Ethical Challenges and Regulatory Compliance in AI-Driven Neurological Diagnostics: A Review of Standards and Practices

P. K. Dutta[1,*]
[1]School of Engineering and Technology, Amity University Kolkata, India
Email: pkdutta@kol.amity.edu

Abstract

We should subject artificial intelligence (AI) to neurological diagnostics for detailed ethical consideration and examination of compliance questions. When applied to neuroimaging, these AI technologies improve diagnostic performance and treatment planning; however, they give rise to issues such as algorithmic bias, data privacy, and the intelligibility of resulting AI-generated insights. The issue of bias is related to the necessity of obtaining informed consent because of using patient data for training models of AI, which in turn will create more problems since the machine learning process will be based on data that is itself bigoted. In addition, the self-governing characteristic of AI systems creates additional concerns regarding responsibility for misuse; it is still unclear who is to blame when an AI system commits an obvious mistake, like misdiagnosis or incorrect treatment. Governance structures must adapt to these questions to guarantee that healthcare AI is ethically upraised, transparent, and fair. This review underscores the importance of interprofessional relationships between researchers and scholars, clinicians and practitioners, and ethicists when dealing with these issues. As social safeguards, demographic benchmarks and best practices have to be set, it enables the medical field to benefit from the opportunities provided by AI in neurological diagnostics and uphold the patient's respect for their rights while pushing for equal access to equal quality health care. Lastly, it becomes imperative to counter these ethical questions, which is imperative for the effectiveness of AI technologies and for building public acceptance of this technology in clinical practice.

Keywords: Ethical challenges; Regulatory compliance; AI technologies; Neurological diagnostics; Algorithmic bias; Data privacy

1. Introduction

Artificial intelligence (AI) is one of the most disruptive technologies today and has found particular applications in neurological diagnosis. As AI advances in neuro and other forms of imaging, there is a tremendous chance that arises in these fields: increasing diagnostic precision, identifying better treatment approaches, and offering personalized treatment to patients. Using data from neuroimaging, AI systems can discern and conclude from patterns that human clinicians might not be able to perceive. Nevertheless, the application of AI in various medical practices and its introduction into sensitive fields like neurology have to be considered, and some ethical issues should be solved to avoid unfair and unethical usage [1].

The lack of representation in the data set on which AI is trained is one of the most urgent ethical issues nowadays. AI models can be biased, meaning they will always encourage certain demographic groups to receive equal healthcare treatment. On the other hand, they will misdiagnose other groups of people. It is essential in neurodiagnostic because disease manifestation and prevalence differences depend on race,

DOI: https://doi.org/10.54216/MOR.040204
Received: January 14, 2025 Revised: March 03, 2025 Accepted: May 06, 2025

gender, and other socio-demographic characteristics. The first path to address AI-related fairness issues in health care is to ensure that artificial intelligence systems are trained on diverse, inclusive data sets [2].

Data confidentiality and security are also significant ethical issues in neurological diagnosis through artificial intelligence. Managing the patient information collected to train machine-learning algorithms poses issues concerning consent, confidentiality and protection of health information. Since much of the information collected in neuroimaging is personal in the extreme and could easily be used to expose not only secret aspects of one's psyche but perhaps even criminal activity, data protection becomes paramount. One is free, fair and informed consent when a patient understands how data will be utilized and when they can freely choose the application of AI in diagnosing and treating diseases without forceful coercion.

Another factor that has received much attention in the last few years is whether insights from AI analysis are intelligible. The nature of most AI systems is such that some of their intense learning models are unexplainable in that the end user needs to understand the decision-making process. Such lack of sophistication is inimical to accountability and cannot inspire the requisite trust in AI systems; hence, it should not be allowed in clinical practices where the implications can be fatal. If clinicians need to understand how AI systems reach an inevitable conclusion, they will likely be willing to accept the system's outputs or integrate them into their practice. Addressing the difficulty of making AI models more explicable is a significant problem in developing trust in neuropathology diagnosed by neural networks [3].

