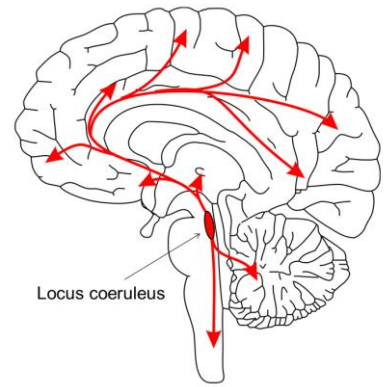


## Call for two doctoral positions

Two positions for PhD students are available. The candidates will work in the field of **neuroscience, cell physiology and biomedicine** and will be enrolled in a four-year doctoral program doing research within the frame of the research program P3-0310 Cell Physiology. This interdisciplinary group of researchers aims to translate their basic scientific findings into advanced therapies.



The candidates will study astrocytes, which are numerous cells in the central nervous system. Astrocytes are positioned in brain to detect synaptic activity, control blood flow, and communicate with neurons and endothelial cells. The candidates will use the latest super-resolution optical-microscopic approaches, atomic force microscopy to measure changes in astrocyte morphology, nanosensors, based on fluorescence energy transfer (FRET) and electrophysiological patch-clamp technique to measure plasma membrane surface area dynamics.

**The topic of one doctoral thesis** will be to discover the mechanism of the metabolic connection between astrocytes and neurons, failure of which may lead to cognitive decline due to neurodegeneration. Alzheimer's disease, a hypometabolic state of the brain, may be due to degeneration of the *Locus coeruleus* (LC) nucleus in the brainstem. As norepinephrine-secreting function of LC neurons decline, lactate production in astrocytes is affected. The candidate will explore the mechanism of astrocyte signaling via new membrane bound receptors and their ligands that may be taken as candidates for new drugs.

**The topic of the second doctoral thesis** will be the neurophysiological processes of sleep. Astrocytes are involved in sleep homeostasis with the release of adenosine, which acts on adenosine A1 or A2A receptors on the presynaptic membrane of neurons. Communication is bidirectional and extracellular adenosine can also affect astrocytes. Astrocytes also play a role in flushing metabolites from the brain during sleep. The so-called glymphatic pathway involves astrocytic aquaporin 4. The discovery of regenerative mechanisms that take place during sleep may contribute to the prevention and treatment of neurodegenerative diseases.

Candidates are invited to send their short CV to PIs:

**Prof. Robert Zorec, PhD, [robert.zorec@mf.uni-lj.si](mailto:robert.zorec@mf.uni-lj.si)**

**Prof. Marko Kreft, PhD, [marko.kreft@mf.uni-lj.si](mailto:marko.kreft@mf.uni-lj.si)**

Preference will be given to candidates with a higher average grade achieved during their previous studies and experience in research.