

## FCMSC Abstract

**Title:** Evaluation of a merged FLAIR-SWI method for simplified central vein sign assessment in multiple sclerosis.

**Authors:**

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**Abstract:**

Introduction:

Multiple sclerosis (MS) is diagnosed based on clinical presentation, imaging features and/or laboratory testing as codified in the McDonald criteria.<sup>1</sup> The presence of magnetic resonance imaging (MRI) lesions is commonly used to satisfy dissemination in time and space. Approximately 1 in 5 patients diagnosed with MS, however, may not actually have the condition and may be misdiagnosed.<sup>2</sup> There is therefore a need for more sensitive and specific diagnostic tests to facilitate early and accurate confirmation of a diagnosis of MS. Prior cross-sectional studies have validated the central vein sign (CVS) as a sensitive and specific imaging biomarker of MS.<sup>3,4</sup> There is some literature evaluating the performance of susceptibility-weighted imaging (SWI) for detection of CVS, however the utility of a merged FLAIR-SWI imaging sequence has not been previously explored.

Objectives:

This study seeks to evaluate the diagnostic performance of a merged FLAIR-SWI method for the detection of CVS within MS white matter lesions utilizing a multicenter cohort.<sup>5</sup>

Methods:

The study sample is comprised of 202 participants recruited across 7 sites from the CAVS-MS cohort that had MRI studies with both, FLAIR and SWI acquisitions. Demographic and clinical variables (sex, race, ethnicity, age, MS status, MS subtype) were obtained for the cohort. Images were deidentified and uploaded to a secure database, QMENTA. FLAIR-SWI images were generated by co-registering SWI and FLAIR, transforming FLAIR, resampling, and multiplying. One trained blinded examiner rated FLAIR-SWI images for presence of up to 6 central veins.

Descriptive statistics were performed for demographic and clinical variables. The proportions of participants who were Select3+ ( $\geq 3$  CVS+ lesions/scan) and Select6+ ( $\geq 6$  CVS+ lesions/scan) were reported. Sensitivities and specificities of FLAIR-SWI using both algorithms were calculated and used to plot a receiver operator characteristic (ROC) curve. Area under the curve (AUC) was reported.

Results:

This cohort (n=202) is predominantly female (n=166 [82.2%]), and white (n=163 [80.6%]), not identifying as Hispanic or Latino (n=184 [91.1%]), with a mean age of 40.9 years (standard deviation [SD]=11.5 years). A total of 53 participants had MS (26.2%), and of all participants with MS, 48 (90.6%) had relapsing remitting MS (RRMS), and 5 (9.4%) had primary progressive MS (PPMS).

On average, 3.4 CVS+ lesions (95% confidence interval [CI] 3.1-3.8 CVS+ lesions) were identified per FLAIR-SWI image. Of the total 202 participants, 118 (58.4%) were Select3+ and 81 (40.1%) were Select6+ using the merged FLAIR-SWI images. FLAIR-SWI sensitivity and specificity were 0.75, 0.48 for Select3, and 0.51, 0.64 for Select6, respectively. AUC was 0.61.

#### Conclusions:

This study reports the diagnostic performance of a merged FLAIR-SWI method for identification of central veins. Comparison studies of this method to FLAIR\*, a previously validated imaging sequence for the detection of CVS, are ongoing within this cohort.

#### References:

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