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Review Article

Artificial intelligence in neuroscience: Transforming brain research, diagnostics, and clinical decision-making: A narrative review

Mane Dipali[1]*, Sitaram Kale[1], Swapnil Phade[1], Pankaj Khuspe[1], Devata Shinde[1]

[1]Dept. of Pharmacy, Shriram Shikshan Sanstha's College of Pharmacy, Paniv, Maharashtra, India

Abstract

The rapid evolution of artificial intelligence (AI) has revolutionized neuroscience by enhancing the understanding, diagnosis, and treatment of neurological disorders. Through advanced algorithms in machine learning (ML) and deep learning (DL), AI enables the interpretation of vast and complex neurological datasets derived from neuroimaging, electrophysiology, and genomics. In basic neuroscience, AI models facilitate the mapping of neural circuits, simulation of brain connectivity, and identification of molecular mechanisms underlying neurodevelopmental and neurodegenerative diseases. Clinically, AI applications in neuroimaging—such as automated lesion detection, tumor segmentation, and functional connectivity analysis—are improving diagnostic accuracy and reducing human error. Moreover, in psychiatry and cognitive neuroscience, AI tools are increasingly employed to analyze behavioral data, predict disease progression, and personalize therapeutic interventions. AI-driven drug discovery and neuropharmacological modeling further accelerate the development of targeted treatments for complex brain disorders. Despite its immense promise, challenges related to data standardization, algorithm transparency, and ethical use remain critical for safe and effective clinical translation. Overall, AI represents a paradigm shift in neuroscience, integrating computational intelligence with biological insights to advance precision medicine and patient care in neurological sciences.

Keywords: Artificial intelligence, Neuroimaging, Machine learning, Clinical neurosciences, Precision medicine.

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1. Introduction

1.1. Emergence of artificial intelligence in biomedical sciences

Over the past decade, AI has evolved from a theoretical computer science discipline into a central tool in biomedical research and healthcare innovation. Encompassing a spectrum of computational methods ML, DL, and natural language processing (NLP) AI enables machines to learn from data, recognize complex patterns, and make predictive decisions with remarkable accuracy. Its integration into biomedical sciences has transformed data interpretation, clinical diagnostics, and therapeutic strategies, particularly in domains generating large, multidimensional datasets such as genomics, radiology, and neuroscience. The convergence of computing power, big data analytics, and neural network modeling has allowed AI to extend human analytical capacity to a scale previously unattainable.[1,2]

1.2. Need for computational approaches in understanding complex neural systems

The human brain, with its intricate architecture comprising billions of neurons and trillions of synaptic connections, represents one of the most complex systems known to science. Traditional experimental methodologies, while indispensable, are often insufficient to capture the brain's high-dimensional dynamics and non-linear interactions. Computational models and AI algorithms now offer a robust framework for deciphering neural mechanisms, predicting functional connectivity, and simulating disease progression. Through supervised and unsupervised learning, AI can analyze massive neuroimaging datasets, decode

*Corresponding author: Mane Dipali
Email: dipsthaware1993@gmail.com

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electrophysiological signals, and identify subtle biomarkers that may escape conventional analytical techniques. These computational approaches have accelerated discoveries in developmental neurobiology, neurodegeneration, and systems neuroscience, facilitating a more integrative understanding of brain function.[2-4]

1.3. Bridging basic neuroscience and clinical applications

AI serves as a powerful bridge between basic neuroscience research and clinical neurology. In translational neuroscience, AI models trained on molecular, structural, and functional data are used to predict clinical outcomes, support early diagnosis, and guide personalized treatment strategies. For example, AI-based neuroimaging tools enable automated detection of tumors, stroke lesions, and neurodegenerative changes, while predictive analytics aid in surgical planning and therapeutic optimization. In psychiatry and cognitive neuroscience, machine learning is being applied to quantify emotion, memory, and behavior, offering an objective framework for understanding complex mental processes. Thus, AI not only enhances data interpretation but also drives precision medicine and evidence-based clinical decision-making.[5]

1.4. Objectives and scope of the review

The primary objective of this narrative review is to critically examine the transformative role of artificial intelligence (AI) across the diverse domains of neuroscience—ranging from fundamental brain research and computational modeling to clinical diagnostics and decision-making support systems. The review emphasizes recent advancements, translational potential, and ethical considerations that influence the integration of AI into neuroscience and neuro-clinical practice.

