Protocol

Dopamine Transporter Imaging With Single-Photon Emission Computed Tomography

(60154)

(Formerly Dopamine Transporter Single-Photon Emission Computed Tomography)

Medical Benefit		**Effective Date**: 01/01/15	**Next Review Date**: 09/18
Preauthorization	No	**Review Dates**: 09/14, 09/15, 09/16, 09/17	

This protocol considers this test or procedure investigational. If the physician feels this service is medically necessary, preauthorization is recommended.

The following protocol contains medical necessity criteria that apply for this service. The criteria are also applicable to services provided in the local Medicare Advantage operating area for those members, unless separate Medicare Advantage criteria are indicated. If the criteria are not met, reimbursement will be denied and the patient cannot be billed. Please note that payment for covered services is subject to eligibility and the limitations noted in the patient's contract at the time the services are rendered.

Populations	Interventions	Comparators	Outcomes
Individuals: • With clinically uncertain Parkinson disease	Interventions of interest are: • Dopamine transporter single-photon emission computed tomography	Comparators of interest are: • Standard diagnostic workup without dopamine transporter single-photon emission computed tomography	Relevant outcomes include: • Test accuracy • Symptoms • Functional outcomes • Medication use
Individuals: • With clinically uncertain dementia with Lewy bodies	Interventions of interest are: • Dopamine transporter single-photon emission computed tomography	Comparators of interest are: • Standard diagnostic workup without dopamine transporter single-photon emission computed tomography	Relevant outcomes include: • Test accuracy • Symptoms • Functional outcomes • Medication use

Description

Dopamine transporter imaging with single-photon emission computed tomography (DAT-SPECT), using radiopharmaceutical ioflupane I 123 injection, is being evaluated to improve the differential diagnosis of parkinsonian syndromes from nonparkinsonian tremor and of dementia with Lewy bodies from Alzheimer disease.

Summary of Evidence

For individuals who have clinically uncertain Parkinson disease who receive dopamine transporter imaging with DAT-SPECT, the evidence includes a number of studies from Europe, where a dopamine transporter (DAT) ligand has been available for over a decade. Relevant outcomes are test accuracy, symptoms, functional outcomes, and medication use. In terms of technical performance, the DAT ligand is specific for the striatal DAT, and studies have indicated reliability in assessment of the images when performed by experienced readers. Studies of diagnostic accuracy have reported good specificity for confirming nigrostriatal degeneration, with less sensitivity for ruling out disease; these findings are dependent, however, on a reference standard (clinical diagnosis), which may be flawed, and it is unknown whether DAT-SPECT would show greater sensitivity than the criterion standard (histopathologic diagnosis). Evidence on clinical utility includes a randomized controlled trial (RCT) that

showed more patients evaluated with DAT-SPECT had changes in diagnosis and management than controls without imaging; however, there is limited evidence to evaluate whether these changes improve health outcomes. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have clinically uncertain dementia with DLB who receive DAT-SPECT, the evidence includes studies on diagnostic accuracy and its effect on diagnosis and confidence in diagnosis. Relevant outcomes are test accuracy, symptoms, functional outcomes, and medication use. For discriminating between DLB and Alzheimer disease, the sensitivity and specificity of DAT-SPECT is somewhat lower than for parkinsonian syndromes, although the comparison standard used in the available studies may be flawed. Few patients have been evaluated with histopathology as the reference standard. Evidence on clinical utility includes an RCT that showed DAT-SPECT can influence the diagnosis of DLB, particularly when the scan is abnormal. It cannot be determined from this study whether the revised diagnosis was more accurate or resulted in a beneficial change in patient management. The evidence is insufficient to determine the effects of the technology on health outcomes.

Policy

Dopamine transporter imaging with single-photon emission computed tomography is **investigational** for all indications, including but not limited to:

- aiding in the diagnosis of patients with clinically uncertain parkinsonian syndromes; OR
- distinguishing between parkinsonian syndromes and essential tremor; OR
- distinguishing between dementia with Lewy bodies and Alzheimers disease; OR
- monitoring of disease progression.

Background

Parkinsonian syndromes (PS) are a group of diseases that share similar cardinal signs, characterized by bradykinesia, rigidity, resting tremor, and gait disturbance. Parkinson disease (PD) is the most common cause of parkinsonism. Despite the signs of PS, diagnosing PD in the early stage of the disease can be difficult. In addition, other etiologies such as essential tremor (ET), corticobasal degeneration, multisystem atrophy, progressive supranuclear palsy, vascular parkinsonism, and drug-induced parkinsonism can lead to a similar set of symptoms. Even in specialized movement disorders centers, up to 25% of patients may be misclassified, and some patients (e.g., those with ET who have been diagnosed with PD) may be erroneously treated.[1] This has led to the development of additional tests to improve the accuracy of clinical diagnosis of PD and other PSs. One recent approach is to evaluate the integrity of dopaminergic pathways in the brain using dopamine transporter imaging with DAT-SPECT.

