Master 2 internship in bioinformatics/biostatistics

Title: Omics datasets to predict chronic kidney allograft rejection from blood biomarkers

Supervisor: Pr. Sophie Limou

Location: Centre de Recherche Translationnelle en Transplantation et Immunologie (CR2TI), Inserm UMR1064, CHU de Nantes, 30 bd Jean Monnet, Nantes.

Background: Kidney transplantation is currently the best treatment of end-stage renal disease, improving both patient survival and quality of life. Development of efficient immunosuppressive treatments has significantly improved the 1-yr graft survival rate, but the long-term graft survival has remained stable over the past 30 years (60% at 10-yrs). Antibody-mediated rejection is the primary cause of graft loss, but its diagnosis through biopsy is an invasive and risky procedure and therapeutical interventions remain limited. Limiting chronic graft loss is all the more essential as the number of patients on waiting list has been increasing for a stable number of available grafts over the last decades.

So far, few omic strategies have been implemented to investigate chronic kidney graft loss and most of them had limited power, notably due to the challenges of collecting relevant material. Nevertheless, two omic studies identified a B cell signature in PBMC associated with graft rejection at a transcriptomic and epigenomic (DNA methylation) levels. However, no clear molecular pathway for chronic graft rejection has been characterized due to limited sample sizes.

Objectives: We collected genomic (GWAS) and transcriptomic (RNAseq) data on 167 blood samples from kidney transplanted patients experiencing or not chronic allograft rejection. We will start collecting DNA methylation profiles on these samples by the end of 2023. In addition, we have collected GWAS data for over 4,000 individuals. The intern will leverage these large datasets to investigate the impact of blood biomarkers (genetic or gene expression level or gene regulation) from kidney transplanted patients on chronic allograft rejection and prioritize molecular regulation networks. In a second step, the intern will assess the predictive and diagnosis potential of the identified blood biomarkers using AI tools to build composite scores. This internship will require the use of genomic and bioinformatic tools (*e.g.* Snakemake, Plink, Bcftools) and the manipulation of R and Python packages.

Important: The internship is adapted for bioinformaticians or computer scientists with an interest for the biomedical field (the biological skills can be acquired during the internship).

Application process: Please send a CV and application letter to Sophie Limou (sophie.limou@univ-nantes.fr)