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Core Facility Day 2024
Life Sciences

16 OCTOBER, 2024
CEITEC, E35/211+ATRIUM

Curious about what expert services are available to researchers on campus? What instruments can you use in shared mode and under what conditions? Do you want to see everything for yourself?

Register at: muni.cz/go/fba265

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MUNI Sports Lab

Ivan Struhár

The primary research interests in our laboratories are to determine:

- the limits of the acute responses and chronic adaptations to exercise
- variety of physiological systems and fitness parameters
- person's cardiovascular, respiratory, and metabolic responses to physical activity as well as assess an individual's balance, flexibility, and power.

The overall aims of our focus are to investigate determinants of:

- sports **performance**
- **health effects** of exe

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Laboratory of Exercise Physiology

- portable high resolution spiroergometry system with Breath-by-Breath technology

- the system allows a complete medical analysis of the functionality of a person's lung, heart and metabolism at rest and under stress

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Laboratory of Muscle Strength Assessment

- measuring and improving human performance in the **clinic, athletic training room**, and **research laboratory**.

- **4 resistance modes** (isokinetic, isotonic, isometric, and passive), and numerous reports to meet the measurement and exercise needs of today's clinicians and researchers.

- includes isolated patterns covering the **shoulder, elbow, wrist, hip, knee, ankle, and back**.

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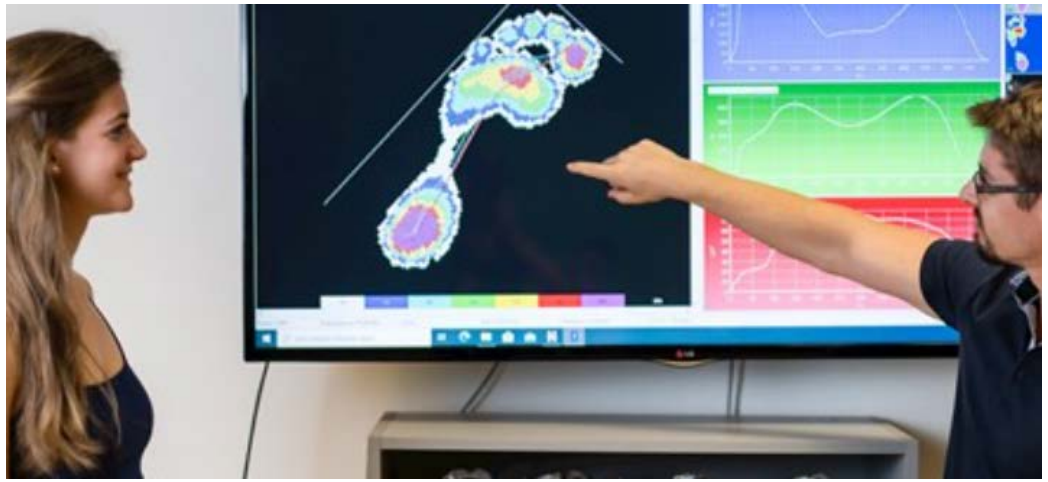
Laboratory of Motion Analysis

- force plates can be used to characterize biomechanical processes such as walking, running or jumping, for example, for performance diagnostics in sport, for clinical analyses or in research
- force plates contains piezoelectric sensors that measure the forces in the three main axes: the vertical, the horizontal and the transverse direction.



To answer specific questions in research or to analyse the movement of the centre of mass.

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Laboratory of Bone Densitometry and Body Composition Analysis

- high accuracy and precision, the DXA whole body scan is a more comprehensive way to measure body composition than methods like calipers, hydrostatic weighing, Bioelectrical Impedance Analysis (BIA), or Bod Pod

- f.e.Bone mineral density in elite athletes: the effect of body composition and long-term exercise

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Laboratory of Physical Therapy

- evaluation the physiological and pathological movement of an individual based on a kinesiological analysis.

- The laboratory serves both - for teaching practical seminars and also for research.

- Our students and researchers use this lab to measure data for their final Ttheses or larger research projects.

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Laboratory of Sport Performance Analysis

Increase performance

- Adapt training based on test results and strengthen the “weak” spots
- Plan individual **recovery phases** when needed
- Select the fittest athletes for the next game

Prevent injuries

- Prevent injuries by monitoring performance
- Adapt rehabilitation based on test results
- Make fast and **safe return-to-play** decisions by comparing test results to the former level or a reference
- Establish **successful rehab concepts** to reduce costs of rehabilitation for your valuable assets

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I value your willingness to hear my words 🙂

Mgr. Ivan Struhár, Ph.D.

Vice-dean for strategy and development FSpS MU
Head of the MUNISPORTSLab
struhar@fsps.muni.cz

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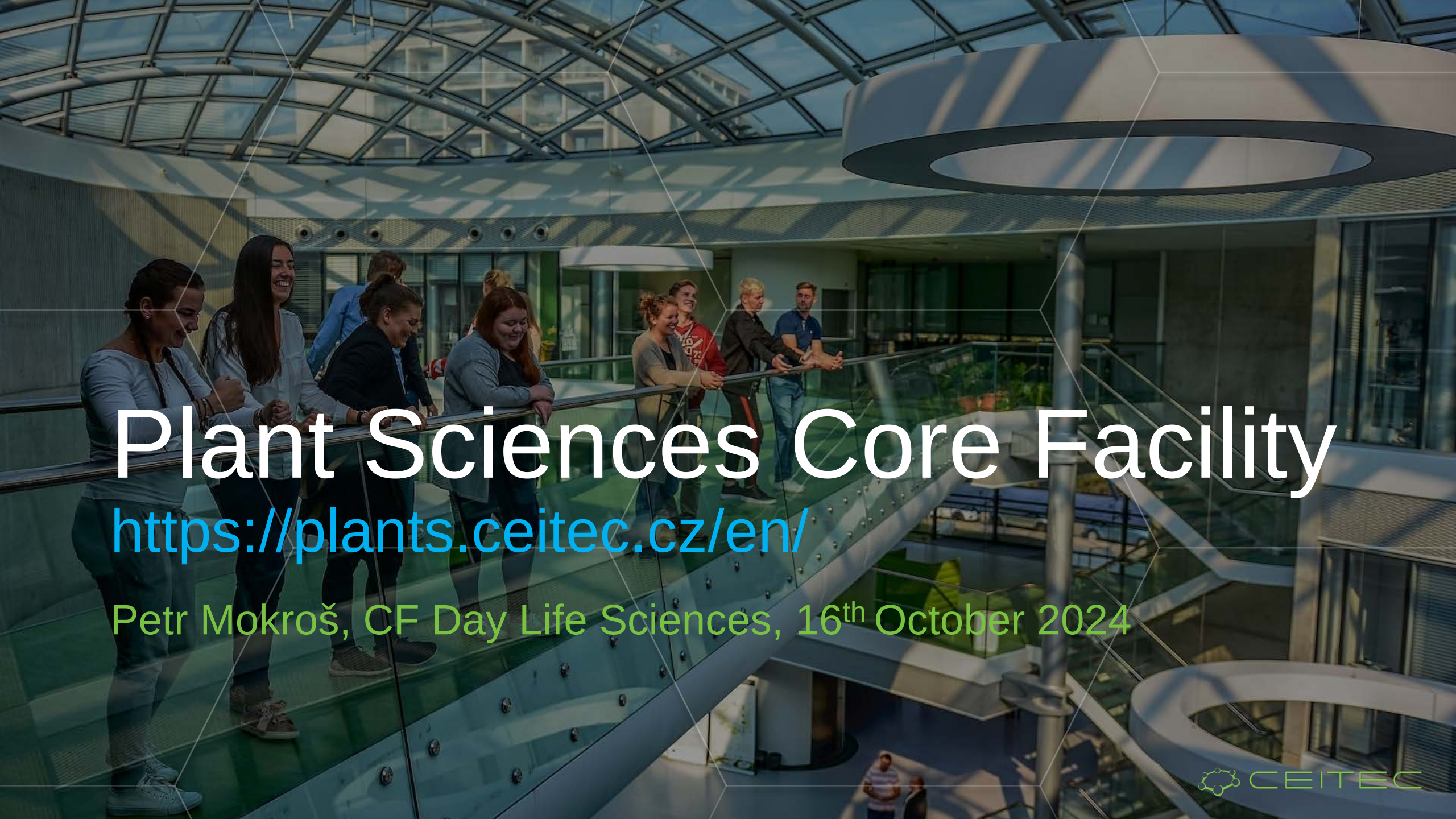


Plant Sciences Core Facility

https://plants.ceitec.cz/en/

Petr Mokroš, CF Day Life Sciences, 16th October 2024

CEITEC

Plant Sciences CF overview

- CF offers to academic institutions and industrial partners access to the research infrastructure for:
  - large-scale cultivation of plants cultivation under standard conditions
  - cultivation under specific conditions - environmental simulation
  - phenotyping analysis

Plant Sciences CF overview

- Large-scale cultivation of plants cultivation under standard conditions
  - 10 individual greenhouse sections
  - 5 individual phytotrons with shelves

Plant Sciences CF overview

- cultivation under specific conditions
  - 10 phytotrons with 120 individual closed banks
  - small growth chambers

We are able to control:

- temperature

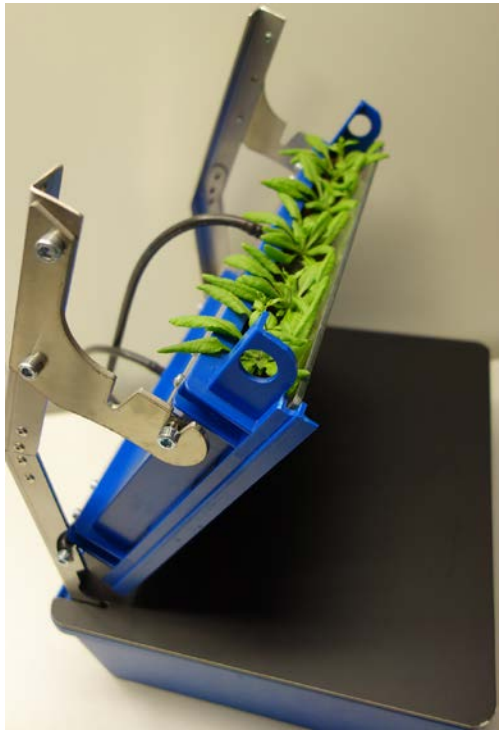
  (below 0°C, up to 40°C)
- day/night lenght
- intensity of cultivation light
  - high light illumination
- color of cultivation light
  - standard (cold white/red/far-red)
  - multi-channel LEDs

    ($UV_{365,385}$, $blue_{400,450}$, $green_{525,525}$, $amber_{590}$, red_{665} and $far\text{-}red_{730}$)

CEITEC

Plant Sciences CF overview

- phenotyping analysis - PlantScreenTM phenotyping system
  - designed for high-precision low-throughput phenotyping of small and mid-size plants, e.g. *Arabidopsis* or *Brassica*.



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PlantScreenTM phenotyping system

- phenotyping analysis -
  - top- and back-view of plants
  - RGB and morphometric imaging
  - kinetic chlorophyll fluorescence imaging
  - root phenotyping
  - low-throughput screening

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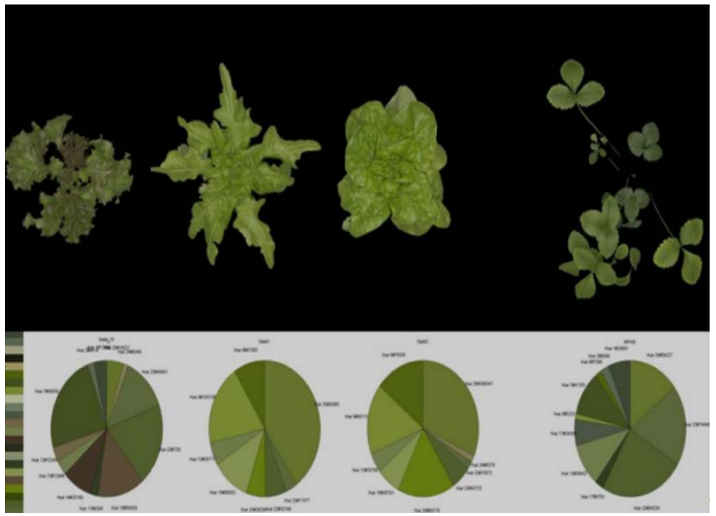
PlantScreenTM phenotyping system

- RGB digital imaging for in-depth analysis of plant morfology, architecture and colour index analysis
- Morphological parameters
  - area
  - perimetr
  - compactness
  - roundness
  - eccentricity
  - RMS rotational mass symetry
  - SOL Slenderness of leaves
  - isotropy
  - greenness



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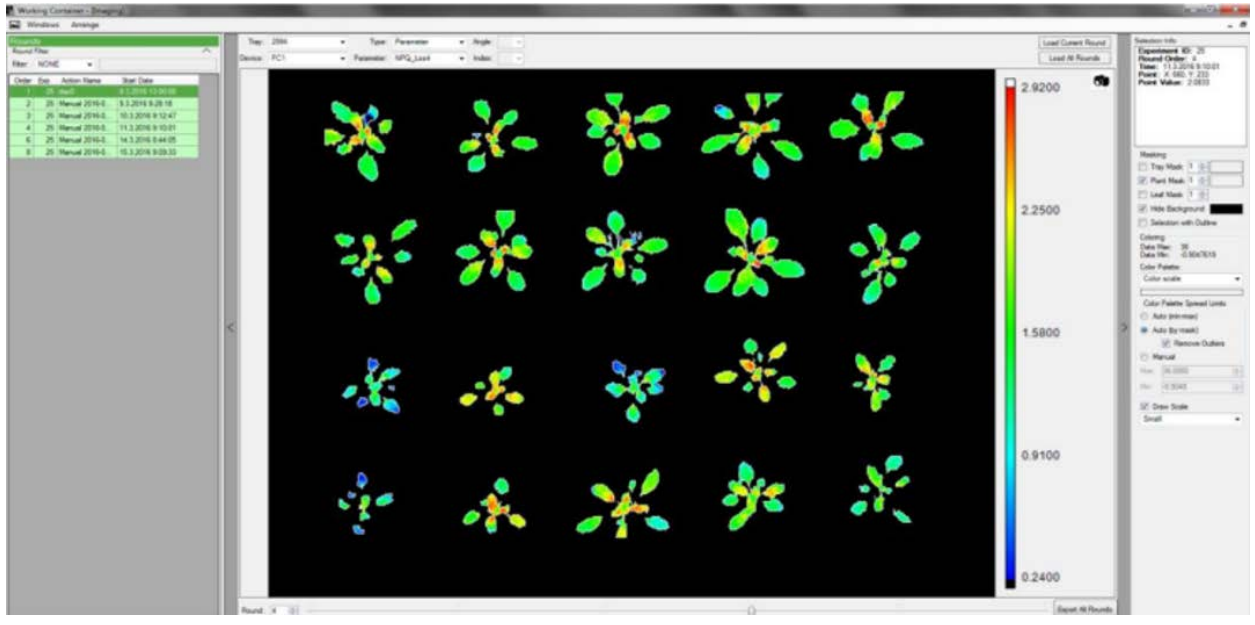
PlantScreenTM phenotyping system

- Root imaging module
  - root system architecture
  - vizualization and morphomrtric analysis of root system

PlantScreenTM phenotyping system

- Kinetic chlorophyll fluorescence imaging for rapid non-invasive measurement of photosystem II activity
    - rapid indicator of photosynthetic performance of plants
    - to investigate genetic heterogeneity due to infection, senescence, abiotic stree or mutation
    - changes in chlorophyll kinetic parameters offen occur well before visible changes are apparent



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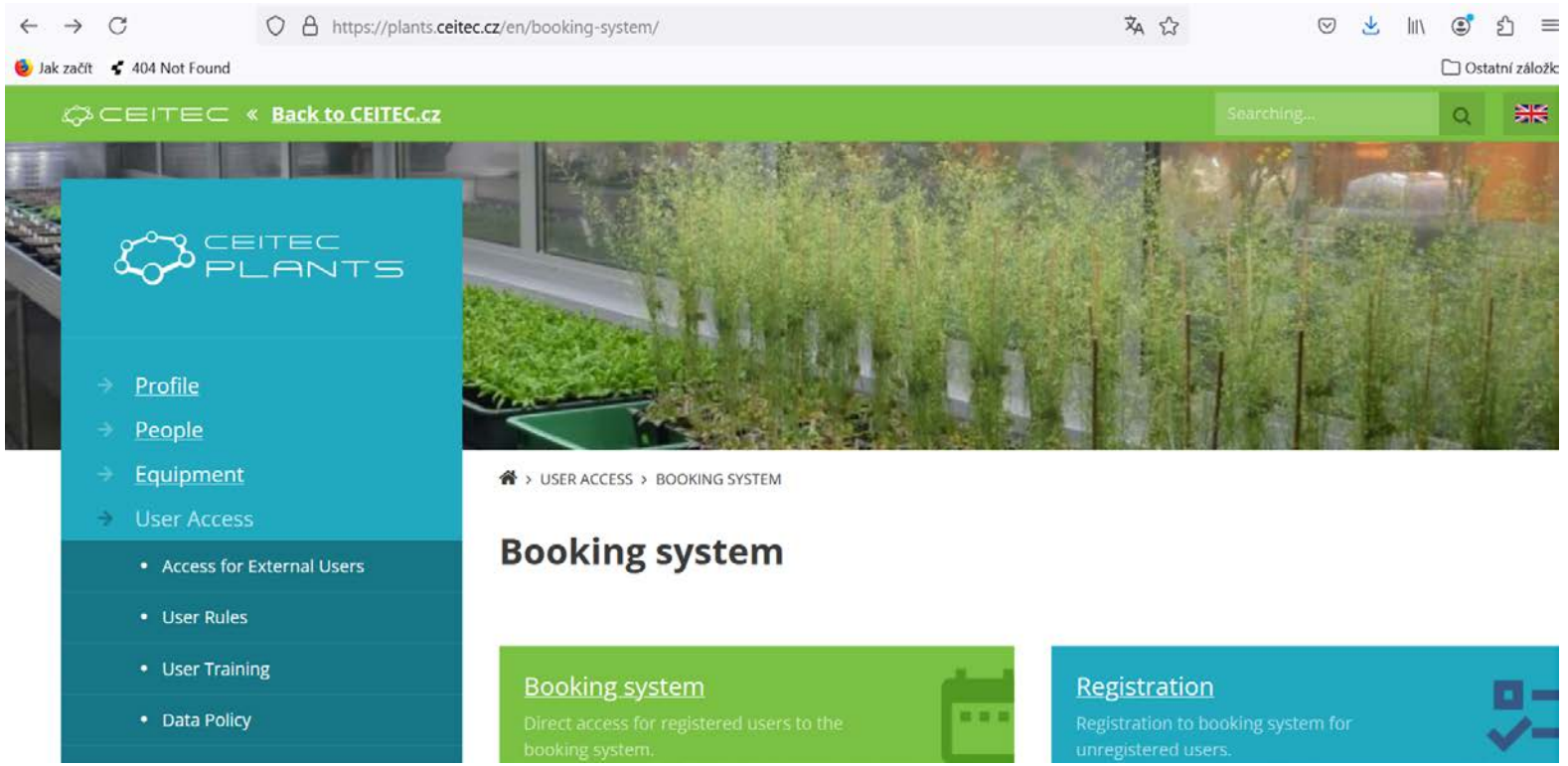
Plant Sciences CF users

- CF offers access to academic institutions and industrial partners
  - basic cultivation facility for 5 plant research groups at Ceitec MU



Acknowledgement text

If our CF has contributed to the successful publication of your work, please be kind enough to mention this fact.

- *„Plant Sciences Core Facility of CEITEC Masaryk University is gratefully acknowledged for the obtaining of the scientific data presented in this paper.”*

- *„Plant Sciences Core Facility of CEITEC Masaryk University is gratefully acknowledged for the cultivation of experimental plants used in experiments presented in this paper.”*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RECETOX_RI

Petr Kukučka
kukucka@recetox.muni.cz

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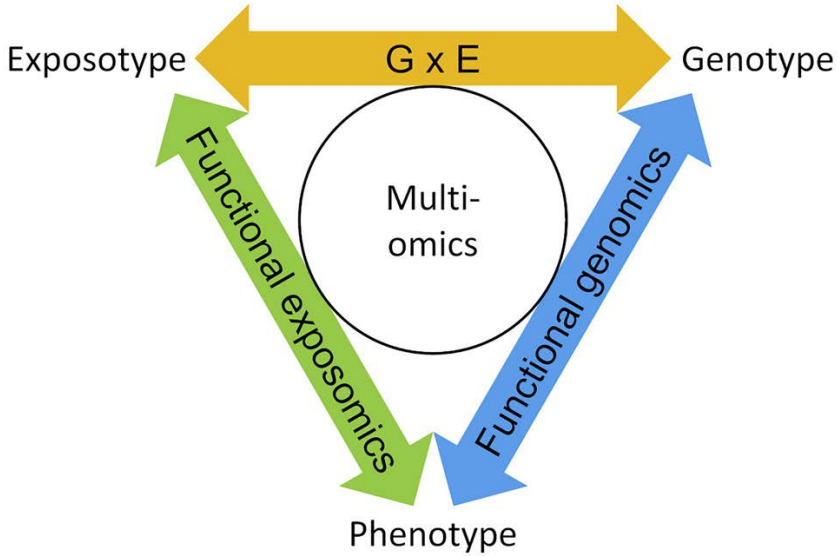
Human exposome redefined (2022)

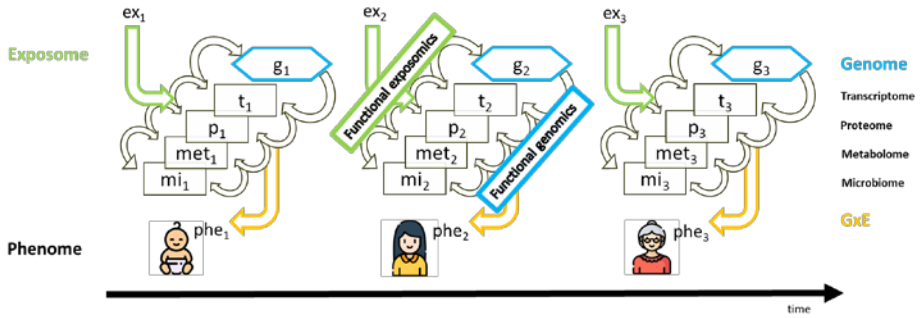
- **Exposome:** the totality of environmental exposures, i.e. the totality of contact between external factors (agents) and a biological entity.

- **Functional exposomics:** the systematic and comprehensive study of environmental exposure-phenotype interaction over a defined time-period.

- Operational definition for studies to **consider the environmental exposures** (contact with external factors) that **influence phenotype and health**



https://doi.org/10.1016/j.isci.2022.103976



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RECETOX Central Laboratories

- currently **the busiest part** of the RECETOX Research infrastructure
- **accredited according to European standards** for environmental sampling and a wide range of chemical analysis
- consists of three major units
  - **Trace Analytical Laboratories**
  - Microbiome analysis
  - Biomarker Analytical Laboratories

Accredited laboratories provide the analytical background for the research programmes of the RECETOX centre and provide the advanced analytical services to our research teams, as well as to external clients. The laboratories also realize long-term monitoring programs of various matrices (MONET EU, MONET Africa).

Microbiome laboratory provides the bacterial and mycobial profiles in various samples using the 16S rRNA gene and ITS gene sequencing. It also performs whole metagenome sequencing, in which all DNA in the sample is sequenced.

The biomarker analysis laboratory focuses on methods of targeted and non-targeted analyses of biologically important molecules (metabolites, proteins, lipids) as potential biomarkers of effects associated with chemical exposure.

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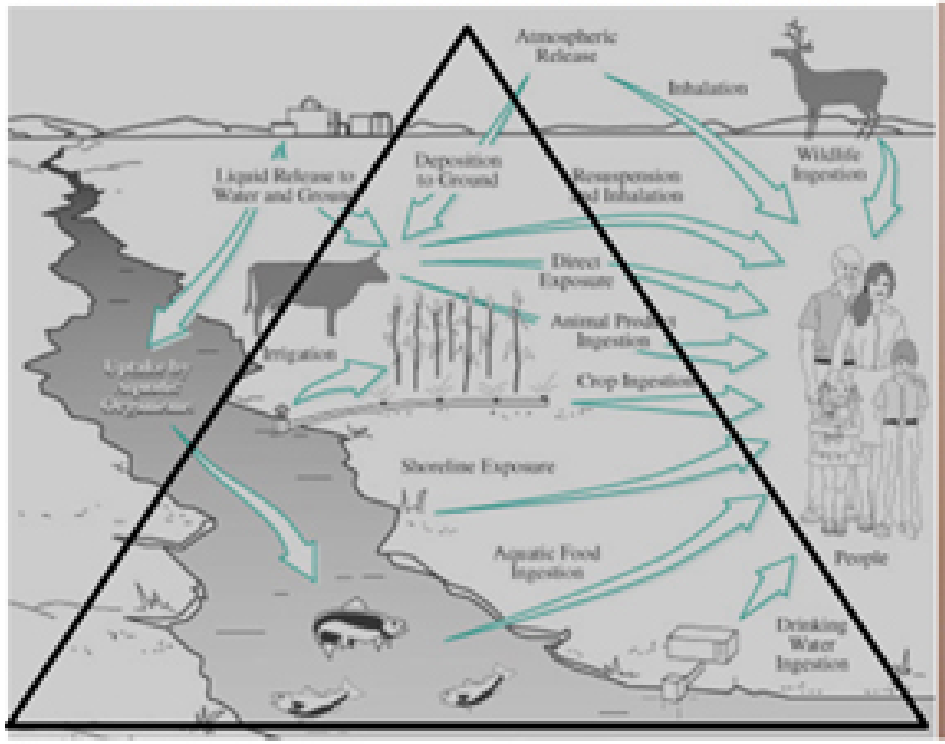
Challenge of Assessing Human Exposome

2005: Wild proposed a non-genetic complement to the genome - the exposome - to encompass all environmental exposures shaping phenotype. https://doi.org/10.1158/1055-9965.EPI-05-0456

Bottom-up Exposomics

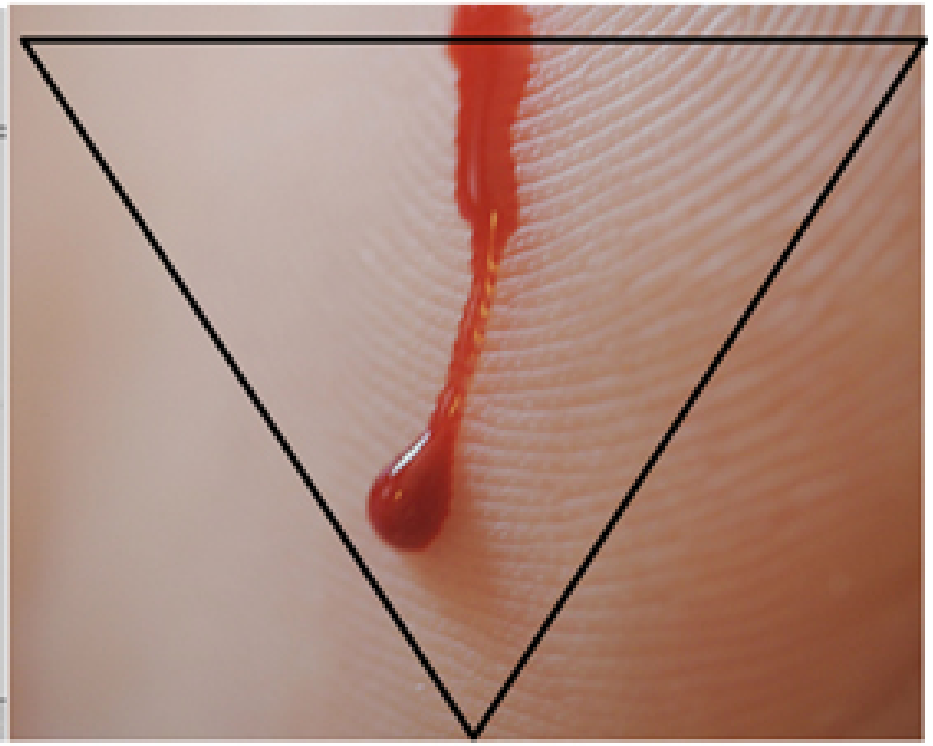
Identify important exogenous exposures



Measure chemicals in air, water & food

Top-down Exposomics

Measure chemicals in blood



Identify all important exposures

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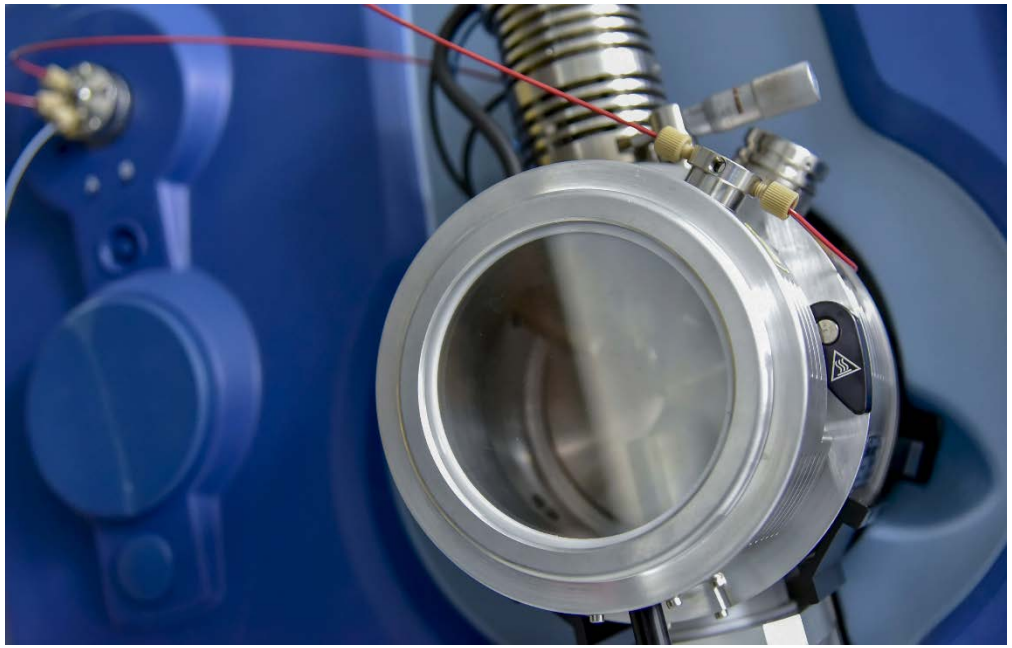
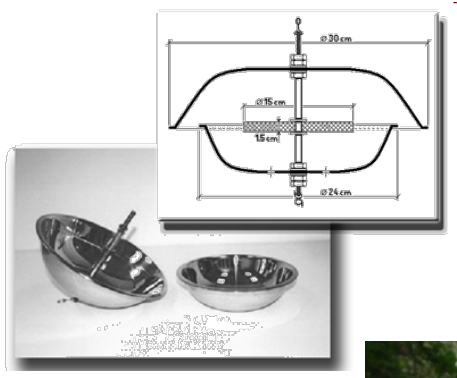
Trace analytical laboratories (TAL)



