

## DEAR READERS!



Neuroscience is an interdisciplinary science and our understanding of the nervous system has increased tremendously during the second half of the twentieth century, principally due to advances in molecular biology, biochemistry, electrophysiology, behavioral and computational neuroscience. A broad range of neuroimaging and electrophysiological research has developed, encompassing fundamental and practical issues ranging from technological developments with the use of patch-clamp technique, microelectrode arrays, EEG, two-photon, molecular and MRI imaging, and image processing approaches for pre-clinical animal studies and independent technique validations, all the way through to diagnostics and therapy-guiding patient examinations. Recent theoretical advances in neuroscience have also been aided by the study of neural networks.



This issue comprises 15 articles which develop and/or apply a variety of modern neurobiological techniques. The methodological studies introduce an approach for multisite electrophysiological recordings in freely moving mice (Senkov et al.), the use of magnetic resonance tractography for differential diagnostics in Parkinson's disease (Trufanov et al.) and development of a new genetic tool for molecular diagnostics of neurodegenerative diseases (Abramycheva et al.). Two interesting experimental reports show  $Ca^{2+}$  imaging of network activity in CA3 neurons (Mitaeva et al.) and astrocytes (Dembitskaya et al.) in acute slices. Four other reports deal with methods aiming to model and study molecular and cellular mechanisms of Parkinson's disease using human induced pluripotent stem cells (Novosadova et al.), to develop a gene therapy of spinocerebellar ataxia type 1 (Shuvaev and Hirai), to perform toxicological profiling of nanoparticles as potential carriers of therapeutic reagents (Mitroshina et al.), and to highlight the perspectives of the use of biodegradable scaffold implants in the treatment of brain injury (Balyabin et al.).

Nine experimental articles are complemented by six reviews covering a broad range of topics. Three reviews in molecular and cellular neuroscience describe targeting the brain extracellular matrix to promote cell survival, growth and synaptic plasticity (Dembitskaya et al.), the interplay between ion channels expressed in cerebral endothelial cells in the functional integrity of the blood-brain barrier (Shuvaev et al.) and principles of optogenetics as a method to tightly control neural cell activity (Bregestovski and Mukhtarov). At the systemic level, three reviews introduce robotic and mechanotherapeutic technologies (Chernikova et al.), exoskeletons (Rukina et al.) and analysis of consciousness (Legostaeva et al.).

We thank the authors for cutting-edge research and high-quality articles and hope that readers of the "Sovremennye tehnologii v medicine" (Modern Technologies in Medicine) will be inspired by the wide variety of potential and future applications of neuroscience research methods. A wide geography of authors of this Special Issue emphasizes international academic interest in our journal. With the success of this thematic issue, we plan to release special issues on new timely topics. The Editorial Board of the journal "Sovremennye tehnologii v medicine" will gladly accept your suggestions.

With best regards,  
Editors of the Special Issue

**Alexander Dityatev**, German Center for Neurodegenerative Diseases, Magdeburg, Germany

**Irina Mukhina**, Nizhny Novgorod State Medical Academy, Nizhny Novgorod, Russia