1.5. Source of review literature search

A comprehensive literature search was conducted using major scientific databases including PubMed, Scopus, Web of Science, IEEE Xplore, and Google Scholar. The search covered publications from 2015 to 2025 using combinations of the following keywords and Boolean operators: "artificial intelligence" OR "machine learning" OR "deep learning" AND "neuroscience" OR "brain imaging" OR "neurodiagnostics" OR "neurological disorders" OR "clinical decision-making."

Only peer-reviewed English-language articles, systematic reviews, meta-analyses, and relevant book chapters were included. Additional references were identified through citation tracking of key papers. The inclusion criteria focused on studies highlighting the application, methodology, or impact of AI in neuroscience research and clinical neurology, while non-AI computational modeling or purely theoretical neuroscience papers were excluded.[6,7]

2. Discussion

2.1. AI in basic and developmental neuroscience

AI has emerged as a transformative force in basic and developmental neuroscience by providing computational frameworks capable of deciphering the complexity of neural organization and brain development. Traditional neurobiological methods, while powerful, are often limited by the vast scale and multidimensional nature of neural data. AI, particularly ML and DL techniques, offers a means to process, integrate, and interpret such data with unprecedented precision, thereby bridging molecular, cellular, and systems-level understanding of the nervous system.[4,5]

2.2. AI in neural circuit mapping and brain connectivity modeling

Mapping the architecture of neural circuits remains one of the most formidable challenges in neuroscience. High-resolution imaging and electrophysiological datasets generate terabytes of information, which are now increasingly analyzed through AI algorithms to identify neuronal patterns and connectivity networks. Convolutional neural networks (CNNs) and graph neural networks (GNNs) have been employed to reconstruct synaptic connections from electron microscopy images, enabling automated and scalable connectome analysis. Such approaches have facilitated projects like the reconstruction of the Drosophila and mouse cortical connectomes, which previously required years of manual annotation. AI-driven tractography in diffusion tensor imaging (DTI) also enhances the reliability of white matter mapping, offering new insights into the structural basis of cognition and behavior.[6-9]

2.3. Machine learning in developmental neuroscience

During brain development, complex spatiotemporal patterns govern neuronal proliferation, migration, and differentiation. ML algorithms can identify and classify these dynamic processes through quantitative image analysis and gene expression profiling. Pattern recognition models, for instance, have been used to delineate neuronal lineage trajectories and predict the fate of neural progenitor cells. In transcriptomic datasets, unsupervised learning techniques such as clustering and dimensionality reduction help unravel gene networks regulating neurogenesis and synaptic maturation. These computational approaches allow researchers to move beyond descriptive embryology toward predictive developmental modeling.[10,11]

2.4. Predictive modeling of neurodevelopmental and neurodegenerative disorders

AI contributes significantly to elucidating the molecular and structural mechanisms underlying neurodevelopmental and neurodegenerative diseases. By integrating multi-omics data (genomic, proteomic, and metabolomic) with neuroimaging findings, AI models can identify early biomarkers and predict disease trajectories. In disorders such as autism spectrum disorder (ASD) and attention-deficit/hyperactivity disorder

(ADHD), ML has been applied to detect atypical connectivity patterns and developmental deviations from neurotypical brain growth. Similarly, in neurodegenerative conditions, predictive models help forecast the onset and rate of neuronal loss, supporting early diagnosis and therapeutic planning.[12-14]

One of the most studied applications of AI in neuroscience is Alzheimer's disease (AD). Deep learning architectures trained on longitudinal MRI and PET imaging data have demonstrated remarkable accuracy in classifying disease stages and predicting cognitive decline. AI models such as recurrent neural networks (RNNs) can analyze temporal sequences of imaging and clinical data to forecast progression from mild cognitive impairment (MCI) to Alzheimer's dementia. The multimodal AI frameworks that integrate imaging, cerebrospinal fluid biomarkers, and genomic information are providing new mechanistic insights into amyloid and tau pathology. These approaches hold potential not only for diagnosis but also for identifying novel therapeutic targets.[15,16]

3. AI in Clinical Neurosciences

AI is rapidly transforming clinical neuroscience by enhancing diagnostic precision, improving prognostic predictions, and supporting therapeutic interventions. The integration of AI in neurology, neurosurgery, and psychiatry offers the potential to overcome traditional limitations of human interpretation, enabling faster and more accurate clinical decision-making.[17]

