

A head-to-head comparison of different methods of Dopamine transporter (DAT) brain SPECT quantification

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Introduction

- Dopamine transporter (DaT) imaging is useful for the differential diagnosis of Parkinson's syndrome from essential tremor.
- Visual evaluation of DaTSCAN images represents the generally accepted diagnostic method
- Semiquantification can assist visual reading, especially in doubtful or borderline cases.

Purpose

Our aim was to compare a widely distributed free tool (Standard Processing-SP) with a commercial software (provided by Siemens-CS).

Methodology I

- DaT imaging studies, were analyzed visually by two nuclear medicine consultants, blind to clinical information.
- Negative scans were classified.
- Images were then processed using the two different softwares.

Standard Processing-SP

- The SP performs a tomo backprojection reconstruction method using a butterworth 0.40 filter.
- After the completion of the reconstruction, the number of axial images that display a clear image, are selected.
- The images are then summed up and are ready for quantification.
- The quantification uses normal patient ROIS', imported in the protocol, to aid the correct basal ganglia segmentation and are adjusted for each examination.

Commercial Software-CS

- The raw data from the tomography are reconstructed using the backprojection method with a Butterworth 0.50 filter.
- The reconstructed data are loaded to the segmentation program, which detects, depending on intensity, the best image for quantification.
- The software automatically identifies the basal ganglia and applies the ROIs on axial and sagittal planes.
- For the finalization of the quantification, the ROIs are fine adjusted for each patient on both planes.

Methodology II

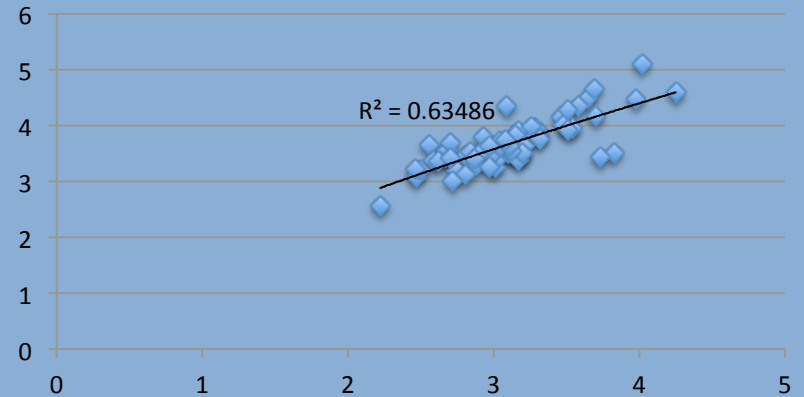
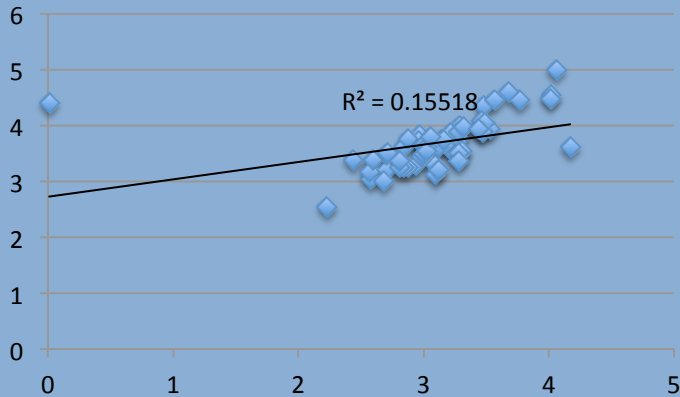
A specific-to-non-displaceable binding ratio (SBR) by normalizing counts on an occipital ROI was then calculated for these two softwares.

Results I

- 24 males and 36 females were visually interpreted as normal (mean age 69.9+/-9.9 y.o.).
- All the calculated parameters were highly correlated between the two softwares with Pearson's '*r*' correlation coefficients ranging from 0.394 to 0.796 ($P < 0.005$).
- Correlation coefficients were higher with putamen than with caudate SBR values with both software, and in general higher with CS.

Ratios to Normalization Region

	Caudate	Putamen	Striatum	Caudate	Putamen	Striatum	Caudate	Putamen	Striatum	Caudate	Putamen	Striatum
	RIGHT SP			LEFT SP			RIGHT CS			LEFT CS		
AV	3,29	3,34	3,12	3,50	3,22	3,10	3,84	3,53	3,68	3,80	3,52	3,69
SD	0,47	0,43	0,42	0,46	0,42	0,56	0,58	0,43	0,45	0,47	0,43	0,45



Correlations Striatum to Occipital lobe for the left and right basal ganglia
 $r=0.394$ $r=0.796$

Conclusions

- Both softwares work well and similarly one another in semi-quantification of DaT SPECT.
- The higher values of CS should be taken into account, especially in borderline studies.