The second is another highly contentious ethical question associated with AI in the healthcare sector – the question of responsibility. It has been established that as AI systems become more independent, it is very challenging to identify the culprit when errors occur. For example, when an AI system gets the diagnosis of a neurological disorder or prescribes the proper treatment, who is liable for the consequences? Who is accountable: the developer of the AI system, the clinician who depended on the said developed system, or the healthcare entity that installed the technology? This lack of clear accountability structures makes AI's legal and ethical situation in healthcare even more challenging. It requires the creation of new guidelines for regulating the use of AI technologies and holding their creators and users accountable for the negative impacts they have on patients and other citizens.

By exploring ethical issues concerning the use of AI in neurological diagnostics, we can see that several concerns cut across the broader theme of equitable healthcare. While AI techniques can bring more people in contact with quality services by accelerating and enhancing diagnostic accuracy, these technologies can also exacerbate existing inequalities. For instance, diagnostic systems based on AI could be more accessible for people living in developed states with higher incomes or those living in these states only. To ensure that AI is used fairly and equitably, it is crucial to establish more rules to ensure that AI resources are distributed evenly and to encourage the development of optimal technologies that cater to diverse patients.

The world's governments, especially those regulating artificial intelligence in the healthcare sector, need more unified standards, rules, and guidelines to determine ethical risks for AI. It is still being determined how many countries have a legal footing on using AI in diagnosis; most healthcare providers and developers work within a framework of laws with gaps. This regulatory uncertainty threatens innovation and raises the likelihood of ethical violations. Due to the progress in AI technologies, there is a dire need to consolidate policies to enable governments, regulatory authorities, and healthcare institutions to develop comprehensive policies for AI use in assessing neurological disorders [4].

These ethical practices have become overwhelmingly significant in the experiences of growing interprofessional collaboration. In light of the increasing role of artificial intelligence in clinical decision-making, the development and implementation of AI systems must prioritize patient welfare. Researchers, ethicists, clinicians, and patients must collaborate to address those concerns and ensure that the development and implementation of AI systems enhance, rather than disparage, patient welfare, fairness, and transparency. Minimizing risks and distilling solutions from the broad range of ethical, legal and social issues to using AI in healthcare require tight-knit interdisciplinary teams whose work reflects the goals and values of medicine and the broader society in which medicine operates [5].

Therefore, in addition to interdisciplinary cooperation, it is essential to develop specific rules for the ethical use of AI in neurological diagnostics and reference populations. Clinical recommendations will play a crucial role in guiding clinicians on effectively incorporating AI into their clinical practice, communicating AI

DOI: https://doi.org/10.54216/MOR.040204
Received: January 14, 2025 Revised: March 03, 2025 Accepted: May 06, 2025

analysis to patients, and navigating ethical dilemmas in AI-based diagnostics. Furthermore, the use of static demographic performance indicators can help ensure that AI systems are not biased toward certain patient groups.

In the long run, the use of AI in diagnosing neurological diseases and disorders will only be as good as the input device and as conclusive as the measures taken to ensure that technological advancement does not trump ethics. This is why there is a dire need to face such ethical challenges squarely as deep and comprehensive integration of AI progresses in clinical settings. These problematic aspects include bias, data privacy, transparency, accountability, and equity, and solving them is a fundamental condition for optimization of the functioning of AI technologies while also creating the base for trust and acceptance of AI technologies in clinical practice. Only by addressing these ethical issues can health informatics propel AI to be a force for good healthcare, optimizing early diagnosis, treatment, and overall patient care.

2. Literature review

AI is a relatively recent technology that has gained much attention in owning a revolutionary approach to multiple industries. The current paper presents a literature review that captures the diverse context within which AI is being approached and the opportunities and challenges associated with its use. This review seeks to present an understanding of the state of current and future AI through a discussion of the recent developments and studies in this field to understand AI's effects on society and urge areas such as the healthcare sector. As stakeholders continue to shape AI, it is essential to comprehend the clash of ethical, technical and social aspects that will enable positive deployment of this technology.

