



Presentations of the Institute's Specialized Laboratories

26.03.2026 r.

Time	Laboratory / Department	Speaker
11.10 – 11.25	Laboratory of Single-Cell Analysis	Dr hab. Paulina Jackowiak, prof. ICHB PAN
11.25 – 11.40	Laboratory of Genomics	Dr Małgorzata Marcinkowska-Swojak
11.40 – 11.55	Laboratory of Cell and Tissue Cultures	Dr Natalia Koralewska
11.55 – 12.10	Laboratory of Plant Breeding	Dr Aleksandra Paweła
12.10 – 12.25	Laboratory of Bioinformatics	Dr Arkadiusz Kajdasz
12.25 – 12.40	Laboratory of Invertebrate Model Organisms	Dr hab. Agata Tyczewska, prof. ICHB PAN
12.40 – 13.10	Break	
13.10 – 13.25	Laboratory of Protein Engineering and Biophysics	Dr Joanna Śliwiak
13.25 – 13.40	Laboratory of Mammalian Model Organisms	Dr Łukasz Przybył
13.40 – 13.55	Laboratory of NMR	Dr Daniel Baranowski
13.55 – 14.10	Laboratory of Mass Spectrometry	Dr Łukasz Marczak
14.10 – 14.25	Laboratory of Molecular Assays and Imaging	Dr Dorota Kwiatek-Rożek
14.25 – 14.40	Laboratory of Medicinal Chemistry	Dr Dorota Jakubczyk
14.40 – 14.55	Research Support Unit	Katarzyna Chojnacka, Katarzyna Solka

Laboratory of Single Cell Analyses

Paulina Jackowiak



Paulina Jackowiak, PhD DSc Anna Samelak-Czajka, PhD Magdalena Trybus, MSc Agnieszka Gąbka-Buszek, PhD, Eng Jakub Kubiś, MSc Eng Anastasiia Zaremba, MSc Eng

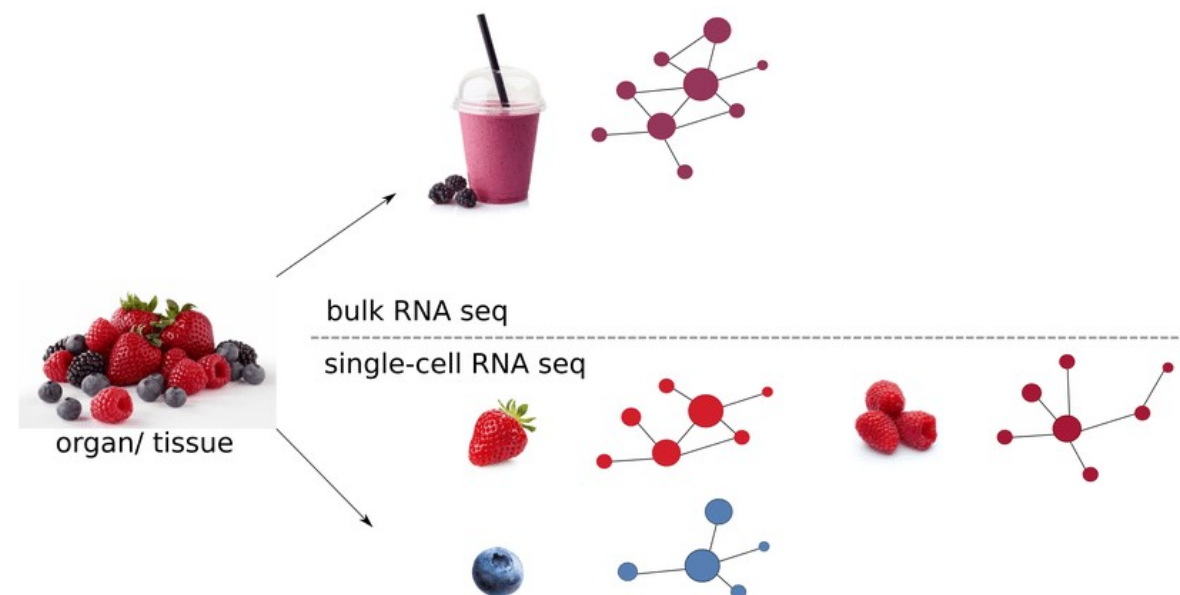
We integrate experimental and computational approaches to comprehensively characterize diverse biological material at single cell resolution.

Why single cells?

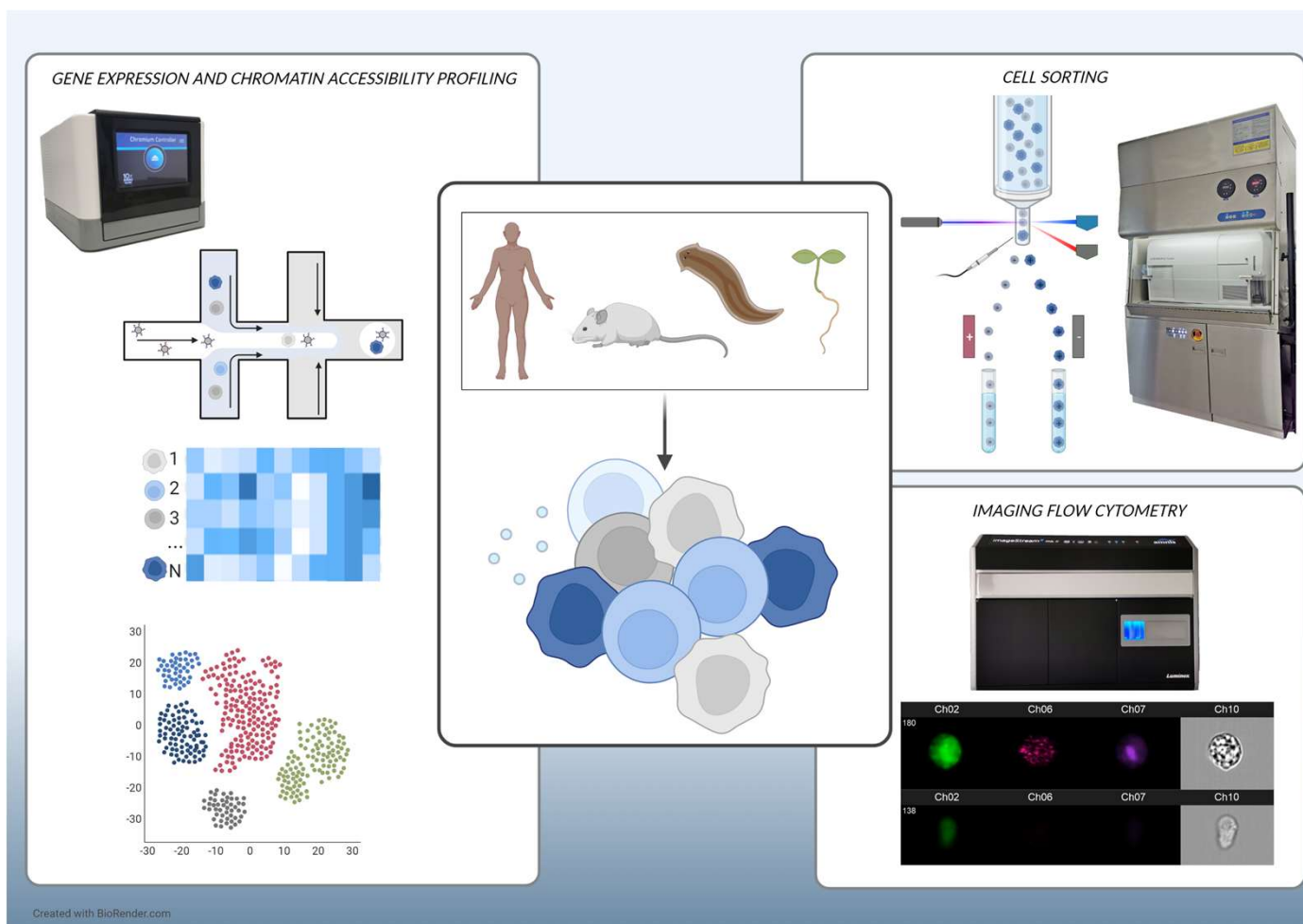
Information obtained based on population average does not provide the whole picture of a sample.

The advantages of taking research one cell at a time:

- identification of cell types and cell states
- identification of distinct subpopulations and differentiation trajectories
- rare cell detection
- exploration of tissue heterogeneity
- more...



Our focus



- We offer **gene expression and chromatin accessibility profiling**, as well as **cell sorting** and advanced analyses using **classical and imaging flow cytometry**.
- We provide equipment for **quantitative and qualitative analysis of nucleic acids**.



Equipment available for self-use by trained researchers



Equipment operated by the Laboratory staff

- LSCA staff performs the experiment, according to the guidelines of the person who submits the samples
- LSCA staff performs the experiment and basic data analysis, according to the guidelines of the person who submits the samples
- LSCA staff performs the experiment, analyzes data and provides substantive intellectual contribution
(consulting, planning of the experiment, compilation of results, analysis and interpretation of data, modification of the procedure, problem solving)



Access to equipment is billed via internal invoices (our major equipment)

- cost of reagents
- cost of utilities: electricity, maintenance, etc. – charged by the Institute

Remember to include the option for internal invoicing in the project budget!



Access to equipment requires replacement of consumed reagents



Access to equipment is provided without additional requirements

Specialized Laboratories

Presentations of the Institute's Specialized Laboratories 06.02.2024



Laboratory of Single Cell
Analyses

Head of Laboratory
Prof. Paulina Jackowiak



Laboratory of Subcellular
Structures Analyses

Head of Laboratory
Prof. Eliza Wyszko



Laboratory of Bioinformatics

Head of Laboratory
Dr. Anna Phillips



Laboratory of Medicinal
Chemistry

Head of Laboratory
Dr. Dorota Jakubczyk



Laboratory of Genomics



Cell and Tissue Culture
Laboratory



Laboratory of Plant Breeding



Protein Engineering and
Biophysics Laboratory

1. Contact us via email at: lab_single_cell@ibch.poznan.pl. Ask for an work order form and suggest a date for the experiment.

2. Send the completed form to the above email address **no later than 24 hours before the submission of samples**.

3. We will provide essential instructions for the sample preparation.

4. You will receive a standard data acquisition and analysis report.

5. We provide the reagents necessary for the operation of the cytometer (*Speed Bead Calibration Reagent, ACE, isopropanol, PBS, Coulter Clenz*).

Their cost is **30 PLN per hour**.

At the end of each quarter, these costs will be settled in the form of internal invoices. The costs of utilities will be settled in the same manner (**12 PLN per hour**).

6. The PI of you project is obliged to allocate part of the indirect costs to the Laboratory (declarations submitted quarterly).

7. In case of intense use of the Laboratory's resources, the project PI may also decide to grant additional remuneration from this project to the specialist performing the experiments.

8. Include one of the following statements in publication:

a) "This research was performed using the infrastructure developed under the project NEBI - National Research Center for Imaging in the Biological and Biomedical Sciences, POIR.04.02.00-00-C004/19, co-financed through the European Regional Development Fund (ERDF) in the frame of Smart Growth Operational Programme 2014-2020 (Measure 4.2 Development of modern research infrastructure of the science sector)."

b) "We acknowledge the use of the infrastructure developed under the project NEBI - National Research Center for Imaging in the Biological and Biomedical Sciences, POIR.04.02.00-00-C004/19, co-financed through the European Regional Development Fund (ERDF) in the frame of Smart Growth Operational Programme 2014-2020 (Measure 4.2 Development of modern research infrastructure of the science sector).



how to start



costs



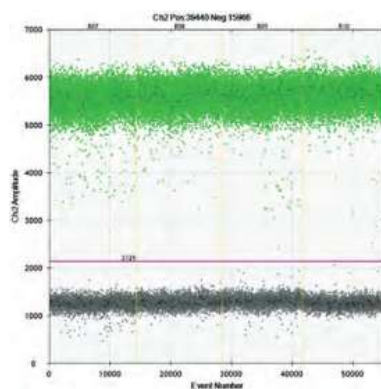
acknowledgement

The **QX200 Droplet Digital PCR System** provides **absolute quantification** of target DNA or RNA molecules for EvaGreen or TaqMan hydrolysis probe-based digital PCR applications.



<https://www.bio-rad.com>

book at: <https://reservation.ibch.poznan.pl>



Starting sample size, μ l	20
QX200 droplet generator capacity	1–8 samples/cartridge
Droplets per 20 μ l sample	20,000
QX200 droplet reader capacity	1–96 samples
Sample illumination	Light-emitting diodes
Sample detection	Multi-pixel photon counter
Detection channels	FAM (EvaGreen), HEX (VIC)
Linear dynamic range	5 orders of magnitude

The **QX600** instrument with 6 detection channels available as demo!



<https://www.bio-rad.com>

The **CFX96** is a precise and flexible, six-channel (five colors and one FRET channel) **real-time PCR** detection system.



<https://www.thermofisher.com>

The **Qubit 4** enables fast and sensitive **quantification** of DNA, RNA and protein, as well as RNA IQ (**integrity & quality**) assay.



book at: <https://reservation.ibch.poznan.pl>





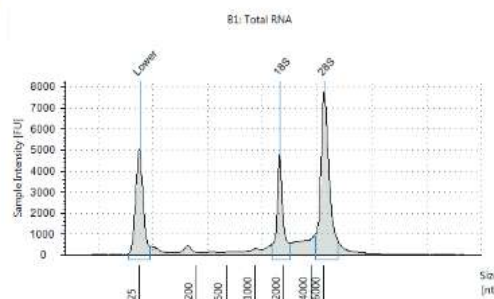
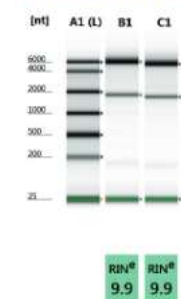
<https://www.agilent.com>



	RNA QC				DNA QC			
	RNA assay	High Sensitivity RNA assay	Genomic DNA assay	Cell-free DNA assay	D1000 assay	High Sensitivity D1000 assay	D5000 assay	High Sensitivity D5000 assay
Sizing range	100–6000 nt	100–6000 nt	200–60000 bp	50–800 bp	35–1000 bp	35–1000 bp	100–5000 bp	100–5000 bp
Quantitative range	25–500 ng/μL	500–10000 pg/μL	10–100 ng/μL	100–4000 pg/μL	0.1–50 ng/μL	10–1000 pg/μL	0.1–50 ng/μL	10–1000 pg/μL
Sample volume needed	1 μL	2 μL	1 μL	2 μL	1 μL	2 μL	1 μL	2 μL
Limit of detection	5 ng/μL	100 pg/μL	0.5 ng/μL	20 pg/μL	0.1 ng/μL	5 pg/μL	0.1 ng/μL	5 pg/μL
Integrity assessment	RNA integrity number equivalent (RIN [®])	RNA integrity number equivalent (RIN [®])	DNA Integrity Number (DIN)	%cfDNA				

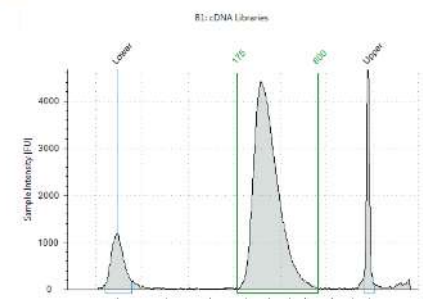
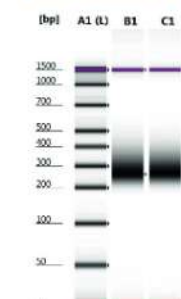
QC: RNA integrity

RNA ScreenTape assay



QC: Sizing (175 – 600 bp)

D1000 ScreenTape assay



QC: genomic DNA integrity assay available

The TapeStation 4150 enables RNA and DNA QC assays, that differ in sizing range and limit of detection. RNA and genomic DNA integrity can be measured.

Wish to use the equipment? Contact us via email at: lab.single.cell@ibch.poznan.pl

Tissue fragmentation and homogenization



The **McIlwain Tissue Chopper** enables rapid chopping (slicing) of tissue.



<https://campdeninstruments.com>



Capacity:

- from 1 to 3 x 2mL, 0.5mL tubes
- 1 x 7mL tube

Speed range:

- 3000, 4000 & 5000 rpm

Locking system:

- Manual (no screw-in system)

Cycles time:

- from 5s to 240s

The **Minilys** uses bead beating technology for tissue grinding, lysing and homogenization.



<https://www.bertin-instruments.com>



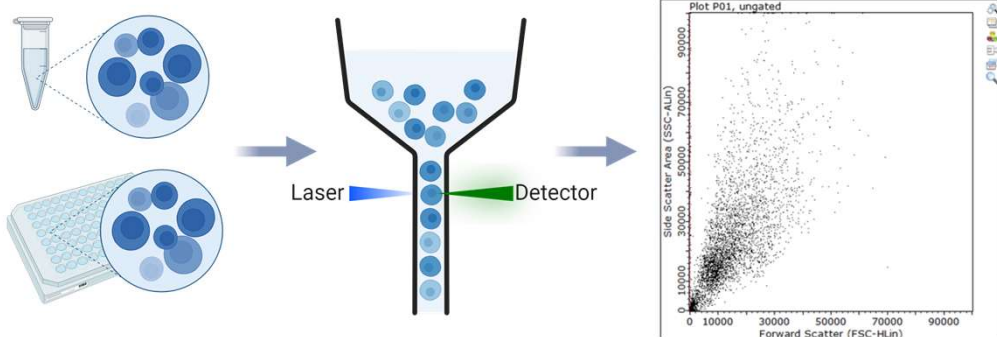
The **gentleMACS Octo Dissociator with Heaters** offers a fully automated workflow for tissue dissociation, using optimized built-in or user-defined programs for almost any biological material. All eight positions can be operated independently. **Single cell suspensions** or **homogenates** can be obtained.



<https://www.pack-icpi.com/>

Wish to use the equipment? Contact us via email at: lab.single.cell@ibch.poznan.pl

Flow cytometry

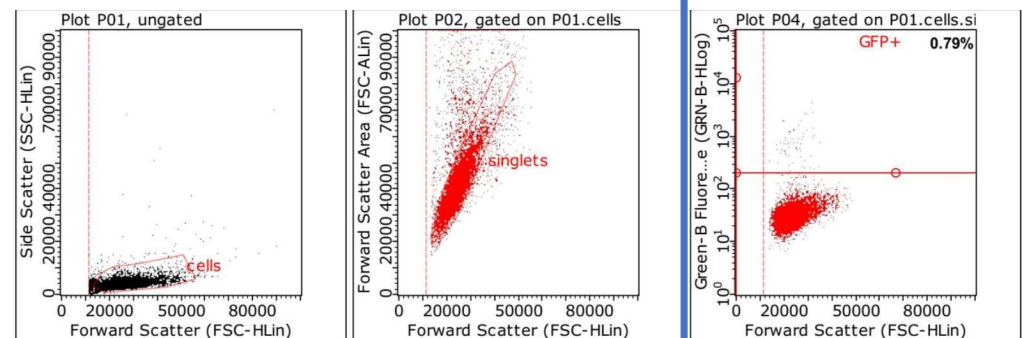


- Each **dot** on a plot represents a **single event** – usually a single cell.
- All parameters are calculated for **each event**.
- Statistical significance is achieved from **rapid acquisition of thousands of cells**.

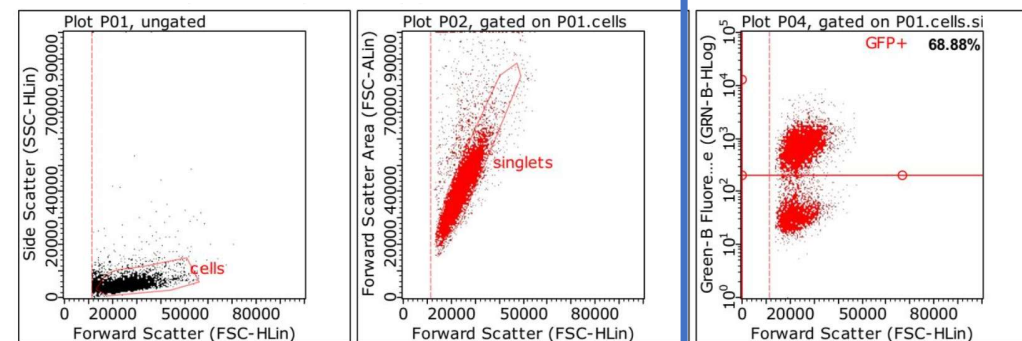
Applications include:

- protein detection, all assays that use fluorescent reporters
- cell viability, cell health (apoptosis, mitochondrial potential, oxidative stress, etc.)
- cell cycle
- cellular pathways (MAPK activation, caspase activation, autophagy)
- multiparametric characterization of diverse biological material
- more...

negative control

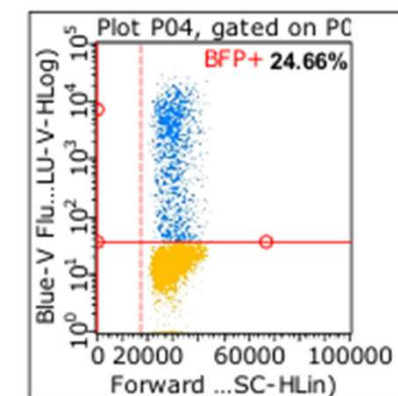
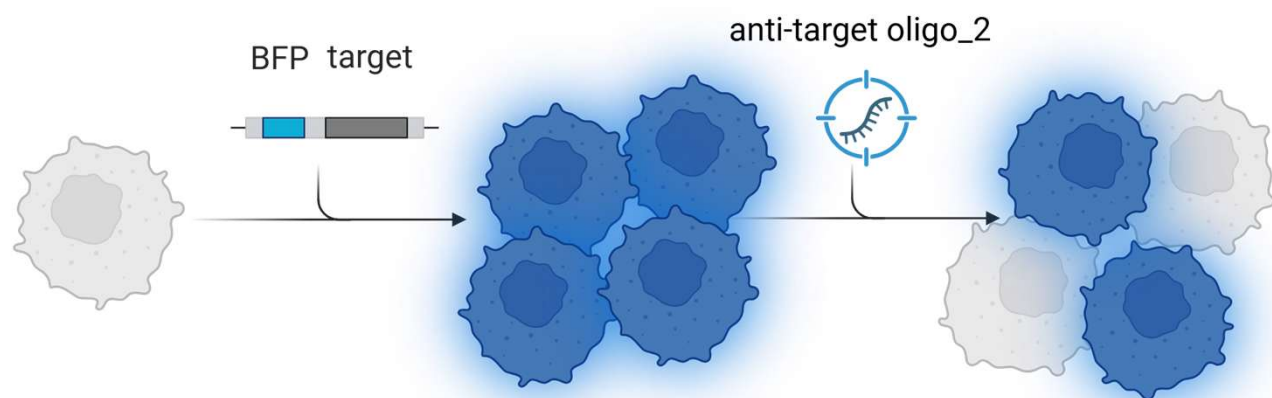
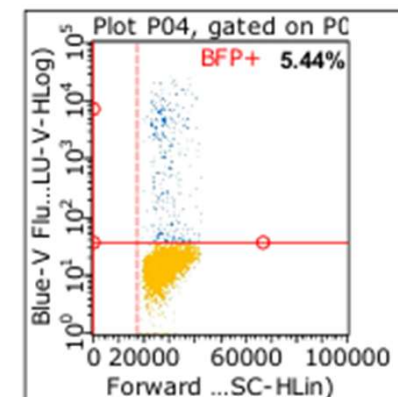
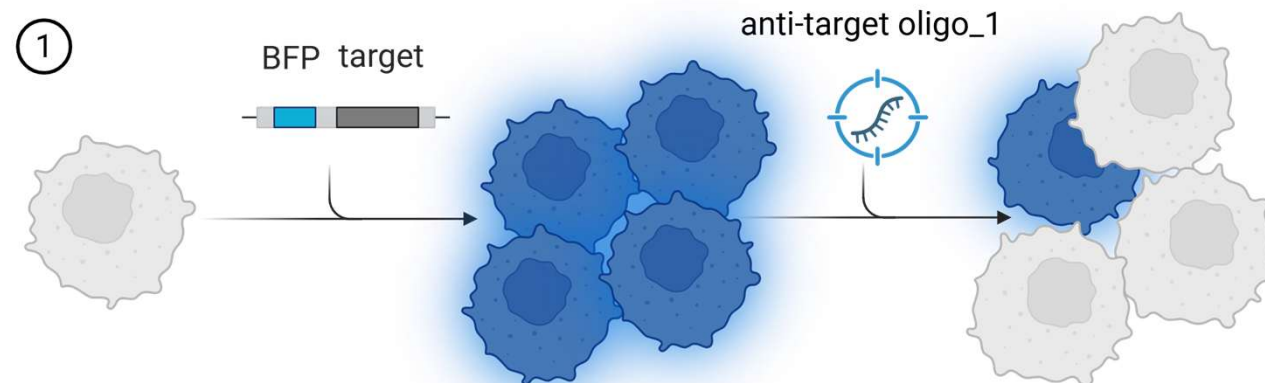


