MuSkLE
PhD programme
Building, maintaining and repairing the functional locomotor system

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PhD Position 22 job vacancy

Reference:	**PP22**
Title:	**Computational modeling of tumor immune microenvironment dynamics under exercise and neoadjuvant chemo-immunotherapy**
Hiring institution:	**CLB**
Location:	Cancer Research Centre of Lyon (CRCL) / Centre Léon Bérard (CLB)– Lyon, France
Start date:	As from 1st September 2027
Duration:	36 months
Application deadline:	15th January 2027

Job description

Objective:

Neoadjuvant chemo-immunotherapy (chemoIO) is now a standard treatment for resectable non-small cell lung cancer (NSCLC). Despite significant improvement in pathological response rates and event-free survival, responses remain highly heterogeneous across patients. Understanding the biological determinants of this variability represents a major translational research challenge, particularly given the central role of the tumor microenvironment (TME) in modulating the efficacy of immunotherapies.

Physical exercise is increasingly recognized as a potential modulator of anti-tumor immunity and TME composition. However, its impact on the cellular, molecular, and spatial organization of the human TME remains largely unexplored. We hypothesize that exercise performed during neoadjuvant chemoIO may reprogram the TME toward a state more favorable to therapeutic response.

This PhD project is embedded within the ERICA-02 randomized prospective trial, which evaluates the preliminary effects of a structured physical exercise program administered during neo-adjuvant chemo-immunotherapy in 40 patients with resectable NSCLC. Using paired pre- and post-treatment tumor samples, the candidate will investigate how treatment and exercise influence TME composition, immune activation, and spatial organization.

The project combines bulk RNAseq and multiplex spatial imaging (CODEX) to characterize TME remodeling. Transcriptomics analyses will identify cellular deconvolution of tumor, immune cell populations and identification of transcriptional signatures associated with immune activation or resistance. The analysis of exercise-associated changes in the TME will be interpreted in relation to a reference framework describing the natural dynamics of TME remodeling under neoadjuvant chemoIO in the absence of any intervention, thus allowing to distinguish treatment-related changes from those potentially attributable to physical exercise.

The work will be conducted in 3 phases:

1) **Analysis of the IMMUCAN NSCLC cohort (EU-IMI2)** to establish and validate transcriptomic and spatial bioinformatics pipelines.
2) **Retrospective analysis of an independent cohort of 27 NSCLC patients** treated with neoadjuvant chemoIO without exercise, allowing formulation of mechanistic hypotheses regarding TME dynamics under treatment pressure.
3) **Analysis of ERICA-02 samples** to determine the specific impact of physical exercise on the TME composition, functional activation, and spatial organization.

In summary, the PhD student will determine whether physical exercise can remodel the TME and thereby improve response to neoadjuvant chemoIO in patients with resectable NSCLC, using an integrative bulk transcriptomic and spatial approach.

Collaborations and co-supervisions:	The project will be carried out within the CASTING team (Cancer Dynamics, Adaptation and Modeling) at the CRCL, as part of a collaboration with the Department of Cancer Prevention and Environment (DCPE) and the Department of Medical Oncology at CLB. The PhD student will evolve in a multidisciplinary environment bringing together bioinformaticians, immunologists, exercise physiologists, and clinicians, and will be jointly supervised by Pierre Saintigny (Professor of Medicine at Lyon 1 University and CASTING team leader at CRCL), and Manon Gouez (Researcher in Exercise Oncology, PhD) at the DCPE.
Supervisors:	Pierre Saintigny – pierre.saintigny@lyon.unicancer.fr Manon Gouez – manon.gouez@lyon.unicancer.fr
Place of work:	Cancer Research Centre of Lyon, Centre Léon Bérard, Lyon, France
Required degree	Master's degree (MSc) or equivalent (engineer degree) in bioinformatics/computational biology.
Skills/Experience:	• Knowledge in cancer biology and cancer immunology will be highly appreciated. • Strong interest in translational oncology, cancer biology and immunology • Proficiency in scientific programming (R and/or Python) • Solid foundation in bioinformatics and/or computational biology • Autonomy, scientific rigor, and critical thinking • Ability to work effectively in a multidisciplinary team
Keywords	Bioinformatics – Computational biology - Tumor immune microenvironment - Exercise oncology - Neoadjuvant chemo-immunotherapy – lung cancer

Mandatory requirements

Eligibility:	The doctoral fellow: - should not have resided or carried out his/her main activity (work, study) in the country where he/she is being recruited, i.e., France, **for more than 12 months in the 3 years before the application call deadline,** unless this time was part of a compulsory national service or a procedure for obtaining refugee status under the Geneva Convention. - **must be in possession of a master's degree** at the date of the call deadline. Applicants who have completed their cursus but not yet been awarded the formal master's degree by that date will not be considered eligible. - must be **a doctoral candidate** (not already in possession of a doctoral degree at the date of the application call deadline).
Languages:	Oral and written skills must meet the standards of academic English used in international research.

Job details

Type of contract:	Full time position
Gross salary:	The monthly **living allowance, including employer and employees' social charges, is €3,913.** This amount corresponds to a gross monthly salary estimated to €2402.85, and to an estimated net monthly salary before income tax of €1788.65 (after deduction of the contribution to the additional insurance). On top of the monthly salary, the doctoral fellow will have access to a budget of 4752 € to cover relocation expenses.
Other benefits:	**Social Protection**: The doctoral fellow will benefit from **full social security coverage**, including health insurance, unemployment insurance, and pension contributions. He/she will also have access to occupational health services (*médecine du travail*), as required by French labour law. **Additional Insurance**: The candidate will take out supplementary health insurance, which is mandatory. €73.20 is payable by the employee and €79.32 by the employer. **Paid Leave**: The doctoral fellow is entitled to up to **25 days of paid leave annually** and up to 32 days of so-called "RTT" (compensation time for extra hours worked under the French 35-hour work week law) in accordance with national labour law, and will enjoy the same employment rights as other public-sector employees, including student union membership. **Transport**: The doctoral fellow benefits from significantly **reduced fares on public transport**, available in all partner cities. Additionally, the host institution will cover 50% of the monthly transportation costs. **Other benefits:** - Home office: the doctoral fellow may work from home for up to 8 days per month. - Meals: the doctoral fellow will have access to the cafeteria at a preferential rate of €3 to €7 per meal, and will benefit from a 20% discount at the Relais H on sandwiches, drinks, salads and desserts.