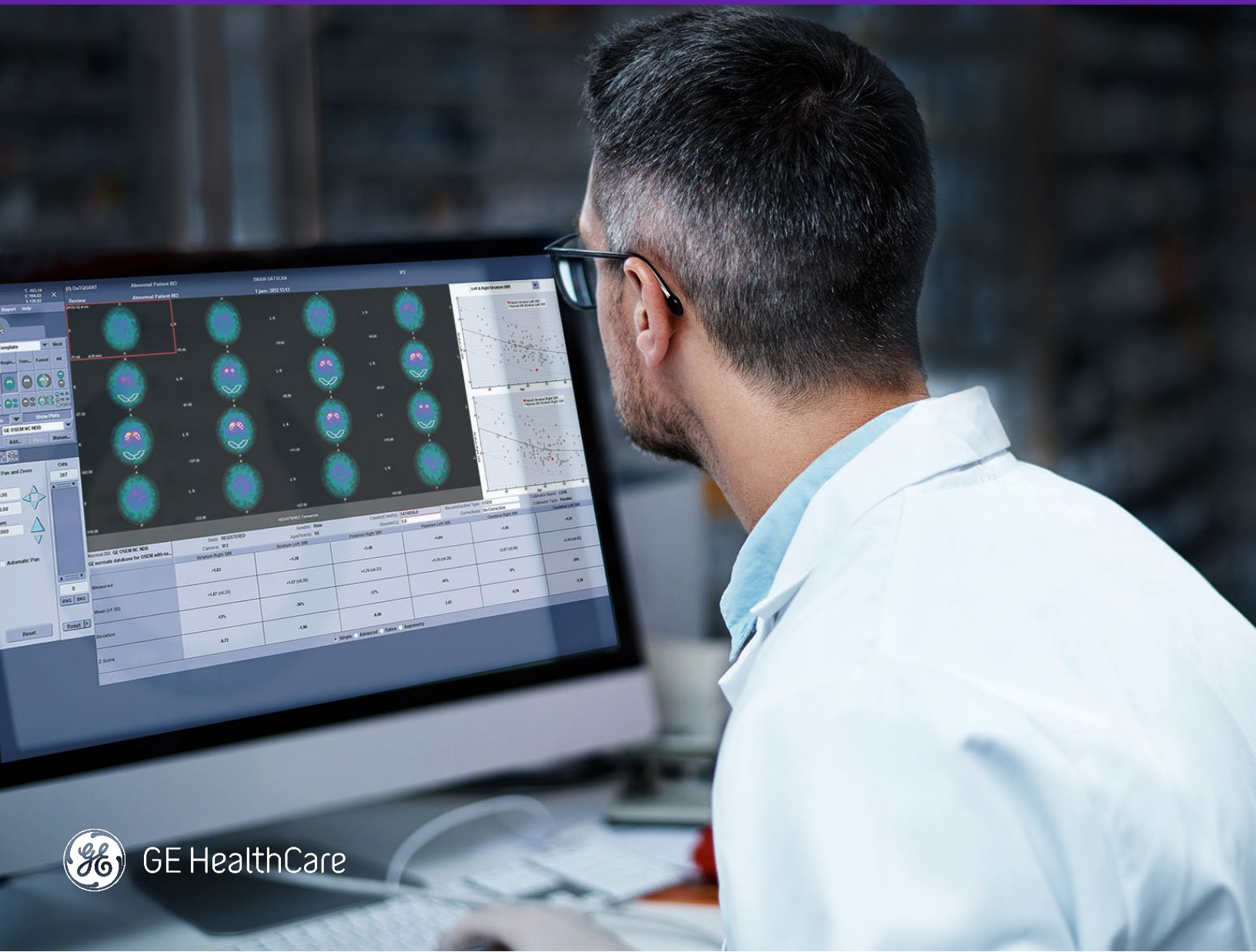


Imaging Quick Guide



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Indication for DaTscan (Ioflupane I 123 Injection):

DaTscan™ (Ioflupane [123I] Injection) is a radiopharmaceutical indicated for visualization of functional striatal dopamine transporter using single-photon emission computed tomography (SPECT) brain imaging.

In adult patients with suspected parkinsonian syndromes (PS), DaTscan SPECT imaging may be used as an adjunct to other established evaluations to help differentiate essential tremor from tremor due to PS related to idiopathic Parkinson's disease (PD), multiple system atrophy (MSA) and progressive supranuclear palsy (PSP).

DaTscan is unable to discriminate between PD, MSA and PSP. (*See Product Monograph at back for more information*)

Contraindications:

DaTscan is contraindicated in patients who are hypersensitive to this drug or to any ingredient in the formulation or component of the container. For a complete listing of ingredients and of packaging components, *see product monograph for more information*.