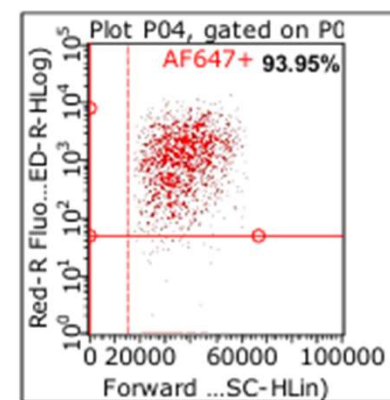
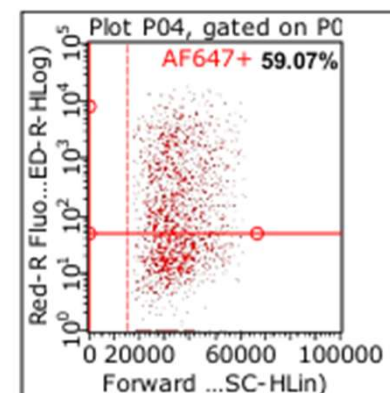
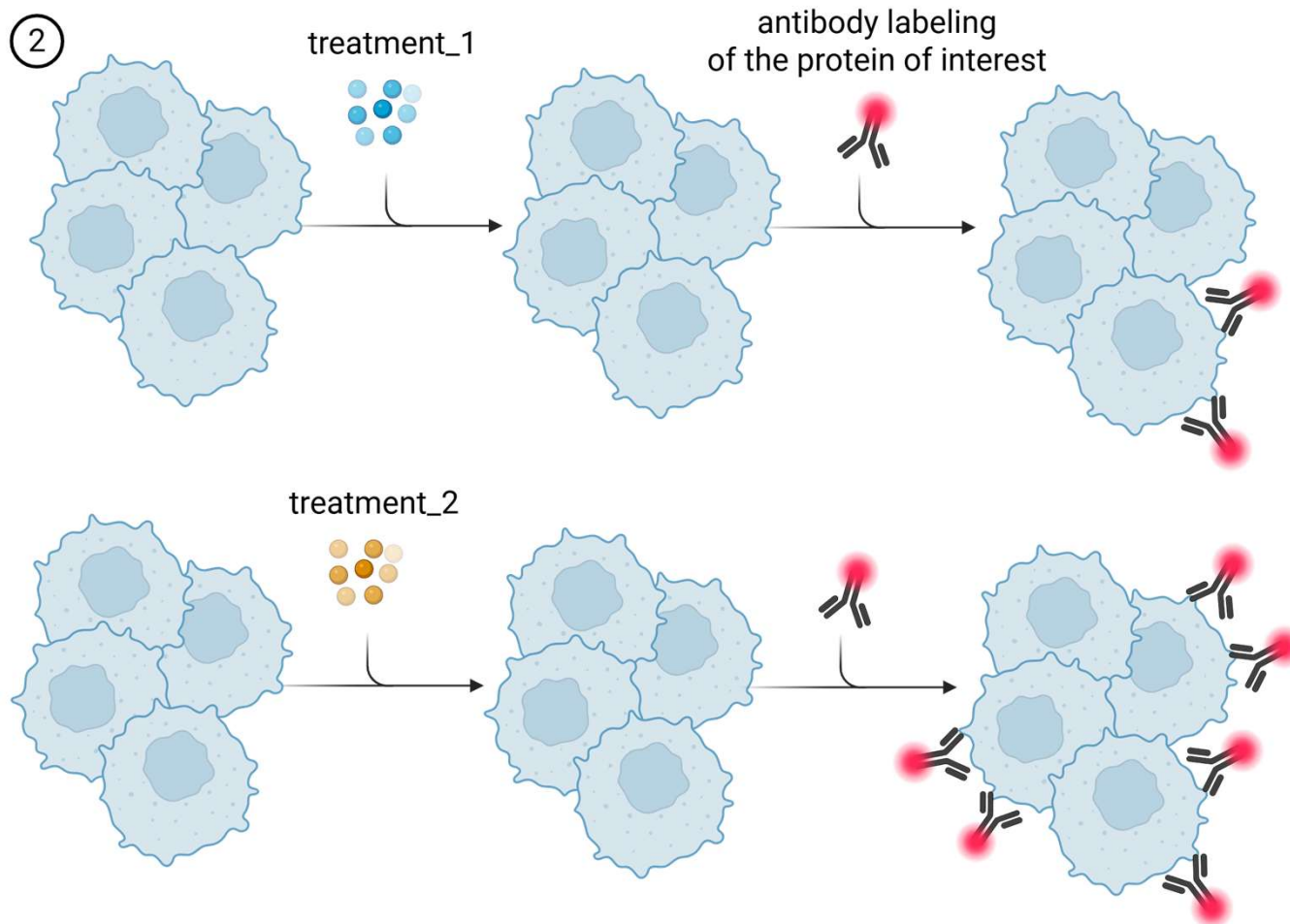
positive sample



Sample types:

- eukaryotic cells
- prokaryotic cells
- nuclei







Magdalena Trybus, MSc

Classical flow cytometry



Cytek Guava easyCyte 12HT

- **405/488/642** nm laser configuration
- 13 detection channels
- sampling system compatible with 1.5 ml tubes and 96-well plates
- pre-defined assays for common applications (dedicated kits and software analysis templates)
- versatile platform for a broad range of cytometric analyses
- user-friendly operation



Cytek Guava Muse

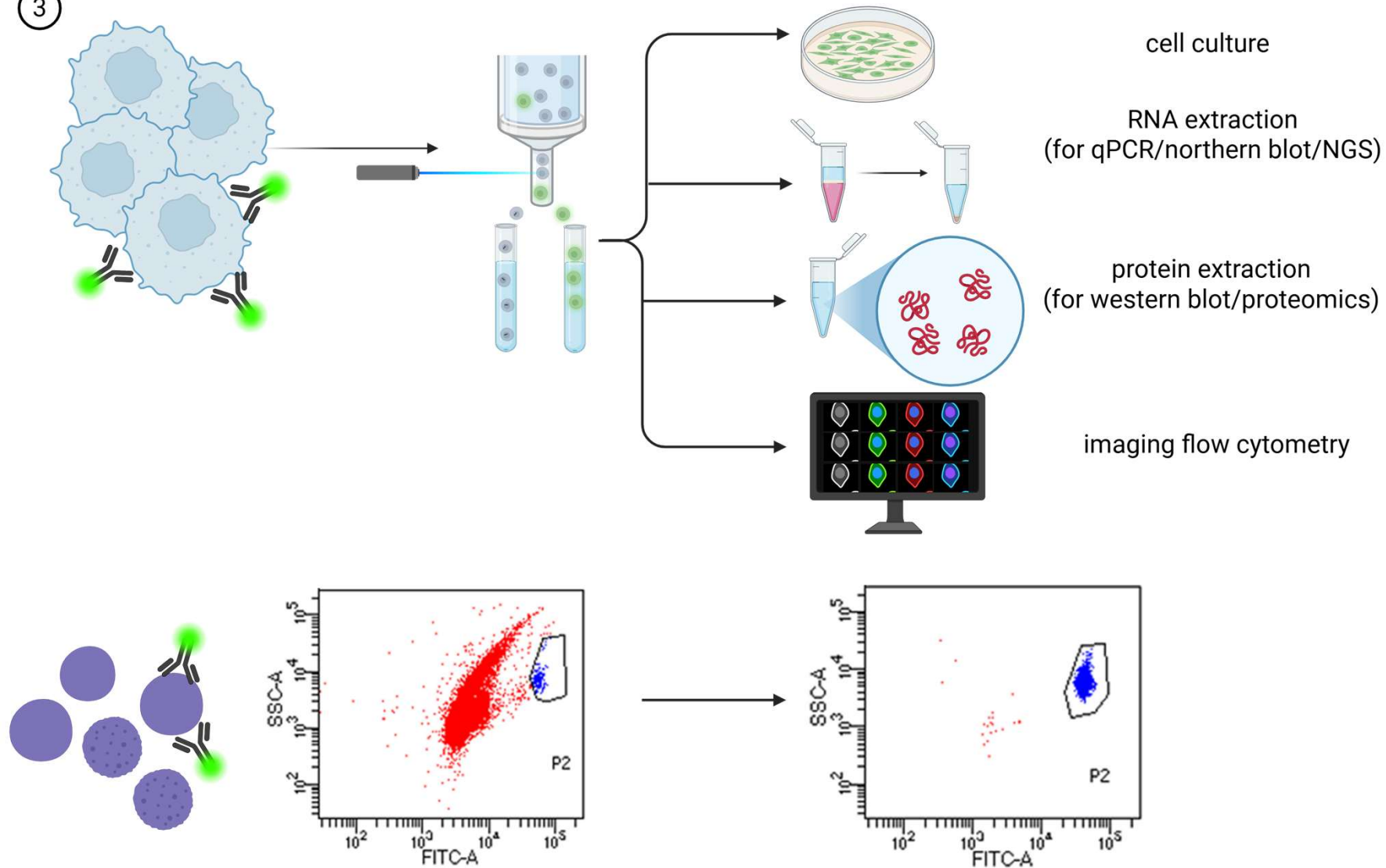


- **532** nm laser
- 2 detection channels
- sampling system compatible with 1.5 ml tubes
- pre-defined assays for a variety of applications (dedicated kits and software analysis templates)
- open module for simple user-defined assays
- easy operation



③

Cell sorting





Magdalena Trybus, MSc

FACS Aria Fusion



- **405/488/561/640** nm laser configuration
- integrated into a dedicated BSL-2 laminar flow cabinet
- 4-way sorting
- ACDU unit for directly sorting onto multiwell plates and microscope slides
- sort collection vessels: 1.5/2 ml tube, FACS tube, 15 ml tube, multiwell plates (up to 96 wells), microscope slides
- 70, 85, 100 & 130 μ m nozzles – gentle sorting possible
- temperature control for pre-sort and post-sort samples available
- several sort precision modes, including single cell sorting and index sorting

sample types sorted thus far:

- cell lines
- primary cells from dissociated tissue (invertebrates)
- iPSCs
- nuclei (mouse cerebellum, plant root)
- protoplasts (plant root)
- clinical samples
- no prokaryotic cells allowed!



Wish to use the equipment? Contact us via email at: lab.single.cell@ibch.poznan.pl

Imaging flow cytometry



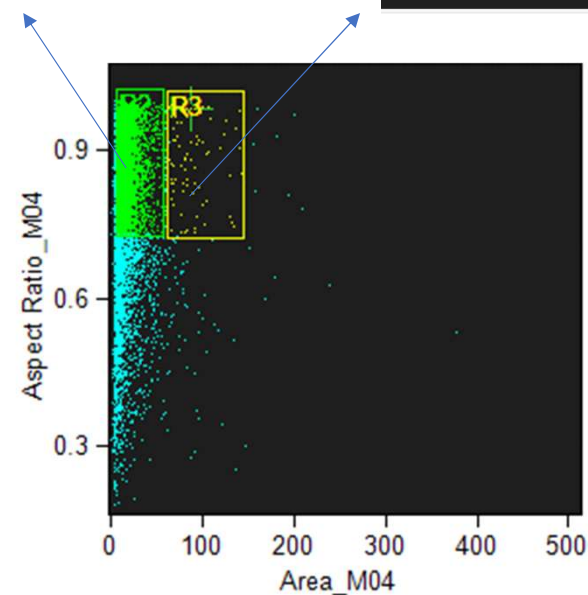
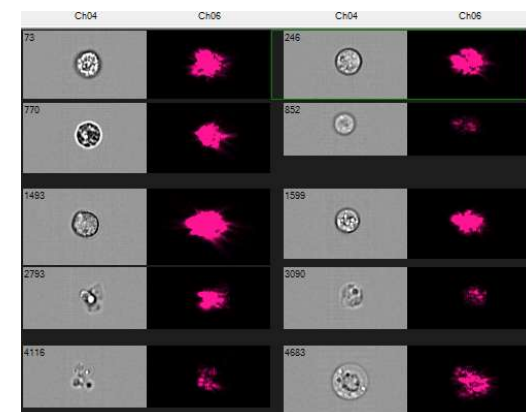
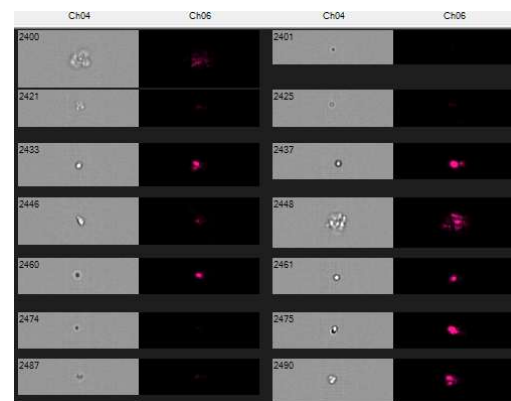
Anna Samelak-Czajka, PhD

Cytek Amnis ImageStream[®] Mk II



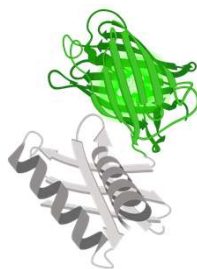
- 405/488/561/642 nm laser configuration
- 2 cameras, 12 detection channels
- multimag: 20x/40x/60x
- autosampler, EDF, High Gain mode

Combines **high-throughput** and multiparameter capabilities of conventional flow cytometry with **morphological** and **spatial** information from imaging at single-cell resolution.

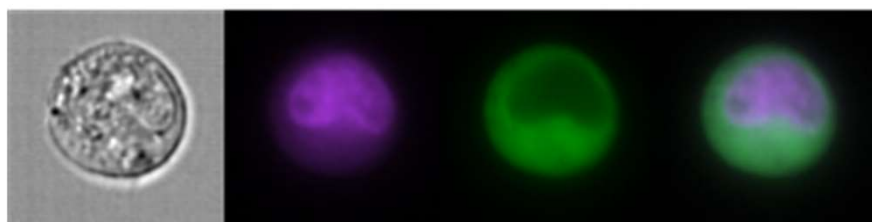


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Intracellular localization



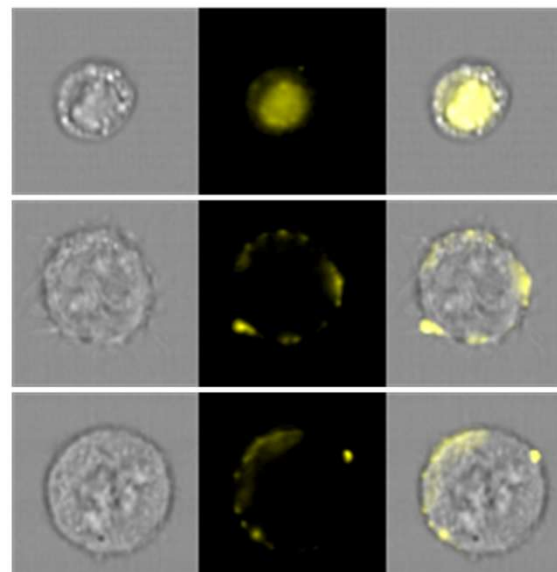
brightfield nucleus GFP composite



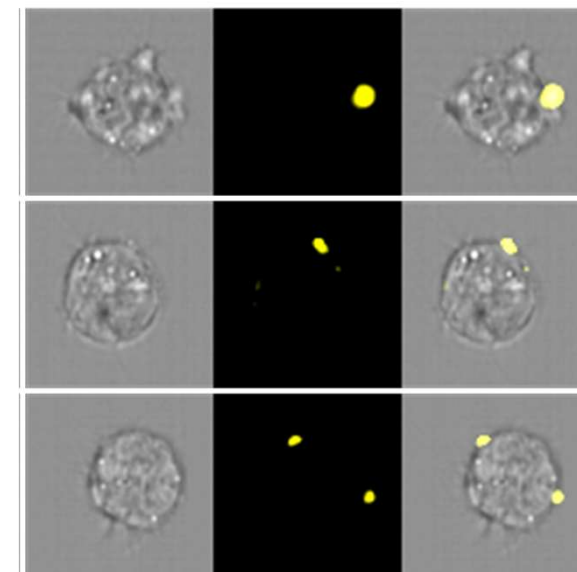
Probe internalization



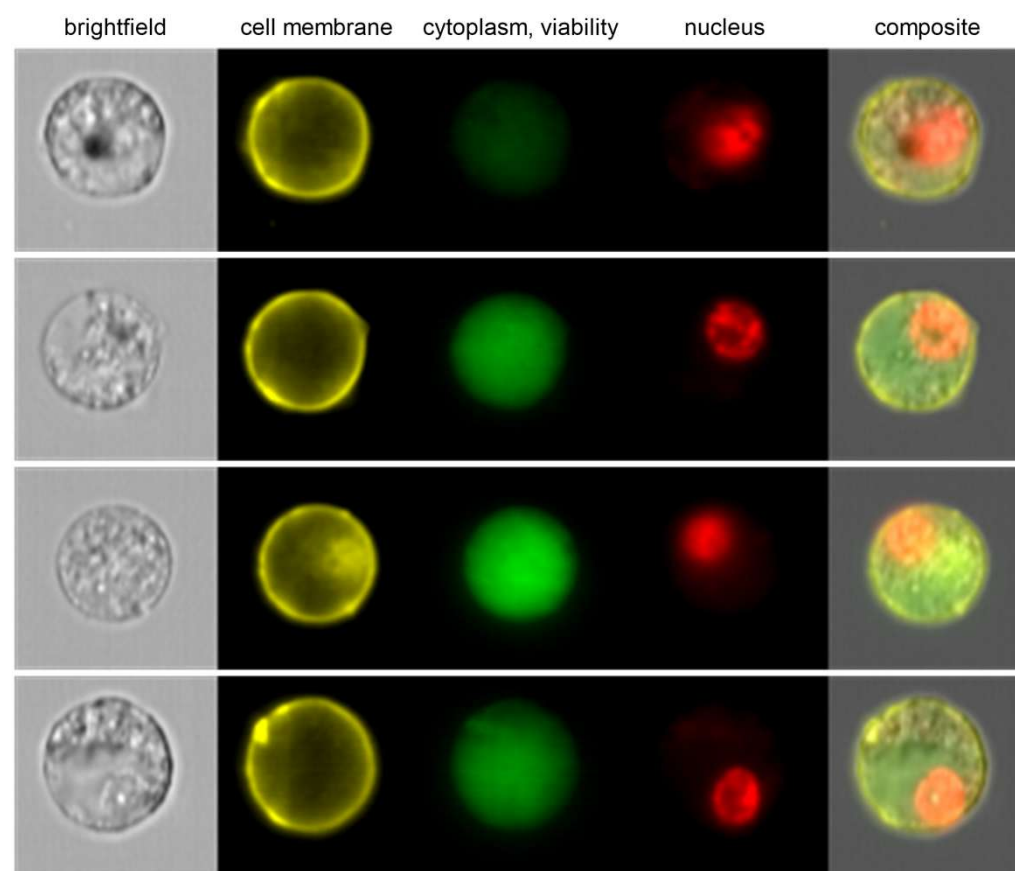
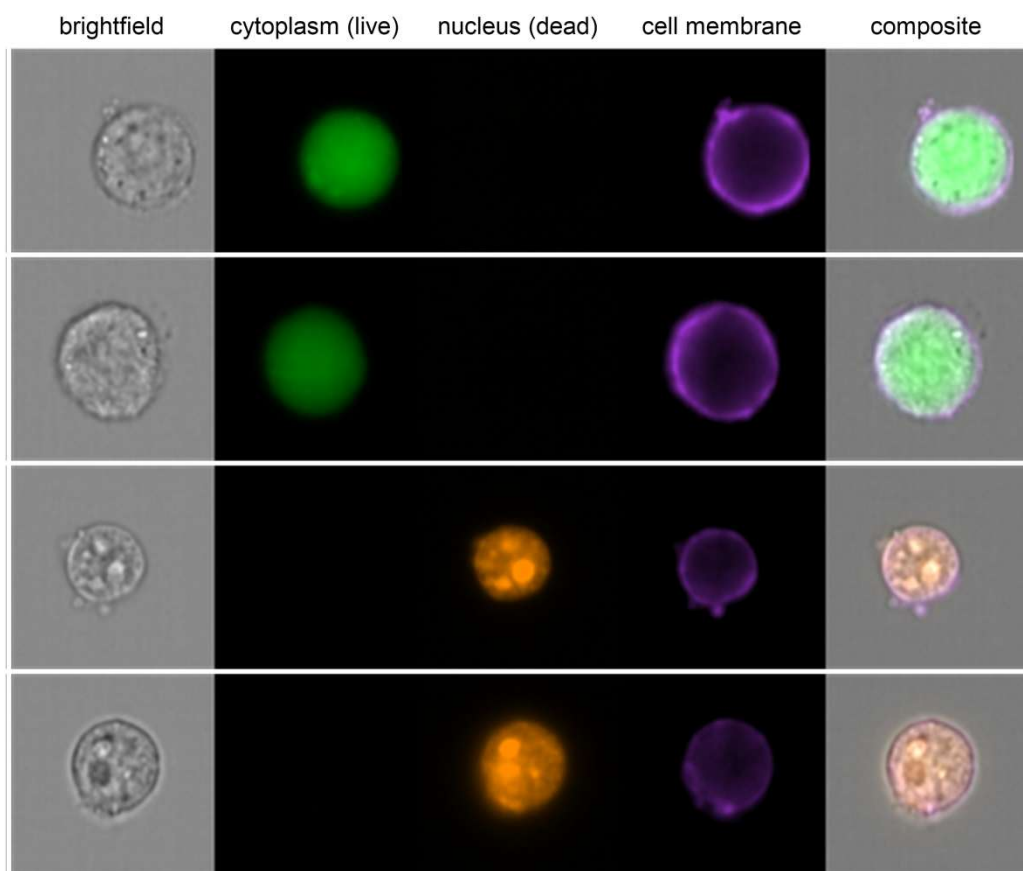
brightfield Cy3 probe composite



