Job offer – Post-doctorate in Cell Biology of Skin Pigmentation
(*For non-French scientists only*)

Research Project Short Title as Submitted to CEFIPRA: "Decoding the biology of pigment organelles in skin keratinocytes: from UV protection to albinism insights"
Principal Investigator contact (Name and email id): "Cédric DELEVOYE, Institut Necker Enfants Malades - Centre de médecine moléculaire (INEM), CNRS UMR8253, Inserm U1151; cedric.delevoye@inserm.fr**"**
Reference Number of the Job Offer: IFI_CEF_26_04

Project description

- **Keywords :** Skin Pigmentation, genome photoprotection, keratinocyte, organelle biogenesis, membrane dynamics, light and electron microscopy.

- **Context :** Skin pigmentation is a physiological trait that contributes to protection against environmental stressors, like ultraviolet (UV) radiation. This process relies on melanosomes, specialized lysosome-related organelles produced in epidermal melanocytes, where melanin is synthesized and stored. Pigment contents of melanosomes are transferred to neighboring keratinocytes, where they form a supranuclear "cap" that shields genomic DNA from UV-induced damage. By absorbing and scattering UV radiation, melanin reduces the formation of DNA photoproducts and limits oxidative stress, thereby preserving genome integrity in epidermal cells. Defects in melanosome biology disrupt this protective mechanism and can lead to hypopigmentation disorders. In albinism, mutations affecting melanosome function result in reduced or absent pigmentation despite normal melanocyte numbers. This causes impaired photoprotection and increases susceptibility to UV-induced DNA damage and skin carcinogenesis, highlighting the central role of melanosome biology in epidermal homeostasis and genome photoprotection.

- **Abstract of the Research Project** : Skin pigmentation is a fundamental photoprotective mechanism that relies on the coordinated activity of melanocytes and keratinocytes. Melanosomes, lysosome-related organelles (LROs) produced by melanocytes, synthesize and store melanin before releasing their membrane-less pigment core, the melanocore (MC). In human epidermis, MCs are taken up by keratinocytes and packaged into specialized lysosome-like pigment organelles that persist near the nucleus, where they shield genomic DNA from ultraviolet (UV)-induced damage. While melanosome biogenesis and trafficking in melanocytes have been extensively studied, the cellular and molecular mechanisms governing pigment organelle biology in keratinocytes remain largely unexplored.

  Genetic defects affecting melanosome-associated pathways cause syndromic form of albinism such as Hermansky–Pudlak syndrome (HPS), characterized by mutations in BLOC (Biogenesis of Lysosome-related Organelle Complex) proteins. Although keratinocytes express BLOC components and generate pigmented lysosome-like organelles, it is unknown whether these organelles constitute bona fide LROs, whether they depend on BLOCs for their function, and whether they are compromised in HPS patients. Moreover, how keratinocytes prevent pigment degradation and whether keratinocyte differentiation influences pigment organelle biology and vectorized pigment distribution in the epidermis remain open questions.

  The proposal addresses how defects in intracellular membrane dynamics within keratinocytes may contribute to impaired pigmentation and reduced genome protection in health and disease. By elucidating how pigment-containing organelles are formed, stabilized, and functionally maintained in keratinocytes, this work aims to uncover previously unrecognized cellular vulnerabilities underlying hypopigmentation disorders. The anticipated outcomes extend beyond basic cell biology, offering a framework to reinterpret pigmentary diseases such as Hermansky–Pudlak syndrome from a keratinocyte-centered perspective, with potential implications for diagnosis, risk stratification, and future therapeutic strategies targeting skin photoprotection.

- **Scientific Objectives of the Project :** This project aims to decode how keratinocytes exploit membrane dynamics and organelle biology to ensure genome photoprotection. Using complementary cellular models developed by the collaborating laboratories, we will (i) define the role of BLOC complexes in pigment organelle biogenesis, positioning, and photoprotective function; (ii) elucidate the mechanisms that allow MC-containing organelles to evade lysosomal degradation; and (iii) determine how keratinocyte differentiation shapes pigment organelle biology. Together, this work will establish keratinocytes as active players in skin pigmentation and photoprotection and provide new insights into the cellular basis of pigmentary disorders.

- Methodology and Timeline of the Project : This project will use complementary human cell models to investigate how skin keratinocytes process pigment and use it to protect their genome from ultraviolet (UV) radiation. By modulating key intracellular pathways involved in pigment handling, we will examine how pigment-containing organelles are formed, organized, and maintained over time, and how these processes contribute to nuclear protection under UV stress. Advanced imaging and quantitative analyses will be employed to monitor pigment uptake, intracellular positioning, and photoprotective outcomes, together with structural approaches to assess organelle integrity.

