AIPD
Marie Skłodowska-Curie
Doctoral Network

AIPD-DC14-RCSI

Identification of Molecular PD Endophenotypes

- **Host Institution:** RCSI University of Medicine & Health Sciences
- **Country Host Institution:** Ireland
- **PhD Enrolment:** RCSI University of Medicine & Health Sciences
- **Start Date:** October 2025
- **Duration:** 36 months
- **Official PhD Supervisor:** Niamh M. Connolly

Research Objectives

PD is a heterogeneous neurological condition, and there is significant demand for peripheral biomarkers for patient stratification. The aim of this project is to apply data integration and network inference approaches to derive PD endophenotype signatures for blood-based stratification of PD patients. Specific objectives: 1) Identify multi-modal clusters of co-expressed genes/proteins and gene-regulatory networks associated with disease state; 2) Derive peripheral PD endophenotype signatures; 3) Refine gene signatures for future clinical application. The student will first apply correlationbased network inference approaches on independent multi-'omic datasets (transcriptome, proteome) from LuxPark and PPMI to identify clusters of co-expressed genes/proteins using unsupervised learning approaches (e.g., MOFA+, clustering, correlation analyses). Data integration approaches incorporating specific genomic markers (e.g., GWAS hits, mutation rates) will then be used to construct multi-modal clusters and infer de novo regulatory networks. Clusters/networks will be correlated with clinical data (disease diagnosis, symptoms, stage) to identify functional clusters associated with particular disease states. Critical regulatory nodes/pathways will be identified by integrating differential expression and network analysis (e.g., centrality). At PETA, the student will apply AI/ML and XAI techniques that can predict an individual's disease molecular disease endotype. Biomarker signatures will be compared with findings obtained by DR8, i.e. DCs8 and 14 will closely collaborate. DC14 will also collaborate with DC2 due to the common focus on disease stratification (DC2: phenotype level, DC14: molecular level).

Expected Results

- Blood-based endophenotypes of PD
- AI/ML models for patient stratification using blood-based biomarker signatures

Planned Secondment(s)

- Host: Petanux
  - **Duration:** 18 months
  - **Purpose:** Apply AI/ML to predict endophenotype

This project is part of the "Precision Neurology" work package.

Applications are now closed
this position. Thank you
your interest.

MORE INFO

Information

pplication and Selection ocedure

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Online in Internet; URL: https://www.aipd-dn.eu/en/vacancies/AIPD-DC14-RCSI.html

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