Internship Proposition
(one page max)

Master 2 GP Immunology & ImmunoIntervention (I^3)
2025-2026

Lab: CR2TI

Team: 3 iTHINK

Name and position of the supervisor: Nicolas Vince, Researcher

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Candidate (if internship filled):

Title of the internship: Assessing performance of low-pass sequencing in complex genomic regions (HLA, KIR)

Summary of the internship proposal:

Low-pass sequencing was developed as an alternative to chip array SNP genotyping, offering a cost-effective way to sequence the whole genome at a lower depth (0.1-5X) compared to the standard 30X used in next-generation sequencing (NGS). As in chip array methodology, the goal is to capture common genetic variation, although some rare variations may be missed. This method offers several benefits: lower cost, faster throughput, reduced computational demands, and less storage space. It can be complemented with classical SNP imputation, providing better coverage of common genetic variants compared to the classical chip array. However, the performance of low-pass sequencing in complex genomic regions, such as HLA and KIR, has not been evaluated. Low-pass sequencing will present many missing alleles, and homozygous sites with very low coverage might lead to heterozygous calls due to biased chromosome sampling. Imputing HLA and KIR alleles from this data is challenging, and requires careful data treatment (introducing missing alleles in unlikely genotypes for instance) before imputation. We propose to assess the coverage and accuracy of low-pass sequencing in complex genomic regions (HLA, KIR) and the possibility of using imputation to obtain high-quality alleles. To achieve this, we generated data from 24 individuals using SNP genotyping chip array, HLA/KIR typing and low-pass sequencing. If successful, this could lower the cost of HLA and KIR typing and accelerate research on immune-related diseases.

Option(s) linked to the project:

☐ Clinical Research Profile (Recherche Clinique)
☒ Data Analyst Profile (Recherche et Analyse de Données Omiques)
☐ Experimental Biology Profile (Recherche Expérimentale)

Form to be sent by email to : gpi3@univ-nantes.fr