Universitat Pompeu Fabra Barcelona | Master in Bioinformatics for Health Sciences

Master project 2020-2021

Personal Information

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Project

Computational genomics

Project Title:

Deep transcriptome characterization of the frontal cortex of frontotemporal lobar degeneration patients

Keywords:

Neurodegenerative disease; RNA sequencing; Transcriptome; Human brain; RNA alterations

Summary:

Frontotemporal lobar degeneration (FTLD) is a neuropathological term for a group of neurodegenerative dementias, mainly characterized by the aberrant deposition of TDP-43 (FTLD-TDP) or tau (FTLD-tau) proteins in the frontal and temporal lobes. Dysfunction of the RNA metabolism has proven to be one of the major pathological hallmarks of FTLD. In order to investigate RNA alterations in FTLD human brains, we have performed high-throughput RNA sequencing (encompassing total and small RNA) to deeply characterize the transcriptome of the frontal cortex of 12 FTLD-tau, 20 FTLD-TDP and 10 healthy controls. In this project, bioinformatics tools will be applied in order to disentangle gene and isoform differential expression, gene co-expression networks and alternative splicing events associated with FTLD which will be integrated with small RNA sequencing data from the same individuals. Finally, cell-type deconvolution algorithms using human single-nucleus RNA sequencing data will be applied to disentangle cellular heterogeneity in FTLD. Since this approach has not yet been performed in this neurodegenerative disorder, outcomes from this study will have a very high potential to be published in specialized journals.

Expected skills::

Linux/Ubuntu, R and python

Possibility of funding::

To be discussed

Possible continuity with PhD: :

To be discussed