

# Validation of Functional Pre-Planning

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## Products

Elements BOLD MRI Mapping

## Hospital / Authors

Department of Neurosurgery, Beijing Tiantan Hospital, Beijing, China

Wang, L.W.; Lin, F.X.; Zhao, B.; Cao, Y.; Wang, S.

## Clinical Background

Surgical treatment of arteriovenous malformations (AVMs) in or near eloquent motor areas remains clinically challenging in terms of maximizing resection while preserving functionality. Microsurgical excision combined with functional mapping is currently considered the approach of choice. The gold standard of functional mapping, electrical cortical stimulation (ECS), can only be performed intraoperatively and is therefore not appropriate for preoperative risk assessment. Preoperative BOLD MRI task-based functional mapping (blood oxygen level-dependent functional MRI) could help in preoperative risk assessment and thus avoidance of surgery-related functional deficits.

## Study Objectives

The study aimed to assess the validity of Elements BOLD MRI Mapping by comparison to gold standard ECS results and investigate the impact and predictive value of lesion-to-activation distance (LAD) on functional motor outcome in patients with AVMs adjacent or involving the hand motor cortex.

N = 43 retrospective cohort study, prospectively analyzed

## Results

- Elements BOLD MRI Mapping showed a high sensitivity of 85% in motor mapping compared to ECS
- LAD was significantly associated with the functional motor outcome
- $LAD \leq 5\text{mm}$  was significantly correlated with muscle strength worsening 6 months postoperatively ( $p=0.039$ )
- ECS caused epileptic seizures as an unwanted complication in 15% of cases

## Summary

- Elements BOLD MRI Mapping can reliably depict activated eloquent cortices such as motor, sensory, language and visual cortex areas with high sensitivity
- Elements BOLD MRI Mapping enables avoidance of surgery-related deficits by revealing the LAD in relevant motor areas (cut-off value 5mm)
- Elements BOLD MRI pre-planning can support risk assessment for the treatment of patients with intracranial lesions
- Results from this study are transferable to other lesions such as intracranial tumors