

## Potential value of quantitative estimate of cortical to cerebellar SUVr in aiding visual interpretation of florbetapir PET scans

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**Aim:** To evaluate inter reader reliability of nuclear medicine physicians interpreting florbetapir PET scans with and without access to cortical to cerebellum SUVr quantitation

**Materials and Methods:** Six radiologist/nuclear medicine physicians agreed to participate. Each reader was asked to use standard visual interpretation techniques for florbetapir (<http://www.amyvidtraining.com>) to interpret 50 florbetapir PET images randomly selected from a previous clinical trial that enrolled patients seeking diagnosis for cognitive decline. The readers were subsequently given instructions in the use of quantitative software as a potential adjunct for interpreting florbetapir images. Readers then reviewed all 50 images again while using MIMneuro 5.6.3 to provide a quantitative estimate (SUVr) of florbetapir amyloid binding. For each case, the reader reassessed their previous interpretation in light of the quantitation results and provided a final interpretation. Cohen's kappa statistic,  $\kappa$ , was used to assess pairwise agreement between readers. Fleiss's kappa statistic was used to estimate overall reader agreement prior to and after access to quantitative processing. Accuracy was also calculated as the percent of cases in agreement with an expert (AKA) visual interpretation.

**Results:** With standard visual interpretation approach, reader-to-reader paired  $\kappa$  values ranged from 0.64 to 0.88 with an overall Fleiss  $\kappa$  of 0.76 (95% CI 0.69-0.83). After obtaining quantitative processing information, interreader agreement improved significantly ( $p < 0.05$ ), with paired  $\kappa$  values ranging from 0.80 to 0.96 and an overall Fleiss  $\kappa = 0.88$  (95% CI 0.81-0.95). 22 of the 50 cases were rated amyloid positive by the expert reader. The accuracy of reader interpretation (agreement with the expert reader) ranged from 80-94% with a mean of  $89 \pm 5.2\%$ . After obtaining SUVrs, the range of accuracy scores narrowed to 92-96% with a mean of  $94 \pm 1.5\%$  ( $p = 0.052$  vs prequantitation). The only two readers that did not increase accuracy with quantitation were those with the highest pre-quantitation accuracy (94%).

**Conclusions:** Interreader reliability increased significantly after obtaining quantitative estimates of florbetapir PET amyloid binding (SUVr). There was a trend toward increased accuracy (compared to expert read) although the study may have been limited by a ceiling effect for some readers who already agreed with the expert reader in 94% of the cases prior quantitative information. The results suggest that quantitative information may improve performance of individual physician readers.

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