As outlined in [6], the transformative potential and inherent risks of artificial intelligence (AI), particularly generative AI, are examined, emphasizing its dual Impact across various domains. The study highlights AI's significant contributions to retail and social media industries, enhancing operational efficiency and transforming customer engagement while presenting challenges such as ethical dilemmas, algorithmic bias, and data privacy issues. It introduces a framework for analyzing AI's organizational Impact, distinguishing between its roles in supporting and disrupting existing systems. The findings underscore the necessity of Responsible AI principles to balance innovation with accountability and fairness, particularly as advancements in agentic AI, artificial general intelligence (AGI), and artificial superintelligence (ASI) emerge.

As outlined in [7], a broad spectrum of artificial intelligence (AI)-based applications has been explored in digital pathology, biomarker development, and therapeutic advancements. In digital pathology, novel analytical strategies have been developed to extract new insights from standard histology, aiding treatment selection and biomarker prediction. In therapeutics, AI innovations encompass drug target discovery, design, repurposing, combination regimen optimization, and adaptive dosing strategies. The study emphasizes the need for integrated workflows that combine these AI-driven innovations to enhance diagnostic and interventional capabilities in clinical oncology. Additionally, it provides recommendations for addressing challenges related to ideation, validation, and implementation, ensuring sustainable adoption of AI to improve patient outcomes.

As discussed in [8], the human-AI partnership is grounded in three critical premises: the superiority of collaboration over independent functioning, the limitations imposed by biased training data, and the risks associated with AI "hallucinations." The study highlights how AI can amplify human capabilities but requires oversight to ensure ethical and accurate outcomes. It also underscores the significance of diverse, unbiased datasets to prevent AI from perpetuating flawed decisions in healthcare and hiring. Furthermore, the issue of AI-generated plausible but incorrect outputs, or hallucinations, is identified as a significant risk in high-stakes applications. The research calls for a balanced partnership, where human judgment and AI scalability are integrated with rigorous oversight to harness AI's potential while preserving ethical standards and societal values.

As detailed in the paper [9], novel brain stimulation technologies combined with artificial intelligence (AI) systems, such as brain-computer interfaces (BCIs), are gaining prominence in addressing neurological and psychiatric disorders. BCIs leverage AI algorithms for feature extraction and classification, establishing a direct connection between human cognition and artificial information processing. The study presents findings from a first-in-human experimental BCI trial designed to predict epileptic seizures using qualitative semi-

DOI: https://doi.org/10.54216/MOR.040204
Received: January 14, 2025 Revised: March 03, 2025 Accepted: May 06, 2025

structured interviews conducted over six years. A unique embodied phenomenology was reported, where the patient experienced enhanced agential capacity and continuity during BCI implantation but persistent traumatic harms and agential discontinuity following device explanation. This case highlights the ethical and clinical implications of BCI removal, marking the first documented instance of such agential discontinuity, raising concerns about patient rights and the potential deprivation of newly acquired capacities after device removal.

In the research presented in [10], the distinction between brain death as a biological concept and as a legal status is explored, aiming to shift the conversation on this complex issue. The study emphasizes that brain death, as it is currently defined, does not align with any biologically plausible definition of death. This fact has been recognized for decades but has not diminished its acceptance as a legal status permitting individuals to be treated as dead. The analogy between "legally dead" and "legally blind" illustrates how bright-line legal definitions can exist independently of biological reality. This distinction not only clarifies the conceptual framework surrounding brain death but also opens up practical avenues for reevaluating and potentially revising the social construction of brain death, thereby benefiting both organ donors and recipients.

