Neuropharmacology and Therapy: Rethinking the Brain Initiative Challenge for Neuroscience

Xiongli Yang1,*

1State Key Laboratory of Medical Neurobiology, Fudan University, Shanghai 200032, China

*Corresponding author:
E-mail: xlyang@fudan.edu.cn (XY)

The Brain Initiative has been a transformative force in neuroscience, driving substantial advancements in understanding of the brain’s intricate mechanisms and the development of novel therapeutic strategies for neurological and psychiatric disorders. As a neuroscientist, I am excited to examine the profound implications of the Brain Initiative for neuropharmacology.

The China Brain Project, a critical component of the global Brain Initiative, has set a series of ambitious goals aimed at revolutionizing the field of neuropharmacology and therapy through establishing accurate early diagnosis standards and intervention methods. The development of new technologies for early diagnosis and treatment, as well as the aspiration to provide Chinese evidence to support the development of international clinical guidelines, underscores the project’s global influence and contribution to the field [1].

One primary achievement of the Brain Initiative has been enhancing the diagnostic rates for various brain diseases, thus indicating the potential for further advancements in this field [1].

To identify potential candidate anti-epileptic drugs from non-clinical drug libraries, an innovative in vivo drug screening system combining high-throughput technology with machine learning has been successfully implemented in zebrafish models [2]. This achievement underscores the value of brain mapping research as a theoretical foundation for neuropharmacology.

Notably, the ability to discover precise drug targets and signaling pathways has been markedly improved by comprehensive mapping of neural circuits through viral tracing. This advancement has shifted the paradigm of neuropharmacology from a reductionist approach to a more holistic understanding of the brain’s regulatory mechanisms [3].

Given the complexity of brain disorders, continuing innovation, and development of new hypotheses and technologies are necessary. Avoiding the pitfalls of overemphasizing technology without practical application will be imperative, which is concerned in the later stages of the European Brain Project [4]. Neuropharmacology must focus on resolving fundamental theoretical issues, whereas therapy should concentrate on the translation of these theories into clinical practice.

The role of the Brain Initiative may help bridge basic science and clinical science in this context. This mission is echoed in the aims and scope of the China Brain Project, which emphasizes the importance of AI in revolutionizing drug treatment design and the development of new technologies. The incorporation of AI into neuropharmacology has led to a paradigm shift in drug discovery and development. Machine learning algorithms and deep learning models have been used to predict drug efficacy and adverse effects, thus decreasing the time and costs associated with traditional drug development processes [5].

Moreover, the application of big data analytics in neuropharmacology has enabled the identification of biomarkers and the development of personalized treatment strategies, as exemplified by a study predicting treatment outcomes in patients with major depressive disorder using big data [6].

In conclusion, the Brain Initiative has been instrumental in driving progress in neuropharmacology and the treatment of brain disorders. The development of innovative
diagnostic and therapeutic methods, emphasizing the translation of basic science into clinical practice, have set the stage for a new era in neuroscience. As the mysteries of the brain continue to be explored, maintaining a balanced perspective that appreciates both novel technologies and their practical applications will be essential.

To this end, my colleagues and I have launched a new platform open-access, peer-reviewed journal, *Neuropharmacology and Therapy* (NPT), publishing original research, review articles, editorials, letters, research highlights, case reports, and study methods on various topics in neuropharmacology, with a focus on regimens and mechanisms of new drugs and neurosurgical therapies for various nervous system dysfunctions. NPT welcomes research contributions pertaining to the fundamental biology and clinical treatment of neurological diseases, thus providing an open platform aimed at facilitating communication between neuroscientists and surgeons in this field. We believe the future of neuropharmacology lies in the linkage between fundamental research and clinical translation, and the Brain Initiative is aimed at facilitating this transformative journey.

REFERENCES