brightfield Cy3 probe composite

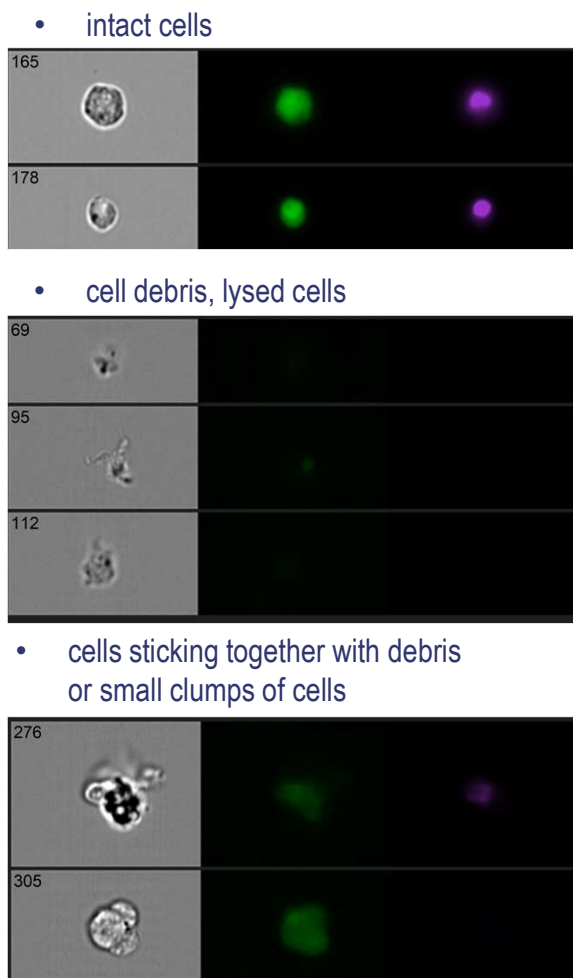


„Cell painting” – nonspecific fluorescent dyes for particular organelles

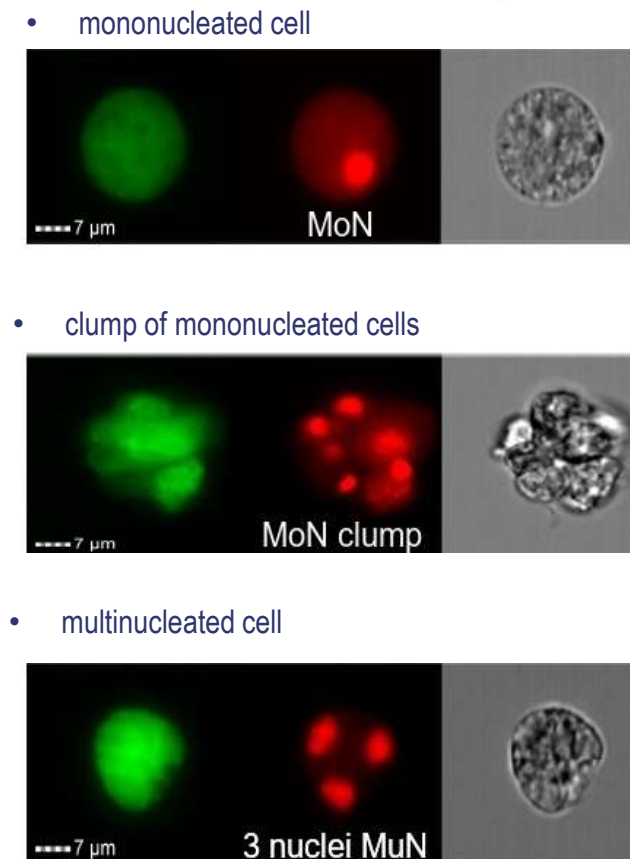


Imaging flow cytometry - applications

Tissue dissociation QC

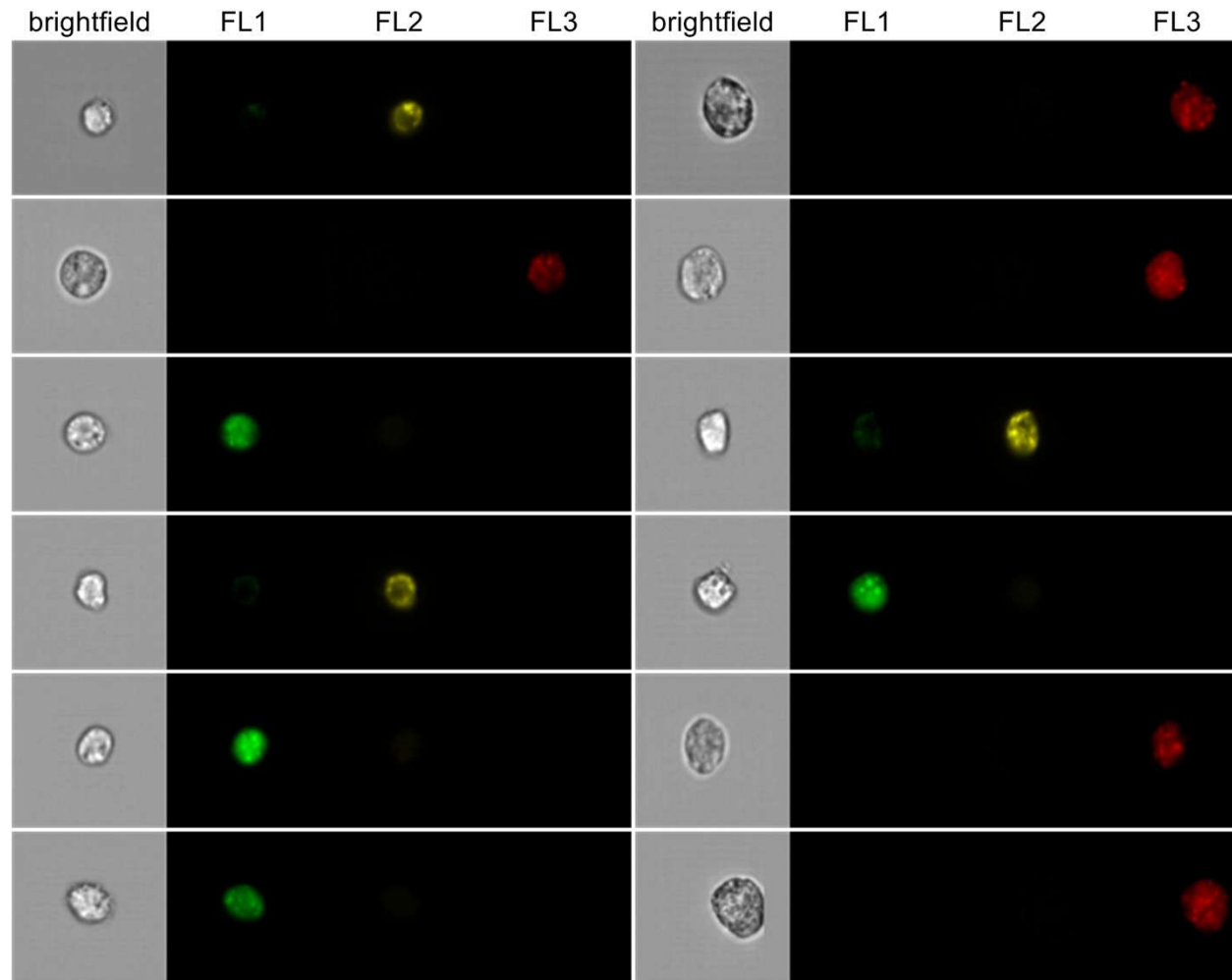


Biological insight



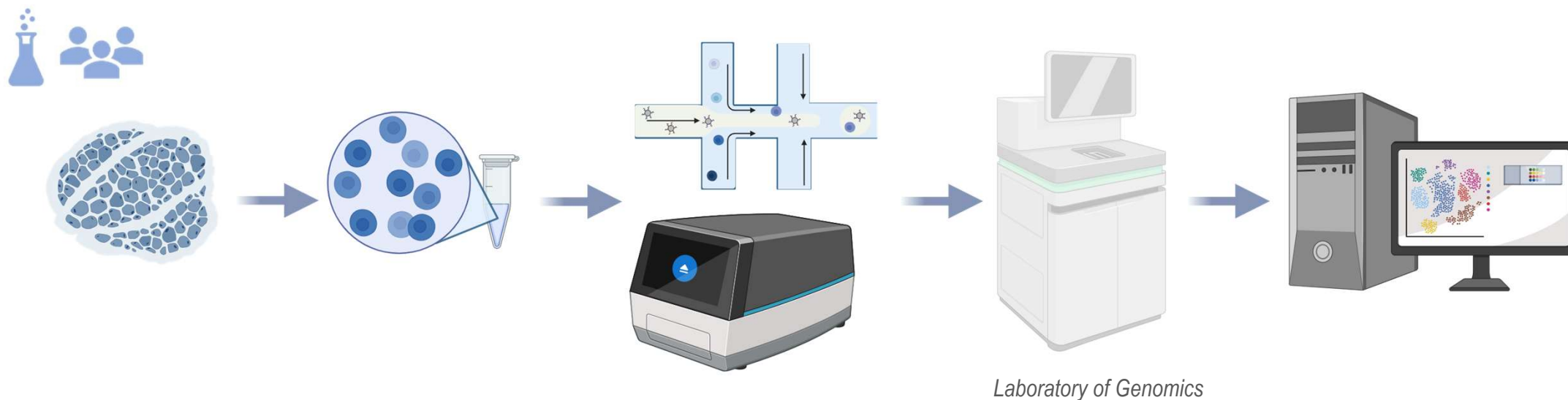
Imaging flow cytometry - applications

FISH Flow – RNA detection



Fixed cells

10x Genomics Chromium X platform for single cell multiomics



Applications include:

- gene expression profiling
- chromatin accessibility profiling (ATAC-Seq)
- feature barcode technology: integration of gene expression data with cell surface protein detection (antibody-oligonucleotide conjugates required), CRISPR screens

Sample types:

- fixed, fresh, frozen
- whole cells, nuclei

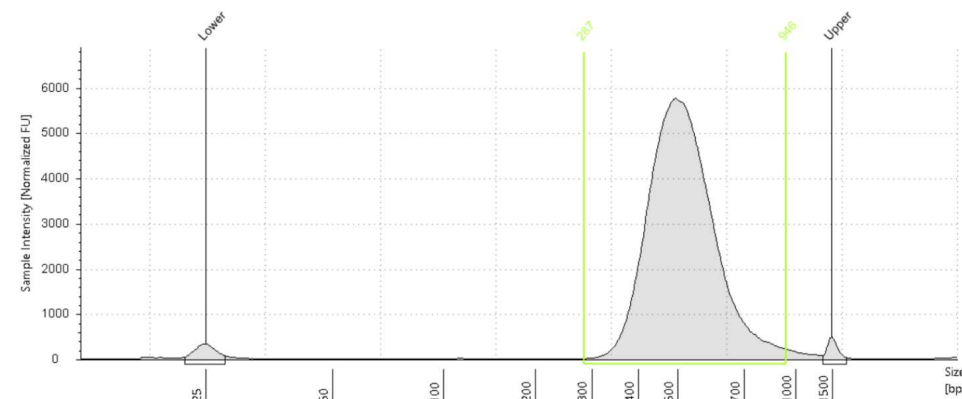
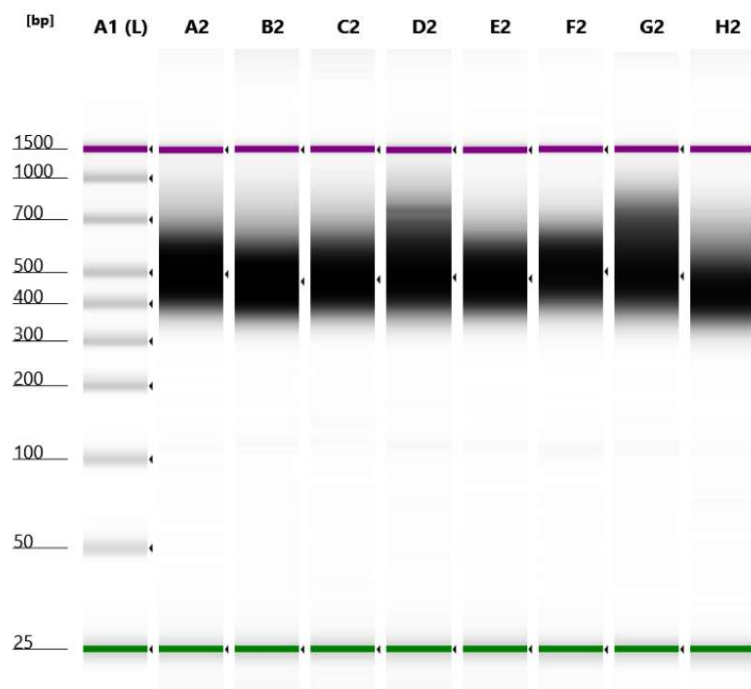
Wish to use the equipment? Contact us via email at: lab.single.cell@ibch.poznan.pl



Anna Samelak-Czajka, PhD

Sample types processed thus far:

- clinical samples
- primary cultured cells
- dissociated tissue (whole invertebrate)
- plant nuclei



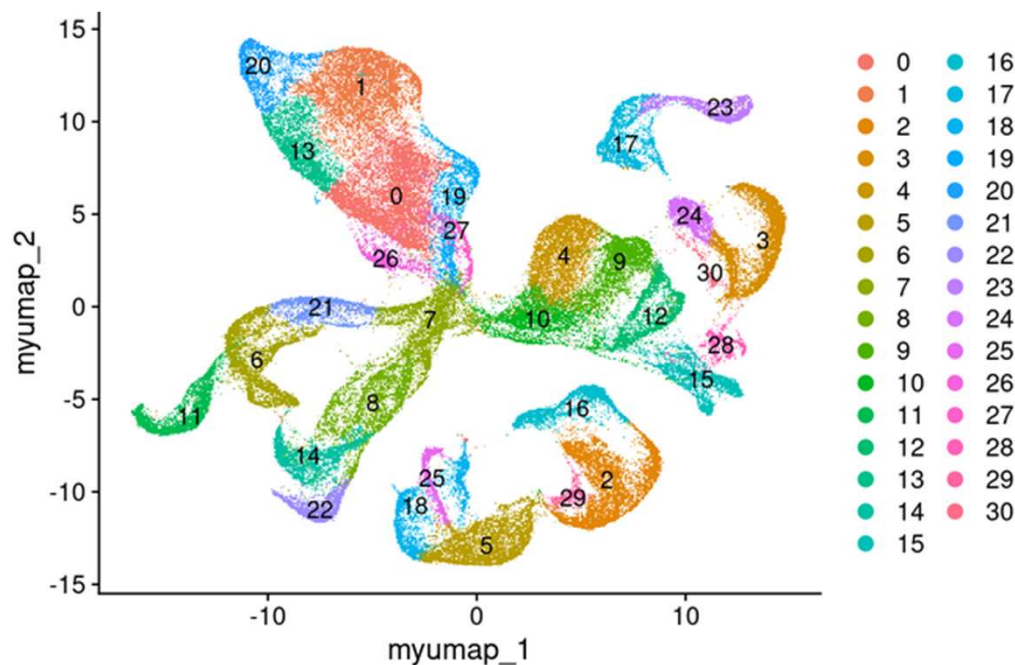
Single cell data analysis

Our analytical offerings:

- ready-to-use tools (e.g. Cell Ranger)
- proven pipelines (e.g. Seurat)
- tailored solutions



Agnieszka Gąbka-Buszek, PhD, Eng Jakub Kubiś, MSc Eng



Author: Jakub Kubiś

Institute of Bioorganic Chemistry
Polish Academy of Sciences
Laboratory of Single Cell Analyses

LSCA
LABORATORY OF SINGLE CELL
ANALYSES

Description

A computational tool for naming cell clusters using statistical methods, including Fisher's exact test and occurrence-based filtering. CellMaNam identifies marker genes and annotates cell types in single-cell RNA sequencing (scRNA-seq) data by analyzing gene occurrence patterns. It systematically determines optimal markers, refines annotations based on hierarchical relationships, and visualizes results through heatmaps, enabling precise and statistically robust cell classification.

Installation

```
install.packages("https://github.com/jkubis96/CellMaNam/raw/refs/heads/main/packages/CellMaNam_0.1.0.tar")
```

SeekOne Digital Droplet System (SeekGene) available as demo

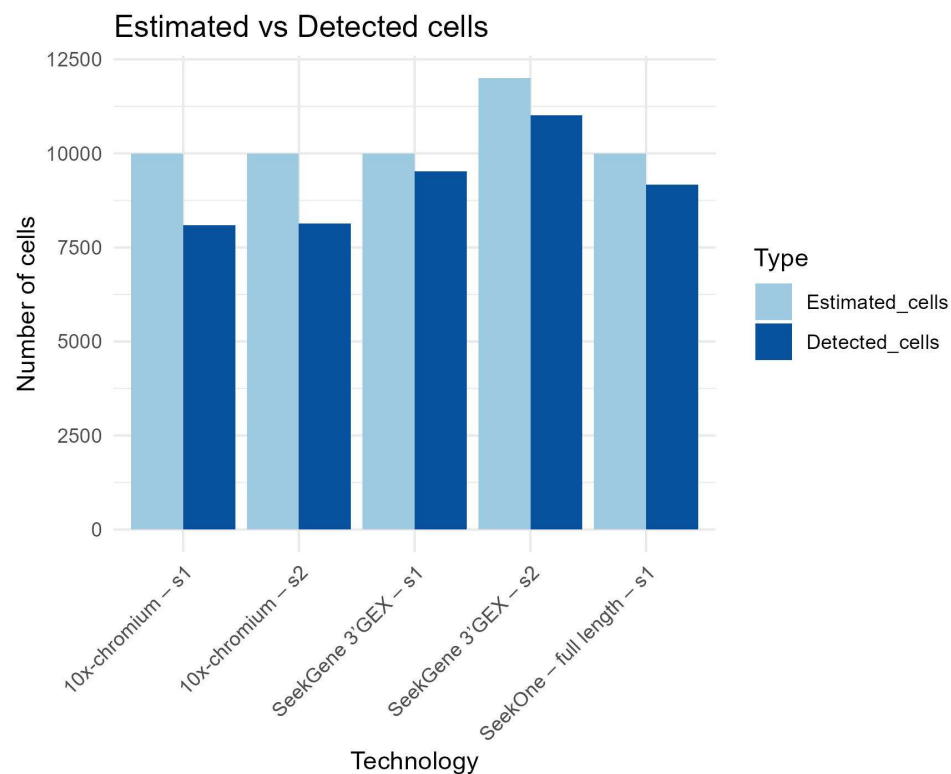
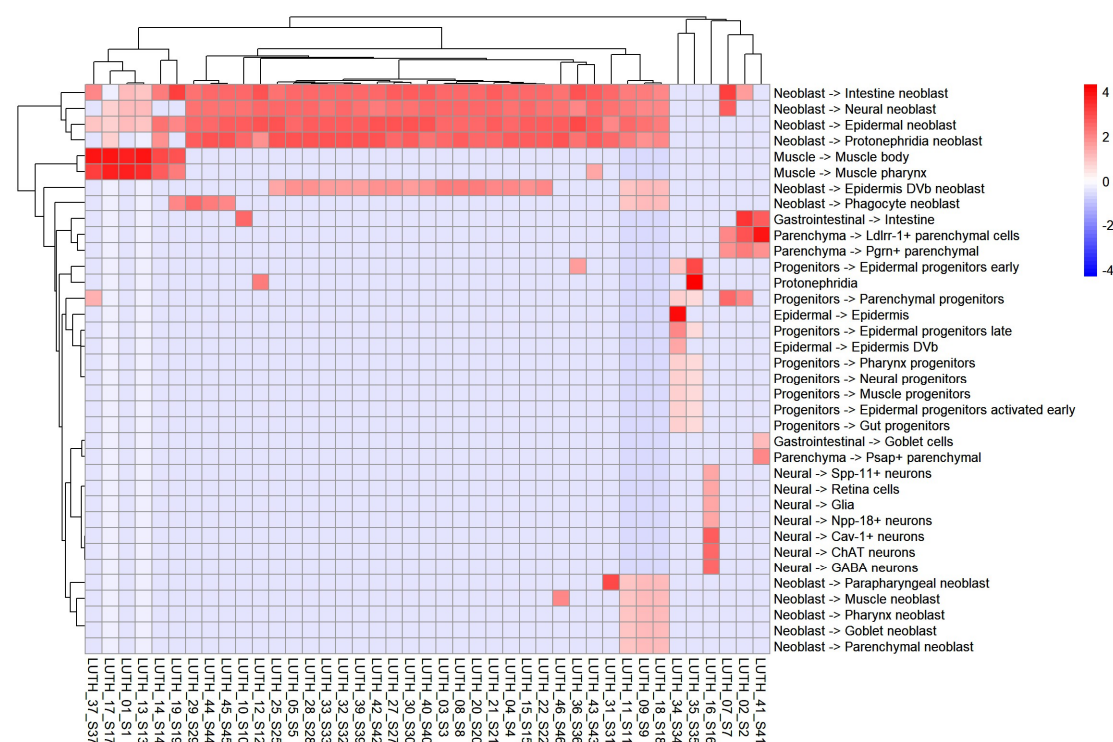


Plate-based approaches – libraries from sorted cells (Lexogen)



Additional applications include:

- full-length RNA profiling
- methylation and gene expression from the same cell

Single Cell Day at IBCH PAS

- presented by LSCA staff
- overview of single cell technologies available in our facility
- best practices for sample preparation and experimental success
- key insights and discoveries enabled by bioinformatics analysis
- 29th of May – save the date!



3rd Guava easyCyte 12HT and Guava Muse Operator Training

- provided by LSCA staff
- small groups, theoretical & hands-on sessions (~4 hours in total)
- date to be announced (September / October 2026)

Training Feedback Survey

Guava easyCyte & Guava Muse Operator Training 2024

Would you recommend this training to your colleagues?

12 Answers

Best Response

Yes

100%

Percentage

12

Responses



Laboratory of Genomics

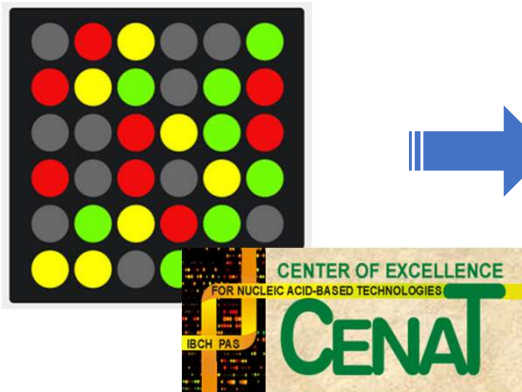
Luiza Handschuh

Presenting: Małgorzata Marcinkowska-Swojak

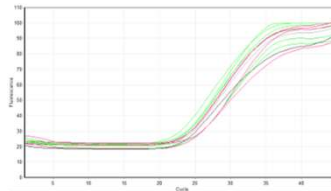
Poznań, 26.03.2026

Brief history

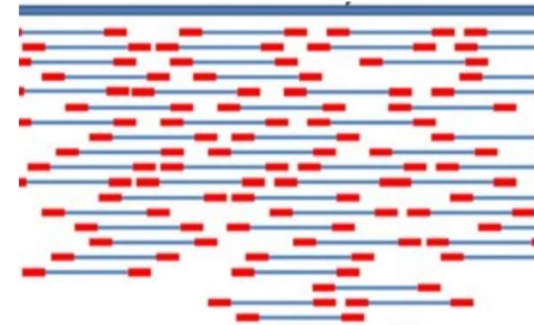
2004
microarrays



2010
quantitative PCR



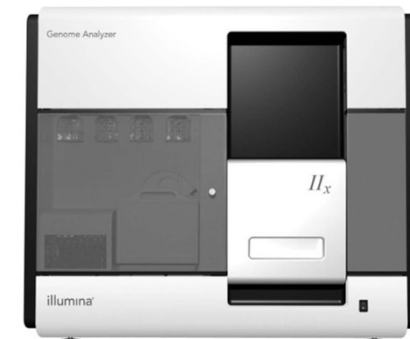
2010
next generation sequencing



**Laboratory of
Genomics**



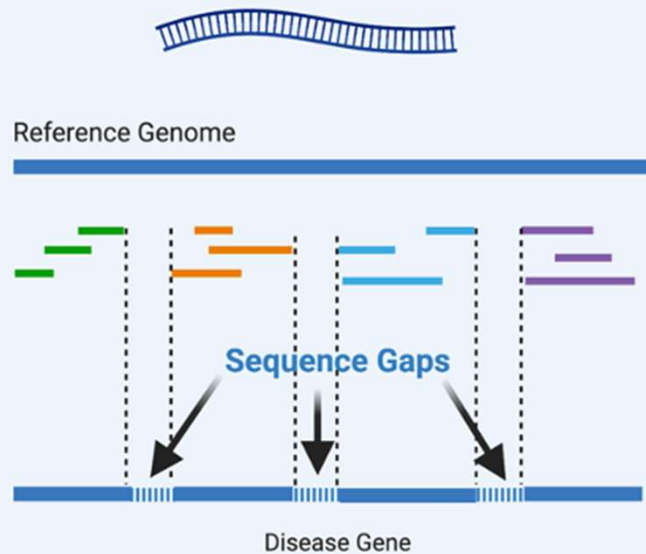
2019



**Laboratory of Microarrays
and Deep Sequencing**
established in January 2013

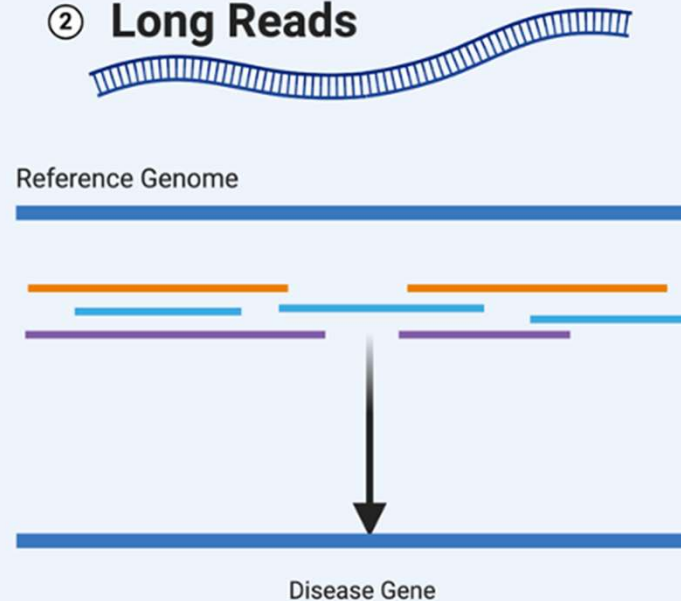
Second and third generation sequencing

① Short Reads



Missing sequence data leads to gaps in genome coverage and limits variant detection

② Long Reads



Long reads map uniquely and span large variants providing comprehensive variant detection

2022/2023 - **five** sequencing systems

Illumina sequencing systems

NextSeq 550



MiSeq (dx)



NovaSeq 6000



NovaSeq X Plus

2022/2023 - **five** sequencing systems



ICHB PAN

Illumina sequencing systems

NextSeq 550



MiSeq (dx)



