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Is the Schaltenbrand-Wahren Atlas a Neurosurgical Relic of the 20th Century?

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I read the article 'Direct anatomical localization of the subthalamic nucleus on CT with comparison to Schaltenbrand-Wahren atlas' by Sather and Patil [1] with great interest.

The authors referred to the Schaltenbrand-Wahren atlas (SWA) in order to document the accuracy of their computed tomography (CT)-based anatomical localization of the subthalamic nucleus (STN), which they consider to be more valuable than direct magnetic resonance (MR) STN targeting.

To emphasize this, Sather and Patil write: 'It has been well documented that gradient field nonlinearities and magnetic field inhomogeneities are responsible for geometric distortions seen on MR images. The AP plane seems to be the most prone to MRI distortion.'

This finding is echoed in the functional neurosurgery community by other authors who, however, specify that STN visualization is nevertheless accurately possible on MR axial images [2–4].

Sather and Patil further state: 'Studies to date have not been able to show a good correlation between the position of the STN on MRI and its coordinates from stereotactic atlases. However, the results from these patients show that the coordinates of the STN derived from the CT scan correlate quite well with the numbers derived from atlases... Furthermore, the results show that what appears anatomically as the STN on CT imaging correlates well with the Schaltenbrand-Wahren atlas coordinates.'

The reliance of Sather and Patil [1] on the SWA as reference to document the accuracy of CT-guided STN identification is rather surprising as the SWA is known to have limitations, particularly with respect to the STN.

The authors of a recently developed 3D histological and deformable atlas of the human basal ganglia [5–7] compared the SWA to their 3D atlas in an article reporting on the 3D atlas validation procedures [7] by stating: 'The first and most significant difference between the SW atlas and this 3D atlas is the number of sections available (for example, 20 sections are available in the axial series of the SW atlas), which is not predetermined in the current 3D atlas because the atlas structures consist of continuous surfaces... Second, the 3D coherency of the contours of the original SW atlas was not verified during the construction of the atlas, leading to irregular 3D contours that cannot be sliced in other directions. An example of this is the STN.'

The finding of Sather and Patil [1] that Cartesian coordinates of directly visualized STN on MR scans seemed to differ consid-

erably from conventional atlas-based coordinates has also been confirmed by other authors, such as Ashkan et al. [2], Littlechild et al. [4] and Patel et al. [8]. However, these latter authors [2, 4, 8] considered the inter-individual topographic variations of the STN (not taken into account by an atlas) primarily responsible for the differences between the MRI STN coordinates and SWA STN coordinates.

The fact that 'studies to date have not been able to show a good correlation between the position of the STN on MRI and its coordinates from stereotactic atlases' [1] may therefore more likely be due to the limitations of the SWA than to the limitations of MRI.

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