  The project will also explore how keratinocytes prevent pigment degradation and adapt pigment organelle behavior to environmental stress, revealing general cellular strategies that ensure long-term pigment persistence. Finally, pigment handling will be compared between proliferative and differentiated keratinocytes to understand how epidermal renewal influences pigment distribution, stability, and function. Conducted through coordinated efforts between collaborating laboratories, this integrated approach will provide a broad and accessible framework for understanding pigment-based photoprotection in healthy and diseased skin.

Candidate profile

- Candidates can be all nationalities except French. In case of double nationality (French and another one), the candidate is not eligible. In the context of CEFIPRA, Indian candidates are preferred
- Applicants for post-doctorate must have a PhD degree (or be in the process of obtaining one) ;
- No competences in French language is required
- Candidate competences
  -Cell biology and organelle biology
  -Skin biology and pigmentation
  -Human cell culture models
  -Functional perturbation of cellular pathways
  -Fluorescence and quantitative imaging
  -Ultrastructural and morphological analysis
  -Cellular stress and DNA damage responses
  -Data analysis and statistics
  -Interdisciplinary and collaborative research
  -Scientific communication

- Candidate know-how
  -Solid understanding of intracellular membrane trafficking, endolysosomal pathways, and organelle dynamics, particularly specialized organelles and their functional adaptation.
  -Knowledge of epidermal cell types, keratinocyte–melanocyte interactions, pigmentation processes, and cellular responses to UV radiation.
  -Expertise in culturing and manipulating human cell lines and primary cells, including comparison of proliferative vs. differentiated states.
  -Experience with genetic or molecular approaches (e.g., gene silencing, functional inhibition) to investigate cellular mechanisms.
  -Proficiency in fluorescence microscopy and image-based analyses to study organelle dynamics, intracellular positioning, and protein localization, with quantitative data extraction.
  -Familiarity with electron microscopy concepts and interpretation of ultrastructural data to complement light microscopy

observations.
-Understanding of cellular responses to environmental stress, particularly UV-induced DNA damage and genome protection mechanisms.
-Ability to perform quantitative analyses, image processing, and statistical interpretation of complex biological datasets.
-Experience working in collaborative, international research environments, integrating complementary methodologies and coordinating experimental workflows.
-Strong skills in scientific writing, data presentation, and oral communication for both specialized and broad audiences.

- Expected starting date: 01/07/2026
- Expected duration: 12 months

How to candidate ?

Documents to be provided :

i. A cover letter (reasons for the candidature, professional project …) max 2 pages
ii. A copy of the master's degree or a proof of the program followed (and expected date of end) OR A copy of the PhD degree or a proof of the PhD program followed (and expected date of defense) max 1 page
iii. A copy of results for previous scholarship (max 3 pages)
iv. A copy of Passport
v. International curriculum vitae (max 2 pages)
vi. Two letters of recommendation: one from any Indian institution and one from the French institution planned to host the candidate –mandatory- (max 2 pages)
vii. All should be submitted within 1 pdf file of no more than 10 pages.

Applications should be submitted to the following email address: msi@institutfrancaisindia.in mentioning the reference number of the Job offer clearly.

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Candidates are requested to contact the French scientific principal investigator of the project before submission. A recommendation letter from the scientific principal investigator is mandatory.

Benefits:

- Monthly allowance of 2400 euros for Post-Doc
- Travel allowance
- University fee
- Carte de séjour fee
- Campus France management fee
- Registration to the French social security scheme

Selection process:

Selection is made by a dedicated selection committee of at least 4 persons. Decisions will be transmitted by the Embassy of France to CEFIPRA. **No consideration will be given for candidates with no recommendation letter from the French institution.**

Criteria for applicants' selection:

Academic excellence

- Excellence of the Academic background, Academic records, Honors, Letters of support, Participation to international research projects, exchange programmes and conferences.

Motivation and qualities

- Academic maturity: appropriation of the thesis project (stakes and contexts) • Quality of the presentation (oral expression, skills for synthesis, English level) • Maturity of the professional project: capacity to project her/himself within five years in terms of career development.

About CEFIPRA:
Indo-French Center for the Promotion of Advanced Research (CEFIPRA/IFCPAR) is an Indian body which promotes scientific cooperation between France and India in advanced fields of Science and Technology. It is supported by the Department of Science and Technology, Government of India and the Ministry of Europe and Foreign Affairs of the French government