NovaSeq 6000



NovaSeq X Plus

Pacific Biosciences sequencing systems



Sequel IIe

2026/2027 - **two** sequencing systems

Long-read sequencing systems

Oxford Nanopore Technologies
PromethION 24

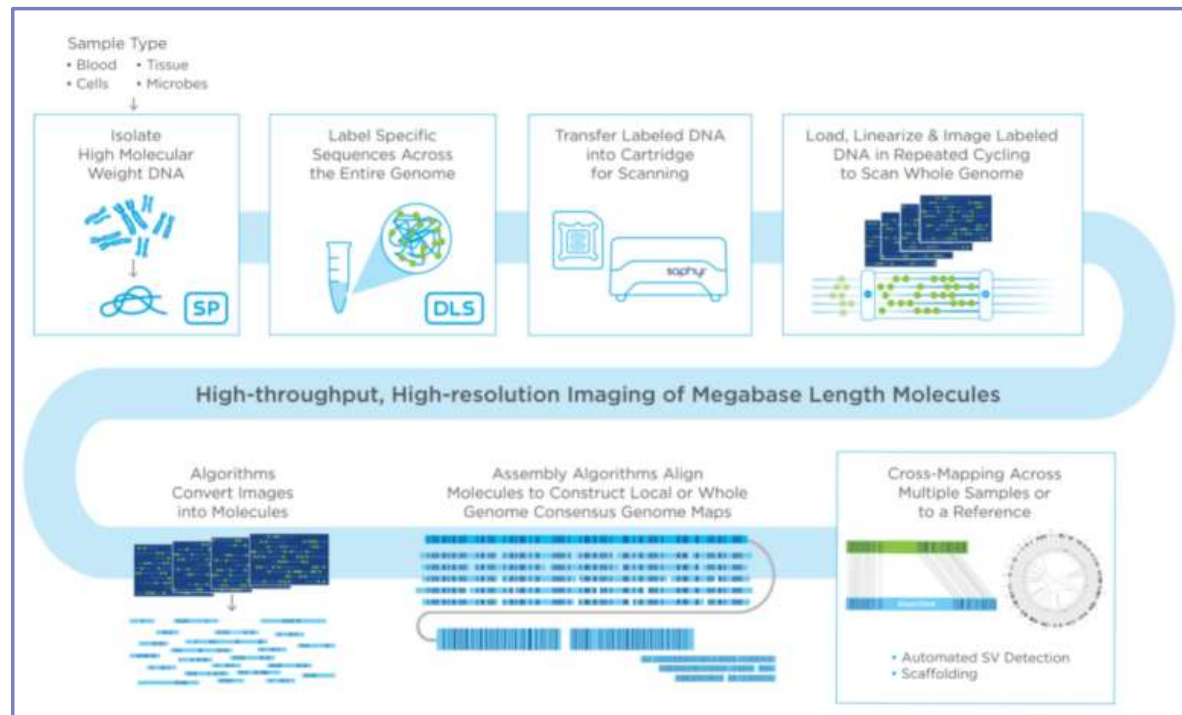
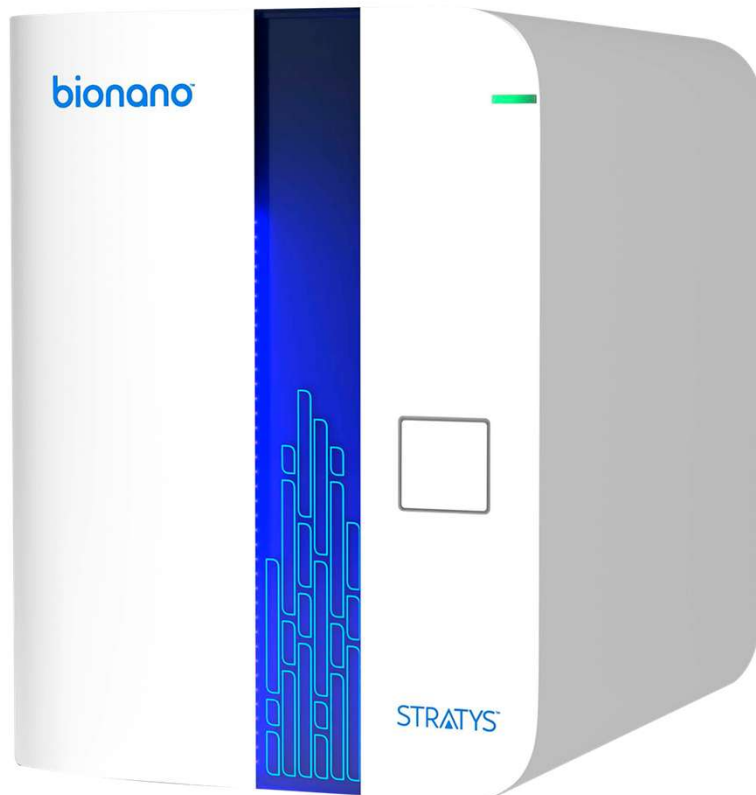


PacBio
Revio

2026/2027 – one optical mapping system

Optical mapping system

bionano STRATYS



Illumina sequencers



MiSeq Series +



NextSeq 550 Series +



2 FCs

NovaSeq 6000 Series +



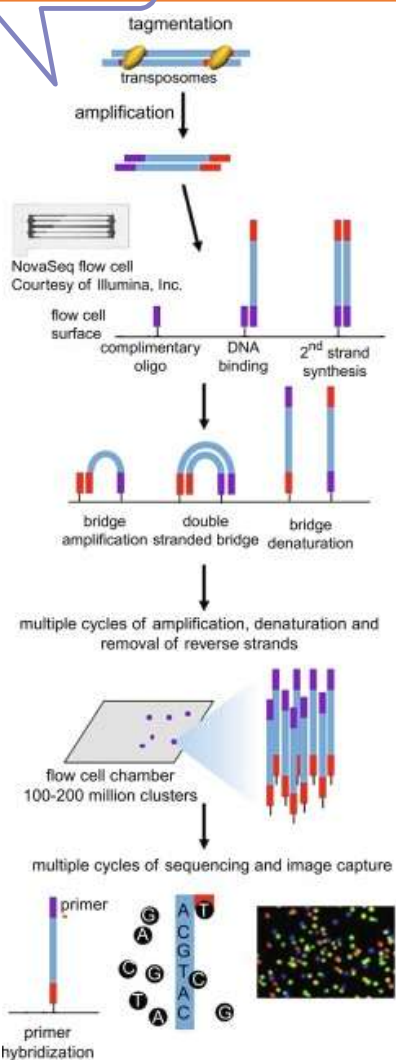
2 FCs

NovaSeq X Series

1x36 bp - 2x300bp	1x75 bp - 2x150 bp	1x35 bp - 2x250 bp	1x100 bp - 2x150 bp
540 Mb -15 Gb	16,25 - 120 Gb	60 - 3000 Gb	165 Gb - 8 Tb
1 - 25 M PE reads	130 or 400 M PE reads	650 M - 10 B PE reads	1,6 B - 26 B PE reads
4 - 56 hrs	11 - 29 hrs	13 - 44 hrs	17 - 48 hrs
4 flowcell types	2 flowcell types	4 flowcell types	3 flowcell types
2 100 – 11 100 zł	7 600 – 32 000 zł	13 300 – 88 200 zł	9 600 – 80 700 zł
0 genomes	1 genome	24 genomes x 2	64 genomes x 2
-	32000 zł / genome	3675 zł / genome	1261 zł / genome

Illumina sequencers

SBS
sequencing by
synthesis



NextSeq 550 System High-Output Kit

1 human whole genome

12 exomes

16 transcriptomes

NextSeq 550 System Mid-Output Kit

3 exomes

12 enrichment panels

96 amplicon panels

NovaSeq 6000 System

Flow Cell Type

SP

S1

S2

S4

Human Genomes per Run

~4

~8

~20

~48

Exomes per Run

~40

~80

~200

~500

Transcriptomes per Run

~32

~64

~164

~400

NovaSeq X Series

Flow Cell Type

1.5B

10B

25B

Human Genomes per Flow Cell

~4

~24

~64

Exomes per Flow Cell

~41

~250

~750

Transcriptomes per Flow Cell

~30

~200

~520

Illumina sequencing

illumina®



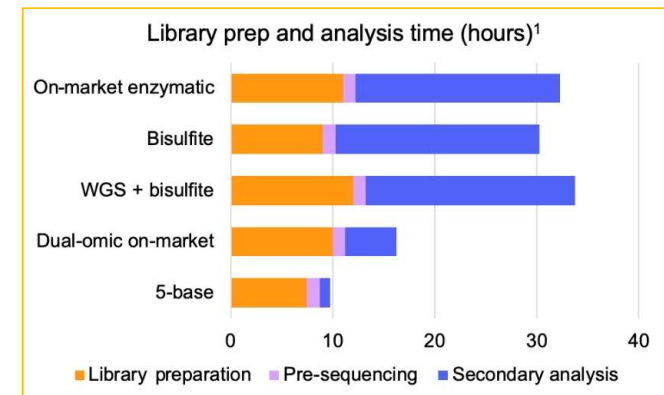
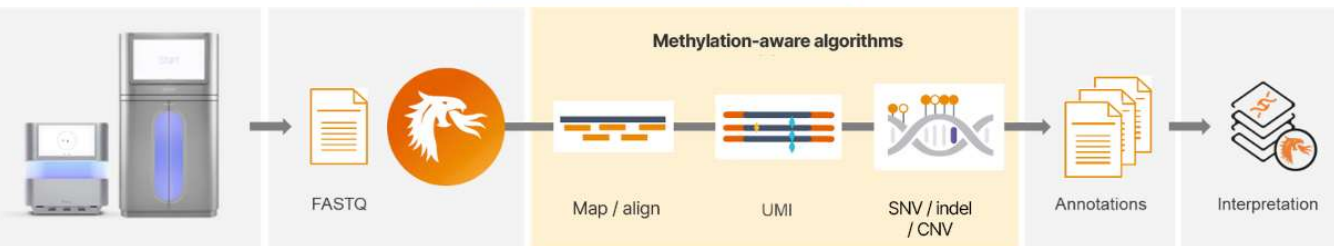
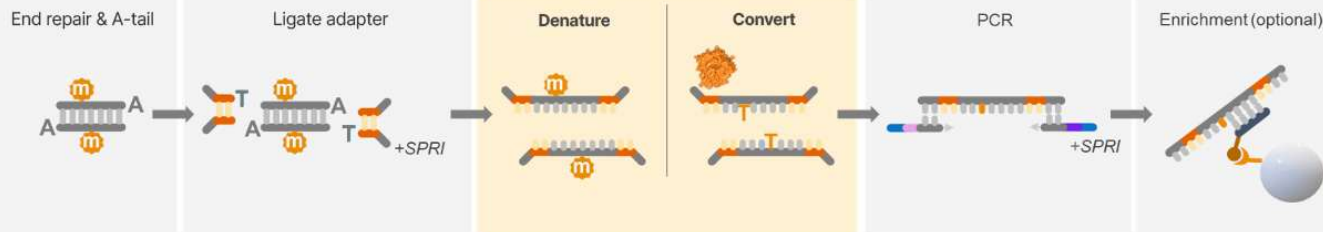
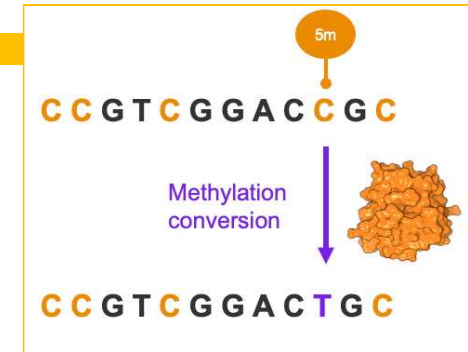
Illumina 5-Base DNA Prep

ACCGCTCG
TGCGAGC
Reference

Watson (+)
Crick (-)

5m
ACCGCTTG
TGCGAAC
Input DNA

C>T
ACTGCTTG
TGCGAAC
Converted DNA



Pac-Bio – what can we do with 1 SMRT cell?



3-4 SMRT cells per 1 **human** genome
1 SMRT cell per 1 **human** transcriptomes

6 500 – 8 500zł / SMRT cell
1 500 – 1 800zł / SMRT cell sequencing

Pac-Bio – what can we do with 1 SMRT cell?

~8000 PLN /SMRTcell



Vega™ system
HiFi within reach

1 SMRT® Cell



Revio® system with
SPRQ™ chemistry
HiFi at scale

1 SMRT Cell

4 SMRT Cells



Application

Samples per run

Whole genome sequencing

Human genome (20× coverage)	1	2	8
Human methylation profiling (5×)	4	8	32
De novo assembly (1 Gb genome)	2	4	16
Microbial de novo assembly (2 Gb total)	384	384	1,536

Targeted panels

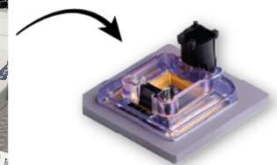
PureTarget™ panels	48	96	384
Amplicon sequencing	>1,000	>1,000	>4,000
Hybrid capture			
20 Mb panel	12	16	64
2 Mb panel	72	96	384
100 kb panel	288	384	1,536

RNA sequencing

Kinnex™ single-cell RNA sequencing	1 (3,000–6,000 cells)	1 (6,000–10,000 cells)	4 (6,000–10,000 cells)
Kinnex full-length RNA sequencing			
5M reads	6	12	48
10M reads	3	6	24

Microbial

Shotgun metagenomic profiling	64 communities	128 communities	512 communities
Shotgun metagenomic assembly	8 communities	16 communities	64 communities
Kinnex 16S rRNA	1,024 communities	1,536 communities	6,144 communities

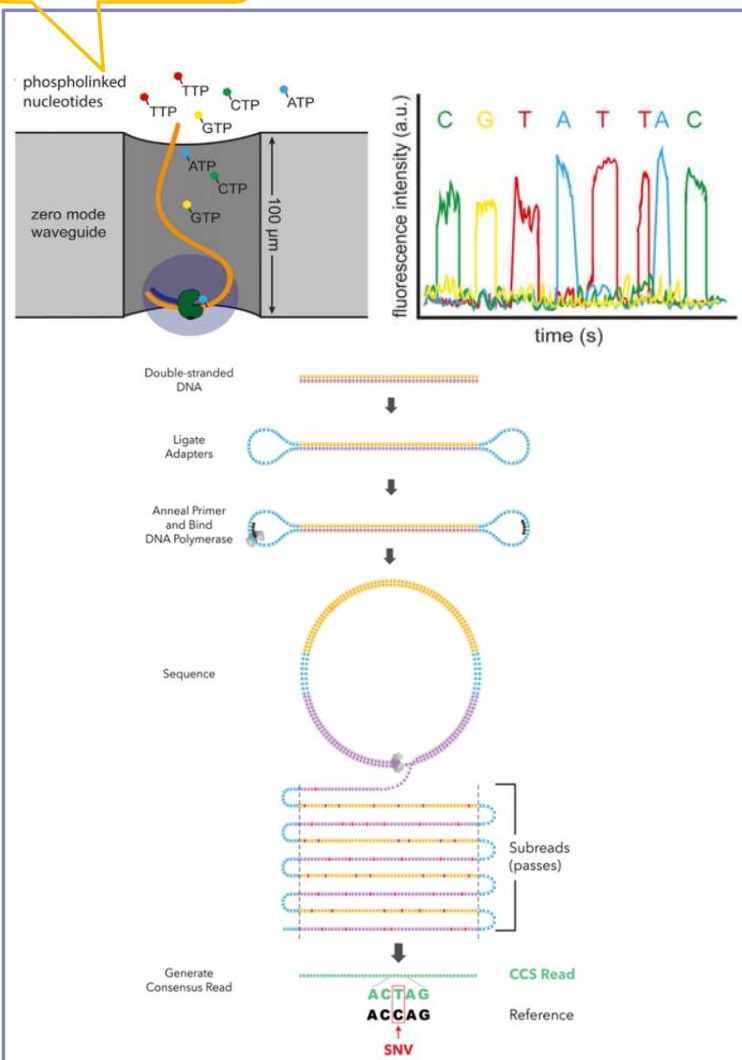


3-4 SMRT cells per 1 **human** genome
1 SMRT cell per 1 **human** transcriptomes

6 500 – 8 500zł / SMRT cell
1 500 – 1 800zł / SMRT cel sequencing

Pac-Bio – genome analysis

SMRT
single molecule, real-
time sequencing



Single Nucleotide Variant



Deletion



Insertion



Tandem Duplication



Interspersed Duplication



Inversion



Translocation



Copy Number Variant



Types of Variants



Automation (2023)



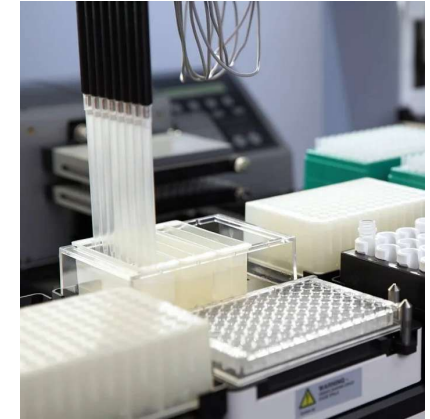
Automated workstations - Beckman Biomek i5



DNA/RNA isolation



Library preparation



up to 96 samples per run	up to 48 samples per run
4 - 8 hrs	6 - 10 hrs
<i>DNA - Beckman GeneFind</i>	<i>Genome - Illumina DNA Prep</i>
<i>RNA - Beckman RNAadvance</i>	<i>Transcriptome - KAPA RNA HyperPrep Kit (+RiboErase)</i>

Additional equipment

Currently

- **Nanodrop**, ThermoFisher Sci.
- **Qubit**, ThermoFisher Sci.
- **Bioanalyzer 2100**, Agilent
- **Bioruptor NextGen Sonicator**, Diagenode
- **T100 thermocyclers**, Bio-Rad
- **Rotor Gene Q**, Qiagen
- **QX200** droplet digital PCR, Bio-Rad



Future (2026)

- **Tape Station 4150 System**, Agilent
- **Megaruptor 3**, Diagenode





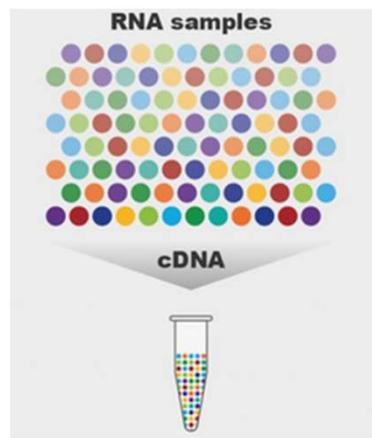
What we can offer

Experiment								
Test Group			Control Group					
T1	T1	T1	C1	C1	C1			
T2	T2	T2	C2	C2	C2			
T3	T3	T3	C3	C3	C3			
T4	T4	T4	C4	C4	C4			

Experiment design



DNA/RNA
extraction
and quality
assessment



Library preparation

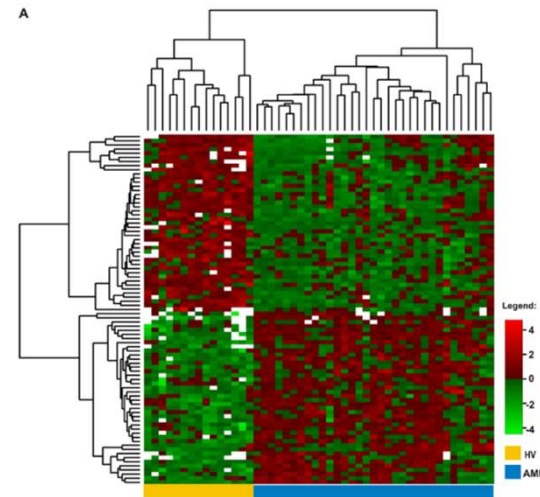
NGS



Sequencing



ATGACCAC
CCACATCTTT
TCTTTTATG
ATGATTAGA
AAGGACAAGA
GAATGCAAGG
Overlapping sequences
aligned by computer
ATGACCACATCTTTTATGATTAGAAATGCAAGGACAAGA



Data analysis
(recommended
collaboration with
the **Laboratory of
Bioinformatics**)

Team

Head

**Luiza Handschuh,
prof. ICHB PAN**



Wet lab

Magdalena Rakoczy, M.Sc.

Klementyna Marciniak, Ph.D.

Jan Podkowiński, Ph.D.

Małgorzata Marcinkowska-Swojak, Ph.D.

Bioinformatics

Weronika Litowczenko, Eng.

Paweł Wojciechowski, Ph.D.

Michał Nawrocki, M.Sc.

Contact

- lab.genomics@ibch.poznan.pl
- **Luiza Handschuh, int. tel. 1249**
luizahan@ibch.poznan.pl
- **Małgorzata Marcinkowska-Swojak, int. tel. 1202**
marcinkm@ibch.poznan.pl



Cell and Tissue Culture Laboratory

Natalia Koralewska

Operation areas

CELL CULTURE

Suspension and
adherent cultures

Biobanking

Cell engineering

Collection of cell lines

SAMPLE PROCESSING

Cryosectioning

H&E, IHC staining

Ultracentrifugation

High-performance
centrifugation

BIOIMAGING

Widefield microscopy
(Bright-field / Dark-field
/ Fluorescence)

Confocal microscopy

Super-resolution
microscopy (STED)

Nanoparticle Tracking
Analysis (NTA)

LABORATORY SUPPORT

Ultrapure water supply

Autoclaving

Labware washing

Biohazard waste
inactivation

Staff



Sylwia Biernacka-Nowak – lab support services, culture labs maintenance /CIES

Magdalena Puszczuk – lab support services, culture labs maintenance /main building

Aleksandra Błaszczak – technical supervision of culture labs /CIES

Marta Wojnicka – technical supervision of culture labs /main building

Ewelina Klupczyńska

Jarosław Lewandowski

Karolina Świtońska-Kurkowska

Natalia Koralewska

nataliak@ibch.poznan.pl

tel. int. 1505

room 126 CIES



Main building: 101A

CIES: 106, 122, 126

Animal cell and tissue cultures



- 9 BSL2 biosafety cabinets
- CO₂ and CO₂/O₂ incubators
- Orbital shakers for suspension cell culture
- 4°C/-20°C/-80°C/liquid nitrogen storage
- Centrifuges (refrigerated, preparatory)
- Microscopes (inverted, fluorescence)
- Automated cell counters (colorimetric/trypan blue, fluorescence/RFP, GFP, Cy5, DAPI)
- Collection of human, mammalian, and insect cell lines

Animal cell and tissue cultures



- 9 BSL2 biosafety cabinets



- CO₂ and CO₂/O₂ incubators
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- Collection of human, mammalian, and insect cell lines

Nucleofection

- Improved electroporation technology
- Efficient transfection of hard-to-transfect cells
- A wide range of substrates
- Applications: overexpression studies, cell reprogramming, RNAi screening, CRISPR/Cas9 genome editing
- For cells in suspension (X unit) or adherent (Y unit)
- 100 μ L cuvettes or 20 μ L 16-well strips (X Unit)
- 24-well culture plates (Y Unit)



Sample preparation

Cryosectioning

CryoStar NX70 cryostat
Section thickness setting from 0,5 up to 500 μm
Fast freezing down to -60°C
Ergonomic design allows user to work in either a standing or sitting position



High-performance centrifugation

Optima XPN-80, XPN-100 ultracentrifuges
(TY-70.1Ti, SW-32.1Ti)
Avanti JXN-26 high-speed centrifuge
(JA-30.50, JLA-8.1)



Sample preparation

Cryosectioning

CryoStar NX70 cryostat
Section thickness setting from 0,5 up to 500 μm
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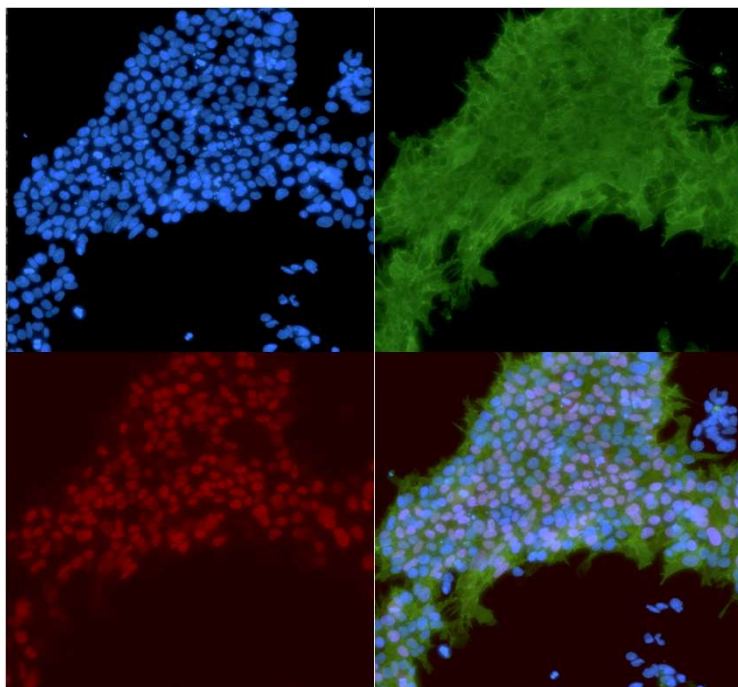


