

# Strokefinder MD100 microwave tomography for early diagnosis of stroke type

TIMEFRAME: Estimated earliest commercial availability in the UK



## TECHNOLOGY

The [Medfield Diagnostics AB](#) Strokefinder MD100 is a compact and portable microwave tomography system designed to differentiate between ischaemic and haemorrhagic strokes in patients presenting symptoms suggestive of a stroke.

The Strokefinder MD100 consists of an array of transmitting and receiving antennae integrated into a headrest that measures 45cm x 35cm x 15cm (l x w x h). Using a USB/wireless interface, the headrest connects to a portable tablet/laptop monitor that uses the provided Strokefinder application software to initiate, execute, analyse and present the test. A classification algorithm is used to evaluate the polarisation, amplitude and phase of microwave signals as they scatter through the brain. Changes in signal constellations due to conductivity and permittivity gradients in the brain are detected and analysed by the Strokefinder application software. This information is compared with stored reference constellations in order to distinguish an ischaemic from a haemorrhagic stroke. The Strokefinder MD100 is intended for use in pre-hospital (including ambulance) and hospital settings to screen patients for the presence of intracranial bleeding. The company claim the diagnostic test is expected to take less than 10 minutes from patient preparation and test initiation to result interpretation.



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The company anticipate a CE mark for the Strokefinder MD100 in mid to late 2014 with launch for private and NHS clinical use in early 2015. The device is currently undergoing investigations to assess its capability to determine the location of a bleed as well as for stroke monitoring applications.

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### POTENTIAL FOR IMPACT

Stroke is a local brain injury caused by a reduction in blood supply and oxygen to the brain. About 85% of strokes are ischaemic, caused by cerebral artery thrombosis or embolisms, whilst 15% are haemorrhagic, resulting from intracranial haemorrhage. Stroke is the third most common cause of death in England and Wales and the leading cause of neurological dysfunction and disability. Thrombolytic therapy is recommended for treatment of ischaemic stroke if the patient arrives in hospital within the first few hours of a stroke, but can be life threatening if administered in cases of haemorrhagic stroke. Currently only 3-8% of stroke patients that could benefit from Thrombolytic therapy actually receive it.

The current differentiation of ischaemic and haemorrhagic stroke relies on computerised tomography (CT) or magnetic resonance imaging (MRI). These imaging procedures are less widely available, may not be available 24 hours a day and are time consuming. The Strokefinder MD100 uses microwave tomography, which the company claim differs from other imaging diagnostic tools as electromagnetic waves at microwave frequencies penetrate into the brain and scatter. The company claim microwave tomography has high sensitivity to differentiate between the dielectric properties of blood and brain tissue, which allows for clinically important applications in the diagnosis of stroke. Requiring less than four hours of training by healthcare professionals, the Strokefinder MD100 is a compact and portable system, which means it can be used earlier in the healthcare pathway.

Medfield Diagnostics claim the Strokefinder MD100 has the potential to increase the number of patients with ischaemic stroke that are diagnosed earlier in pre-hospital (including ambulance) settings, which may reduce the demand for CT and MRI services if comparative effectiveness is shown. The company also claim timely treatment following early diagnosis may significantly shorten the length of stroke related hospital stays, decrease the number of patients suffering from permanent disabilities and save lives. The company anticipate the potential for a reduction in overall stroke associated healthcare costs. The annual cost of stroke in England has been estimated at around £7 billion, including direct costs to the NHS of £2.8 billion.

### EVIDENCE

#### PUBLISHED PAPERS AND ABSTRACTS

Fhager A. and Persson M. A microwave measurement system for stroke detection. Antennas and Propagation Conference (LAPC) on 14-15 November (2011), pp. 1-2.

Mesri H., Najafabadi M. and McKelvey T. A multidimensional signal processing approach for classification of microwave measurements with application to stroke type diagnosis. Annual international conference of the IEEE Engineering in Medicine and Biology Society. (2011), pp. 6465-6469. <http://www.ncbi.nlm.nih.gov/pubmed/22255819>

Fhager A., McKelvey T. and Persson M. Stroke detection using a broadband microwave antenna system. Antennas and Propagation (EuCAP). Proceedings of the fourth European conference on 12-16 April (2010), pp. 1-3.

Khorshidi M.A., McKelvey T., Persson M. and Trefna H.D. Classification of microwave scattering data based on a subspace distance with application to detection of bleeding

stroke. Computational advances in multi-sensor adaptive processing (CAMSAP). 3<sup>rd</sup> IEEE international workshop on 13-16 December (2010), pp. 301-304.

### COMPLETED UNPUBLISHED STUDIES

A report covering the results from two clinical studies is planned for publication.

### ONGOING STUDIES

A study investigating the application of Strokefinder MD100 in distinguishing an ischaemic from a haemorrhagic stroke and for monitoring applications in transient ischaemic attacks and during thrombolytic therapy is ongoing.

### COMPANY INFORMATION

Medfield Diagnostics AB is a Swedish medical technology company. The company plan to test the Strokefinder MD100 in hospitals as well as ambulances in the second half of 2014.

### INFORMATION FROM

This Alert is based on information from the company and a time-limited internet search.