Scheduling considerations:

Ask the patient if they:

- are pregnant or breastfeeding
- are sensitive to DaTscan, iodine, Potassium Iodide Oral solution, or Lugol's Solution
- have reduced renal or hepatic function
- are claustrophobic
- are able to lay still for 30-40 mins
- Review patient's list of current medications

Patient preparation:

- No diet restrictions
- Encourage patient to hydrate prior to and following the administration of DaTscan

Striatal uptake of DaTscan (ioflupane):

- occurs at the presynaptic dopamine transporter (DaT)
- drugs that bind to the presynaptic DaT with high affinity may interfere with uptake of DaTscan and impact the interpretation of the resulting images [1-3]

The data below is compiled from approved labeling and published literature and provided for your consideration when evaluating how to manage concomitant medications prior to administration of DaTscan [1-3].

Medications with the potential to interfere with uptake of DaTscan:

Table 3 Established or Potential Drug-Drug Interactions Drug	Source of Evidence	Effect	Clinical Comment
Amphetamine	T	Potential reduction of ioflupane striatal binding	Consider temporary discontinuation of use ^{2,3}
Benzatropine	T	Potential reduction of ioflupane striatal binding	Consider temporary discontinuation of use ²
Bupropion	T	Potential reduction of ioflupane striatal binding	Consider temporary discontinuation of use ²
Cocaine	T	Potential reduction of ioflupane striatal binding	Consider temporary discontinuation of use ²
Mazindol	T	Potential reduction of ioflupane striatal binding	Consider temporary discontinuation of use ²
Methylphenidate	T, CT	Reduction of ioflupane striatal binding ratios	Consider temporary discontinuation of use ²
Phentermine	T	Not specified	Consider temporary discontinuation of use ²
Sertraline	T	Not specified	Consider temporary discontinuation of use ²
Legend: C = Case Study; CT = Clinical Trial; T = Theoretical			

The following medications should not significantly interfere with ioflupane binding and do not need to be withdrawn:

- Cholinesterase inhibitors and neuroleptics (antipsychotics)
- Anti-parkinsonian drugs (e.g., L-dihydroxyphenylalanine (L-DOPA), dopamine agonists, monoamine oxidase-B inhibitors (MAO-B), N-methyl-D-aspartate (NMDA) receptor blockers, amantadine, and catechol-O-methyltransferase inhibitors (COMT) in standard dosages)
- Selective serotonin reuptake inhibitors (SSRI) may increase binding to DaT but should not interfere with visual interpretation

Day of procedure:

- Administer thyroid block at least one hour prior to DaTscan injection
 - Potassium iodide oral solution, IOSAT tablets or Lugol's solution (equivalent to 100mg iodide) or Potassium Perchlorate (400mg)
- Administer DaTscan
 - Recommended dose: 3 to 5 mCi (111-185 MBq)
 - Injection Technique: slow Intravenous injection over 15 to 20 secs
- SPECT Imaging (begin between 3 and 6 hours post injection)
- Post-Processing

***** To maintain consistency between patients, post injection imaging time, acquisition parameters and processing parameters should be consistent*****

Acquisition parameters:

- LEHR (Low Energy High Resolution) collimators
- 128 x 128 matrix
- Ideal pixel size is 3.5 to 4.5 mm. A zoom may need to be applied to achieve this pixel size (camera dependent)
- Photopeak of 159 KeV with $\pm 10\%$ energy windows
- Minimum of 60 views per detector/120 total views
- 1800 rotation per detector/3600 total rotation
- Minimum of 1.5m total counts, 30 seconds per view recommended
- Step and shoot mode with circular orbit

Patient positioning:

- Position Camera heads in the lateral position
- The patients' shoulders should be lined up to the edge of the bed allowing the cameras to rotate closely around the head. Relaxed and bound arms by the side will lower the shoulders
- An off-the-table headrest must be used to ensure high quality images. Head restraint (Velcro) should also be used to minimize movement
- Depending on the length of the neck and other patient physical attributes, it may seem as though not all of the head is in the field of view. But, unlike cerebral blood flow studies, the cerebellum does not need to be included. The structures being imaged are positioned above ear level
- Raise the table until the head is at the center on the field of view
- Set the detector radius no more than 15 cm (confirm both detectors are at the same radius)
Record radius of rotation on the patient's chart
- Rotate the detectors slowly confirming that they remain close to, but not touching, the patient. If any adjustments are necessary, only adjust the table height
- The acquisition can now be started

