Editorial

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Artificial Intelligence in Cardiology

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Artificial Intelligence (AI) was first coined by American scientist John McCarthy in 1955, who is also considered co-founder of the field Artificial Intelligence.

Artificial Intelligence (AI) is an agent that is able to perform tasks that would require human intelligence. It is a sub-field of computer science that includes the creation of intelligent machines and software that work and react like human beings. Artificial Intelligence is transforming the nature of almost everything which is connected to human life and healthcare etc. In near future it is leading humanity towards making this planet a better place to live.

Artificial Intelligence (AI) is a fast-growing technology that has great potential for advancements in cardiovascular medicine. Cardiovascular Diseases (CVDs) are currently diagnosed through a comprehensive patient evaluation that includes a review of the patient's medical history, biomarker analysis, physical examinations and specialized testing. The clinical expertise and experience of medical practitioners are required for the interpretation of test results and the findings are used to devise treatment plans for patients.

Cardiovascular disorders, also known as CVDs, encompass various medical conditions that arise from irregularities in the functioning of the heart (such as cardiomyopathy, valvular diseases, and arrhythmia) or cardiac artery disease and peripheral arterial disease. If left untreated, these conditions can trigger severe health complications such as heart failure, heart attack and stroke.[1] World Health Organization (WHO) reported that CVDs remain the primary cause of mortality globally, resulting in about 17.9 million fatalities, which accounts for 32% of all global deaths.[2] Moreover, the WHO anticipates that the number of deaths caused by CVDs will persistently increase, with an estimated 23.6 million deaths projected to occur by 2030.[3] The current procedures utilized for diagnosing CVDs entail a comprehensive evaluation of patients through analysis of their medical history, scrutiny of biomarkers, conduction of physical examinations and administration of specialized tests.[4] The interpretation of examination results necessitates the clinical expertise and experience of medical practitioners. These results are subsequently utilized to formulate assessments and treatment strategies for patients. However, this approach has been shown to be flawed and inefficient owing to variations in how physicians perform the procedure and the likelihood of errors occurring.[5]

Recent technological innovations based on Artificial Intelligence (AI) have been implemented in healthcare to reduce the likelihood of inaccurate patient diagnoses and treatments.[6] AI integration in cardiology began with diagnostic algorithms in the 1980s and 1990s.[7] Machine Learning (ML) techniques, particularly in cardiac imaging, helped diagnose conditions like coronary artery disease, heart failure and myocardial infarction. Deep Learning (DL) algorithms, like Convolutional Neural Network (CNN), demonstrated exceptional capabilities in cardiac image analysis. AI was also used for risk assessment and prediction in cardiovascular diseases, enabling personalized patient care. The use of AI in cardiovascular medicine is becoming increasingly prevalent, with the capacity to enhance the efficiency of work processes, achieve cost savings, and enhance the quality of decision-making.[8,9] Various disciplines of science and industry, including medicine, are utilizing AI for the diagnosis, treatment, prediction of diseases and pre-procedural planning. AI can be used in cardiovascular applications in two main ways: Virtually and Physically.[10] The virtual part regulates health management systems such as medical imaging analysis software and electronic health records using ML, DL and Natural Language Processing (NLP). The physical part of AI in cardiology can be applied

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through robotic invasive treatments. The use of AI in medicine is expected to make a big difference in how diagnosis and treatment can be improved. By integrating AI into the healthcare domain, workflow efficiency, cost-effectiveness and decision-making across various scientific disciplines, including medicine, can be significantly enhanced. Although the potential advantages of AI in cardiovascular care are substantial, it is essential to recognize and tackle the existing constraints.

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