Universitat Pompeu Fabra Barcelona | Master in Bioinformatics for Health Sciences

Master project 2020-2021

Personal Information

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Project

Computational systems biology

Project Title:

Identification of synergistic drug combinations in autoimmune diseases through single-cell analysis

Keywords:

Autoimmune Disease; Combinatorial drug therapy; Single Cell RNA-seq; Network analysis; Personalized medicine

Summary:

Autoimmune diseases (ADs) are chronic inflammatory diseases that are present at a high frequency in our population. They include diseases like rheumatoid arthritis, psoriasis, lupus and inflammatory bowel disease. They cause a significant reduction in the quality of life of many patients and a significant increase in comorbidities. In the last decade there has been a big increase in number of therapies available to treat ADs. However, these therapies only work for a subset of patients and, in many cases, after a period of time their efficacy diminishes. In our group we are convinced that one solution to this major health problem would be the use of drug combinations. By identifying pairs of drugs that synergize their effect we could provide a more powerful therapy. The present master's thesis project is focused in this interesting research problem. To do so, the student will use single cell RNA-seq data on tissue and immune system cell samples, and different statistical and data mining tools to identify the most likely drug combination for a specific autoimmune disease. During this project, the student will learn a very novel type of data, will acquire advanced data analysis skills and interact with several other bioinformatics specialists in the group as well as clinical researchers.

References:

We have been recently granted a 5-year EU project on combinatorial therapies. We are the coordinators of this translational project, which includes single-cell data analysis. http://doctis.eu/

Expected skills::

Programming skills in R and Python Statistical analysis of data Biological knowledge

Possibility of funding::

No

Possible continuity with PhD: :

Yes

Comments:

While we don’t provide funding during the Master’s thesis, our aim is to integrate the candidate into our team and provide him/her with funding to be able to pursue his/her PhD.