

Specialty area: Cerebrovascular Disease: From Acute to Chronic

Title of the talk: The Diffusion-Perfusion Mismatch Hypothesis

Speaker Name: Katie D. Vo, M.D. (vok@wustl.edu)

Highlights

- Overview of critical issues relating to the treatment of acute stroke patient
- Definition of the ischemic penumbra
- Defining the ischemic penumbra with MR Diffusion/Perfusion Mismatch
- Clinical stroke trials using MR Diffusion/Perfusion Mismatch

Target audience: – MD's and PhD's with an interest in applying the diffusion and perfusion mismatch toward the management and treatment of acute ischemic stroke patients.

Stroke is the fourth leading cause of death in the US, and the leading cause of adult disability. The only FDA-approved drug for the treatment of acute ischemic stroke is iv tPA, but it must be given within 4.5 hours after stroke onset. Because of this very short therapeutic time window, less than 5% of ischemic stroke patients receive tPA. Other promising interventions for clot retrieval are available, but the precise therapeutic time-window for these therapies has not yet been defined. Thus, there is increasing need for non-invasive and practical imaging methods to define the presence of viable brain tissue (i.e. ischemic penumbra). Determination of tissue viability using advanced imaging has tremendous potential to individualize therapy, extend the therapeutic time window for some acute ischemic stroke patients, and permit treatment of stroke patients whose time of onset is unknown. One of the most commonly used and best known techniques to determine tissue viability is MR Diffusion-Perfusion Mismatch. This technique has been used in multiple large randomized-controlled clinical trials to select patients for thrombolytic treatment of acute stroke. In this talk, the pathophysiologic concept of core, ischemic penumbra, and oligemic tissue after an arterial occlusion will be defined. The evidence of MR Diffusion-Perfusion to detect these regional changes will be discussed. The results from large clinical stroke trials that use MR Diffusion-Perfusion mismatch will be presented.

REFERENCES:

1. Astrup, J., B.K. Siesjo, and L. Symon, *Thresholds in cerebral ischemia - the ischemic penumbra*. *Stroke*, 1981. **12**(6): p. 723-5
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3. Albers, G.W., et al., *Magnetic resonance imaging profiles predict clinical response to early reperfusion: the diffusion and perfusion imaging evaluation for understanding stroke evolution (DEFUSE) study*. *Ann Neurol*, 2006. **60**(5): p. 508-17