

Simulating growth of cancer and the immune system

In this project, we will investigate the effect of the patient's own immune system on the growth and death of tumor cells under treatment. Chemotherapy and many other cancer treatments have the ability to kill or severely limit the growth of cancer cells. However, because these medications are typically toxic, they also limit the patient's immune system, which then is not able to fight the cancer itself to the same degree. This is a problem because the patient's own immune system often contributes to fighting the cancer as well, and because it impairs the use of immunotherapy cancer treatments.

This project will focus on modelling the dynamics of populations of cancerous cells in acute myeloid leukemia. We will include the effects of the treatment as well as the immune system on the growth and death of the cells.

You will write a numerical simulation of a model that we will construct in collaboration with Prof. Ran Friedman, from the Department of Chemistry and Biomedical Sciences, Linnæus University in Kalmar, Sweden. You will run the simulations, perform parameter studies, and analyse the results. If necessary, you will run the simulations on high-performance computing facilities.

Recommended background

A basic programming course and an interest in modelling or programming. Basic knowledge of thermodynamics or statistical mechanics.

Supervisor

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Research environment: <http://syonax.net/science/research.html>.

Resources

The project may need to make use of high-performance computing resources that are already available through NTNU IT's HPC facilities.

Work load

This project is intended for a combined specialization project thesis and master thesis, i.e. 45 or 60 ECTS in total.