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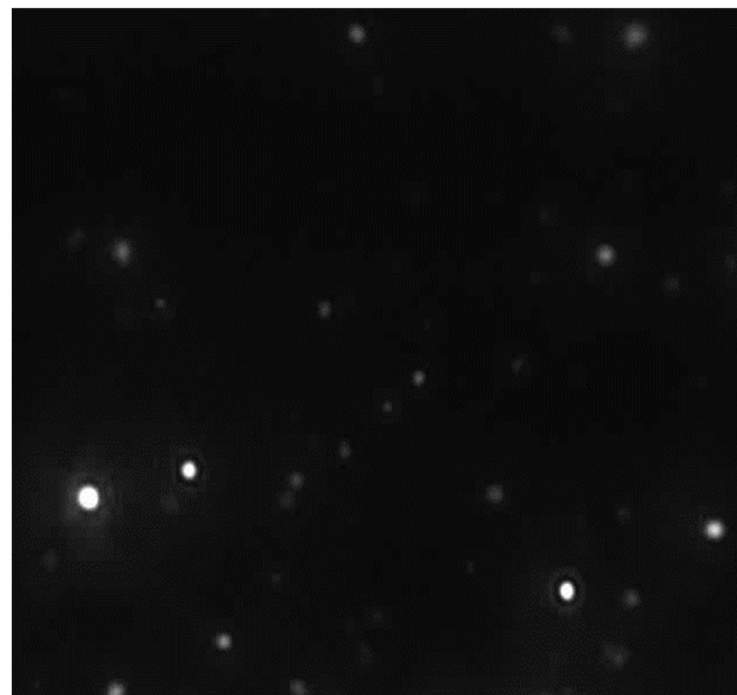


Bioimaging



Microscopy

-121 CIES



Nanoparticle Tracking Analysis

119 CIES

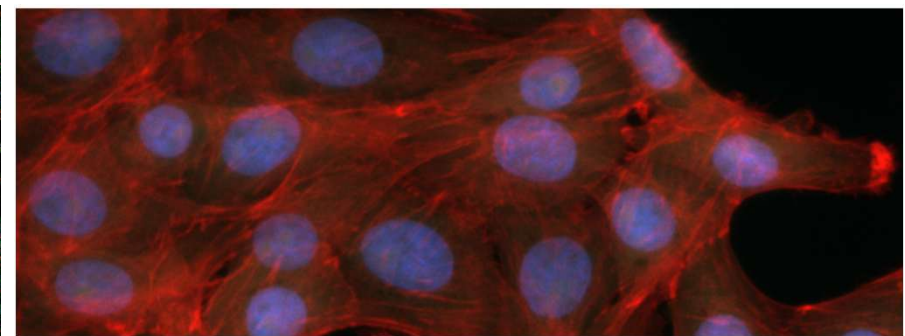
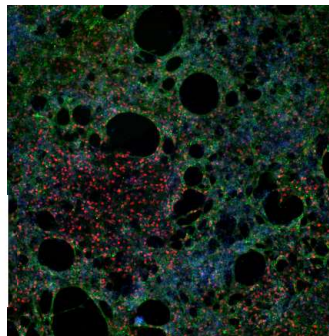
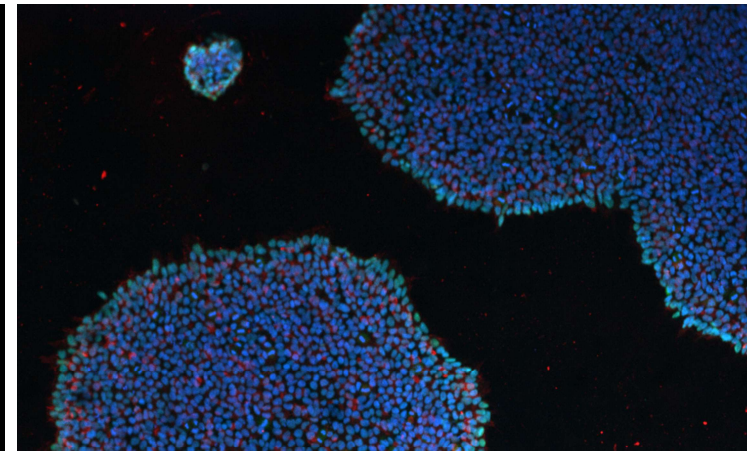
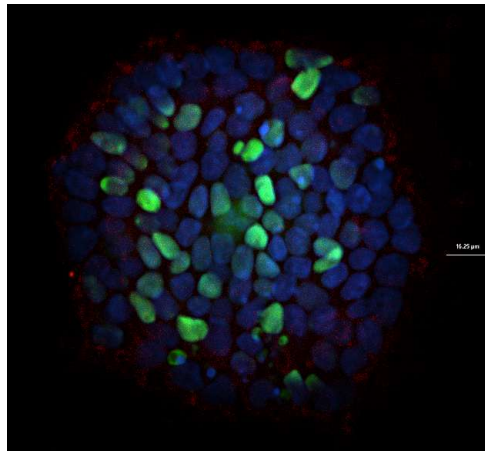
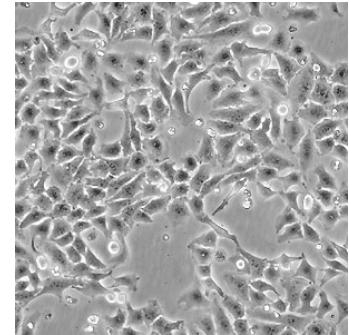
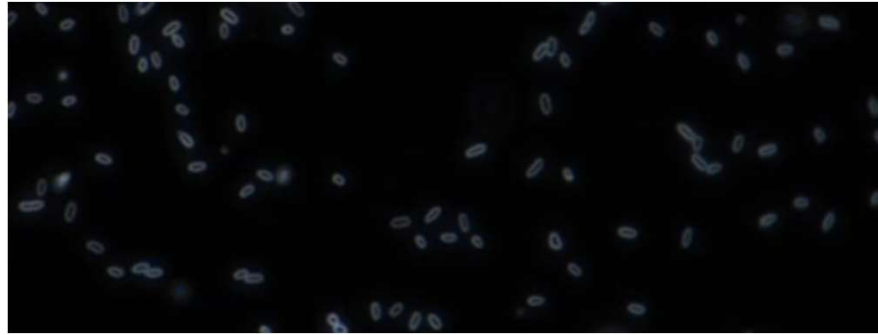
Microscopy

 Dark-field label-free imaging of transparent samples (bacteria!) & nanomaterials

 FURA-2 real-time functional imaging of Ca^{2+} dynamics

 Spinning-disk high-speed confocal imaging with ultra-low phototoxicity

 STED super-resolution imaging of nanoscale sub-cellular structures (<40 nm)



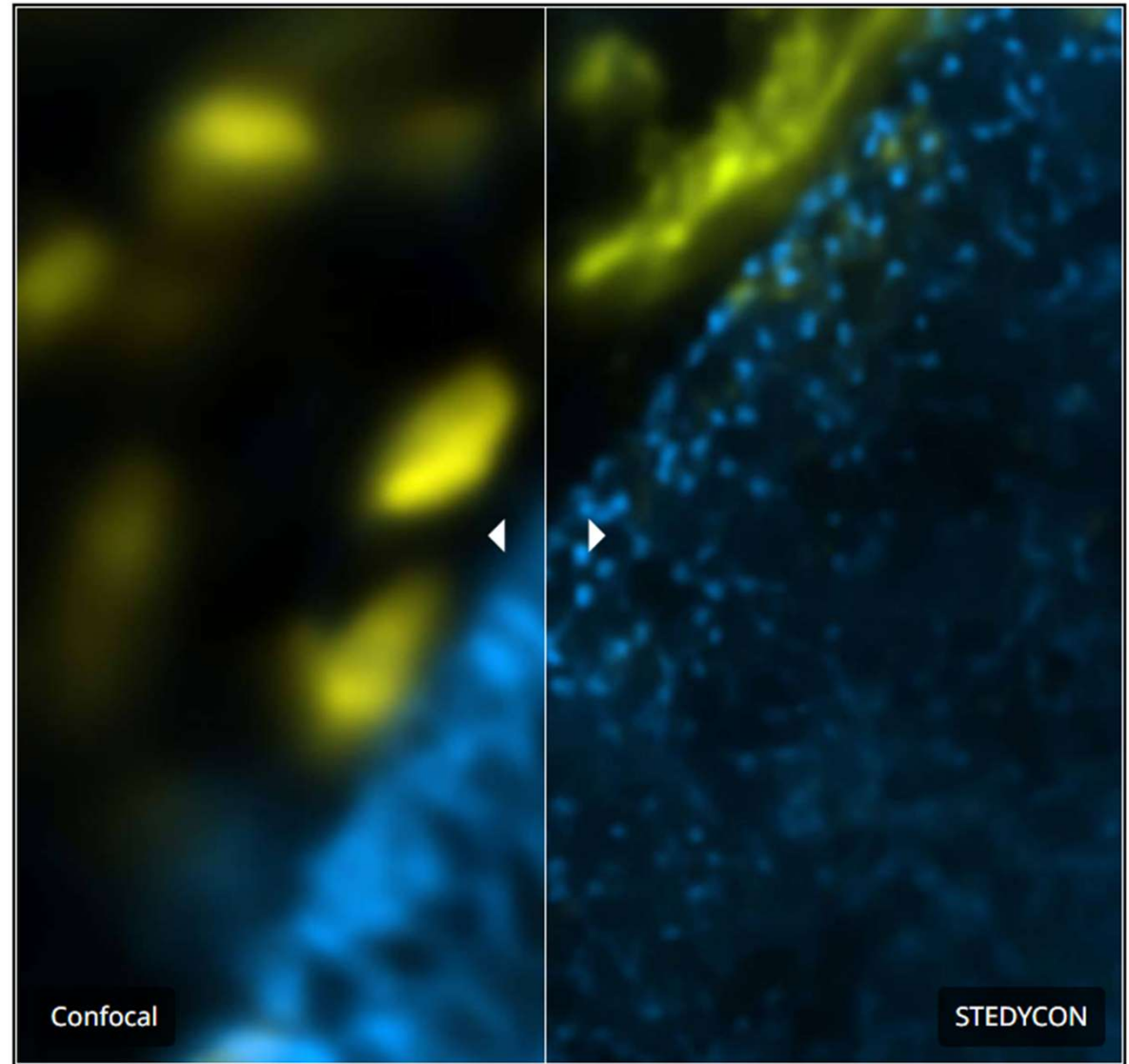
Microscopy

 **Dark-field** label-free imaging of transparent samples (bacteria!) & nanomaterials

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Nuclear pores and Golgi apparatus

Source: Nikon

Microscopy

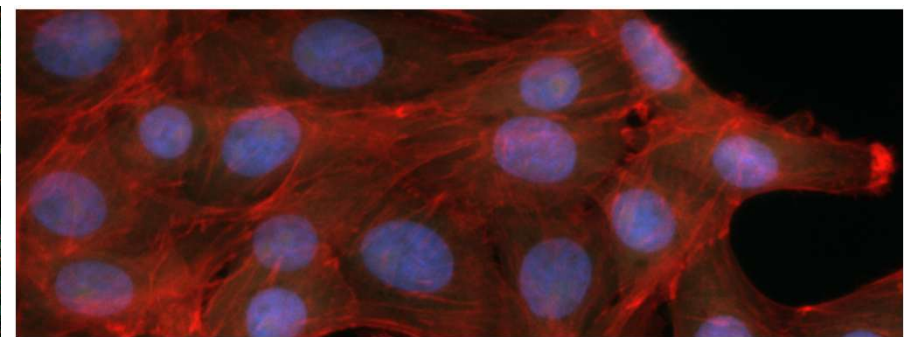
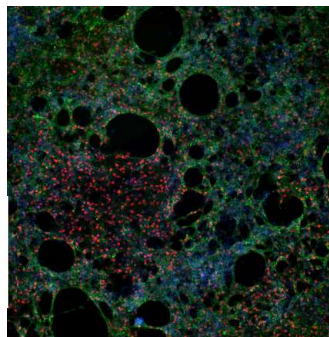
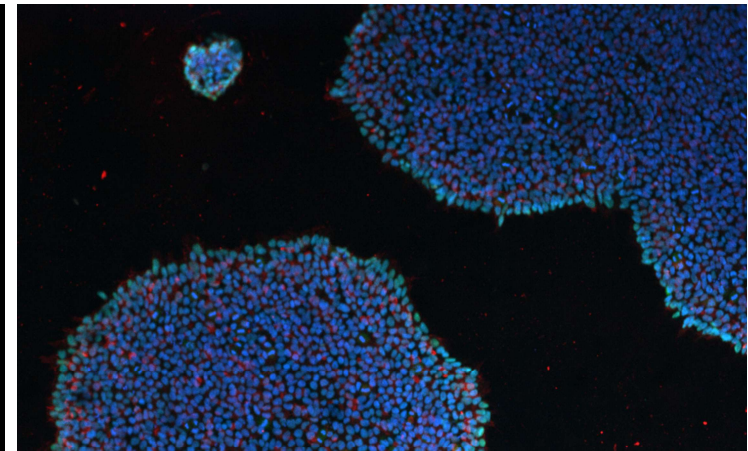
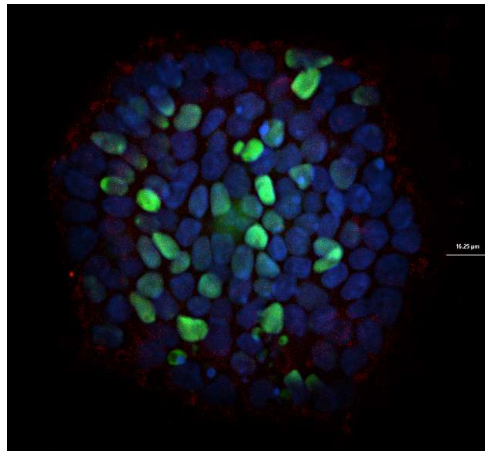
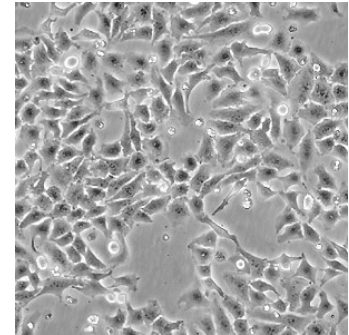
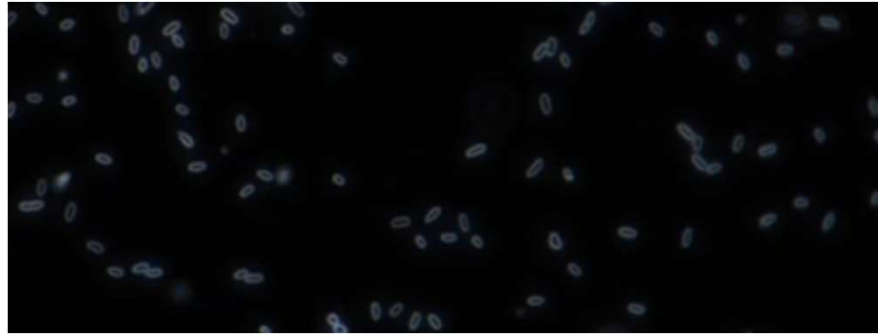


 **Dark-field** label-free imaging of transparent samples (bacteria!) & nanomaterials

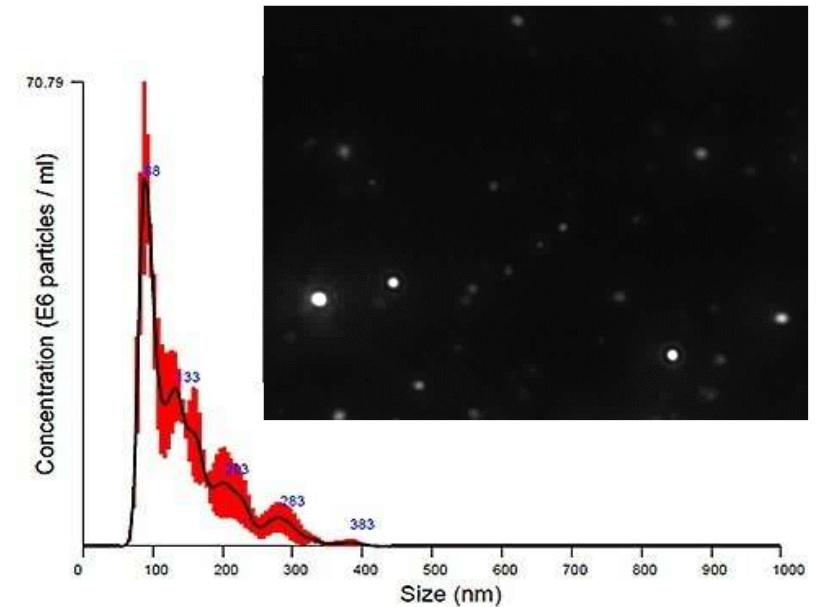
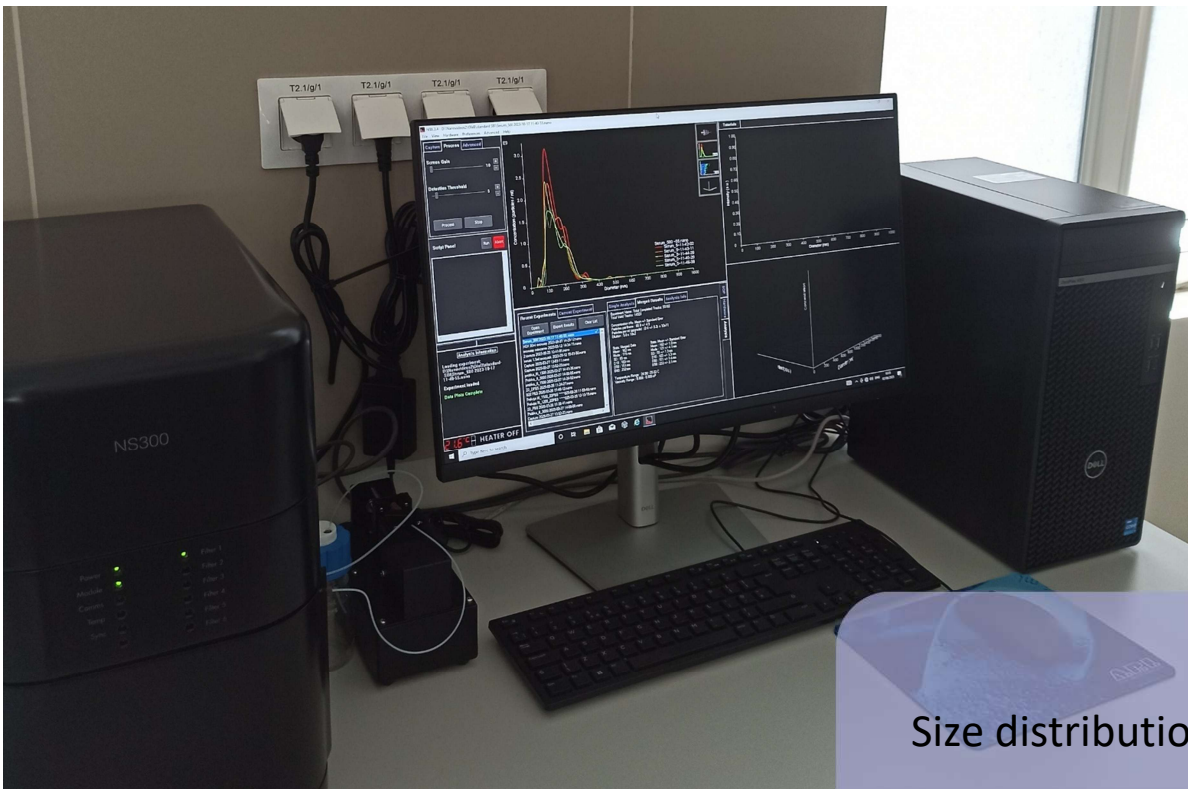
 **FURA-2** real-time functional imaging of Ca^{2+} dynamics

 **Spinning-disk** high-speed confocal imaging with ultra-low phototoxicity

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Nanoparticle Tracking Analysis

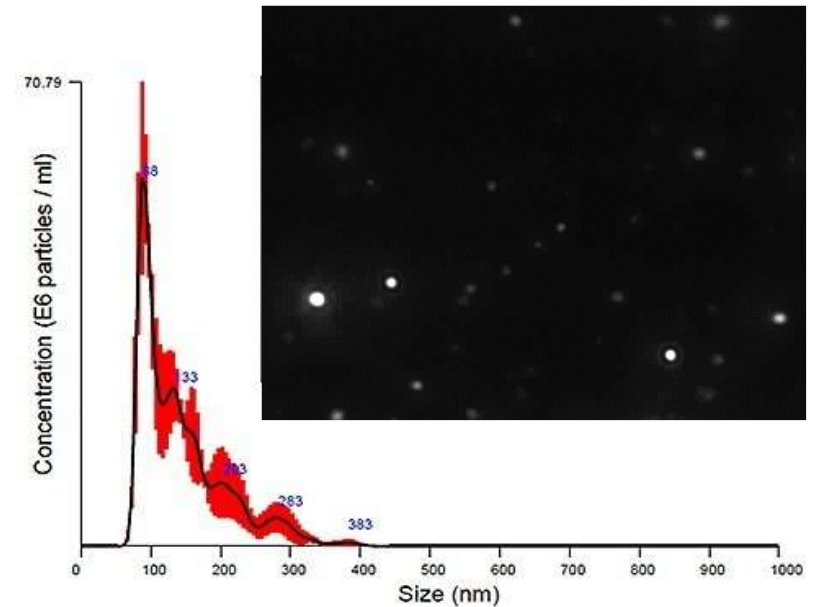
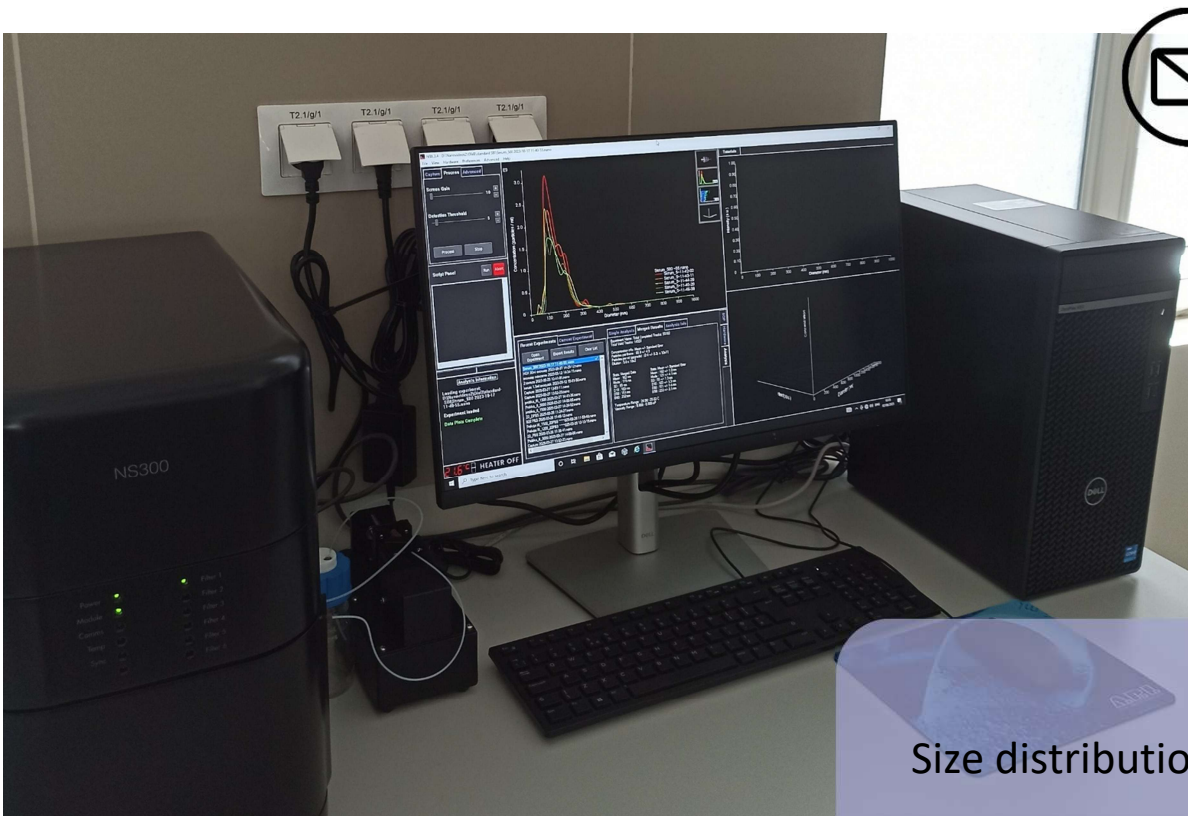


Malvern Panalytical NS300 (488 nm, 532 nm)

Size distribution and concentration of nanoparticles (10-2000 nm)

Applications: EVs, VLPs, nanoplastic analysis, viral titer determination, aggregation tests

Nanoparticle Tracking Analysis



Malvern Panalytical NS300 (488 nm, 532 nm)

Size distribution and concentration of nanoparticles (10-2000 nm)

Applications: EVs, VLP, nanoplastic analysis, viral titer determination, aggregation tests

Laboratory support

- Centralized services for dishwashing and autoclaving
- Sterilization of glassware, plastic consumables, media and buffers
- Ultrapure water supply
- Processing and disposal of hazardous biological waste materials

101A, -124 CIES



Terms of access

DIRECT ACCESS

independent use of our
infrastructure

after mandatory training

RESEARCH SERVICE

on-demand sample
preparation, processing
and analysis performed
by our staff

laboratory support
services

SCIENTIFIC COLLAB

joint projects requiring
significant intellectual
input, protocol
development, and
experimental design

Terms of access

Trained users are free to operate independently in the cell culture laboratories by reserving time through the IBCH PAS booking system.

