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Wastewater-based Epidemiology

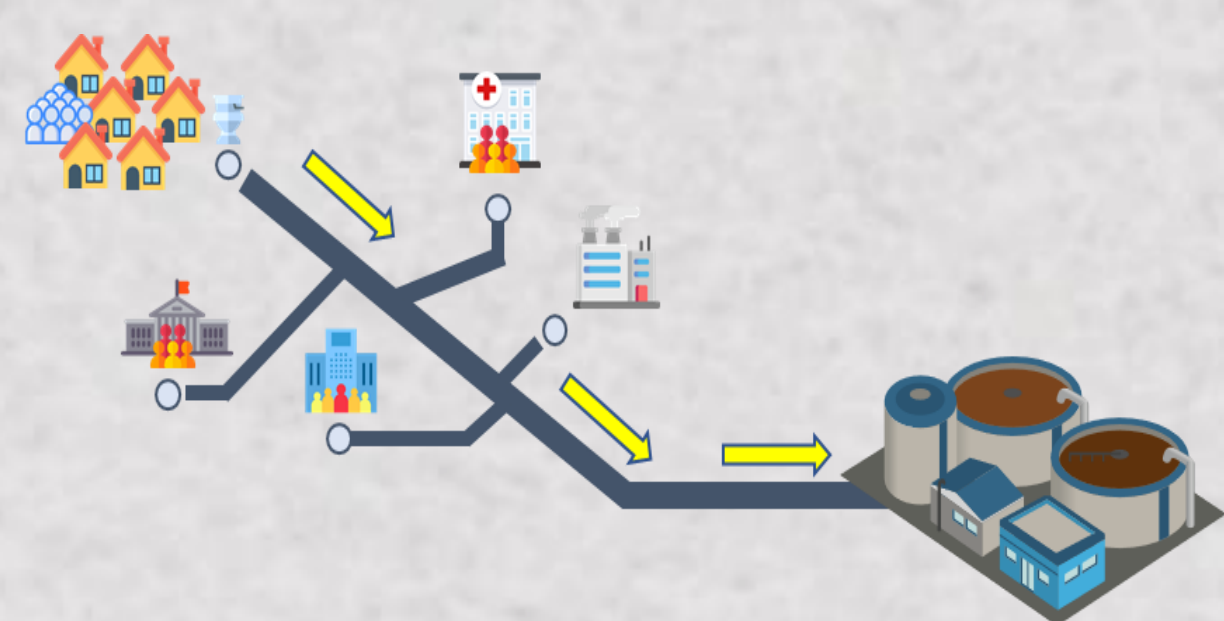
Wastewater as a mirror of the society

What?

- Analysis of spatio-temporal trends of use of drugs and pharmaceuticals
- Investigating lifestyle (e.g. tobacco & alcohol use) and health aspects (e.g. exposure to toxicants) of communities
- Screening for new psychoactive substances (NPS)

How?

- Wastewater = "pooled urine sample" of a large population
- Reflects disease, lifestyle and exposure
- European network of wastewater analysis



Environmental Contaminants

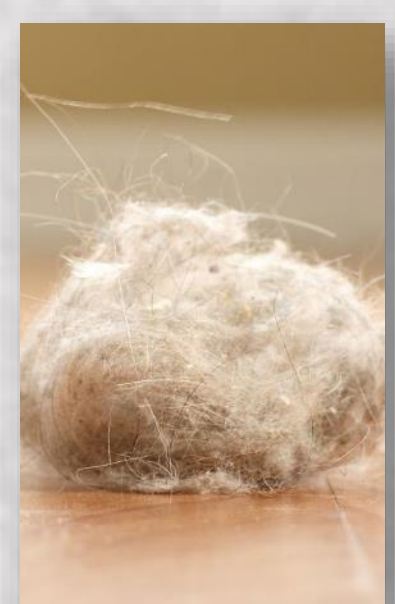
Human exposure and health impact for POPs, flame retardants, plasticizers, pesticides, PFAS, and other emerging contaminants

What?

- Chemicals with endocrine disruptive properties and widespread exposure
- Via food, water, dust ingestion, air, dermal contact, ...
- Presence in building materials, furniture, personal care products, food contact materials, ...
- Chemical safety of edible insects & other novel foods

How?

- Identification and evaluation of emerging contaminants
- Characterization of human exposure pathways to chemicals
- Human biomonitoring studies
- Characterization of pharmacokinetics
- Risk evaluation & assessment



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Forensic & Clinical Toxicology

Forensic analysis as a toxicological tool for justice, patients & physicians

What?

- Alcohol & drugs of abuse in traffic (oral fluid and blood)
- Post-mortem toxicological screening
- Monitoring adherence, abstinence & chronic abuse via hair and/or nail analysis
- Therapeutic drug monitoring
- Drug analysis in seizures



How?

