MARIE SKŁODOWSKA-CURIE POSTDOCTORAL FELLOWSHIPS 2023

EXPRESSION OF INTEREST FOR HOSTING MARIE CURIE FELLOWS

HOST INSTITUTION

NOVA Medical School

RESEARCH GROUP AND URL

Membrane Traffic in Infection and Disease

SUPERVISOR (NAME AND E-MAIL)

Duarte Barral (duarte.barral@nms.unl.pt)

SHORT CV OF THE SUPERVISOR

Duarte Barral completed the Degree in Microbiology and Genetics from the University of Lisbon, Faculty of Sciences and the PhD in Cell Biology from Imperial College London. He was a Post-Doctoral Fellow at Brigham and Women's Hospital, Harvard Medical School until he took a position as Principal Investigator at the Chronic Diseases Research Center (CEDOC) from NOVA Medical School, Universidade NOVA de Lisboa. He is currently a tenured Associate Professor with Habilitation at the same School. Duarte Barral has been working in the field of membrane traffic and its regulation by GTPases of the Rab and Arf families for >20 years. He has helped uncover the previously unknown role of several of these proteins, namely Rab27a (Stinchcombe et al., J Cell Biol., 2001; Hume et al., Traffic, 2002), Arl8b (Garg et al, Immunity, 2011), Arl13b (Barral et al, PNAS, 2012; Casalou et al., J. Cell Sci., 2014; Casalou et al., Cancers, 2019) and Rab35 (Kuhns et al., EMBO Rep., 2019), and established that Rab isoforms can be functionally redundant by studying Rab27a and Rab27b in the pigmentary disorder Griscelli syndrome (Barral et al., J Clin. Invest., 2002). Duarte Barral has a solid track record in attracting competitive funding (>2.75 M€ of funding for projects as PI) and successfully running research projects (10 funded projects successfully concluded). Moreover, he published 51 articles in peer-reviewed international journals and has a strong track record: h-index 30 and a total of 2797 citations. Furthermore, Duarte Barral has an extensive experience in supervision (11 post-doctoral fellows, 14 PhD students and 10 Master students who completed their training under his supervision). Finally, Duarte Barral has experience in coordinating teams and consortia, as evidenced by several publications as co-last author with researchers from different countries, the integration in projects involving collaborations and the coordination of a Twinning project, with two other European institutions.

5 SELECTED PUBLICATIONS

- Cabaço LC, Bento-Lopes L, Neto MV, Ferreira A, Staubli WBL, Ramalho JS, Seabra MC, Barral DC. RAB3A Regulates Melanin Exocytosis and Transfer Induced by Keratinocyte-Conditioned Medium. JID Innov. 2022 Jun 21;2(5):100139. doi: 10.1016/j.xjidi.2022.100139.
- Moreiras H, Bento-Lopes L, Neto MV, Escrevente C, Cabaço LC, Hall MJ, Ramalho JS, Seabra MC, Barral DC. Melanocore uptake by keratinocytes occurs through phagocytosis and involves protease-activated receptor-2 internalization. Traffic. 2022 Jun;23(6):331-345. doi: 10.1111/tra.12843.
- Hall MJ, Lopes-Ventura S, Neto MV, Charneca J, Zoio P, Seabra MC, Oliva A, Barral DC. Reconstructed human pigmented skin/epidermis models achieve epidermal pigmentation through melanocore transfer. Pigment Cell Melanoma Res. 2022 Jul;35(4):425-435. doi: 10.1111/pcmr.13039.
- Moreiras H, Pereira FJC, Neto MV, Bento-Lopes L, Festas TC, Seabra MC, Barral DC. The exocyst is required for melanin exocytosis from melanocytes and transfer to keratinocytes. Pigment Cell Melanoma Res. 2020 Mar;33(2):366-371. doi: 10.1111/pcmr.12840.
- Correia MS, Moreiras H, Pereira FJC, Neto MV, Festas TC, Tarafder AK, Ramalho JS, Seabra MC, Barral DC. Melanin Transferred to Keratinocytes Resides in Nondegradative Endocytic Compartments. J Invest Dermatol. 2018 Mar;138(3):637-646. doi: 10.1016/j.jid.2017.09.042.

PROJECT TITLE AND SHORT DESCRIPTION

Shedding Light on the Molecular Mechanisms of Melanin Transfer

The skin is the largest organ of the human body and provides protection against external aggressions. Its outmost layer, the epidermis, is composed mainly by two cell types: melanocytes and keratinocytes. Melanocytes localize to the basal layer and synthesize the pigment melanin. Keratinocytes are the final recipients of the pigment and differentiate from the basal to the apical layers. Melanin synthesis and transfer ensure protection of skin cells against ultraviolet radiation (UVr)-induced damage, which can lead to the onset of skin cancers. Melanin synthesis occurs in specialized membrane-bound organelles called melanosomes. Once fully mature and located at the tips of melanocyte dendrites, melanosomes are transferred to keratinocytes. Our group found evidence that the predominant mode of melanin transfer is via coupled melanin exo/phagocytosis, in a process dependent on the small GTPase Rab11b (Tarafder et al., J. Invest. Dermatol., 2014). However, several key questions remain to be answered, namely the crosstalk between melanocytes and keratinocytes at the yet uncharacterized pigmentary synapse; the phagocytic receptor involved in melanin phagocytosis by keratinocytes; the role of autophagy in melanin processing within keratinocytes; and the polarization of melanin within keratinocytes to form supra-nuclear caps. The answers to these questions will shed light on fundamental membrane trafficking processes that remain elusive. Since the function of melanin is to protect skin cells from UVr, the elucidation of these processes is essential to understand the mechanisms of skin pigmentation and allow their manipulation for health and cosmetic purposes.

SCIENTIFIC AREA WHERE THE PROJECT FITS BEST*

Life Sciences (LIF)

***Scientific Area where the project fits best** – Please select/indicate the scientific area according to the panel evaluation areas: Chemistry (CHE) • Social Sciences and Humanities (SOC) • Economic Sciences (ECO) • Information Science and Engineering (ENG) • Environment and Geosciences (ENV) • Life Sciences (LIF) • Mathematics (MAT) • Physics (PHY)