Paper ID: 81029
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IAF MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)
Interactive Presentations - IAF MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (IP)

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BUILDING AN ELECTROPHYSIOLOGY RIG, WILL IT WORK IN SPACE?

Abstract

One of the main objectives of human-based space research is to understand the influence of gravity on the human body. The concept of electrophysiology and its uses helps us experiment on biological cells even under the conditions of microgravity allowing us to learn more about the complexities of cellular and organ functions showcasing the different behaviours that take place in the absence of gravity. Astronauts have carried out experiments and investigated how cells grow while in microgravity. The possibility of having an electrophysiology rig on board of the ISS would help manipulate neural activity in biological cells and provide real time results that would be vital for many researchers on earth to tackle some of the uncertainties in gravitational research, particularly in mechanobiology and space pharmacology. Even though the potential studies for science in microgravity research of ion channel functions is enormous, due to extensive preparation effort, and safety constraints only short-term effects of microgravity have been observed using electrophysiology techniques thus far. This report will discuss the feasibility of having an electrophysiology rig in space by comparing commercially available off the shell patch-clamp systems to the traditional electrophysiology rig set-ups built in laboratories worldwide. The rig that was built for this project was assembled in the Institute of Cellular and Integrative Neuroscience at the University of Strasbourg.