Biobanking as an integral part of the RECETOX research infrastructures

Pavel Piler, Ph.D.
CELSPAC biobank
10. 03. 2023
WHO WE ARE

Masaryk University (1919)

Faculty of Science (1920)

RECETOX (1983)

CELSPAC Core Facility (2013)
FACTORS AFFECTING HEALTH DURING LIFE
CELSPAC POPULATION STUDIES

Longitudinal vs. Cross-sectional
Prospective vs. Retrospective
Observational vs. Intervention
Causal relationship vs. Association

since 2013 < 36 000 active participants
different age groups
multidisciplinary research
CELSPAC POPULATION STUDIES

• Birth cohort from 1991 – 1992
• Brno and Znojmo
• 7,589 mother-child pairs
• Followed for 20 years through the questionnaires
• Children re-examined as 30 years old = Young Adults cohort
• Re-examination of parents is planned = Ageing cohort

CELSPAC TNG

• The Next Generation – birth cohort
• 3000 mother-child pairs from 2018
• Exposome cohort
• Biobanking / Omics methods
• Online validated questionnaires / Health Records
CELSPAC POPULATION STUDIES

PROSECO
- Prospective seroprevalence coronavirus study (2020-2022)
- 30 000 participants from the Czech Republic
- Antibodies against SARS-CoV-2
- Three six-month-long periods (pandemic, vaccination, post-vaccination period)
- Rest of the samples in the biobank for further research

HAPIEE
- Czech Republic, Poland, Lithuania and Russia
- 30 000 participants aged 45-69 years
- Enrolled from 2002 to 2005; 3 waves of follow-up
- Association between rapid social and economic transition and population health
- Czech samples are stored in the CELSPAC biobank
RECETOX RI

Servis for excellent research

CELSpac core facility
Accredited mass spectrometry labs
IT core facility

CELSpac BioBank

blood, urine, buccal swab, faeces, breast milk

• Collection, manual and automatic processing and long-term storage of various types of biological material according to validated SOPs in QA/QC mode
• Basic biochemical and immunological characterization of the sample
• Long-term archiving under monitored conditions
High-quality samples for future research

- Reduced human errors (barcodes, QR codes)
- SBS format for next automatic (pre-)analysis
- Reduced cryotube size = saves storing space
- Uniforming vs. fluctuated sample temperature
- High-throughput processing of samples

CELSpac Biobank
automatic processing and storing
BIOMARKER ANALYTICAL LABORATORY

High-throughput quantitative assays for clinically relevant effect biomarkers.

MICROBIOME – METABOLOMICS – PROTEOMICS

LC-MS/MS, GC-MS/MS
Mass spectrometry labs

ELISA based multiplex
CELSpac core facility
Organic pollutants:

- Polychlorinated dibenzo-\(p\)-dioxins/furans (PCDDs/Fs)
- Brominated and organophosphorus flame retardants
- Organochlorine, cyclodiene, and polar pesticides
- Polycyclic aromatic hydrocarbons (PAHs), NOx-, and oxy-PAHs
- Perfluorinated compounds (PFAS)
- Pharmaceuticals and cosmetic products
- Bisphenols
- Thyroid hormones

Metabolites:

- OH-PAHs
- Phthalates metabolites + DINCH
- Pesticides metabolites

Trace elements, heavy metals, and species
DATA COLLECTION AND EXAMINATIONS

- Data management
  - Validated questionnaires
  - Health records
- Participant Management
- PR activity
- Examinations
- IT Infrastructure
CONCLUSION

• The biobank is an important infrastructure for research on factors affecting human health.
• The automated biobank brings high-quality samples for multi-omics research.
• The biobank is not isolated but integrated entity.

CELSpac core facilities provide these services:
• Datasets and samples from CELSpAC population studies
• Biobank capacity
• Analyses of environmental pollutants as well as metabolic/proteomic markers
Thank you for your kind attention