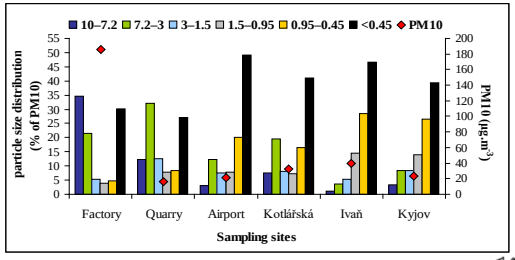
TAL major activities

- Development of samplers for non-polar and polar compounds contamination and development of analytical methods for selected chemicals, pollutants and their metabolites in the human exposure studies
- Laboratory and field studies, programs of integrated monitoring

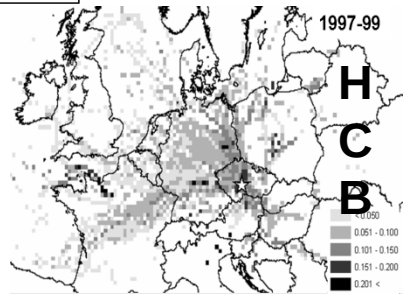
passive samplers



atmospheric particles



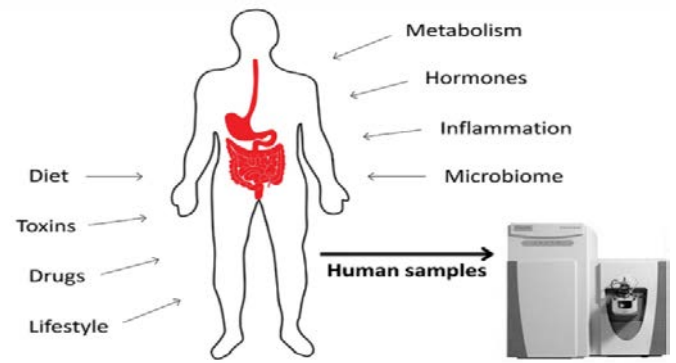
primary and secondary sources



long-range transport

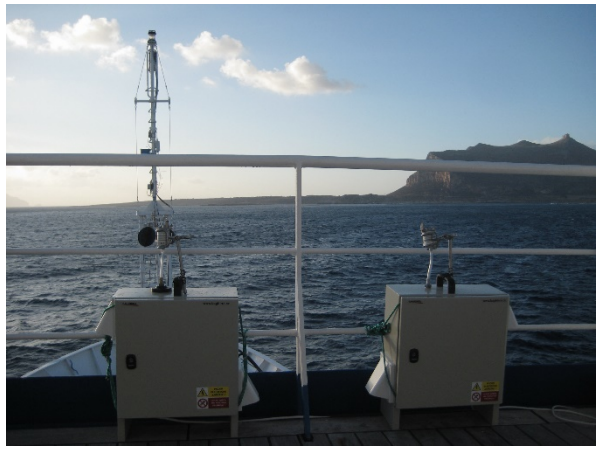
natural disasters

Human exposition

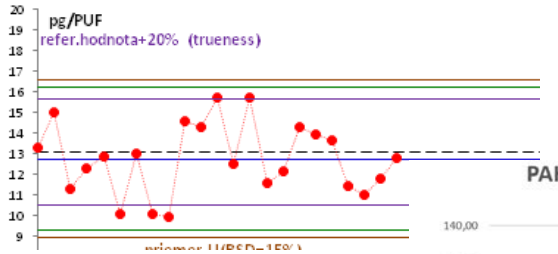


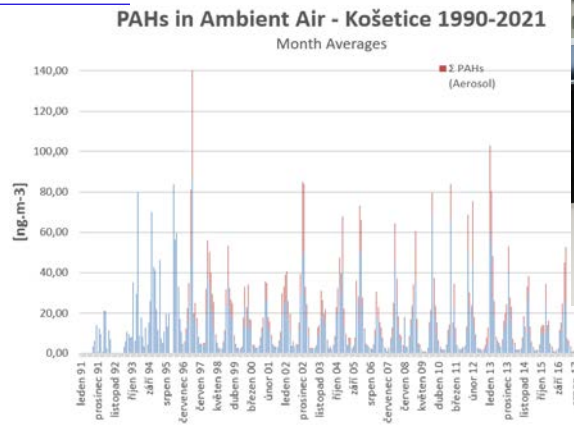
• RECETOX Laboratory services

- Sampling



- Samples preparation
- Analysis and data evaluation
- QA/QC system





- Monitoring studies

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Compounds analysed

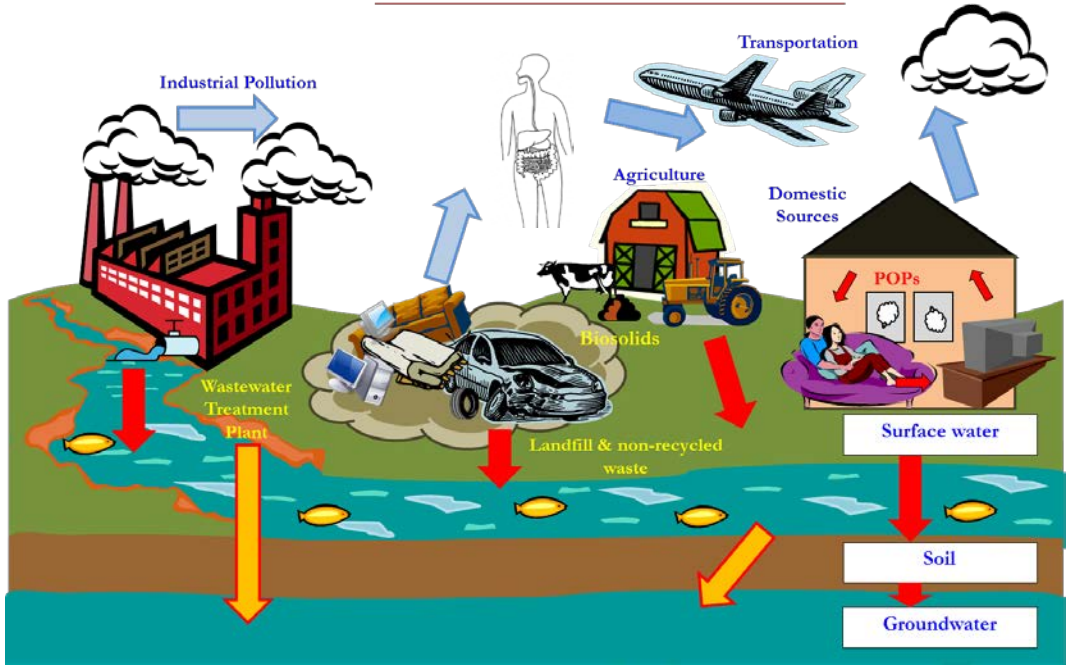
Organic pollutants:

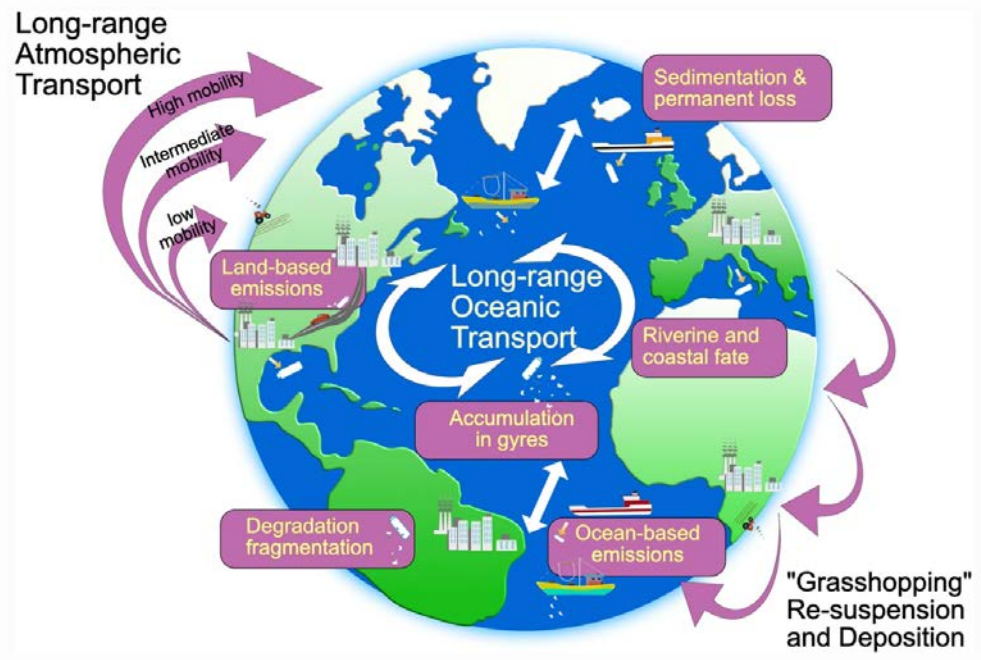
- Polychlorinated dibenzo-*p*-dioxins/furans (PCDDs/Fs)
- Polychlorinated biphenyls (PCBs) – indicator and dioxin-like
- Brominated and organophosphorus flame retardants
- Organochlorine, cyclodiene, and polar pesticides
- Polycyclic aromatic hydrocarbons (PAHs), NOx-, and oxy-PAHs
- Perfluorinated compounds (PFAS)
- Bisphenols
- plasticizers
- Thyroid hormones
- UV filters – benzophenone
- Mycotoxins

Metabolites:

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

Trace elements, heavy metals, and species





Trace Analytical Laboratories - accredited

L 1666

Equipped by: GC-MS/MSs, GC-HRMSs, LC-MS/MSs, (LC)-ICP-MS/MS, AAS

ilac-MRA

NÁRODNÍ AKREDITAČNÍ ORGÁN

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Olšanská 54/3, 130 00 Praha 3

issues

according to section 16 of Act No. 22/1997 Coll., on technical requirements for products, as amended

CERTIFICATE OF ACCREDITATION

No. 149/2022

Masarykova univerzita
with registered office Žerotínovo náměstí 617/9, 602 00 Brno, Company Registration No. 00216224

to the Testing Laboratory No. 1666
RECETOX: Trace Analytical Laboratories

Scope of accreditation:

Special trace and ultratrace analysis of organic compounds and elements in environmental samples, biotic samples, food and feed; sampling of air, surface water, soils, and bottom sediments to the extent as specified in the appendix to this Certificate.

This Certificate of Accreditation is a proof of Accreditation issued on the basis of assessment of fulfillment of the accreditation criteria in accordance with

ČSN EN ISO/IEC 17025:2018

In its activities performed within the scope and for the period of validity of this Certificate, the Body is entitled to refer to this Certificate, provided that the accreditation is not suspended and the Body meets the specified accreditation requirements in accordance with the relevant regulations applicable to the activity of an accredited Conformity Assessment Body.

This Certificate of Accreditation replaces, to the full extent, Certificate No.: 586/2019 of 8. 11. 2019, or any administrative acts building upon it.

The Certificate of Accreditation is valid until: 17. 3. 2027

Prague: 17. 3. 2022

Český institut pro akreditaci, o.p.s.

Lukáš Burda
Director of the Department
of Testing and Calibration Laboratories
Czech Accreditation Institute
Public Service Company

www.cai.cz

Accredited matrices:

- Outdoor / indoor air
- Surface water
- Sediments, soils
- Food, foodstuffs
- Cell tissues
- Human matrices

Analytes:

- PCDDs/Fs, dl-PCBs, ind. PCBs
- PBDEs
- PAHs, OCPs
- PFAS
- metals

GC/MS, LC/MS, ICP-MS

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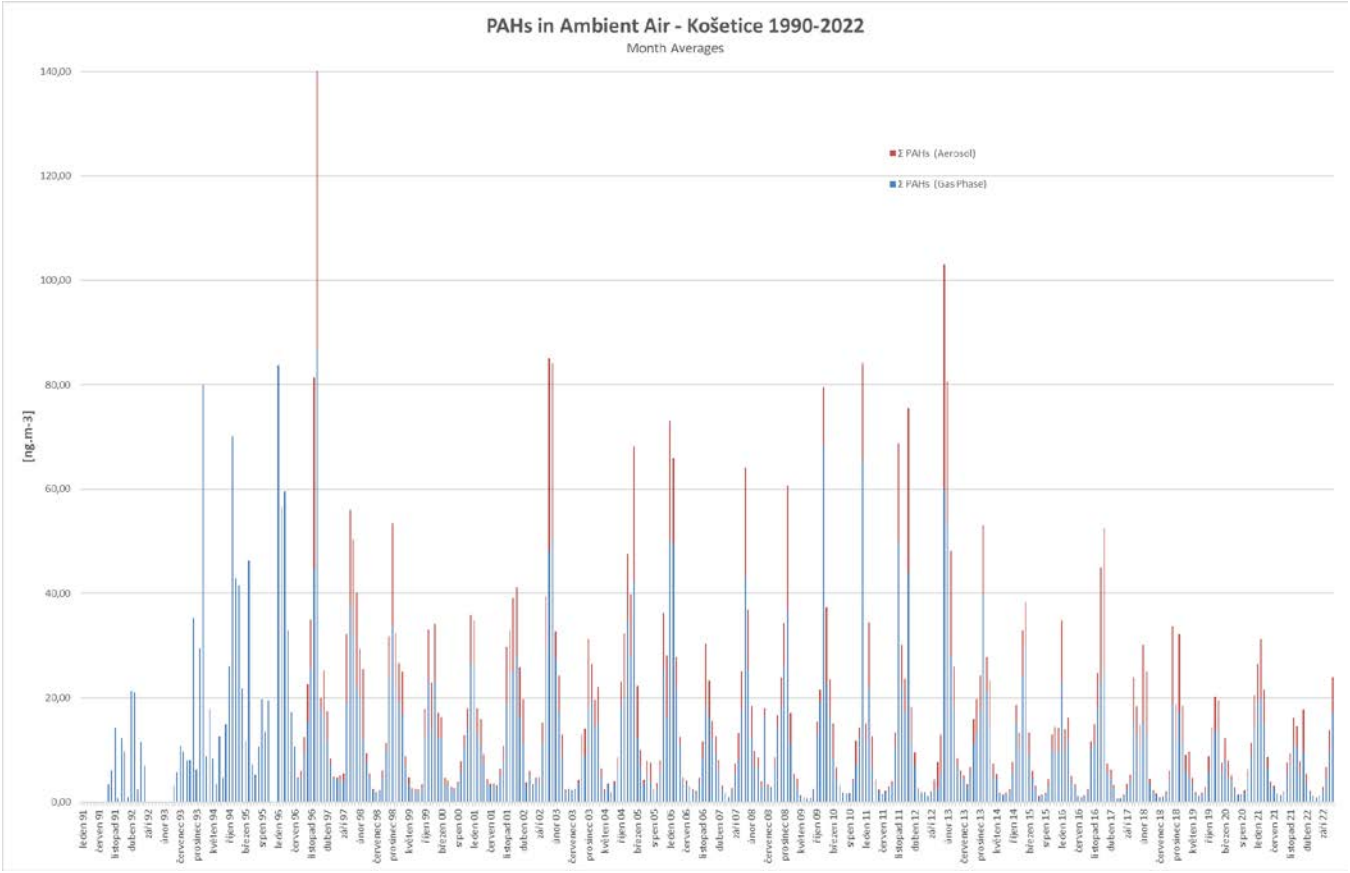
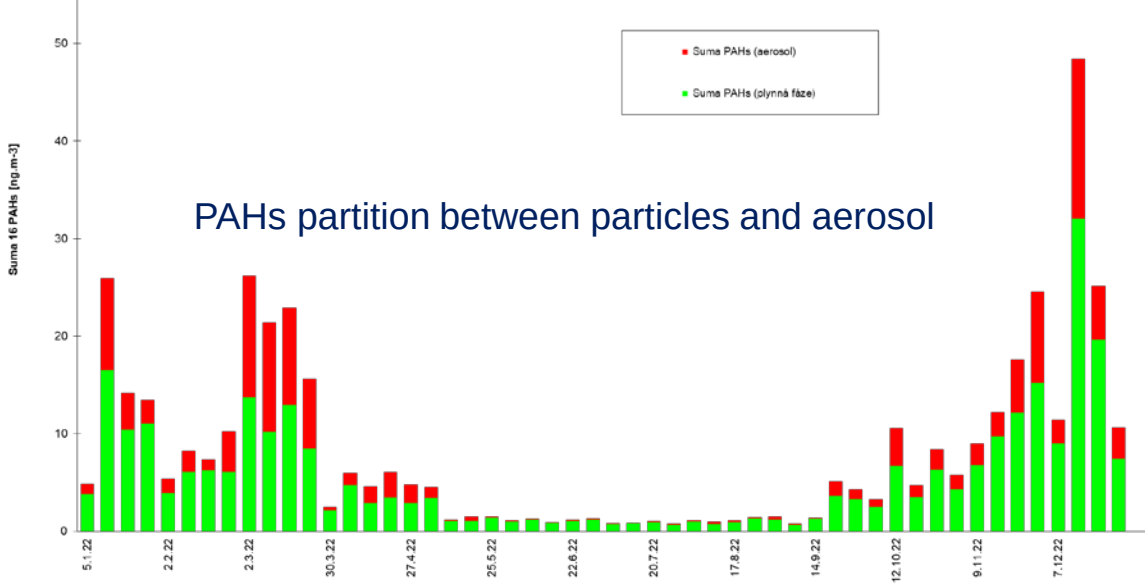
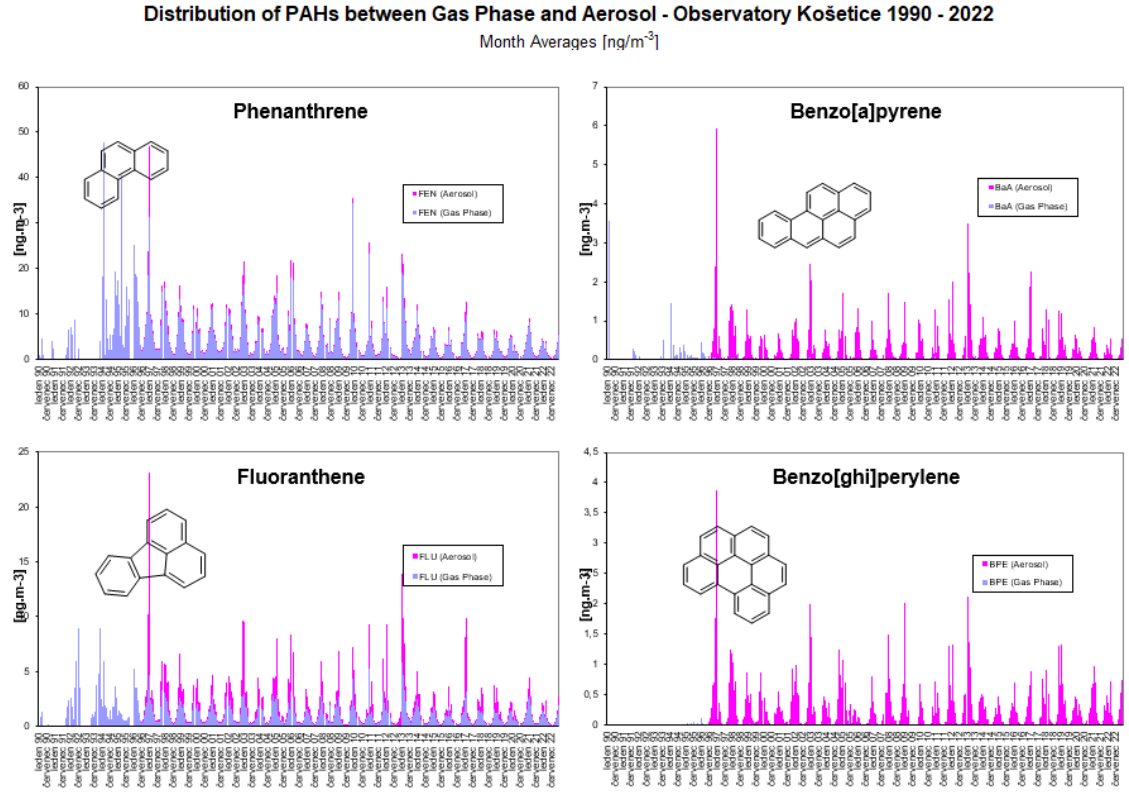
Active air samplers

Trends in PAHs concentrations







Data usage

- **Data** are used in monitoring programs:

EMEP (European Monitoring Environmental programme,

UNEP (UN Environmental program with GMP like Global Monitoring Plan),

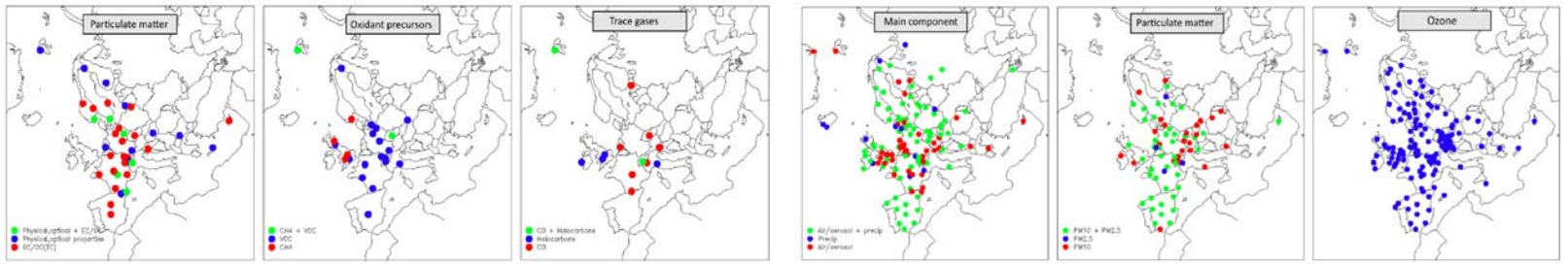
UNECE (UN Economic Commission for Europe with LRTAP),

MONET_CZ, MONET_EU, MONET_Africa (Monitoring Networks established by RECETOX)

ACTRIS (The Aerosol, Clouds and Trace Gases Research Infrastructure)

HBM4EU, PARC consortia

Norman water quality monitoring



Stockholm and Basel Conventions Regional Centres - UNEP

Technology transfer + capacity building;

RECETOX: SC Regional centre in the Central and Eastern European (CEE) region with the activities far beyond the region

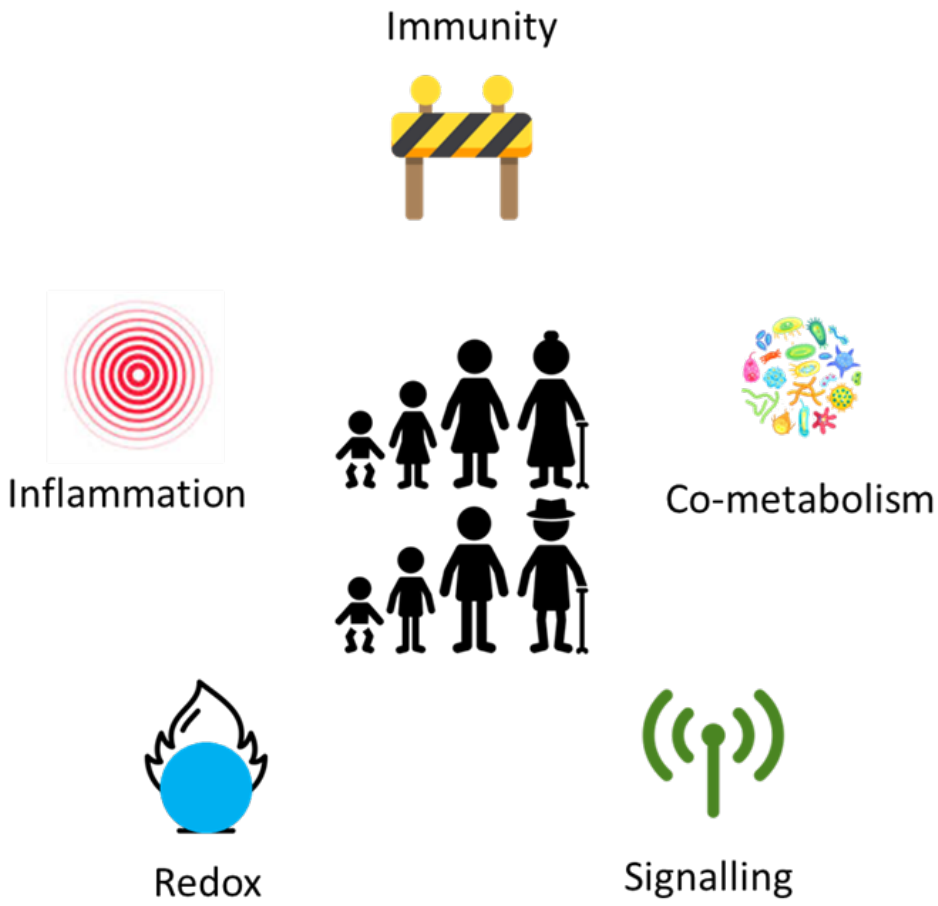
Biomarker Analytical Laboratories (BAL RI)

- Integrative platform to identify chemical exposure, quantify biological response and assess the effects on molecular health, primarily serving environmental scientists, molecular epidemiologists, clinicians, and clinical researchers.

- Panels based on core molecular signatures at intersection of hallmarks of health (https://doi.org/10.1016/j.cell.2020.11.034) and hallmarks of environmental insults (https://doi.org/10.1016/j.cell.2021.01.043).

- Assays have been specifically tailored to answer clinical demand.

- Main focus on cancer, neurology & cardiometabolic health outcomes.



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Panels of health markers

Inflammation protein panel - Dried blood spot (DBS), serum, plasma

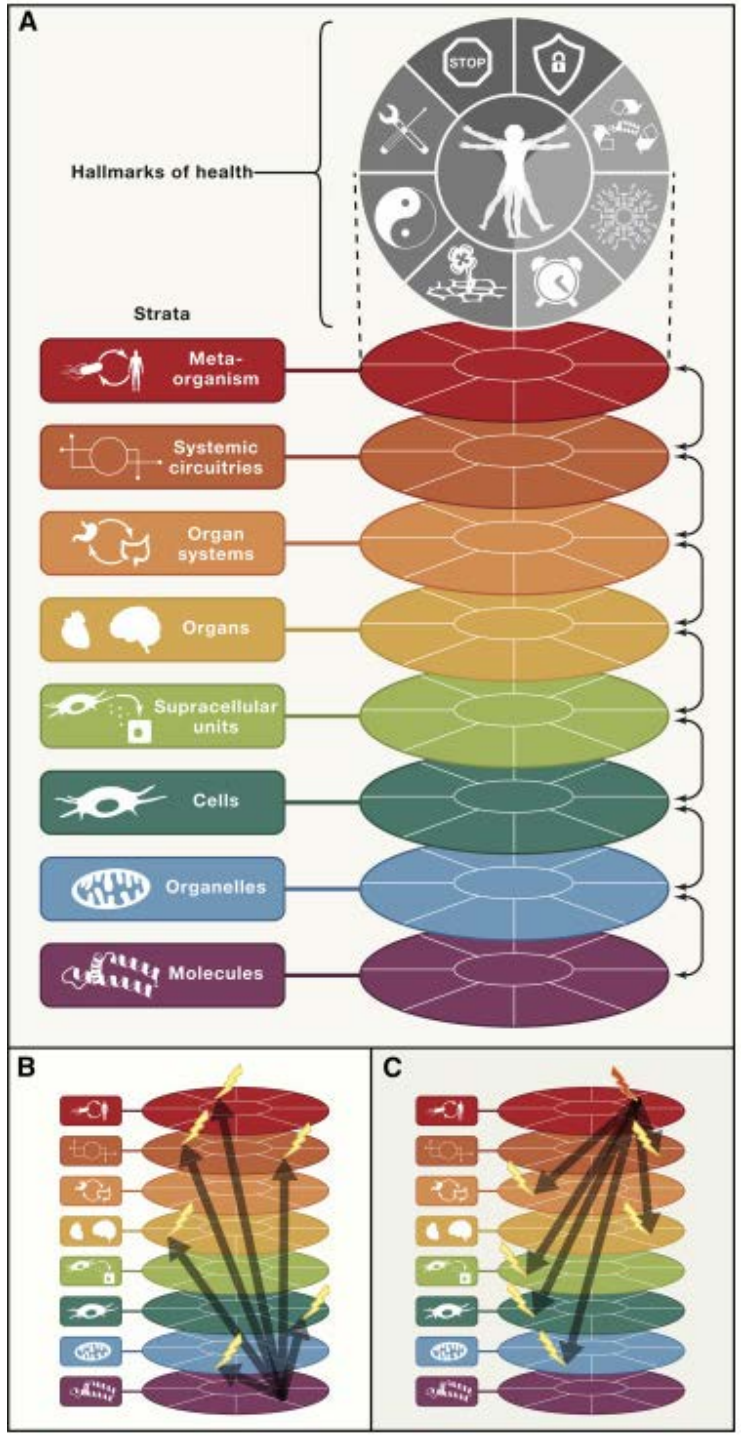
- Inflammatory proteins SAA1, SAA2, SAA4, CRP, A1AT, A1AG including proteoforms and adaptive immunity effector IGHA1.
- Quantification of inflammatory proteins is essential to distinguish between harmful and beneficial immune response.
- Comparable results to routine immunonephelometry but able to measure quantify proteoforms and using smaller sample size.

Immune protein marker panel – Fecal swabs

- Immunity markers A1AT, ECP, EDN, MPO, CAL1, CAL2 and adaptive immunity effectors IGHA1 & IGHA2.
- Suitable for neonates with relevance for investigation of intestinal mucosal barrier homeostasis and inflammatory response.
- Fecal swabs

Microbial co-metabolite panel - DBS, serum, plasma, urine, fecal swabs

- Microbiome co-metabolites 5-hydroxyindolacetate, 5-hydroxy-l-tryptophan, 5-methoxy-3-indolacetic acid, anthranilate, indole-3-acetamide, indole-3-acetate, indole-3-aldehyde, indole-3-butyric acid, indole-3-lactic acid, indole-3-propionic acid, L-kynurenine, L-tryptophan, melatonin, methyl indole-3-acetate, methyl indole-3-propionic acid, N-acetyl tryptophan, serotonin, tryptamine.
- Circulating microbial metabolites reflect the diversity of human gut microbiota. Method applicable to numerous sample types, including application neonates.



