

MSCA PF 2025 Hosting Offers



IBCH PAS

Evaluation panel:
LIF

Keywords:
*plant science, structural
variation, copy number
variation, whole-
genome assembly,
functional genomics,
transposable elements,
plant-microbe
interactions, DNA
methylation*

Agnieszka Żmieńko

Head of the Department of Plant Genomics



New talented and creative members are always welcome in our team. We are interested in deciphering the links between the plant genome and the phenotype by investigating natural differences between the plants of same species adapted to different environments.

We use both genotype-first and phenotype-first approaches, and heavily rely on genomic techniques such whole-genome sequencing and transcriptomics. Our current models are Arabidopsis and Medicago, and we mainly focus on the role of selected genes, transposable elements and epigenetic regulation in natural phenotypic variation.

Please go to our web page to read about the current projects. Any related topic proposal from the candidate will also be considered.

Evaluation panel:
LIF

Keywords:

*Caenorhabditis elegans,
aging, human diseases,
nanoparticles, small
molecule compounds*

Agata Tyczewska

Head of the Laboratory of Invertebrate Model
Organisms



*We study the role of tRNA-derived small RNAs in the process of aging and age-related diseases using *C. elegans* as a model. The post-doc may join the existing project or the topic can be adapted to the candidate's profile e.g., analysis of the influence of small molecule compounds on various *C. elegans* disease models, nanoparticle analysis and uptake, protein, RNA function or chromatin structure analysis.*

***Evaluation panel:
LIF***

Keywords:

RNA molecules; three-dimensional structure of RNA; RNA associated with pathology of neurodegeneration; cryo-EM, x-ray crystallography; biophysical evaluation of RNA molecules; RNA-ligand interactions

Agnieszka Kiliszek

Head of the Department of RNA Structural Research



The general scope of research involves the structural and biophysical analyses of RNA molecules relevant to human physiology and disease etiology.

Example of research study topics:

- *Structural characterization of RNA molecules involved in neurodegeneration*
- *Structural and biophysical evaluation of RNA G-quadruplexes*

Evaluation panel:
LIF

Keywords:

*RNA structure, RNA
viruses, influenza virus,
SARS-CoV-2, nucleic
acids thermodynamics,
modified
oligonucleotides,
antisense
oligonucleotides, small
molecules, RNA
interactions, pathogenic
RNA*

Elzbieta Kierzek

Head of the Department of RNA Structural
Genomics



- *RNA structural genomics of viruses*
- *Secondary and tertiary structure of pathogenic RNA*
- *Modulation RNA functional activities, including pathogenic RNAs related with human diseases*
- *RNA structural genomics of influenza virus and SARS-CoV-2, influence of RNA structure on virus replication*
- *Projecting and optimization of modified oligonucleotides, siRNA, ribozymes and small molecules as potential inhibitors RNA viruses*
- *Modified oligonucleotides – antisense and microarrays strategies*
- *Nucleic acids thermodynamics, prediction of RNA secondary structure with modifications*
- *Natural modifications of RNA – influence on structure, thermodynamics and biology of RNA*
- *Functional RNA structural motifs of RNA viruses*

Please note that a topic can be adapted to the candidate's profile

Evaluation panel:
LIF

Keywords:
neurodegenerative disorders, RNA splicing, small molecule kinase inhibitors, circular RNA, intron retention

Marzena Wojciechowska

Head of the Department of Rare Diseases



- *Molecular characteristics of the causes and consequences of global dysregulation of circular RNAs in myotonic dystrophies.*
- *Testing the therapeutic potential of small-molecule compounds in cells derived from myotonic dystrophy patients.*
- *Evaluating the extent of intron retention in various tissues from myotonic dystrophy patients.*

Evaluation panel:
LIF

Keywords:
emerging viruses; virus-host cell interactions; antiviral strategy; influenza A virus; SARS-CoV-2; coronaviruses, MPXV; wastewater; genomic epidemiology

Paweł Zmora

Head of the Department of Molecular Virology



My research interests focus on the emerging viruses, i.e., influenza A virus, SARS-CoV-2, and virus-host cell interactions, with particular interest in virus entry. The obtained knowledge allows me to design new antiviral strategies, based on RNA and/or small molecules. Recently, my research has focused on the seroprevalence and genomic epidemiology, especially in the context of the mpox virus.

My research group works mostly with cell culture models, but we have also done some in vivo experiments. Thanks to the collaboration, we also work with human material.

Within my projects, I combine virology, molecular and structural biology, genomics, immunology, and epidemiology, but I am open to any new interesting topics, which may broaden my scientific horizon.

