

MEETING ABSTRACT

Open Access

Pre-hospital diagnosis for stroke and trauma patients using microwave technology

Stefan Candefjord^{1,2*}, Mikael Persson^{1,2}, Andreas Fhager^{1,2}, Bengt Arne Sjöqvist^{1,2}, Jan-Erik Karlsson³, Mikael Elam^{2,3}

From London Trauma Conference 2014
London, UK. 9-12 December 2014

Background

For stroke and traumatic brain injury (TBI) patients minimizing the time from stroke onset/accident to treatment is fundamental to increase the chances of achieving good clinical outcome. For patients with ischemic stroke thrombolytic treatment may be effective, but only 1–8% receive this treatment due to delays in seeking medical attention and late diagnosis. TBI patients with severe injury require immediate transportation to a trauma center. Microwave technology (MWT) has potential to be used for prehospital diagnosis of stroke and TBI patients by detecting intracranial bleedings and thereby make pre-hospital thrombolysis for stroke patients possible and increase triage accuracy for TBI patients.

Methods

Two clinical trials enrolling 20 + 25 stroke patients performed with research prototype systems (Brain Alfa and Stroke finderR10, Medfield Diagnostics AB, Göteborg, Sweden) have been completed. Two further studies are ongoing.

Regarding TBI laboratory experiments using a human cranium phantom and numerical simulations of subdural hematoma (SDH) have been performed. The first clinical study assessing the potential for MWT to detect SDH has recently started.

The microwave-based systems use 8–12 transmitting and receiving antennas. The classification algorithm is trained on measurements on patients with confirmed diagnosis, using a leave-one-out procedure.

Results

For the clinical studies on stroke patients all cases of hemorrhagic stroke could be detected while correctly

classifying most cases of ischemic stroke [1]. For the SDH models the total classification accuracy was 98–100%, and SDH of different sizes and at different positions could be distinguished.

Conclusions

MWT has potential to improve the acute care for stroke and trauma patients by making a prehospital diagnosis. This would lead to decreased human suffering and large societal economic savings.

Authors' details

¹Chalmers University of Technology, Göteborg, Sweden. ²MedTech West, Göteborg, Sweden. ³Sahlgrenska University Hospital, Göteborg, Sweden.

Published: 11 September 2015

Reference

1. Persson M, et al: Microwave-based stroke diagnosis making global pre-hospital thrombolytic treatment possible. *IEEE Trans Biomed Eng* 2014, **61**:2806-2817.

doi:10.1186/1757-7241-23-S2-A26

Cite this article as: Candefjord et al.: Pre-hospital diagnosis for stroke and trauma patients using microwave technology. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine* 2015 **23**(Suppl 2):A26.

Submit your next manuscript to BioMed Central
and take full advantage of:

- Convenient online submission
- Thorough peer review
- No space constraints or color figure charges
- Immediate publication on acceptance
- Inclusion in PubMed, CAS, Scopus and Google Scholar
- Research which is freely available for redistribution

Submit your manuscript at
www.biomedcentral.com/submit



* Correspondence: stefan.candefjord@chalmers.se

¹Chalmers University of Technology, Göteborg, Sweden

Full list of author information is available at the end of the article