Small molecule screening

- Parallel screening of chemical agents and metabolites for discovery-driven research
- Detect novel associations of chemical exposure with biological response.
- Identify chemicals of known, emerging and future potential concern in a single analysis.
- Plasma & serum

- Applied to numerous projects, incl. policy-focused
  - European Human Biomonitoring Initiative (HBM4EU)
  - European Human Exposome Network (EHEN)
  - European Partnership for the Assessment of Risks from Chemicals (PARC)

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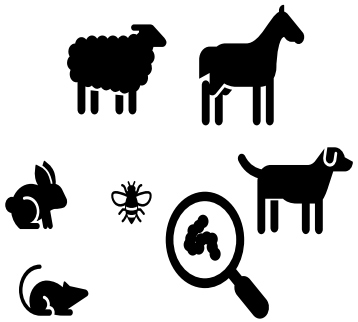
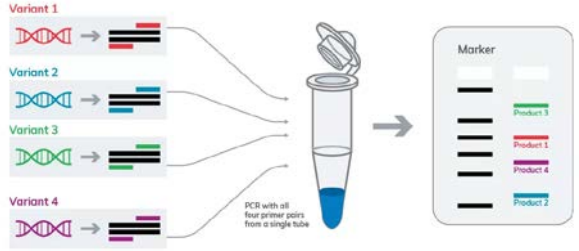
Microbiome Labs

Samples

- a new core facility of the RECETOX RI, which analyzes the bacterial profile using constantly modernizing methods
- The laboratory has experience mainly **with human samples** processing typical for microbiome research, such as **stools** and **buccal swabs, meconium**.
- We also process **environmental samples**, where we focus on **dust, water or soil microbiome**.
- Our laboratories' experienced experts use verified and standardized procedures for **DNA isolation, library preparation, and sequencing**, including all necessary control steps.



- Preparation of a library for **16S rRNA gene** including experimental design, **DNA isolation, preparation of amplicons** (V4 region) and **sequencing** on Illumina MiSeq instrument.
- Preparation of a library for ITS gene, including experimental design, DNA isolation, preparation of amplicons and sequencing on Illumina MiSeq instrument.
- Preparation of a library for **whole metagenomic sequencing** (WMGS) including experimental design, DNA isolation, library preparation using Nextera DNA Flex Library Prep (Illumina) and sequencing on Illumina NextSeq instrument.



CELSPAC Population cohorts

- 1960s: > 500 mother-child pairs

- 1990s: ELSPAC parents

- 2020s: ELSPAC follow up

- 2020s: CELSPAC_ TNG, >1000 mother-child pairs

- 2010s: KARDIOVIZE, >2000 individuals

- 2000s: HAPIEE

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CELSPAC platform services

- Study design, protocol, SOP, ethical clearance
- Sample collection, preparation, analysis and long-term biobanking according to validated SOPs and QA/QC
- Analysis of basic biomarkers (creatinine, albumin, thyroid hormones, blood lipids - cholesterol, triglycerides, HDL, LDL), and immunomarkers (IgG; IgM; IgE; interleukins)





- Biobanking of in-house and external samples and harmonisation of data
- Longitudinal follow up
- Access to samples and data (also via BBMRI)

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CELSPAC

Central European Longitudinal Studies of Parents and Children

Pavel Piler, Ph.D.

16. 10. 2024

CELSPAC
for a healthy future

We look after the CELSPAC population studies.

More than 36,000 active participants since 2013

Participants from different age groups

EXPOSOME Multidisciplinary Research

Study of factors affecting health throughout life

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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 the child's parents = Ageing cohort

CELSPAC TNG

- The Next Generation – birth cohort
- 3,000 mother-child pairs from 2018
- Exposome cohort
- Biobanking / Omics methods
- Online validated questionnaires / Health Records

IEA

International Journal of Epidemiology, 2017, 1379–1379f
doi: 10.1093/ije/dyw091
Advance Access Publication Date: 5 July 2016
Cohort Profile

Cohort Profile

Cohort Profile: The European Longitudinal Study of Pregnancy and Childhood (ELSPAC) in the Czech Republic

Pavel Piler,[1] Vít Kandrnal,[1] Lubomír Kukla,[1] Lenka Andrýsková,[1] Jan Švancara,[1,2] Jiří Jarkovský,[1,2] Ladislav Dušek,[1,2] Hynek Pikhart,[1,3] Martin Bobák[1,3] and Jana Klánová[1]*

JAMA Network | Open

Original Investigation | Public Health

Association of Maternal Depression During Pregnancy and Recent Stress With Brain Age Among Adult Offspring

Klara Mareckova, PhD; Radek Mareček, PhD; Martin Jani, PhD; Lenka Zackova, MSc; Lenka Andryskova, PhD; Milan Brazdil, MD, PhD; Yuliya S. Nikolova, PhD

General and abdominal adiposity and hypertension in eight world regions: a pooled analysis of 837 population-based studies with 7·5 million participants

NCD Risk Factor Collaboration (NCD-RisC)*

Article | Open Access | Published: 10 April 2020

Association between Stress Urinary Incontinence and Depressive Symptoms after Birth: the Czech ELSPAC Study

Miluše Jurášková, Pavel Piler, Lubomír Kukla, Jan Švancara, Petra Daňsová, Lukáš Hruban, Vít Kandrnal & Hynek Pikhart

Scientific Reports 10, Article number: 6233 (2020) | Cite this article

Sci Rep. 2021 May 13;11(1):10222. doi: 10.1038/s41598-021-89384-0.

Simultaneous quantitative profiling of clinically relevant immune markers in neonatal stool swabs to reveal inflammation

Veronika Vidova [1], Eliska Benesova [1], Jana Klanova [1], Vojtech Thon [1], Zdenek Spacil [2]

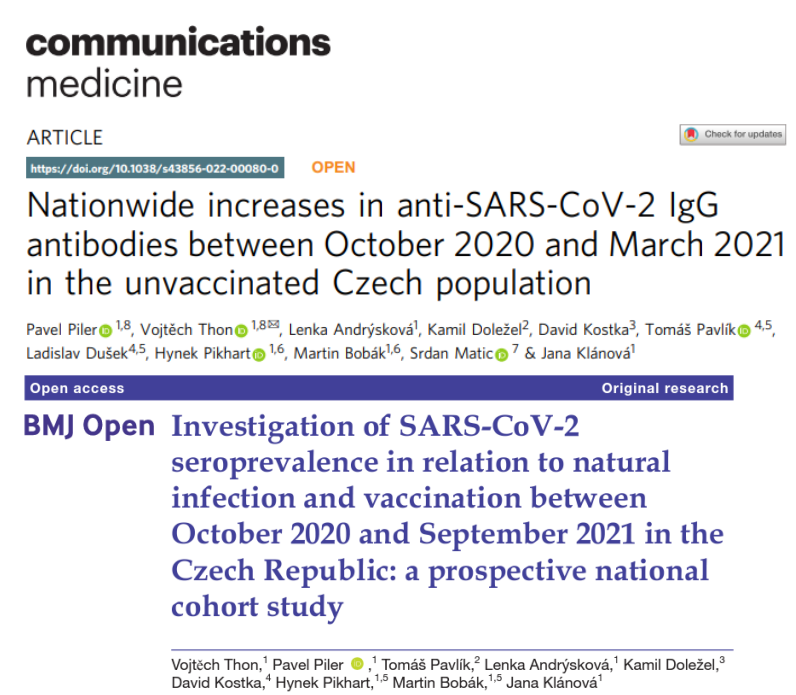
CELSPAC POPULATION STUDIES

PROSECO

- Prospective coronavirus seroprevalence 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 between 2002 and 2005; 3 waves of follow-up
- Association between rapid social and economic transition and population health



communications medicine

ARTICLE

https://doi.org/10.1038/s43856-022-00080-0 OPEN

Nationwide increases in anti-SARS-CoV-2 IgG antibodies between October 2020 and March 2021 in the unvaccinated Czech population

Pavel Piler[1,8], Vojtěch Thon[1,8✉], Lenka Andrýsková[1], Kamil Doležel[2], David Kostka[3], Tomáš Pavlík[4,5], Ladislav Dušek[4,5], Hynek Pikhart[1,6], Martin Bobák[1,6], Srdan Matic[7] & Jana Klánová[1]

Open access Original research

BMJ Open Investigation of SARS-CoV-2 seroprevalence in relation to natural infection and vaccination between October 2020 and September 2021 in the Czech Republic: a prospective national cohort study

Vojtěch Thon,[1] Pavel Piler,[1] Tomáš Pavlík,[2] Lenka Andrýsková,[1] Kamil Doležel,[3] David Kostka,[4] Hynek Pikhart,[1,5] Martin Bobák,[1,5] Jana Klánová[1]

Study protocol | Open Access | Published: 18 October 2006

Determinants of cardiovascular disease and other non-communicable diseases in Central and Eastern Europe: Rationale and design of the HAPIEE study

Anne Peasey, Martin Bobak, Ruzena Kubinova, Sofia Malyutina, Andrzej Pajak, Abdonas Tamosiunas, Hynek Pikhart, Amanda Nicholson & Michael Marmot

BMC Public Health 6, Article number: 255 (2006) | Cite this article

J Clin Endocrinol Metab. 2008 Mar; 93(3): 750–757. PMCID: PMC2266962

Published online 2007 Dec 11. doi: 10.1210/jc.2007-0737 PMID: 18073316

The Relationship between Alcohol Consumption and Cortisol Secretion in an Aging Cohort

Ellena Badrick, Martin Bobak, Annie Britton, Clemens Kirschbaum, Michael Marmot, and Meena Kumari

Author information ▸ Article notes ▸ Copyright and License information Disclaimer

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SERVICES WE OFFER

- CELSPAC data for scientific purposes
- Biological samples (+BBMRI samples)
- Laboratory services - Processing of human biological samples
- Laboratory services - Automated extraction of DNA/RNA
- Laboratory services - Analysis of biochemical markers on the clinical ROCHE systems

https://openaccess.recetox.cz

pavel.piler@recetox.muni.cz

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Life Sciences

16 OCTOBER, 2024
CEITEC, E35/211+ATRIUM

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Central European Advanced
Therapy and Immunotherapy Centre

Centre of Excellence LF MU

CZECRIN

CZECH CLINICAL RESEARCH
INFRASTRUCTURE NETWORK

Funded by
the European Union

MINISTRY OF EDUCATION,
YOUTH AND SPORTS

Core Facility Day CEITEC
16.10.2024

Doc. MUDr. Regina Demlová, Ph.D.
Lékařská fakulta MU

MEYS decision to include the Czech Republic in the ECRIN-ERIC Board from 21 March 2014

Článek 16
Vymezení stupně důvěrnosti údajů

Je-li předmět řešení Projektu předmětem obchodního tajemství, postupuje se v souladu s občanským zákoníkem[14]. Stupeň utajení a označení údajů, které podléhají ochraně podle zákona o ochraně utajovaných informací a o bezpečnostní způsobilosti, je součástí Přílohy č. 1 tohoto rozhodnutí.

Článek 17
Změny rozhodnutí

1) Toto rozhodnutí může být změněno pouze novým rozhodnutím poskytovatele.
2) Rozhodnutí podle odstavce 1 může být vydáno nejpozději dva měsíce před termínem ukončení řešení projektu.

Článek 18
Závěrečná ustanovení

Příloha č. 1 Návrh Projektu velké infrastruktury schválený vládou a Příloha č. 2 Detailní rozpočet Projektu a uznané náklady Projektu jsou nedílnými součástmi tohoto rozhodnutí o poskytnutí účelové podpory.

V Praze dne ..... 21. 03. 2014 ..

Za poskytovatele: Jan Zikl, I. náměstek ministra

Razítko:

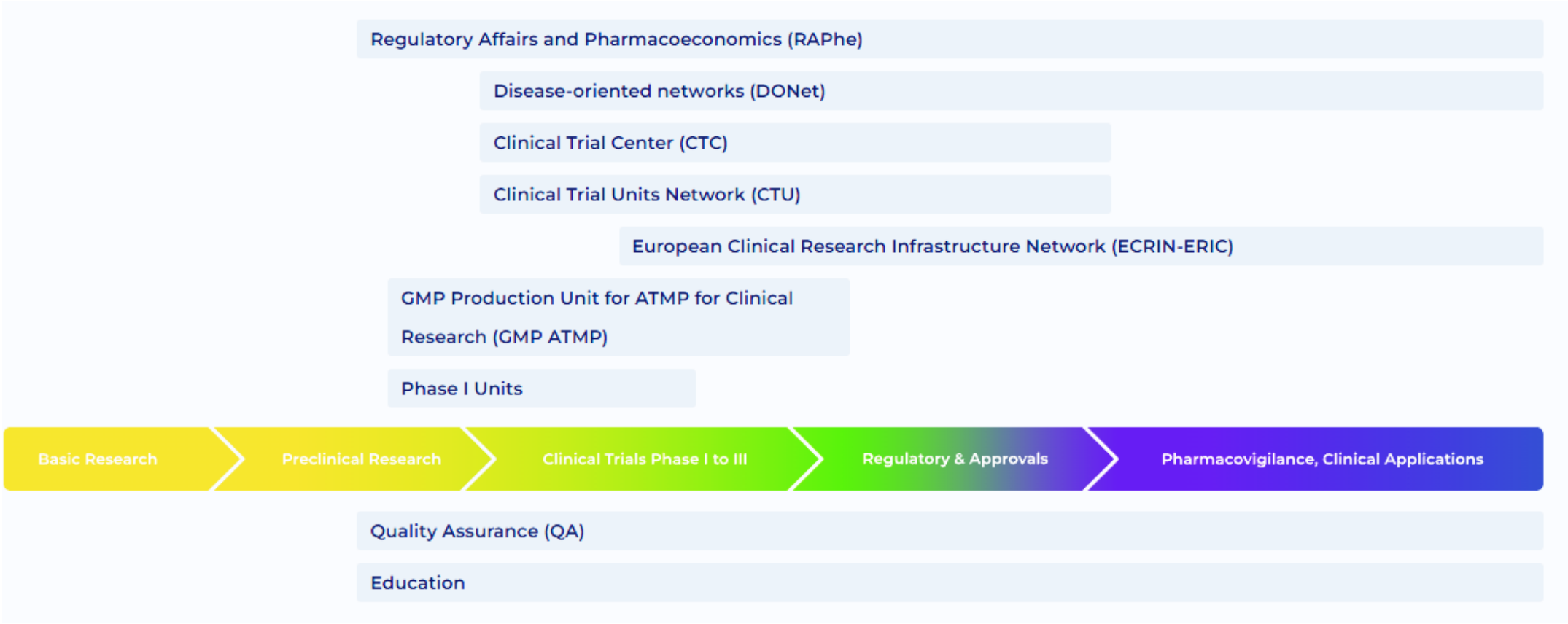
Ministerstvo školství, mládeže a tělovýchovy

7

ECRIN Member & Observer Countries

Country	National Hub	National CTU Network Network
Czech Republic	Brno	CZECRIN
France	Toulouse	F-CRIN
Germany	Berlin	KKSN
Greece	Thessaloniki	GreCRIN
Hungary	Budapest	HECRIN
Ireland	Cork	HRB-NCTO
Italy	Rome	ItaCRIN
Norway	Bergen	NorCRIN
Poland	Warsaw	PolCRIN
Portugal	Lisbonne	PtCRIN
Slovakia	Kosice	SlovaCRIN
Spain	Malaga	SCReN
Switzerland	Bern	SCTO

CZECRIN'S LIFE CYCLE EXPERTISE



CZECRIN – KPIs 20

 # 12 fakultních nemocnic v síti CZECRIN

 # 28 spolupracujících ZZ v projektech (+ 16 ZZ)

 # 177 klinických studií podpořených CZECRINem - **Celkem 200+**

- **44 nových studií v roce 2023**
- 8 studií ve spolupráci s ECRIN-ERIC
- 75 mezinárodních **Celkem 100+**
- 94 národních
  - 91 nekomerčních
  - 3 komerční

CZECRIN – KPIs 2023 +

 # 281 nových žádostí o poskytnutí služeb VVI CZECRIN

 # v roce 2023 celkově 837 „users served“

- 35 Host/partner
- 710 externí národní
- 92 externí zahraniční

 # 5 nových aplikací do HEU projektů

- 2 CZECRIN samostatně
- 3 CZECRIN s ECRIN-ERIC

- **Celkem** **30+** H2020/HEU projektů

CZECRIN – KPIs 2023 +

 # 10 900 + pacientů v klinických studiích **Celkem** **12 000+**

 # 42 publikovaných článků **Celkem** **200+**

 # 1 248 účastníků seminářů a konferencí CZECRIN Academy **Celker** **2 700+**

 # 80 PhD studentů

 # 81 Datasets

 # 3 KH s inovativními produkty ve vlastním vývoji

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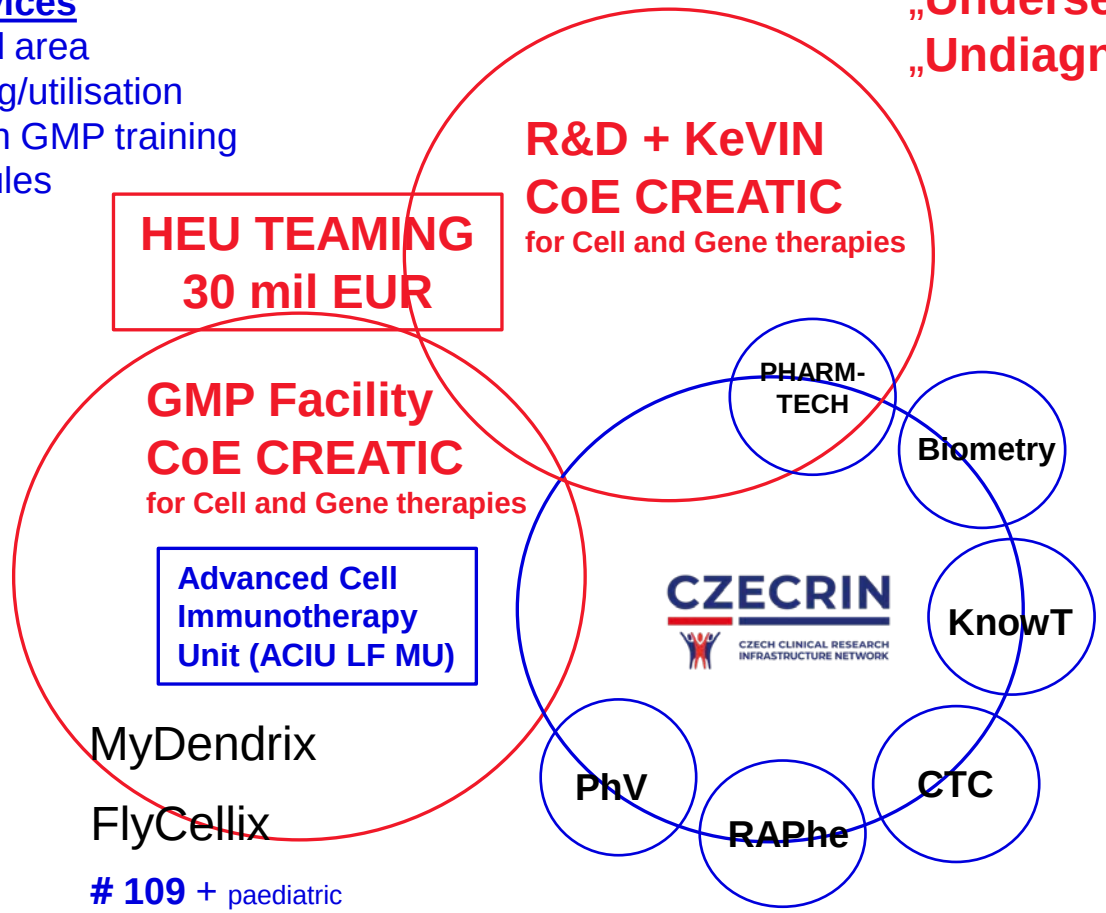
Central European Advanced Therapy and Immunotherapy Centre

Open-access services

Highly controlled area
Data proccessing/utilisation
Trained staff/with GMP training
HE TEAMING rules

„Underserved“ rare diseases +
„Undiagnosed“ patients



CoE CREATIC LF MU 1.1.2024

10th CZECRIN ANNIVERSARY

Open-access services

 # 12 University Hospitals Network

 # 30+ HEU and H2020 projects

 # 177 CZECRIN Clinical Trials

- **44 newly initiated in 2023**
- 8 in collaboration with ECRIN-ERIC
- 75 international

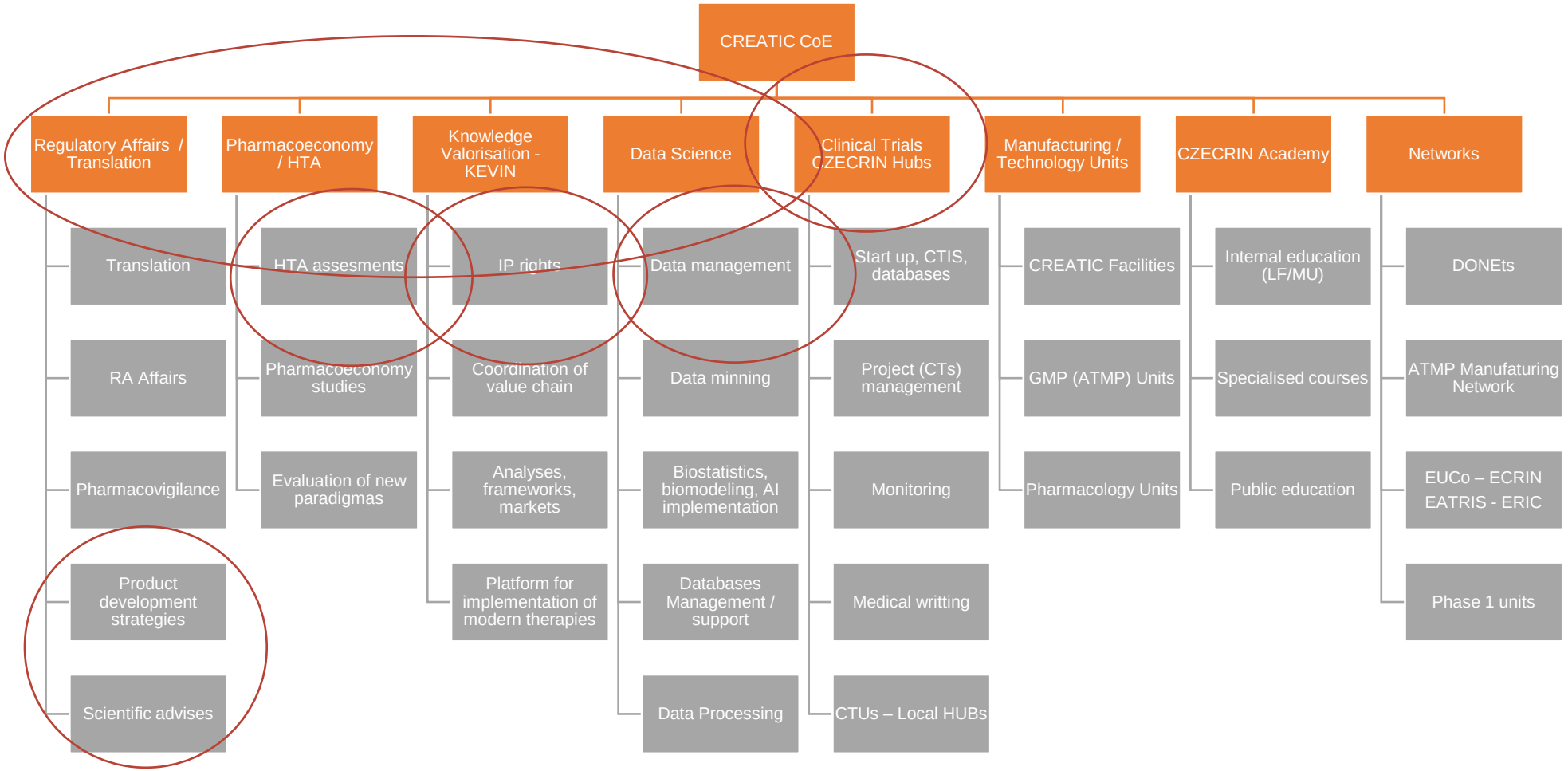
 # 10 900 + patients enrolled

 # 1 248 CZECRIN Academy participants

Funded by the European Union
MINISTRY OF EDUCATION, YOUTH AND SPORTS

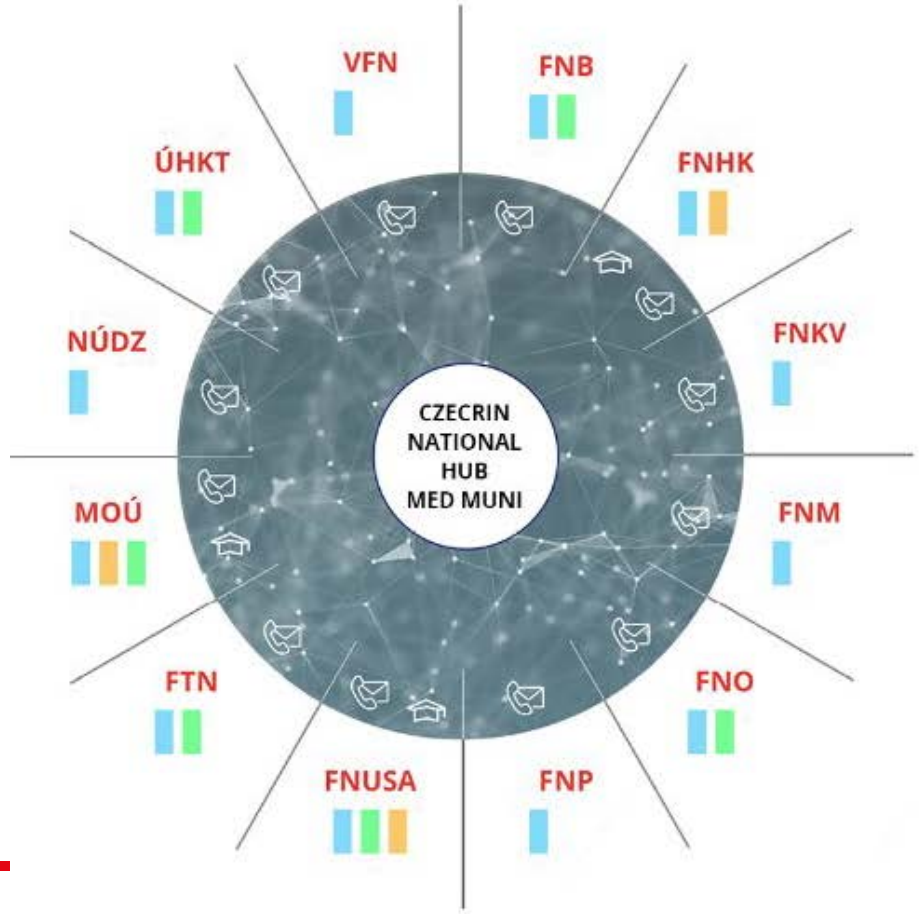
CoE CREATIC / RI CZECRIN LF MU

Knowledge / Services / Technology Core Units



Funded by the European Union
MINISTRY OF EDUCATION, YOUTH AND SPORTS

RI CZECRIN - Clinical trial HUBs



CZECRIN Local HUBs:

FNB	University Hospital Brno
FNHK	University Hospital Hradec Králové
FNKV	University Hospital Královské Vinohrady
FNM	University Hospital Motol
FNO	University Hospital Ostrava
FNP	University Hospital Plzeň
FNUSA	St. Anne´s University Hospital Brno
FTN	Thomayer University Hospital
MOÚ	Masaryk Memorial Cancer Institute
NÚDZ	National Institute of Mental Health
ÚHKT	Institute of Hematology and Blood Transfusion
VFN	General University Hospital in Prague

The presence of Clinical Trials Unit

Leading a Disease-Oriented Network

Certificate for FIH CT/Phase I Unit

CZECRIN HUB contact person

CZECRIN Academy parts

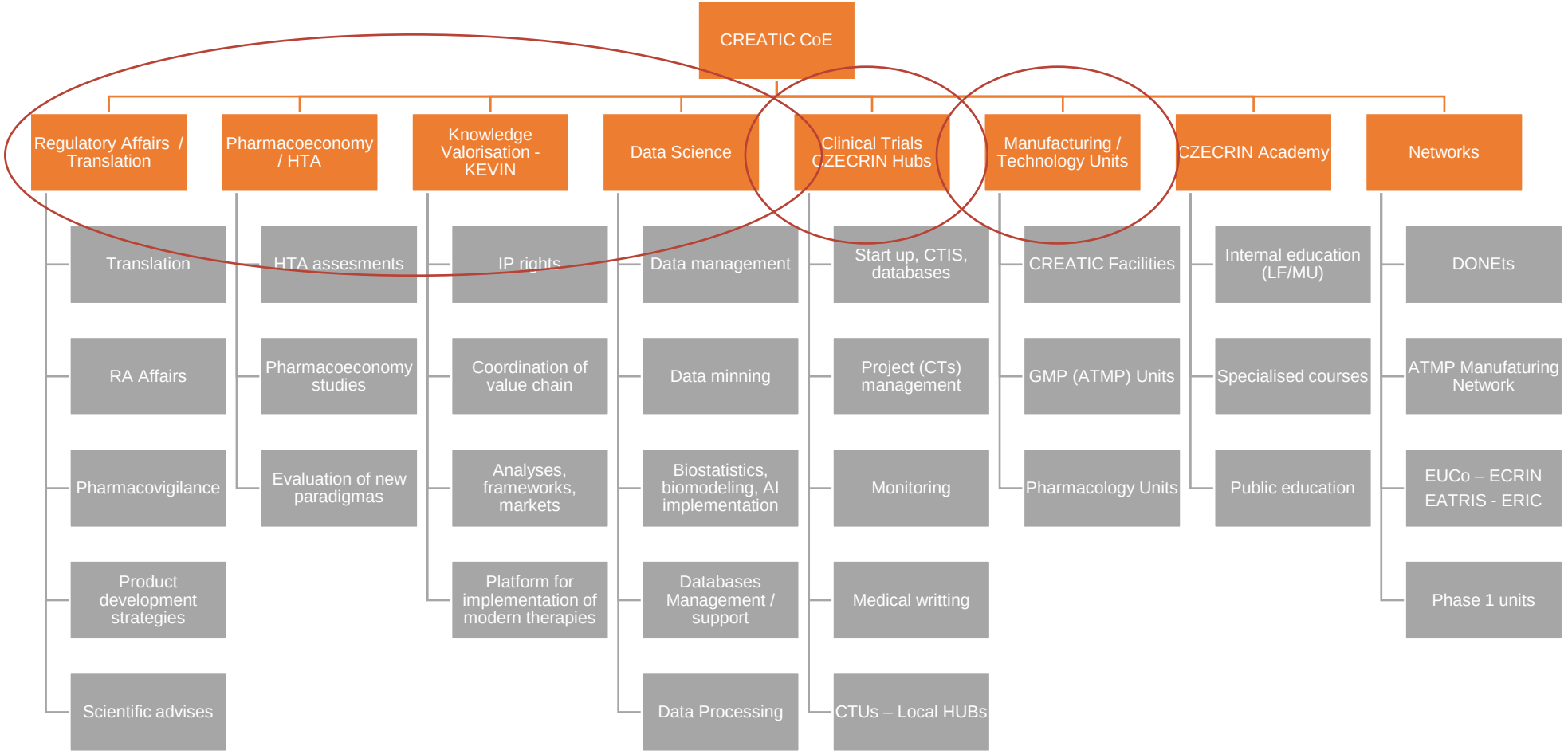
RI CZECRIN – Clinical Trials Services

CZECRIN expert team provides comprehensive Services to implement clinical trials and research in the field of medicinal products, diagnostic methods and medical devices following Czech and GCP legislation.

