

## Editorial: Brain Matters

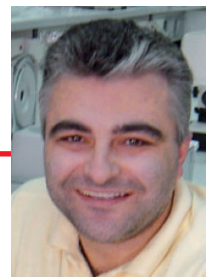
Understanding the brain is one of the most daunting challenges of modern science. As Francis Crick quoted "There is no scientific study more vital to man than the study of his own brain. Our entire view of the universe depends on it". How consciousness, thoughts and emotions emerge through the workings of less than one kilogram and a half of soft tissue remains one of the most engaging mysteries. Our brains comprise roughly a hundred billion networked neuronal cells, constantly signaling one another, processing and storing information received through our senses, controlling and coordinating vital body functions and ultimately, generating behavior. We use our brains to perceive, negotiate and understand the physical world, and to also ponder our own actions and interactions with elements of the environment. However, our understanding of the physical world will never be complete unless we first understand the intricacies of the very tool we use to reflect on physical phenomena and scientific questions, our brain.

It used to be that matters pertinent to higher functions of the brain, such as self-awareness and complex emotions belonged to the realm of philosophy or even religion. Nevertheless, apart from the purely philosophical significance and implications of the efforts to decipher the brain, there are also multiple, important benefits with relevance to human health and quality of life to be reaped. Battling numerous devastating neurode-

generative conditions such as Alzheimer's and Parkinson's disease, amyotrophic lateral sclerosis and stroke, and other brain pathologies such as epilepsy, schizophrenia and bipolar disorders, depends critically on the progress towards a more comprehensive elucidation of the brain.

While the capacity to dissect the properties and function of individual neuronal cells has advanced considerably in recent years, understanding how large assemblages of neurons integrate and work together to give rise to elaborate behavioral patterns remained beyond the reach of experimental neuroscience. However, the advent of modern, cutting edge tools for monitoring brain activity, coupled with sophisticated molecular genetics methodologies in animal models holds promise for decisively accelerated pace of research and major breakthroughs towards this direction.

In this issue, the *Biotechnology Journal* surveys and highlights current research on several important neurobiology topics and also considers potential ethical issues that are raised by recent developments in various neuroscience fronts. Included articles signify the inherent interdisciplinary nature of neuroscience research as well as the broad and diverse character of contemporary approaches to decoding the brain. The ethical aspects of interventions targeting the nervous system, and manipulations of brain activity are presented and debated in the articles by Clausen, Decker &



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Fleischer and Synofzik & Schlaepfer. In addition, a collection of five comprehensive articles review important developments in highly active fields of neurobiology, such as acetylcholinergic neurotransmission (article by Millet Treinin), novel gene delivery approaches for the treatment of nervous system disorders (article by Zahariou & Terzi), the role of the immunoglobulin superfamily of neuronal cell adhesion molecules in the development and function of the nervous system (article by Karagogeos and colleagues), the biology of neural stem cells and their potential applications in regenerative medicine (article by Santama & Lederer) and the molecular mechanisms underlying neurodegeneration (article by Efthimiopoulos and colleagues). The contributions in this issue of the *Biotechnology Journal* provide but a glimpse of the breadth and scope of ongoing endeavors in neuroscience. These are truly exciting times for brain research.

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