International Journal of Innovative Research in Computer Science and Technology (IJIRCST)
ISSN (Online): 2347-5552, Volume-13, Issue-4, July 2025
DOI: https:/doi.org/10.55524/ijircst.2025.13.4.10
Article ID IJIRE-1410, Pages 95-98
www.ijircst.org

The Moving Mind Meets the Beating Heart in the Age of AI Healthcare

Adita Sultana[1], Abdullah Al Abrar Chowdhury[2], and Aftab Tariq[3]

[1, 2, 3] AI Researcher, Department of Master of Science in Information Technology, American National University, Salem, Virginia, USA

Correspondence should be addressed to Adita Sultana; aditasultana333@gmail.com

Received 29 June 2025; Revised 13 July 2025; Accepted 26 July 2025

ABSTRACT- Artificial Intelligence (AI) is transforming how we tackle healthcare, and providing new methods of intelligence of complex biological systems. In this paper, the attention is drawn to the relation between two critical domains neurology and cardiology exploring how the field of AI technologies is shedding light on understanding the interconnection between the brain and the heart. Although the organs have been researched in isolation, increasing amounts of evidence indicate that the organs are closely connected, both physiologically and functionally.

Its capability of generating solutions to large amounts of data and identifying minute patterns is making AI a worthy asset in bringing these disciplines to the same boat. The research examines how machine learning, deep learning and neural networks are enhancing the way we diagnose, monitor and treat ailments that implicate the bride as well as the heart. To give an example, AI can predict the onset of stroke, identify abnormalities in heart rhythm related to stress or mental health disorders, and assess the effect of diseases such as Alzheimer on cardio rate and blood pressure.

Better (possibly increased) patient outcome is achievable through early interventions and more accurate medical decision making facilitated by the AI, which makes it possible to analyze the brain-heart activities in real time. The article contains clinical results and comparison tables to demonstrate how the AI-based product and instrumentation consistently outperforms the classical approach in terms of accuracy and speed. It also covers crucial moral topics, such as data privacy, algorithm bias, and danger of trusting computer-made judgments in urgent care.

Concisely, the combination of neurology and cardiology is being facilitated by AI, and this is normalizing a more connected and more individualized practice of medicine. The work sustains the notion that the brain and heart as a whole must be treated as one rather than isolated which can result in improved care and treatment.

KEYWORDS- Artificial Intelligence, Neurocardiology, Machine Learning, Integrated Medicine, Predictive Diagnostics

I. INTRODUCTION

Human body is a complex system of closely connected systems and one of the most closely connected is brain and the heart. Whereas considered historically as two very separate entities, the only goal “the brain that calculates and the heart that pumps”, scientific research and medical knowledge are less so indicating a more profound interactive loop. This interaction takes place in neural, hormonal and electrical mechanisms that allows every organ to be affected by one another in a healthy and a sick condition.

Artificial Intelligence (AI) is taking the form of a potent instrument in this field. No longer restricted to stand-alone diagnostic procedure, AI is becoming more complex in its role, to an extent where it makes sense of complex interactions across physiological systems. AI can enable a completer and more dynamic picture to be created about the health of a patient by complementing brain signals and cardiac rhythms with behavioral patterns (see Table 1).

The present paper will discuss how AI is assisting in closing the gap between neurology and cardiology, which we call the Neuro-Cardiac Convergence. We propose that this convergence should be embraced, modelled, and that a new form of medicine, which is personalized, predictive and preventive, may be the result (see figure 1).