Reservations for selected equipment are mandatory prior to use. Reservations must be made for the entire time the equipment is used.

Access to bioimaging infrastructure scheduled based on request forms.

<https://reservation.ibch.poznan.pl/>

Terms of access

Free of charge

- Equipment & cell culture training
- Consultations & experimental design support

Tier 1: Laboratory support services

- No direct fees
- Include us in your quarterly grant declarations for Laboratories involvement

Tier 2: Direct access (e.g. cell culture & biobanking)

- Quarterly grant declaration
- Participation in bulk consumables (CO₂, LN₂)

Tier 3: Custom services & collaborations

- Individual pricing

Terms of access

Please remember to include an acknowledgment of the Cell and Tissue Culture Laboratory in your publications.

Example:

Cell cultures were performed using the infrastructure of the Cell and Tissue Culture Laboratory (IBCH PAS), which is part of the European Centre for Bioinformatics and Genomics (ECBiG) consortium, included in the Polish Roadmap for Research Infrastructures, and supported by the Ministry of Science and Higher Education through the SPUB (Special Research Facility) grant.

Contact & More information

Natalia Koralewska
nataliak@ibch.poznan.pl
tel. int. 1505
room 126 CIES



portal.ichb.pl/cell-and-tissue-culture-laboratory/



Laboratory of Plant Breeding

Head of Laboratory: Dr. Aleksandra Pawela

Stuff of Laboratory:



Dr. Paweł Stróżycki



Dr. Mariola Piślewska-Bednarek

Magdalena Puszczuk

Mgr inż. Sylwia Biernacka - Nowak

Research Projects Supported by the Laboratory Infrastructure in 2025:

- 2019/35/B/NZ1/03731 – PI: prof. dr hab. Paweł Bednarek
- 2020/39/B/NZ9/00784 - PI: prof. dr hab. Michał Jasiński
- 2020/39/B/NZ2/03426 - PI: prof. dr hab. Paweł Bednarek
- 2021/43/B/NZ3/00672 - PI: dr hab. Joanna Banasiak
- 2022/45/B/NZ9/03572 - PI: dr hab. Anna Piasecka
- 2022/47/B/NZ9/00443 - PI: prof. dr hab. Michał Jasiński
- 2022/47/B/NZ9/01440 - PI: dr hab. Agata Tyczewska
- 2023/51/D/NZ9/00883 - PI: dr Wanda Biała-Leonhard
- IZ11Z0_230926 - PI: prof. dr hab. Michał Jasiński

Research Publications - 2025

- Tomasz Jamruszka, Joanna Banasiak, **Aleksandra Pawela**, Karolina Jarzyniak, Jian Xia, Wanda Biała-Leonhard, Lenka Plačková, Tashi Tsering, Francesca Romana Iacobini, Ondřej Novák, Markus M. Geisler, Michał Jasiński. MtABCG40 is a Cytokinin Transporter that Limits Lateral Root Density and Nodule Formation in *Medicago truncatula*. The Plant Journal, 2025, 124(5):e70622.
<http://dx.doi.org/10.1111/tpj.70622>
- Björn Sabelleck, Matthias Freh, Meltem Lammertz, Jennifer Browatzki, Anna-Maria Vllaho, **Mariola Piślewska-Bednarek**, Paweł Bednarek, Ralph Panstruga. Thiamine is a vitamin for plant-pathogenic powdery mildew fungi. iScience, 2025, 28(8):113123. <https://doi.org/10.1016/j.isci.2025.113123>

Infrastructure - Phytotron Complex

- 3 walk-in growth chambers
- Preparation room
- Water filtration system



Infrastructure – additional Plant Growth Facilities



- 4 Plant growth chamber
- Greenhouse

Infrastructure – *in vitro* Culture Facilities



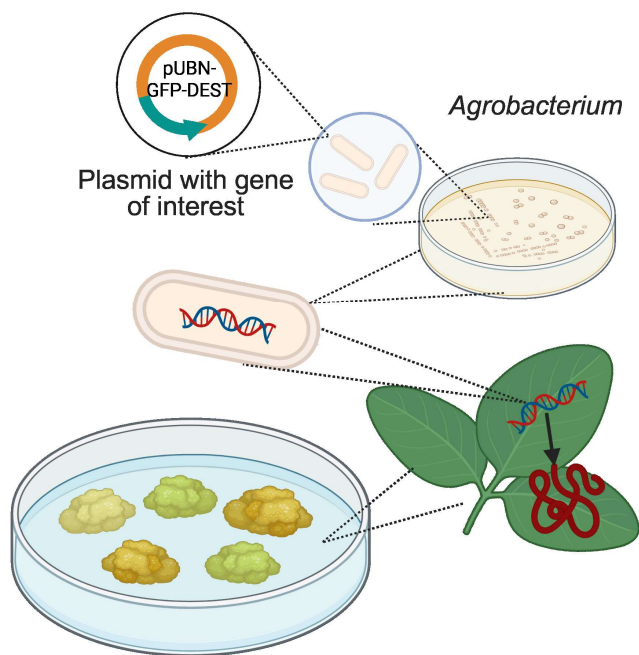
- 2 laminar airflow cabinets
- 2 growth rooms (light and dark)



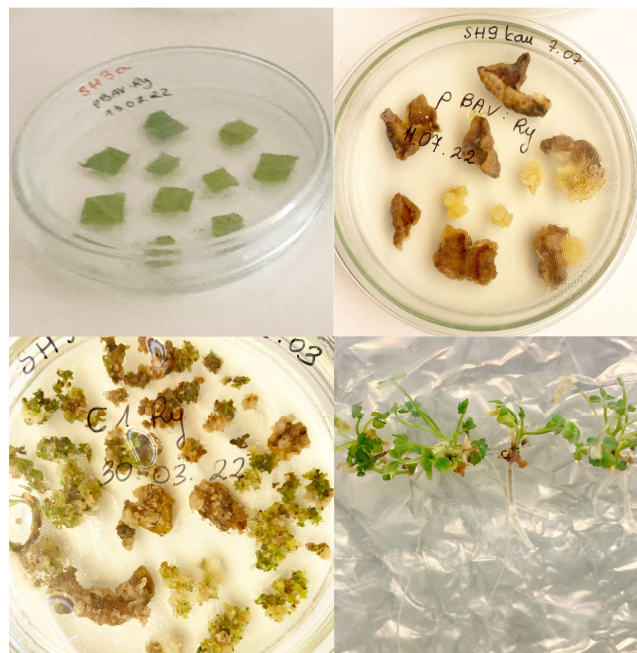
Automated system for sterilization and dispensing of culture media, Mediacleve10 (INTEGRA Biosciences)

Research Scope

Plant transformation and transformants selection



Medicago truncatula transformation via *Agrobacterium tumefaciens*

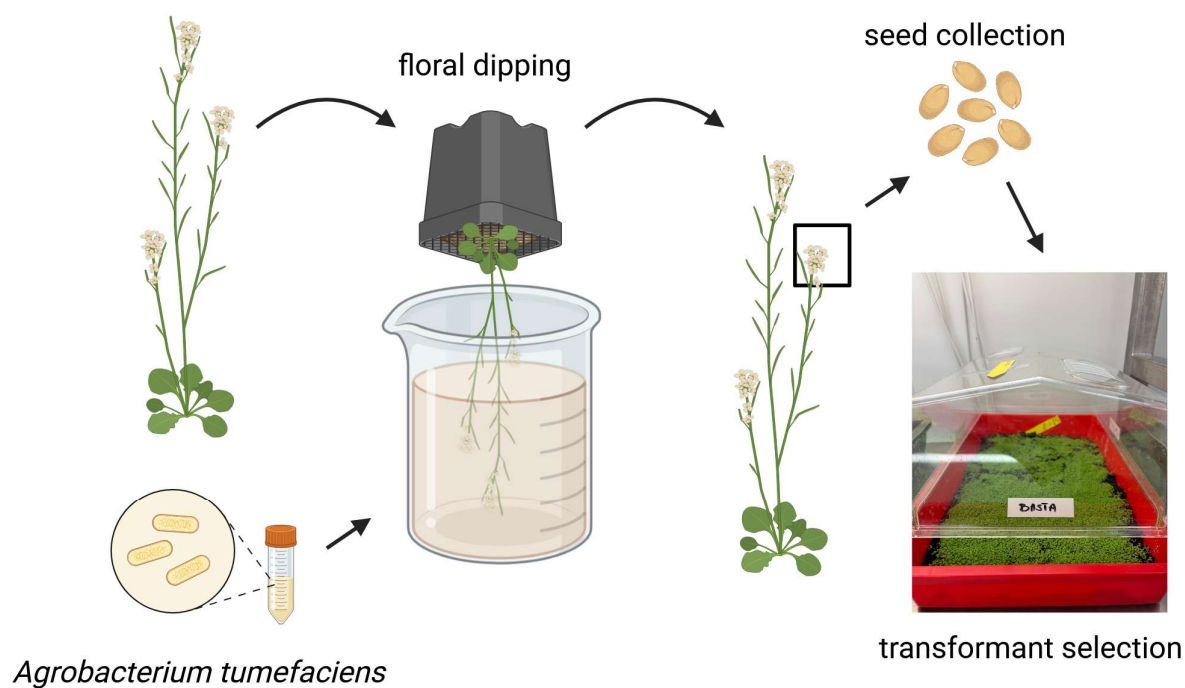


Medicago truncatula transformation via *Agrobacterium rhizogenes*



Research Scope

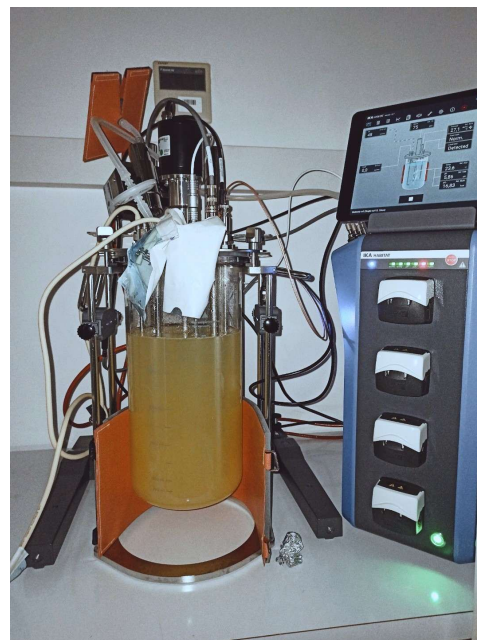
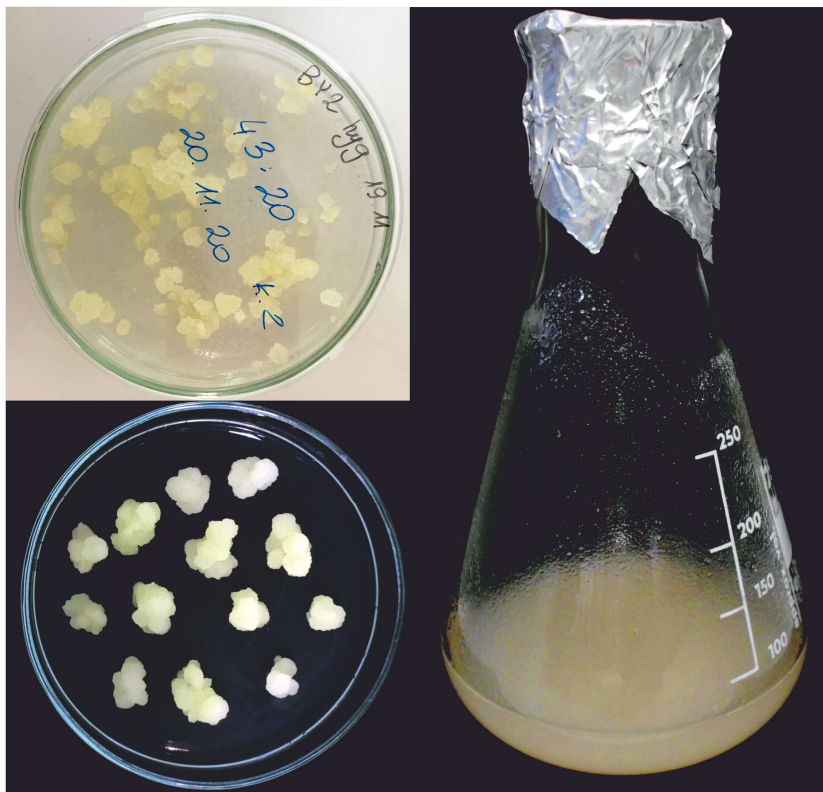
Agrobacterium-mediated transformation of *Arabidopsis thaliana* by the floral dip method



Biolistic cell transfection system PDS-1000/He Biolistic System (Bio-Rad)

Research Scope

Transformation of *Nicotiana tabacum* By2 callus cells
via *Agrobacterium tumefaciens*



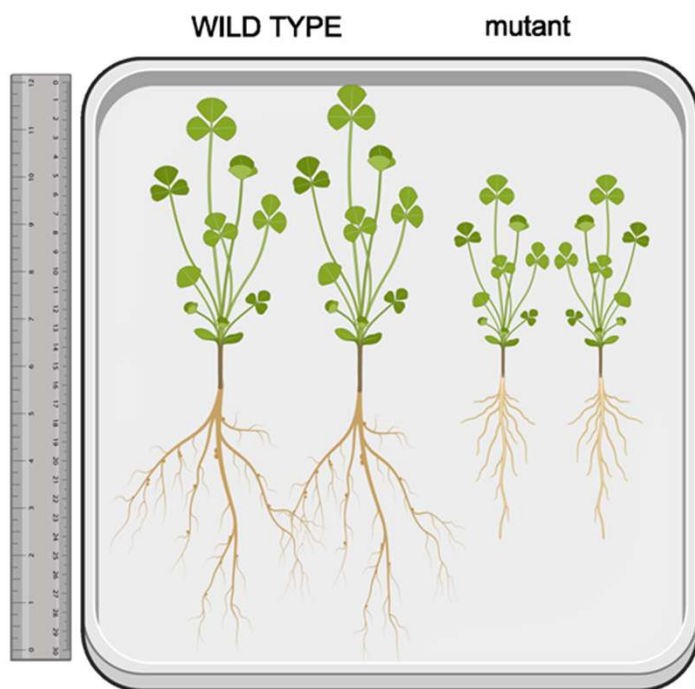
Habitat Cell SW5 bioreactor
(IKA Poland)



Eppendorf™ Centrifuge 5804 R

Research Scope

Phenotypic analysis



Analytical balance with antistatic ionizer, Cubis MCA125P-2S00-I (Sartorius)



Leica M205 FA fluorescence microscope. The microscope is equipped with a Leica DFC450C camera and GFP LP filters (excitation filter: 480/40 nm; barrier filter: 510/∞ nm), DSR ET filters (excitation filter: 545/30 nm; barrier filter: 620/60 nm)

Contact:

website: <https://portal.ichb.pl/laboratory-of-plant-breeding/>

email: apawela@ibch.poznan.pl

Thank you for your attention!

LABORATORY OF BIOINFORMATICS



INSTITUTE OF BIOORGANIC CHEMISTRY

Polish Academy of Sciences

www.ich.pw.edu.pl

STRUCTURE

IBCH PAS

Department of Molecular Genetics

Prof. Piotr Kozłowski

Laboratory of Bioinformatics (2020)

B building, 2nd floor
Room 207 & 208

Equipment

- Computer



Equipment

- Computer
- Poznań Supercomputing and Networking Center – powerfull server



Equipment

- Computer
- Poznań Supercomputing and Networking Center – powerfull server
- **People, our know-how, skills, and experience**



OUR TEAM

Dr hab. Anna Philips, prof. IBCH PAS

- Head of Laboratory

- MSc. in Computer Science (Applied Computer Science)
- Ph.D. in Biology (Bioinformatics)
- In IBCH PAS from 2014



Dr hab. Natalia Szóstak

- MSc. in Biology (Bioinformatics)
- Ph.D. in Computer Science (Bioinformatics)
- In IBCH PAS from 2020



Dr Arkadiusz Kajdasz

- MSc. in Biology (Molecular Biology)
- Ph.D. in Biology (Molecular Genetics)
- In IBCH PAS from 2021
(in Bioinformatics Lab 2023)

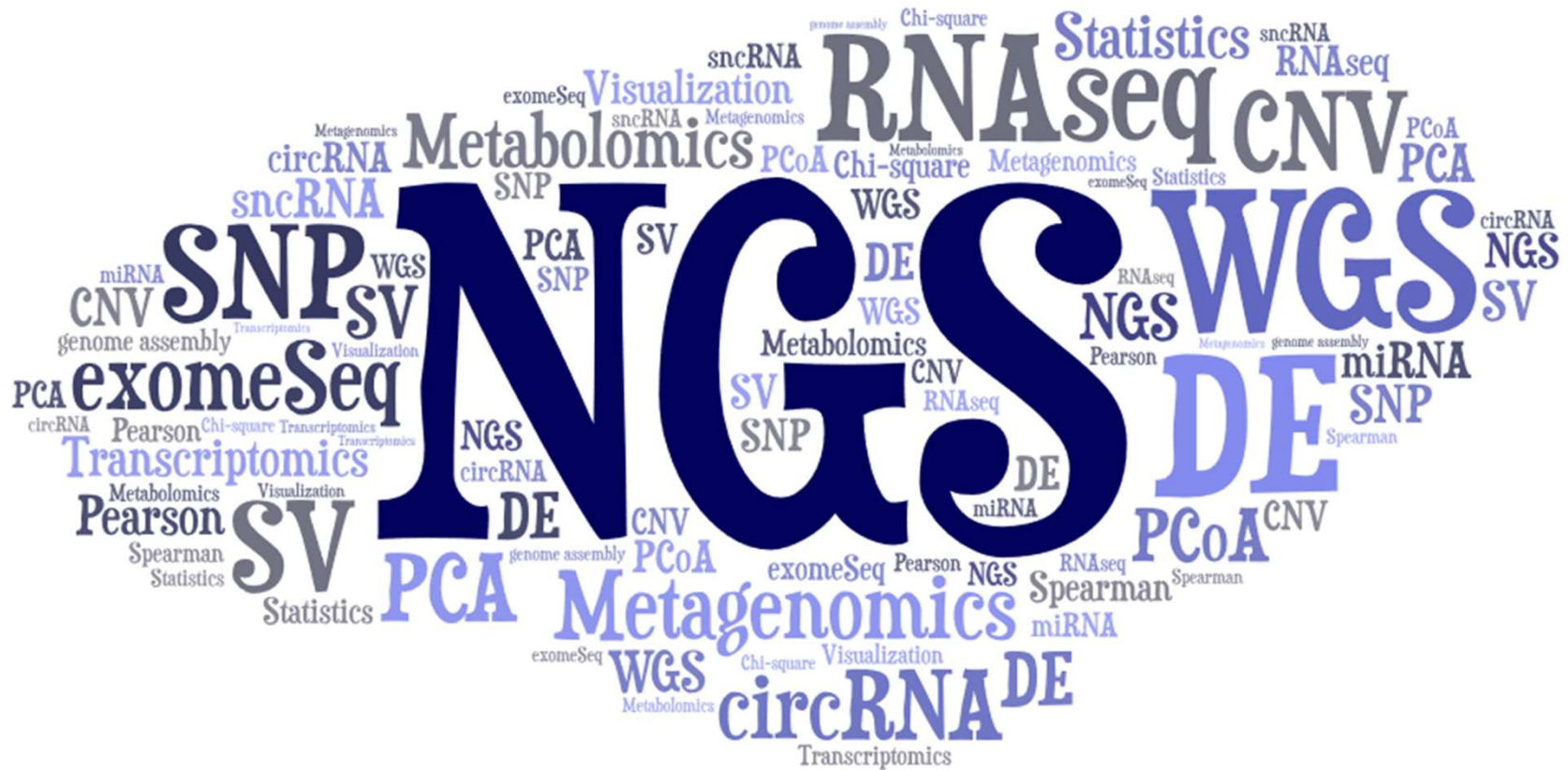


Maciej Michalczyk, Ph.D. Student

- MSc. In Biology (Bioinformatics)
- In IBCH PAS from 2023



WHAT WE DO



Homemade SCRIPTS

JOURNAL ARTICLE

LINE-1 mRNA 3' end dynamics shape its biology and retrotransposition potential

Damian M Janecki, Raneet Sen, Natalia Szóstak, Arkadiusz Kajdasz, Martyna Kordyś, Kinga Plawgo, Dmytro Pandakov, Anna Philips, Zbigniew Warkocki ✉ Author Notes

Nucleic Acids Research, Volume 52, Issue 6, 12 April 2024, Pages 3327–3345,

<https://doi.org/10.1093/nar/gkad1251>

Published: 09 January 2024 Article history ▼

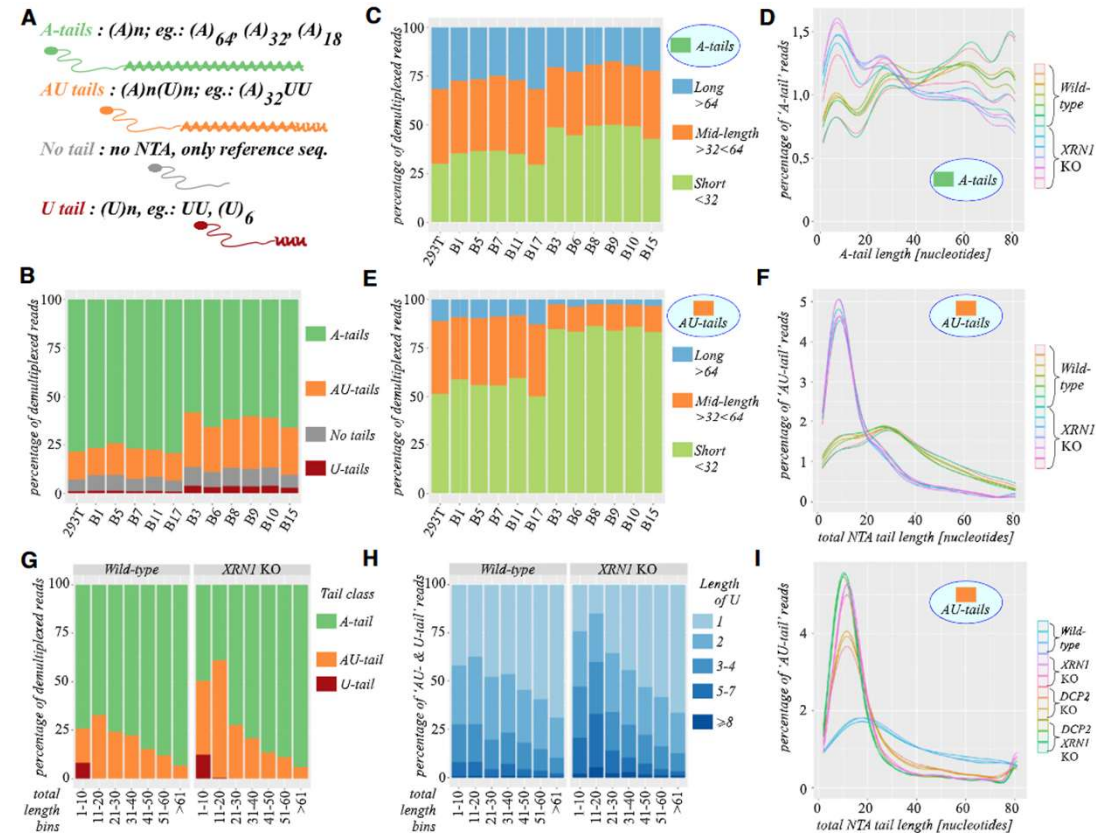


Figure 5. High-throughput 3' RACE-seq of L1 reporter mRNA 3' ends.

RESEARCH ARTICLE | GENETICS

miRNA gene mutations commonly disrupt the proper functioning of miRNA genes

MAGDALENA MACHOWSKA , NATALIA SZOSTAK , ADRIAN TIRE , WLADYSLAW WEGOREK, MALWINA SUSZYNSKA , ARKADIUSZ KAJDASZ .

