Stroke Diagnosis

Traditional in-hospital imaging techniques such as computed tomography (CT) and magnetic resonance imaging (MRI) remain the standard modalities for diagnosing stroke. The development of prehospital stroke detection devices may facilitate earlier diagnosis, initiation of stroke care, and ultimately better patient outcomes. In this review, the authors summarize the features of eight stroke detection devices using noninvasive brain scanning technology. The review summarizes the features of stroke detection devices including portable CT, MRI, transcranial Doppler ultrasound, microwave tomographic imaging, electroencephalography, near-infrared spectroscopy, volumetric impedance phaseshift spectroscopy, and cranial accelerometry. The technologies utilized, the indications for application, the environments indicated for application, the physical features of the eight stroke detection devices, and current commercial products are discussed. As technology advances, multiple portable stroke detection instruments exhibit the promising potential to expedite the diagnosis of stroke and enhance the time taken for treatment, ultimately aiding in prehospital stroke triage [1].

A rapid and reliable diagnostic test to distinguish ischemic from hemorrhagic stroke in patients presenting with stroke-like symptoms is essential to optimize management and triage for thrombolytic therapy.

Stroke has been extensively studied in clinical practice and experimental research by means of MR images with ever-emerging new technologies, such as DWI, PWI, and ADC maps. More recently, different PWI-derived parameters, such as the rCBV), the relative cerebral blood flow (rCBF), the relative MTT, and the time to peak (TTP) have been applied to quantify the perfusion deficit and to evaluate the temporal infarct growth in acute stroke either in patients or in small animals with high field strength MR spectrometers [2].

1)
Guo X, Dye J. Modern Prehospital Screening Technology for Emergent Neurovascular Disorders. Adv Biol (Weinh). 2023 Jun 25:e2300174. doi: 10.1002/adbi.202300174. Epub ahead of print. PMID: 37357150.

2)
Park JW, Kim HJ, Song GS, Han HS. Blood-brain barrier experiments with clinical magnetic resonance imaging and an immunohistochemical study. J Korean Neurosurg Soc. 2010 Mar;47(3):203-9. doi: 10.3340/jkns.2010.47.3.203. Epub 2010 Mar 31. PubMed PMID: 20379473; PubMed Central PMCID: PMC2851093.