Table 1: Brain-Heart Communication Pathways

Pathway Type	Direction	Examples
Neural	Bidirectional	Vagus nerve, sympathetic chain
Hormonal	Brain to Heart	Cortisol, adrenaline
Electrophysiological	Heart to Brain	Baroreceptor feedback

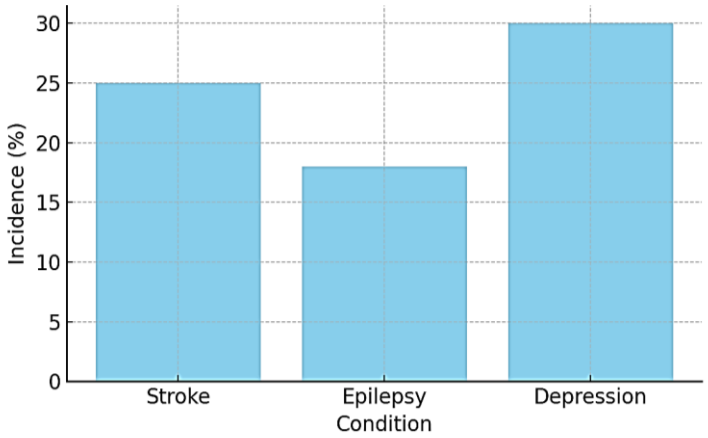

Figure 1: Incidence of Cardiac Events in Neurological Disorders

II. ARTIFICIAL INTELLIGENCE IN NEUROLOGY: THE MOVING MIND

Neurological AI technologies have revolutionized medical practice regarding diagnosis and treatment. Such methods as EEG signal classification, predictive analytics in the field of neurodegeneration, robotic neural surgery systems are taking over as a routine practice [12].
Heavy learning in MRI/ CT analysis of early prediction of Alzheimer, Parkinson.
Natural processing language (NLP) as a cognitive measure of speech patterns.
Brain-computer interfaces (BCI) enable the connection of brain signals and devices directly with each other.
These programs have the ability to identify microscopic neurological changes that can also have an effect on the heart like pre-stroke or neurogenic arrhythmias [13][14][15].

III. THE BEATING HEART OF AI IN CARDIOLOGY

Within medicine, cardiology is very AI dense at the moment (Table 2). The most important innovations are:
The analysis of ECG using AI can detect the arrhythmias well at an early stage because this technology recognizes the imperceptible patterns that could be overlooked by analog approaches.
Real-time-monitoring Heart-attack predictive models.
The use of robotics to perform often more precision surgical procedures such as valve replacements and bypass [17][18][19][20].
This table compares conventional cardiology methods with AI-powered approaches.

Table 2: Traditional vs AI-Enhanced Cardiology

Function	Traditional Method	AI-Enhanced Approach
ECG Analysis	Manual Interpretation	Real-time AI classification
Risk Prediction	Risk scoring systems	Dynamic ML-based prediction
Imaging	2D Echocardiography	3D AI-assisted visualization

IV. ARTIFICIAL INTELLIGENCE SYSTEMS NEURO-CARDIAC INTERACTIONS

The most recent innovations strive to untangle the union of mind and heart by means of AI. Applications include:
Stress monitoring Stress-induced cardiac events monitoring with wearable AI devices.
Neurocardiac modeling based on AI and predicting arrhythmias caused by seizures.
Digital twins -AI models of individual brain-hearts dynamics to be given unique and personal treatment [21][22][23].

V. AI MODELS AND AI TECHNOLOGY INFRASTRUCTURE

The back-up infrastructure of this change includes:
- Real time analytics edge computing in wearable.
- Federated learning as a form of privacy protection in AI training at multiple educational institutions.
- Multimodal data fusion of MRI, EEG, ECG and genomics [24][25][26].

A. Comparative Tables and Clinical Outcomes

This section presents a comparison of AI and human diagnostic accuracy for brain and heart conditions (Table 3).