Evaluation panel:
LIF

Keywords:
Huntington's
disease (HD),
Spinocerebellar ataxia
type 3 (SCA3),
Neurodegeneration,
Autophagy, UPS
(ubiquitin-proteasome
system), Gene silencing,
AAV, therapy, Brain
organoids, Single-cell
RNAseq

Maciej Figiel

Molecular Neurobiology Group



Huntington's disease (HD) and spinocerebellar ataxia type 3 (SCA3) are caused by excessive CAG repeats in HTT and ATXN3, leading to brain degeneration by toxic protein aggregates that disrupt key neural cell functions like protein clearance, energetics, axonal transport, RNA and DNA regulation and metabolism. Our research aims to understand neurodegeneration and develop therapeutic strategies, with implications for other neurodegenerative diseases like Alzheimer's and Parkinson's.

Pathogenesis: We explore the neurodevelopmental mechanisms of neurodegenerative diseases, particularly in juvenile forms of HD and SCA3, and ask if early interventions might prevent neuronal degeneration long before symptoms emerge.

We explore therapeutic strategies:

1. *CAG-directed gene silencing:* This strategy lowers mutant proteins in the brain by shRNA delivered by AAV vectors. The intravenously injected AAV crosses the blood-brain barrier (BBB) and eliminates the need for invasive brain injection.
2. *Protein clearance.* Enhancing the removal of toxic polyQ aggregates by targeting cellular pathways like autophagy and UPS, where the key regulator is ATXN3. Small molecules activate types of autophagy, promoting protein degradation.
3. *Neurodietary interventions* - Investigating caloric restriction and ketogenic diets to counteract neurodegenerative mechanisms and improve neuronal resilience.

Models and methodologies:

We utilize *knock-in mouse models for HD and SCA3*, alongside advanced brain organoid systems that mimic disease processes. We use high-throughput proteomic, transcriptomic, and single-cell approaches to enable deep analysis of disease mechanisms and therapeutic effects. Our work combines discovering the mechanisms of brain disease pathogenesis with investigating their translational applications. We aim to advance and expand therapeutic strategies for polyQ disorders and other neurodegenerative diseases. Research topics can be tailored to the candidate's expertise and interests.

***Evaluation panel:
LIF, CHEM***

Keywords:

***BioPolymers, RNA, DNA,
Nucleic Acids,
Modifications,
Thermoresponsive
Biotools, Biomaterials,
Microbeads, Chemical
Synthesis***

Marcin Chmielewski

Head of the Department of Biopolymers
Chemistry



Our research focuses on the chemical synthesis of biopolymers (nucleic acids, peptides, carbohydrates, and lipids) and their chemical modifications. We develop novel functional polymeric materials with potential applications in drug delivery systems and as supports for solid-phase synthesis. Additionally, our team explores thermocyclization reactions in chemical synthesis and advances thermoresponsive technologies, including the design of protective groups, novel fluorescent labels, and thermoreleasable polymers.

We are specialists in qualitative and quantitative instrumental analysis using high-performance liquid chromatography (HPLC) with UV-Vis, fluorescence, and refractometric detectors, as well as MALDI-TOF-MS mass spectrometry.

- Chemical modification and synthesis of nucleic acids, particularly modified siRNA.*
- Development of novel functional polymeric materials with potential applications in drug delivery systems.*
- Chemical synthesis of thermoresponsive biotools.*
- Functionalized polystyrene microbeads for use in bioorganic chemistry.*

Evaluation panel:
LIF

Keywords:

*Dicer-type
ribonucleases, RNases III,
helicases, ATPases,
nucleic acid-protein
interactions*

Anna Kurzyńska-Kokorniak

Head of the Department of Ribonucleoprotein
Biochemistry



Our interests focus on the role of RNA and DNA in the regulation of the activity of nucleic acid-binding proteins and exploring the mechanisms beyond the activity and specific functions of these proteins. The main object of our research is Dicer-type ribonucleases. Dicer proteins are mostly known for their important role in the biogenesis of small regulatory RNAs: microRNAs and small interfering RNAs. However, a growing number of reports demonstrate that the activity of Dicer proteins extends beyond the biogenesis of small regulatory RNAs.

The research topics carried out in our Department include:

- the cellular interactome of human ribonuclease Dicer,*
- ATP hydrolysis activity of vertebrate Dicers,*
- signaling pathways involving Dicer proteins,*
- evolution of Dicer domains (the topic can be adapted to the candidate's profile)*

Evaluation panel:
LIF

Keywords:
*cancer genetics, Copy
Number Variation
(CNV), Multiplex
Ligation-dependent
Probe Amplification
(MLPA), miRNA, lncRNA,
non-coding genomics*

Piotr Kozłowski

Head of the Department of Molecular Genetics



- *Analysis of cancer somatic mutations in non-coding genome, particularly in miRNA genes.*
- *Designing and developing MLPA test for large mutation and copy number analysis of a gene/genomic region of interest.*
- *Genomic and transcriptomic NGS data analysis.*
- *Cancer predisposition analysis.*