

What is the ExposUM Doctoral Nexus?

PhD funding opportunities in Montpellier, France : ExposUM Doctoral Nexus

A Doctoral Nexus, as proposed by the [ExposUM Institute](#), brings together networks of three to four PhD students from diverse disciplinary backgrounds, affiliated with at least two distinct research units.

Unlike traditional PhD programs, a Doctoral Nexus is designed to enhance collaborative skills and the ability to develop transdisciplinary projects, while allowing students to deepen their own field of expertise.

Nexus doctoral students will benefit from a dedicated training program and will have the opportunity to organize seminars within their Nexus network.

The ExposUM Institute provides full funding for four years, covering both the PhD students' salaries and an environmental allowance.

The context of the thesis: This thesis will be conducted under the supervision of Valérie Zimmermann in the "Hematopoiesis and Immunotherapy" laboratory at the Institut de génétique moléculaire de Montpellier (www.igmm.cnrs.fr), as part of the Nexus Nutri-CART project, which also includes the teams of Sofia Kossida (IGH) and Marie Péquignot (INM/Genopolys).

The proposed project builds on the team's previous work focusing on the role of metabolism in T cell function and the improvement of the efficacy of CAR-T cell (chimeric antigen receptor T cell) therapies (1-4). Indeed, due to their efficacy compared to previous conventional treatments, CAR-T cell therapies have become the standard treatment for various relapsed or refractory B-cell lymphoproliferative disorders, such as diffuse large B-cell lymphoma (DLBCL), within a few years. However, about 50% of patients remain refractory or relapse, highlighting the importance of continuing to improve these therapies. One factor associated with the failure of these therapies is linked to a defect in the proliferation or persistence of CAR-T cells, as well as an alteration of their phenotype, including a loss of functionality and the acquisition of an exhausted phenotype. Our previous results, along with those from other groups, have clearly established that metabolism is a key element regulating T cell function (5).

More generally, it is now accepted that diet can influence a person's immune status; for example, a "Western" diet is associated with higher levels of inflammation compared to a Mediterranean or fiber-rich diet (6). Recent studies have also shown a beneficial effect of certain metabolites or diets on responses to chemotherapy or antibody immunotherapy treatments (7). Taken together, these data, combined with our recent findings, led us to hypothesize that modulating the metabolic environment could represent an interesting strategy to improve the efficacy of CAR-T cells. Specifically, the thesis project will focus on the role of metabolism both during the in vivo expansion/persistence of CAR-T cells and during

the ex vivo production/generation stages of these cell-based drugs. With this in mind, the project will consist of two main axes: the first focusing on establishing parameters to optimize the ex vivo production of CAR-T cells, and the second on determining the impact of specific diets on the in vivo efficacy of CAR-T cells in murine models.

1. Klysz D, Tai X, *et al.* Glutamine-dependent α -ketoglutarate production regulates the balance between T helper 1 cell and regulatory T cell generation. *Sci Signal* (2015) 8(396):ra97
2. Clerc I, Abba Moussa D, Vahlas Z, Tardito S, Oburoglu L, Hope TJ, Sitbon M, Dardalhon V, Mongellaz C, Taylor N. Entry of glucose- and glutamine-derived carbons into the citric acid cycle supports early steps of HIV-1 infection in CD4 T cells. *Nat Metab* (2019) 1:717–730.
3. Matias MI, Yong CS, *et al.* Regulatory T cell differentiation is controlled by aKG-induced alterations in mitochondrial metabolism and lipid metabolism. *Cell Reports* (2021) 37(5):109911
4. Lamure S, Van Laethem F, *et al.* Clinical and Product Features Associated with Outcome of DLBCL Patients to CD19-Targeted CAR T-Cell Therapy. *Cancers (Basel)* (2021) 13(17):4279
5. Ma S, Ming Y, Wu J, Cui G. Cellular metabolism regulates the differentiation and function of T-cell subsets. *Cell Mol Immunol.* 2024, 21(5):419-435.
6. Itsiopoulos C, Mayr HL, Thomas CJ. The anti-inflammatory effects of a Mediterranean diet: a review. *Curr Opin Clin Nutr Metab Care.* 2022;25:415–22.
7. Kian N, Behrouzieh S, Razi S, Rezaei N. Diet Influences Immunotherapy Outcomes in Cancer Patients: A Literature Review. *Nutr Cancer.* 2023;75(2):415-429. doi: 10.1080/01635581.2022.2133151

Planned start date: 10/01/2026

The title of the doctoral student's position: Evaluation of the impact of metabolism on the anti-tumoral CAR-T cell response

Main mission: The student will need to take charge of the proposed PhD project, first, carrying out the planned experiments in consultation with his/her supervisor and analyzing the results obtained. He/she will learn to interpret the results within the context of the field of study notably through bibliographic research and discussion with colleagues. The student will regularly present his/her results and bibliographic researches during laboratory meetings and journal clubs (weekly meetings), as well as to the other project partners and, when the opportunity arises, at national and international conferences. In doing so, he/she will gradually gain greater independence, enabling him/her to take an active role and contribute ideas to the direction of his/her PhD project.

Activities:

Performing and analyzing experiments (cell culture, vector production, flow cytometry, metabolic analyses, in vivo experiments in mouse models, monitoring tumor growth, etc.)

Compiling experimental reports

Presenting results

Reviewing literature

Participating in laboratory life (stocks, ordering, etc.)

Expected skills and qualifications:

Training in immunohematology, cell biology, and oncology
Knowledge of metabolism and immunohematology
Motivation
Curiosity and enthusiasm
Organizational and analytical skills
Ability to work both independently and as part of a team
Ability to present findings orally and in writing in French and English

Diploma/field required:

Master 2 or equivalent diploma in immunology, hematology, cell biology or cancer biology

Key words: Biological Sciences

CNU section to which the applicant belongs: 65 (cell biology) or 47 (Cancerology, genetic, hematology, immunology)

Application procedure

The application must include the following

- A CV
- A letter of motivation
- The name and coordinates of at least one referee
- A copy of the diploma required for enrollment or, if unavailable, the most recent transcripts from Master 2 (semester 1 and/or semester 2)
- Any specific elements **possibly** required by the Doctoral School CBS2 (<http://edcbs2.umontpellier.fr/>)

If you would like to apply for this position, please send an e-mail to the thesis director Valérie Zimmermann (valerie.zimmermann@igmm.cnrs.fr) with a CC to exposum-aap@umontpellier.fr to inform them of your interest.

Application deadline : Before 05/24/2026, 5:00 pm CET



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KEY FIGURES



RESEARCH CENTERS

From space exploration and robotics to ecological engineering and chronic diseases, UM researchers are inventing tomorrow's solutions for mankind and the environment. Dynamic research, conducted in close collaboration with research organizations and benefiting from high-level technological platforms to meet the needs of 21st century society.

The UM is committed to promoting its cutting-edge research by forging close links with local industry, particularly in the biomedical and new technologies sectors.

More Information: <https://www.umontpellier.fr/en/recherche/unites-de-recherche>

SCIENTIFIC APPEAL

Open to the world, the University of Montpellier contributes to the structuring of the European higher education area, and strengthens its international positioning and attractiveness, in close collaboration with its partners in the I-SITE Program of Excellence, through programs adapted to the major scientific challenges it faces.

More Information: <https://www.umontpellier.fr/en/international/attractivite-scientifique>



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