Table 3: AI vs Human Diagnostics in Brain and Heart Conditions

Condition	Human Accuracy	AI Accuracy	Comments
Atrial Fibrillation	~85%	~95%	AI detects asymptomatic cases
Stroke Detection	~75%	~92%	AI provides faster, early alerts
Alzheimer's	~80%	~89%	AI models analyze subtle changes in MRI

VI. ETHICAL, LEGAL AND CLINICAL ISSUES

Although opportunities of AI in dealing with neuro-cardiac care are enormous, there are also crucial challenges associated with it to cure them:

- Bias and Fairness: AI systems when applied, can inadvertently amplify racial, gender, socioeconomic biases in the training data, resulting in unfair treatment of patients.
- Data Privacy: Brain and heart data are some of the most sensitive health records- its privacy is extremely important to keep.
- Accountability: under what conditions is AI helpful in the complicated diagnoses, following which a question surfaces: who is ultimately responsible, the algorithm or the doctor, or both? [27][28].
- New ways to go: AI that think and feel
- To the future, then, the next stage of AI will shift out of the realm of analysis into interpretation of emotional and physiological condition:
- Emotion-sensitive AI including facial expressions, the tone of the voice, and heart rate variability (HRV) used to measure the state of the mind and body.
- Smart neural implants which adaptively respond to cardiac signals by adjusting stimulation.
- Behavioral-AI technologies which monitor lifestyle behaviors and emotional predispositions and assist to detect and address brain-to-heart connections in real time [29][30].

VII. CONCLUSION

The involvement of the AI profession into neurology and cardiology is turning the medical profession into one that is more connected, responsive, and personalized. Artificial intelligence is no longer a matter of merely studying isolated systems--it is a matter of studying the dynamic dialogue between the mind and the child. ThroughSuch modeling, AI provides clinicians with a highly accurate, flexible and comprehensive framework of information that enhances care and outcomes.

The use of this technology will become very real, as it evolves and develops as we go on, so the question will be maintaining that unplugged aspect of the world that is still human. When made in a sensible way, AI will not leave compassion behind, and it will be able to complement it, becoming the interpreter that makes brain, heart, and technology speak in one harmonic rhythm of life.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