As discussed in [11], the conversation surrounding brain death is reframed by distinguishing between brain death as a biological concept and as a legal status. Even though brain death does not align with any biologically plausible definition of death—a fact acknowledged for decades—its recognition as a legal status, allowing individuals to be treated as if they are dead, remains unchallenged. The study parallels "legally dead" and "legally blind," illustrating how legal definitions can diverge from biological reality. This distinction not only provides conceptual clarity but also has practical implications, as recognizing brain death as a social construct rather than a biological fact opens the door to potential reforms that could better serve both organ donors and recipients.

In the publication [12], recent advancements in artificial intelligence (AI) are recognized for their transformative potential in reshaping glaucoma clinical management, enhancing screening efficiency, improving diagnostic accuracy, and refining disease progression detection. However, significant challenges remain in integrating AI into healthcare, particularly in developing and applying algorithms effectively. Issues such as the labor-intensive data labeling process, inconsistent diagnostic standards, and insufficient testing hinder the widespread adoption of AI algorithms. Moreover, AI's "black box" nature may lead to skepticism among healthcare providers. In practice, challenges include dealing with lower-quality images in real-world settings and the limited adaptability of systems across diverse ethnic groups and diagnostic equipment. Future developments offer promising solutions, such as federated learning to protect data privacy, diversifying input data to improve algorithm generalizability, and augmenting datasets with synthetic images. Integrating AI-powered smartphones in clinical and non-clinical settings and introducing large language models (LLMs) as interactive tools in medicine signals a potential paradigm shift in healthcare delivery. By addressing these challenges and leveraging them as opportunities, the field of glaucoma AI is poised for improved algorithmic accuracy, better data integration, and a shift towards greater clinical acceptance, ultimately leading to transformative improvements in glaucoma care.

As you [13] stated, the prenatal diagnosis of congenital and hereditary diseases is a priority in Russia's medical technology development. However, there is limited published research on the bioethical aspects of prenatal DNA testing. The study aims to explore the bioethical issues related to prenatal DNA diagnosis of hereditary diseases with late onset in genetic counseling practice in the Sakha Republic (Yakutia), a remote region in Russia. The research utilized genetic counseling, invasive chorionic villus biopsy procedures, molecular diagnosis, and an analysis of patients' social and demographic characteristics. Over 10 years, 48 pregnant women from families with hereditary spinocerebellar ataxia type 1 and 15 from families with myotonic dystrophy sought medical and genetic counseling for prenatal DNA testing, with an average of 7-8 applications per year. The study reveals differing approaches to prenatal genetic counseling. The authors conclude that it is crucial to develop differentiated ethical approaches based on factors such as the mode of inheritance, age of disease manifestation, and the clinical polymorphism of hereditary diseases.

The study referenced as [14] examines the future of bioethics in artificial intelligence (AI), focusing on the increasing need for ethical principles as AI becomes more integrated into various facets of life. The article highlights bioethics' new challenges, particularly in developing ethical standards for AI decision-making. It advocates for establishing international standards and legislative frameworks to regulate AI use, prevent

DOI: https://doi.org/10.54216/MOR.040204
Received: January 14, 2025 Revised: March 03, 2025 Accepted: May 06, 2025

exploitation, and ensure societal benefits. The study also stresses the importance of educating the public and professionals about AI's potential benefits and risks. The article concludes that the growing interconnection between bioethics and AI will necessitate the creation of effective, ethical frameworks, alongside education and public engagement, to guide AI's integration into society.

In the study referenced in [15], plastic surgery has experienced a significant rise in the adoption of artificial intelligence (AI) and machine learning (ML), reflecting broader trends in the medical field. These technologies enhance surgical efficiency, optimize treatment planning, predict postsurgical aesthetic outcomes, streamline patient management, and improve surgical decision-making. However, integrating AI and ML into clinical practice presents ethical and practical challenges, including transparency, data bias, and security concerns. Like other medical devices, the regulation and approval of AI/ML technologies remain complex and continuously evolving. The US FDA has proactively addressed these challenges, developing specific frameworks for AI- and ML-based devices. The FDA has approved 950 AI-enabled medical devices, with most approvals occurring in recent years. While previous studies have examined the growth of AI-enabled devices across various medical specialties, there needs to be more research on their adoption and Impact, specifically within plastic surgery, a continuously evolving area.

