Pharmaceutical and Biomedical Analysis, 50, 602-612 \(2009\)](#)

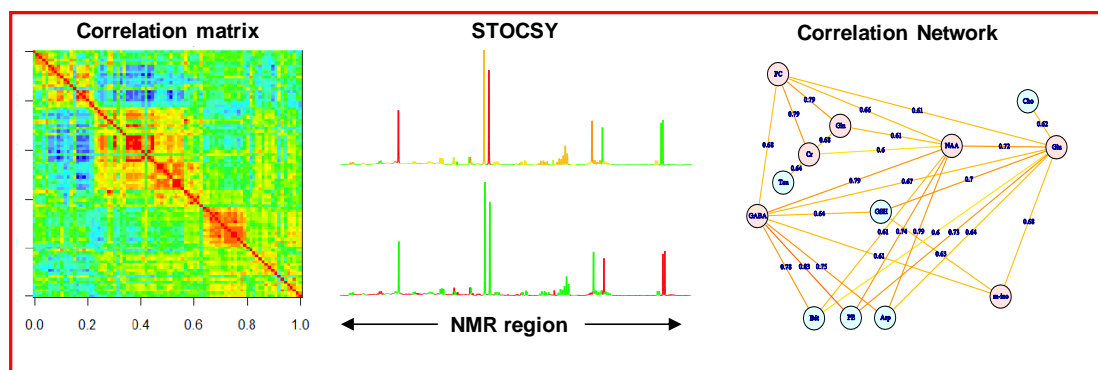
Improving metabolite knowledge in stable atherosclerosis patients by association and correlation of GC-MS and  $^1\text{H}$  NMR fingerprints  
J. TEUL, F.J. RUPEREZ, A. GARCIA, J. VAYSSE, S. BALAYSSAC, V. GILARD, M. MALET-MARTINO, J.-L. MARTIN-VENTURA, L.M. BLANCO-COLIO, J. TUÑÓN, J. EJIDO, C. BARBAS  
[Journal of Proteome Research, 8, 5580-5589 \(2009\)](#)

Analysis of hydrophilic and lipophilic choline compounds in radio-resistant and radiosensitive glioblastoma cell lines by HILIC-ESI-MS/MS  
D. DESOUBZDANNE, C. CLAPAROLS, N. MARTINS-FROMENT, C. ZEDDE, S. BALAYSSAC, V. GILARD, F. TERCÉ, R. MARTINO, M. MALET-MARTINO  
[Analytical and Bioanalytical Chemistry, 398, 2723-2730 \(2010\)](#)

# HIGHLIGHTS

## NMR-based metabolomics

Metabolomics is a field of study that attempts to detect all the low molecular weight organic metabolites in biofluids, cells, tissues or whole organisms, and applies chemometric methods to identify their key, but potentially subtle changes, as consequence of multiple context-dependent factors including genetics, diet, life-style, environment, disease state and pharmaceutical interventions. NMR-based metabolomics is used by the group for the analysis of biofluids, cell or tissue extracts in relation with various diseases.



## DOSY NMR

DOSY (Diffusion-Ordered Spectroscopy) NMR is a method particularly well adapted for uncovering counterfeit drugs or adulterated herbal medicines as it provides both comprehensive information on the formulation and a virtual separation of the components of the mixture based on the difference in their translational self-diffusion coefficients in solution, thus leading to a “spectral signature”. Ciprofloxacin, fluoxetine (Prozac®), sildenafil (Viagra®), tadalafil (Cialis®), artesunate (Arsumax®) and “herbal” drugs marketed as slimming products or for sexual dysfunction were analyzed by the group.

