How AI Is Empowering Radiologists to Transform Cardiac Health Care

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People think of diagnostic radiology as a specialty where physicians provide insights about specific diseases or conditions from behind the walls of a darkroom. Often, they neglect to connect the impact of our field to improvements across the broader health care landscape.

For decades, radiology has been at the forefront of some of the most significant changes in medicine. In the acute care setting, for example, advances in imaging technologies such as CT, MRI, PET, and ultrasound have improved acute care by aiding the detection of conditions such as as appendicitis, aortic dissection, and stroke, in addition to 'what aches us,' from broken bones to kidney stones.

Among the more notable contributions of our field are imaging-based screening programs. Early breast cancer detection, made possible through screening mammography, has reduced breast cancer mortality by 15–30% in women aged 40–74, depending on the frequency and starting age of screening.[1] Studies have shown that low-dose chest CT has reduced mortality from lung cancer significantly, with a 20% reduction in the NLST and 24% in NELSON.[2,3] Additionally, screening men aged <65 with ultrasound for abdominal aortic aneurysm has been shown to reduce rupture-related death by up to 50%.[4]

Chronic Conditions: A New Frontier for Radiology?

While imaging has enabled the early and accurate diagnosis of numerous conditions for more than a century, with an immeasurable impact on global health, the field has yet to make inroads as significantly in the early detection of major chronic health conditions. According to the CDC, an estimated 129 million people in the United States have at least 1 major chronic disease (eg, heart disease, cancer, diabetes, obesity, and hypertension). Five of the 10 leading causes of death in the US are, or are strongly associated with, preventable and treatable chronic diseases.[5] The prevalence of these conditions has increased steadily over the past two decades, and the trend is expected to continue.[5]

More than 944,800 Americans die of heart disease or stroke every year—that is more than 1 in 3 deaths. In addition to the toll that it takes on personal health, chronic disease costs the United States healthcare system $254 billion per year and results in an estimated $168 billion in lost wages. Costs related to cardiovascular diseases are projected to hit roughly $2 trillion annually by 2050.[6]

An Opportunity to Impact Cardiovascular Disease

Radiology, as a specialty, is in a prime position to reduce deaths resulting from the most prevalent chronic health condition: cardiovascular disease. It is well known in the cardiology literature that coronary artery calcium burden is the leading predictor of a cardiovascular event.[7,8]

Calcium can be seen on non-contrast chest CT scans, including the lower-dose scans performed for lung cancer screening. While some radiologists will note the presence of coronary artery calcium in their evaluations, few will quantify the amount.[9] The practice of "eyeballing" the degree of calcified plaque is subjective and not standardized, often rendering the radiology report less effective than it could be for making the diagnosis of cardiovascular disease and determining the extent. Therefore, the referring physician may not appreciate the actionable insights from the report. This is an unfortunate, missed opportunity.

Artificial intelligence can identify, segment, and measure the coronary

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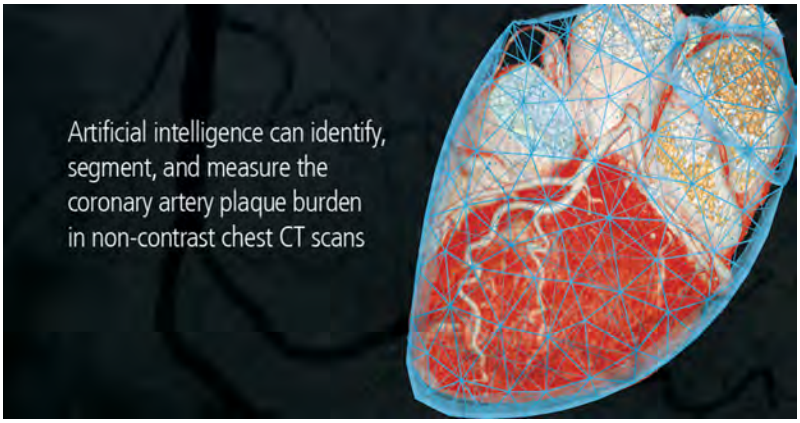

artery calcium burden in non-contrast chest CTs, enabling radiologists to quantitatively diagnose and assess cardiovascular disease burden based on coronary artery calcium scoring and Agatston category. Several FDA-approved algorithms are commercially available in the United States and European Union. Recent findings have shown that 49% of individuals undergoing chest CT have moderate (100–399) or high (>400) Agatston units of coronary artery calcium,[10] and 64% of those with detected plaque had no prior diagnosis of cardiovascular disease.[11]

Consider the potential impact of identifying coronary artery calcium burden in the chest CTs of patients seen for other indications. Radiologists could trigger a preventive health pathway for these patients that includes lifestyle changes, such as diet and exercise, and a potential prescription for statins, which decrease the rate of a cardiovascular event by 25%.[12]

With the seamless integration of advanced AI systems into the radiology workspace, radiologists can significantly contribute to identifying patients at high risk of cardiovascular events with minimal disruption to the radiology workflow. There will, however, be newly added patient information directed to primary care and related subspecialties, which could result in more work, but that should translate into improved patient care and, potentially, to improved long-term outcomes. As these technologies become more widely available, radiologists will increasingly play a pivotal role in preventive health care, shaping better health outcomes worldwide.

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