DAT-SPECT detects presynaptic dopaminergic deficit by measuring DAT binding. In general, striatal DAT binding is reduced in PD, genetic parkinsonism, dementia with Lewy bodies (DLB), corticobasal degeneration, progressive supranuclear palsy, and multiple system atrophy, while striatal DAT binding is in the normal range in Alzheimer disease (AD), ET, dystonic tremor, orthostatic tremor, drug-induced parkinsonism, psychogenic parkinsonism, and vascular parkinsonism.[2] It is proposed that an abnormal DAT-SPECT supports the diagnosis of PD or other neurodegenerative PS (multisystem atrophy, progressive supranuclear palsy), while a normal DAT-SPECT in a symptomatic patient increases the likelihood of a disease not affecting the nigrostriatal dopaminergic pathway. There is, however, a significant percentage of patients with clinically diagnosed PD who do not show reduced DAT-SPECT binding. These are commonly referred to as scans without evidence of dopaminergic deficit. Additional research may shed light on these cases.

Due to the degeneration of nigrostriatal neurons in DLB, DAT-SPECT is also proposed to differentiate DLB from AD. Some have noted a severe sensitivity to neuroleptics (potentially life-threatening) in patients with DLB. However, newer agents are usually well-tolerated, and patients with DLB may also respond to the cholinesterase inhibitors that are more commonly used to treat AD.

Analysis of DAT-SPECT images can be visual, semiquantitative, or quantitative. Because patients typically do not become symptomatic before a substantial number of striatal synapses have degenerated, visual interpretation of the scan is thought to be sufficient for clinical evaluation. A variety of methods are being tested to improve the validity and reliability of ratings, including commercially available software to define the region of interest (ROI) for analysis and the development of an atlas for visual interpretation. Quantitative interpretation may aid visual interpretation and, if performed rigorously, may increase diagnostic accuracy; however, interobserver variability tends to be high with manual ROI-based semiquantification.[3] Semiquantitative analysis also requires normal control values and varies across imaging systems.

DAT ligands include iodine 123 2β-carbomethoxy-3β-(4-iodophenyl) tropane (^{123}I-β-CIT), iodine 123 N-(3-fluoropropyl)-2β-carbomethoxy-3β-(4-iodophenyl) nortropane (^{123}I-FP-CIT), and technetium 99m (2β((N,N'-bis(2-mercaptoethyl) ethylene diamino) methyl), 3β-(4-chlorophenyl) tropane (^{99m}Tc-TRODAT- 1).[2] Intravenous ^{123}I-β-CIT requires a delay between injection and scan of about 24 hours. Intravenous ^{123}I-FP-CIT (DaTscan™) is a fluoropropyl derivate of β-CIT that can be injected three to six hours before the scan.

Regulatory Status

DaTscan™ (GE Healthcare) has been in use in Europe since 2000 with a diagnostic indication for use in parkinsonian patients and with expanded use since 2006 in patients suspected of dementia with Lewy bodies. In 2011, DaTscan™ was approved by the U.S. Food Drug Administration (FDA) through a new drug application and is "indicated for striatal dopamine transporter visualization using single photon emission computed tomography brain imaging to assist in the evaluation of adult patients with suspected parkinsonian syndromes. In these patients, DaTscan may be used to help differentiate ET [essential tremor] from tremor due to parkinsonian syndromes (idiopathic Parkinson's disease, multiple system atrophy and progressive supranuclear palsy). DaTscan is an adjunct to other diagnostic evaluations."[4] FDA product code: KPS.

Related Protocol

Deep Brain Stimulation

Services that are the subject of a clinical trial do not meet our Technology Assessment Protocol criteria and are considered investigational. *For explanation of experimental and investigational, please refer to the Technology Assessment Protocol.*

It is expected that only appropriate and medically necessary services will be rendered. We reserve the right to conduct prepayment and postpayment reviews to assess the medical appropriateness of the above-referenced procedures. **Some of this protocol may not pertain to the patients you provide care to, as it may relate to products that are not available in your geographic area.**

References

We are not responsible for the continuing viability of web site addresses that may be listed in any references below.

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