**AI can estimate heart biological age from ECG data**

AI algorithm estimates heart age from ECGs, identifying those at risk for heart disease and early death.

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Everyone’s heart has a chronological age, which matches their actual age in years. However, hearts also have a biological age determined by how well they function.

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Biological heart age reflects the heart’s condition and can differ from the person’s chronological age based on lifestyle and health factors.

At EHRA 2025, scientists shared a study in which they used artificial intelligence (AI) to analyze ECG heart data from nearly 500,000 people. They created an algorithm that can estimate the heart’s “biological age” based on how well it works. This tool could help identify people who are at higher risk of heart problems or early death.

The study found that if the heart’s biological age was seven years older than its actual age, the risk of death and significant heart problems increased significantly. On the other hand, if the biological age was seven years younger, the risk of death and major heart issues was noticeably lower.

Integrating artificial intelligence (AI) into clinical diagnostics opens exciting new possibilities for improving accuracy in predicting heart-related risks. Developing algorithms with AI could revolutionize how cardiovascular risks are assessed, offering more personalized and effective prevention strategies.

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The study tested a deep learning algorithm to calculate biological ECG heart age (AI ECG-heart age) using data from 12-lead ECGs. Trained on 425,051 ECGs over 15 years and validated with 97,058 additional cases, the algorithm’s predictions were compared to traditional chronological age for mortality and cardiovascular risk.

Results showed that when AI ECG-heart age was seven years older than chronological age, the risk of death increased by 62% and major cardiovascular events (MACE) by 92%. Conversely, when the AI heart age was seven years younger, the risk of death decreased by 14% and MACE by 27%. This demonstrates the algorithm’s potential for improving risk predictions.

The study consistently found higher AI ECG heart ages in individuals with reduced ejection fraction. These subjects also showed prolonged QRS durations, which reflect the time for electrical signals to travel through the ventricles for contraction. They extended corrected QT intervals, indicating the total time for the heart’s electrical system to complete one cycle of contraction and relaxation.

Researchers noted, *“The significance of the observed correlation between reduced ejection fraction and increased AI ECG heart ages, alongside prolonged QRS durations and corrected QT intervals, suggests that AI ECG heart age effectively reflects various cardiac depolarisation and repolarisation processes. These indicators of electrical remodeling within the heart may signify underlying cardiac health conditions and their association with ejection fraction (EF).”*

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Associate Professor Baek [explains](https://www.eurekalert.org/news-releases/1078451" \t "_blank), *“However, obtaining a statistically sufficient sample size in future studies is crucial to substantiate these findings further. This approach will enhance the robustness and applicability of AI ECG in clinical assessments of cardiac function and health.”*

The study is presented today at EHRA 2025, the European Society of Cardiology (ESC) scientific congress.