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PhD student in Cancer Systems Biology

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Uppsala University is a comprehensive research-intensive university with a strong international standing. Our ultimate goal is to conduct education and research of the highest quality and relevance to make a long-term difference in society. Our most important assets are all the individuals whose curiosity and dedication make Uppsala University one of Sweden's most exciting workplaces. Uppsala University has over 54,000 students, more than 7,500 employees and a turnover of around SEK 8 billion.

The Department of Immunology, Genetics and Pathology (IGP) at Uppsala University has a broad research profile with strong research groups focused on cancer, autoimmune and genetic diseases. A fundamental idea at the department is to stimulate translational research and thereby closer interactions between medical research and health care. Research is presently conducted in the following areas: medical and clinical genetics, clinical immunology, pathology, neuro biology, neuro-oncology, vascular biology, radiation science and molecular tools. Department activities are also integrated with the units for Oncology, Clinical Genetics, Clinical Immunology, Clinical Pathology, and Hospital Physics at Akademiska sjukhuset, Uppsala. The department has teaching assignments in several education programmes, including Master Programmes, at the Faculty of Medicine, and at the Disciplinary Domain of Science and Technology. The department has a yearly turnover of around SEK 500 million, out of which more than half is made up of external funding. The staff amounts to approximately 345 employees, out of which 100 are PhD-students, and there are in total more than 700 affiliated people. Feel free to read more about the department's activities here: www.igp.uu.se

[Read more about our benefits and what it is like to work at Uppsala University](#)

Duties

Unlike many fatal forms of cancer, the brain tumor glioblastoma causes death not by distant metastasis but by local invasion. The local invasive growth of glioblastomas is multi-faceted: tumor cells invade along multiple anatomical routes, including the perivascular spaces, white matter fibers, and directly through brain parenchyma. Studies from our lab and others have linked these invasion routes to cellular pathways; the emerging picture is that invading glioblastoma cells appear to co-opt numerous pathways from embryo development and wound healing, including mesenchymal transformation and differentiation along oligodendrocyte and astrocyte lineages. Looking ahead, a central question is to what degree these mechanisms can be exploited for therapy. Here we will address two questions:

How can promising anti-invasion therapies and variations in tumor tissue organization be assessed and predicted using computational models? Can we predict the outcome of tailored patient-specific interventions that hit multiple invasion routes?

In the first part, we will develop new computational strategies to model and predict the spatial organization and temporal change in tumors. The research will focus on computational methods to score invasion in patient-derived xenograft brain slice assays (time-lapse confocal data) and spatial transcriptomics data (done with Mats Nilsson, SU and Dr. Hitesh Mangukhiya, IGP). In the project's second part, we aim to stratify patients for invasion-targeted therapy and to work with experimental team members to test its performance. In brief, we will build a computational predictor that links signatures of newly collected patient samples to a list of invasion-targeted drugs. The predictor will combine molecular features with features derived from MRI imaging of patients (collaboration with dept of Neurosurgery). The predictions will be tested in zebrafish models and mouse PDX models, working with Kaska Koltowska's team and Cecilia Krona. Altogether, the project presents a challenging integration of themes to address a crucial health problem.

In this Ph.D. project, you will receive training in computational systems biology, and working in an exciting cross-disciplinary setting, in a large team with many expertises (nelanderlab.org). Prof Sven Nelander is the main supervisor. Prof Rebecka Jörnsten, Associate Professor Kaska Koltowska, and Dr. Cecilia Krona are co-supervisors. In addition to the research project, you will take part in seminars, conferences, teaching. The Ph.D. project is supported by a 5-year grant from the Knut and Alice Wallenberg Foundation.

Requirements

To meet the entry requirements for doctoral studies, you must

Hold a Master's (second-cycle) degree in biotechnology, computational biology, applied mathematics, engineering, biomedicine, medicine, or similar. Have completed at least 240 credits in higher education, with at least 60 credits at Master's level including an independent project worth at least 15 credits, or have acquired substantially equivalent knowledge in some other way.

The successful applicant must also

- Have working knowledge of, and interest in, real-world, data analysis.
- Have substantial experience in at least one programming language (typically Python, R, or MATLAB)
- knowledge of the mathematics needed to conduct research work in computational biology (corresponding to a degree in engineering or equivalent). Examples of mathematical concepts relevant for the project include: linear algebra, machine learning, regression, dimensionality reduction, Ising models, neural networks, probability, statistical testing, image analysis)
- Have documented knowledge of molecular biology, cell biology, cancer biology, biotechnology, or related areas.
- Have strong communication skills (oral and written English)
- Have strong interpersonal skills consistent with working in a team

Additional qualifications

We particularly welcome applicants with specific research experience in cancer data analysis, particularly for nervous system cancers. We also put strong emphasis on prior experience in high-dimensional molecular biological or image data sets, such as single cell RNA sequencing data, or microscopy data. We value a past record of innovation and originality, as well as a past record of productive teamwork.

Rules governing PhD students are set out in the Higher Education Ordinance chapter 5, §§ 1-7 and [in Uppsala University's rules and guidelines](#).

About the employment

The employment is a temporary position according to the Higher Education

Ordinance chapter 5 § 7. Scope of employment 100 %. Starting date Aug 1, 2023 or as agreed. Placement: Rudbeck Laboratory, Uppsala.

For further information about the position, please contact: Sven.Nelander [a t] igp.uu.se, +46 76 1380123

Please submit your application by 25 May 2023, UFV-PA 2023/1219

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Please do not send offers of recruitment or advertising services.

Submit your application through Uppsala University's recruitment system.

Placement: Department of Immunology, Genetics and Pathology

Type of employment: Full time, Temporary position

Pay: Fixed salary

Number of positions: 1

Working hours: 100 %

Town: Uppsala

County: Uppsala län

Country: Sweden

Union representative: ST/TCO tco@fackorg.uu.se

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Saco-rådet sacco@uadm.uu.se

Number of reference: UFV-PA 2023/1219

Last application date: 2023-05-25

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