- Study Sponsor Responsibilities and Clinical Trial Project Management
- Preparing Clinical Trials Documentation and Application and Medical Writer/Medical Consultant Services
- Clinical Trial Regulatory Authority (SÚKL) and Ethics Committee Submission
- Consulting and Expert's Advisory, Scientific advises
- Project management
- Quality control and quality assurance
- Monitoring
- Pharmacovigilance for CTs
- Access to national network of hospitals /patients
- Access to ECRIN – ERIC panEU network
- Education

CoE CREATIC / RI CZECRIN

Knowledge / Services / Technology Units



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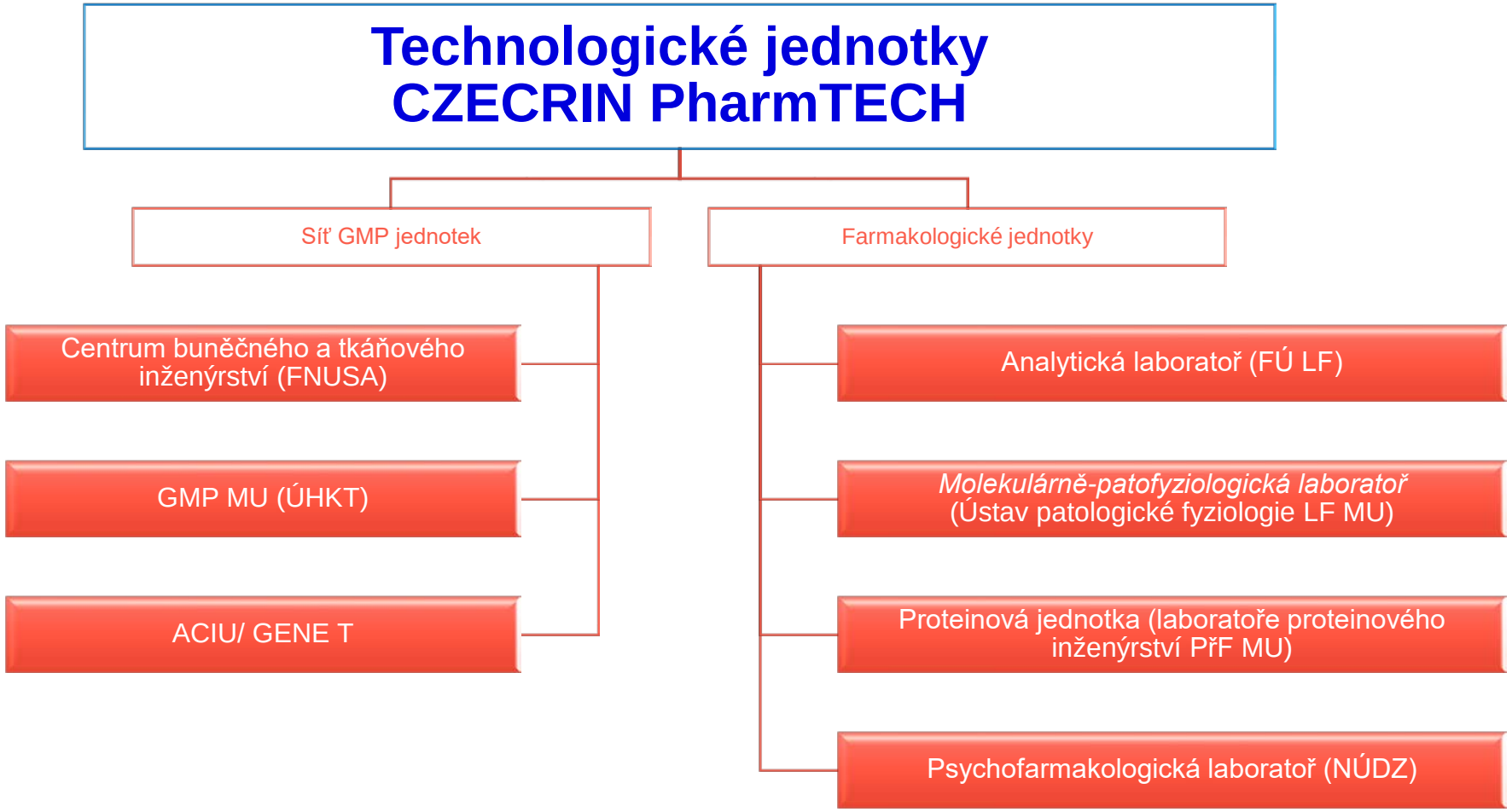
CoE CREATIC / RI CZECRIN LF MU



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ACIU: Advanced Cell Immunotherapy Unit

University-based GMP R&D unit

CERTIFICATE OF GMP COMPLIANCE OF A MANUFACTURER
Part 1

Issued following an inspection in accordance with Art. 15 of Directive 2001/20/EC and Section 13, paragraph 2, letter a, point 3 of the Act No 378/2007 Coll., on Pharmaceuticals and on Amendments to Some Related Acts (the Act on Pharmaceuticals), as amended.

The competent authority of the Czech Republic confirms the following:

The manufacturer:
Masarykova univerzita
Žerotínovo nám. 617/9
601 77 Brno

Site address:
Advanced Cell Immunotherapy Unit (ACIU), MU
Kamenice 5
625 00 Brno

Has been inspected under the national inspection programme in connection with manufacturing authorisation no 17692/2/INS/06, last variation no sukls125048/2015 issued on 26.10.2015 in accordance with Art. 13 of Directive 2001/20/EC transposed in the following national legislation: Section 57 of the Act No 378/2007 Coll., on Pharmaceuticals and on Amendments to Some Related Acts (the Act on Pharmaceuticals), as amended.

From the knowledge gained during inspection of this manufacturer, the latest of which was conducted on 12.11.2015, it is considered that it complies with The principles and guidelines of Good Manufacturing Practice laid down in Directive 2003/94/EC[1].

[1] These requirements fulfil the GMP recommendations of WHO.

Part 2
☒ **Human Investigational Medicinal Products**

1 MANUFACTURING OPERATIONS
1.1 Sterile Products
1.1.1 Aseptically prepared (processing operations for the following dosage forms)
1.1.1.4 Small volume liquids

1.1.3 Batch certification

1.3 Biological medicinal products
1.3.1 Biological medicinal products (list of product types)
1.3.1.3 Cell therapy products

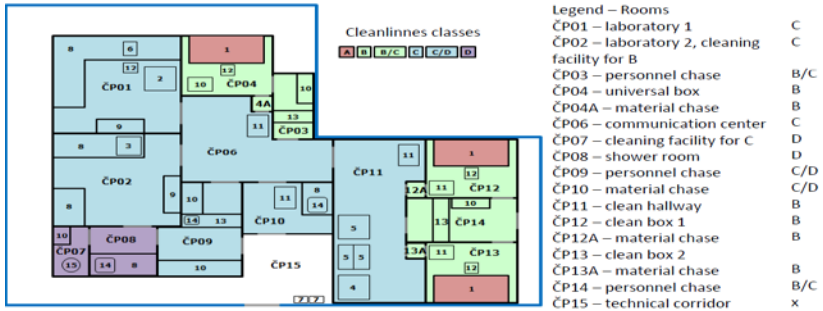
1.3.2 Batch certification (list of product types)
1.3.2.3 Cell therapy products

1. 5 Packaging
1.5.2 Secondary packing

1.6 Quality control testing
1.6.4 Biological

Any restrictions or clarifying remarks related to the scope of this certificate:
1.3.1.3 Cell therapy products –

- autologous and alogenous investigational medicinal products based on in vitro cultivation of immunocompetent cells
- autologous and alogenous investigational medicinal products based on cultivation of hematopoietic and non-hematopoietic stem cells and immunocompetent cells including their depletion



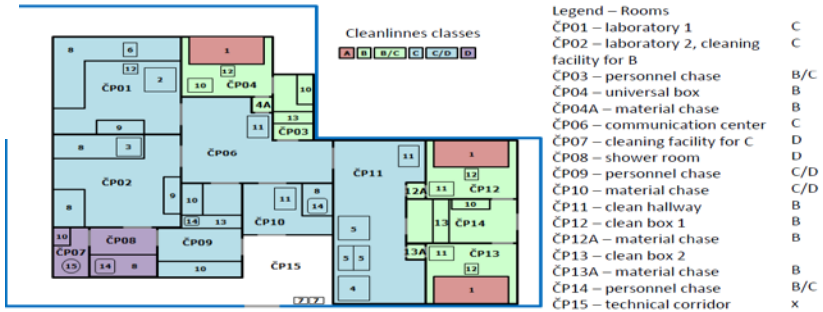
Legend – Rooms	
ČP01 – laboratory 1	C
ČP02 – laboratory 2, cleaning facility for B	C
ČP03 – personnel chase	B/C
ČP04 – universal box	B
ČP04A – material chase	B
ČP06 – communication center	C
ČP07 – cleaning facility for C	D
ČP08 – shower room	D
ČP09 – personnel chase	C/D
ČP10 – material chase	C/D
ČP11 – clean hallway	B
ČP12 – clean box 1	B
ČP12A – material chase	B
ČP13 – clean box 2	
ČP13A – material chase	B
ČP14 – personnel chase	B/C
ČP15 – technical corridor	x

Advanced Cell Immunotherapy Unit

University-based GMP R&D unit

A.1	Member State in which the submission is being made:	**Czechia - SUKL**
A.2	EudraCT number:	**2020-002936-55**
A.3	Full title of the trial:	
	English	**Safety and Efficacy of Allogenic Adipose Tissue-derived Mesenchymal Stromal Cells in Patients with Epidermolysis Bullosa: Clinical Trial Phase I/II**

A.1	Member State in which the submission is being made:	**Czech Republic - SUKL**
A.2	EudraCT number:	**2014-003388-39**
A.3	Full title of the trial:	
	English	**COMBINED ANTITUMOR THERAPY WITH EX VIVO MANIPULATED DENDRITIC CELLS PRODUCING INTERLEUKIN-12 IN CHILDREN, ADOLESCENTS AND YOUNG ADULTS WITH PROGRESSIVE, RECURRENT OR PRIMARILY METASTATIC HIGH-RISK TUMORS**



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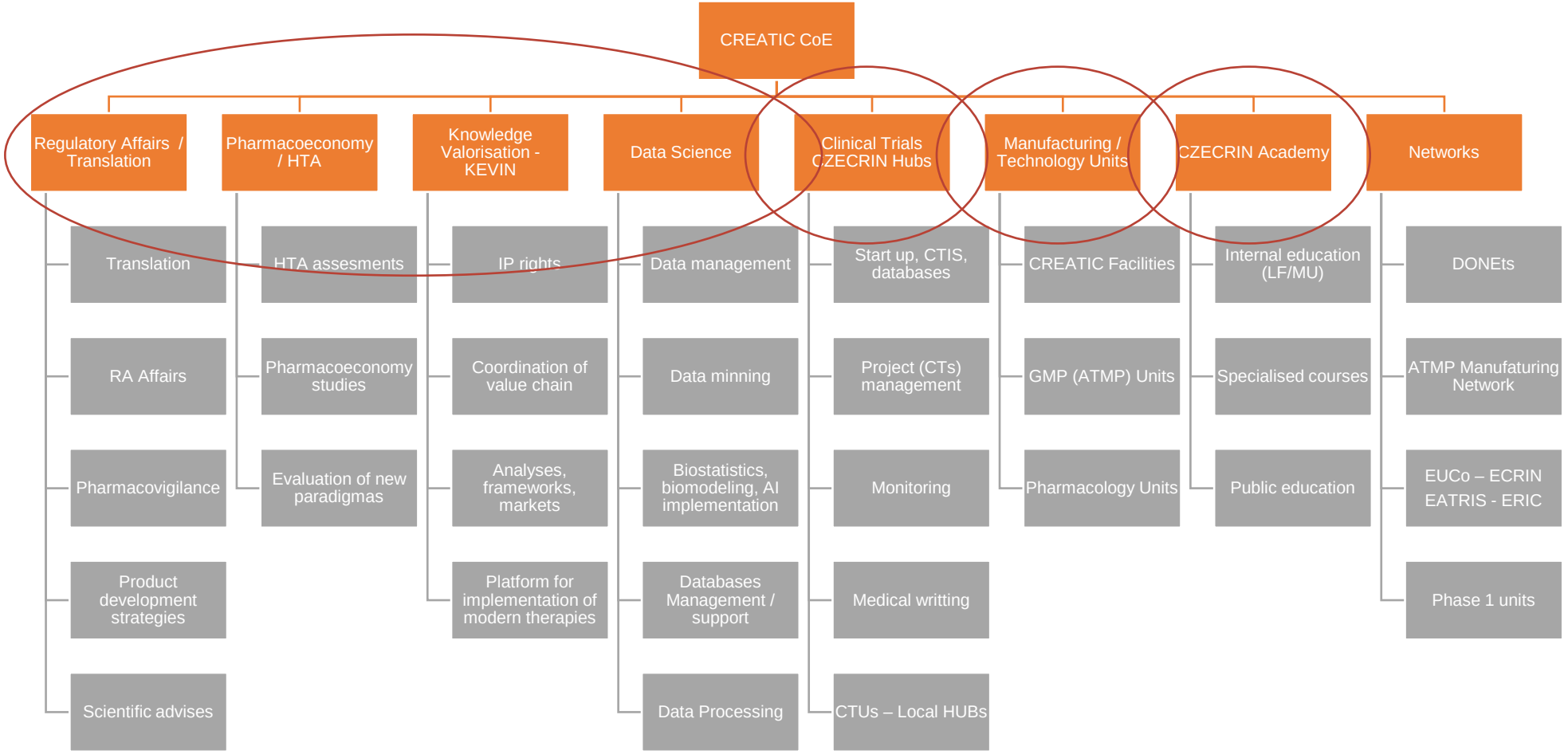

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CZECRIN ACADEMY

EDUCATION DEVELOPMENT

MOTTO

Becoming better through education.

VISION

Education for all in clinical research.

MISSION

Improve patient care through clinical research.

- The sharing of knowledge and experience is an essential element for the development of clinical reserch.
- We continue educational activities since 2014.
- We develop them and thus create a comprehensive integrated systém of education.

Open Access a využívání kapacity CZECRIN/CREATIC CoE

- Hlavními pilíři jsou
  - Kontinuální otevřený a spravedlivý přístup,
  - poskytování vysoce kvalitních služeb a výstupů
  - soulad s vědeckými, regulačními a etickými požadavky
  - Flexibilní schémata pro různé typy žadatelů
- Zajištěno již několik let fungujícími vnitřními procesy
- Kapacita a její sledování
  - definována a pravidelně hodnocena
  - přímé propojení s poskytnutými zdroji - schválenými rozpočty
  - dostupnost expertizy a služeb pro uživatele

Kdo využívá naši expertízu…

- **Primárními uživatelé**
  - subjekty přímo zapojené do biomedicínského výzkumu
    - Akademické instituce, nezávislá výzkumná centra, postgraduální výzkumní pracovníci a univerzitní nemocnice,
    - SME (status SME dle EMA)
    - Komerční subjekty
    - Zvláštní zájem je věnován mezinárodní spolupráci
      - účast na mezinárodních konsorciích
      - projektech Horizon 2020 / Europe.
      - strategická výhoda členství v ECRIN-ECRIC
      - aktivní vyhledávání příležitosti s cílem maximalizovat propojení českých institucí s ERA

- **Sekundárními uživatelé**
  - dostávají lékařskou péči a využívají vyvíjené léčivé přípravky a metody
  - pacienti, organizace pacientů a zdraví dobrovolníci účastnící se klinických studií

Základní schémata spolupráce

- strategický přístup k alokaci kapacity je realizován podle 3 základních schémat v závislosti na
  - typu služeb / podpory CZECRIN (znalostní expertize / technická základní jednotka)“
  - „typu uživatele“ (akademický / SME / komerční uživatelé):

- **Free of charge**
  - Využití expertizy a kapacity je poskytnuto bezplatně – akademické subjekty, vysoká inovace, mezinárodní projekt
- **Non profit**
  - Využití expertizy a kapacity je poskytnuto v neziskovém modelu – akademické subjekty, granty, mezinárodní projekty, může i SME
- **Standart profit**
  - Využití expertizy a kapacity je v normálním ekonomickém (ziskovém) režimu (20%) – komerční subjekty

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Central European Advanced
Therapy and Immunotherapy Centre

Děkujeme za pozornost

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Life Sciences

16 OCTOBER, 2024
CEITEC, E35/211+ATRIUM

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MUNI
MED

Surgical Anatomy Center

Doc. MUDr. Marek Joukal Ph.D.

History of the Surgical Anatomy Center

- The establishment of the center at the Faculty of Medicine of Masaryk University in 2006
- Teaching undergraduate and postgraduate students in the form of courses and workshops focused on theoretical and practical education of non-interventional and interventional procedures in surgery
- Cooperation in the development and testing of new methods and materials for medical use

History of the Surgical Anatomy Center

- Research in the application of clinical anatomy in surgical disciplines
- Other specific research, for example, in the field of conservation of teaching cadavers
- Collection of necropsy tissues for teaching and research
- Teaching specialized educational courses

Organization of courses and workshops

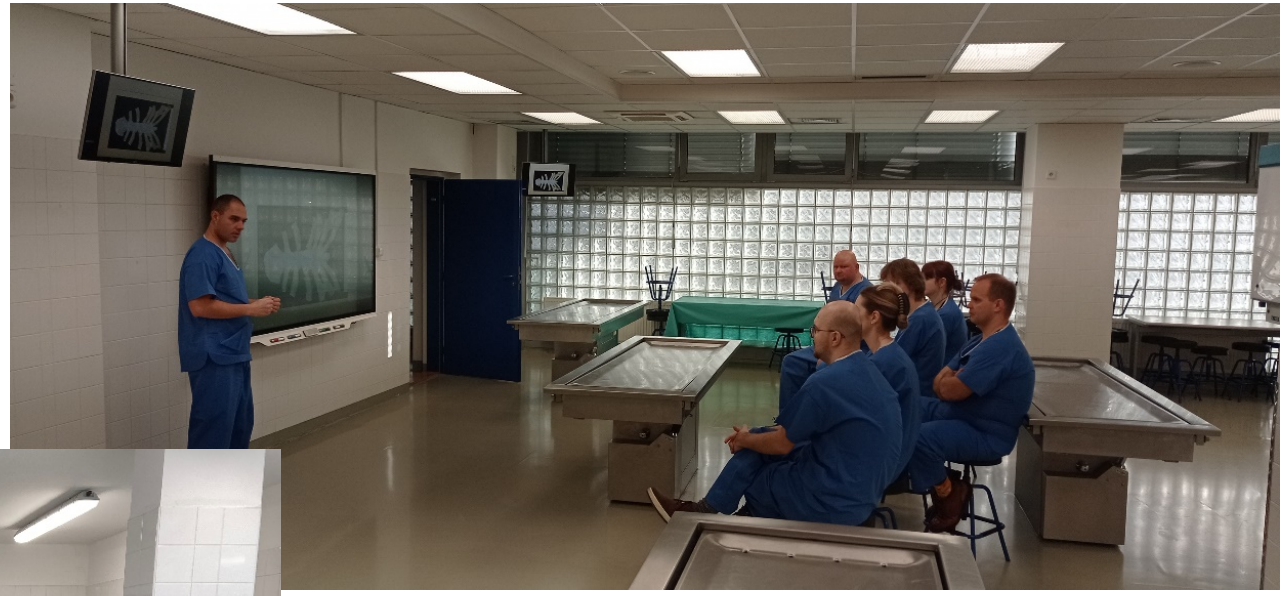
MUNI
MED

Organization of courses and workshops

MUNI MED

Tuition of spcialized education courses

– Embalming, dissection and plastination techniques course



MUNI MED

Erasmus+ SCaLPEL

- Focus on general surgery, plastic surgery, neurosurgery and spinal surgery

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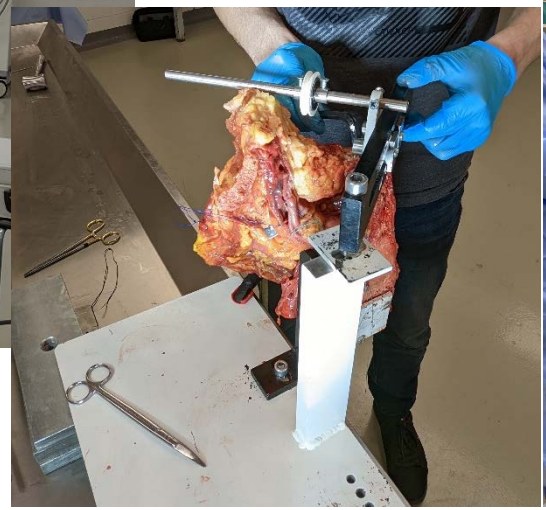
Cooperation in the development and testing of new methods and materials for medical use

– Gynecology and Obstetrics Clinic UHB, BUT, Medin



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Research in the application of clinical anatomy in surgical disciplines

Journal of Plastic, Reconstructive & Aesthetic Surgery 75 (2022) 4393–4402

ELSEVIER

JPRAS
An International Journal of Surgical Reconstruction
www.JPRASurg.com

Use of free radial forearm and pronator quadratus muscle flap: Anatomical study and clinical application

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Received 26 January 2022; accepted 18 August 2022

KEYWORDS
Radial forearm flap (RFF);
Pronator quadratus muscle (PQM);

Summary The authors present an anatomical study and clinical experience with radial forearm flap (RFF) and pronator quadratus muscle (PQM) application in the reconstruction of various body areas. The aim was to describe the anatomical placement and proportions of the PQM, the anatomical location of the major arterial branch of the radial artery supplying the PQM, and the application of this knowledge in clinical practice.

†Tomáš Kempný and Zuzana Musilová contributed equally to this work.
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https://doi.org/10.1016/j.bjps.2022.08.043

Hand Surgery and Rehabilitation 40 (2021) 808–809

Letter to the editor

Proximal- or radial-based dorsal capsulotomy? The importance of a proper cadaver study

Une capsulotomie dorsale à base proximale ou radiale? L'importance d'une étude cadavérique appropriée

Dear editor-in-chief,

We read with great interest the article 'A new capsulotomy-based dorsal approach to the wrist: A cadaver study', where the authors described a modification of the commonly used approach. The new dorsal approach to the wrist joint, suggested by the authors, uses 'U-shaped with proximal base' capsulotomy. The ulnar longitudinal incision is made on the triquetral bone insertion of the dorsal intercarpal ligament (DICL) and dorsal radiocarpal ligament (DRCL). The radial border is located in the extension of the medial edge of the radial styloid process. Finally, the capsular flap is created with incision along the DICL. The authors considered capsular flap healing more effective by maintaining the vascular supply via the dorsal branches of the anterior interosseous artery. In addition, they described the dorsal radiocarpal arch (DRCA) running along the radiocarpal joint line while the dorsal intercarpal arch (DICA) followed a trajectory parallel to the distal insertion of the DICL. The terminal branches of the anterior interosseous artery were described as having a longitudinal course, anastomosing with both of the arterial arches [1].

However, in their anatomical studies, Mestdagh et al. [2], Gelbermann et al. [3] and Kuhlmann et al. [4] found the DICA to be the largest, formed by the constant dominant branch – *ramus carpeus dorsalis* – which originated from the radial artery in most cases just behind the trapezium. The dorsal carpal branch was the strongest blood vessel contributing to the arcade and contributed the greatest part in the supply to the dorsal capsule of the wrist. The radial part of the DICA provided the supplying branches running upward to the proximal row of the carpal bones. The DRCA was the second largest, and both of the arches were formed by the anastomosis of the terminal branches of the radial, ulnar and anterior interosseous arteries [2–4]. From our experience and from the aforementioned sources, it is clear that the arterial vascular supply to the dorsal portion of the carpal joint capsule is provided by the radial branches of the DICA (Fig. 1). The dorsal carpal branch is the dominant artery running distally or along the course of the DICL. The radial supplying branches run upward and across the DICL. The branches of the radial portion of the DICA are larger, more numerous and more constant than the dorsal branches of the anterior interosseous artery. Therefore, the modified proximal-based capsulotomy suggested by Athlani et al. [1] would not correlate with the position of the blood vessels and would affect the blood supply to the created flap. The radial and distal capsular incisions would interrupt crossing branches originating from the radial portion of the DICA. Due to the small number of specimens,

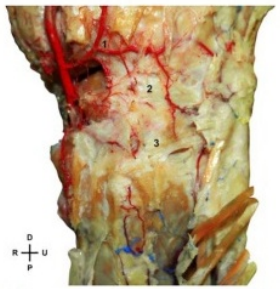

Fig. 1. Blood supply of the dorsal portion of the radiocarpal joint after injection of the radial (red), interosseous (blue) and ulnar (yellow) arteries. 1: dorsal carpal branch; 2: dorsal intercarpal ligament; 3: dorsal radiocarpal ligament.

the cadaver study with vascularization may not be a representative sample of the population. In order to preserve the vascularization of the capsular flap, its vitality and healing capacity, we would suggest capsulotomy with incisions respecting the position of the radial branches of the DICA crossing the DICL.

Conflict of interest

The authors declare that they have no competing interest.

Informed consent

The participant whose image was used in this correspondence had given informed consent for use of their body for medical research.

CRediT authorship contribution statement

Z. Musilová: Conceptualization, Investigation, Writing - original draft. **V. Dzetkuličová:** Conceptualization, Writing - review & editing. **M. Joukal:** Supervision, Conceptualization, Writing - review & editing.

https://doi.org/10.1016/j.hansur.2021.07.007

MUNI MED

Embalming methods research

Anatomical Science International (2023) 98:441–447
https://doi.org/10.1007/s12565-023-00707-9

ORIGINAL ARTICLE

Substantial decrease in SARS-CoV-2 RNA after fixation of cadavers intended for anatomical dissection

Kateřina Vymazalová[1] · Omar Šerý[2,3,4] · Petr Králík[3] · Radka Dziedzinská[3] · Zuzana Musilová[1] · Jan Frišhons[1] · Tomáš Vojtíšek[4,5] · Marek Joukal[1]

Received: 31 March 2022 / Accepted: 19 February 2023 / Published online: 4 March 2023

Abstract
With the onset of the COVID-19 pandemic, a problem arose with classic body donation programmes for obtaining cadavers for anatomical dissections, science and research. The question has emerged whether bodies of individuals who died of COVID-19 or were infected by SARS-CoV-2 could be admitted to Departments of Anatomy. To determine the risk of SARS-CoV-2 transmission to employees or students, the presence and stability of SARS-CoV-2 RNA in cadavers after fixation agents' application and subsequent post-fixation baths over time were examined. The presence of viral RNA in swabs from selected tissues was assessed by the standardized routine RNA isolation protocol and subsequent real-time PCR analysis. To support the results obtained from the tissue swabs, samples of RNA were exposed in vitro to short and long-term exposure to the components of the injection and fixation solutions used for the bodies' conservation. Substantial removal of SARS-CoV-2 RNA was observed in post-mortem tissue following perfusion with 3.5% phenol, 2.2% formaldehyde, 11.8% glycerol and 55% ethanol, and subsequent post-fixation in an ethanol bath. In vitro experiments showed significant effects of formaldehyde on SARS-CoV-2 RNA, while phenol and ethanol showed only negligible effects. We conclude that cadavers subjected to fixation protocols as described here should not pose a considerable risk of SARS-CoV-2 infection while being handled by students and staff and are, therefore, suitable for routine anatomical dissections and teaching.

Keywords Embalming · Dissection · Infections · Coronavirus · Polymerase chain reaction

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Further development

- BioBanking – control tissues available for clinical research

- OP TAK application – development of the SAC, new equipment, testing and research

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Thank you for your attention

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Core Facility Day 2024
Life Sciences

16 OCTOBER, 2024
CEITEC, E35/211+ATRIUM

Curious about what expert services are available to researchers on campus? What instruments can you use in shared mode and under what conditions? Do you want to see everything for yourself?

Register at: muni.cz/go/fba265

Preclinical Center (PC) MU

Core Facility Day 2024

Aleš Hampl & **Vítězslav Bryja**

What is the Preclinical Center?