REFERENCES

1. S. Xiang, S. Rasool, Y. Hang, K. Javid, T. Javed, and A. E. Artene, "The effect of COVID-19 pandemic on service sector sustainability and growth," *Frontiers in Psychology*, vol. 12, p. 633597, 2021. Available from: https://doi.org/10.3389/fpsyg.2021.633597
2. S. Rasool, A. Husnain, A. Saeed, A. Y. Gill, and H. K. Hussain, "Harnessing predictive power: exploring the crucial role of machine learning in early disease detection," *JURIHUM: Jurnal Inovasi dan Humaniora*, vol. 1, no. 2, pp. 302–315, 2023.
3. Husnain, S. Rasool, A. Saeed, and H. K. Hussain, "Revolutionizing pharmaceutical research: Harnessing machine learning for a paradigm shift in drug discovery," *International Journal of Multidisciplinary Sciences and Arts*, vol. 2, no. 4, pp. 149–157, 2023. Available from: https://doi.org/10.47709/ijmdsa.v2i2.2897
4. M. Arikhad, M. Waqar, A. H. Khan, and A. Sultana, "AI-driven innovations in cardiac and neurological healthcare: Redefining diagnosis and treatment," *Revista Espanola de Documentacion Cientifica*, vol. 19, no. 2, pp. 124–136, 2024. Available from: https://tinyurl.com/3eh554fx
5. M. Arikhad, M. Waqar, A. H. Khan, and A. Sultana, "The role of artificial intelligence in advancing heart and brain disease management," *Revista Espanola de Documentacion Cientifica*, vol. 19, no. 2, pp. 137–148, 2024.
6. M. Arikhad, M. Waqar, A. H. Khan, and A. H. Rafi, "Transforming cardiovascular and neurological care with AI: A paradigm shift in medicine," *Rev. De Intel. Artif. En Med*, vol. 15, pp. 1264–1277, 2024.
7. M. Arikhad, A. H. Khan, M. Tariq, and A. Al Abrar, "AI-powered solutions for precision healthcare: Focusing on heart and brain disorders," *Revista De Inteligencia Artificial En Medicina*, vol. 15, no. 1, 2024, Available from: https://tinyurl.com/mw7tkn7x
8. H. Khan, M. Arikhad, and M. Tariq, "Revolutionizing heart and brain healthcare with artificial intelligence: Challenges and opportunities," *Revista De Inteligencia Artificial En Medicina*, vol. 15, no. 1, 2024, Available from: https://tinyurl.com/38369mzn
9. H. Rafi, F. Ahmad, J. Anis, R. Khan, H. Rafiq, and M. Farhan, "Comparative effectiveness of agmatine and choline treatment in rats with cognitive impairment induced by AlCl3 and forced swim stress," *Current Clinical Pharmacology*, vol. 15, no. 3, pp. 251–264, 2020. Available from: https://doi.org/10.2174/1574884714666191016152143
10. Bhatti, H. Rafi, and S. Rasool, "Use of ICT technologies for the assistance of disabled migrants in USA," *Revista Espanola de Documentacion Cientifica*, vol. 18, no. 1, pp. 66–99, 2024.
11. H. Rafi, H. Rafiq, and M. Farhan, "Inhibition of NMDA receptors by agmatine is followed by GABA/glutamate balance in benzodiazepine withdrawal syndrome," *Beni-Suef University Journal of Basic and Applied Sciences*, vol. 10, no. 1, p. 43, 2021. Available from: https://link.springer.com/article/10.1186/s43088-021-00125-8
12. H. Rafi, H. Rafiq, and M. Farhan, "Pharmacological profile of agmatine: An in-depth overview," *Neuropeptides*, vol. 105, p. 102429, 2024. Available from: https://doi.org/10.1016/j.npep.2024.102429
13. M. Farhan, H. Rafi, and H. Rafiq, "Behavioral evidence of neuropsychopharmacological effect of imipramine in animal model of unpredictable stress induced depression," *International Journal of Biology and Biotechnology*, vol. 15, no. 22, pp. 213–221, 2018. Available from: https://tinyurl.com/yk7fw8ax
14. H. Rafiq, M. Farhan, H. Rafi, S. Rehman, M. Arshad, and S. Shakeel, "Inhibition of drug induced Parkinsonism by chronic supplementation of quercetin in haloperidol-treated wistars," *Pak J Pharm Sci*, vol. 35, pp. 1655–1662, 2022. Available from: https://tinyurl.com/y8hcdadj
15. T. Ghulam, H. Rafi, A. Khan, K. Gul, and M. Z. Yusuf, "Impact of SARS-CoV-2 treatment on development of sensorineural hearing loss," *Proceedings of the Pakistan Academy of Sciences: B. Life and Environmental Sciences*, vol. 58, suppl., pp. 45–54, 2021. Available from: https://tinyurl.com/2nzbknar
16. H. Rafi, H. Rafiq, R. Khan, F. Ahmad, J. Anis, and M. Farhan, "Neuroethological study of AlCl3 and chronic forced