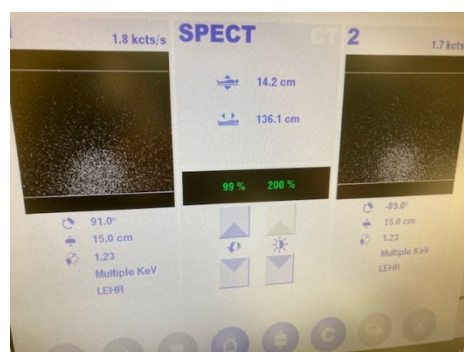
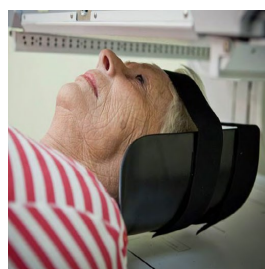


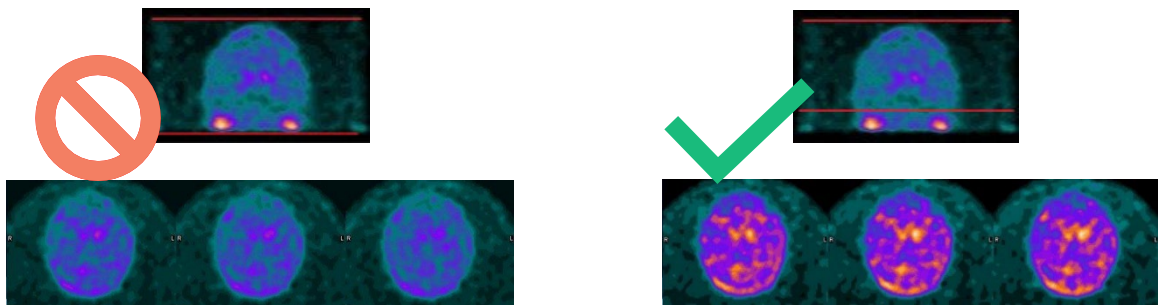
Image reconstruction and display:

1. Reconstruction type:

- Iterative reconstruction (OSEM) recommended or Filtered Back Projection (FBP)
- Filter: Butterworth or Gaussian (camera dependent)

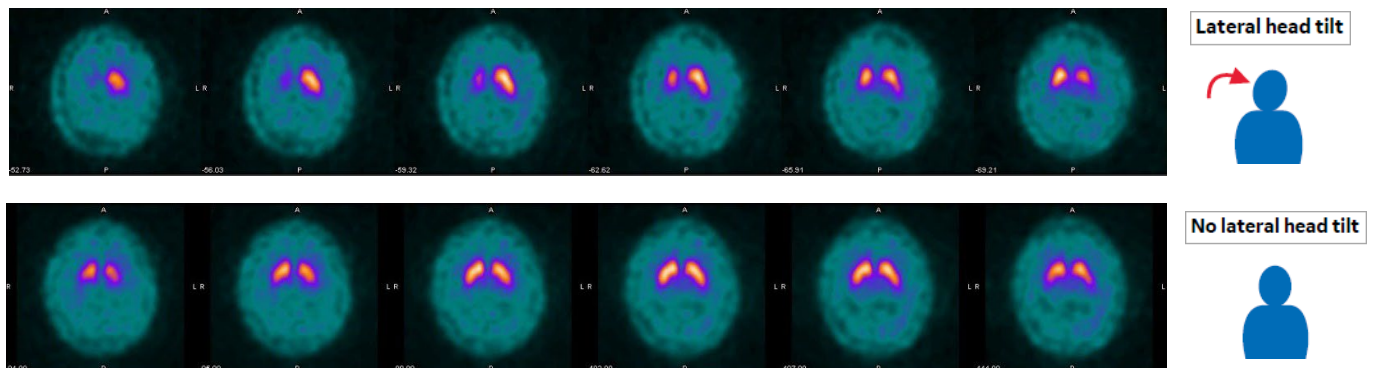
2. Image reconstruction volume:

- Exclude salivary glands from reconstruction volume as salivary gland uptake may impact normalization of the image