Cluster of core facilities :

- to support teaching and research using *in vivo* and *ex vivo* models
- to provide services using these models

Enable Res&Dev with defined impact on clinical medicine	Develop effective interdisciplinary interactions	Create a base for participation in international projects	Target Res&Dev to the most modern ones in the field of biomedicine

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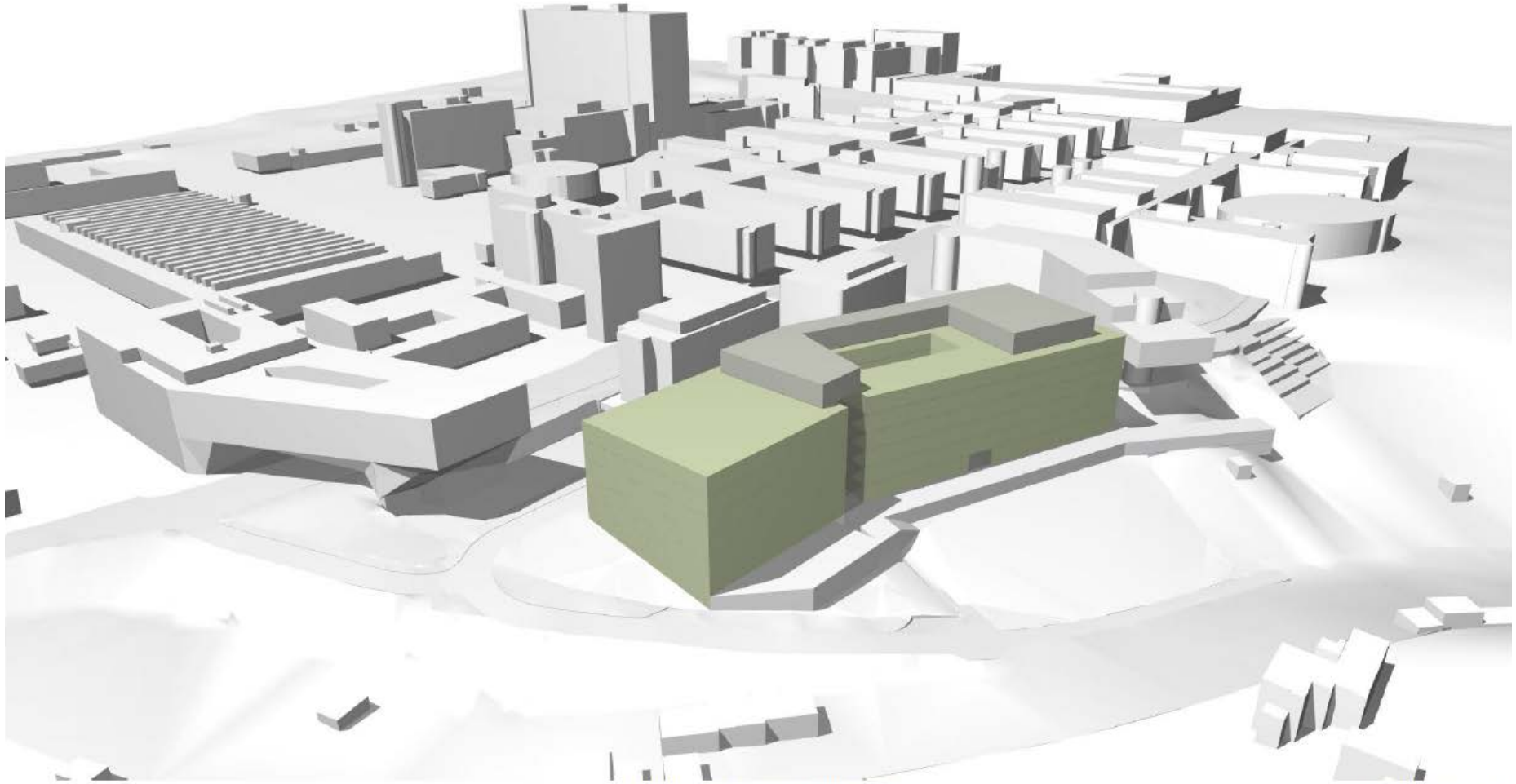
PC as a part of BioPharma Hub MU



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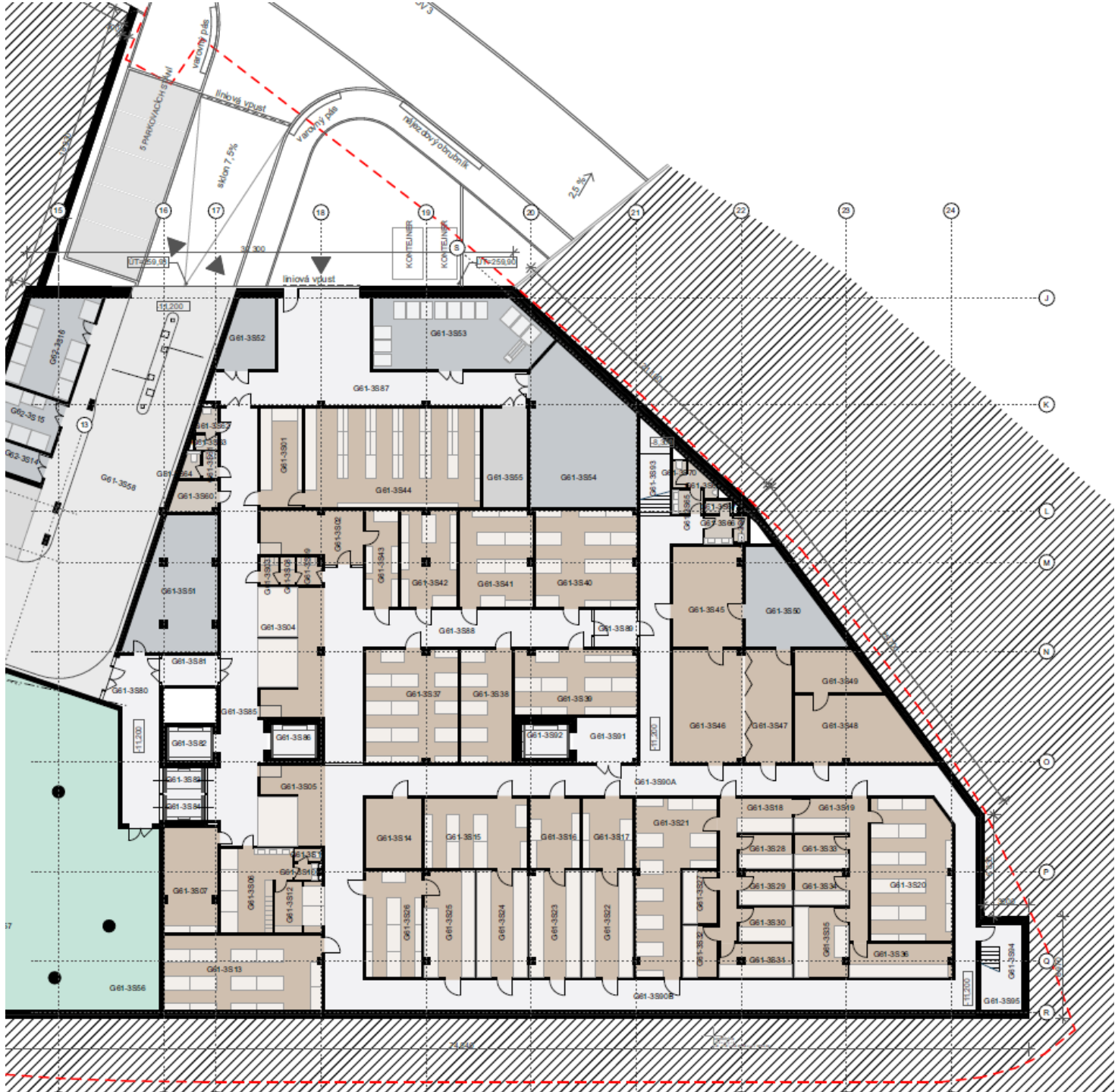
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PC structure

- The PC will consist of functional modules, so-called units, which will concentrate specific know-how
- units for animal ("*in vivo*") and human/cellular ("*ex vivo*") models will be logically and logistically integrated into one physical and functional unit
- The PC will be organically integrated into the scientific research axis existing at the Bohunice University Campus (UKB) and will thus complete the local unique environment of a globally competitive biomedical research center
- PC MUNI will operate as an entity open to internal and external researchers and commercial partners

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PC units

In vivo models

- Mouse/Rat Breeding Unit (Core Breeding)
- Tumor Models Unit
- Experimental Surgery Unit
- Unit for Neurobehavioral Experiments
- Pharmacological-toxicological unit
- In vivo imaging unit
- Electrophysiology unit
- Zebrafish facility
- BSL-3 laboratories for animal experiments

Ex vivo models

- Tissue Culture and Genetic Modification Unit
- Organoid Unit
- Immunology and Flow Cytometry Unit
- Histopathology and Hematology Unit

Biobank

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Units for *In vivo* models

Mouse/Rat Breeding Unit

- Research
  - "core" breeding (SPF - Specific Pathogen Free)
  - all long-term maintained strains of mice and rats, including genetically modified ones, will be located here
  - experiments will not be carried out here

- Contract research
  - paid breeding of mice/rats for external users
  - cryostorage
  - embryotrasfer

Experimental Surgery Unit

- Research
  - support unit
  - enables all surgical interventions on living animals (e.g. implantation of engineered tissues and organs, implantation of sensors for in vivo telemetric monitoring of functions, ...)

- Contract research
  - identical to the research activities mentioned above

Unit for Neurobehavioral Experiments

- Research
  - research in psychiatry, neuroscience and pharmacology
- Contract research
  - validated behavioral testing of drug effects
  - normal animals as well as models of neuropsychiatric diseases

Tumor Models Unit

- Research
  - mechanisms of tumor formation and progression
  - development of anticancer strategies

- Contract research
  - development of models of the formation and development of tumors - transgenic animals
  - testing substances for their antitumor effect in mouse and PDX models

Pharmacological-toxicological unit

- Research
  - support unit
  - enables basic safety, toxicokinetic and pharmacokinetic testing of substances (part of drug development)
  - it is closely related to the Unit for Experimental Surgery and the Unit for Histopathology and Hematology

- Contract research
  - identical to the research activities mentioned above

In vivo imaging unit

- Research
  - support unit
  - enables imaging of biological processes in living animals in high spatial and temporal resolution
  - key instrumentation is microCT and a multiphoton in vivo microscope
  - has a close relationship with the Unit for Experimental Surgery

- Contract research
  - identical to the research activities mentioned above

Unit for breeding and experiments on *Danio rerio* (zebrafish facility)

- Research
  - support/research unit
  - zebrafish maintenance, production of transgenic lines of fish and research in the field of developmental biology and biomedicine
  - drug development

- Contract research
  - preparation of transgenic fish (models for research)
  - testing the effects of substances (pharmaceuticals)

BSL-3 laboratories for animal experiments

- Research
  - research unit
  - enables research of pathogenic infectious agents classified as biological risk level 3 on live laboratory animals (mice, rats)
  - the unit will be equipped with all the instrumentation for monitoring the animals' vital functions and analyzing the samples taken

- Contract research
  - testing of new anti-infective drugs and vaccines

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Units for Ex vivo models

Histopathology and Hematology Unit

- Research
  - support unit
  - provides a comprehensive histopathological and hematological examination of laboratory mice and rats, including a qualified description of the findings
  - ensures the dissection of tissue samples (animal and human) and their preparation for processing in other units

- Contract research
  - mouse/rat examination

Tissue Culture and Genetic Modification Unit

- Research
  - support/research unit
  - ensures the basic techniques of in vitro cell cultivation and their standardization
  - develops new cell culture and testing strategies, establishes new primary lines from tissue samples
  - prepares genetically modified cell lines

- Contract research
  - preparation of genetically modified cells
  - testing substances on cells
  - design and implementation of targeted cell assays
  - testing of cytotoxicity, pharmacodynamics, etc.

Organoid Unit

- Research
  - support/research unit
  - provides and develops procedures for ex vivo creation of 3D structures imitating tissues and organs (organoids)
  - enables the use of organoids for research into developmental processes and disease pathogenesis
  - offers testing of substances (pharmaceuticals) using organoids
  - special technologies such as 3D bioprinting and microfluidics
  - it is closely related to the Unit for Immunology and Flow Cytometry

- Contract research
  - testing substances using organoids

Immunology and Flow Cytometry Unit

- Research
  - support unit
  - realizes the most advanced analysis and isolation (sorting) of cells by flow cytometry and microfluidic techniques, including specialized preparation of cells for their subsequent examination (in vivo application, "single cell" proteomics and genomics, ...)
  - closely linked to the Unit for Tissue Culture and Genetic Modification, the Unit for Experimental Surgery and the Unit for Organoids

- Contract research
  - analysis of cell phenotypes and immune system changes, especially in coordination with other PC units

Biobank

- Research
  - support unit
  - enables the storage of patient tissue samples (in cooperation with FN) and samples that are the result of Res&Dev implemented in PC
  - storage of these two types of samples is completely separate in fully robotic high-capacity N_2 tanks
- Contract research
  - provision of unique samples (or their analysis in other Units)
- Service
  - long-term storage of samples, including keeping appropriate records

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Thank you for your attention - we look forward to your questions!

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Core Facility Day 2024
Life Sciences

16 OCTOBER, 2024
CEITEC, E35/211+ATRIUM

Curious about what expert services are available to researchers on campus? What instruments can you use in shared mode and under what conditions? Do you want to see everything for yourself?

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GMP Pilot Plant for drug formulations

Jan Gajdziok, CF Day Life Sciences, 16 October 2024

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GMP PILOT PLANT

Intro & Motivation

GMP Pilot Plant

- part of R&D of innovative and generic drugs - **processing** of API into suitable **application form**
- small-batch manufacturing site operated under **Good Manufacturing Practice** (GMP), serving to develop drug formulations and **produce small-scale (clinical) batches of drugs (1-10 kg)**

- help **researchers** and **companies** with limited possibilities in **manufacturing small batches** of drugs under **GMP conditions**

Intention

- to build **GMP facility to develop and manufacture drug forms** and **evaluate their quality**
- GMP Pilot Plant - part of **BioPharmaHub**
- the manufacturing site occupies ~ 350 m^2 + 130 m^2 (QC)

- part for **solid, semi-solid, and liquid drug forms** (class D)
- class C area with isolator (A) for **sterile preparation of liquid and lyophilized drug forms**
- dedicated **Quality Control (QC) laboratories** with the possibility of pharmacopoeial and in-house testing of prepared drugs and stability testing

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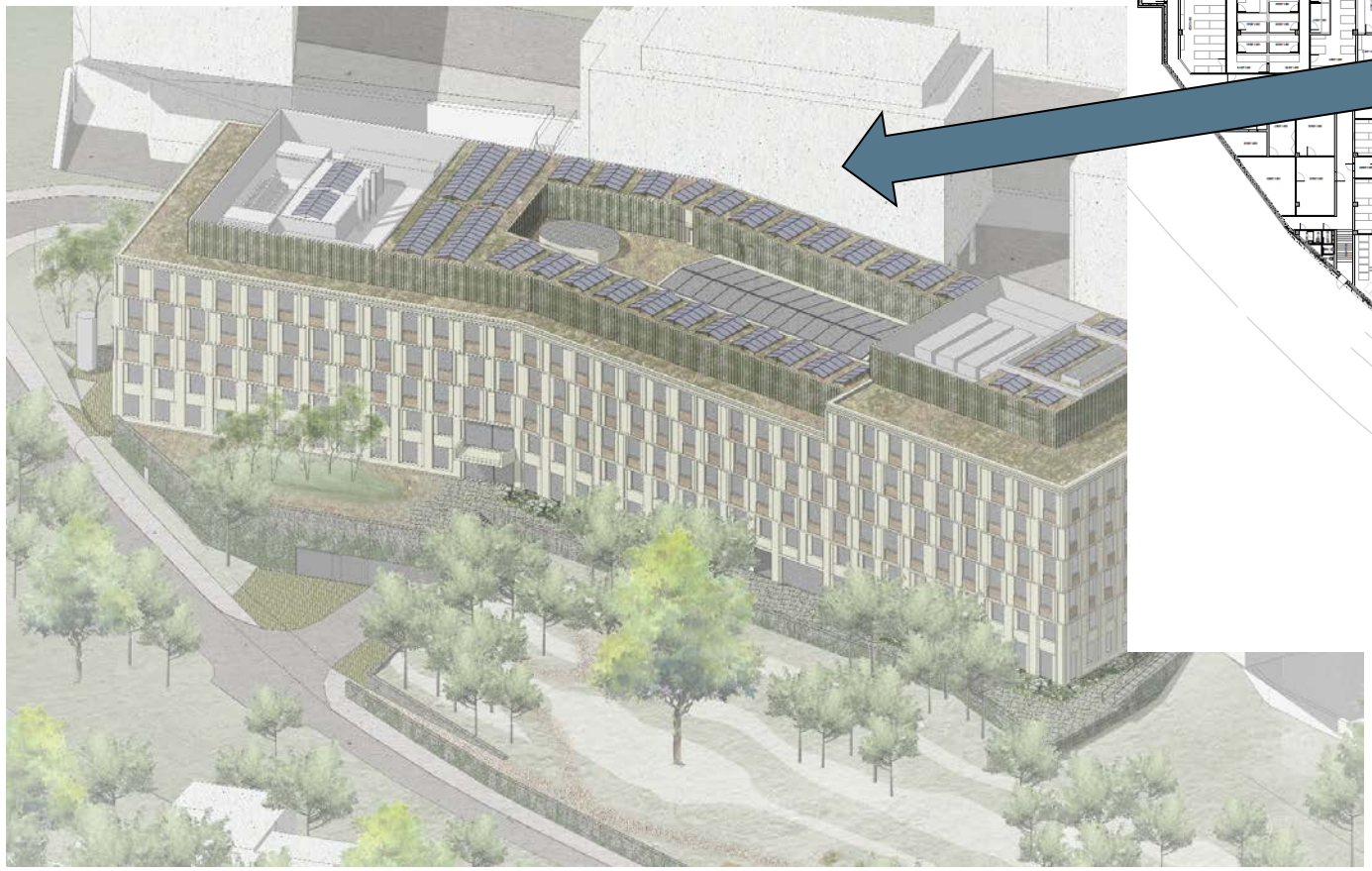
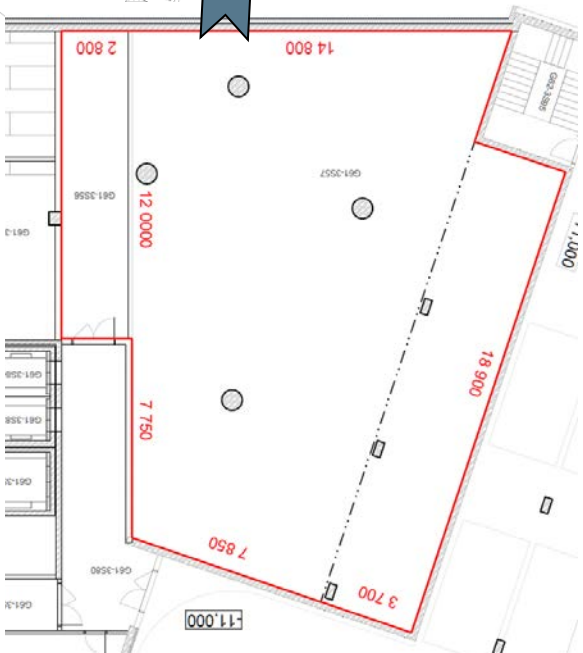
Location





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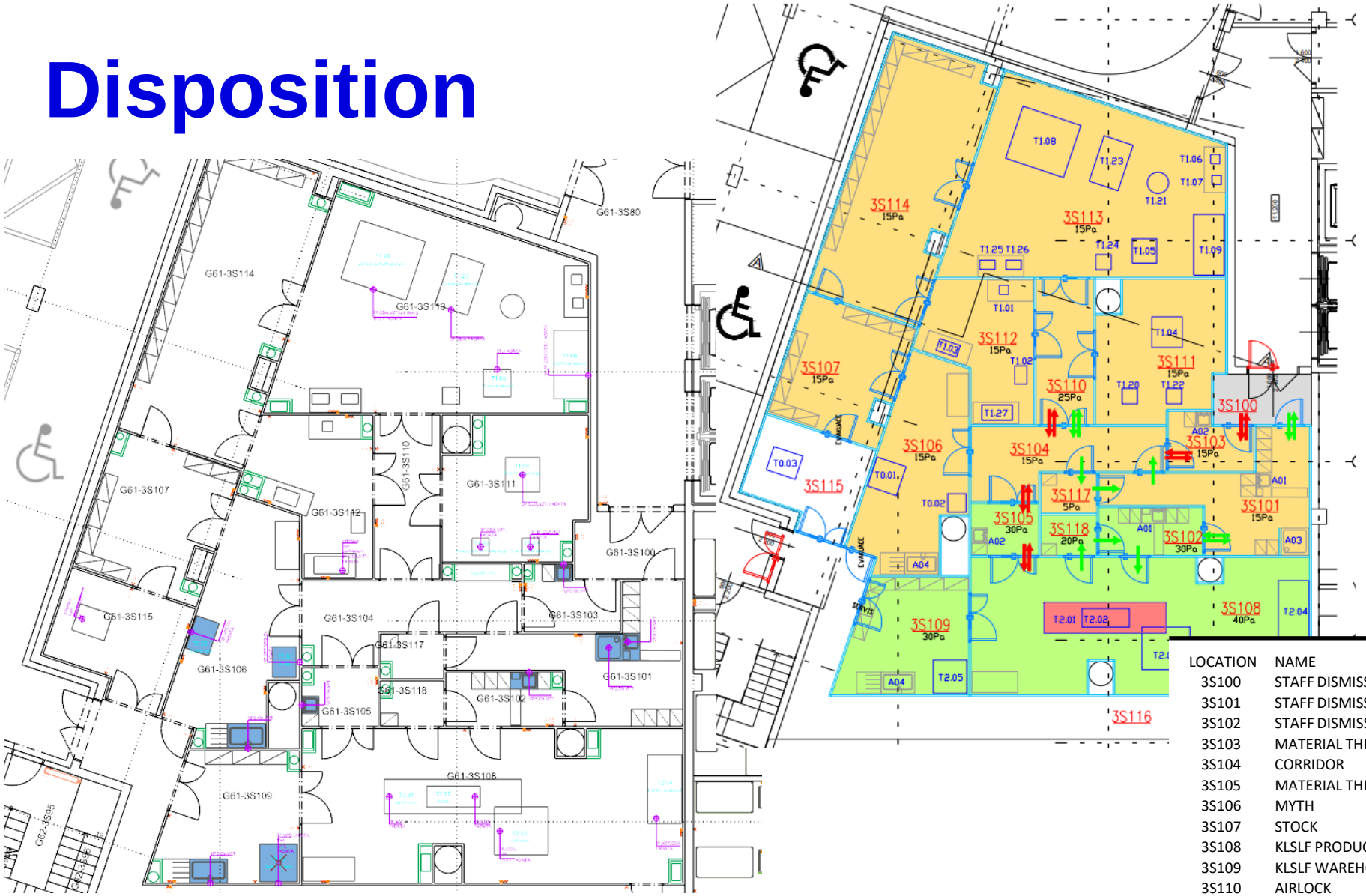
Disposition



LOCATION	NAME	AREA (m2)	Room height (m)	CLEANLINESS CLASS
3S100	STAFF DISMISSAL	9,4	2,5	K
3S101	STAFF DISMISSAL	11,1	2,5	D
3S102	STAFF DISMISSAL	6,1	2,5	C
3S103	MATERIAL THROUGHPUT	5,5	2,5	D
3S104	CORRIDOR	12,0	2,5	D
3S105	MATERIAL THROUGHPUT	4,9	2,5	C
3S106	MYTH	19,6	2,5	D
3S107	STOCK	15,3	2,4	D
3S108	KLSLF PRODUCTION ROOM	48,1	3,0	C
3S109	KLSLF WAREHOUSE	14,9	3,0	C
3S110	AIRLOCK	9,6	2,5	D
3S111	PRODUCTION ROOM PPKLF 1	19,7	4,0	D
3S112	PRODUCTION ROOM PPKLF 1	14,6	4,0	D
3S113	PRODUCTION ROOM PPKLF 1	47,7	5,0	D
3S114	PPKLF WAREHOUSE	32,7	2,4	D
3S115	TECHNICAL ROOM	11,1	2,4	--
3S116	TECHNICAL CORRIDOR	33,8	2,4	--

Solid, Semi-Solid, and Liquid Forms

Operations

- Dry & wet milling/milling
- Granulation, compaction
- Spraying
- Drying
- Extrusion/spheronization
- Encapsulation
- Tableting
- Coating of solid drug forms
- Packaging
- IPC

Equipment

- Ball mill
- High-shear mixer
- Roller compactor
- Fluid bed equipment - granulation, drying, and coating (Wurster)
- Rotary/excentric tablet press
- Tablet/capsule coating device
- Automatic capsule filler
- Extruder and spheronizer
- Tablet evaluation device (height, width, strength)
- Tabletop container filler/tablet counter

Liquid and Lyophilized Sterile Forms

Operations

- Wet mixing
- Lyophilization
- Filling
- Hot air sterilization
- Steam sterilization

Equipment

- Hazard box
- Hot air pass-through sterilizer
- Isolator
- Lyophilization device
- Steam sterilizer
- Filling device
- Tabletop bottle capper by crimping
- Sterile packaging welder

QC Lab

Operations

- Pharmacopoeial methods (F-CH)
- “In-house” methods (F-CH)

Equipment

- BET
- Dissolution device - flow-through cell (USP IV), paddles/baskets (USP I/II)
- HPLC with UV/VIS (DAD) and MS with nitrogen supply
- IR spectrometer
- Laser diffraction (wet and dry measurement)
- X-ray powder diffraction
- Stability boxes for 25 °C/60 %RH; 30 °C/65 %RH; 40 °C/75 %RH
- Thermal analysis (differential scanning calorimetry, thermogravimetry)
- UV/VIS spectrophotometer
- Device for measuring bulk and tapped volume, tablet abrasion, disintegration, flowability

GMP Pilot Plant mission

- **connection of R&D with the industrial sphere**
- modern GMP facility will have a significant scientific-research contribution
- **transferring excellent research results into practice**
- the facility will supplement large-capacity manufacturers

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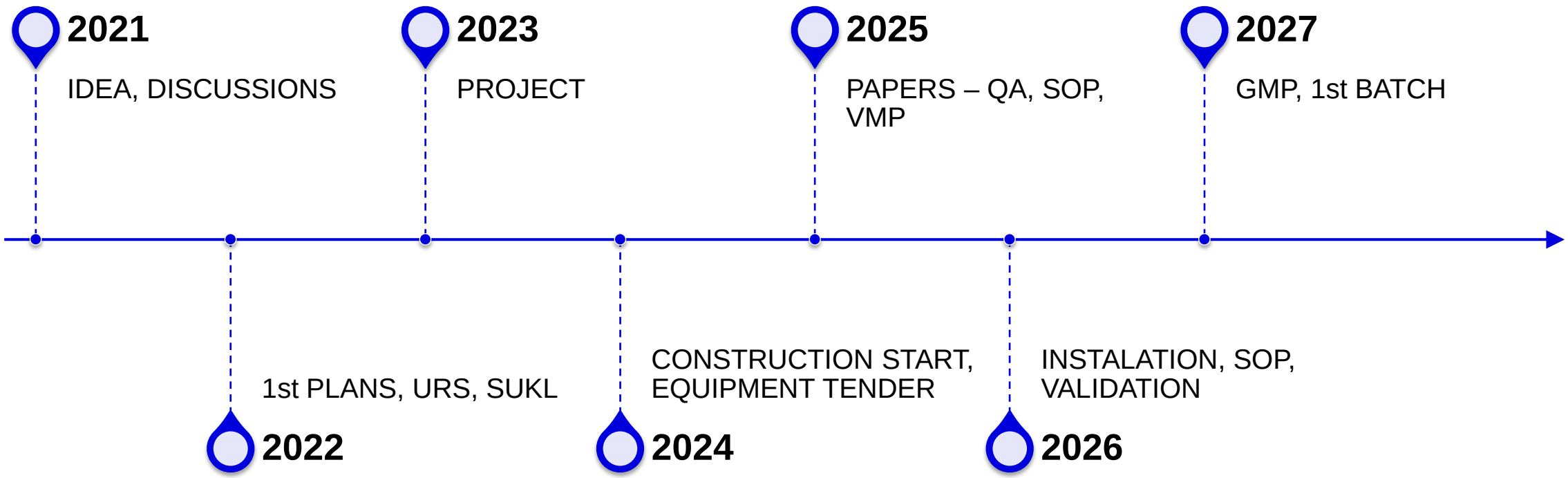
GMP - schedule



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Cooperations - non GMP

Services and **cooperation in R&D of application/dosage forms** in non-GMP mode:

- research, development, and evaluation of modern solid, semi-solid, and liquid dosage forms
- areas of pharmacy, cosmetics, medical devices, veterinary medicine, food industry
- consulting activities, formulation proposals, solving formulation problems
- evaluation of dosage forms, stability studies, analytics
- cooperation in projects as the university partner
- Ph.D. study or internship on a specific project

Current partners and projects

- Addicoo – modern veterinary application forms
- Oritest – toxic substance detection tubes
- Oncomed – parenteral lyophilized drugs
- Promed – formulation of innovative solid preparation
- Hartmann – medical devices

Formulation of tablets, capsules, fluid processes

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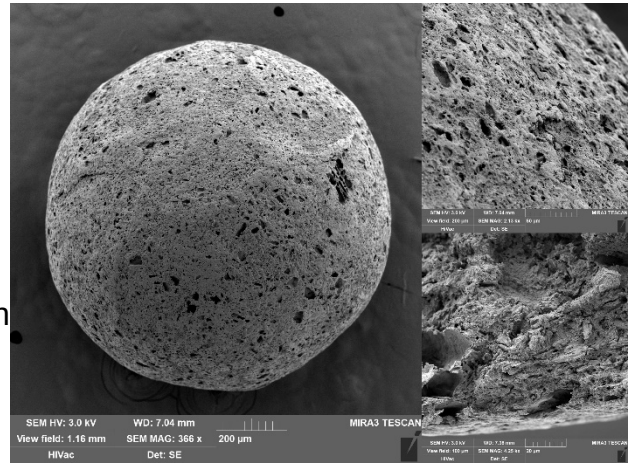
Detection systems to monitor nerve agents

- preparation and evaluation of porous carriers (pellets, microparticles, scaffolds…)
- collaboration with the company Oritest Ltd., Prague, CZE

before and after reaction with phosgene (UV 366 nm)

