PARKINSON DISEASE

Accurate noninvasive diagnosis of Parkinson disease

A study from the University of Illinois at Chicago has found that patients with Parkinson disease (PD) can be reliably distinguished from unaffected individuals by diffusion tensor imaging (DTI), an MRI technique that uses changes in the mobility of water molecules (termed 'fractional anisotropy') as a measure of structural changes in the brain. This research may enable accurate diagnosis of PD early in the disease course.

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"We conducted this study because the diagnosis of PD remains subjective, and a noninvasive imaging marker that identifies the disease reliably in individual patients does not exist," explains David Vaillancourt, lead author of the paper. Investigations using mouse models had found that dopaminergic neuron loss correlated with DTI measurements. The study population comprised 14 unmedicated patients with early PD, none of whom had clinically significant cognitive impairment, and 14 healthy controls. The study focused on three small regions of interest in the rostral, middle and caudal areas of the substantia nigra. DTI measurements, obtained in a 3 T scanner, showed that fractional anisotropy was notably lower in the middle and caudal regions in patients with PD than in controls. The caudal region showed the greatest difference. "Our finding that fractional anisotropy is reduced in the substantia nigra of PD is consistent with two previous studies in humans," says Vaillancourt. "Our paper is important because we used small regions of interest and a high-resolution technique to determine that specific segments of the substantia nigra are highly sensitive to the cell loss that occurs in PD." From measurements of the caudal region, patients with PD could be distinguished from controls with 100% sensitivity and 100% specificity.

Further research will include comparisons of PD patients with a disease control group whose symptoms mimic those of PD, such as supranuclear palsy.

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Original article Vaillancourt, D. E. *et al.* High-resolution diffusion tensor imaging in the substantia nigra of *de novo* Parkinson disease. *Neurology* [doi:10.1212/01.wnl.0000340982.01727.6e] (2009).