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Is there an interest to perform regional Amyloid quantification in comparison to overall cortical index in MCI patients?

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Abstract:

Objectives: Although visual analysis of amyloid PET has been considered sufficient to discriminate Alzheimer patients from healthy elderly subjects, early stages of Alzheimer degenerative process, ongoing years before the clinical stage, may exhibit fewer amyloid deposits. The level of amyloid load in MCI patients due to AD should therefore be more challenging to detect reason why cortical sub-region analysis could theoretically be considered to detect focal amyloid deposits, not yet spread to the whole cerebral cortex.

Methods: In this study, the result of global neocortical index SUVR computed with PNEURO 3.5 was compared to 10 different cortical sub-regions, known to visually show high discriminant F18-Flutemetamol uptake in AD patients compared to healthy elderly controls. 30 healthy controls and 62 MCI were reviewed for the analysis. The ten regions, regrouping left and right structures (to limit the analysis), were designed as such:

1_NC: whole neocortex

2_NC+SP: neocortex + specific regions (described hereunder)

3_SP: sum of specific regions: orbitofrontal cortex, striatum (caudate nucleus & putamen), superior parietal cortex and posterior cingulate cortex.

4_PSCP: superior parietal cortex and posterior cingulate cortex.

5_PC: parietal cortex.

6_FC: frontal cortex.

7_OFC: orbitofrontal cortex.

8_OC: occipital cortex.

9_TC: temporal cortex.

10_ST: striatum (caudate nucleus & putamen).

The gold-standard method to characterize positive or negative amyloid scan stayed the visual reading as recommended. Global and regional cut-off values were arbitrary defined at the PC-90 value of the control group to consider a positive amyloid load.

Results: The regional statistics and comparison between the control and MCI groups for each sub-region are given below:

	Control		MCI		P value
	MEAN±SD (MED)	PC90	MEAN±SD (MED)	(Mann-Whitney)	
1_NC	1.29±0.16 (1.26)	1.5	1.55±0.35 (1.42)	0.001	
2_NC+SP	1.29±0.16 (1.25)	1.5	1.54±0.35 (1.42)	0.001	
3_SP	1.3±0.18 (1.25)	1.58	1.59±0.4 (1.5)	0.003	
4_PSCP	1.31±0.2 (1.24)	1.75	1.66±0.46 (1.59)	0.001	
5_PC	1.3±0.17 (1.26)	1.63	1.61±0.4 (1.5)	0.001	
6_FC	1.33±0.21 (1.27)	1.66	1.62±0.4 (1.47)	0.001	
7_OFC	1.37±0.22 (1.3)	1.82	1.7±0.43 (1.49)	0.002	
8_OC	1.29±0.11 (1.27)	1.47	1.44±0.26 (1.35)	0.004	
9_TC	1.25±0.13 (1.22)	1.45	1.46±0.3 (1.35)	0.002	
10_ST	1.16±0.14 (1.14)	1.33	1.33±0.3 (1.25)	0.008	

In comparison to the gold standard visual analysis, the percentage of positivity in global and sub-regional cortical volumes of interest was calculated, based on previously defined PC90 cut-off values. Results are summarized in the table below:

Visual analysis gold standard	1_NC	2_NC+SP	3_SP	4_PSCP	5_PC	6_FC	7_OFC	8_OC	9_PC	10_ST
Amyloid +	100%	100%	100%	90%	97%	97%	90%	79%	97%	90%
Amyloid -	0%	0%	0%	0%	0%	0%	0%	0%	0%	6%

Conclusion: Even if each sub-region showed a significant difference between control and MCI groups, the last results demonstrated no particular interest to perform additional sub-regional amyloid quantification beside the global neocortex quantification, due to the high consistency of positive or negative pattern in nearly all regions of interest.

Presentation Preference (Complete): Poster Only

Category Selection (Complete): Neurology

FDA Disclosure/Additional Information (Complete):

: Yes

Name of Device/Drug : F18-Flutemetamol

FDA Approval Status: Approved