3.1. Applications in neurology, neurosurgery, and psychiatry

In neurology, AI algorithms are being employed to analyze large datasets from electronic health records, neuroimaging, and electrophysiological studies to detect subtle patterns that may be missed by human observers. For instance, deep learning models can identify early signs of neurodegenerative diseases such as Alzheimer's and Parkinson's disease, facilitating timely intervention. In neurosurgery, AI aids in preoperative planning, intraoperative guidance, and postoperative monitoring by integrating imaging data with predictive analytics. Psychiatry has also benefited from AI through the analysis of behavioral, genetic, and neuroimaging data to predict disease onset, stratify patient risk, and personalize therapeutic strategies for conditions such as depression, schizophrenia, and anxiety disorders.[18,19]

3.2. AI-based diagnostic tools for stroke, epilepsy, parkinson's disease, and brain tumors

AI-driven diagnostic systems are revolutionizing the early detection and classification of neurological disorders. In stroke management, machine learning algorithms can rapidly analyze CT or MRI scans to identify ischemic regions, predict infarct evolution, and optimize reperfusion strategies. For epilepsy, AI models can detect seizure patterns from EEG data with higher sensitivity than conventional methods, enabling better seizure forecasting and management. In Parkinson's disease, AI assists in analyzing motor function data, speech patterns, and neuroimaging biomarkers to support early diagnosis. Similarly, AI-based radiomics approaches for brain tumors allow automated segmentation, grading, and response monitoring, reducing observer variability and improving treatment planning.[20]

3.3. Predictive analytics for patient outcomes and treatment response

Predictive analytics powered by AI enables clinicians to forecast patient outcomes and optimize individualized treatment plans. By integrating longitudinal clinical data, imaging features, and molecular markers, machine learning models can predict disease progression, functional recovery, and risk of complications. In stroke rehabilitation, AI-driven models predict motor and cognitive recovery trajectories, informing tailored rehabilitation strategies. Similarly, in neuro-oncology, predictive models guide treatment selection based on tumor characteristics, genetic profiles, and patient-specific responses, enhancing precision medicine approaches.[21]

3.4. Use in surgical planning and robotic-assisted neurosurgery

AI plays a crucial role in neurosurgical planning by providing 3D reconstructions of patient-specific anatomy, simulating surgical trajectories, and predicting intraoperative risks. Robotic-assisted neurosurgery systems integrated with AI algorithms enable precise navigation, real-time tissue differentiation, and optimized instrument control, minimizing surgical complications. Moreover, AI facilitates postoperative monitoring by detecting early signs of neurological deterioration, guiding timely interventions, and improving overall patient outcomes. Collectively, these advances represent a paradigm shift toward data-driven, precision-guided neurosurgery.[22]

4. AI in Cognitive and Behavioral Neuroscience

Cognitive and behavioral neuroscience seeks to understand the neural mechanisms underlying complex psychological processes such as memory, attention, emotion, and decision-making. The integration of AI, particularly ML and DL techniques, has profoundly enhanced this field by enabling the analysis of large, multidimensional datasets that were previously intractable. AI offers unprecedented capabilities for modeling brain activity, predicting behavioral outcomes, and identifying subtle biomarkers of neuropsychiatric disorders.[23]

4.1. Machine learning for decoding brain activity patterns related to memory, emotion, and cognition

Machine learning algorithms have been instrumental in decoding neural activity patterns associated with cognitive and emotional processes. Using functional neuroimaging data, such as fMRI and MEG, ML models can predict cognitive states, reconstruct visual or motor imagery, and map emotion-specific neural signatures with high accuracy. Deep learning frameworks, including CNNs and recurrent neural networks (RNNs), allow for temporal and spatial pattern recognition in complex brain signals, providing insights into memory consolidation, decision-making processes, and affective states. Critically, these models have enabled the identification of latent neural networks that underlie cognitive flexibility and emotional regulation, offering potential biomarkers for psychiatric conditions.[24]

4.2. Use of EEG, fMRI, and behavioral data for mental health prediction

The combination of electrophysiological recordings (EEG), neuroimaging modalities (fMRI), and behavioral assessments provides rich multidimensional data for AI-driven mental health prediction. Supervised and unsupervised learning models have been employed to classify patients with depression, anxiety, schizophrenia, and attention-deficit disorders, and often outperforming traditional statistical approaches. AI algorithms can detect subtle anomalies in neural oscillations, functional connectivity, and behavioral patterns that correlate with disease onset, progression, or treatment response. Importantly, these predictive models support early intervention strategies and personalized therapeutic planning, although rigorous validation across diverse populations remains a challenge.[25]

