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Machine intelligence in cardiovascular medicine – Past, present & future

Douglas Miller
Medical College of Georgia, USA

The computer science technology trend called artificial intelligence (AI) is not new. Both machine learning and deep learning applications have recently begun to impact cardiovascular medicine. Scientists working in the AI domain have recognize the importance of data quality and provenance to AI algorithm efficiency and accuracy. A diverse array of cardiovascular raw data sources of variable quality – electronic medical records, radiological picture archiving and communication systems, laboratory results, 'omics, etc. – are available to train algorithms for predictive modeling of clinical outcomes (post-CABG mortality, MI/ACS risk stratification, etc.), accelerated image interpretation (edge detection, tissue characterization, etc.) and enhanced phenotyping of heterogeneous conditions (heart failure with preserved ejection fraction, hypertension, etc.). A number of narrow AI products for cardiac arrhythmia characterization and advanced image de-convolution are now FDA-approved software as medical device, and others are in the pipeline. Health professionals using AI-infused analytics and wearable devices have three critical roles to play in their development and ethical application in practice: 1) medical domain experts providing clinical context to computer and data scientists, 2) data stewards assuring the quality, relevance and provenance of data inputs, and 3) real-time and post-hoc interpreters of AI 'black box' solutions and explainability to patients. The next wave of contextual adaption AI technologies will more closely approximate human decision-making, potentially augmenting cardiologists' real-time performance in emergency rooms, catheterization laboratories, imaging suites and clinics. Before such general AI technologies are adopted in the clinic and by healthcare, regulatory agencies and industry must jointly develop robust AI standards of practice and transparent technology insertion rulesets.

Biography

Douglas Miller published >200 high-impact papers and book chapters in the medical field, Miller enjoys a global reputation as an expert cardiologist and academic health leader. He has uniquely served as the Dean of three research-intensive medical schools in the U.S. and Canada, and as a member of two national MD program accrediting bodies. He advises several global health policy (i.e., UC Berkeley) and technology business (i.e., IBM Watson) organizations. A serial entrepreneur, Dr. Miller holds U.S. patents in the fields of new drug development, advanced medical imaging and artificial intelligence.