Postdoctoral Position in Bioinformatics:
scRNA sequencing and spatial transcriptomics of tissue microenvironment

The Sumbalova Koledova laboratory at the Institute of Molecular Genetics (IMG) - BIOCEV Centre, Prague, CZ, is looking for a passionate, intellectually curious postdoctoral scientist specialized in bioinformatics with an interest in developmental and cancer biology.

The research project FIBROFORCE aims to decipher the functional heterogeneity of fibroblasts during mammary gland development utilizing scRNA sequencing and spatial transcriptomic technology. The postdoctoral fellow will have access to a unique set of scRNAseq and spatial transcriptomic data from mammary gland and mammary tumors. Their mission will be to identify markers of different cell populations and signaling pathways enabling cellular communication to improve our understanding of the role of the microenvironment in mammary gland development and tumorigenesis. Model building and validation will also exploit available public databases.

About the research group

In the Sumbalova Koledova's Laboratory of Tissue Morphogenesis and Cancer we study processes and mechanisms, which govern epithelial morphogenesis and homeostasis, and how their deregulation can lead to developmental defects and cancer. We investigate the interplay of biochemical and mechanical signals in shaping epithelial sheets to functional structures, with particular interests in the role fibroblasts in this process. Our ultimate research goal is to understand, how organs are formed and how tumors emerge.

Using the mammary gland, a paradigmatic branched organ unique to mammals, as the main research model we seek answers to these main research questions:

1. How is the branched pattern of glandular organs formed?
2. What is the functional role of fibroblast heterogeneity in mammary gland development?
3. How do fibroblast-mediated developmental programs contribute to tumor formation?

Our research strategy combines advanced organoid models, state-of-the-art imaging techniques, genetic mouse models, biosensors, single-cell and spatial transcriptomic analyses, mathematical modeling, and AI-driven image analysis.

Our publications most relevant to the project

- Sumbal J, Fre S, **Sumbalova Koledova Z**: Fibroblast-induced mammary epithelial branching depends on fibroblast contractility. *bioRxiv* 2023.03.24.534061.
  doi: http://doi.org/10.1101/2023.03.24.534061

- Sumbal J, Belisova D, **Koledova Z**: Fibroblasts: The grey eminence of mammary gland development. *Sem Cell Dev Biol.* 2020. S1084-9521(20)30169-5.
  doi: https://doi.org/10.1016/j.semcdb.2020.10.012
- Sumbal J, **Koledova Z**: FGF signaling in mammary gland fibroblasts regulates multiple fibroblast functions and mammary epithelial morphogenesis. *Development*. 2019; 146(23). pii: dev185306.
  doi: https://doi.org/10.1242/dev.185306
- **Koledova Z**, Zhang X, Streuli C, Clarke RB, Klein O, Werb, Z, Lu P: SPRY1 Regulates Mammary Epithelial Morphogenesis by Modulating EGFR-dependent Stromal Paracrine Signalling and ECM Remodeling. *Proc Natl Acad Sci USA*. 2016; 113(39): E5731 – 5740.
  doi: https://doi.org/10.1073/pnas.1611532113

Requirements and qualifications of the candidate

- Expertise in bioinformatics, computational biology, biostatistics, or machine learning,
- PhD in biological sciences and/or bioinformatics,
- Relevant knowledge in scRNA sequencing and transcriptomic profiling, with experience in the analysis and interpretation of such data, as well as the data management requirements,
- Advanced IT skills for a range of applications, particularly for high-level programming languages such as Python or R,
- Highly motivated and independent with excellent communication skills, enthusiastic about performing interdisciplinary work and open to learn and apply new techniques,
- Excellent organizational skills and the ability to maintain meticulous records, with ability to plan and prioritize own work in order to meet deadlines,
- Committed to personal development and updating of knowledge and skills.
- The IMG strives for gender equality and diversity. We welcome applications from all backgrounds, regardless of gender, nationality, ethnicity, sexual orientation, religion, age, and other components of identity.

We offer

- Full-time or part-time fixed-term employment contract initially for 1 year with the possibility of extending to 2 years, starting from 1 January 2024 or upon agreement,
- Attractive salary funded by the ERC-CZ,
- 5 weeks of vacation and 3 sick days,
- Employment benefits, including meal allowance and childcare services,
- A collaborative scientific environment supported by state-of-the-art facilities,
- Training in the form of specialized courses,
- Full focus on research without teaching obligations,
- Support to apply for independent funding and to develop your own research program.

How to apply

Written applications should include a cover letter (stating your motivation to apply for this position and a brief description of your research interests and accomplishments), a structured CV, a list of

publications, and contact information for two references – all as a single pdf file. Send the application to the group leader Zuzana Sumbalova Koledova at zuzana.sumbalova-koledova@img.cas.cz.

Applications will be reviewed on a rolling basis until the position is filled.
Best to apply before 1 November 2023.

About the Institute

The Laboratory of Tissue Morphogenesis and Cancer of the IMG is situated in the BIOCEV Centre (The Biotechnology and Biomedicine Centre of the Academy of Sciences and Charles University). The BIOCEV Centre is a unique research platform and a cutting-edge scientific facility with an international reach. It is a well-established center of excellence in basic research. Its scientific work is divided into five programs – Functional Genomics, Cell Biology and Virology, Structural Biology and Protein Engineering, Biomaterials and Tissue Engineering, and the Development of Diagnostic and Therapeutic Procedures.

More information

- Sumbalova Koledova Laboratory: www.img.cas.cz/group/zuzana-sumbalova-koledova/
- X (former Twitter): @KoledovaZuzana
- IMG: www.img.cas.cz/en/
- BIOCEV: www.biocev.eu/en
- For further information about the position, contact Dr. Sumbalova Koledova (zuzana.sumbalova-koledova@img.cas.cz)