

**SUPPLEMENTAL MATERIAL**

**FLAIR hyperintensity correlates with MMP-9 level and hemorrhagic transformation in  
acute ischemic stroke**

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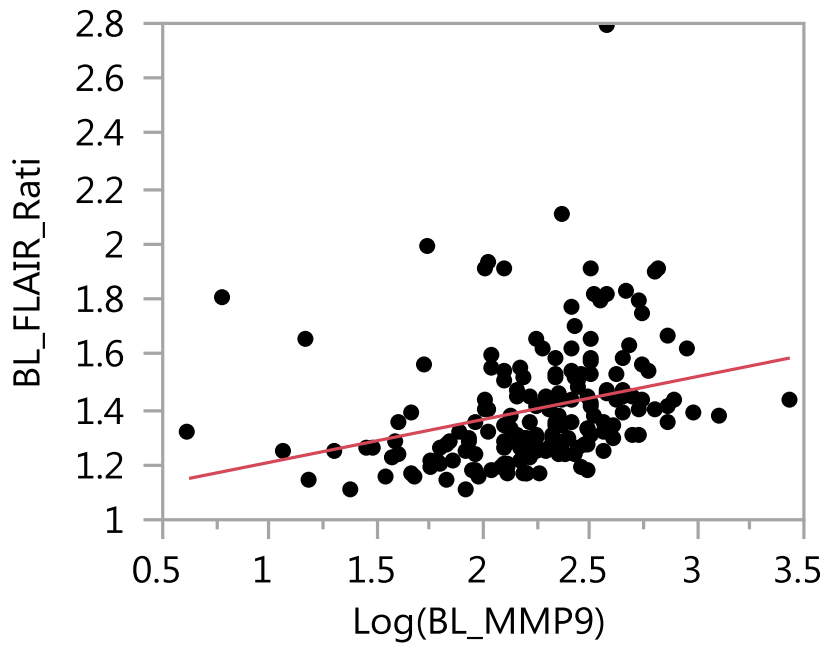
## Supplemental Methods

### Gold standard determination of FLAIR signal intensity ratio

In order to assess the accuracy of the rapid bedside method for generating a FLAIR ratio value, we compared the bedside technique to FLAIR ratio values determined using imaging analysis software (“gold standard”). For a training set of thirty MRI scans, we used AnalyzeDirect 11.0 (AnalyzeDirect, Overland Park, KS) to outline the stroke lesion and the normal contralateral hemisphere separately on the DWI sequence, with cerebrospinal fluid spaces greater than 2mm excluded.<sup>1</sup> The T2 FLAIR sequence was co-registered to the DWI and the outlines were applied to the FLAIR sequence. The signal intensity ratio was developed by normalizing the average FLAIR intensity within the stroke lesion to that of the contralateral hemisphere (FLAIR ratio, FR). The exclusion of periventricular white matter hyperintensities did not alter the final signal intensity ratio. The intraclass correlation coefficient of this method was 0.84, and Bland-Altman analysis did not reveal a systematic bias.<sup>2</sup>

### Supplemental References

1. Yoo AJ, Sheth KN, Kimberly WT, Chaudhry ZA, Elm JJ, Jacobson S, et al. Validating imaging biomarkers of cerebral edema in patients with severe ischemic stroke. *J Stroke Cerebrovasc Dis.* 2013;22:742-749
2. Bland JM, Altman DG. Statistical methods for assessing agreement between two methods of clinical measurement. *Lancet.* 1986;1:307-310



**Supplemental Figure I.** Scatter plot of the association between FLAIR ratio and MMP-9 level. Because MMP-9 was skewed, the values were log transformed prior to correlation analysis.

**Supplemental Table I: Univariate and Multivariate predictors of hemorrhagic transformation as determined by CT**

	Univariate analysis of HT (CT determined)			Multivariate analysis of HT (CT determined)		
	OR	95% CI	P Value	Adjusted OR	95% CI	P Value
Age	1.03	0.99-1.06	0.13	1.04	0.99-1.09	0.13
Admission NIHSS	1.04	0.98-1.1	0.2	1.05	0.95-1.1	0.34
IV tPA treatment (Y)	3.0	1.1-8.0	<b>0.03</b>	5.3	1.6-20.0	<b>0.008</b>
MMP-9	1.6	0.61-4.03	0.34	-	-	-
Admission glucose	1.0	0.99-1.01	0.5	-	-	-
DWI volume	1.8	0.68-5.0	0.23	1.03	0.23-4.7	0.97
FLAIR ratio	6.23	1.09-42	<b>0.04</b>	49	4.5-726	<b>0.002</b>