4.3. Role in sleep disorder classification and cognitive performance analysis

Sleep disorders, including insomnia, sleep apnea, and narcolepsy, significantly impact cognitive performance and mental health. AI-based analyses of polysomnography, EEG, and actigraphy data facilitate automated sleep stage classification, detection of microarousals, and identification of abnormal sleep patterns. Machine learning approaches have also been applied to assess cognitive performance, linking neural activity patterns with attention, working memory, and executive function. These models not only enhance diagnostic precision but also provide actionable insights for behavioral interventions, pharmacotherapy optimization, and longitudinal monitoring of cognitive decline.[26,27]

5. AI in Neuropharmacology and Therapeutics

The application of AI in neuropharmacology and therapeutics has emerged as a transformative force, offering unprecedented opportunities to accelerate drug discovery, optimize therapeutic strategies, and personalize treatment for neurological disorders. Traditional approaches in neuropharmacology are often labor-intensive, time-consuming, and costly, with high attrition rates during drug development. AI-driven methodologies provide a computational framework to overcome these challenges, integrating vast datasets from genomics, proteomics, neuroimaging, and clinical records to inform rational drug design and treatment selection.[28]

5.1. AI-assisted drug discovery and repurposing for neurological disorders

AI algorithms, particularly deep learning and reinforcement learning models, have revolutionized the identification of novel drug candidates and the repurposing of existing molecules. These models can analyze complex chemical structures, predict their interaction with neural targets, and identify potential therapeutic effects. For example, AI has been employed to screen thousands of compounds for efficacy against Alzheimer's disease and Parkinson's disease, enabling rapid prioritization of candidates with high translational potential. Drug repurposing, facilitated by AI-driven pattern recognition in multi-omics datasets, offers a cost-effective strategy to expedite treatment options for neurodegenerative and psychiatric disorders.[29]

5.2. Computational models for blood–brain barrier (BBB) permeability and pharmacokinetics

The blood–brain barrier represents a critical hurdle in neurotherapeutics. AI-based predictive models now allow accurate estimation of BBB permeability and pharmacokinetic properties, enhancing the selection of molecules with optimal CNS bioavailability. Machine learning approaches integrate molecular descriptors, physicochemical properties, and transporter interactions to simulate drug absorption, distribution, metabolism, and excretion (ADME) profiles. These predictive insights minimize experimental failures and streamline preclinical evaluation.[30]

5.3. Personalized medicine approaches in neuropharmacology

AI enables the tailoring of therapeutic interventions to individual patients by leveraging genetic, epigenetic, and phenotypic data. Predictive modeling can forecast patient-specific drug responses, optimize dosing regimens, and reduce adverse events. In epilepsy, for instance, AI-guided algorithms can suggest the most effective antiepileptic drugs based on seizure patterns, genomic variants, and prior treatment history. Such personalized approaches promise to improve outcomes and minimize trial-and-error prescribing.[31]

5.4. Predictive modeling of drug efficacy and adverse effects

Beyond discovery and personalization, AI contributes to safety profiling and efficacy prediction. Machine learning models analyze clinical trial data, electronic health records, and real-world evidence to anticipate both therapeutic benefits and potential side effects. Early detection of adverse drug reactions through AI not only safeguards patient health but also informs regulatory decisions and post-marketing surveillance, making neurotherapeutics safer and more efficient.[32]

6. AI in Diagnostics and Neuroimaging

Advances in AI have fundamentally transformed diagnostic approaches and neuroimaging in neuroscience. Traditional neuroimaging interpretation relies heavily on human expertise, which is time-consuming and subject to inter-observer variability. AI, particularly ML and DL techniques, offers unprecedented opportunities to automate, standardize, and enhance the accuracy of neuroimaging analysis.[33]

6.1. Automated image analysis: MRI, CT, PET, and diffusion tensor imaging (DTI)

Automated AI-driven pipelines have been developed for the analysis of structural and functional imaging modalities. Magnetic Resonance Imaging (MRI) benefits from AI in volumetric measurements, tissue segmentation, and detection of subtle structural changes. Computed Tomography (CT) analysis using AI enables rapid identification of intracranial hemorrhage, stroke, and trauma with high sensitivity. Positron Emission Tomography (PET) and DTI further leverage AI to quantify metabolic activity and white matter tract integrity, providing insights into neurodegenerative processes and connectivity patterns. These automated tools reduce diagnostic delays and facilitate large-scale studies that were previously infeasible due to manual processing constraints.[34,35]