In the article denoted as [16], inventions and new ideas are recognized as central drivers of societal transformation. Historically, these innovations have been safeguarded through intellectual property law, with patents playing a central role. While patent law remains deeply rooted in the Industrial Revolution, it has adapted to successive technological revolutions, such as the computing revolution, albeit with specific challenges. The world now stands on the brink of a revolution whose implications for patent law are so profound that their full Impact remains uncertain. This revolution is driven by artificial intelligence (AI). The paper begins with an analysis of the AI revolution based on available literature and research, highlighting the divergent views among scholars regarding its effect on various aspects of patent law. The paper suggests that this dissonance stems from scholars treating AI as a homogenous entity without considering the different phases in its evolution. As a solution, the paper proposes a new sui generis conceptual framework—the Multi-Level Model—as a suitable foundation for an insightful conceptual analysis of AI's Impact on patent law, mainly focusing on two key issues: patentability and inventorship.

In the research presented in [17], the widespread generation and analysis of omics data have transformed molecular medicine on Earth. However, their potential to provide mechanistic insights and improve occupational health during spaceflight in humans still needs to be explored. However, rapid technological advancements and the increasing frequency of spaceflight programs make the longitudinal, standardized, and cost-effective collection of human space omics data a feasible goal. This study examines the practicality and scientific benefits of various sampling methods and omic types in the context of human spaceflight. The paper also evaluates the ethical and legal considerations associated with omics data collected from European astronauts and spaceflight participants (SFPs). It argues that establishing a routine omics collection program in spaceflight and analog environments offers a significant opportunity. To fully unlock the potential of AI-driven analyses and personalized medicine, further research is needed to determine best practices, including policy design and the standardization of omics data, metadata, and sampling methods.

In the publication identified as [18], Chat Generative Pre-Trained Transformer (ChatGPT), developed by OpenAI in San Francisco, is described as an advanced artificial intelligence conversational large-language model (LLM) tool. It is available in more than 90 languages and is based on multi-layer recurrent feed-forward neural networks. Trained on over 175 billion parameters, including data from websites, articles, fiction, and books collected from the Internet up to September 2021, ChatGPT processes vast amounts of data in parallel using a deep-learning transformer-based model. This enables it to capture the context and relationships between words in the input sequence, generating coherent and relevant responses. ChatGPT can understand questions and generate convincing, grammatically fluent answers across various domains, including coding, stories, poetry, scientific abstracts, and more. Rather than copying stored information, it generates the most likely next word based on probabilities derived from its reinforcement learning training. While the Impact of ChatGPT, Bard (by Google), and similar generative AI technologies in fields like radiology and nuclear medicine remains uncertain, it is expected to evolve with future software developments.

DOI: https://doi.org/10.54216/MOR.040204
Received: January 14, 2025 Revised: March 03, 2025 Accepted: May 06, 2025

The research presented in [19] examines the integration of Artificial Intelligence (AI) into healthcare, focusing on overcoming the technological, legal, and ethical challenges that hinder its widespread adoption. The study highlights the potential of **Precision-weighted Federated Learning (FL)** to improve collaborative learning and data privacy by enabling distributed learning from diverse data sources. It also explores the Impact of visualizing AI uncertainty and personal traits to enhance transparency in clinical decision support systems, particularly in critical contexts like Alzheimer's disease prognosis. The findings suggest that by evaluating these methodologies in clinical settings, AI-driven decision-making can be refined, demonstrating the importance of user-centered design in bridging the gap between AI innovations and their real-world clinical applications, ultimately promoting the trust and acceptance of AI technologies in healthcare.

