

Job position: 4-year **PhD positions** (2-3 candidates)

Deadline of the application: 31st August 2023

Starting date: 1st October 2023

Institute: Institute for Anatomy and Cell Biology, and Institute for Pharmacology (Heidelberg, Germany)

Name of the PI: Drs. Amit Agarwal and Manuela Simonetti

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Institute Website:

<https://www.medizinische-fakultaet-hd.uni-heidelberg.de/einrichtungen/institute/anatomie-und-zellbiologie/abteilungen/chs-gruppen-1/agarwal>

<https://www.medizinische-fakultaet-hd.uni-heidelberg.de/einrichtungen/institute/pharmakologie>

Project title: Glial adrenergic receptors as targets for the treatment of neuropathic pain

Project Summary: Activation of adrenergic receptors in the brain and spinal cord, and the neurostimulation have recently emerged as novel analgesic paradigms for the treatment of chronic pain. Glial cell such as microglia and astrocytes are known to be important players in the development and maintenance of chronic pain conditions, and express a variety of adrenergic receptors and respond to neurostimulation (e.g. trans-cranial direct current stimulation, tDCS). In this project, we will investigate the glial adrenergic receptors mechanisms in the develop of novel approaches for an effective and efficient pain relief.

In this project we aim to understand whether adrenergic receptors agonists and tDCS utilize common mechanisms to impart their analgesic effects by engaging norepinephrine signaling on astrocytes and microglia. To address this question, we will study chronic pain mechanism in central (brain and spinal cord) pain axis. We will combine mouse genetics and recombinant AAV (rAAVs) based viral vectors for cell-type and region-specific manipulation of adrenergic receptor signalling in the nociceptive pathway. We will use a wide array of techniques such as *in vivo* two-photon microscopy (2PM), *in vivo* Ca²⁺ imaging, electrophysiology, metabolomics, cytokine assays, single-cell transcriptomics, and pain behavioral analysis. Additionally, to validate key findings in our mouse models of neuropathic pain, we will use co-cultures of human iPSC-derived astrocytes, microglial cells, and neurons.

In addition, Heidelberg University is the oldest university in Germany and it offers the best life science research program in the country. The University provides a dynamic and multidisciplinary environment for the neuroscience research with state-of-the-art core facilities and transgenic animal facility. CellNetworks, University's Cluster of Excellence, hosts several core facility centers such as the Nikon Imaging Center, RNA Sequencing cores and mouse behavioural core (INBC).

Eligible qualifications: Diploma/Master in a biomedical, life science (i.e. MSc in Biology, Biochemistry, Neuroscience), medicine or related disciplines.

Desirable skills:

- Hands-on laboratory experience in molecular cell biology, biochemistry, advanced imaging techniques, 2-photon microscopy, electrophysiology, and stereotaxic injections will be strongly preferred
- Strong analytical and technical skills
- Problem-solving and proactive attitude
- Ability to work in a team and independently plan and conduct experiments is essential.
- Good proficiency in English language skills (German language is not a requirement)

Enclosures: The following documents must be enclosed with your application as a **single pdf file**: updated CV with publications, 2-page motivation letter, copies of degree certificates and contact details (name, address and email) of 3 people who can provide reference letters.

Information for the applicant: For any updates and further information (e.g. change of deadline of the application), please visit the consortium website career section: <https://sfb1158.de/index.php/career-eng>.