

## The *in situ* immune profiling of solid tumors

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### Research area:

Cancer/Oncology

### Brief description

The effect of anti-tumor immunotherapy is very heterogeneous and only a minor fraction of patients benefits from this therapy. We will characterize immune infiltrate in major solid cancers and investigate infiltration patterns of different immune cell classes, enabling a detailed classification of different tumor types according to their immunological status.

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### Aim

The aim of this project is to characterize the immune infiltration in major solid tumor types on the sections of tumor tissue. We plan to cover three important blocks of cancer immunity: the T-cell system, the antigen presentation machinery and the NK/NKT system.

### Background

Cancer immunotherapy is regarded as one of most promising treatment strategies. However, its effect is very heterogeneous between different tumor types and also within different patients with the same tumor type. Only a minor fraction of patients benefits from this therapy. The presence of predictive biomarkers such as PD-L1 or high tumor mutational burden can explain some of the responses, but the causal mechanism and the cells involved in the induced anti-cancer reaction are still unclear.

Check-point inhibitors are largely efficient in tumors with intense T cell infiltration. However, most of solid tumors are characterized by moderate or low T cell infiltrates and T cell infiltration is not related to the abundance of immunogenic antigens. This suggests involvement of other important elements in the immune response, such as the antigen presentation machinery. There is also evidence that the innate immune system is of major importance, providing rapid response to the presence of tumor cells.

### Project plan

The project includes two different subprojects.

1. Laboratory work is needed to test, validate and apply immune markers for the recognition of the immune cells in the tumor tissue. This is an iterative process, which includes 'wet lab' work with antibodies, dyes and tissue sections to perform multiple immune staining. The following step is imaging through the

acquisition of multi-channel images and image analysis. This type of activity would be of highest interest for a student aiming to become a specialist pathologist.

2. Another part of the project is focused on the deep analysis of data from several immune panels and multiple patients and tumor types, which leads to the handling of large datasets. We are therefore looking for a highly motivated student with knowledge of R or Python.

### Contact details

Tobias Sjöblom, Professor

E-mail: [tobias.sjoblom@igp.uu.se](mailto:tobias.sjoblom@igp.uu.se)

Phone: 018-471 5036

