



## METABONOMICS-based RESEARCH at UMONS

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# UNONS Université de Mons



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School of Medicine and Pharmacy

#### Department of Human Biology & Toxicology

http://portail.umons.ac.be/FR/universite/facultes/fmp/services/toxico/Pages/default.aspx







NMR background at UMONS

Since 1980, laboratory of Organic Chemistry

Research

Interest in the development of Contrast Agent

for MRI

 $\Rightarrow$  Relaxometry & MRI

 $\Rightarrow$  Profs. Robert Muller and L. Vander Elst  $_{5}$ 

NMR-based Metabonomics background at UMONS

• From 2000 - 2005 COMET (Consortium of MBX

in Toxicology)

- Initiated by J. Nicholson's team
- Including Imperial College and 6

Pharmaceutical companies





#### <u>Consortium on Metabonomic in Toxicology</u>



#### **COMET: Control Model**

# Identifying abnormal urine samples

- > 4521 "normal" urine samples
- > PCA-based approach

Determine the distance to the model (DmodXPS+) as well as the probability of belonging to the model (PmodXPS+):



Prediction and Classification of Drug Toxicity Using Probabilistic Modeling of Temporal Metabolic Data: The Consortium on Metabonomic Toxicology Screening Approach T. Ebbels, H. Keun, O. Beckonert, M. Bollard, J. Lindon, E. Holmes, and Jeremy K. Nicholson Journal of Proteome Research/2007 COMET: CLOUDS Model (Classification Of Unknowns by Density Superposition) Prediction and Classification of Drug Toxicity Using Probabilistic Modeling of Temporal Metabolic Data: The Consortium on Metabonomic Toxicology Screening Approach T. Ebbels, H. Keun, O. Beckonert, M. Bollard, J. Lindon, E. Holmes, and Jeremy K. Nicholson Journal of Proteome Research/2007

#### Identifying toxicity type

> PNN-based model (Probabilistic Neural Network – Specht 1990)



#### Test sample

#### **OCTOBER 2008**

#### Laboratory of Human Biology & Toxicology

School of Medicine & Pharmacy

#### UMONS

Develop & Apply tools in Predictive Toxicology including :

- QSAR models
- Cell cultures
- in vivo studies in rodents and invertebrates
- METABONOMICS













In collaboration with the Chemistry Dpt (Prof. Sophie Laurent & Dr. Céline Hénoumont) Initial research interest in the group :

Metabonomics signatures of drug-

induced adverse effects

- Liver, Kidney and cardiac toxicities
- Special focus on mitochondria





Sarcosine, mediator of trophoblast differentiation. From its discovery through an in vivo metabonomic approach to its validation in a trophoblastic stem cell model





Evaluation of perturbations of mitochondrial biochemical pathways by metabonomic approach





Hypertension and hypothyroidism as potential biomarkers of the efficacy of Sunitinib, a tyrosine kinase inhibitor





Contribution of an integrated approach combining metabonomics and proteomics in the characterization and prediction of the toxic effects of xenobiotics. Application to the particular case of acetaminophen (APAP) and its meta isomer (AMAP) UMONS = 2017



## IN 2012 NEW RESEARCH CENTER

## **UMHAP**









# From benchtop to bedside ....

## To facilitate translational studies and better transpose lab results to clinics

#### ACCESS to phase I clinical studies



#### **KIDNEY CANCER**

UMONS = 2017

## ATTRACTIVE RESEARCH ENVIRONMENT FOR INDUSTRIAL PARTNERS



CARDIATIS Sponsor of Dorian Maroil PhD thesis



#### ACADEMIC PARTNERSHIPS







#### **CORENTIN SCHEPKENS**

FNRS CONTACT GROUP ULG : Profs. P. De Tullio, M. Frederich UCL : Prof. B. Govaerts KUL Prof. J. Swinnen LIPIDOMICS LYSOCAN (PhD thesis)

### WALLONIA PUBLIC FUNDING

#### **GREENWIN PROJECTS**

#### MEMORIS DUFERCO & SITEREM

+ academic partners



#### AUDE DEVALCKENEER



#### METABONOMICS in ECOTOXICOLOGY



## OUR NEAR FUTURE ... 2018 EU FUNDING BIOPROFILING UNIT





## ACADEMIC PROJECTS

#### OPEN to PRIVATE PARTNERS





## VIRGINIE ZEHRA DELSINNE **THANK YOU !** KAHVECIOGLU

## Winners of UMONS scholarships





#### MATTHIEU DALLONS

#### MANON DELCOURT

#### **GOOD LUCK !**



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- Tagliatti Vanessa, Colet Jean-Marie, "Drug-Induced Impairment of Mitochondrial Fatty Acid Be- ta-Oxidation: A Metabonomic Evaluation in Rats" in HSOA Journal of Medical Genomics and Biomarkers, 3, 005 (2016)
- Duquesne Marilyn, Decleves Anne-Emilie, Deprez Eric, Nortier Joëlle, Colet Jean-Marie, "Interest of metabonomic approach in environmental nephrotoxicants : Application to aristolochic acid epxosure" in Food & Chemical Toxicology (2017)
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- 3-10, DDTEC428 (2015)
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