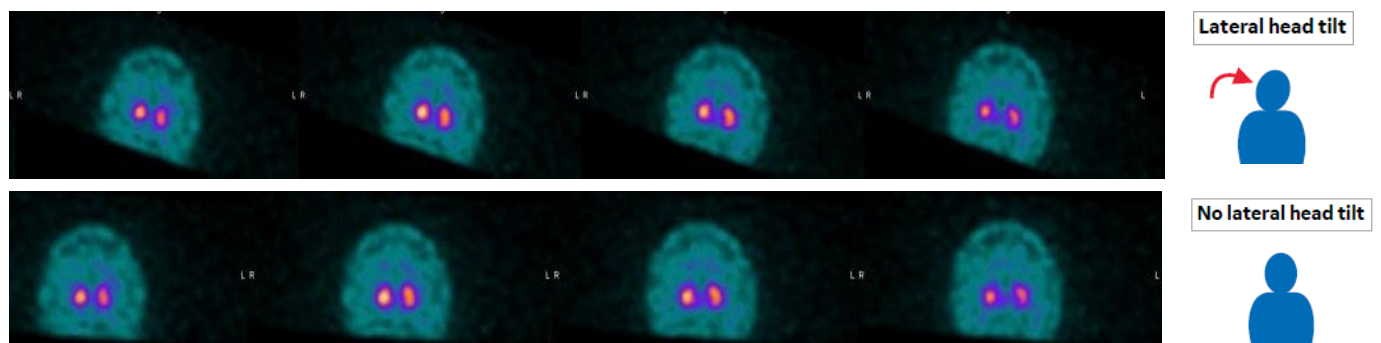


3. Assess and correct for lateral head tilt:

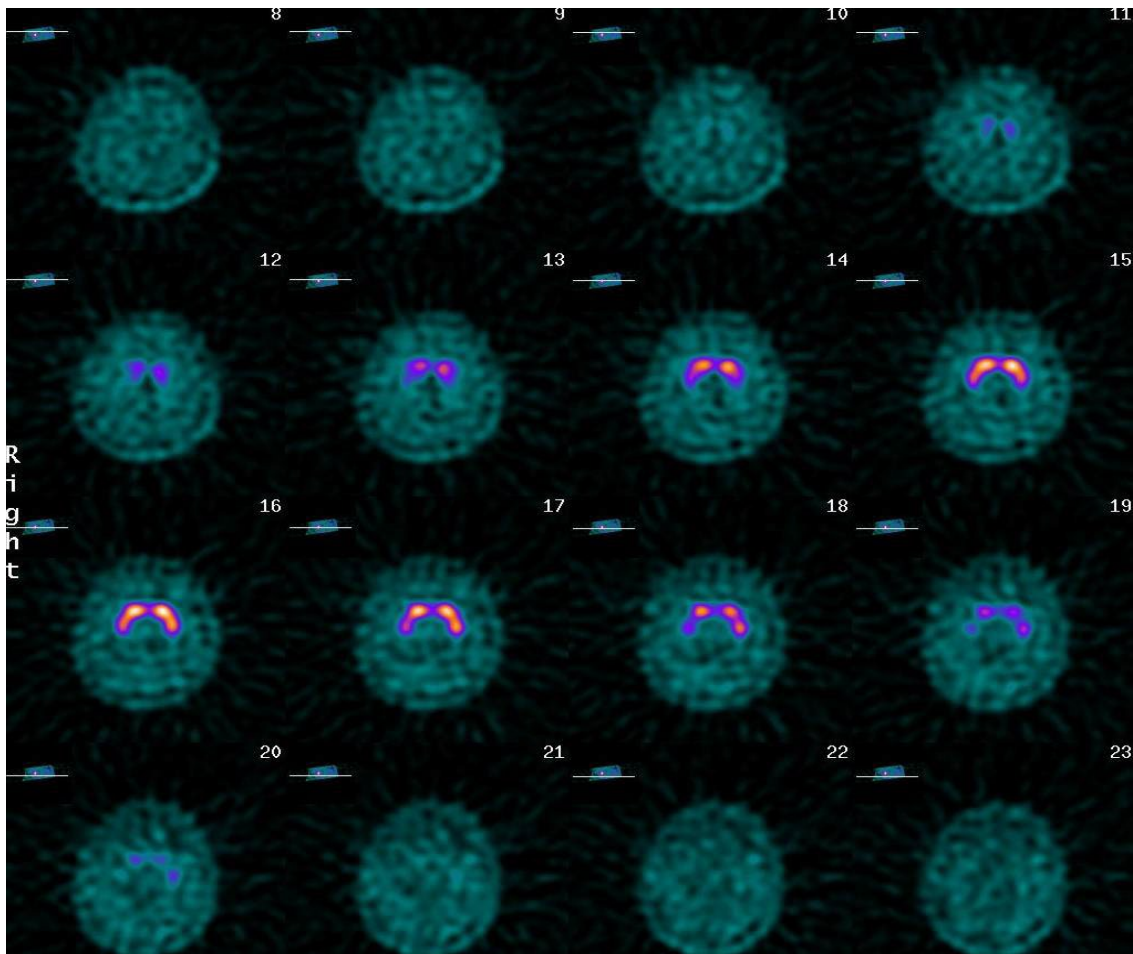
- If the patient's head is tilted during acquisition, this can result in an asymmetrical appearance on the reconstructed transverse slices. This head tilt may be corrected during processing