PAULINA GALKA-MARCINIAK , ANNA PHILIPS , AND PIOTR KOZŁOWSKI [Authors Info & Affiliations](#)

SCIENCE ADVANCES • 18 Feb 2026 • Vol 12, Issue 8

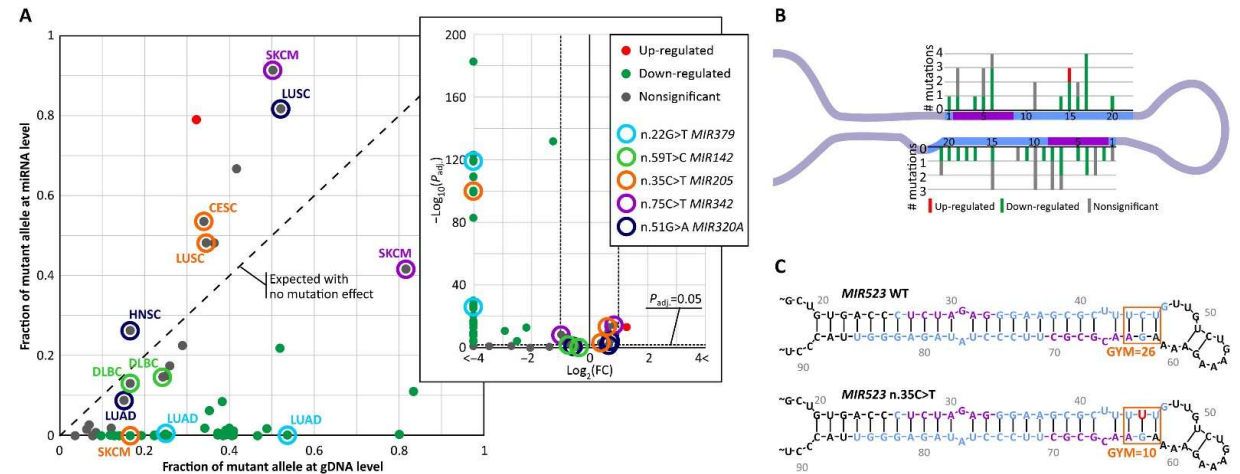


Fig. 2. Effects of miRNA gene mutations on miRNA levels (Experiment_1).

JOURNAL ARTICLE

Malwina Suszynska, Magdalena Machowska, Eliza Fraszczyk, Maciej Michalczyk, Anna Philips, Paulina Galka-Marciniak, Piotr Kozlowski ✉ Author Notes

<https://doi.org/10.1093/nar/gkae017>

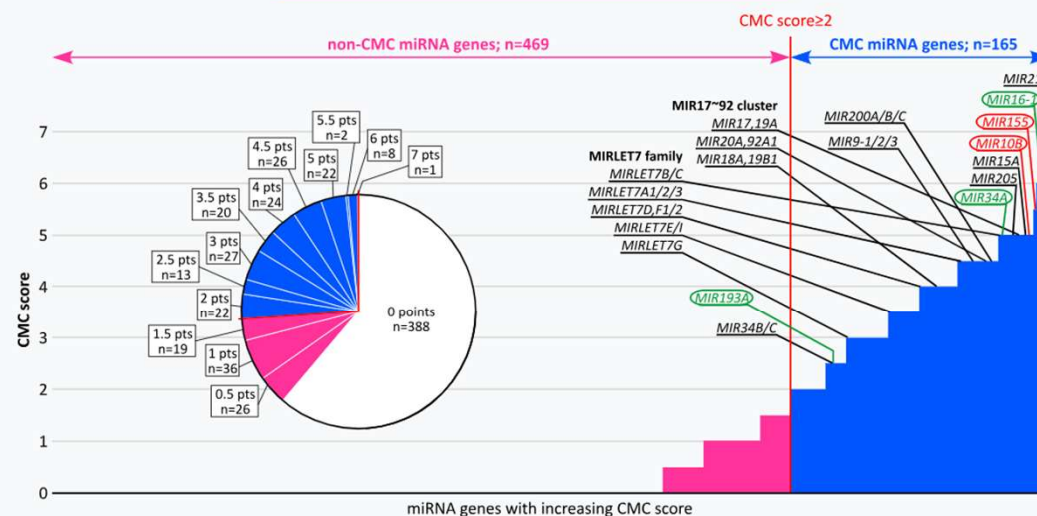
Published: 23 January 2024 Article history ▼



Version 1.0 beta ▾

- a list of cancer-related miRNA genes

Search



GENOMICS

Animal Genetics

RESEARCH ARTICLE

Evidence That *GYP*A (Glycophorin A) Encodes the K Blood Group System in Horses

Mariusz Mackowski¹ | Arkadiusz Kajdasz² | Kaja Laskowska¹ | Jakub Cieslak¹ 

¹Department of Genetics and Animal Breeding, Poznań University of Life Sciences, Poznań, Poland | ²Laboratory of Bioinformatics, Institute of Bioorganic Chemistry, Polish Academy of Sciences, Poznań, Poland

Correspondence: Jakub Cieslak (jakub.cieslak@up.poznan.pl)

Received: 31 October 2025 | Revised: 13 February 2026 | Accepted: 23 February 2026

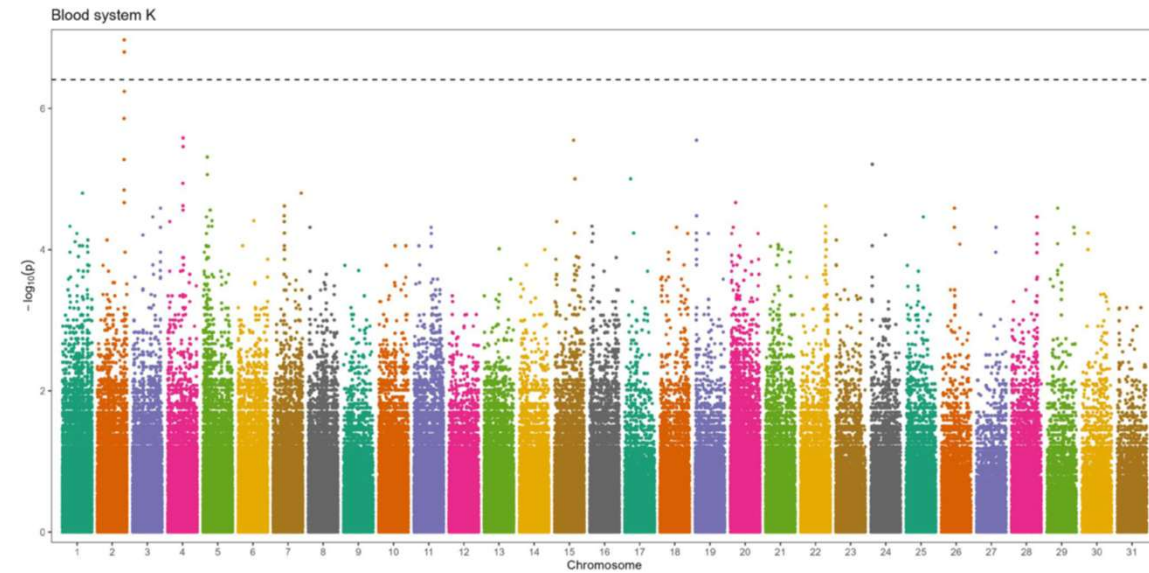


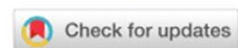
FIGURE 1 | Manhattan plot showing the association between SNPs and serological results of blood group K typing

METAGENOMICS

RESEARCH ARTICLES | APRIL 02 2024

Gut Mycobiota Dysbiosis Is Associated with Melanoma and Response to Anti-PD-1 Therapy

Natalia Szóstak ; Luiza Handschuh ; Anna Samelak-Czajka ; Katarzyna Tomela ; Bernadeta Pietrzak ; Marcin Schmidt ; Łukasz Galus ; Jacek Mackiewicz ; Andrzej Mackiewicz ; Piotr Kozłowski ; Anna Philips



+ Author & Article Information

Cancer Immunol Res (2024) 12 (4): 427–439.

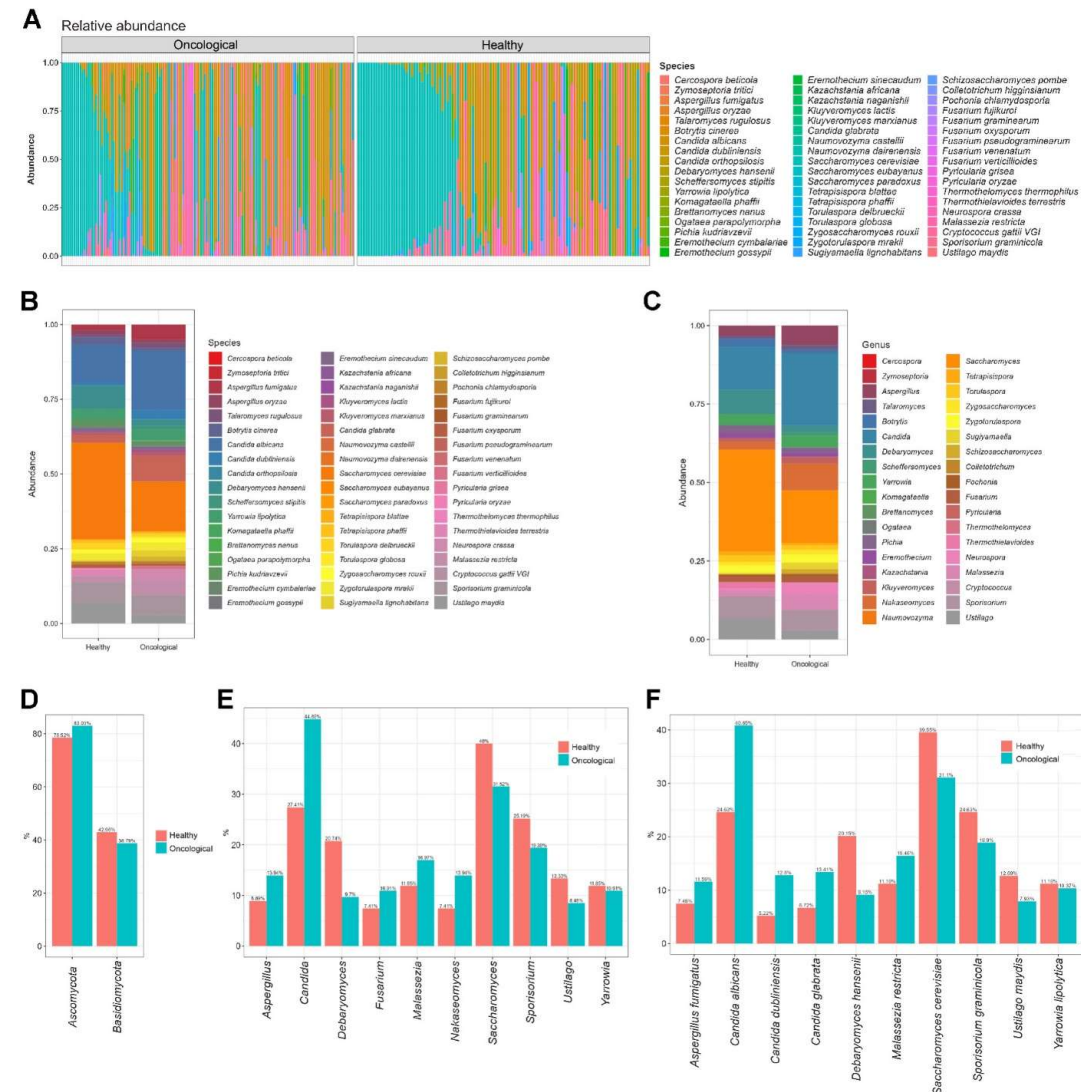
<https://doi.org/10.1158/2326-6066.CIR-23-0592> Article history 

Fig. 2. Baseline gut mycobiota characteristics of melanoma and healthy subjects

OTHERS....

- RNA-Seq
 - Gene expression
 - RNA isoforms
 - RIBO-Seq, CLIP-Seq, etc.
 - Single cell RNA-Seq
- Clinical data
 - From whole genome, exome or transcriptome sequencing of patients
 - Pathogenic genetic variants
 - Somatic mutations in cancer
 - Potential therapeutic targets
- Statistics
- Data mining
- Big data analyses
- Web services
- Non-standard analyses
- ... Or standard, but not popular

HOW TO COLABORATE WITH US

1. Talk to us
2. Indicate on the quarterly reports that you use our resources

LABORATORY OF BIOINFORMATICS





INSTITUTE OF BIOORGANIC CHEMISTRY
Polish Academy of Sciences

Laboratory of Invertebrate Model Organisms

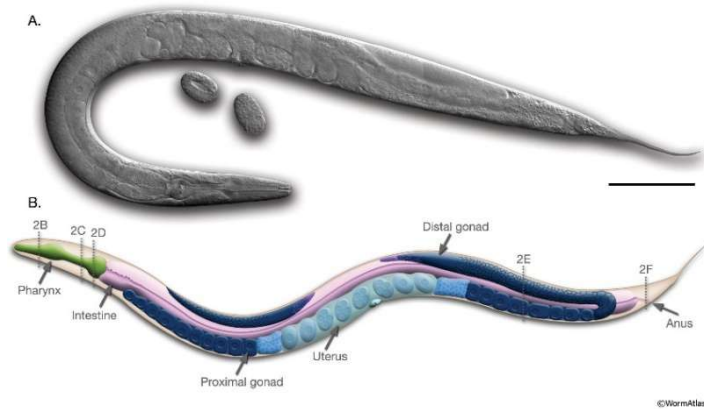
Head: Agata Tyczewska

lab.model.invertebrate@ibch.poznan.pl

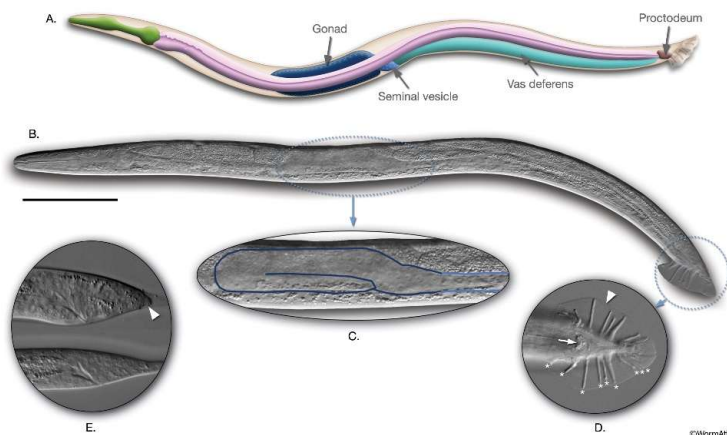
agatat@ibch.poznan.pl

26 March 2026

Caenorhabditis elegans



Anatomy of an adult hermaphrodite (source: WormAtlas).



C. elegans male (source: WormAtlas).

- The life cycle - 2 to 3 weeks, 4 larval stages before reaching maturity.
 - Two sexes: male and hermaphrodite. Males arise infrequently (0.1%), at higher frequency (up to 50%) through mating.
 - Self-fertilization of the hermaphrodite allows for homozygous worms to generate genetically identical progeny, and male mating facilitates the isolation and maintenance of mutant strains as well as moving mutations between strains.
- !!! Ability to self-fertilize is a useful tool because hermaphrodites can reproduce quickly in high numbers.

Key Benefits of the Worm



*Complete genome
sequence published in
1998*



*Tiny size ~**1mm***



***Transparent**
& Easy to Study*



*Grown on **E. coli** plates
(cheap, large number)*



***Genetic Tools & Mutants**
Gene Knockouts &
Transgenics*



Frozen & Revived



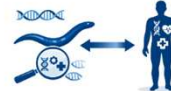
*High Genetic Homology
60-80% with Humans*



***300 Eggs** per Worm*



*Short Lifespan
18-21 Days*



*Model for **Human**
Diseases*

Caenorhabditis elegans - resources

In House Resources



RNAi Library *Ahringer*

16,757 Clones
Exons + Intron
500 bp - 2.5 kb



RNAi Library *Vidal (ORFeome)*

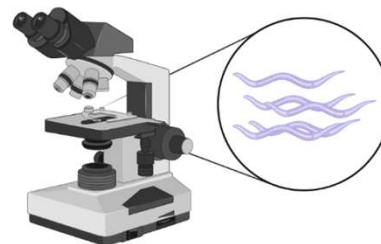
11,511 Clones
~55% Genes



Strains Collection

~2,000 strains
(more in CGC -
Caenorhabditis
Genetics Center)

Caenorhabditis elegans



Online Resources



WormBook

Protocols & Reviews



WormBase

Gene Info
& Genome Browser



WormAtlas

Neuron & Tissue Atlas



NEXTDB / BCGSC

Expression Patterns

Genetic Toolbox: forward genetics, RNAi knockdown, transgenesis, CRISPR editing, fluorescent reporters, optogenetics, bioinformatics resources

Caenorhabditis elegans – model organism



- Longevity and Aging
- Infection model for a variety of bacterial and fungal pathogens
- Trinucleotide Repeat Diseases
- Obesity
- Biomedical and Environmental Toxicology
- Neurotoxic and Behavioral effects of various compounds
- Microbiome Research
- Parkinson's disease
- Duchenne Muscular Dystrophy
- Neural Development due to the availability of a comprehensive connectivity map, and only 302 neurons and ~7000 synapses.
- Mitochondrial Diseases
- Immunology
- Environmental Epigenetics

Caenorhabditis elegans – model organism



- Longevity and Aging (K. Grzywacz, A. Tyczewska)
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Aging and Longevity Research

C. elegans is one of the most powerful **aging models** available.

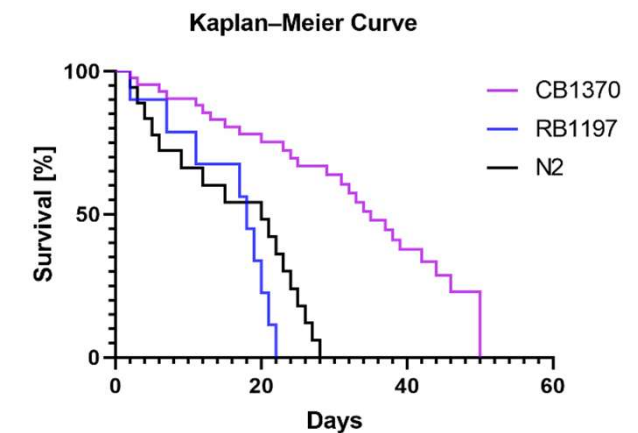
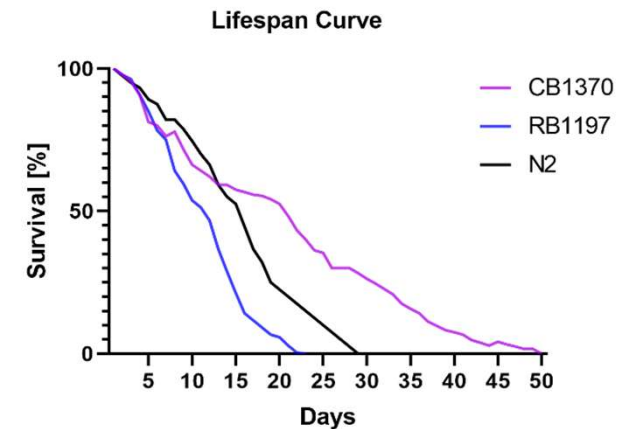
Mutations in the insulin receptor homolog, *daf-2*, can double lifespan.

The insulin, mTOR, AMPK, and sirtuin pathways that regulate mammalian aging are conserved in worms.

Because lifespan is only weeks, we can **test pro-longevity interventions** rapidly and reproducibly.

We can measure:

- ✓ Lifespan
- ✓ Healthspan (locomotion (movement speed), pharyngeal pumping (feeding activity), reproduction, stress resistance, mitochondrial function, resistance to protein aggregation, tissue integrity)
- ✓ Proteostasis
- ✓ Autophagy
- ✓ Stress resistance
- ✓ Mitochondrial function



Caenorhabditis elegans – model organism



- Longevity and Aging (K. Grzywacz, A. Tyczeńska)
- Infection model for a variety of bacterial and fungal pathogens (K. Brzeziński)
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Infection Biology and Host–Pathogen Interactions

C. elegans is a **robust infection model** for many clinically relevant pathogens, including *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Salmonella*, *Enterococcus*, *Candida albicans*, *Cryptococcus neoformans*.

Although it lacks adaptive immunity, it possesses highly conserved innate immune pathways, including p38 MAP kinase signaling, insulin signaling, TGF- β , antimicrobial peptides, and ROS defense.

Infection can be monitored through survival assays, fluorescent pathogen colonization, and immune reporter activation. There is a multitude of mutant strains available (from CGC).

This system enables **screening** for antibiotics, anti-virulence compounds and host-directed therapies, and immunomodulators.

We can simultaneously evaluate pathogen virulence, host survival and response, and immune activation, drug efficacy, and toxicity in a single organism.

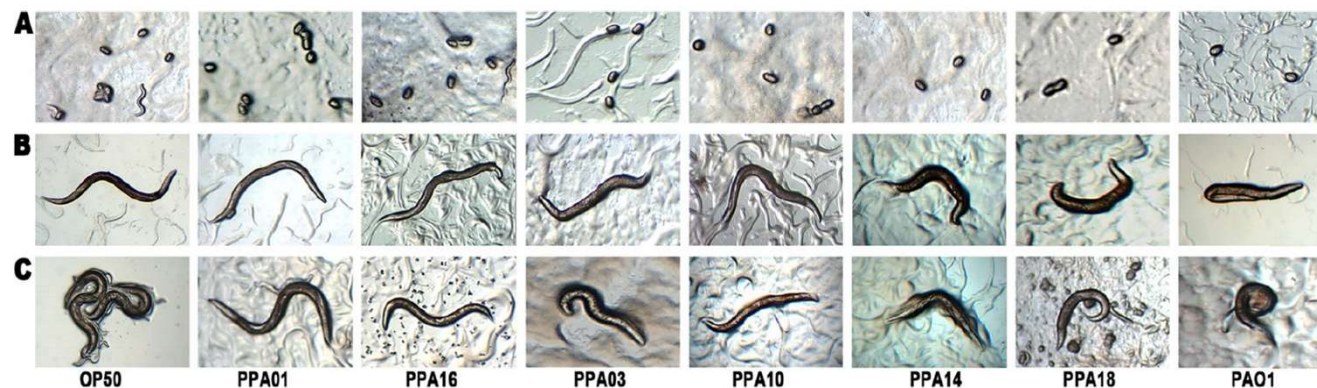


Fig. Impact of selected strains of plant-associated *P. aeruginosa* on *C. elegans*. A. egg laying B. paralysis C. mortality (Ambreetha and Balachandar 2022, BMC Microbiology)

Caenorhabditis elegans – model organism



- Longevity and Aging (K. Grzywacz, A. Tyczewska)
- Infection model for a variety of bacterial and fungal pathogens (K. Brzeziński)
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Trinucleotide Repeat Diseases

Modeling triplet repeat expansion diseases in *C. elegans*

Transgenic *C. elegans* models typically express **polyQ sequences** or fragments of human proteins (e.g., huntingtin) fused to fluorescent reporters in neurons or muscle cells. These models reproduce key disease features including age-dependent protein aggregation, neuronal dysfunction, and behavioral defects.

Examples of modeled diseases

Huntington's disease (HTT polyQ expansion)

Spinocerebellar ataxias (SCA1, SCA3, SCA7)

Spinal and bulbar muscular atrophy

Dentatorubral-pallidoluysian atrophy

Major research applications:

Identification of genetic modifiers of polyQ toxicity

Study of protein misfolding and proteostasis

Screening of therapeutic compounds for neurodegenerative diseases

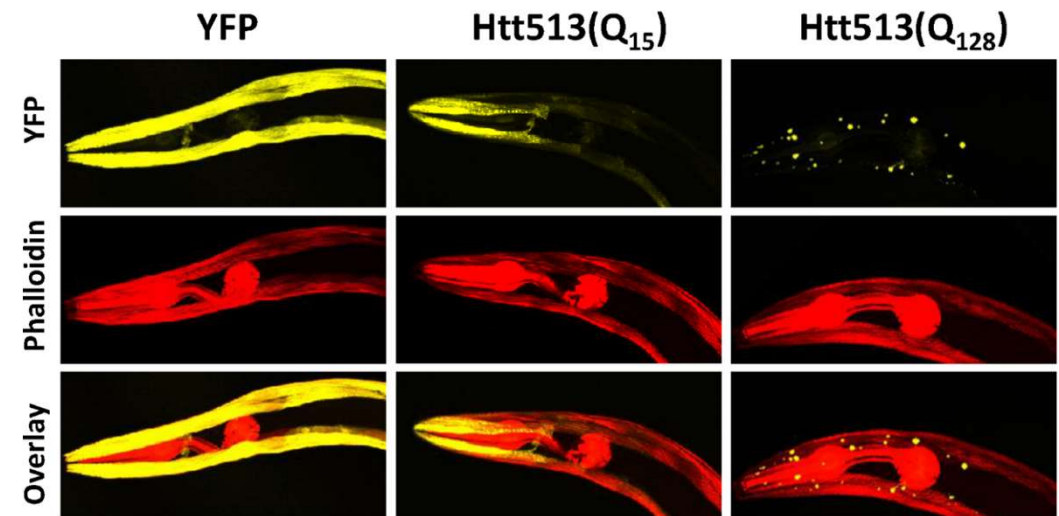


Fig. Aggregation dynamics for Htt513 in *C. elegans* (Lee et al. 2017, PLoS ONE)

Caenorhabditis elegans – model organism



- Longevity and Aging (K. Grzywacz, A. Tyczewska)
- Infection model for a variety of bacterial and fungal pathogens (K. Brzeziński)
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Metabolism and Anti-Obesity Research

Although worms lack adipose tissue in the mammalian sense, they accumulate lipid droplets that are regulated through conserved metabolic pathways. Fat storage can be quantified using lipid staining or fluorescent reporters. Insulin signaling, nutrient sensing, and metabolic regulation are conserved.

