Artificial Intelligence: A New Era in Cardiology

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Very few fields have evolved as Cardiology has. A lot has changed since Dr. William Harvey concluded in 1628 that "The blood in the animal body moves around in a circle continuously, and the function of the heart is to accomplish this by pumping," a moment that is associated with the Birth of Cardiology. The last four centuries have brought extraordinary discoveries, achievements, inventions, and innovations. This includes, but is not limited to, electrocardiography (ECG), echocardiography, coronary angiography, percutaneous interventions, and nuclear cardiology. While these latter tools were groundbreaking at some point, they are considered routine testing in today's age and they are performed daily on millions of patients worldwide. More recently, newer imaging modalities have emerged, such as Coronary Computed Tomography Angiography (CCTA), Cardiac Computed Magnetic Resonance (CMR), and Cardiac Positron Emission Tomography (Cardiac PET). These latter tools are considered advanced or specialized testing, which goes beyond primary care in cardiology and often require unique training to perform and interpret. Having said that, I believe that we are on the verge of witnessing the beginning of a new chapter of Cardiology that will unlock diagnostic and therapeutic interventions that are today considered impossible. Why? **Artificial Intelligence (AI).**

What is Artificial Intelligence? Simply put, AI consists of dynamic algorithms that adapt to perceived data and then generate a response to achieve its set goal. The application of AI nowadays is widespread and shapes our lives daily. Whether it's Google predicting your next search, Facebook showing you a gadget you didn't know you needed, or Tesla's self-driving cars, we have all been impacted by AI one way or another.

Now, for a moment, imagine the use of AI in Cardiology. Imagine having a device that can help you identify heart sounds or predict future heart attacks or dangerous arrhythmias by analyzing data from commonly available tests like angiography or echocardiography. The applications and benefits of such technology can be limitless.

Scientists are already working hard on this. One major avenue where AI is making its way to Cardiology is ECG-based screening, detection, and prevention of cardiovascular diseases.

By leveraging massive databases, AI can uncover subtle electrocardiophragic patterns easily missed by an experienced reader. It can also predict clinical outcomes, such as low cardiac ejection fraction, the propensity towards developing Atrial Fibrillation, hypertrophic cardiomyopathy, amyloidosis, and so much more [1]. Not even the most experienced reader can do such a thing [3]. Another avenue for AI in Cardiology has been aiding clinicians in image interpretation and procedural guidance. AI aims to limit the variability of advanced imaging interpretation, which can vary between clinicians. A study that included over 2000 patients has shown that AI improves the detection of obstructive coronary disease [2]. AI has also shown promise in CCTA whereby it helps identify obstructive lesions that are appropriate for intervention by extracting fractional flow reserve, which, up till now, can only be done with invasive procedures [4].

These are fascinating times for Cardiology. We are witnessing the birth of a new era. As more research and innovation continue to emerge, the use of AI will become more widespread, and more physicians will be familiar with it. The best is yet to come!

References

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