CWA protection for the third millenium



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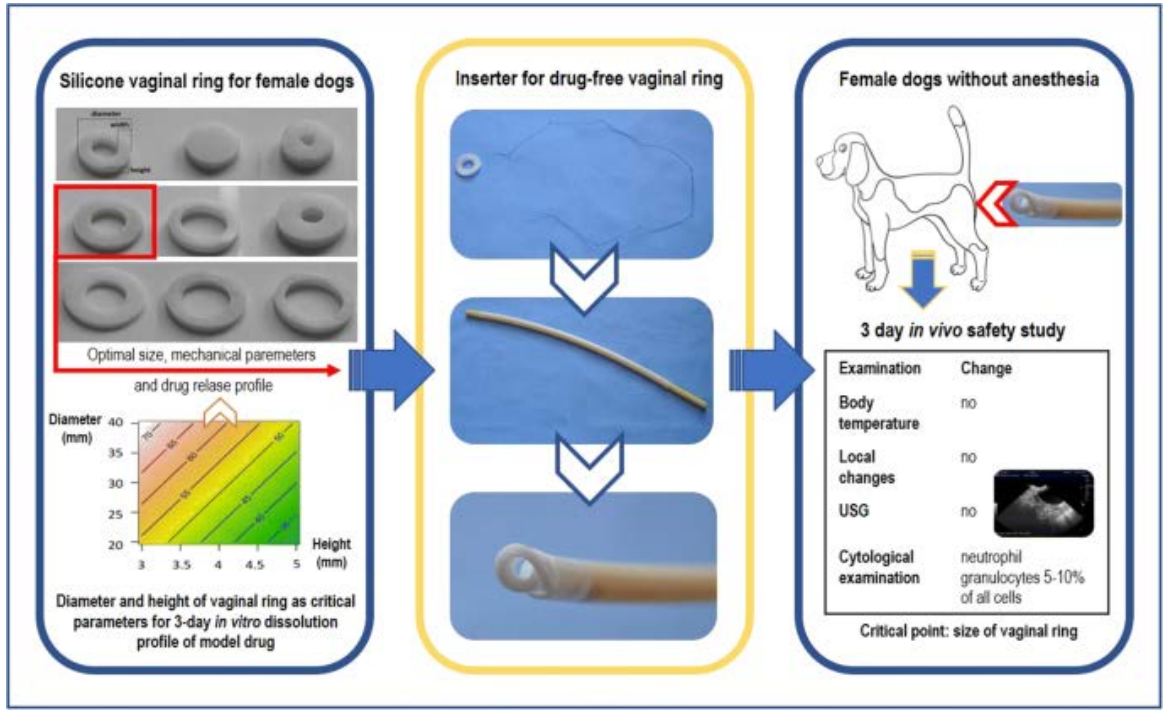
Parenteral lyophilized preparations

- collaboration with the company Oncomed Manufacturing a.s. Brno, CZE and Department of Chemistry, Faculty of Science, Masaryk University, Brno, CZE

Veterinary preparations



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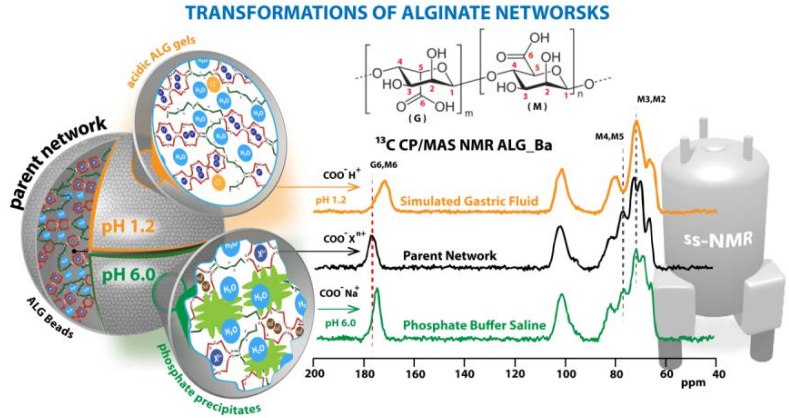
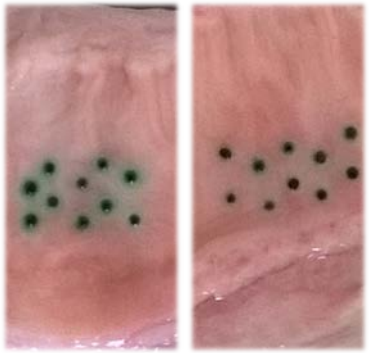
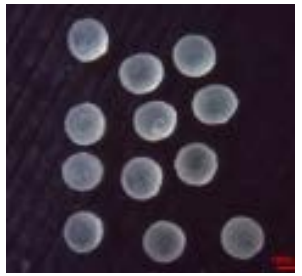
WE respect ANIMALS

VETERINARY MEDICAMENTS PRODUCER

ss-NMR
IMC AS CR & JHI AS CR

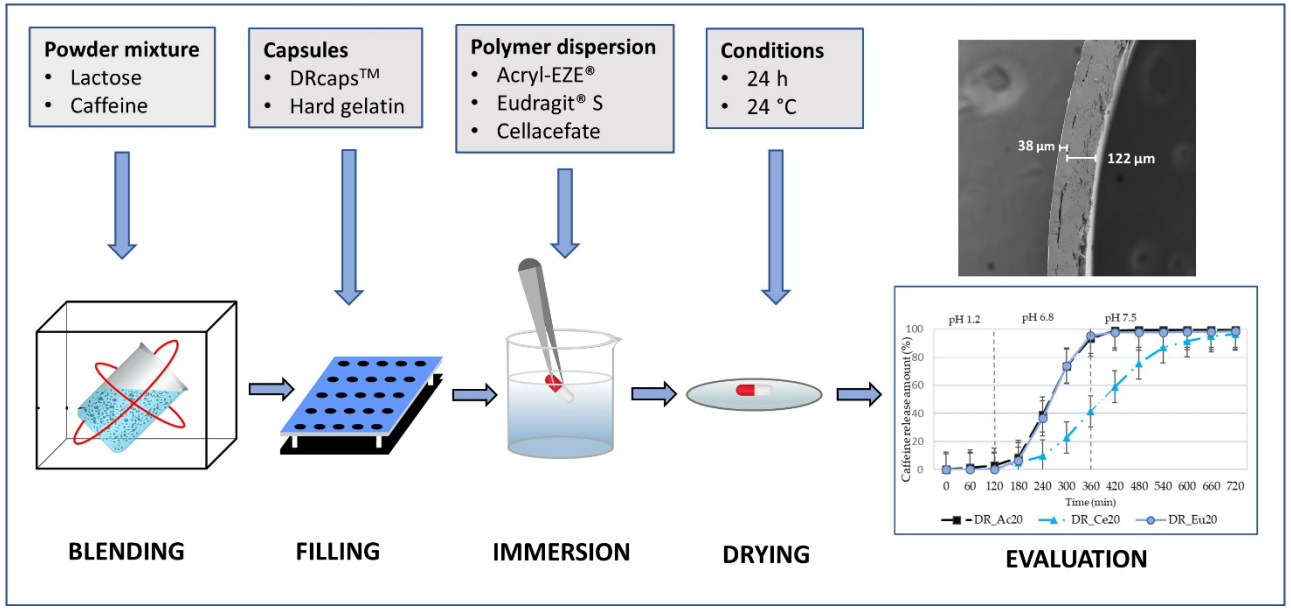




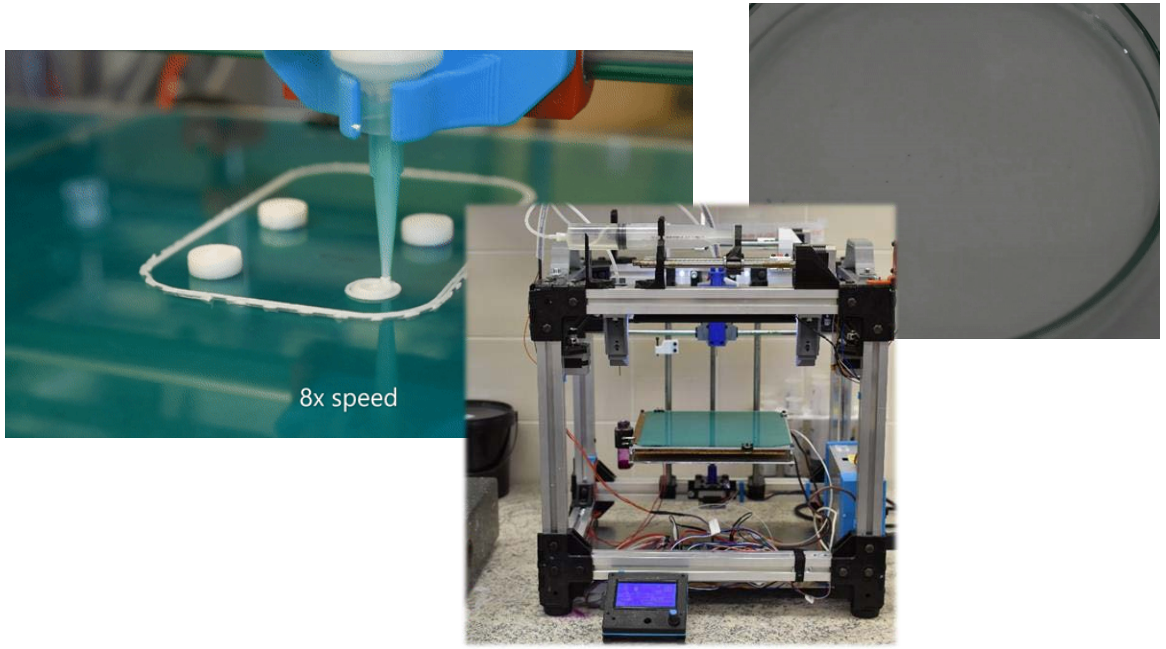


MUNI PHARM

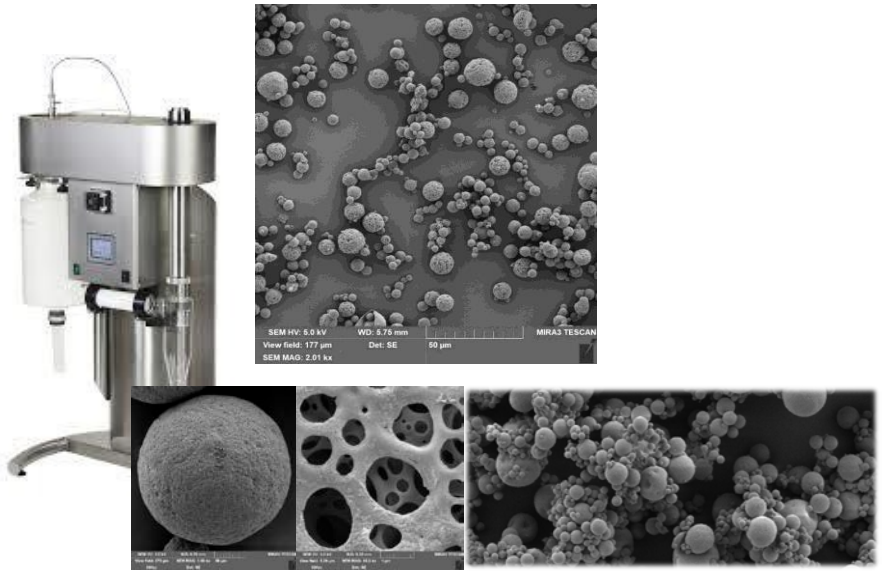
Biorelevant dissolution



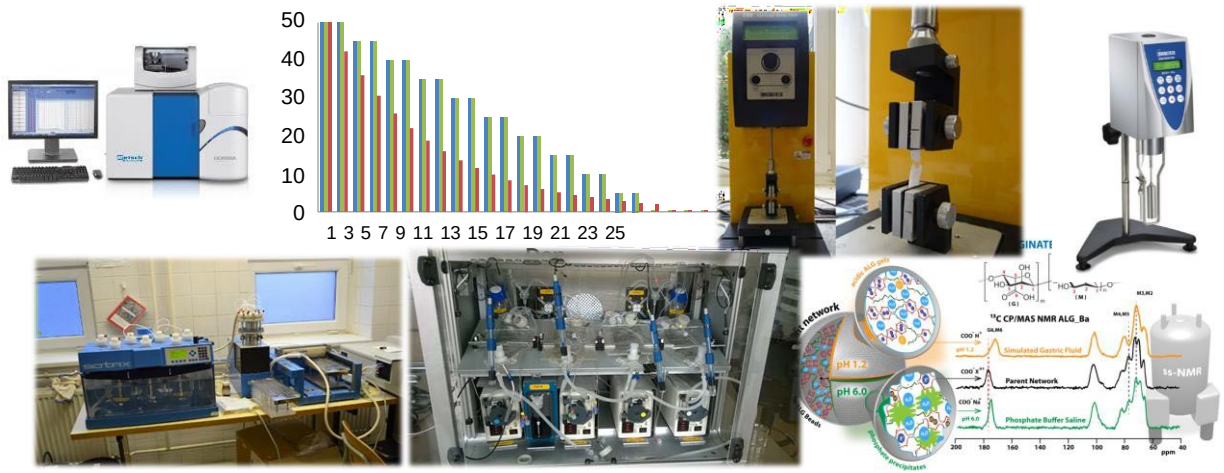
Colonic delivery



3D printing of drugs



Microparticle systems



Analysis and evaluation and stability testing of dosage forms

MUNI PHARM

Contact

Jan Gajdziok, Assoc. prof., Ph.D.

gajdziokj@pharm.muni.cz

+420739677101

https://www.pharm.muni.cz/en/science-and-research/research-activities

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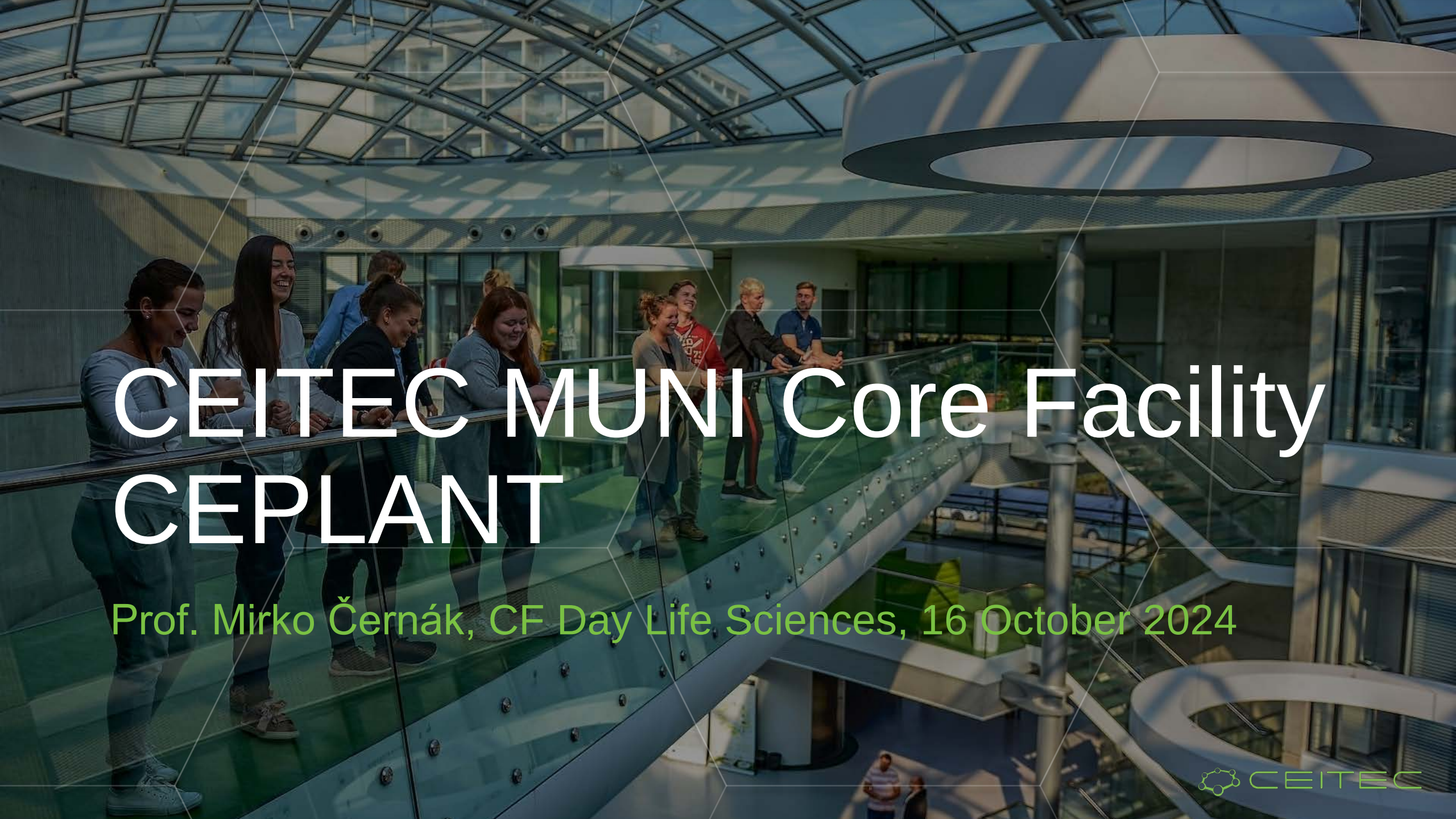
Core Facility Day 2024
Life Sciences

16 OCTOBER, 2024
CEITEC, E35/211+ATRIUM

Curious about what expert services are available to researchers on campus? What instruments can you use in shared mode and under what conditions? Do you want to see everything for yourself?

Register at: muni.cz/go/fba265



CEITEC MUNI Core Facility CEPLANT

Prof. Mirko Černák, CF Day Life Sciences, 16 October 2024

CEITEC

Content

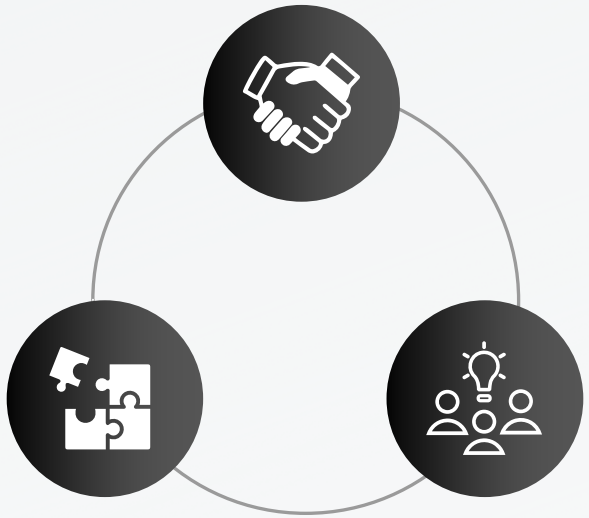
- R&D center CEPLANT and its history
- Research groups and their activities
  - Plasma nanotechnologies and bioapplications
  - Deposition of thin films and nanostructures
  - Plasma diagnostics and modelling
  - Optics for thin films and solid surfaces
- Surface analyses at CEPLANT
- New instrumentation
- Open Access

CEPLANT

EXPERIMENTAL
FACILITIES
AVAILABLE IN THE
OPEN ACCESS MODE

WWW.CEPLANT.CZ

R&D CENTRE FOR PLASMA AND NANOTECHNOLOGY SURFACE MODIFICATIONS



- offers equipment and services for analyses and scientific research for industry and other companies and research institutions
- established in 2010
- large research infrastructure – an unique facility with a high level of knowledge and technological sophistication in low-temperature plasma that operates on an open access basis
- since 2019, a part of the KET (Key Enabling Technologies) network

WHAT DO WE DO

- physics of plasma and electrical discharges
- diagnostics of plasma, discharges and processes
- modelling and simulation of processes and phenomena
- practical applications

- low-temperature plasma, ionized gases, plasma chemistry
- nanostructures, nanomaterials, thin films
- plasma surface treatment

WHERE CAN YOU FIND US?

CEPLANT R&D center is located at its parental institution the Department of Plasma Physics and Technology at the Faculty of Science, Masaryk University.

CONTACT US

E-mail: info@ceplant.cz
Address: Kotlářská 267/2, 602 00 Brno, Czechia

PLASMA NANOTECHNOLOGIES AND BIOAPPLICATIONS

Research

- development of atmospheric plasma sources
- surface treatment of temperature-sensitive materials
- environmentally friendly plasma technologies

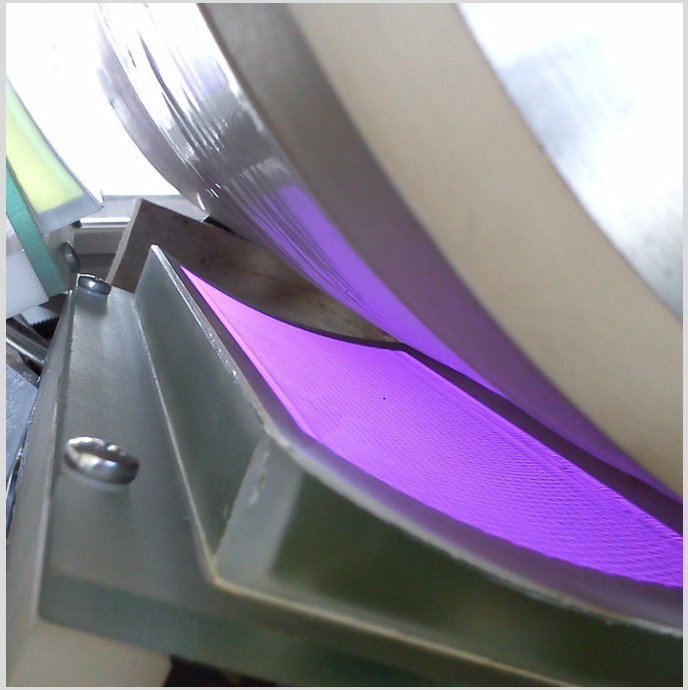
Applications

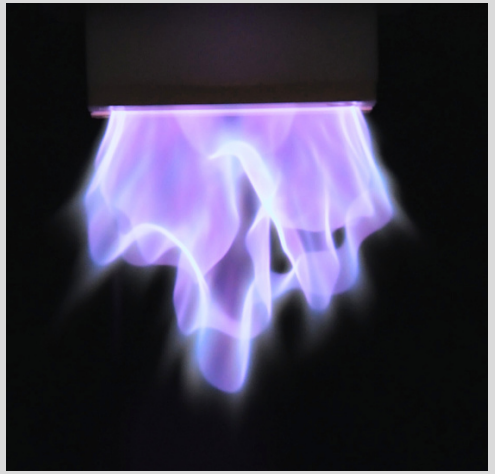
- improvement of surface properties of various materials (e.g. glass, polymer, textile, metals, papers, etc.)
- surface cleaning, activation, functionalization and decontamination
- ultrathin composites films (ALD)
- plasma reduced graphene oxides

Cooperation with industry

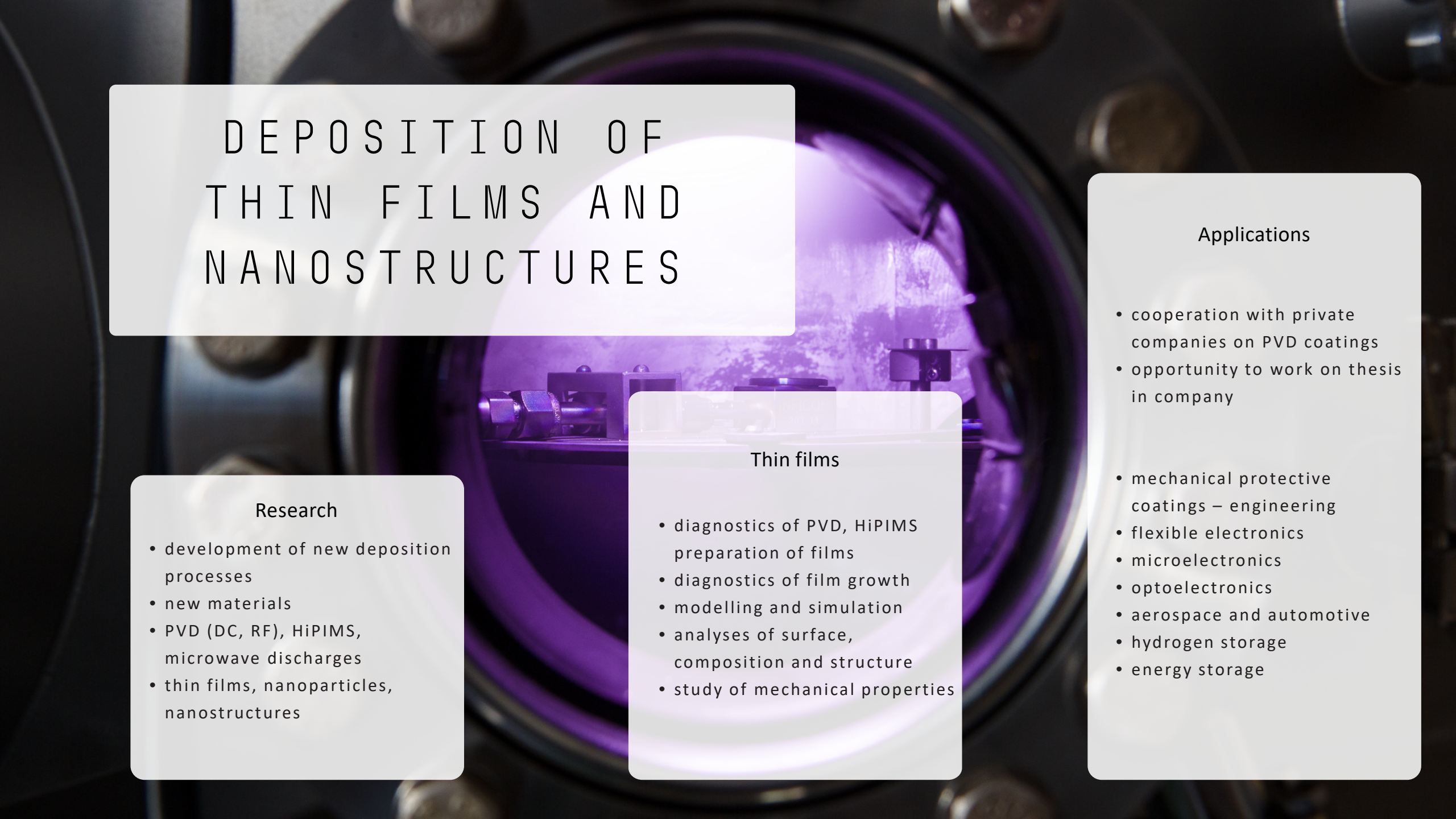
- flexible and printed electronics
- UV digital printing
- glass surface treatment
- paper surface treatment
- plasma assisted calcination of nanofibers
- roll-to-roll plasma treatment of flexible materials
- plasma treatment of hollow objects and tubes
- development and innovation of new plasma sources
- bioapplications

PLASMA NANOTECHNOLOGIES AND BIOAPPLICATIONS





DEPOSITION OF THIN FILMS AND NANOSTRUCTURES



Research

- development of new deposition processes
- new materials
- PVD (DC, RF), HiPIMS, microwave discharges
- thin films, nanoparticles, nanostructures

Thin films

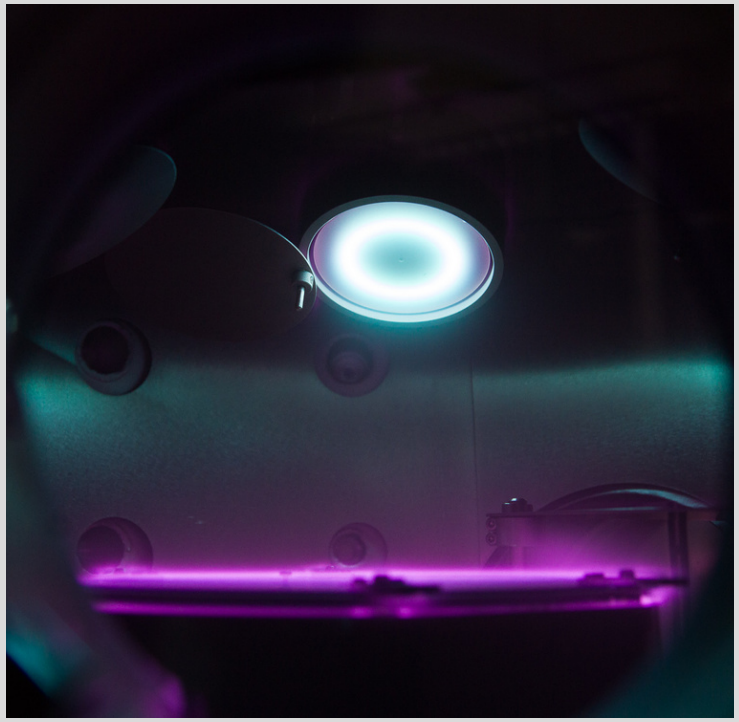
- diagnostics of PVD, HiPIMS preparation of films
- diagnostics of film growth
- modelling and simulation
- analyses of surface, composition and structure
- study of mechanical properties

Applications

- cooperation with private companies on PVD coatings
- opportunity to work on thesis in company

- mechanical protective coatings – engineering
- flexible electronics
- microelectronics
- optoelectronics
- aerospace and automotive
- hydrogen storage
- energy storage

DEPOSITION OF THIN FILMS AND NANOSTRUCTURES



PLASMA DIAGNOSTICS AND MODELLING

Research

- basic physical and chemical processes in discharges and plasma in gases and liquids
- theory and experimental

Modelling

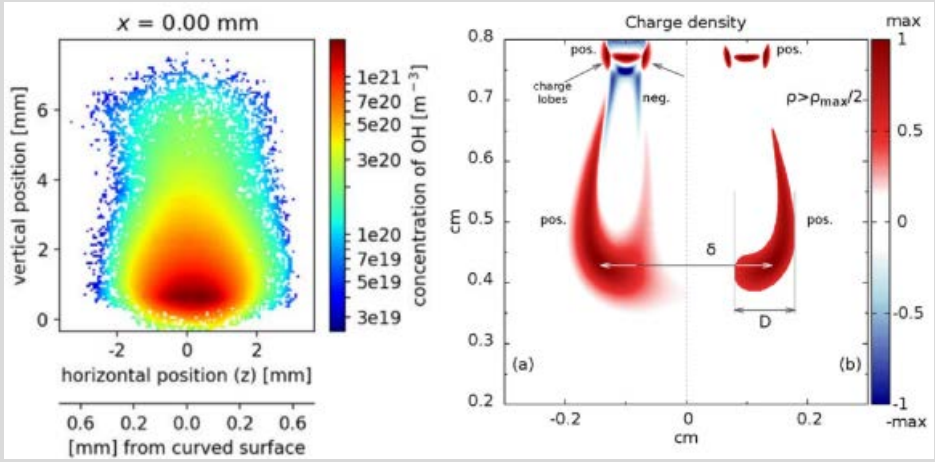
- acceleration of highly energetic electrons in gases
- plasma simulation in magnetic fields
- collision-radiative models in gases
- fluid, hybrid and particle models for propagation of ionizaed waves (streamers)

