

# RECETOX RESEARCH INFRASTRUCTURE

## OPEN ACCESS



RECETOX  
Research Infrastructure

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### Description of the RECETOX RI

The RECETOX RI addresses problems related to the environment and health, i.e. it supports research on various (not exclusively environmental) determinants of human health. The assessment of environmental and human exposure to toxic chemicals, related effects, and risks have been a main focus of the parent RECETOX Centre for several decades. The RECETOX RI was originally built to support analyses of various anthropogenic and natural toxins in environmental matrices as well as in biological tissues.

As a result, data management, interpretation, and visualization tools were developed to hold environmental data from various providers at the national and international levels and make them accessible to the scientific community and for reporting under international legislation.

Since 2012, the establishment of a core unit supporting epidemiological studies and complementing the existing environmental and human exposure and risk assessment RI finally allowed for multidisciplinary research addressing the complex issue of the exposome (i.e. multiple factors affecting human health).

The joint capacities of the RECETOX RI three core facilities bring together the interdisciplinary expertise on environmental science, social science, biomedicine, and informatics necessary to address the most relevant European research priorities and societal challenges.

### RI Research Areas

1. Environmental science (major)
2. Biomedicine (major)
3. Informatics/e-infrastructures (minor)
4. Social studies and humanities (minor)

State of the art research infrastructure is effectively distributed among research teams; in addition, some infrastructure has been centralized in three core facilities:

TRACE ANALYTICAL LABORATORIES

GENASIS INFORMATION SYSTEM

ELSPAC DATABASE



### RECETOX Research Infrastructure (RI) comprises

#### Trace analytical laboratories (TAL)

##### Instrumentation

Instruments available in the TAL are high and low volume air sampling devices for quantification of human exposure via gas and particle phases of air, cascade impactors for selective sampling of atmospheric particles, wet deposition samplers, and air and water passive sampling devices.

These techniques are used in field studies but can be also employed for characterization of public, occupational and residential indoor environments. The TAL operates the MONET international passive air monitoring networks as well as the integrated POPs monitoring programme at the EMEP Central European background station in Kosetice, Czech Republic.

Analytical instruments used for detecting residues of organic and inorganic compounds in abiotic and biotic matrices includes: high resolution mass spectrometers (HR MS), Thermo Scientific HRMS DFS equipped with two Thermo HR GC Trace 1310 gas chromatographic systems, Agilent qTOF with Agilent liquid and gas chromatographs (LC and GC), two inductively coupled plasma (ICP) MS systems combined with Agilent 7500ce LC and GC, AB-SCIEX MS-MS QTRAP mass spectrometer with Agilent LC, MS-MS XEVO TQ-S mass spectrometer with Waters LC, APGC MS-MS XEVO TQ-S mass spectrometer with Agilent GC and others.

##### Analytes

This instrumentation allows quantification of a broad range of analytes such as:

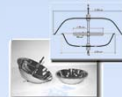
- polychlorinated and brominated dioxins and furans,
- polychlorinated and brominated biphenyls,
- short- and medium-chain chlorinated paraffins,
- polycyclic aromatic hydrocarbons,
- organochlorine and currently used pesticides,
- brominated and organophosphorus flame retardants,
- perfluorinated surfactants, artificial musks, alkylphenols,
- estrogenic compounds and phytoestrogens,
- cyanotoxins, pharmaceuticals, sweeteners,
- toxic metals and organometallic compounds.

##### Accreditation

Many of these analytical methods have been accredited according to EN ISO/IEC 17025.

##### Capacity

The capacity of the TAL is open to the international scientific community and it has been already used in many national and international research and capacity building projects.



#### GENASIS information system

Environmental databases (GENASIS at [www.genasis.cz](http://www.genasis.cz) and GMP at [www.pops-gmp.org](http://www.pops-gmp.org)) store data from global environmental monitoring (Global Air Passive Sampling - GAPS, MONET, EMEP) and biomonitoring (World Health Organisation /United Nations Environment Programme) programmes, provide tools for national and regional reporting under international environmental conventions on chemicals (e.g. the GMP under the Stockholm Convention) and present outcomes to the scientific community, decision makers, and the general public. International capacity building programmes/courses supporting global use of these databases are provided on a regular basis.

#### ELSPAC database

The ELSPAC epidemiological database ([www.elspac.cz](http://www.elspac.cz)) contains multidimensional long-term (two decades) data characterizing the socio-economic environment of participating families, their history, lifestyle, habits, activities, diet, housing, employment as well as relations, stressors, including information on the physical and psychiatric/mental health of family members, their behaviour and successes. Multidisciplinary research teams from the Czech Republic and abroad currently use ELSPAC data to address individual factors affecting human health and well-being. Specimen banking/biobanking technologies supporting future follow-up, nested and complementary studies are under development.

