Computational biologist in single cell OMICS applied to immune-oncology

The CISTAR Laboratory " **C**ancer **I**mmune **S**urveillance and **T**herapeutic t**AR**geting"
<u>Head</u>: Dr C. Caux, Cancer Research Center of Lyon (CRCL)

Position Summary

We are seeking a highly motivated and scientifically driven computational biologist/bioinformatician who will bring his/her expertise to contribute to the efforts of the team in identifying key immune surveillance pathways and immune escape mechanisms operating in tumors. The successful candidate will take the lead of a project that aims to identify novel immunosurveillance pathways by performing a comprehensive comparison of tumors from patients with a paraneoplastic neurological syndrome (PNS) and conventional non-PNS tumors through computational analysis of single cell RNA-sequencing data of immune cells, tumor cells and stromal cells, antigen receptor sequencing data and of spatial data of the tumor immune contexture based on multispectral immunofluorescence tissue imaging. It follows our recent observations with the team of J. Honnorat (INMG Lyon) that ovarian and breast carcinomas from PNS patients differed from their non-PNS counterpart by a massive infiltration by CD8 T cells and antibody producing plasma cells, as well as signs of tumor immune attack, indicating efficient and concomitant *in situ* anti-tumor cellular and humoral immunity. This project is part of a large effort of the team to discover novel tumor immune surveillance pathways using single cell OMICS in early versus advanced tumors, for which the candidate is also expected to participate according to his/her skills.
Contract: **2 years** with possible extension to 3 years.

Recent publications from the lab related to the field
- Small M et al. (2018) Genetic alterations and tumor immune attack in Yo paraneoplastic cerebellar degeneration. Acta Neuropathol. 135(4):569-579.
- Chefdeville et al. (2019) Immunopathological characterization of ovarian teratomas associated with anti-N-Methyl-D-Aspartate receptor encephalitis. Acta Neuropathol. Com. 7(1):38.
- Hubert et al. (2020). IFN-III Is Selectively Produced by cDC1 and Predicts Good Clinical Outcome in Breast Cancer. Science Immunology 5(46).

Responsibilities
- Use and adapt existing pipelines and develop novel computational methods to analyze complex scRNAseq datasets to identify features/pathways in immune cells, tumor cells and/or stromal cells associated with the higher immunogenicity of PNS tumors
- Exploit TCR-seq and BCR-seq data to provide a comprehensive picture of B and T cell clonotype diversity and cell trajectories in relation to their transcriptomic features
- Implement computational methods to calculate cell-cell proximity metrics and infer cell neighborhoods from raw data of multiplex-immunofluorescence tumor tissue staining
- Interact with the immunologists of the team to optimize the design of dry experiments and best adapt the analysis pipelines to the complexity of the tumor immune ecosystem and to the project objectives
- Contribute to data integration/synthesis and to the writing of papers
- Keep abreast of emerging methods in computational biology/bioinformatics

Skills and qualifications
- PhD in Bioinformatics, Computational Biology, Systems Biology/Immunology or related field with at least 1 first author paper or Master/Engineer degree in the same fields with > 1 year experience. Candidates with a PhD in immunology and proven expertise in bioinformatics/computational biology are also welcome to apply.
- Experience in utilizing Python and R programming languages as well as bioinformatics pipeline development

- Prior experience in working with high dimensional single cell omics datasets is a plus
- Ability to be inventive and to present novel ideas in method development, data analysis and interpretation
- Knowledge of tumor immunobiology will be considered as an advantage. At least, curiosity for immunology and willingness to learn its basic aspects applied to oncology is required
- Strong problem-solving skills and ability to work independently
- Strong collaboration skills and ability to evolve in a multidisciplinary research environment
- Excellent organizational and time management skills
- Strong oral and written communication skills

Host Lab
The team "Cancer Immune Surveillance and Therapeutic Targeting" (CISTAR) is part of the Cancer Research Center of Lyon (CRCL, www.crcl.fr) and is composed of researchers, clinicians, technicians and PhD students all devoted to identify new tumor immune surveillance and escape networks to improve cancer treatments. It already hosts 2 bioinformaticians and collaborate with the CRCL Gilles Thomas bioinformatics platform since several years. The team benefits from long-standing interactions with clinicians of CLB and HCL and is part of various networks/consortiums, including the RHU-BETPSY, which fund the position. The CRCL is a renowned and dynamic research center which benefits from state-of-the-art technological facilities for flow cytometry, cell and molecular biology, bulk and single cell sequencing, spatial transcriptomics, spatial tissue imaging and *in vivo/ex vivo* models.

Application
Interested candidates should submit a motivation letter, CV and contact details of 2 references to Bertrand Dubois (Bertrand.dubois@lyon.unicancer.fr). The position is to be filled as soon as possible. **The closing date for applications is October 15 2022.**

CRCL - Cancer Research Center of Lyon - INSERM-1052, CNRS-5286, Université de Lyon, CLB
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