

Membrane Potential Imaging in the Nervous System and Heart (Advances in Experimental Medicine and Biology)



This volume discusses membrane potential imaging in the nervous system and in the heart and modern optical recording technology. Additionally, it covers organic and genetically-encoded voltage-sensitive dyes; membrane potential imaging from individual neurons, brain slices, and brains in vivo; optical imaging of cardiac tissue and arrhythmias; bio-photonics modelling. This is an expanded and fully-updated second edition, reflecting all the recent advances in this field. Twenty chapters, all authored by leading names in the field, are cohesively structured into four sections. The opening section focuses on the history and principles of membrane potential imaging and lends context to the following sections, which examine applications in single neurons, networks, large neuronal populations and the heart. Topics discussed include population membrane potential signals in development of the vertebrate nervous system, use of membrane potential imaging from dendrites and axons, and depth-resolved optical imaging of cardiac activation and repolarization. The final section discusses the potential and limitations for new developments in the field, including new technology such as non-linear optics, advanced microscope designs and genetically encoded voltage sensors. Membrane Potential Imaging in the Nervous System and Heart is ideal for neurologists, electro physiologists, cardiologists and those who are interested in the applications and the future of membrane potential imaging.

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