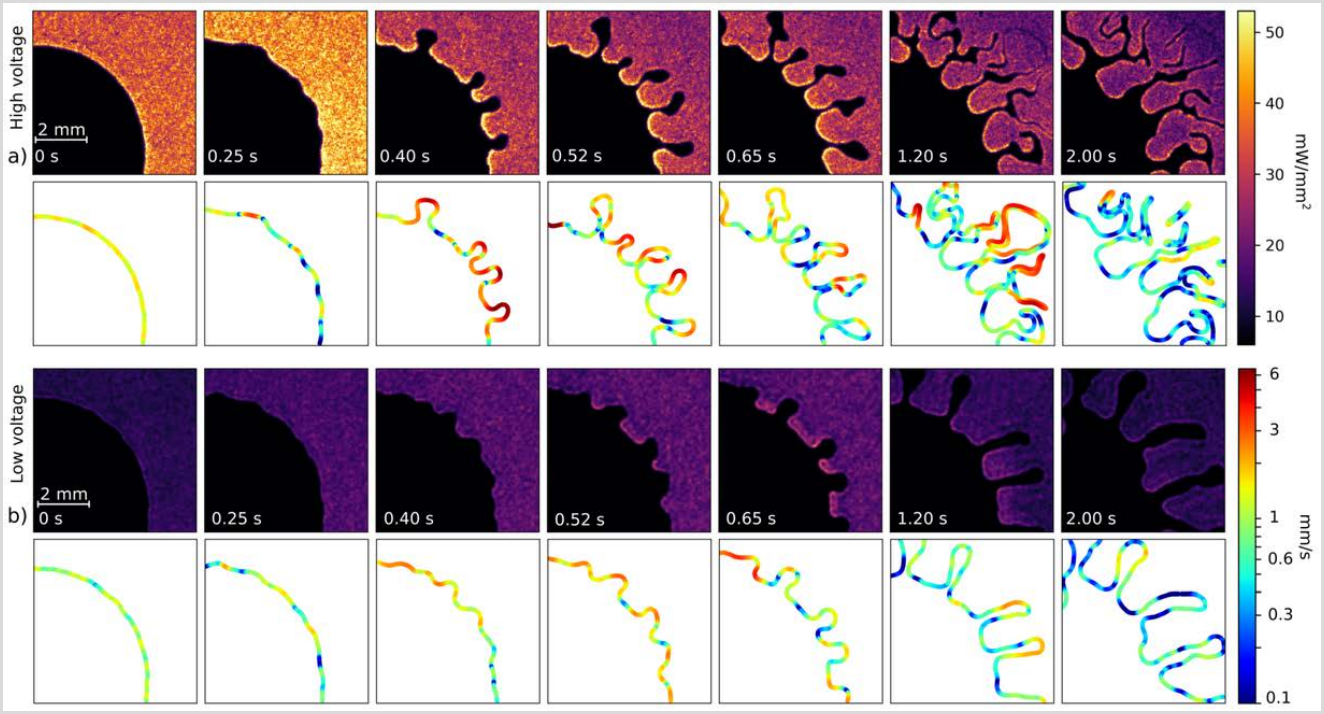
Topics

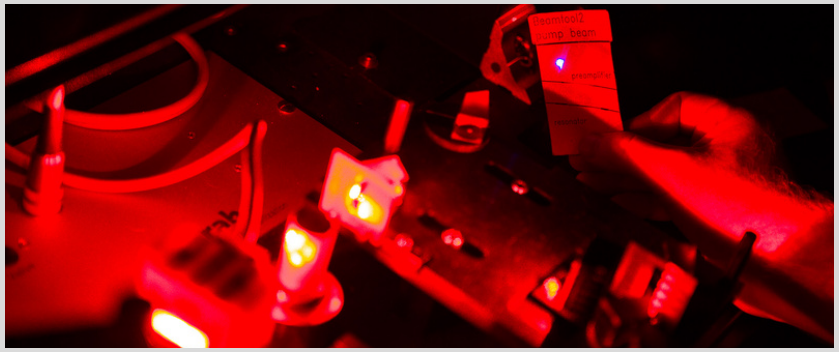
- advanced experimental methods (spectroscopy and electrical measurement)
- laser diagnostics
- determination of plasma basic parameters
- extremely small spacial and time scales
- models to prove experimental behavior
- deep understanding of physical processes in plasma

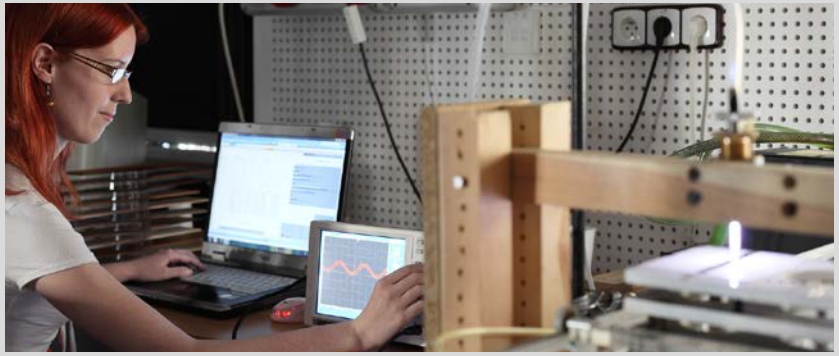
- cooperation with industry and other research institutions

PLASMA DIAGNOSTICS AND MODELLING









OPTICS FOR THIN FILMS AND SOLID SURFACES

Equipment

- spectrophotometers
- ellipsometers

- wide spectral range from far infrared to vaccum ulraviolet

Research

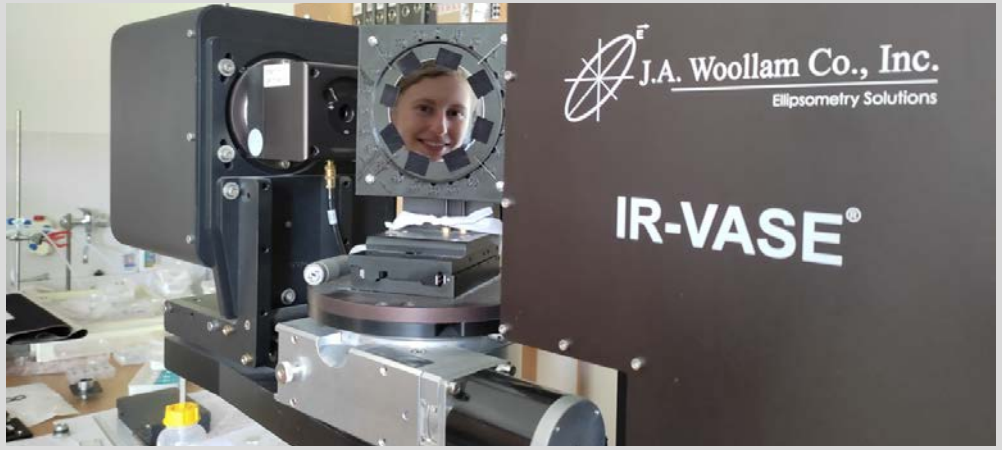
- optical properties of various systems
- characterization of optical properties of films
- formulation of new dispersion and structural models
- study of random surface roughness

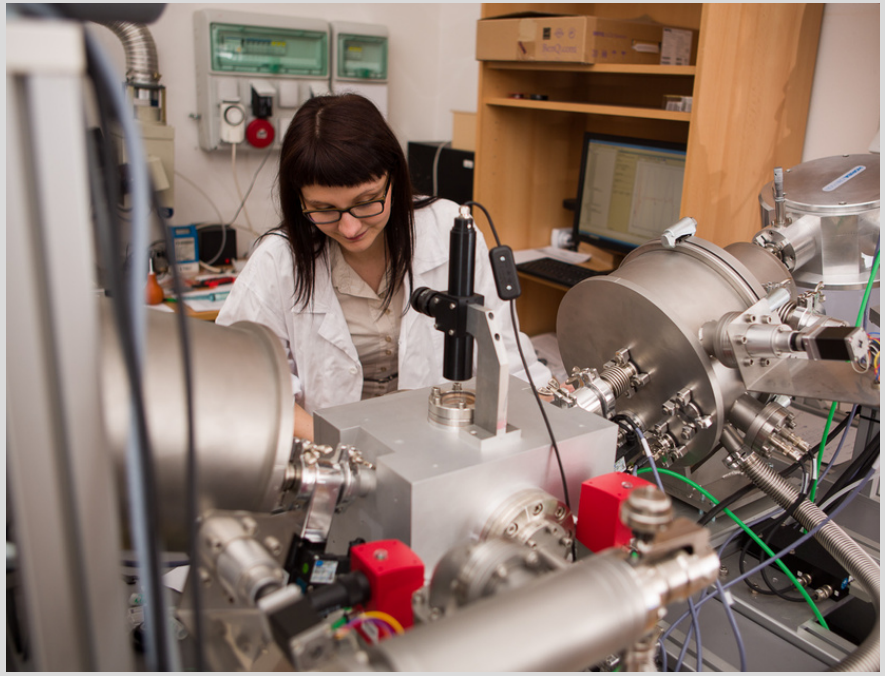
Cooperation

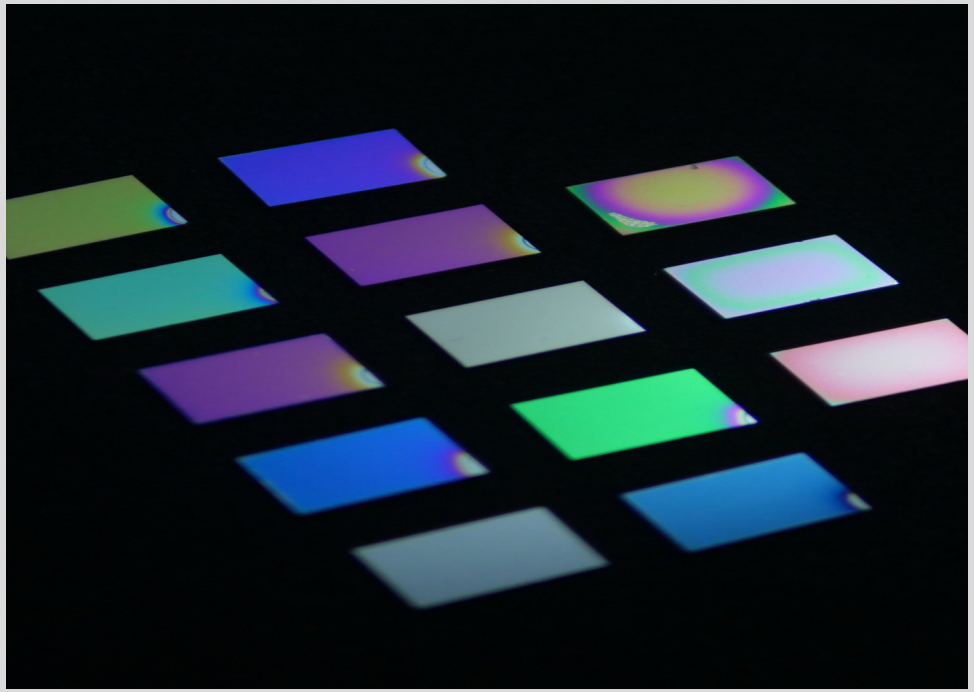
- analyses of films prepared by plasma-chemical methods, magnetron sputtering, or other vacuum coating methods

- cooperation in research of defects: random roughness on boundaries, inhomogeneity of films, thickness nonuniformity, transitional interlayers, or others

OPTICS FOR THIN FILMS AND SOLID SURFACES



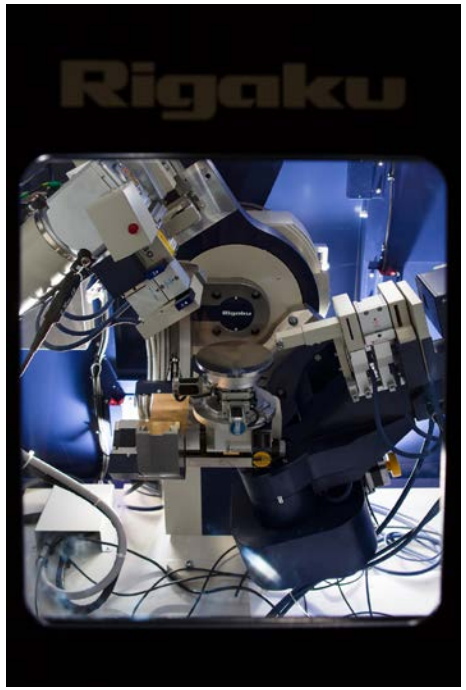




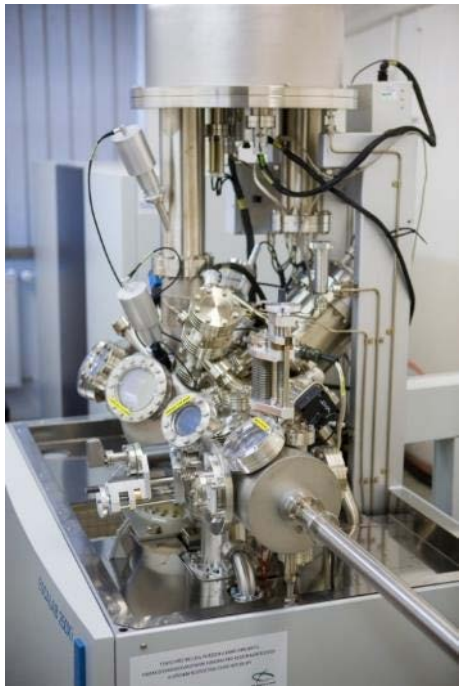
Surface analyses at CEPLANT

Raman
microspectrometer

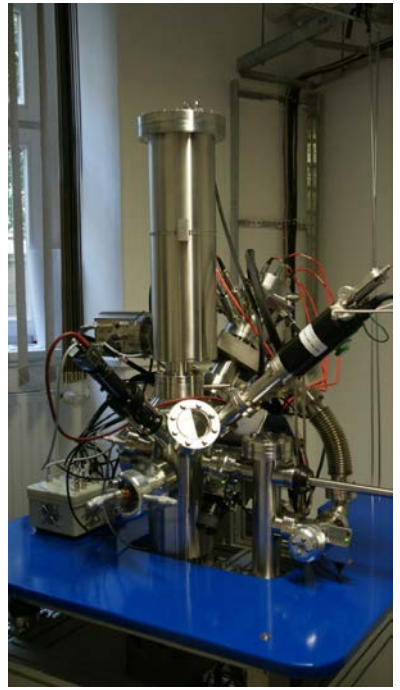
FT-IR
ellipsometer



X-ray
difractometer



X-ray Photoelectron
spectroscopy



Secondary Ion
Mass Spectrometry

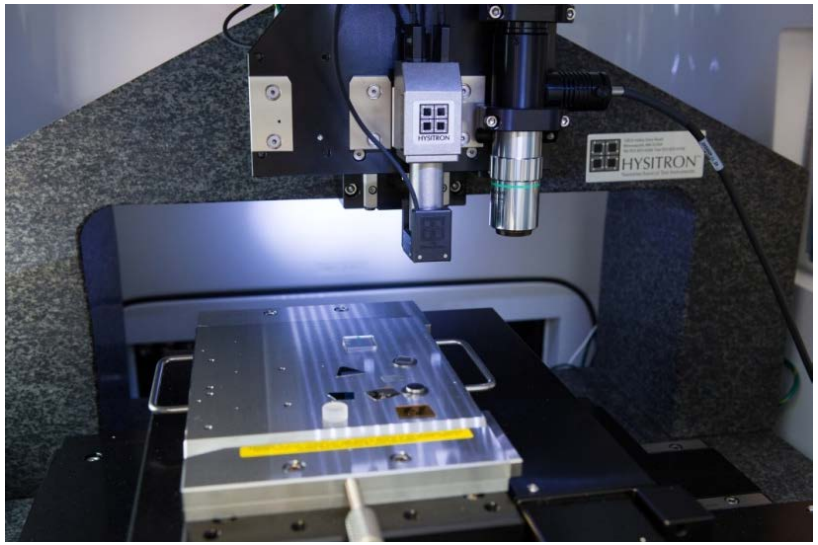
Matrix-Assisted Laser
Desorption/Ionization

MUNI

Surface analyses at CEPLANT

Scanning electron microscope with EDX and WD spectroscopy

Atomic Force Microscope



Nanoindenter Hysitron

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New instrumentation

- OP JAK Infrastructure investments 2023-2026
- 59 905 kCZK
- 5 new instruments:
  - XPS
  - SEM
  - magnetron deposition device with HiPIMS technology
  - streak camera with monochromator
  - picosecond photomultiplier

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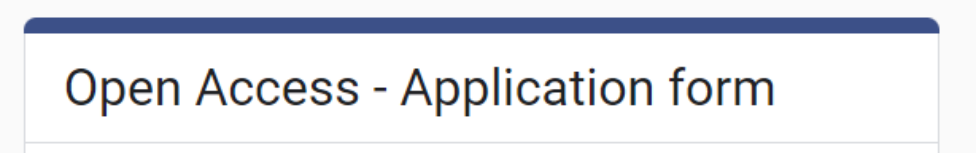
Open Access

– https://ceplant.cz/research



CEPLANT

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Research

Research

Open Access

The CEPLANT Research Infrastructure offers access for external users to its experimental facilities in open access mode. Access to the facilities in the laboratories of CEPLANT is free of charge for national and international academic users if the results from experiments at the facilities of the infrastructure will be disseminated in the public domain. The costs of access are covered by the program Large Research Infrastructures financed by the Ministry of Education, Youth, and Sports of the Czech Republic.

To apply for open access to the infrastructure facilities, scientific proposals should be submitted via a signed application form (see the attachment below). There are no deadlines, each project proposal can be submitted at any time, and the evaluation is done continuously. The project proposal will be assessed for its feasibility by the instrument responsible, and then by our Scientific Board for its scientific merit. You will be informed by e-mail if the proposal is accepted or not.

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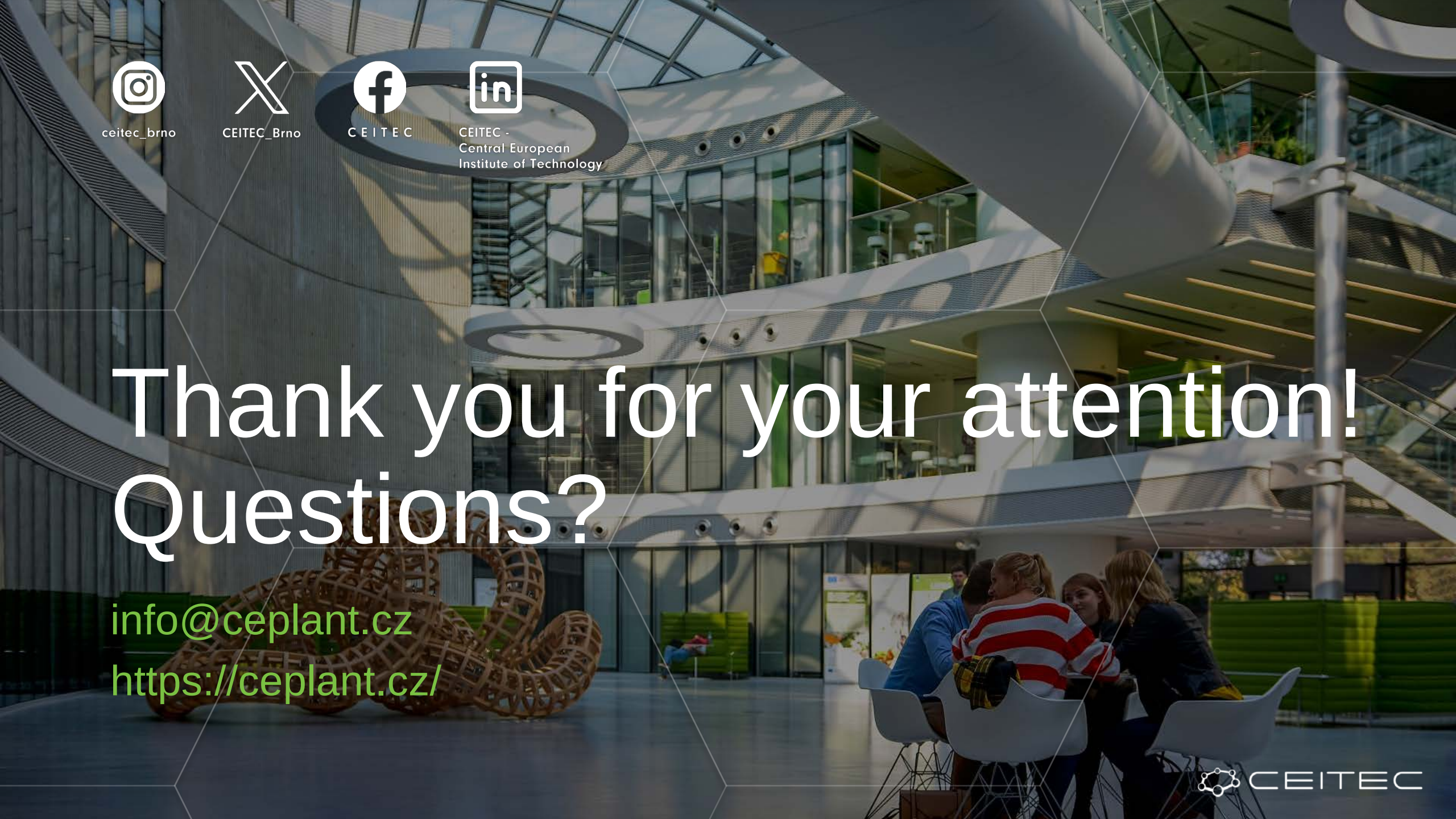
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Core Facility Day 2024
Life Sciences

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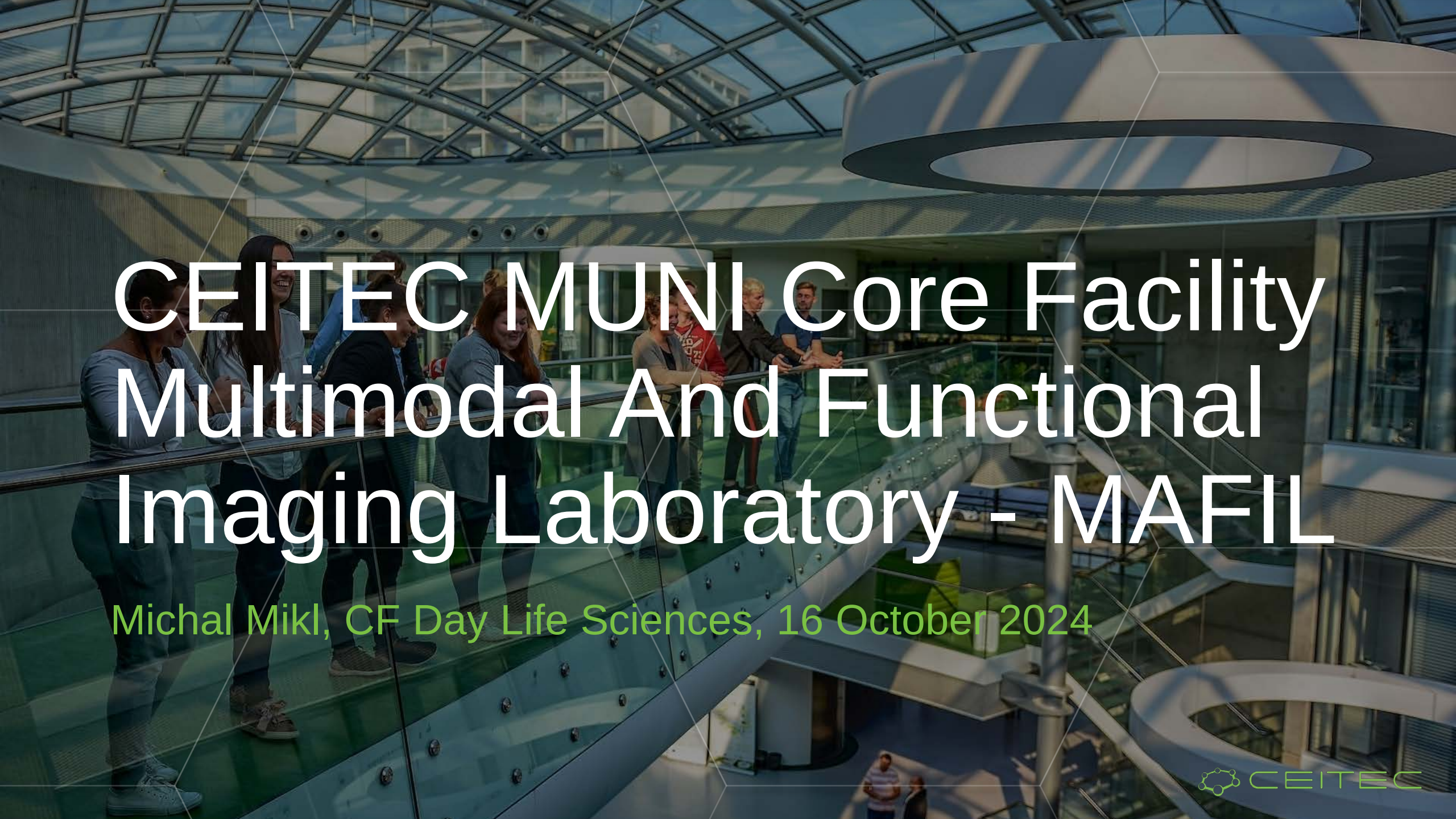

CEITEC MUNI Core Facility Multimodal And Functional Imaging Laboratory - MAFIL

Michal Mikl, CF Day Life Sciences, 16 October 2024

MAFIL overview

Overview and equipment

- Focused on human medical imaging (mainly neuroscience)
- Magnetic Resonance Imaging and Spectroscopy
  - Two 3T MR scanners
  - Specific equipment for fMRI studies
  - Hyperscanning with simultaneous use both scanners

- Electrophysiological techniques
  - Both standalone labs and simultaneous measurements in MRI, EEG
  - Including techniques for brain stimulation

CZECH BIO OPEN ACCESS

EURO BIOIMAGING OPEN ACCESS

http://mafil.ceitec.cz https://www.facebook.com/CFMAFIL

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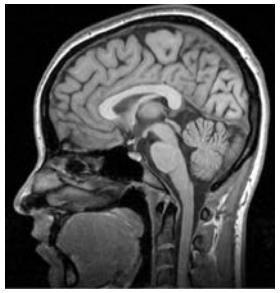
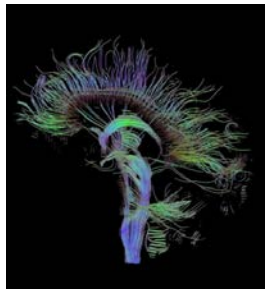
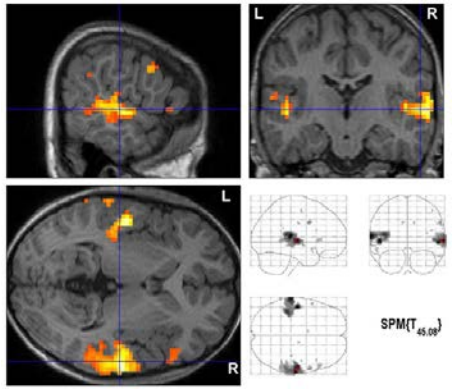
Services

- Support in preparation of neuroimaging studies
- Structural imaging
- Perfusion MRI
- Diffusion MRI (DTI, DKI, …)
- Morphometric studies (VBM and similar techniques)
- fMRI (functional Magnetic Resonance Imaging)
- Real-time fMRI neurofeedback



- Hyperscanning (dual fMRI with two participants in two scanners measured simultaneously)
- Simultaneous EEG-fMRI
- MR spectroscopy
- Electrophysiological rec. in RF shielded lab
- Data processing
- Training



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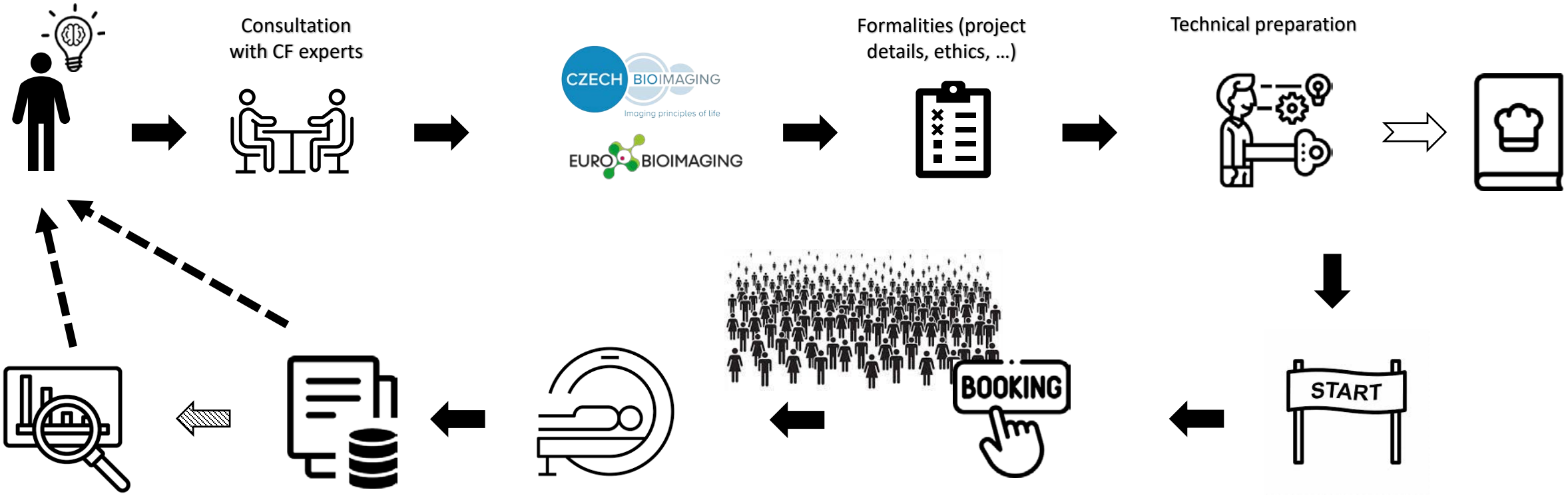
User access and project lifetime



User characteristics

- Most frequent users' scientific domains (Neuroscience – 90%, Biomedical and electrical engineering – 5%, Oncology – 3%, Other disciplinces 2%)
- Users' geographic provenience: 97% from CZ (Brno, Olomouc, Hradec Kralove, Ostrava, Prague), then Slovakia, Poland, United Kingdom, Neetherland, Canada, Brazil, …