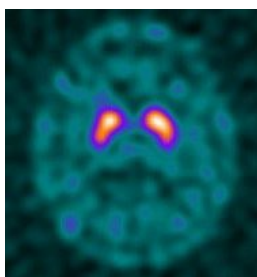
- Coronal slices may be useful to assess and correct head tilt:



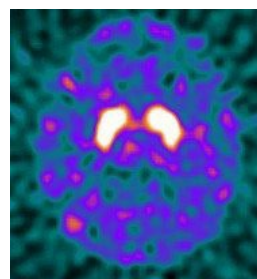
- Display 12 to 16 transverse slices including striatal volume on a single page



- When the images are reconstructed, the maximum pixel value should be located in the striatum. There is no need to adjust the window level or remove background

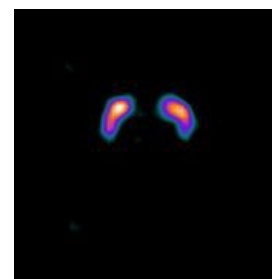


Auto window level



Window level manually adjusted:

0-52%



33-100%



6. Recommended color scales:

- GE cool or black and white/linear
- Cool or black and white color scales demonstrate appropriate sensitivity and specificity for DaTscan images

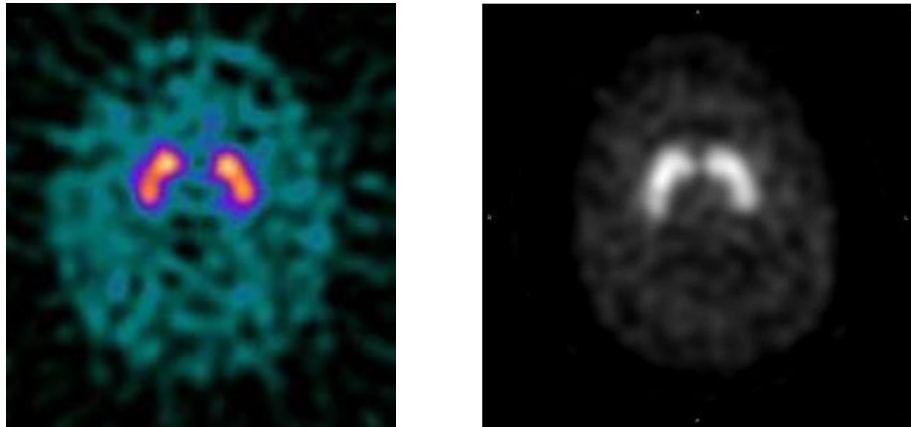
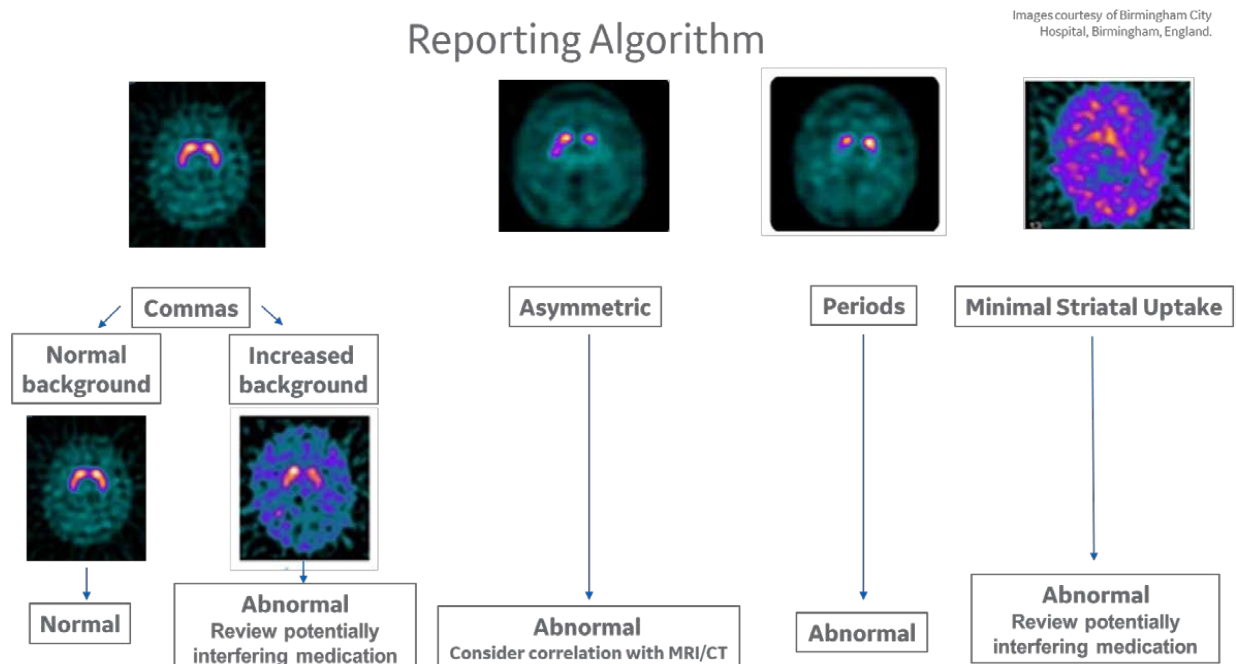