- Biological samples: blood, urine, oral fluid, organs, vitreous humour, ...
- Hair & nails
- Seized chemicals, powders, tablets, plant materials, ...

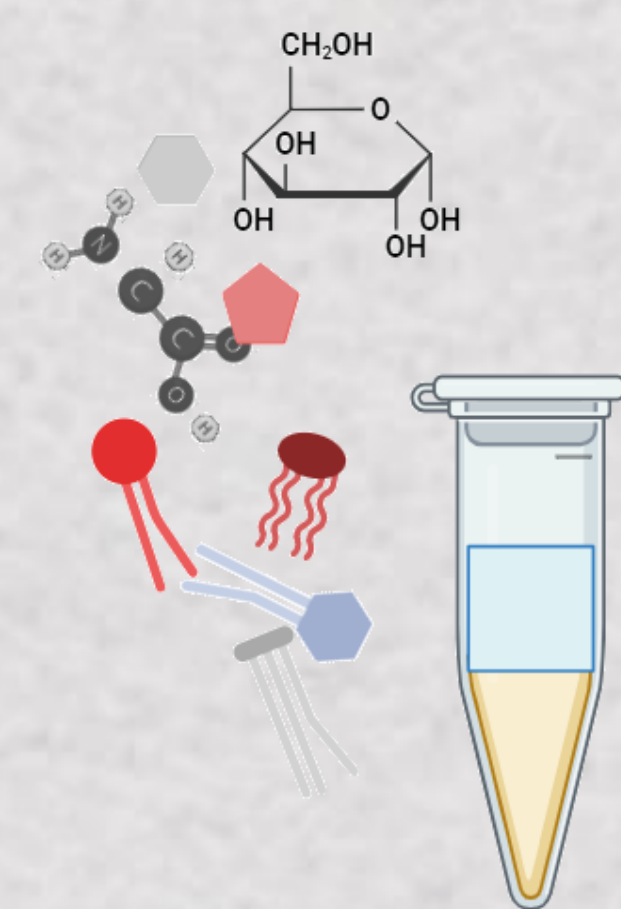


In vitro metabolism & Metabolomics

Studying human metabolism using *in silico*, *in vitro* and *in vivo* methods

What?

- Prediction and elucidation of Phase I & II metabolites & metabolic pathways
- Characterization of alterations in endogenous metabolites (e.g. lipids, amino acids)



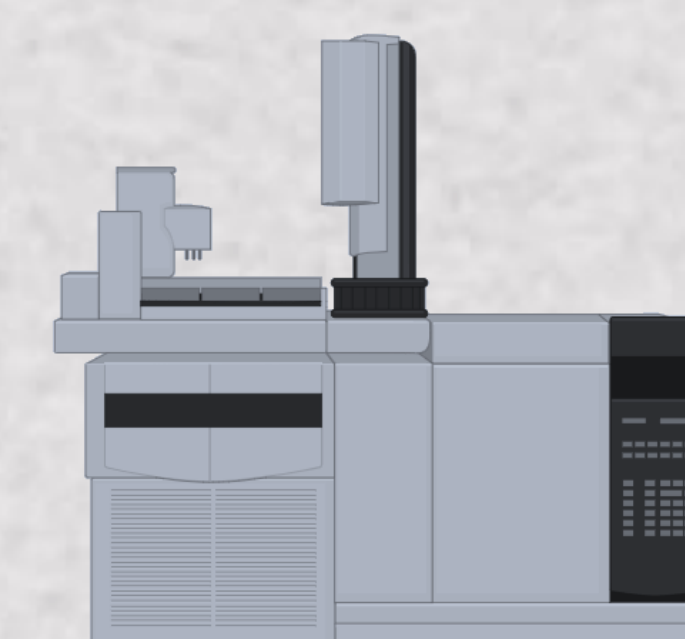
How?

- Elucidation of metabolism of chemicals using human liver microsomes (HLM) and S9 fractions
- Comparison of *in vitro* results with *in vivo* samples
- Biomarker discovery using metabolomics and lipidomics
- Bioinformatics and statistical tools
- Characterization of affected biochemical pathways for different matrices (cells, blood, vitreous humour, hair)

Analytical Techniques

Sample preparation

- Solid-phase extraction (SPE & μ SPE)
- Liquid-liquid extraction (LLE)
- Soxhlet extraction



Analysis

- LCxLC-IM-QTOF-MS
- LC-QTOF-MS
- LC-MS/MS
- LC-DAD/FLU
- GC-MS and GC-MS/MS
- GCxGC-QTOF-MS
- Headspace-GC-FID

