



# DWI-FLAIR mismatch radiomics in large vessel occlusion stroke: Histogram kurtosis and gray level cluster shade

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## Introduction

- For patients presenting with large vessel occlusion for endovascular thrombectomy (EVT), FLAIR hyperintensity within ischemic lesions may be inversely related to parenchymal viability but relies on subjective grading.
- Radiomics is an emerging image quantification methodology that may more objectively represent continuous image characteristics.

## Purpose

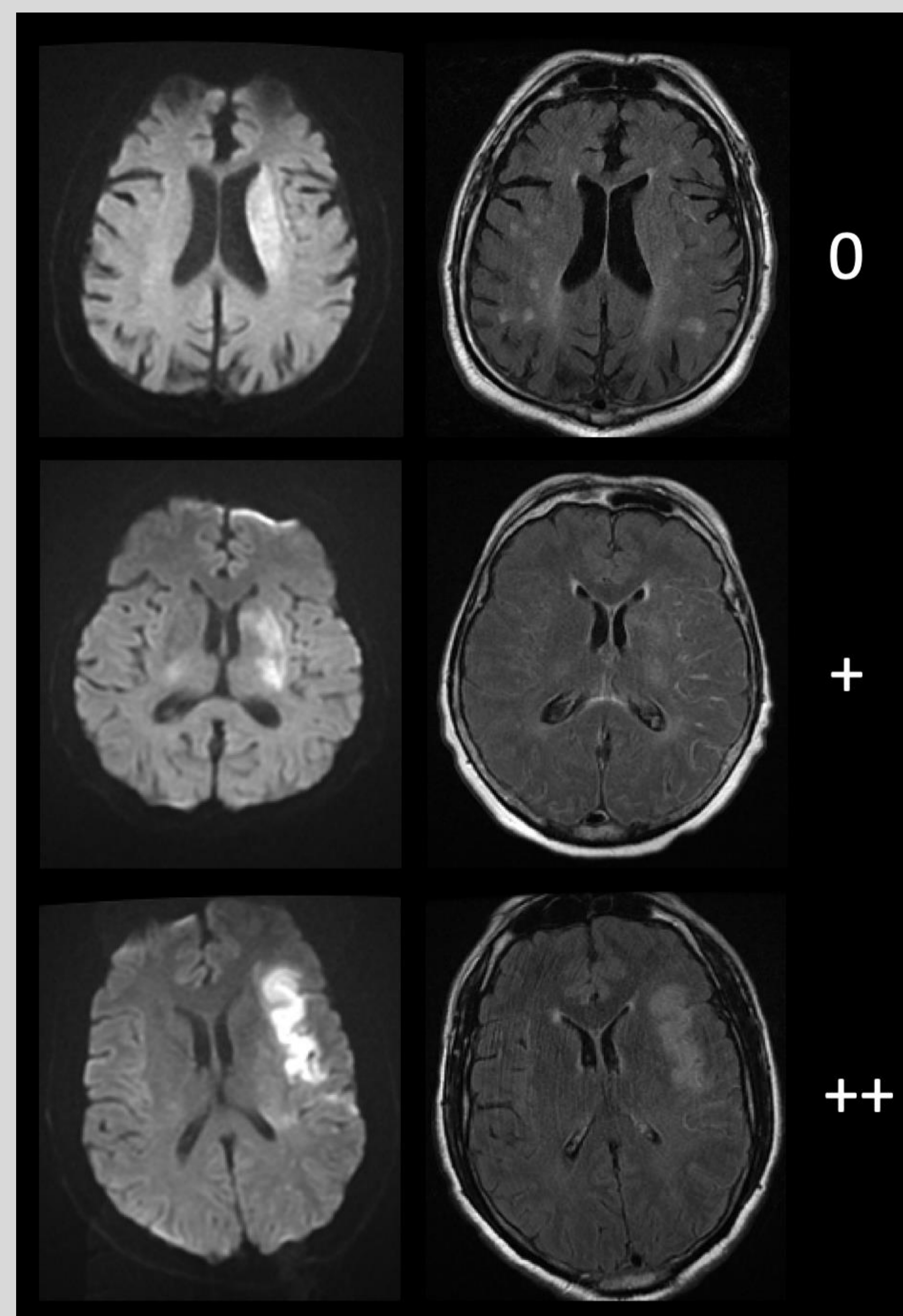
- We propose a novel radiomics approach to describe infarct FLAIR positivity and evaluate its correlation with clinical presentation.

## Methods

- For patients with pre-EVT MRI, ischemic lesions were manually segmented on DWI, co-registered to FLAIR and visually graded for FLAIR positivity, defined as absent (0), subtle (+), or frank (++)
- Radiomics were extracted within the ischemic lesion outlines on FLAIR.
- LASSO regression was used to select features for the DWI-FLAIR mismatch radiomics signature.
- Canonical correlation analysis was used to relate this signature to clinical features.

## Results

- We identified 103 patients.
- The radiomics signature of DWI-FLAIR mismatch included FLAIR histogram kurtosis and gray level cluster shade; both correlated with visual grading.
- The first of the estimated 3 canonical pairs was statistically significant (canonical correlation=0.50, corrected p=0.009); kurtosis was positively associated with atrial fibrillation and age, while negatively associated with last known well, smoking, and diabetes.



