Signal and shape of subthalamic nucleus on susceptibility-weighted image (SWI). ***-Comparison with STIR image-***

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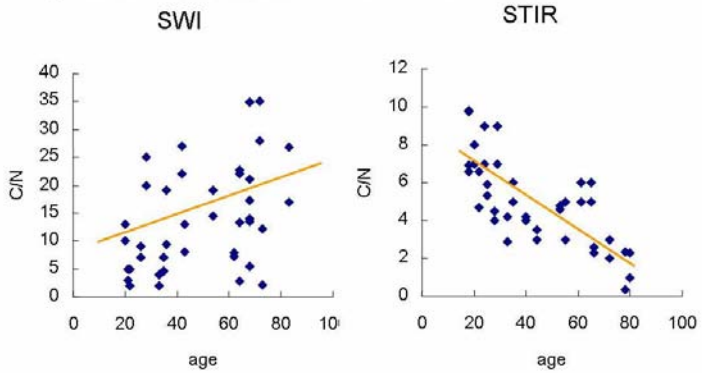
Purpose: The purpose of this study is to assess the feasibility of susceptibility-weighted image (SWI) [1] for targeting of subthalamic nucleus (STN) in stereotactic deep brain stimulation electrode surgery for Parkinson disease. For this purpose, we evaluated age related changes in signal and shape of subthalamic nucleus on SWI in comparison with short tau inversion recovery (STIR) image**.**

Materials and Methods: The subjects were 20 normal volunteers (18 to 80 years old) and 40 STNs were evaluated.

SWI (Velocity compensated gradient echo sequence: TR=49ms, TE=40ms, FOV=256mm, imaging matrix=256x256, slice thickness=2mm, slice spacing=2 mm) and STIR images (Turbo spin echo sequence: TR=5000 ms, TE=10 ms, TI=150ms, FOV=256mm, imaging matrix=256x256, slice thickness=3mm, slice spacing=2 mm) were obtained using a 1.5T clinical scanner. We identified STNs at locations that were 4mm caudal to anterior commissure -posterior commissure line and 12 mm lateral to the midline.

We measured signal intensity of STNs on both SWI and STIR image, and calculated contrast to noise ratio (CNR) between STNs and adjacent white matter. We evaluated correlation between CNR to their age. We also evaluated the shape of STN depicted on both imaging method.

Figure: C/N radio between STN and white matter



Results: As shown in the figure, there was positive correlation between CNR and ages on SWI. On the other hand, there was negative correlation on STIR image. Correlation coefficients were 0.41 in SWI and -0.74 in STIR image. The table shows the shape of STNs depicted on both imaging methods. The shapes of STNs are rather short on SWI compared to STIR images, and posterior parts of STNs were not conspicuous on SWI.

Table: The shape of STN

	STIR	SWI
Thin oval	12	0
Oval	19	14
Short oval	0	10
Spoon shaped	0	12
Not clear	9	4

Discussion and Conclusion: Since there was positive correlation between CNR and ages on SWI, the conspicuousness of STNs may be better on SWI in elderly populations, which most of the patients of Parkinson disease belong to. On the other hand, posterior parts of STNs were not conspicuous on SWI. Combination of SWI and STIR image may be helpful for targeting of STN in stereotactic deep brain stimulation electrode surgery.

Ref.: 1. Haacke EM et al. Magn Reson Med. 2004;52(3):612-8