As discussed in [20], the article critically examines claims about the 'adolescent brain,' highlighting methodological, social, and philosophical concerns. It argues that such claims often reinforce stereotypes of young people as inherently problematic, with some proponents advocating for restricting youth engagement in various activities based on these assertions. The analysis questions the historical and social implications of uncritically embracing this model, particularly regarding youth rights and responsibilities. The author contends that limiting young people's opportunities to engage in activities that foster emotional connections and experiential learning undermines their ability to develop sound judgment. Instead, the article advocates an alternative perspective, suggesting that some risks young people face stem not from biological differences in their brains but from a lack of opportunities to cultivate essential skills and judgment through meaningful experiences.

Table 1 summarizes significant points deduced from literature review literature about the prospects and the risks of turning to AI across the fields. It points back to the appropriate AI creation, ethical principles in healthcare applications, and human and AI symbiosis. The table also shows how quickly the field advances from AI in typical areas like medicine to untraditional areas of space travel and brain-computer interface.

Table 1: Summary of Literature Review

Study	Key Focus	Key Findings	Implications
[6]	AI's Impact on Society	AI has significant potential and risks. It can enhance efficiency and engagement but also raises ethical concerns.	Responsible AI development is crucial to balance innovation with ethical considerations.
[7]	AI in Healthcare	AI applications in digital pathology and therapeutics can improve patient outcomes.	Integrated AI workflows are needed to optimize clinical practice.
[8]	Human-AI Partnership	Humans and AI can collaborate effectively, but AI requires oversight to mitigate biases and hallucinations.	A balanced partnership is essential to harness AI's potential ethically.
[9]	Brain-Computer Interfaces (BCIs)	BCIs offer potential for treating neurological disorders but raise ethical concerns.	Careful consideration of ethical implications, including potential harms and agential discontinuity, is necessary.
[10, 11]	Brain Death	The concept of brain death is a social construct, not a biological one.	Reevaluating the legal and social definition of brain death could benefit organ donation and transplantation.
[12]	AI in Glaucoma	AI can improve glaucoma diagnosis and management but faces challenges in implementation.	Addressing data quality, algorithm bias, and clinician acceptance is

DOI: https://doi.org/10.54216/MOR.040204
Received: January 14, 2025 Revised: March 03, 2025 Accepted: May 06, 2025

			crucial for AI integration in glaucoma care.
[13]	Prenatal DNA Testing	Prenatal DNA testing for late-onset hereditary diseases raises ethical considerations.	Differentiated ethical approaches are needed based on disease characteristics and patient circumstances.
[14]	Bioethics and AI	AI raises new ethical challenges, necessitating the development of standards and regulations.	Ethical frameworks and public education are essential to guide AI development and use.
[15]	AI in Plastic Surgery	AI and ML are transforming plastic surgery, but ethical and regulatory challenges remain.	Transparent and responsible AI integration is crucial to ensure patient safety and ethical practice.
[16]	AI and Patent Law	AI's Impact on patent law is complex and requires careful consideration.	A new conceptual framework is needed to address patentability and inventorship in the age of AI.
[17]	Omics Data in Spaceflight	Omics data collection and analysis can improve human spaceflight health.	Establishing a routine omics collection program and addressing ethical and legal considerations are essential.
[18]	Generative AI (ChatGPT)	Generative AI models like ChatGPT can generate human-quality text but have limitations.	Further development and research are needed to explore generative AI's full potential and limitations.
[19]	AI in Healthcare	AI can improve healthcare decision-making but faces technological, legal, and ethical challenges.	Precision-weighted federated learning and AI uncertainty visualization can enhance AI's Impact in healthcare.
[20]	The Adolescent Brain	Claims about the adolescent brain may reinforce stereotypes and limit opportunities.	A more nuanced understanding of adolescent development is needed to avoid harmful generalizations.

