

Application of SHIVAI Automatic Perivascular Spaces Counting in a Memory Clinic Cohort

#10019

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On routine T1-weighted MRI, automated SHIVAI PVS counting shows substantial agreement with expert visual ratings and reproduces the difference between early-onset (EOAD) and late-onset AD (LOAD), supporting scalable and reproducible PVS quantification in memory-clinic cohorts.

INTRODUCTION

- Enlarged perivascular spaces (PVS) are an MRI marker of cerebral small-vessel disease, frequently increased in Alzheimer’s disease (AD) and dementia with Lewy bodies (DLB)^{1–4}.
- PVS burden is usually rated visually at the centrum semiovale (CS) and basal ganglia(BG)⁵ : a slow, rater-dependent task.
- Automated quantification could improve throughput and reproducibility in memory-clinic cohorts.

AIMS

- Assess agreement between SHIVAI PVS counts and expert visual ratings.
- Test whether automated measures reproduce clinically observed group differences.

METHODS

COHORT

196 patients from Leenaards Memory Center in Lausanne (CH) with a clinical-biological diagnosis of DLB and AD. Mean age 73.3 ± 7.8 y; 49.0% women

DLB
n = 74

AD
n = 122

EOAD
39

LOAD
83

IMAGING & SEGMENTATION

PVS were automatically segmented on T1-weighted MRI using the **SHIVA-PVS** detection model (v2)⁶. Separately quantified in the CS and BG.

ANALYSIS

- 1) Agreement with expert ratings
Pearson correlation at CSO and BG
- 2) Group comparisons
Age/sex matched DLB vs AD (69) EOAD vs LOAD

THREE QUANTIFICATION STRATEGIES
(derived from the same segmentation; each benchmarked against expert visual ratings)

1

Original

Raw SHIVA-PVS output, with no post-processing.

2

Cleaned

Remove labels overlapping the periventricular region, cortical grey matter, or CSF masks.

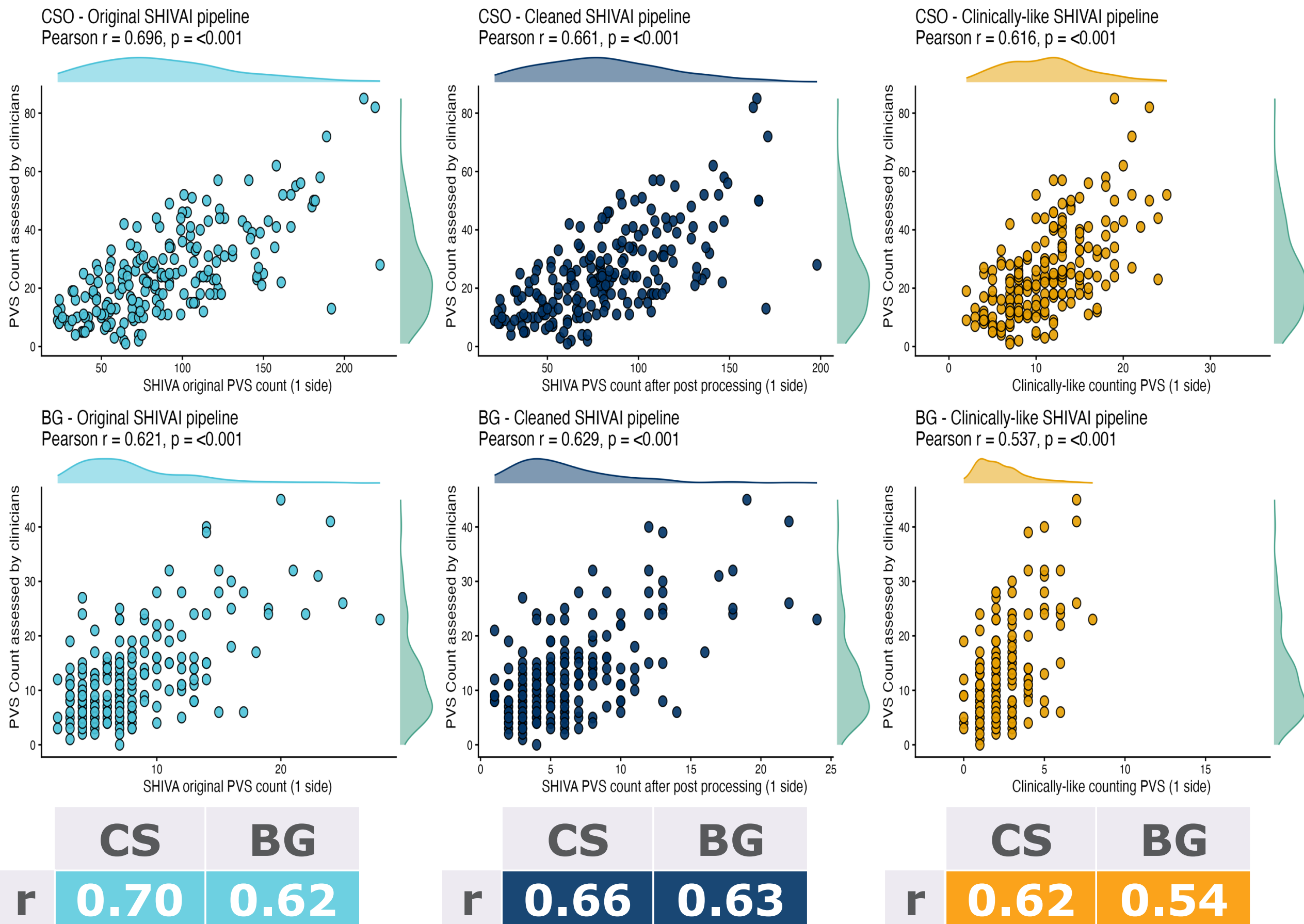
3

Clinically-like

Emulate visual rating: axial browsing; maximum PVS count across eligible CSO/BG slices; best slice & hemisphere

RESULTS

1) Agreement between SHIVAI counts and clinician visual ratings at CSO and BG, across the three processing variants (Pearson r)



2) Group comparison summary

	Clinical (expert)		SHIVA (original)		SHIVA (cleaned)		SHIVA (clinically-like)	
	CS	BG	CS	BG	CS	BG	CS	BG
DLB vs AD	**	**	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
EOAD vs LOAD	*	**	*	**	*	**	n.s.	n.s.

■ significant ■ not significant

CONCLUSIONS

- SHIVAI delivers automated PVS quantification on routine T1w MRI with substantial agreement to expert visual rating.
- Anatomical cleaning preserves agreement; the clinically-like slice-maximum strategy reduces both agreement and sensitivity.
- Automated counts reproduce the EOAD vs LOAD difference, but not the matched DLB vs AD difference: warranting refinement and further validation.

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