

Bonn, 24 May 2022

Offer: PhD student and Postdoc positions

Project Title: Neuro-vascular communication in the central nervous system

Research group: Prof. Dr. Carmen Ruiz de Almodóvar

Application Deadline: 30.06.2022

Start of projects: as soon as possible

Project Description:

The central nervous system (CNS) (brain and spinal cord) is composed of different neural cell types organized in a very stereotyped pattern and localized in defined compartments. Apart of the neuronal cell types, the CNS is also composed of blood vessels, responsible for providing oxygen and nutrients to the neuronal tissue. Similar to neurons, during development, blood vessels also follow defined pathways to enter and invade the CNS in order to assure proper oxygen and nutrient delivery to all parts of the tissue.

In our group, we aim to identify and characterize the molecular mechanisms of the bidirectional communication between neural cells and cells forming the vasculature in development, homeostasis and disease. In disease, the interaction of the vasculature with the immune system will also be explored. We intend to understand how different neuronal populations control CNS vascularization and how the vasculature also actively contributes to the development and maintenance of CNS homeostasis.

References:

Luck R, Karakatsani A, Shah B, Schermann G, Adler H, Kupke J, Tisch N, Jeong HW, Back MK, Hetsch F, D'Errico A, De Palma M, Wiedtke E, Grimm D, Acker-Palmer A, von Engelhardt J, Adams RH, Augustin HG, [Ruiz de Almodovar C](#). The angiotensin-Tie2 pathway regulates Purkinje cell dendritic morphogenesis in a cell-autonomous manner. *Cell Rep.* 2021, 36(7), 109522.

Paredes I, Vieira JR, Shah B, Ramunno CF, Dyckow J, Adler H, Richter M, Schermann G, Giannakouri E, Schirmer L, Augustin HG, [Ruiz de Almodovar C](#). Oligodendrocyte precursor cell specification is regulated by bi-directional neural progenitor-endothelial cell crosstalk. *Nat Neurosci.* 2021, 24, 478–488.

Vieira JR, Shah B, [Ruiz de Almodovar C](#). Cellular and molecular mechanisms of spinal cord

vascularization. *Front Physiol* 2020. Dec 21

Luck R*, Urban S*, Karakatsani A, Harde E, Sambandan S, Nicholson L, Haverkamp S, Mann R, Martin-Villalba A, Schuman EM, Acker-Palmer A, Ruiz de Almodóvar C. VEGF/VEGFR2 signaling regulates hippocampal axon branching during development. *Elife*. 2019 Dec 23;8.

Karakatsani A, Shah B, Ruiz de Almodovar C. Blood vessels as regulators of neural stem cell properties. *Front Mol Neurosci* 2019 Apr 12;12:85

Paredes I, Himmels P, Ruiz de Almodovar C. Neuro-vascular communication in the CNS during development. *Dev Cell*. 2018. Apr 9;45(1):10-32

Wang X, Freire Valls A, Shermann G, Shen X, Moya IM, Castro L, Urban S, Solecki GM, Winkler F, Riedemann Lm Jain RK, Mazzone M, Schmidt T, Fischer T, Halder G, Ruiz de Almodovar C. YAP/TAZ orchestrate VEGF signaling during developmental angiogenesis. *Dev Cell*. 2017 Sep 11;42(5):462-478.e7.

Himmels P, Paredes I, Karakatsani A, Luck R, Marti H, Rempel E, Stoeckli E & Ruiz de Almodovar C. Motoneurons guide blood vessels in the developing spinal cord via a sFlt1 dependent mechanism. *Nat Commun*. 2017 Mar 6;8:14583.

Methods that will be used:

Single cell sequencing and spatial transcriptomics

Mouse genetics

Micro-dissections

Ex vivo 3D cell culture

In vitro cell culture

Cell Biology

Biochemistry and Molecular Biology techniques

Histology

Immunohistochemistry

Light and fluorescent microscopy

Confocal microscopy

Profile of candidate's qualification:

The candidate should be an enthusiastic and motivated scientist willing to join an international research group in a highly dynamic working environment (with English as main language). The ideal candidate should have a biomedicine, neuroscience, biology or a biochemical and molecular biology background.

Application: For further details on the application procedure, please send an email with your CV, letter of motivation and contacts for references to:

carmen.ruizdealmodovar@ukbonn.de