BIOMARKER SPOTLIGHT

Iodine-123-ioflupane injection (DaTscan™)
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123I-ioflupane (N-ω-fluoropropyl-2β-carbomethoxy-3β-(4-iodophenyl)nortropane, FP-CIT) is an agent for dopamine transporter (DaT) SPECT imaging that was approved by the FDA in January 2011 as a neuroimaging radiopharmaceutical drug. 123I-ioflupane is a cocaine analogue that has high binding affinity and relatively good selectivity for the dopamine transporters. These are particularly abundant in the presynaptic nerve endings in the striatal region of the brain. DaT visualization is useful in the evaluation of adult patients with suspected parkinsonian syndromes. In patients with parkinsonian syndromes associated with presynaptic dopaminergic nerve degeneration (including idiopathic Parkinson disease, multiple-system atrophy, progressive supranuclear palsy and corticobasal degeneration), DaT binding is decreased, whereas in patients with essential tremor, drug induced parkinsonism, psychogenic parkinsonism and most patients with vascular parkinsonism it is normal. Furthermore, 123I-ioflupane SPECT may be used to differentiate dementia with Lewy bodies (associated with a significant decrease in DaT signal) from Alzheimer disease.

The iodine introduced during manufacture is a radioactive isotope, I-123, and makes the ioflupane detectable with a gamma camera. This isotope has a half-life of approximately 13 hours, and a gamma photon energy of 159 keV, making it an appropriate radionuclide for medical imaging. Patients are scanned 3-6 hours after intravenous injection of the 123I-ioflupane (typically 185 MBq or 5 mCi). To reduce exposure of the thyroid to free 123I, a single 400-mg dose of potassium perchlorate or a single dose of potassium iodide oral solution or Lugol solution (equivalent to 100 mg of iodide) can be administered at least 1 h before the tracer injection, unless the patient has a known sensitivity to any of these products. Even in the absence of a blocking agent, the radiation dose to the thyroid would be low. The effective dose resulting from 185 MBq (5 mCi) of 123I-ioflupane is about 4 mSv (0.4 rem). The effect of renal or hepatic impairment on 123I-ioflupane imaging has not been formally established. Because 123I-ioflupane is excreted by the kidney, patients with severe renal impairment may have increased radiation exposure and altered 123I-ioflupane images. Hypersensitivity to 123I-ioflupane and injection site reactions are very rare. In clinical trials, the most common adverse reactions were headache, nausea, vertigo, dry mouth and dizziness (in less than 1% of subjects).

The drug is manufactured and sold by GE Healthcare under the trade name DaTscan and marketed only in the United States and Europe at this time. In the United States, 123I-ioflupane is classified as a schedule II controlled substance, and registration with the Drug Enforcement Agency is required to order the tracer.

References
- Dopamine Transporter SPECT Imaging. Marcel J.R. Janssen. SNM Brain Imaging Council Newsletter, Summer 2010; updated November 2011
- FDA Approves DaTscan for Imaging of Dopamine Transporters. Medscape News Today; January 17, 2011
- SNM Practice Guideline for Dopamine Transporter Imaging with 123I-ioflupane SPECT (in press for publication, January 2012) see http://interactive.snm.org/docs/123I_ioflupane_SPECT_Practice_Guideline_JNM_Edit_FINAL.pdf