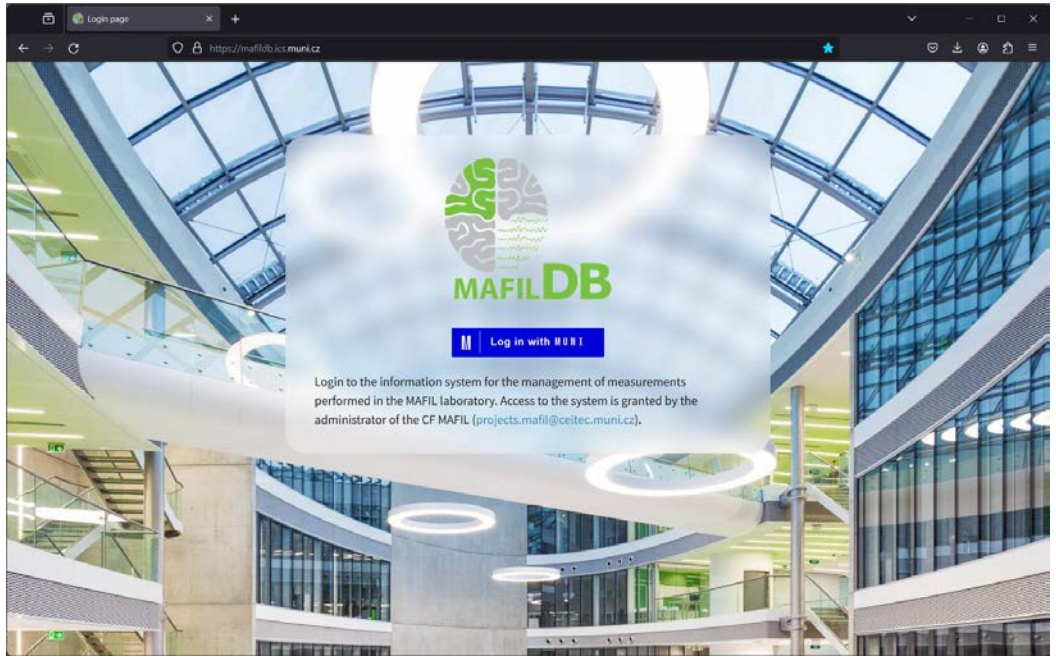
Acknowledgement text – Czech-BioImaging

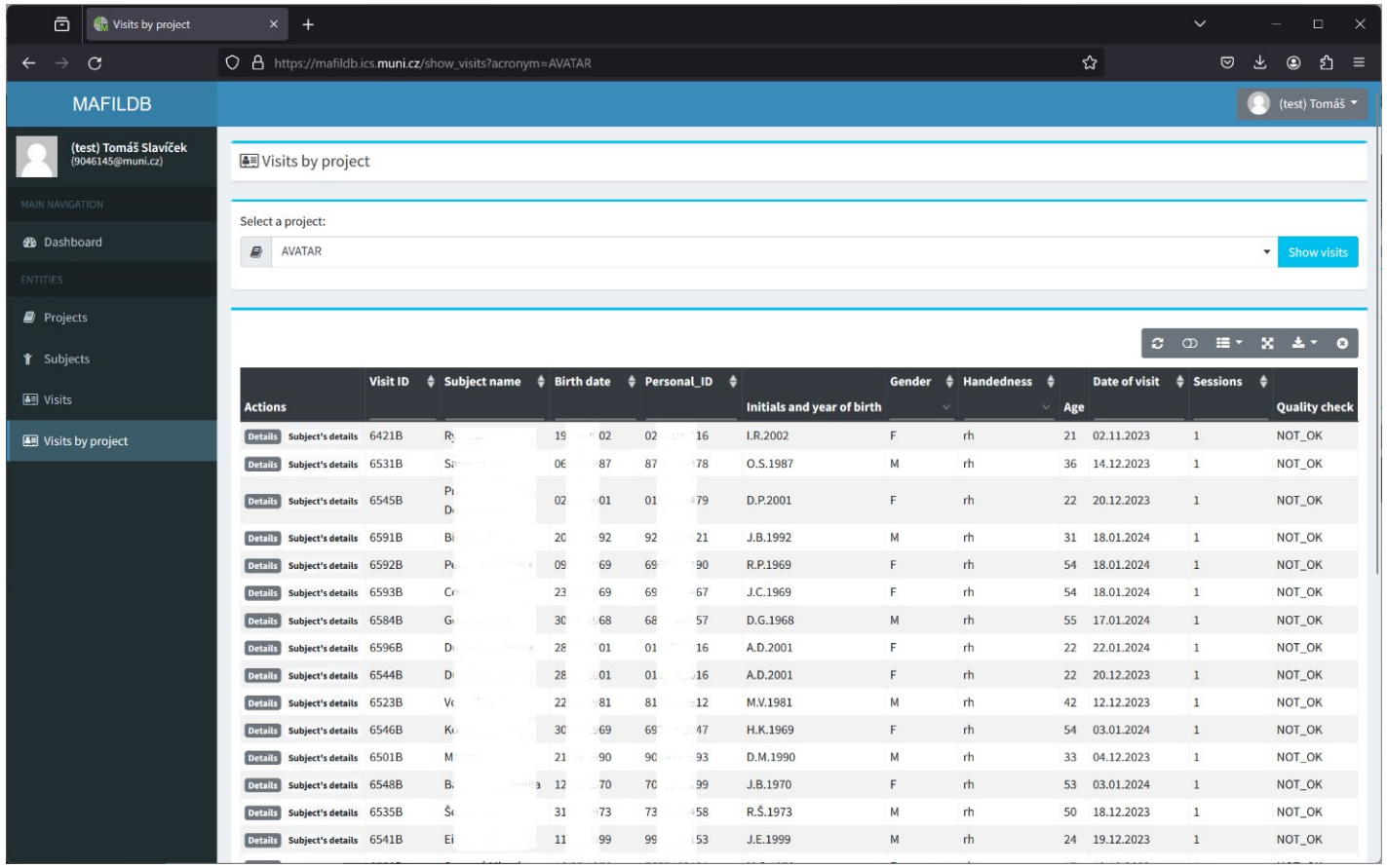
- **Preferred version:** *„We acknowledge the core facility MAFIL supported by the Czech-BioImaging large RI project (LM2023050 funded by MEYS CR) for their support with obtaining scientific data presented in this paper.“*
- **Short version:** *„We acknowledge the core facility MAFIL supported by MEYS CR (LM2023050 Czech-BioImaging).“*

MAFIL news

MAFIL in 2024

- Database of measurements (MAFILDB) has been made available to users





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MAFIL in 2024

- New eye-tracking camera
- Studies with electrical stimulation of brain in MR scanner
- FAIRification and data management activities (involvement in EOSC-CZ, Euro-BioImaging working groups, internal workshop for users, …)
- Annual renewal of registration for booking system started in 2024
- Spring workshop on quantitative MRI methods

- Educational course Neuroimaging (November 11-13)

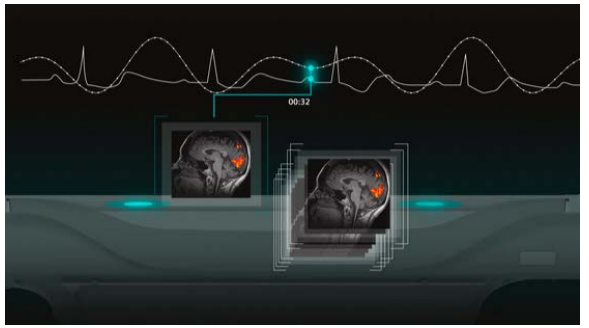
You can look forward to:

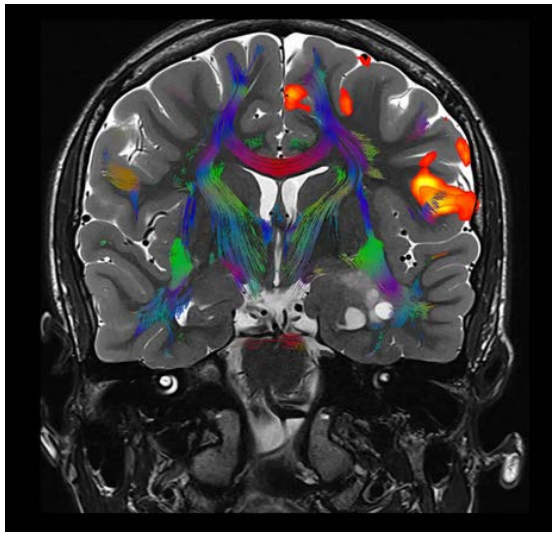
- processing and analysis of fMRI data
- processing and analysis of electrophysiological data
- morphometric methods and their reach to functional brain mapping
- diffusion imaging
- specifics of animal MRI studies
- and more...

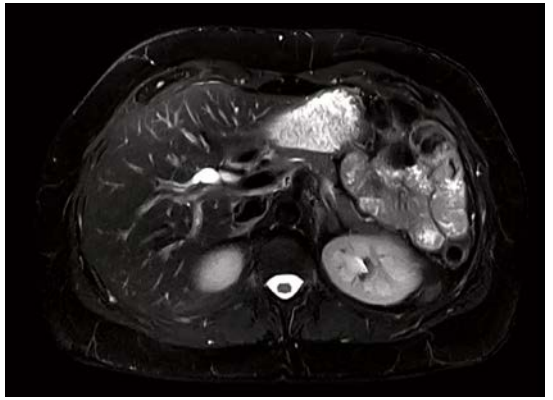
MORE INFORMATION
about registration and payment is on the website:
muni.cz/go/NeuroImagingCourse

MAFIL in 2025

- Upgrade of one Prisma MR scanner to Cima.X
  - New biomatrix technology (built-in sensors, improved coil sensitivity, optimized excitation, ..)
  - New gradient system and new software
  - Improved acquisition speed, data quality, pushing-up limits in DWI and other methods







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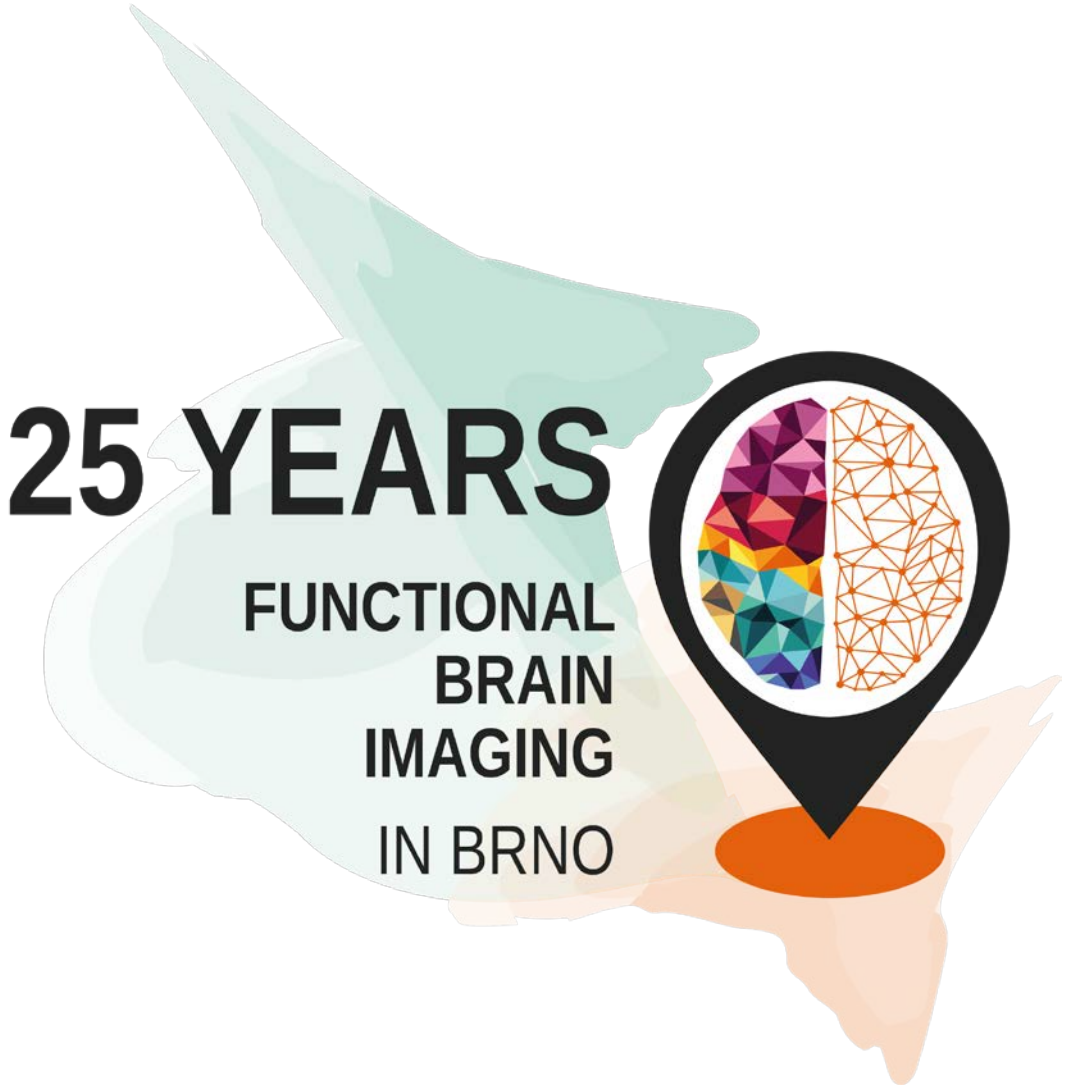
Anniversary

- 25 years of functional MRI in Brno (2000 - 2025)
- 10 years of MRI at CEITEC, MAFIL (2015 - 2025)



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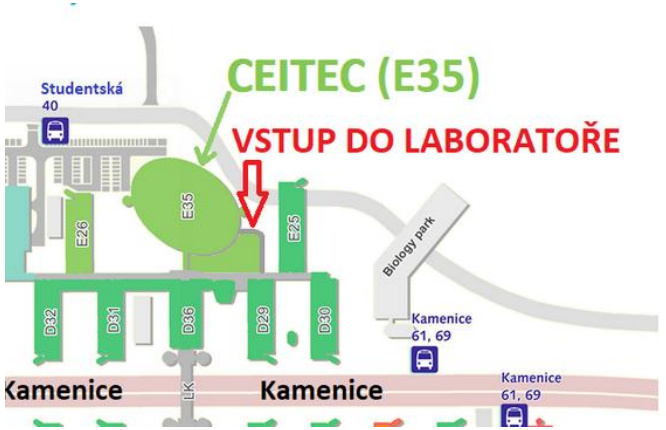
MAFIL practical hints for users

CEITEC

- Please inform properly subjects/volunteers
  - Name of researcher and project name
  - Use MAFIL entrance, not the CEITEC main one
  - Provide MAFIL operators' phone number 770 158 552
- Include subject name and contact info. in private description of the reservation
- Consider time for preparation (10-20 min.), when inviting volunteers
- Regular working hours 8:00 to 17:00, reservation beyond, on demand
- Useful email aliases: projects.mafil@ceitec.muni.cz, datarequest.mafil@ceitec.muni.cz, mri.mafil@ceitec.muni.cz, elfyz.mafil@ceitec.muni.cz



- When ordering, make sure to reserve all the instruments and laboratories that are needed for the given measurements
  - For instance, MRI + ExG + Eye-tracking, or EEG + EEG lab + Eye-tracking

- Late cancellations create problems for CF and other users. Please inform us immediately if any problem arise. A penalty may be applied in case of a large number of late cancellations.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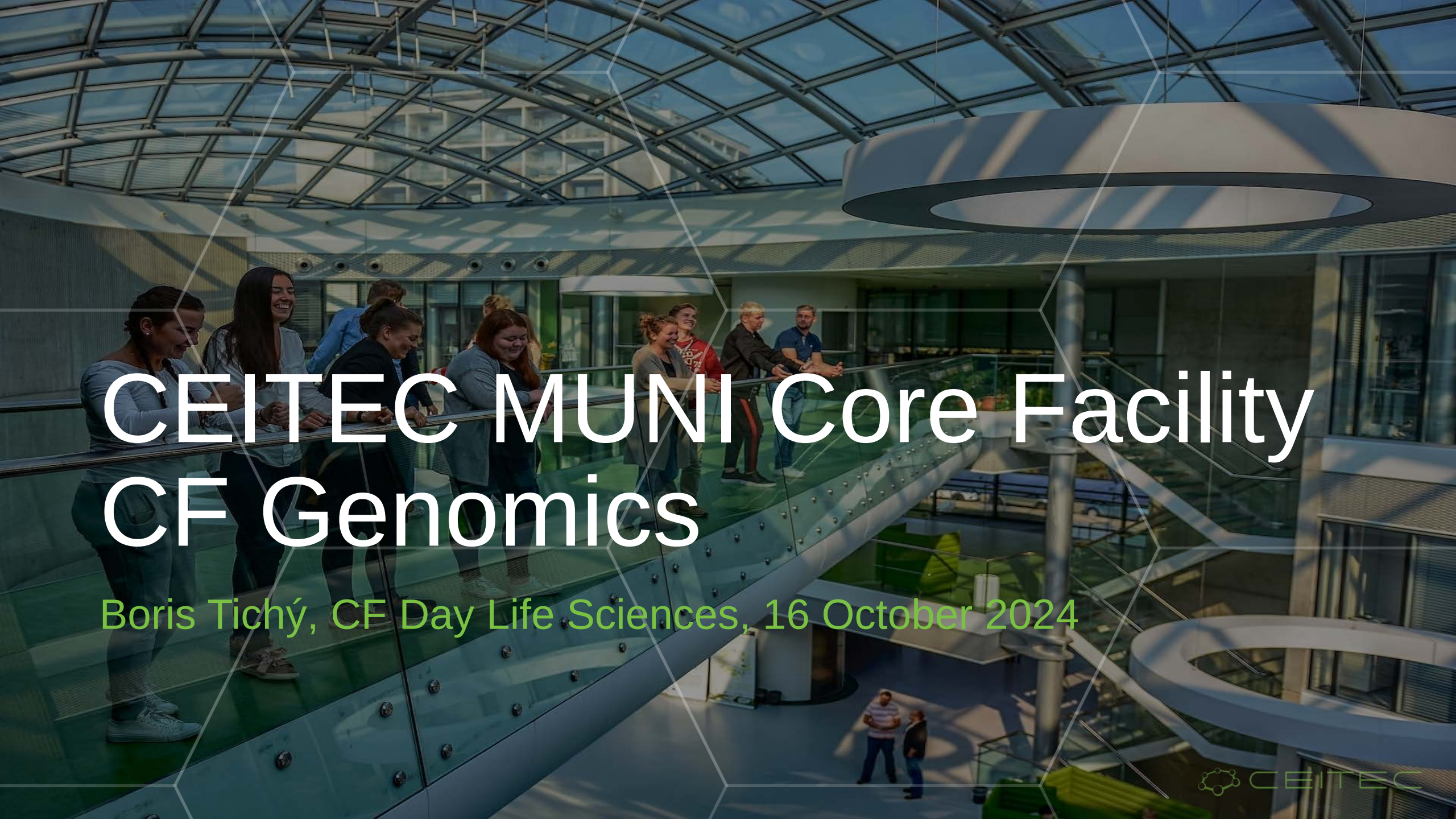
Core Facility Day 2024
Life Sciences

16 OCTOBER, 2024
CEITEC, E35/211+ATRIUM

Curious about what expert services are available to researchers on campus? What instruments can you use in shared mode and under what conditions? Do you want to see everything for yourself?

Register at: muni.cz/go/fba265



CEITEC MUNI Core Facility CF Genomics

Boris Tichý, CF Day Life Sciences, 16 October 2024

CF Genomics – Access modes, fees

- Full service
  - NGS library prep + sequencing
  - SIngle-cells
- Assisted usage
  - Access to instrumentation and equipment
  - Help with experiments, training
- Self service
  - Access to instrumentation (training required)
  - qPCR, NGS QC
- Fees
  - Consumables – 100%
  - Instrument time – 15-100%

CF Genomics – Data policy

- Primary NGS data are stored for at least 6 months
- Data from other instruments could be deleted without notice – users are responsible for data backup
- CF Data Policy details available on CF web page

CF Genomics – NGS instrumentation

- Illumina NextSeq 500 & MiSeq
  - Will be discontinued soon !
- ONT PromethION & MinION
  - Long-read sequencing
- MGI DNBSEQ G400
  - Benchtop short-read sequencer
- (Illumina NovaSeq X plus)
  - Prague NCMG node
- Illumina NovaSeq 6000
  - Hosted for Excelles project
- Element Bio AVITI
  - Hosted for Excelles project

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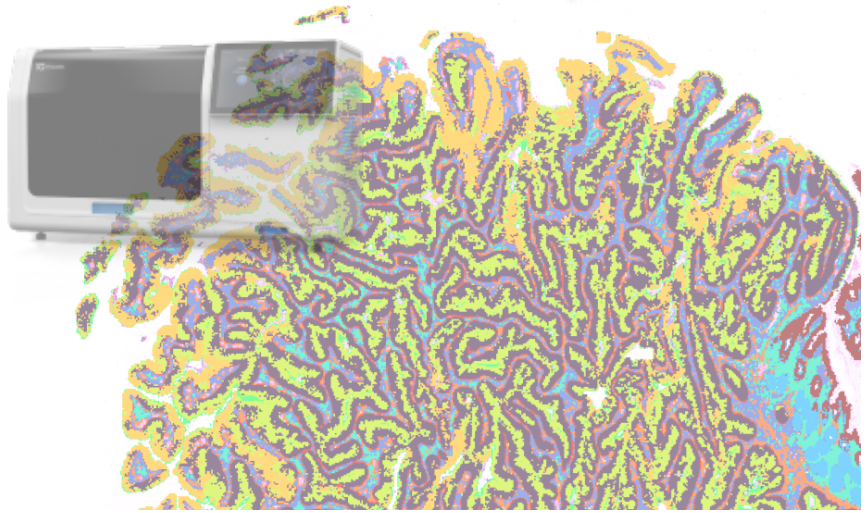
CF Genomics – New instrumentation, services

- 10X Xenium In-situ Platform
  - Spatial transcriptomics profiling
  - Up to 5000 genes at subcellular resolution
  - FFPE or fresh-frozen samples
- Single-cell libraries
  - 10X Chromium
  - Singleron
  - ScaleBio
    - Low cost per cell
    - 100 – 500.000 cells/run, 1 - 96 samples/run, fixation up to 12 months
- Nanopore sequencing
  - DNA library prep + sequencing
    - WGS, targeted, methylation
  - RNA (cDNA) library prep + sequencing



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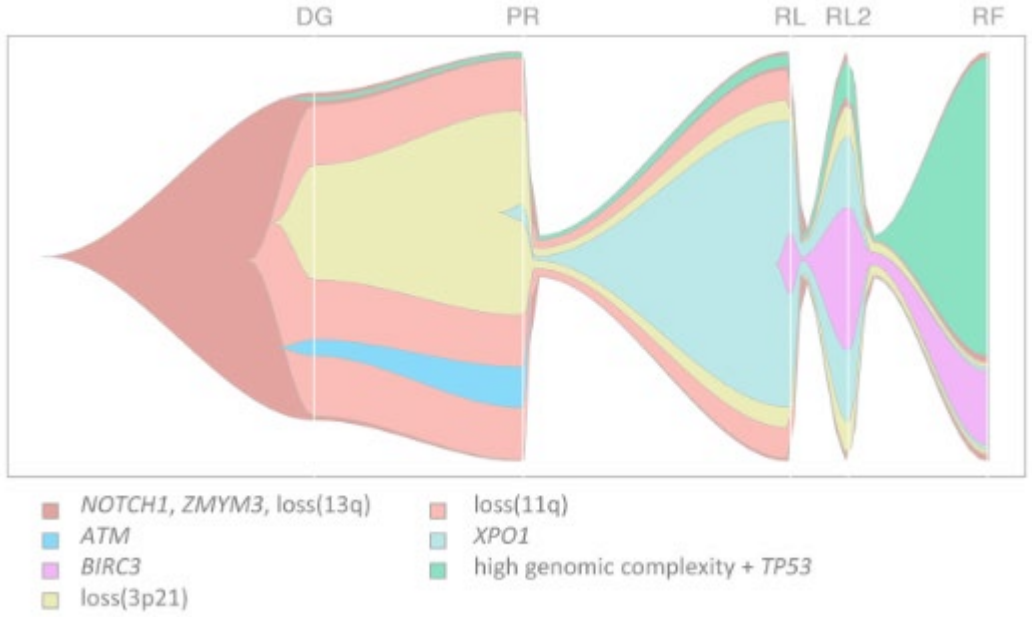
CF Genomics – Results

Molecular Oncology

FEBS PRESS

Unveiling the dynamics and molecular landscape of a rare chronic lymphocytic leukemia subpopulation driving refractoriness: insights from single-cell RNA sequencing

Terezia Kurucova[1,2], Kamila Reblova[1,3], Pavlina Janovska[2], Jakub Pawel Porc[1,4], Veronika Navrkalova[1,3,4], Sarka Pavlova[1,3,4], Jitka Malcikova[1,3,4], Karla Plevova[1,3,4], Boris Tichy[1,4], Michael Doubek[1,3,4], Vitezslav Bryja[2], Jana Kotaskova[1,3,4] and Sarka Pospisilova[1,3,4]



Nucleic Acids Research, 2024, **52**, 5959–5974
https://doi.org/10.1093/nar/gkae147
Advance access publication date: 1 March 2024
RNA and RNA-protein complexes

50 TH ANNIVERSARY OXFORD

Splicing analysis of STAT3 tandem donor suggests non-canonical binding registers for U1 and U6 snRNAs

Michal Kramárek[1,2,3], Přemysl Souček[1,2,*], Kamila Réblová[4], Lucie Kajan Grodecká[1] and Tomáš Freiberger[1,2]

Received: 15 January 2024 | Accepted: 17 July 2024
DOI: 10.1111/jpy.13496

Phycological

RESEARCH ARTICLE

Nanopatterns on silica scales of *Mallomonas* (Chrysophyceae, Stramenopiles): Unraveling UV resistance potential and diverse response to UVA and UVB radiation

Yvonne Nemcova | Petr Knotek | Iva Jadrná | Ivana Černajová | Pavel Škaloud

RESEARCH ARTICLE
ADVANCED SCIENCE Open Access
www.advancedscience.com

YAP Signaling Regulates the Cellular Uptake and Therapeutic Effect of Nanoparticles

Marco Cassani, Soraia Fernandes, Jorge Oliver-De La Cruz, Helena Durikova, Jan Vrbsky, Marek Patočka, Veronika Hegrova, Simon Klimovic, Jan Pribyl, Doriana Debellis, Petr Skladal, Francesca Cavalieri, Frank Caruso, and Giancarlo Forte**

Article

OXFORD JLB JOURNAL OF LEUKOCYTE BIOLOGY

Calcineurin-NFAT signaling controls neutrophils' ability of chemoattraction upon fungal infection

Ondrej Vymazal,[1,2] Ioanna Papatheodorou,[1,2] Ivana Andrejčinová,[1,2] Veronika Bosáková,[1,2] Gianluca Vascelli,[3] Kamila Bendíčková,[1,4] Teresa Zelante,[3] Marcela Hortová-Kohoutková,[1,4] and Jan Frič[1,4,5,*]

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NCMG

Acknowledgement text – NCMG

- *„We acknowledge the CF Genomics and CF Bioinformatics supported by the NCMG research infrastructure (LM2023067 funded by MEYS CR) for their support with obtaining scientific data presented in this paper.“*
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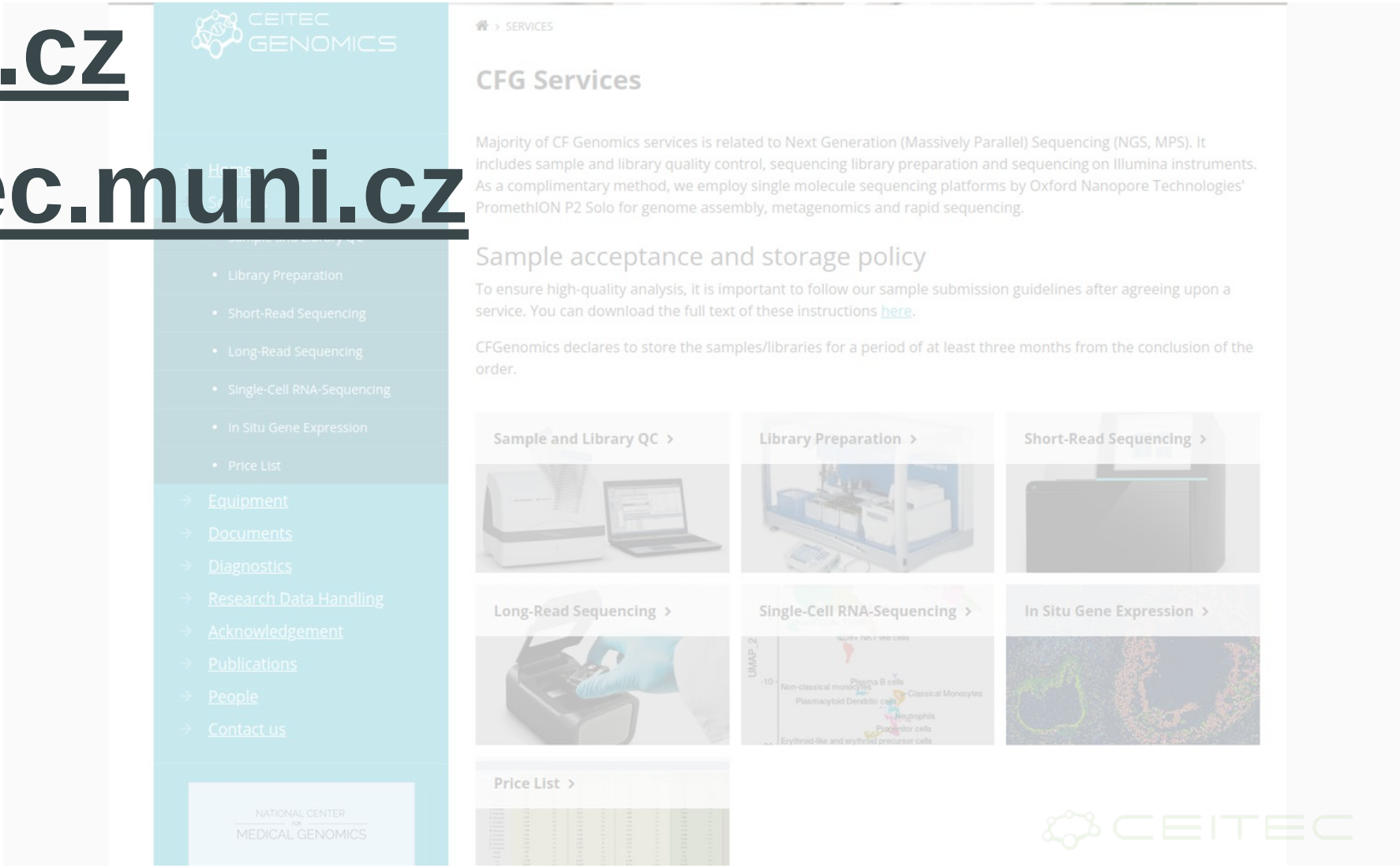
CF Genomics – Contacts

- **cfg.ceitec.cz**
- **cfg@ceitec.muni.cz**



Thank you for your attention!
Questions?

core.facility@ceitec.muni.cz

ceitec.eu/core-facilities/

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