Image interpretation algorithm:

Assess: Morphology and striatal signal intensity

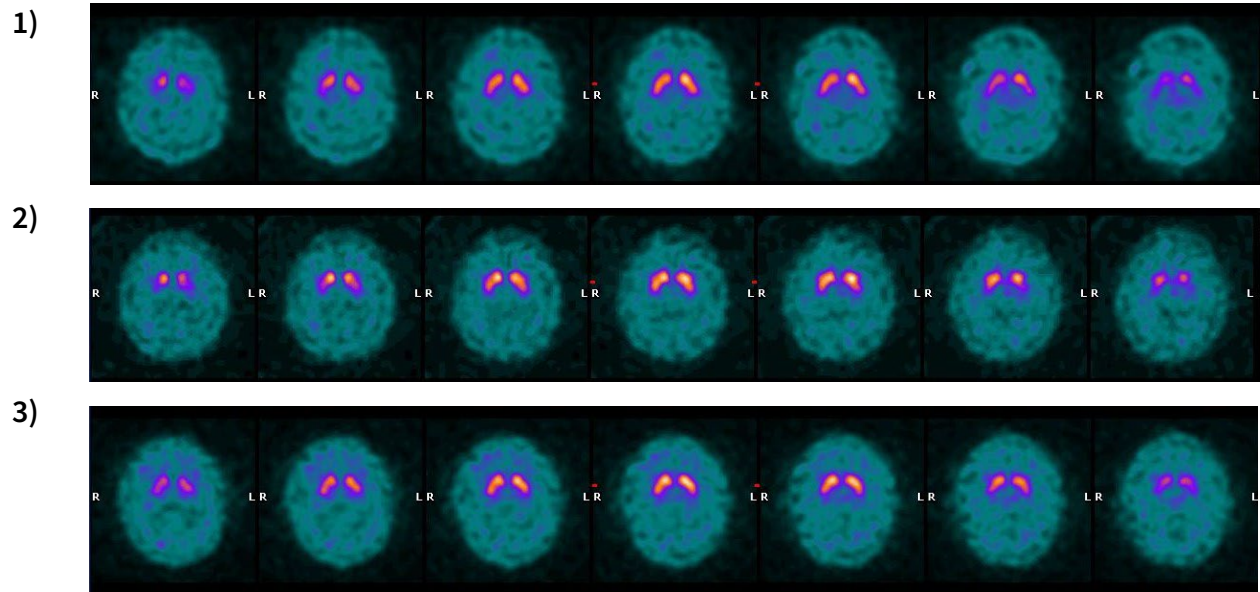
- Morphology – Is the striatal uptake symmetric and comma in shape? Yes or No
- Signal - Is background activity increased (striatal intensity reduced)? Yes or No
- Result: Normal or Abnormal Images



Normal Images

Normal and two symmetric, comma uptake of DaTscan in the striata without imaging evidence of dopaminergic neurodegeneration. Two symmetric comma shaped focal regions of activity. There is no evidence of dopaminergic deficit