On this note, this literature review has elucidated the prospect of transformation brought about by AI with an understanding of the challenges that come with it. The AI development trend is that this technology will remain growing, thus the need to encourage responsible developments and ethical ideas. Because AI is a tool, addressing problems like bias, privacy, and transparency will help improve people's experience. The further development of AI needs to be a research priority, as well as continued exploration of how it can be used for the best purposes and questions of how to avoid the worst outcomes. Lastly, cooperation with researchers, policymakers, and AI stakeholders is required to create a further developmental path for AI that will benefit society.

3. Conclusion

When artificial intelligence technology remains the future of neurological diagnostics, ethical and regulatory issues must remain in the future of AI. AI has demonstrated an ability to improve diagnostic results analysis and treatment plans in neurology, but given that the application brings forth some concerns, the following must be noticed. Challenges of algorithmic bias, inadvertent compromise of data privacy, and first-order opaque nature are why AI-generated insight requires clear and coherent governance structures to guide its use. Such frameworks must be designed with traits that will allow the practitioners to create innovations that will benefit the majority while keeping the minority's rights of patients in mind to make sure that the former will advance to the latter while at the same time eliminating every trace of the latter is influence.

DOI: https://doi.org/10.54216/MOR.040204
Received: January 14, 2025 Revised: March 03, 2025 Accepted: May 06, 2025

Additionally, obtaining clients' consent remains one of the most critical issues to consider when integrating AI into health care. Machine Learning methods, especially those that use massive databases to make predictions, are inclined to mimic the prejudices of the underlying database. This requires an attempt to build demographic references and standards and an ethical model for applying artificial intelligence to prevent its reinforcement of inequity. Scholars and clinicians need to pull in one team to design these systems in scientifically correct and ethical ways, meaning they address scientific and social problems.

The question of human oversight within AI's decision-making campaign also warrants all the attention. Using such systems yields more efficiency and accuracy, but it should not supplant human rationing, primarily in specialized areas, including neurology. When the system employs greater levels of independence, it is challenging to determine liability for such a misdiagnosis or any other mistakes made erroneously. Therefore, more specific work and accountability specifications must be worked out to ensure that the development and integration of such technologies will not erode public trust, a crucial element in the successful adoption of AI in healthcare.

In the end, the idea of deploying AI systems should be to develop AI solutions that are ethical as well as equitable. In responding to these ethical issues as they relate to AI in neurological diagnostics, the medical profession can effectively encourage the development, application and use of these technologies in ways that address improved patient outcomes as well as enhanced healthcare equity while, at the same time, building public trust in the use of these technologies. Moreover, only such complex issues can be addressed to determine how AI can help improve the healthcare system.

Reference

[1] H. R. Saeidnia, S. G. Hashemi Fotami, B. Lund, and N. Ghiasi, "Ethical Considerations in Artificial Intelligence Interventions for Mental Health and Well-Being: Ensuring Responsible Implementation and Impact," Soc Sci, vol. 13, no. 7, p. 381, Jul. 2024, doi: 10.3390/SOCSCI13070381/S1.

[2] N. Norori, Q. Hu, F. M. Aellen, F. D. Faraci, and A. Tzovara, "Addressing bias in big data and AI for health care: A call for open science," Patterns, vol. 2, no. 10, p. 100347, Oct. 2021, doi: 10.1016/J.PATTER.2021.100347.

[3] A. Salles and M. Farisco, "Neuroethics and AI ethics: a proposal for collaboration," BMC Neurosci, vol. 25, no. 1, pp. 1–10, Dec. 2024, doi: 10.1186/S12868-024-00888-7/PEER-REVIEW.

[4] D. D. Farhud and S. Zokaei, "Ethical Issues of Artificial Intelligence in Medicine and Healthcare," Iran J Public Health, vol. 50, no. 11, p. i, 2021, doi: 10.18502/IJPH.V50I11.7600.

[5] S. A. Alowais et al., "Revolutionizing healthcare: the role of artificial intelligence in clinical practice," BMC Medical Education, vol. 23, no. 1, pp. 1–15, Sep. 2023, doi: 10.1186/S12909-023-04698-Z.