6.2. Deep learning for segmentation, classification, and lesion detection

Deep learning architectures, such as CNNs, have demonstrated remarkable performance in segmenting brain structures, classifying tissue types, and detecting lesions with near-human or superhuman accuracy. For instance, DL models can accurately delineate tumor margins, identify microbleeds, or segment hippocampal subfields in Alzheimer's disease. These models not only improve reproducibility but also enable quantitative biomarkers for disease progression and therapeutic response.[36]

6.3. Integration of multimodal imaging data (Radiomics and Connectomics)

AI facilitates the integration of multimodal imaging data, combining structural, functional, and molecular information to produce comprehensive brain models. Radiomics, which extracts high-dimensional quantitative features from images, allows identification of patterns invisible to the human eye. Connectomics analysis, enhanced by AI, maps complex neural networks and their disruptions in disease. This integration supports precision diagnostics, risk stratification, and personalized treatment planning.[37]

6.4. AI in early disease detection and monitoring

One of the most impactful applications of AI lies in early detection and longitudinal monitoring of neurological disorders. AI algorithms can identify prodromal changes in diseases such as Alzheimer's, Parkinson's, and multiple sclerosis by detecting subtle structural or functional anomalies before clinical symptoms manifest. Continuous monitoring using AI-enabled imaging workflows also allows assessment of therapeutic efficacy and disease progression, supporting proactive and personalized clinical management.[38]

7. Challenges and Ethical Considerations

7.1. Data privacy, bias, and algorithmic transparency

AI systems in neuroscience rely on large-scale and multimodal patient datasets, including neuroimaging (MRI, fMRI, PET), electrophysiological recordings (EEG, MEG), and increasingly, genetic and behavioral information. Ensuring the privacy, confidentiality, and security of such sensitive data is paramount, as these datasets often contain highly identifiable neural and genomic signatures unique to individuals. Inadequate anonymization, improper data handling, or cyber breaches can lead not only to the violation of patient privacy but also to potential psychological, social, and legal harm, especially when linked to neuropsychiatric conditions or genetic predispositions. Beyond technical safeguards, there is a pressing ethical responsibility to implement robust data governance frameworks. These include the use of advanced de-identification algorithms, federated learning models (which allow AI to learn across decentralized data without transferring raw patient information), and blockchain-based audit trails to enhance transparency and traceability. Compliance with international regulations—such as the General Data Protection Regulation (GDPR) in the European Union and HIPAA in the United States—is essential to ensure lawful data use and patient consent.[39]

Moreover, as AI models become more sophisticated, the potential for data re-identification through reverse engineering of neural patterns poses a new ethical challenge. Thus, interdisciplinary collaboration among neuroscientists, AI developers, ethicists, and legal experts is vital to establish standardized ethical guidelines and cybersecurity protocols. Such proactive measures are critical to maintain public trust, safeguard participant rights, and ensure that AI-driven neuroscience advances are both scientifically robust and ethically sound. AI algorithms are susceptible to bias arising from imbalanced datasets, which may lead to disparities in diagnosis and treatment across different populations. Transparent reporting of algorithm development, including training data, model architecture, and performance metrics, is essential to build trust among clinicians and patients. Explainable AI (XAI) frameworks are increasingly advocated to allow clinicians to interpret AI-driven decisions, thereby mitigating the "black box" problem inherent in complex models.[39]

7.2. Standardization and validation of AI tools for clinical use

The lack of standardized protocols for AI deployment in neuroscience poses a major barrier to clinical translation. Variability in data acquisition, preprocessing, and annotation can affect model performance and reproducibility. Rigorous validation using multi-center datasets, external benchmarking, and prospective clinical trials is essential to ensure reliability. Establishing consensus on evaluation metrics and reporting guidelines will facilitate wider adoption of AI tools in real-world clinical settings.[40]

7.3. Regulatory and ethical frameworks for AI in neuroscience

Regulatory oversight of AI-driven neurotechnologies is still evolving. Guidelines must address not only safety and efficacy but also liability, consent, and patient autonomy. Ethical frameworks should govern the use of predictive models, particularly when AI outputs may influence high-stakes decisions such as neurosurgical interventions or psychiatric treatments. Continuous dialogue among researchers, clinicians, ethicists, and policymakers is necessary to align innovation with societal and ethical norms.[41]