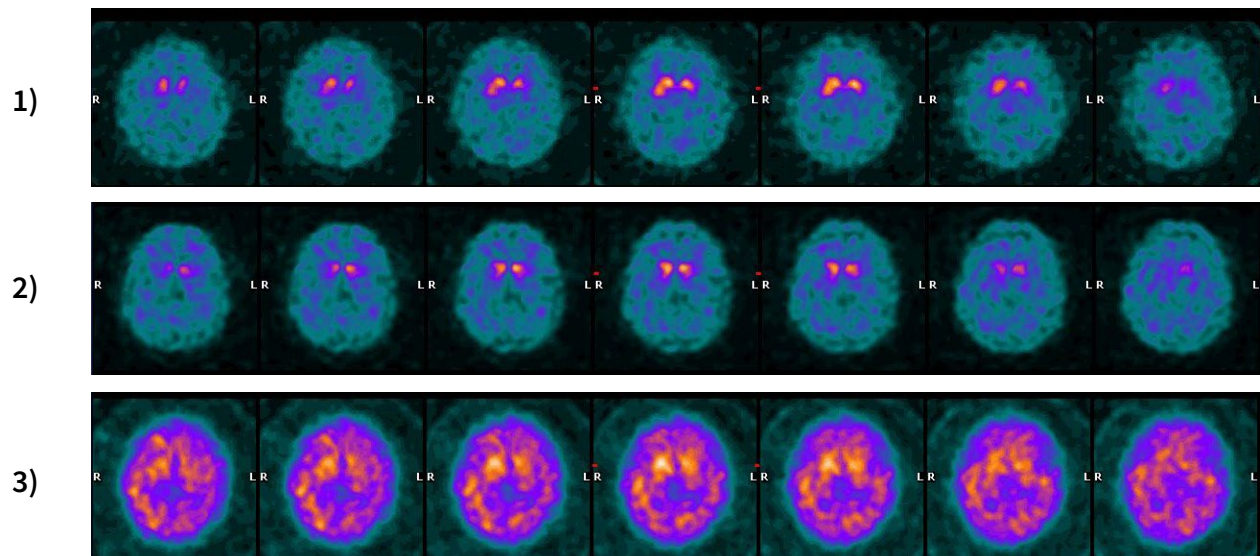
Examples of normal images:



Abnormal images

Abnormal DaTscan with evidence of dopaminergic neurodegeneration.

Examples of normal images:



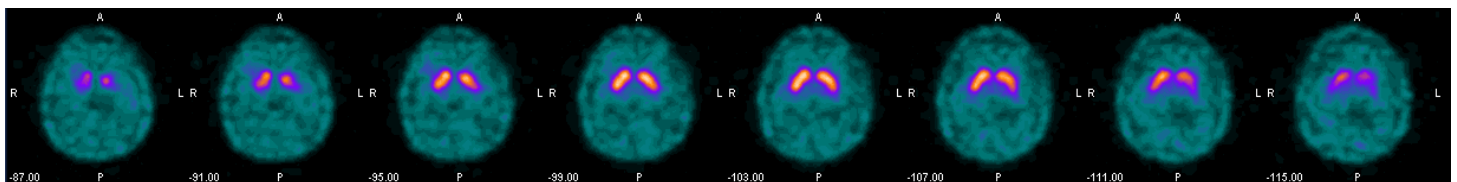
Normal scan report example:

Examination: Dopamine transporter (DaT) SPECT imaging of the brain

Technique: Thyroid blocking agent of 400 mg potassium perchlorate was orally administered one hour before the intravenous administration of 5.0 mCi (185 MBq) of 123-I labeled DaTscan. Three hours later, a 30 minutes SPECT scan of the brain was acquired. Data was reconstructed using iterative reconstruction and displayed in axial planes.

Findings: Bilateral, symmetric tracer uptake is noted in the striata. Nuclei uptake is distinct and above the background activity.

Impression: Normal and symmetric uptake of DaTscan in the striatum without imaging evidence of a presynaptic dopaminergic deficit.



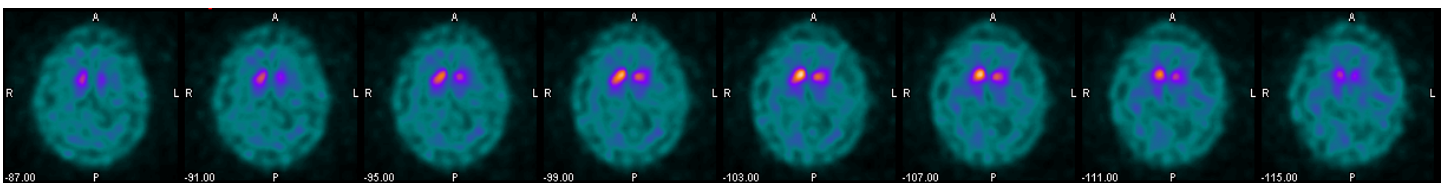
Abnormal scan report example:

Examination: Dopamine transporter (DaT) SPECT imaging of the brain

Technique: Thyroid blocking agent equivalent to 100 mg iodide was orally administered one hour prior to the intravenous administration of 4.8 mCi (178 MBq) of 123-I labeled DaTscan. Four hours later, a 30 minutes SPECT scan of the brain was acquired. Data was reconstructed using iterative reconstruction and displayed in axial planes.

Findings: The images demonstrate reduced radiotracer uptake in the left and right striata, with more extensive involvement in the putamen, relative to caudate. Striatal reductions are more pronounced on the left caudate and putamen compared with the right.

Impression: Abnormal DaTscan with imaging evidence of a presynaptic dopaminergic deficit.



