

The pattern of uptake on DaTSCAN in parkinsonism and essential tremor

Appraised by Kevin Galbraith, 4 February 2016

Update due 2019

Clinical question

What is the pattern of uptake on DaTSCAN in parkinsonism and essential tremor?

Background

Parkinson's can be difficult to differentiate from other parkinsonian syndromes or essential tremor. DaTSCAN, which measures the density of nigrostriatal dopamine transporter sites, may in some cases help the clinician make the correct diagnosis. The diagnostic accuracy of DaTSCAN in Parkinson's and clinically uncertain parkinsonism has been addressed separately in a Parkinson's UK CAT. This CAT looks at the evidence contributing to our understanding of the uptake pattern in parkinsonism and essential tremor.

Clinical bottom line

1. The Society for Nuclear Medicine (SNM) presents typical uptake patterns for normal aging, various parkinsonian syndromes, Alzheimer's disease and essential tremor within a guideline developed in 2012 (presented below). The guideline is of moderate quality.

Search terms

Nervous System Diseases / [Radionuclide imaging] AND (Tomography, Emission-Computed, Single-Photon / OR DaTSCAN OR dopaminergic imaging OR FP-CIT OR ioflupane OR Tropanes / [Diagnostic Use] OR tropanes)

Search strategy

Ovid Medline, adapted for Embase and Cochrane Library. All searches were up to December 2015. Studies in languages other than English were excluded. This yielded 640 studies. As there were many relevant primary studies on a wide variety of conditions, only guidelines and systematic reviews that covered parkinsonian conditions in general were selected. Two guidelines and one systematic review were found.

Evidence

One guideline provided a well-referenced summary of DaTSCAN uptake patterns in a variety of conditions.¹ It is summarised, and critically appraised below.

Djang DSW, Janssen MJR, Bohnen N, Booij J, Henderson TA, Herholz K, et al. SNM practice guideline for dopamine transporter imaging with 123I-ioflupane SPECT 1.0. *Journal of Nuclear Medicine*. 2012;53(1):154-63.

Summary

A Society of Nuclear Medicine guideline addressing the indications, technical aspects, interpretation and reporting of DaT SPECT scans with ¹²³I-ioflupane ('DaTSCAN').

The information presented on uptake patterns is reproduced in a table below:

Condition / comparison	Uptake pattern on DaTSCAN
Normal aging	Some decrease in striatal binding, in both the caudate and putamen, at a rate of around 5% to 7% per decade. Small in comparison to decreases caused by disease, this should not normally interfere with interpretation. ²
Parkinson's / atypical parkinsonian syndromes	In Parkinson's, a common pattern is decreased binding in the dorsal putamen contralateral to symptoms, progressing anteriorly and ipsilaterally over time. In atypical parkinsonian syndromes, loss of uptake tends to be more symmetrical, and to involve relatively more of the caudate. However, there is too much overlap to allow discrimination between Parkinson's and atypical parkinsonian syndromes such as multiple system atrophy, progressive supranuclear palsy, and corticobasilar degeneration. ³⁻⁷
Essential tremor	Normal binding. ⁸
Drug-induced parkinsonism	Normal binding. ⁹
Vascular parkinsonism	Binding is normal or slightly diminished, except when an infarct directly involves a striatal structure. Even then, a deficit from an infarct often gives a 'punched-out' appearance, differing in morphology and quality from a typical presynaptic parkinsonian syndrome deficit. ¹⁰⁻¹²
Psychogenic parkinsonism	Normal binding. ^{5, 13}
Alzheimer's disease / dementia with Lewy bodies	Striatal binding normal or only mildly diminished in Alzheimer's disease and is significantly decreased in dementia with Lewy bodies. ^{14, 15}

The guideline was critically appraised using the AGREE II instrument.¹⁶ Points were noted and scores calculated (between zero and 100%) for each domain as follows:

- **Scope and purpose:** Well described. **Score 94%.**
- **Stakeholder involvement:** Details provided in separate document.¹⁷ No stipulation that the writing committee should include a clinician directly involved in patient care. Nor was there mention of any methodological expertise in guideline development. It was unclear whether the wider public involved in the process comprise only the users of the SNM/ European Association of Nuclear Medicine (EANM) websites and members of the society, or general public or patients. **Score 56%.**
- **Rigour of development:** A separate document on guideline development policy¹⁷ stipulates documentation of search terms and criteria for inclusion of research articles in the guideline development, but the guideline itself did not include these items. Nor were strengths and limitations of the body of evidence stated. An iterative process of review was described¹⁷ but there was no clear link between recommendations and supporting evidence. Precautions and contraindications were described in detail. The composition of the bodies providing external review was not clearly described. A clear procedure for updating the guideline was provided. **Score 46%.**
- **Clarity of presentation:** The recommendations were specific, unambiguous and easily identifiable. **Score 94%.**
- **Applicability:** The guideline did not describe facilitators and barriers to its application. There was no advice on how the recommendations can be put into practice. Potential resource implications were not covered. There were no monitoring or auditing criteria. **Score 0%.**
- **Editorial independence:** There was no indication of external funding, and no indication that any funding body influenced content. The SNM and EANM stipulate conflict-of-interest screening criteria. Relevant documents are made available on their website. **Score 83%.**

- **Overall, the guideline was rated as of moderate quality. The greatest limitation was thought to be a lack of clarity regarding the search strategy. However, criteria for development were set in advance and were largely upheld.**

References

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