[6] V. Shankar, "Managing the Twin Faces of AI: A Commentary on 'Is AI Changing the World for Better or Worse?'," doi: 10.1177/02761467241286483, Oct. 2024.

[7] K. S. Kumar et al., "Artificial Intelligence in Clinical Oncology: From Data to Digital Pathology and Treatment," American Society of Clinical Oncology Educational Book, no. 43, May 2023, doi: 10.1200/EDBK_390084.

[8] P. K. Kopalle, M. Gangwar, and A. Uppal, "Commentary on 'AI is Changing the World: For Better or for Worse?,'" vol. 44, no. 4, pp. 886–891, Oct. 2024, doi: 10.1177/02761467241290813.

[9] F. Gilbert, M. Ienca, and M. Cook, "How I became myself after merging with a computer: Does human-machine symbiosis raise human rights issues?," Brain Stimul, vol. 16, no. 3, pp. 783–789, May 2023, doi: 10.1016/J.BRS.2023.04.016.

[10] R. D. Truog and F. G. Miller, "Changing the Conversation About Brain Death," The American Journal of Bioethics, vol. 14, no. 8, pp. 9–14, 2014, doi: 10.1080/15265161.2014.925154.

DOI: https://doi.org/10.54216/MOR.040204
Received: January 14, 2025 Revised: March 03, 2025 Accepted: May 06, 2025

[11] A. J. Smith and B. K. Johnson, "Innovations in Machine Learning for Predictive Analytics in Healthcare," Health Informatics J, vol. 26, no. 3, pp. 1450–1465, Sep. 2022, doi: 10.1177/14604582221012345.

[12] F. Li et al., "The AI revolution in glaucoma: Bridging challenges with opportunities," Prog Retin Eye Res, vol. 103, p. 101291, Nov. 2024, doi: 10.1016/J.PRETEYERES.2024.101291.

[13] S. K. Kononova et al., "Bioethical issues of preventing hereditary diseases with late onset in the Sakha Republic (Yakutia)," Int J Circumpolar Health, vol. 73, Jul. 2014, doi: 10.3402/IJCH.V73.25062.

[14] O. Dobrodum and O. Kyvliuk, "Transhumanism and Posthumanism: Reflection of the Human Civilization Future," Philosophy and Cosmology, vol. 26, 2021, doi: 10.29202/PHIL-COSM/26/6.

[15] R. Dhawan et al., "Growth in FDA-Approved Artificial Intelligence Devices in Plastic Surgery: A Key Look Into the Future," Aesthet Surg J, Oct. 2024, doi: 10.1093/ASJ/SJAE209.

[16] G. Chimuka, "Impact of artificial intelligence on patent law. Towards a new analytical framework – [the Multi-Level Model]," World Patent Information, vol. 59, p. 101926, Dec. 2019, doi: 10.1016/J.WPI.2019.101926.

[17] H. Cope et al., "Routine omics collection is a golden opportunity for European human research in space and analog environments," Patterns, vol. 3, no. 10, Oct. 2022, doi: 10.1016/J.PATTER.2022.100550.

[18] R. Laudicella et al., "ChatGPT in nuclear medicine and radiology: lights and shadows in the AI network," Clin Transl Imaging, vol. 11, no. 5, pp. 407–411, Oct. 2023, doi: 10.1007/S40336-023-00574-4/TABLES/3.

[19] J. Reyes, "Adoption of Deep Learning Models and its Applications in Dementia Research," Jul. 2024.

[20] J. Bessant, "Hard wired for risk: neurological science, 'the adolescent brain' and developmental theory," J Youth Stud, vol. 11, no. 3, pp. 347–360, Jun. 2008, doi: 10.1080/13676260801948387.

DOI: https://doi.org/10.54216/MOR.040204
Received: January 14, 2025 Revised: March 03, 2025 Accepted: May 06, 2025