Lab: CRCI2NA
Team: Team 7 – Group CP2C (https://www.univ-nantes.fr/vincent-guen)
Name and position of the supervisor: Vincent GUEN, Inserm Investigator, PhD-HDR
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Candidate: M2 Bioinformatics
Title of the internship: Investigating cellular heterogeneity plasticity and signaling in the mammary gland during the reproductive cycle and in young onset-breast cancers

Summary of the internship proposal: The adult mammary gland is an organ that has the fascinating property of developing during the reproductive cycle for lactation before regressing to a virgin-like state. The control of these physiological processes involves numerous cell types that transit through different phenotypic states and communicate by paracrine signaling in a dynamic cellular ecosystem. The diversity and plasticity of cells that communicate with each other to regulate tissue remodeling during the reproductive cycle remain poorly understood. Dysfunctions of these processes lead to aggressive breast cancers in young women. We have generated spatial transcriptomic (10X) and scRNAseq (SeqWell) data from the analysis of mammary glands at distinct developmental stages during the reproductive cycle and of breast cancers to get additional insights into these physiological and pathological conditions.

Goal of the project The student's mission will be to participate in the analysis of raw data from spatial transcriptomics and scRNAseq analyses to develop cellular atlases of mammary glands at different stages of the reproductive cycle and in breast cancers. Briefly, bioinformatics analyzes will be carried out to characterize cellular heterogeneity within the population of cells analyzed using conventional approaches and tools (R Seurat package). The most significant transcripts from each cell clusters will be studied in order to establish specific signatures for each group of cells. The student will participate in the study of intercellular communications at each stage of development through the use of different tools (CellChat, LIANA, CellPhoneDB). He/she will also participate in the analysis cellular differentiation trajectories during the reproductive cycle (Slingshot, Monocle) and in breast cancers.

Expected results The project will reveal new knowledge about the physiology of the mammary gland during the reproductive cycle and about early-onset breast cancers. Breast cancers in young women represent an increasing group of aggressive tumors. The causes are still poorly understood. The internship will provide highly new insights into this group of aggressive tumors.

Option(s) linked to the project:
☐ Clinical Research Profile
☒ Data Analyst Profile
☐ Experimental Biology Profile