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EDITORIAL

AI in stroke

Saman B Gunatilake

Emeritus Professor of
Medicine and Neurologist,
University of Sri Jayewardenepura,
Sri Lanka.

Correspondence

Saman B Gunatilake
University of Sri Jayewardenepura,
Sri Lanka.

Email: saman.gunatilake@sjp.ac.lk

https://orcid.org/
0000-0002-1551-8561

Artificial Intelligence (AI) offers significant benefits in Neurology by improving patient care by enabling faster data analysis, and providing personalised treatment recommendations based on provided datasets. AI excels in specific tasks, while it may still lack in holistic, reasoning and care (like by experienced neurologists). Unlike traditional approaches that relied on manual review of medical records and generalised treatment protocols, AI can process vast amounts of data in real-time.[1] This allows for more precise, data-driven decision-making and early intervention.

Management of stroke has been revolutionised with diagnostic and treatment options innovated in the last decade. Most significant of this revolution has been in relation to imaging with continuous improvement of computed tomography (CT) and magnetic resonance imaging (MRI) technology, and the establishment of interventional neuroradiology. Imaging of the cerebral vasculature was one of the first targets of AI in stroke and may be the most advanced in that respect. Deep learning models that use artificial neural networks (ANN) with many hidden layers can considerably improve the detection of strokes[2] and vessel occlusions. Artificial neural networks (ANN) which allow automated detection of abnormal vessel findings without any a-priori restrictions and in <2 minutes are now available.[3]

Already, AI-based vascular imaging tools have been approved by the Food and Drug Administration (FDA) and are used in clinical settings and in stroke research. Examples are software tools such as **RapidASPECTS** to detect early infarcts.[4] Based on the Alberta Stroke Program Early CT Scoring System, RapidASPECTS automatically generates a standardised score-based on machine-learning algorithms showing a patient's ischaemic changes. RapidASPECTS, a machine learning-based automated software for the CT-based assessment of ASPECTS, has been shown to be comparable or superior to neuroradiologists in patients with favourable ASPECTS. **FastStroke** for perfusion imaging is a GE HealthCare medical imaging software designed to streamline CT workflow and assist in diagnosing strokes. It helps clinical teams by providing fast, automated review of CT stroke images and facilitating quick communication among medical staff, assessing patients for potential treatment.[5]

Other applications of AI in stroke comprise detection of paroxysmal atrial fibrillation[6], an AI-enabled ECG acquired during normal sinus rhythm that permits identification of patients with atrial fibrillation and prediction of complications such as stroke-related pneumonia.[7] A quite advanced field of AI based imaging in stroke care is detection of large vessel occlusion and stroke thrombectomy. These AI tools will soon further optimise imaging analysis for stroke detection, and decision making, particularly in places where neuroradiologic expertise is not available. AI-based interpretation of images can be shared by smartphone in telemedicine scenarios.

Furthermore, machine learning (ML) and deep learning (DL) approaches are increasingly being studied that combine imaging data with data from history and patient records, laboratory tests to aid triage, and acute treatment decisions.[8,9] The prediction of outcome after stroke[4,3] is increasingly being studied by AI methodology and hence as part of a "precision" or "personalised" approach rather than by the traditional more rigid scores or scales.[10] These are examples of applications of AI mainly in ischaemic stroke. Haemorrhagic stroke, secondary stroke prophylaxis and stroke rehabilitation, are other areas with rapidly evolving changes and promises of AI.

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Saman Gunatilake

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