7.4. Human–machine collaboration and clinician training

AI is intended to augment, not replace, human expertise. Effective human–machine collaboration requires clinicians to understand AI capabilities, limitations, and potential biases. Training programs in AI literacy and digital neuroscience are crucial to equip healthcare professionals with the skills necessary to interpret AI insights responsibly. A well-integrated workflow combining AI assistance with clinical judgment can enhance patient outcomes while minimizing risks associated with overreliance on automated systems.[42]

8. Future Directions

8.1. Integration of AI with neuroinformatics and brain–computer interfaces (BCIs)

The convergence of AI and neuroinformatics offers unprecedented opportunities to manage and interpret the vast datasets generated in neuroscience. Large-scale neural recordings, multi-omics data, and longitudinal clinical datasets require sophisticated AI-driven analytics to extract meaningful patterns. Furthermore, the integration of AI with brain–computer interfaces (BCIs) promises to translate neural signals into actionable outputs, potentially restoring motor function in paralyzed patients or enabling communication in individuals with severe neurological impairments. By combining real-time data processing with adaptive learning algorithms, future BCIs could achieve higher precision, reduced latency, and personalized user experiences.[4,6]

8.2. Development of explainable and interpretable AI models

A major challenge in clinical adoption remains the "black box" nature of many AI models. Future research must prioritize the development of explainable AI (XAI) frameworks, which provide transparency in decision-making and build clinician trust. Interpretable models will not only enhance regulatory compliance but also facilitate the identification of novel biomarkers and mechanistic insights into neurological disorders. By elucidating how AI arrives at predictions, researchers and clinicians can validate findings, uncover hidden patterns, and improve patient safety.[43,44]

8.3. Collaborative data-sharing platforms for global neuroscience research

The advancement of AI in neuroscience will require extensive, high-quality, and diverse datasets. International collaborative platforms enabling secure data sharing and harmonization of neuroimaging, genetic, and clinical information can accelerate model development and generalizability. Such initiatives will help overcome biases inherent in small or localized datasets and support large-scale meta-analyses. Cloud-based infrastructures with privacy-preserving AI techniques, such as federated learning, will allow global collaboration while maintaining patient confidentiality.[45]

8.4. Vision for AI-driven precision neurology and psychiatry

AI holds the potential to revolutionize personalized neuroscience care. Predictive algorithms could tailor interventions based on individual risk profiles, genetic background, lifestyle factors, and disease progression patterns. In neurology, AI could optimize treatment selection for epilepsy, stroke, or neurodegenerative diseases. In psychiatry, computational models may predict treatment response and early relapse in mood disorders, enabling proactive interventions. Ultimately, AI-driven precision neurology and psychiatry will facilitate a paradigm shift from reactive to preventive, patient-centered care.[46-48]

9. Conclusion

AI has emerged as a transformative force in neuroscience, fundamentally reshaping the ways in which brain research, diagnostics, and clinical decision-making are conducted. By leveraging machine learning, deep learning, and advanced computational algorithms, AI enables the integration and interpretation of complex multimodal datasets—from neuroimaging and electrophysiology to genomics and behavioral metrics. This capability not only enhances our understanding of the underlying mechanisms of neurological and psychiatric disorders but also facilitates the development of predictive models that can inform early diagnosis, prognosis, and personalized treatment strategies. The translational potential of AI in neuroscience is particularly significant. Laboratory discoveries in neural circuit mapping, neurodevelopment, and neuropharmacology can now be rapidly translated into clinical applications, including automated image analysis, risk stratification, and individualized therapeutic recommendations. Such integration bridges the gap between basic science and patient care, paving the way for precision neurology and psychiatry. Despite these advancements, the ethical, technical, and regulatory challenges associated with AI such as algorithmic bias, data privacy, and reproducibility cannot be overlooked. Addressing these issues requires robust collaboration across disciplines, including computational scientists, clinicians, ethicists, and policymakers. Only through coordinated efforts can AI-driven neuroscience fulfil its promise in a responsible and impactful manner. AI represents not merely a technological tool but a paradigm shift in neuroscience, offering unprecedented opportunities for understanding the human brain, improving diagnostic accuracy, and enhancing patient-centered care. Strategic, ethical, and multidisciplinary engagement will be critical to harness its full potential, ensuring that innovation translates into tangible clinical and societal benefits.

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None.

11. Conflict of Interest

None.

Reference

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