swim stress induced memory and cognitive deficits in albino rats," *The Journal of Neurobehavioral Sciences*, vol. 6, no. 2, pp. 149–158, 2019.
17. H. Rafi and M. Farhan, "Dapoxetine: An innovative approach in therapeutic management in animal model of depression," *Pakistan Journal of Pharmaceutical Sciences*, vol. 2, no. 1, pp. 15–22, 2015. Available from: https://tinyurl.com/3ms25ax4
18. M. Farhan, H. Rafi, and H. Rafiq, "Dapoxetine treatment leads to attenuation of chronic unpredictable stress induced behavioral deficits in rats model of depression," *Journal of Pharmacy and Nutrition Sciences*, vol. 5, no. 4, pp. 222–228, 2015. Available from: https://doi.org/10.6000/1927-5951.2015.05.04.2
19. H. Rafi, H. Rafiq, and M. Farhan, "Antagonization of monoamine reuptake transporters by agmatine improves anxiolytic and locomotive behaviors commensurate with fluoxetine and methylphenidate," *Beni-Suef University Journal of Basic and Applied Sciences*, vol. 10, no. 1, p. 26, 2021. Available from: https://link.springer.com/article/10.1186/s43088-021-00118-7
20. M. Farhan, H. Rafiq, H. Rafi, S. Rehman, and M. Arshad, "Quercetin impact against psychological disturbances induced by fat rich diet," *Pakistan Journal of Pharmaceutical Sciences*, vol. 35, no. 5, 2022. Available from: https://tinyurl.com/56yu6nmt
21. H. Rafi, H. Rafiq, I. Hanif, R. Rizwan, and M. Farhan, "Chronic agmatine treatment modulates behavioral deficits induced by chronic unpredictable stress in wistar rats," *Journal of Pharmaceutical and Biological Sciences*, vol. 6, no. 3, p. 80, 2018. Available from: https://tinyurl.com/ycxyxt3c
22. S. Zuberi, H. Rafi, A. Hussain, and S. Hashmi, "Role of Nrf2 in myocardial infarction and ischemia-reperfusion injury," *Physiology*, vol. 38, suppl. 1, p. 5734743, 2023. Available from: https://doi.org/10.1152/physiol.2023.38.S1.5734743
23. M. Farhan, H. Rafiq, H. Rafi, R. Ali, and S. Jahan, "Neuroprotective role of quercetin against neurotoxicity induced by lead acetate in male rats," int. J. Biol. Biotech, vol. 16, no. 2, 2019,. Available from: https://shorturl.at/nWiOl
24. H. Rafi, H. Rafiq, and M. Farhan, "Agmatine alleviates brain oxidative stress induced by sodium azide," unpublished, 2023. Available from: https://doi.org/10.21203/rs.3.rs-3244002/v1
25. M. Farhan, H. Rafi, H. Rafiq, F. Siddiqui, R. Khan, and J. Anis, "Study of mental illness in rat model of sodium azide induced oxidative stress," *Journal of Pharmacy and Nutrition Sciences*, vol. 9, no. 4, pp. 213–221, 2019. Available from: https://doi.org/10.29169/1927-5951.2019.09.04.3
26. Q. E. Cell, *Self-Assessment Report Department of Biochemistry*, Ph.D. dissertation, University of Karachi, 2019. Available from: https://tinyurl.com/5cu66vcf
27. M. Farhan, H. Rafiq, and H. Rafi, "Prevalence of depression in animal model of high fat diet induced obesity," *Journal of Pharmacy and Nutrition Sciences*, vol. 5, no. 3, pp. 208–215, 2015. Available from: https://doi.org/10.6000/1927-5951.2015.05.03.6
28. Y. Hayat, A. M. Khaja, S. Rasool, and A. Gill, "Artificial intelligence in early detection of neurological disorders," *International Journal of Innovative Research in Computer Science and Technology (IJIRCST)*, vol. 13, no. 3, pp. 76–81, 2025. Available from: 2025. Available from: https://doi.org/10.55524/ijircst.2025.13.3.11
29. S. Rasool, A. M. Khaja, Y. Hayat, and A. H. Khan, "AI-based predictive tools for managing and preventing cardiovascular diseases," *International Journal of Innovative Research in Computer Science and Technology (IJIRCST)*, vol. 13, no. 3, pp. 76–81, 2025. Available from: 2025. Available from: https://doi.org/10.55524/ijircst.2025.13.3.13
30. M. Khaja, M. Arikhad, Y. Hayat, and S. Rasool, "Predictive modeling for chemotherapy response using machine learning," *International Journal of Innovative Research in Computer Science and Technology (IJIRCST)*, vol. 13, no. 3, pp. 62–66, 2025. Available from: https://doi.org/10.55524/ijircst.2025.13.3.10