AMYLOID IMAGING IN DIAGNOSIS OF CEREBRAL AMYLOID ANGIOPATHY RELATED INTRACEREBRAL HEMORRHAGE

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Objective: We aimed to assess the diagnostic performance of ^{11}C-Pittsburgh Compound B (PiB) positron emission tomography (PET) for underlying cerebral amyloid angiopathy (CAA) in Asian patients with spontaneous intracerebral hemorrhage (ICH).

Methods: Ninety-two non-demented spontaneous ICH patients (17 CAA, 75 non-CAA) were recruited in our study **(Table 1)**. All patients underwent PiB PET to evaluate brain amyloid retention. The amyloid burden was visually assessed and dichotomized as PiB (+) or PiB (-) **(Figure 1)**. The global standardized uptake value ratio (SUVR) was calculated using the cerebellum as reference.

Results: The cerebral amyloid deposition were significantly higher in CAA than non-CAA patients (SUVR 1.40 [1.17–1.57] *vs* 1.07 [1.00–1.16], *p*<0.001). Based on visual classification, 13/18 CAA patients were PiB (+) as compared with 15/75 non-CAA patients (sensitivity=82.4% [56.6%-96.2%], specificity=80.0% [69.2%-88.4%]). Quantitative assessment using global SUVR > 1.24 as the cutoff value yielded similar findings (sensitivity=76.5% [50.1%-93.2%], specificity=85.3% [75.3%-92.4%) **(Table 2)**. There was no difference in the diagnostic performance between visual ratings and quantitative assessment **(Figure 2)**.

Conclusion: ^{11}C-PiB PET can be used as a diagnostic tool with high sensitivity and specificity for CAA in patients with spontaneous ICH. Visual ratings had a similar diagnostic efficacy as the quantitative method and could be readily applied in clinical and research settings. .

Table 1: Demographics in patients with spontaneous intracerebral hemorrhage

	CAA (n=17)	Non-CAA (n=75)	p value
Male, %	6 (35.3%)	53 (70.1%)	0.006
Age, y	75.0 ± 9.7	62.6 ± 12.3	<0.001
Hypertension	10 (58.8%)	69 (92.0%)	<0.001
Diabetes, %	2 (11.8%)	15 (20.0%)	0.430
Dyslipidemia, %	1 (5.9%)	18 (24.0%)	0.096
Chronic kidney disease, %	0 (0%)	5 (6.7%)	0.274
Fazekas scale ≥ 2, %	13 (76.5%)	56 (74.7%)	0.877
Hemorrhagic lesions distribution			
***Strictly lobar**	17 (100%)	0 (0 %)	<0.001
Strictly deep	0	22 (29.3 %)	0.010
Mix	0	53 (70.7%)	<0.001

Table 2: Diagnostic performance metrics of PiB-PET visual and quantitative assessments for CAA classification.

	Sensitivity	Specificity	PPV	NPV	Area under the curve
Visual assessment	78% (14/17)	80% (60/75)	48% (14/29)	95% (60/63)	0.76 (0.66-0.87)
Global SUVR*	72% (13/17)	85% (64/75)	54% (12/24)	94% (64/68)	0.70 (0.56-0.85)

Global SUVR > 1.24 was classified as CAA positive; global SUVR ≤ 1.24 was classified as CAA negative

Figure 2: Comparison of ROC curves. There was no difference (*p*=0.29) in the diagnostic performance between visual evaluation (blue line) and quantitative evaluation (SUVR, red line).
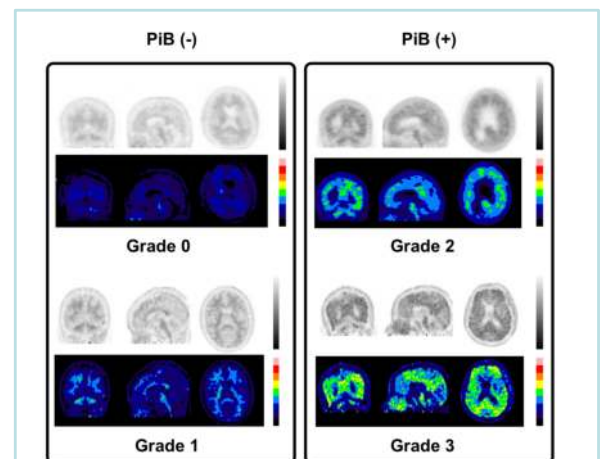

Figure 1: Visual rating of Pittsburgh compound B scan. All the images were manually adjusted according to the signal intensity of the cerebellar white matter. The image was graded from 0 to 3 (grade 0: absent retention; grade 1: punctuate retention; grade 2: scattered retention beginning confluent; grade 3: diffuse retention). Grade 0/1 was categorized as PiB (-), and grade 2/3 was categorized as PiB (+).
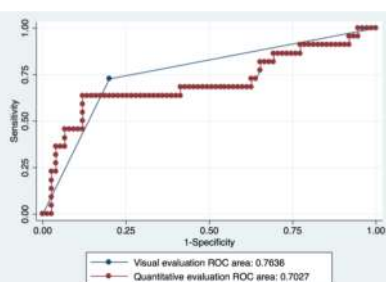
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