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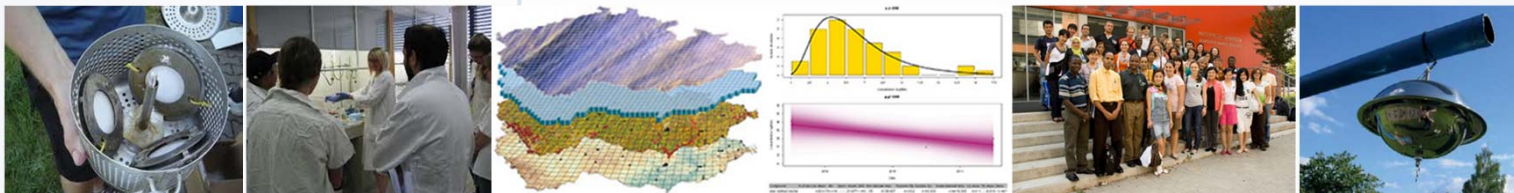
### OTHER AVAILABLE INSTRUMENTATION, EXPERTISE AND SERVICES OF RECETOX RI

Open access is also available to specialized technologies distributed among four research programmes.

The **Environmental Chemistry programme** provides process laboratories for simulation of environmental processes (volatilization, sorption, penetration, bioaccumulation, degradation - including extreme conditions such as walk-in cold rooms). A complementary set of laboratory organisms allowing toxicity and ecotoxicity studies of chemicals and their mixtures, and also complex equipment for cell and molecular toxicology is available in the **Ecotoxicology programme** (a set of ZEISS microscopes (Axio Imager, Axio Observer Z1), flow cytometer equipped with photographic recording (FlowCAM), microbial respiration assessment system (OxiTop) and GC-TCD on-line determination of gas concentrations (CO<sub>2</sub>, O<sub>2</sub>, CH<sub>4</sub>, alkanes)). Detailed mechanistic studies can be undertaken in the **Photochemistry programme** facilities - nanosecond laser flash spectroscopy (500 ps Nd-YAG laser), pump-and-probe spectroscopy (150 fs Ti: sapphire laser), optical bench for fast transient kinetic measurements, UV/VIS/NIR absorption spectroscopy, spectrofluorimeter, photochemical cryogenic photoreactors). Finally, the **Protein Engineering programme** offers technologies addressing relations between function and structure of enzymes (Stopped Flow and Rapid Quench Flow, CD spectrophotometer (Applied Photophysics) and Microcalorimeter ITC and DSC (MicroCal)).

This equipment has been used by many external visiting scientists.

RECETOX RI also organizes conferences, workshops, seminars, educational and training activities, and "capacity building". The most important event is the international summer school.



### APPLICATION PROCEDURE

External scientists interested in the use of the RI are requested to submit:

- application form (to download here: [www.recetox.muni.cz/RI](http://www.recetox.muni.cz/RI))
- CV of an applicant,
- motivation letter (explaining motivation for working with the RI, short description of the proposed research topic, experiments, and expected outcomes)
- recommendation letter from their supervisor

Documents are provided to the RI coordinator

The evaluation process consists of two steps:

- evaluation of technical feasibility of the proposed project by the leader of the relevant core facility
- evaluation of scientific quality by the RECETOX Board

At the end of this procedure, each applicant is informed about the outcome by the RI coordinator. Successful applicants are contacted by the leader of relevant RI core facility to discuss details (technical data, financial support). The proposals on use of the ELSPAC database are considered and approved by the ELSPAC Executive Board and Ethical committee.

### USE OF THE RESEARCH INFRASTRUCTURE



- 20% of the capacity of the infrastructure has been made available to the external users
- majority of them are foreigners



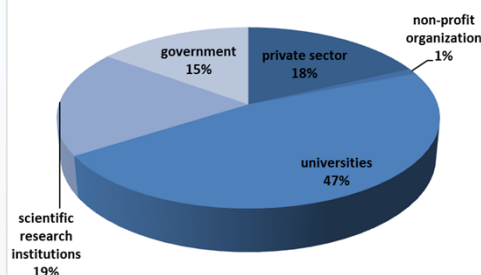
institutions cooperating with RECETOX  
new institutions, universities, industrial partners, national and regional authorities

#### Infrastructure's use in the last 5 years

- open access > 130 external users
- analytical capacity > 60 external users
- training and educational capacity > 200 external users



### RECETOX RI users are from



## We look forward to work with you !

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