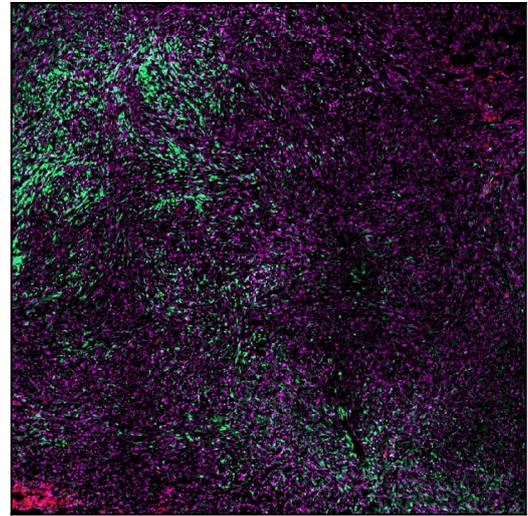


Uncovering the tricks used by tumors to escape the immune system by analyzing spatial transcriptomics and single-cell RNA sequencing patient data

One of the jobs of the immune system is to destroy tumor cells. Tumor cells use molecular tricks to lure the immune system into allowing them to grow. If we understood these tricks, we could design therapies that counter these tricks and help the immune system destroy tumors.

Therapies that counter the tricks of cancer cells are already used in the clinic. But they only help a minority of patients because we know only a few of the tricks that tumor have up their sleeves. How can we discover all the tricks used by tumors to escape the immune system?

That's the question you will work on in this project.



You will perform computational analyses on large-scale single-cell RNA sequencing and spatial transcriptomics datasets

To find out, you will analyze single-cell RNA sequencing (scRNAseq) and spatial transcriptomics (ST) data from cancer patients. You will combine these data with a new mathematical method which we are developing in the lab to reveal the tricks that tumors use to escape the immune system. We already validated the method using tumor single-cell RNAseq data. You will apply the method to spatial transcriptomics data, with the support of experienced bioinformaticians from the lab.

You will grow as a data scientist in biology

In doing so, you will grow your skills with the data science tools of Python, you will learn how mathematical thinking can reveal hidden order in complex datasets, and you will develop your understanding of cancer and tumor immunology.

Project organization

The project is located in Jean Hausser's lab at Karolinska Institutet & SciLifeLab (Stockholm). We are a team of 9 data scientists, mathematical theorists and experimentalists working on cracking how to help the immune system destroy tumors (www.hausserlab.org).

Month 1: learn data science tools of Python, familiarize with the spatial transcriptomics and scRNAseq dataset of the project

Month 2-3: apply method to identify tricks that tumors use to escape the immune system.

Month 4-5: expand analysis to transcriptomics and scRNAseq dataset from another cancer type; meet oncologist to share the findings

Month 6: write report, defend thesis

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