Is AI Better at Detecting Heart Disease? A Professional Review of Machine Learning in Cardiology

Rasit Dinc

Rasit Dinc Digital Health & AI Research

Published: August 22, 2024 | Medical Imaging AI

DOI: 10.5281/zenodo.17997001

Abstract

The global burden of cardiovascular disease CVD remains one of the most significant public health challenges, accounting for millions of deaths annually. In ...

The global burden of cardiovascular disease (CVD) remains one of the most significant public health challenges, accounting for millions of deaths annually. In the face of this persistent crisis, the integration of Artificial Intelligence (AI) and Machine Learning (ML) into cardiology has sparked a critical question: **Is AI better than human clinicians at detecting heart disease?** While the technology offers unprecedented capabilities in data processing and pattern recognition, a professional and academic review suggests that the most effective future lies not in replacement, but in a powerful collaboration between human expertise and algorithmic precision.

The Unprecedented Promise of AI in Cardiovascular Diagnosis

AI's primary advantage in cardiology is its capacity to analyze vast, complex datasets—from electrocardiograms (ECGs) and cardiac imaging to electronic health records—at a speed and scale impossible for human practitioners. This capability translates into tangible diagnostic improvements across several domains.

For instance, AI models have demonstrated exceptional accuracy in analyzing ECGs, a foundational tool for heart disease detection. Studies applying AI/ML to public ECG databases have reported diagnostic accuracies as high as **96.3%** for certain conditions [1]. Similarly, in predicting high-risk conditions like Heart Failure (HF) and Atrial Fibrillation (AF), AI models have achieved accuracy rates ranging from **90.9% to 95.9%** [2]. This precision is driven by deep learning algorithms that can identify subtle, sub-visual patterns that may be missed by the human eye, suggesting that AI holds significant potential for improving the precision of diagnostic results [3].

AI vs. The Human Element: A Collaborative Future

The question of whether AI is "better" is complex, as it often compares a highly specialized tool against the holistic judgment of a clinician. While AI excels in specific, data-driven tasks, human expertise provides the essential **clinical context**. A cardiologist integrates patient history, physical examination findings, and nuanced judgment—factors that are difficult to fully quantify and input into an algorithm.

However, in direct comparative studies, AI has shown its potential to augment human performance. One study involving the detection of structural heart disease from ECGs found that a specific AI model achieved an accuracy of **77.3%**, compared to **72.6%** for non-AI-assisted methods [4]. This evidence points not to a superior replacement, but to a powerful enhancement. AI acts as a sophisticated co-pilot, flagging potential issues and providing a second, highly analytical opinion.

For more in-depth analysis on the practical integration of AI into clinical workflows and its impact on professional practice, the resources at www.rasitdinc.com provide expert commentary.

Navigating the Challenges and Limitations

Despite the impressive performance metrics, the widespread adoption of AI in cardiology is tempered by significant challenges. The academic literature highlights several key pitfalls, including the critical issues of **data bias** and **generalizability** [5]. AI models are only as good as the data they are trained on; if training data lacks diversity or incompletely includes covariates, the model may perform poorly or even dangerously in real-world, diverse clinical settings.

Furthermore, the "black box" nature of many deep learning models—where the decision-making process is opaque—presents a significant barrier to clinical trust and regulatory approval. Clinicians require transparency to understand *why* a diagnosis was made, especially when a patient's life is on the line. The lack of interpretability hinders the adoption of AI in high-stakes clinical environments. Addressing these limitations, including issues of overfitting, inadequate evaluation metrics, and the need for standardized reporting, is essential for moving AI from the research lab to the bedside and ensuring its ethical deployment [6]. The path to full clinical integration also demands robust regulatory frameworks that can keep pace with the rapid evolution of the technology while guaranteeing patient safety and data privacy.

Conclusion: Precision Medicine Through Partnership

Ultimately, the debate over whether AI is "better" than a human is a false dichotomy. AI is not poised to replace the cardiologist but to redefine the scope of their practice. By automating the detection of subtle patterns and accelerating the analysis of massive datasets, AI enables clinicians to focus on personalized patient care and complex decision-making.

The real-world impact of this partnership is already being seen. Deployments of AI in clinical settings have demonstrated a **17% reduction in unnecessary diagnostic procedures** and a **12% decrease in time-to-diagnosis** [7]. The

future of heart disease detection is a collaborative one, where the precision of artificial intelligence combines with the wisdom and empathy of human medical professionals to usher in an era of truly precise and personalized cardiovascular medicine.

**

References

[1] Armoundas, A. A. (2024). Use of Artificial Intelligence in Improving Outcomes in Heart. Circulation*, 152(3). [https://www.ahajournals.org/doi/10.1161/CIR.0000000000001201] (https://www.ahajournals.org/doi/10.1161/CIR.0000000000001201) (AHA Journals) [2] Singh, M. (2024). Artificial intelligence for cardiovascular disease risk.* eClinicalMedicine*, 74. [https://www.sciencedirect.com/science/article/pii/S2589537024002396] (https://www.sciencedirect.com/science/article/pii/S2589537024002396) (ScienceDirect) [3] Shaikh, M. F. W. (2025). The Role of Artificial Intelligence in the Prediction, Diagnosis.* PMC*, 12034035. [https://pmc.ncbi.nlm.nih.gov/articles/PMC12034035/] (https://pmc.ncbi.nlm.nih.gov/articles/PMC12034035/) (PMC) [4] Poterucha, T. J. (2025). Detecting structural heart disease from electrocardiograms.* Nature*, 640(8052). [https://www.nature.com/articles/s41586-025-09227-0] (https://www.nature.com/articles/s41586-025-09227-0) (Nature) [5] Cai, Y. Q. (2024). Pitfalls in Developing Machine Learning Models for.* PMC*, 11316160. [https://pmc.ncbi.nlm.nih.gov/articles/PMC11316160/] (https://pmc.ncbi.nlm.nih.gov/articles/PMC11316160/) (PMC) [6] Jaltotage, B. (2024). Essentials for AI Research in Cardiology: Challenges and.* ScienceDirect*, 2589790X24003214. [https://www.sciencedirect.com/science/article/pii/S2589790X24003214] (https://www.sciencedirect.com/science/article/pii/S2589790X24003214) (ScienceDirect) [7] Abstract 4371686: Impact of Artificial Intelligence on. (2025).* Circulation*, 152(Suppl_3). [https://www.ahajournals.org/doi/10.1161/circ.152.suppl_3.4371686] (https://www.ahajournals.org/doi/10.1161/circ.152.suppl_3.4371686) (AHA Journals)

© 2024 Rasit Dinc