PhD opportunity - RNA Polymerase II Citrullination as a Regulator of Transcriptional Control in Triple-Negative Breast Cancer

This PhD opportunity is offered through the BEST Doctoral Programme, led by the **University of Toulouse** and co-funded by the **European Union** through **Horizon Europe – Marie Skłodowska-Curie Actions (MSCA COFUND)** and the **Toulouse Initiative for Research's Impact on Society** (TIRIS). Thanks to this programme, **19 doctoral candidates** will be recruited through an international co-supervision scheme across three major TIRIS thematic pillars : Health & Well-being, Global Changes and Sustainable Transitions. The entire recruitment process will take place between November 2026 and April 2027 and will be managed by the **University of Toulouse (UT)**.

Host Institution	Institute of Pharmacology and Structural Biology, Centre National de la Recherche Scientifique, University of Toulouse, France
Supervisor	**Priyanka Sharma -** Epigenetic Mechanisms in Cancer
Co-supervising institution	National Center for Biotechnology, Madrid, Spain
Co-supervisor	Juan Torreño Piña
Contract duration: 36-month	**Starting date:** September/October 2027

Please contact us at international@ipbs.fr for any questions regarding IPBS and/or the recruitment process.

Research topic

Cancer progression is driven by transcriptional programs that are regulated not only by transcription factors but also by post-translational modifications (PTMs), which fine-tune protein function and cellular signaling. Among these PTMs, protein citrullination has emerged as an important regulatory PTM involved in oncogenesis. Citrullination is the enzymatic conversion of peptidyl-arginine to peptidyl-citrulline, catalyzed by the peptidyl arginine deiminase (PADI) family of enzymes. This modification increases protein hydrophobicity and alters protein conformation, thereby affecting hydrogen bond formation, protein structure, protein–protein interactions, and protein–nucleic acid interactions (1–4). Consequently, citrullination has been implicated in the regulation of histone–DNA interactions, gene expression, and protein aggregation (1,5–9), suggesting a broad role in controlling essential cellular processes. Among the PADI family members, PADI2 is the most frequently overexpressed enzyme across several tumor types, including breast cancer (2,10–15). Our recent studies identified PADI2-mediated citrullination of arginine 1810 (Cit1810) on RNA polymerase II (RNAPII) as a critical regulator of transcription and cell proliferation in breast cancer cells (2,4,16-17).

Moreover, our recent analysis pointed out that elevated PADI2 expression is associated with aggressive breast cancer, highlighting PADI2-mediated RNAPII citrullination as a potentially underrecognized mechanism by which TNBC cells may exploit the transcriptional apparatus to sustain malignant transcriptional states.

The project aims to elucidate the molecular mechanisms through which PADI2-mediated Cit1810 RNAPII regulates transcription and to evaluate its clinical relevance in TNBC patient samples. These studies will provide fundamental insights into transcriptional regulation in aggressive breast cancers and may uncover novel therapeutic opportunities for TNBC treatment.

Keywords: Arginine citrullination, RNA polymerase II, Triple-Negative Breast Cancer, high-resolution microscopy, Therapeutic strategies

International Co-supervision

The Ph.D student will be jointly supervised by Dr. Priyanka Sharma (Epigenetic Mechanisms in Cancer Team, IPBS, Toulouse, France) and Dr. Juan Torreño Piña (Single Molecule Nanoimaging of Cell Membrane Glycoprocesses Team, National Center for Biotechnology, CSIC, Madrid, Spain). In addition, the project will be conducted in close collaboration with Dr. R.L. Kosinsky at the Robert Bosch Center for Tumor Diseases, Stuttgart, Germany, an expert in chromatin profiling analysis approaches. This collaboration will provide complimentary access to advanced epigenomic methodologies and strengthen the molecular characterization of the study. The project will also benefit from close interaction with the senior clinician at Oncopole, Toulouse. This clinical partnership will provide the doctoral candidate with valuable translational insight and access to a highly multidisciplinary oncology research environment. Overall, these collaborations will offer the selected candidate a unique opportunity to work across complementary areas of expertise in a multidisciplinary setting spanning basic, technological, and clinical research.

Experience/Skills required :

- Hold, by 23 November 2026, a Master's degree or an equivalent qualification and not hold a doctoral degree.
- Have not resided in France or carried out your main activity in France for more than 12 months during the 36 months immediately preceding 23 November 2026. Periods of stay as a tourist, refugee, or time spent in national service, are not considered as residency.
- Have a B2 level of English
- Have a strong interest in chromatin biology, biophysics, and transcriptional regulation, who is eager to apply advanced methodologies to address key scientific questions.
- Have a strong learning spirit, be willing to learn basic French, and possess advanced English skills for effective writing and communication.

Application Process

Call for application - 23 November 2026

Applications must be submitted online through the application platform : edd-projets.utoulouse.fr

Please contact us at international@ipbs.fr before applying, or if you have any questions regarding IPBS or the recruitment process. Please use the following email subject line: BEST call – [Supervisor name].

Eligibility check - 24 to 30 November 2026
Written evaluation - 4 December to 15 January 2027
Consolidation of pre-selected projects - 19 January to 19 March 2027
Oral evaluation - 29 March to 4 April 2027
Result - April 2027
Starting date: September/October 2027 (Contract duration: 36 months)

For additional information: https://doctorat.univ-toulouse.fr/cofund-best

About the IPBS

Located in Toulouse, in the sunny southwestern of France, IPBS is a leading research institute affiliated with the National Center for Scientific Research (CNRS) - the largest public research organization in France - and the University of Toulouse . The institute brings together **19 research groups**.

IPBS conducts state-of the-art research in *cancer biology, immunology, microbiology, structural biology and biophysics.* It is a world leader in the discovery, characterization, validation and exploitation of novel pathways and pharmacological targets in the fields of cancer, infection, and inflammation. The institue combines molecular and cellular biology approaches and in vivo experiments.

IPBS offers an **international and interdisciplinary research environment**, with access to advanced facilities and opportunities for scientific and career development. The institute benefits from **a collaborative and international scientific culture**, and is committed to promoting equality, diversity and inclusivity.