Reading DaTscan in the Dose Calibrator

Please review the steps below to learn how to properly calibrate your dose of DaTscan:

1. Place the vial into the dose calibrator and read the number of mCi/ MBq detected.
2. See the table below to determine time and dose (for example, at 10:00 AM ET, the vial should read no greater than 4.1 mCi/ 151.7 MBq).
3. Manually dial the potentiometer to read the correct number of mCi for the time (in the example above, this would be 4.1 mCi/ 151.7 MBq).
4. Draw everything out of the vial using a syringe (for consistency, use the same brand and size of syringe moving forward).
5. Place the vial back into the calibrator and read the residual mCi /MBq in the vial.
6. Subtract the residual reading from the vial reading. This determines how many mCi/MBq of DaTscan are in the syringe.
7. Place the syringe into the dose calibrator.
8. Adjust the manual dial on the potentiometer to the expected reading (vial reading minus residual reading from Step 6).
9. This is the setting to read all future syringes of DaTscan.

Calibration	mCi	MBq	Pacific	Mountain	Central	Eastern	Atlantic
Tues/Thurs	10.0	370	14:00	15:00	16:00	17:00	18:00
	9.5	351.5	15:00	16:00	17:00	18:00	19:00
	9.0	333	16:00	17:00	18:00	19:00	20:00
	8.5	314.5	17:00	18:00	19:00	20:00	21:00
	8.1	299.7	18:00	19:00	20:00	21:00	22:00
	7.7	284.9	19:00	20:00	21:00	22:00	23:00
	7.3	270.1	20:00	21:00	22:00	23:00	Wed/Fri 00:00
	6.9	255.3	21:00	22:00	23:00	Wed/Fri 00:00	1:00
	6.6	244.2	22:00	23:00	Wed/Fri 00:00	1:00	2:00
	6.2	229.4	23:00	Wed/Fri 00:00	1:00	6.2	229.4
	5.9	218.3	Wed/Fri 00:00	1:00	5.9	218.3	Wed/Fri 00:00
	5.6	207.2	1:00	2:00	3:00	4:00	5:00
	5.3	196.1	2:00	3:00	4:00	5:00	6:00
	5.1	188.7	3:00	4:00	5:00	6:00	7:00
	4.8	177.6	4:00	5:00	6:00	7:00	8:00
	4.5	166.5	5:00	6:00	7:00	8:00	9:00
	4.3	159.1	6:00	7:00	8:00	9:00	10:00
	4.1	151.7	7:00	8:00	9:00	10:00	11:00
	3.9	144.3	8:00	9:00	10:00	11:00	12:00
	3.7	136.9	9:00	10:00	11:00	12:00	13:00
Expiry	3.5	129.5	10:00	11:00	12:00	13:00	14:00

Additional Resources:

1. Kägi G, Bhatia KP, Tolosa E. The role of DAT-SPECT in movement disorders. *J Neurol Neurosurg Psychiatry*, 2010;81(1):5-12.
2. Booij J, Kemp P. Dopamine transporter imaging with [(123)I]FP-CIT SPECT: potential effects of drugs. *Eur J Nucl Med Mol Imaging*, 2008;35(2):424-438.
3. Morbelli S, Esposito G, et al. EANM practice guideline/SNMMI procedure standard for dopaminergic imaging in Parkinsonian syndromes 1.0. *Eur J Nucl Med Mol Imaging*, 2020;47(8):1885-1912.
4. Buchert R, Buhmann C, Apostolova I, et al. Nuclear Imaging in the Diagnosis of Clinically Uncertain Parkinsonian Syndromes. *Dtsch Arztebl Int*, 2019; 116(44):7474-754.
5. Nicastro N, Wegrzyk J, et al. Classification of degenerative parkinsonism subtypes by support-vector-machine analysis and striatal 123 I-FP-CIT indices. *J Neurol*, 2019; 266(7):1771-1781.
6. Nichols K, Chen B, et al. Interpreting 123 I-ioflupane dopamine transporter scans using hybrid scores. *Eur J Hybrid Imaging*, 2018;2(1):10.
7. McKeith I, Boeve B, et al. Diagnosis and management of dementia with Lewy bodies. *Neurology*, 2017; 89:1-13.
8. Marshall V, Grosset D. Role of Dopamine Transporter Imaging in Routine Clinical Practice. *Movement Disorders* 2003;18;1415-1423.
9. Benamer H, Patterson J, et al. Accurate Differentiation of Parkinsonism and Essential Tremor Using Visual Assessment of [123I]-FP-CIT SPECT Imaging: The [123I]-FP-CIT Study Group. *Movement Disorders* 2000;15;503-510.