PhD student position
in cardiac electrophysiology – ion channels (experiments and modeling)

Department of Physiology, University of Bern
http://www.physio.unibe.ch

Keywords: physiology, biophysics, bioelectricity, patch clamp, computer modeling, gap junctions, sodium channels, action potential, signal processing, cardiac arrhythmias, heart

Description:

Background:
Cardiac arrhythmias are prevalent causes of morbidity and mortality. The general goal of our research is to better understand the fundamental mechanisms leading to altered propagation of the electrical excitation (action potential) in cardiac tissue. Our interdisciplinary approach involves electrophysiological experiments and computer simulations of the action potential.

Research project:
This project aims at a deeper understanding of the function of Na^+ channels and the mechanisms of action potential propagation in cardiac tissue. The action potential propagates from one cell to the next due to currents passing through gap junctions. However, another mechanistic hypothesis (called ephaptic coupling) proposes that the current produced by Na^+ channels in one cell generates a substantial extracellular potential in the narrow intercellular cleft, which influences the function of Na^+ channels in the next cell. Using cell lines expressing cardiac channels, experiments will be conducted to investigate Na^+ channel function in this context (collaboration with the Ion Channel Research Group, Prof. H. Abriel, Institute of Biochemistry and Molecular Medicine). These experiments will be paralleled with computer simulations using mathematical models of ion channels and ephaptic coupling (collaboration with Prof. S. Poelzing and prof. R. Gourdie, Virginia Tech, USA). The study is expected to further our understanding of the function of cardiac Na^+ channels.
The project is supported by the Swiss National Science Foundation.
Further details can be found on http://www.physio.unibe.ch/~kucera/group/index.aspx

Education and profile:

The ideal candidate
- has a master's degree in a discipline pertaining to the project (e.g., life sciences, medicine, biomedical sciences, biomedical engineering, physics)
- is interested in electrophysiological experiments
- has previous working experience with mathematics (calculus, linear algebra), programming languages (e.g., MATLAB, C/C++) and/or finite element methods
- is able to collaborate in an interdisciplinary manner with different research teams
- has a good knowledge of the English language (oral and written)
- has oral knowledge of German permitting to be involved in teaching activities (up to 10% of work time; practical workshops and tutoring of small groups of undergraduate medical students)

Candidates selected for an interview are expected to travel to Bern for a visit at their own expenses. Applications that do not fulfill these criteria will not be answered.

Entrance upon: Between July 1, 2019 and October 1, 2019, to be discussed.

Duration: 3-4 years.

Location: University of Bern

Applications: Applications (motivation statement, CV and a copy of the master's degree) are to be submitted by e-mail to: kucera@pyl.unibe.ch

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