Master Biologie Moléculaire et Cellulaire 'BMC',
Université Paris Cité - *UFR Sciences du Vivant*

Parcours : **Biologie et Développement Cellulaires 'BDC'**
https://master2bdc.ijm.fr/
Fiche de Projet de Stage de M2, 2026-2027

Unité INSERM ou CNRS ou Université : INSERM U1151 CNRS8253 **Intitulé Equipe :** Team Cellular & Membrane Dynamics in Stress Response - MEMBRAMICS **ED d'appartenance :** ED 562 - BioSpc **Responsable de l'Equipe :** Etienne Morel	**Responsable du Stage :** Laura SALAVESSA **Contacts** Adresse : Institut Necker Enfants Malades (INEM), 160 rue de Vaugirard, 75015 Paris Email : laura.salavessa@inserm.fr Tel : 01 40 61 54 04

Titre du projet : Melanin particles as signaling hubs in skin intercellular communication

Résumé du Projet de Stage

Intercellular communication is fundamental to tissue homeostasis, as it allows cells to sense and respond to environmental cues. Beyond direct cell-cell contacts, cells also exchange biological material that carries information shaping the behavior of recipient cells. A key example of this takes place in human skin, where melanocytes produce melanin particles and transfer them to surrounding keratinocytes — a process that gives skin its color and provides a critical photoprotective shield against solar UV radiation. Despite being a familiar process, the cell biology underlying melanin transfer remains poorly understood, particularly regarding the molecular factors that contribute to an efficient transfer and its susceptibility to cellular stress conditions such as inflammation.
Our team has recently uncovered that secreted melanin particles are coated with extracellular vesicles (EVs). EVs are lipid-enclosed particles now widely recognized as key mediators of intercellular communication, as they can transfer lipids, proteins, and nucleic acids between cells. This finding raises the unexpected possibility that melanin particles are not merely photoprotective pigments, but also carriers of regulatory signals between skin cells.
Thus, this project asks whether melanin particles act as signaling entities, encoding the functional state of the producing cells and instructing recipient keratinocytes, and whether inflammatory stress can reshape the message they carry. To address this, we will combine quantitative cell biology, biochemistry, and advanced imaging approaches (fluorescence, live, and electron microscopy), applied to in vitro skin models. The goal is to define the signaling potential of melanin-associated EVs, determine how it is remodeled under inflammatory conditions and how it impacts keratinocyte responses, including melanin uptake, intracellular trafficking, and photoprotective capacity.
This work, which includes concepts of cell biology, skin physiology, and extracellular vesicle biology, aims to uncover new mechanisms of intercellular communication through the exchange of biological particles, and provide insights into how stress may disrupt cellular homeostasis and contribute to skin disorders.

Publications de l'équipe relatives au projet de stage (max 5)

1. Benito-Martínez, S.*, Salavessa, L.*, Macé, A.-S., Rouabah, M., Lardier, N., Fraisier, V., Sirés-Campos, J., Jani, R.A., Romao, M., Roca, V., et al. (2026). Keratin intermediate filaments mechanically position melanin pigments for genome photoprotection. Nat Cell Biol 28, 98–112. https://doi.org/10.1038/s41556-025-01817-4.
2. Salavessa, L.*, Rouabah, M., Pernea, P., Hadj-Rabia, S., and Delevoye, C.* (2025). Functional and Morphological Plasticity of the Endolysosomal System: Pigment Organelles at the Crossroads of Physiology and Pathology. Biol Cell 117, e70036. https://doi.org/10.1111/boc.70036.
3. Diallo, M.*, Salavessa, L.*, Arveiler, B., and Delevoye, C. (2025). Albinism: from genetics to cell biology and physiopathology. Presse Med 55, 104333. https://doi.org/10.1016/j.lpm.2025.104333.
4. Benito-Martínez, S.*, Salavessa, L.*, Raposo, G., Marks, M.S., and Delevoye, C. (2021). Melanin Transfer and Fate within Keratinocytes in Human Skin Pigmentation. Integr Comp Biol 61, 1546–1555. https://doi.org/10.1093/icb/icab094.