NIHSS, median (IQR)	16 (12-19)
Intravenous alteplase	48%
LKW-MRI, min, mean (SD)	369 (277)
Infarct volume, cc, mean (SD)	29 (30)
LKW-puncture, min, mean (SD)	475 (358)
Successful recanalization	71%
90-day mRS, median (IQR)	2 (1-5)
90-day good functional outcome	40%

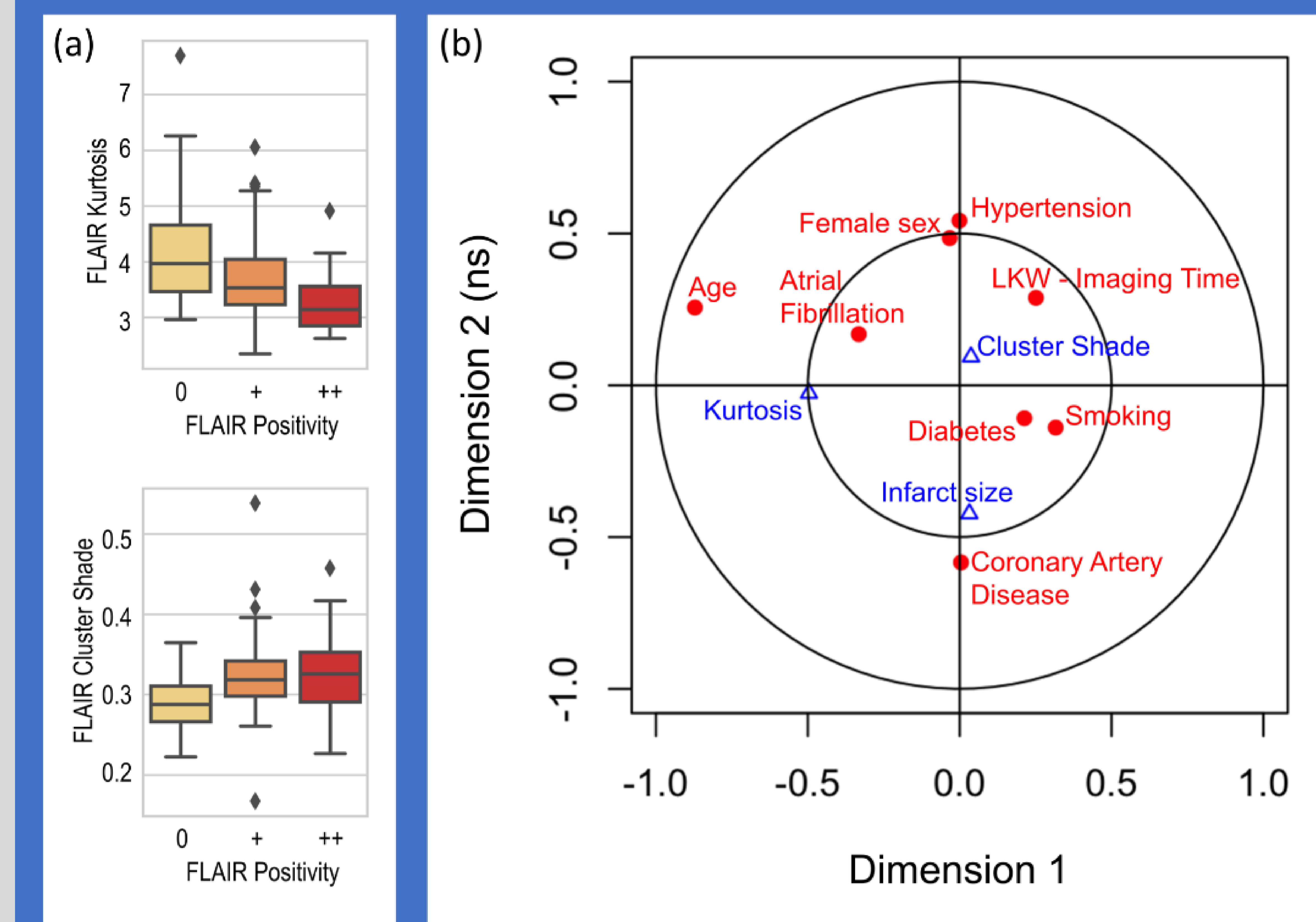


Figure 1: (a) Box plots of radiomics features included in the radiomics signature of DWI-FLAIR mismatch. Both features correlate with visual FLAIR positivity grading. (b) Loading plot of the variables projected over the 2 first canonical dimensions. Dimension 1 is statistically significant, such that clinical variables (red) and radiomics variables (blue) are positively correlated if close and negatively correlated if diagonally opposed on the x-axis. Kurtosis is positively associated with age and atrial fibrillation, while negatively associated with time from last known well (LKW), smoking, and diabetes. *ns*: non significant

Age, years, mean (SD)	68 (16)
Female	63%
Pre-stroke mRS, median (IQR)	0 (0-1)
Hypertension	74%
Atrial fibrillation	34%
Diabetes mellitus	20%
Coronary artery disease	20%
Transient ischemic attack	16%
Smoking	17%

## Conclusions

- The radiomics signature of DWI-FLAIR mismatch before EVT correlates with visual grading and may provide a continuous metric to describe infarct evolution.
- Further exploration of larger datasets is required to determine additional granular relationships with clinical features.