Post-doctoral position for single cell analysis to study tumor heterogeneity

Keywords: Cancer, single cell analysis, 10x genomics, transcriptome, RNA-sequencing

Missions and activity of the recruited scientist: Recent advances in technologies have allowed to perform analyses with unprecedented levels of precision and sensitivity to achieve deep characterization of cancer including the characterization of genetic and epigenetic alterations as well as heterogeneity within tumours. Among these methods, single cell RNA-sequencing allows to perform such studies at the single cell level instead of a global cell population. It consequently offers a unique opportunity to characterize interactions between cancer cells within the tumour as well as between cancer cells and their environment. These tools should yield to a better understanding of the tumor molecular classification but also on the mechanisms implicated in cancer recurrence and/or resistance to treatments. In this context, droplet-based microfluidics allow such single cell analysis with a very high precision and throughput.

We propose to develop single cell approaches to study tumour heterogeneity in colorectal cancer. These developments are central to a larger collaborative project, aiming at studying interactions between the heterogeneity at the genome scale and microenvironment in several cancer model (Hetcoli project, see http://hteprogram.com/our-networks/hetcoli/).

Candidate profile: The ideal candidate, post doc or research engineer, should have a robust experience in droplet-based single cell RNA-sequencing (10x genomics platform) including sample preparation (tissue dissociation and sample treatment) and data analysis. Strong experiences in cell biology, data analysis and strong academic background are required.

Objectives and proposed position: The candidate should achieve the development of robust strategies and protocols to perform single cell transcriptomic analyses of freshly dissociated tumour samples.

The successful candidate will be offered a 18-month contract with salary depending on candidate's experience. The objective is to apply for long-term post-doctoral fundings in "Fondation de France", ARC foundation, "Ligue nationale contre le cancer", etc.

Description of the place of work:

CRC is a research centre of excellence located in the centre of Paris. CRC develops fundamental, translational and clinical research in the field of biology and health. CRC's research projects are multidisciplinary, mainly in the fields of oncology, immunology, the study of metabolism and the major physiological functions of the body. In January 2019, CRC has more than 500 people working in 17 teams in three departments with 3 ISO9001-certified technology platforms. CRC is headed by Professor Jessica Zucman-Rossi, a specialist in oncology and tumour genomics. The Cordeliers Research Centre is administrated by Inserm, Sorbonne University, Paris Descartes and Paris Diderot Universities with the participation of the CNRS and the University Paris Nord.

The MEPPOT team (headed by P. Laurent-Puig/V. Taly within the « Genome and cancer department ») research is dedicated to the improvement of personalized medicine, mainly in the cancer field through several axes. One main research axis is centred on the elucidation of the diversity of different tumour types (colon, lung, pancreas) through molecular profiling of large collections of tumours.. A second axis is the development of new biomarkers for diagnosis and prognosis in various cancers (colon, lung, pancreas, stomach, ovary). This axis encompasses basic science for the identification step, technology development (notably microfluidic tools) to optimize detection, large-scale validation and transfer to the clinics. We are also developing liquid biopsy monitoring approaches that allow detection of rare, non-targeted genetic or epigenetic alterations for patient follow-up. Our approaches combine deep molecular and phenotypic analysis of tumours including its microenvironment on the one hand and liquid biopsies on the other hand with a large range of cutting edge methods including high depth/highly sensitive NGS, droplet-based digital PCR and transcriptomic analyses (including droplet-based single cell analysis). Our work is strongly built on several large cohorts of patients obtained thanks to our strong link with European Georges Pompidou Hospital (HEGP), our participation to several trials or national and international multi-centric collaborations. Our approaches also include in silico bioinformatics studies within the team and through several collaborations including the French League Against Cancer ('identity card" research program). Cell-based studies including bulk or single cell analysis within 2D and 3D cultures are also central to our research. Microfluidic systems are central to many developments and translational research performed in the laboratory. Various animal models are also used for example to validate developed therapeutic strategies.

Elements to be provided for your application:

Applications should be sent by email at valerie.taly@inserm.fr and include a CV, a cover letter and a names of referees.