This enables screening of compounds that influence fat accumulation or metabolic balance in a whole-organism context.

Major research applications:

Lipid metabolism genetics

Insulin signaling

Nutrient sensing

Fat storage quantification (Oil Red O, Nile Red)

Screening anti-obesity compounds

Metabolic regulation pathways are highly conserved

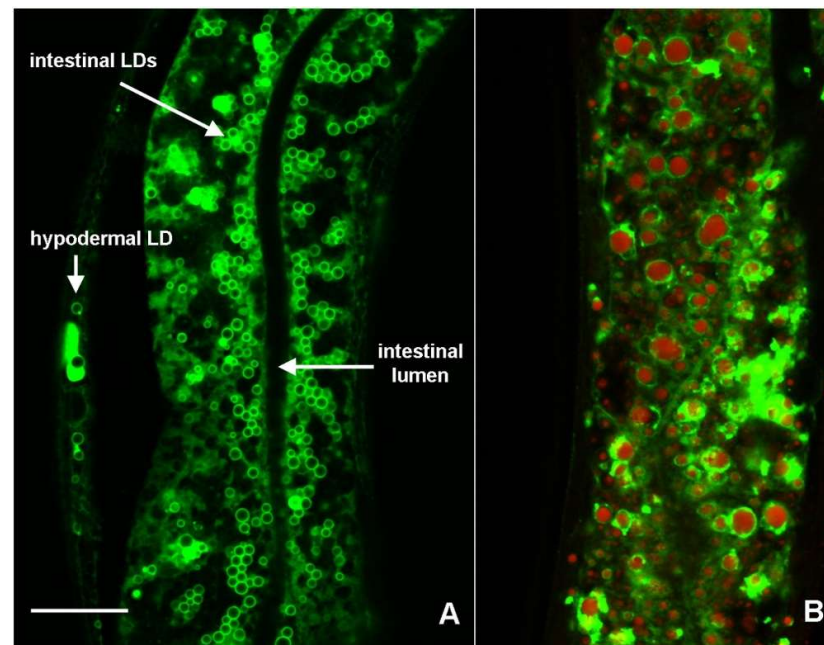


Fig. A. Live imaging of L₄ stage ACS-4::GFP strain reveals lipid droplet surface localization throughout the intestine and in the hypodermis. The intestinal lumen is visible in the center of the intestine. B. Post-fix composite image of ACS-4::GFP and Nile red in intestinal tissue (Vrablik et al. 2015, (BBA) - Molecular and Cell Biology of Lipids)

Laboratory of Invertebrate Model Organisms - equipment



Mediaclave 10 and MediaJet vario (Integra).

Autoclaving and pouring plates

Mediaclave 10 (Integra) - used for preparing and sterilizing many types of media, min. 1l, max. 10l of broth for sterilization.

MediaJet vario (Integra) - Petri Dish Filler with sets for Petri dishes Ø 35 mm, 60 mm, 90 mm, up to 330 plates/h, equipped with a UV lamp allowing for contamination-free filling of Petri dishes.

Laboratory of Invertebrate Model Organisms - equipment



Stereoscope (Nikon).



Image viewed under the stereoscope.

Laboratory of Invertebrate Model Organisms - equipment

- **Axio Vert.A1** (Zeiss), with Eppendorf microinjection kit mounted
- **InjectMan®₄ micromanipulator** with dynamic motion control and programmable micromembrane
- **FemtoJet®_{4i}** with integrated pressure supply
- **PC-100** (Narishige) – microneedle preparation

A



B



C



PC-100 microneedle puller (Narishige).

A. Axio Vert.A1 (Zeiss). B. FemtoJet _{4i} (Eppendorf). C. InjectMan ₄ (Eppendorf).

Laboratory of Invertebrate Model Organisms - equipment



Laboratory of Invertebrate Model Organisms - equipment



Stereo microscope (Nikon) characterized by a large magnification ratio of 25: 1, high resolution and exceptional fluorescence transmission ability.



Axio Imager 2 (Zeiss) is designed to be a platform for an impressive number of applications in cell biology, neuroscience, molecular genetics and pathology.



Laboratory of Invertebrate Model Organisms – other equipment



- ✓ fully equipped **microorganism culturing room** with BIO BAN 48 laminar flow cabinet
- ✓ **Azure Biosystems** - gel and chemiluminescence documentation system
- ✓ **Victor Nivo** plate reader (detection modes: Abs, Lum, FI, FP, TRF, and Alpha, gas dispenser and controller, time-resolved fluorescence)
- ✓ **Tissue Lyser** (Eppendorf) - medium and high-throughput low-temperature grinding homogenizer with 24 x 2ml and 2 x 10ml adapters
- ✓ a device for preparing linear sucrose and glycerol gradients
- ✓ TransBlot Turbo and Mini Blot Module devices for transferring proteins and nucleic acids
- ✓ Qubit 4 fluorometer from Invitrogen
- ✓ BluPAD and GeneDire transilluminators
- ✓ Nanodrop One spectrophotometer
- ✓ ProFlex and BioRad thermocyclers

Laboratory of Invertebrate Model Organisms - members



Head: Agata Tyczewska

C. elegans, S. cerevisiae:

**Kamilla Grzywacz
Kamila Pełowska**

Glycine max:

**Alicja Rzepczak
Kinga Plawgo
Kamilla Grzywacz**



Bioeconomy, public perception:

Ewa Woźniak-Gientka

Research Support Unit:

Katarzyna Solka

Contact:

agatat@ibch.poznan.pl

lab.model.invertebrate@ibch.poznan.pl



Laboratory of protein engineering and biophysics

Head Dr hab. Anna Urbanowicz
aniau@ibch.poznan.pl

Location: Building A
Basement – level 000A
2nd floor – room 112



OFFER

- ✓ Preparation of bacterial expression vectors; purification of recombinant proteins; quality assessment for functional and structural studies
- ✓ Protein–macromolecule interactions: binding kinetics & thermodynamics and enzymatic activity
- ✓ Crystallization of biomolecules and diffraction data collection (rotating anode diffractometer)
- ✓ Eukaryotic cell culture: propagation, maintenance, banking; assays (cytotoxicity, cell cycle, apoptosis)

TEAM

Dr Jakub Barciszewski

Dr hab. Agata Świątkowska

Dr hab. Anna Urbanowicz – head

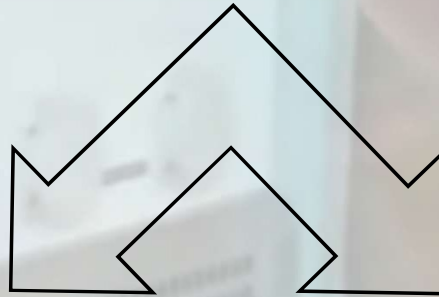
Mgr inż. Martyna Kabacińska

Mgr Martyna Kordyś

Mgr Alina Kasperska

Dr Joanna Śliwiak

Equipment/services



Preparative/control equipment:

available to each IChB employee
or PhD student, after prior
notification of the Lab Head and
initial training

Specialized equipment:

available only in cooperation
with Laboratory Staff

Preparative/control equipment



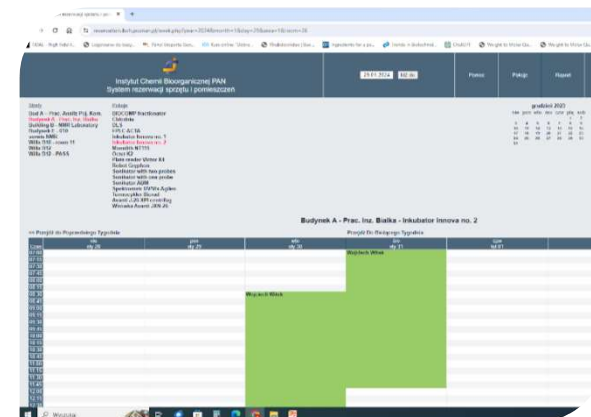
Preparative/control equipment

- Notification of Lab Head (possible initial training)
- Disposable materials/reagents provided by the user
- Reservation system – obligatory
 - ✓ Reservation.ibch.poznan.pl
(login/password - IBCh email box)
 - ✓ Feel the log sheet: condition before and after use (to ensure proper cleanliness and maintenance)



Handwritten log sheet titled "NNOVA 42" with a circled "2" in the top right corner. The table has columns for "Date", "Clean before use*", "Clean after use**", and "Notes".

Date	Clean before use*	Clean after use**	Notes
4.11.2025	15 OK	15 OK	swiped with EtOH
5.11.2025	15 OK	15 OK	
12.11.2025	15 OK	15 OK	
19.11.2025	15 OK	15 OK	everything was thoroughly cleaned
26.11.2025	15 OK	15 OK	
3.12.2025	15 OK	15 OK	
10.12.2025	15 OK	15 OK	
17.12.2025	15 OK	15 OK	
24.12.2025	15 OK	15 OK	
31.12.2025	15 OK	15 OK	swiped with EtOH
7.1.2026	15 OK	15 OK	
14.1.2026	15 OK	15 OK	
21.1.2026	15 OK	15 OK	

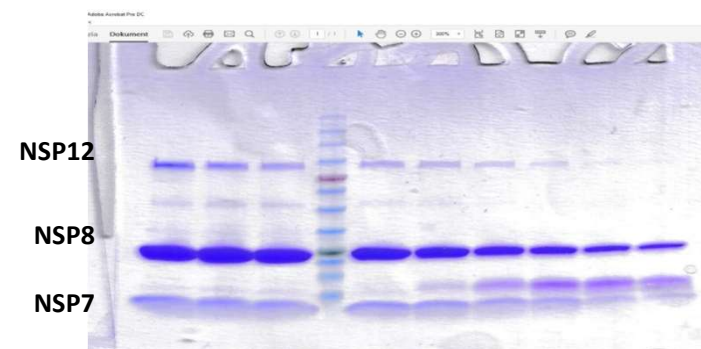
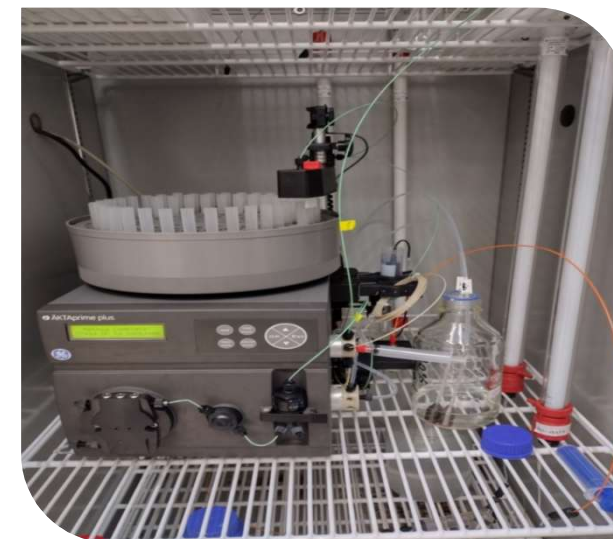


Specialized equipment available only in cooperation with Laboratory Staff

Akta system

FPLC – various purification methods
Protein expression

In cooperation with: mgr inż. Martyna Kabacińska & dr hab. Anna Urbanowicz



Active recombinant SARS CoV-2 RdRp preparation (NSP7,8,12 complex). The polymerase was produced in *E. coli* and purified by III-step chromatography: Ni-NTA affinity, ion-exchange and, finally SEC (presented fractions after SDS-PAGE).

Specialized equipment available only in cooperation with Laboratory Staff

Biocomp equipments

Preparation of the gradient prior to separation of particles through ultracentrifugation or fractionation

- ✓ polysome profiling
- ✓ separation and fractionation of proteins and complexes

mgr Martyna Kordyś



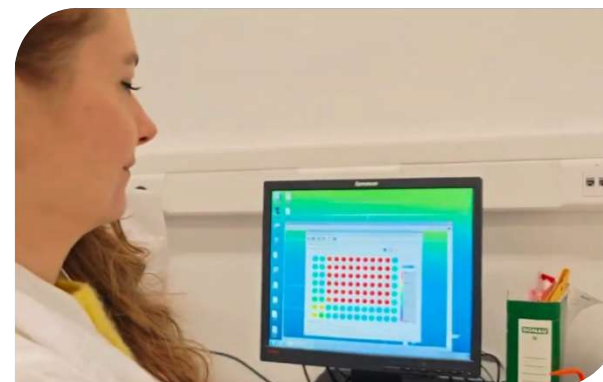
Specialized equipment available only in cooperation with Laboratory Staff

Spectrophotometer Victor X4 Multimode plate reader (Perkin Elmer): fluorescence (fluorescein, GFP, mCherry), luminescence (luciferase system), visible absorbance

HL-2000 HybriLinker Incubator: hybridization oven and UV crosslinker

2450 Microplate Counter MicroBeta 2 MicroBeta²® - radiometric and luminescence detection

dr hab. Agata Świątkowska, mgr inż. Martyna Kabacińska

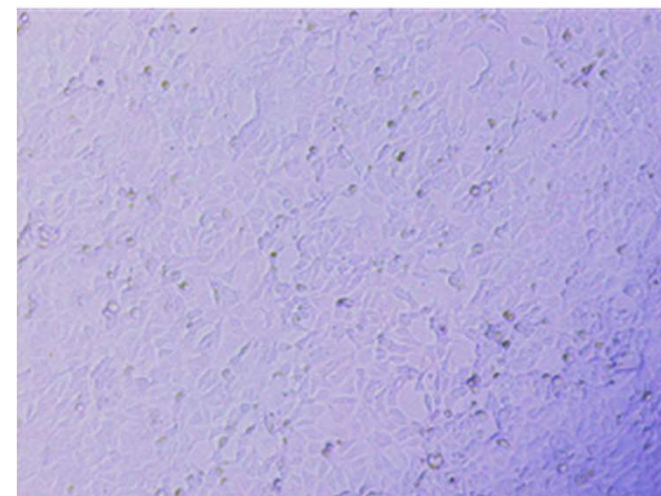
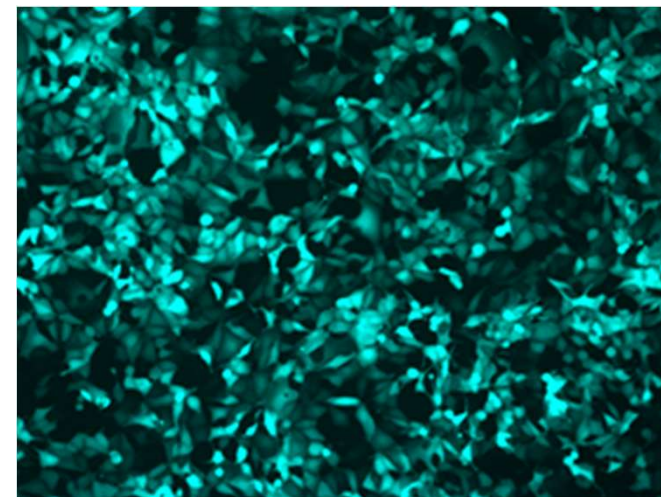


Specialized equipment available only in cooperation with Laboratory Staff

We can support you in the research:

- ✓ Propagation, maintaining and banking of eukaryotic cells
- ✓ Cell tests (test for cytotoxicity, cell cycle arrest, apoptosis)
- ✓ Luciferase assay
- ✓ DNA and RNA constructs preparation for expression in mammalian cells
- ✓ Protein expression in mammalian cells
- ✓ Cell line cultures (our banks): Adherent human cell lines : HepG2, HT-29, HCT116, MCF-7, H1299, HEK-293, BEAS-2B, adherent mouse cell lines: MEF, NIH3T3, DC2.4

dr hab. Agata Świątkowska, mgr inż. Martyna Kabacińska



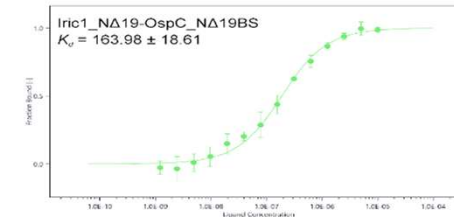
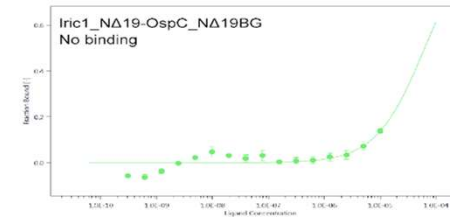
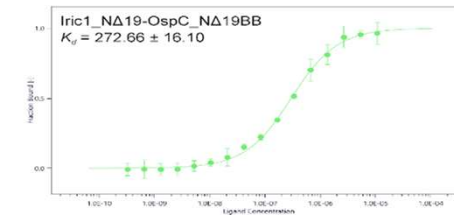
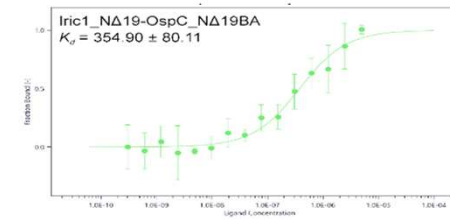
a) Visualization of GFP synthesis in MCF cells by fluorescence microscopy. Image was taken 24 hours post-transfection with RNA encoding GFP, b) MCF cells in light microscopy

Specialized equipment available only in cooperation with Laboratory Staff

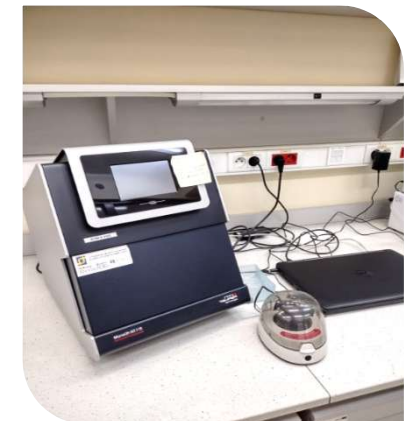
Monolith NT.115

- ✓ Binding affinity by microscale thermoforesis (MST)
- ✓ K_D 1nM – 500 mM
- ✓ molecular size range: 300 Da – 2.5 MDa
- ✓ one of the studied molecules fluorescently labelled
- ✓ single measurement takes 15 minutes, a small amount of material is needed, a set of 16 ligand dilutions is analyzed

dr hab. Anna Urbanowicz



Exemplary MST curves and assessed binding affinities. Binding affinity between Iric1 recombinant protein from *I. ricinus* tick and recombinant OspC protein from *Borrelia*. Bierwagen et al., 2021

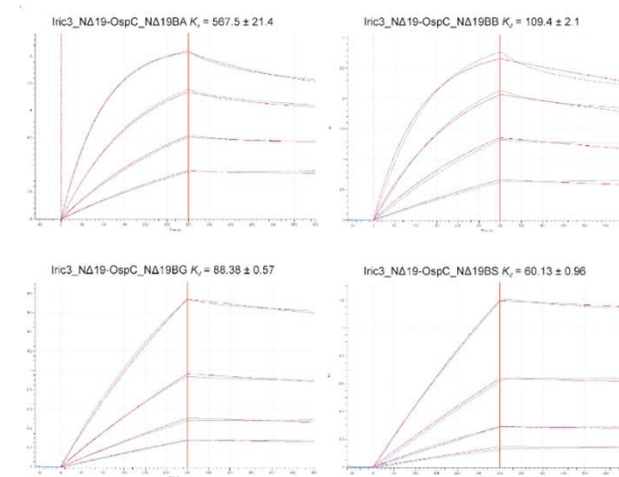


Specialized equipment available only in cooperation with Laboratory Staff

Octet K2 (Forte Bio)

- ✓ Binding affinity by biolayer interferometry (BLI)
- ✓ real-time measuring association (k_a) and dissociation (k_d) kinetics, and affinity constants (K_D)
- ✓ K_D range: 0.1 nM – 500 mM
- ✓ molecular size range: 150 Da – whole cells
- ✓ small amount of material is needed, at least 4 ligand dilutions are analyzed

dr hab. Anna Urbanowicz



Exemplary BLI curves and assessed binding affinities. Binding affinity between Iric3 recombinant protein from *I. ricinus* tick and recombinant OspC protein from *Borrelia*. Bierwagen et al., 2021

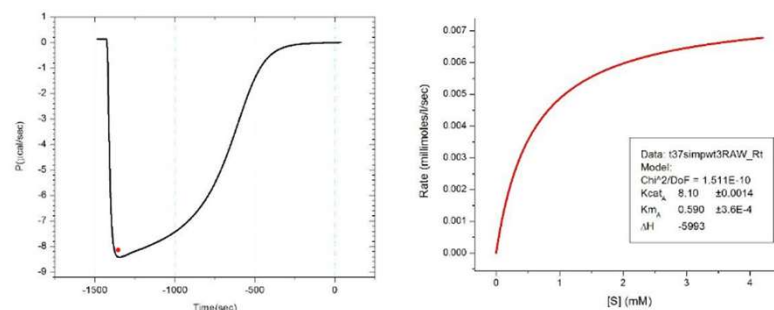


Specialized equipment available only in cooperation with Laboratory Staff

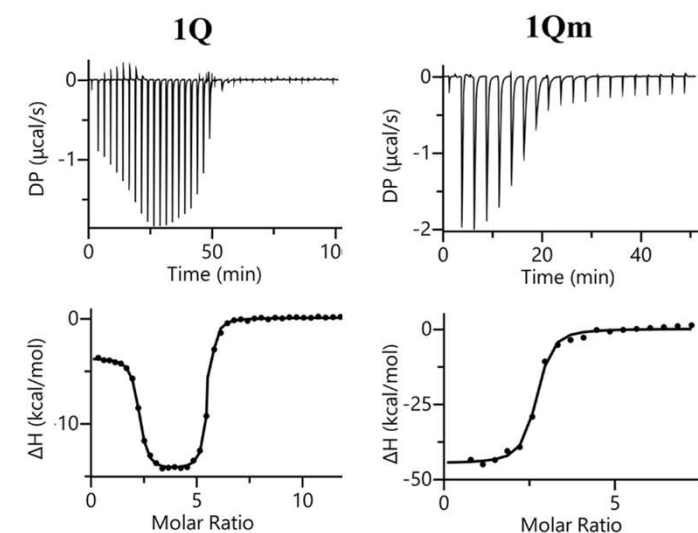
PEAQ-ITC, ITC-200 microcalorimeters

- ✓ Thermodynamic parameters (K_D , ΔH , ΔS , N) of binding (nM- μ M)
- ✓ Enzyme kinetics parameters (k_{cat} , K_M)
- ✓ Universality of heat: all chemical processes are either exothermic or endothermic

dr Joanna Śliwiak



Raw kinetic ITC data (right) and its analysis (left) obtained for the K138A ReAV variant in the presence of 10 μ M Zn^{2+} . The raw data were processed by MicroCal Analysis Launcher (ITC-200 data) and fitted to the Michaelis-Menten equation (Pokrywka et al. 2025)



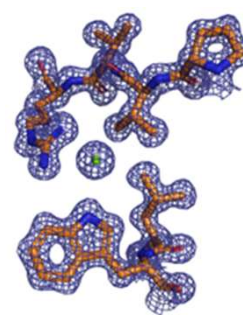
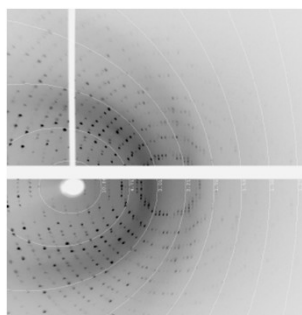
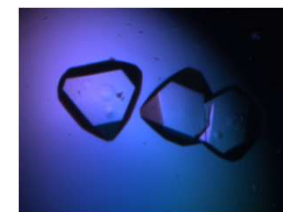
Representative raw data (upper panels) and integration of the peaks (bottom panels) with the best fit of the 'One Set of Sites' or 'Two Sets of Sites' model (only in the case of wild-type sequences). The data were obtained after titrations of 1Q G-quadruplex and its 1Qm mutant with TMPyP4 ligand (Nalewaj et al. 2025)

Specialized equipment available only in cooperation with Laboratory Staff

Crystallization robot ARI Gryphon crystallization of proteins, nucleic acids and their complexes, determination of initial crystallization condition, optimization of conditions

Diffractionmeter Rigaku XtaLAB Synergy-R assessment of crystal quality, solving crystal structures of proteins, nucleic acids and their complexes

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