The Use of DaTscan for Imaging of Parkinson’s Disease

By Chad Wiltz, CNMT, RT(R)(N)

Parkinson’s disease (PD) is a progressive degenerative disorder of the central nervous system. Early in the course of the disease, the most obvious symptoms are movement-related, including shaking, rigidity, slowness of movement and difficulty with walking and gait. The pathology of the disease is characterized by insufficient formation and activity of dopamine produced in certain neurons of parts of the midbrain.

PD is the second most common neurodegenerative disorder after Alzheimer’s disease. The prevalence is estimated at 0.3 percent of the whole population in industrialized countries, rising to one percent in those over 60 years of age and to four percent of the population over 80 years of age. The mean age of onset is around 60 years, although 5–10 percent of cases, classified as young onset, begin between the ages of 20 and 50. Approximately 60,000 Americans are diagnosed with PD each year, and this number does not reflect the many thousands of cases that go undetected.

Historically, a diagnosis of PD is usually made based on the patient’s medical history and a neurological examination. The physician conducts an interview specifically looking for cardinal motor symptoms while attending to other possible symptoms that would exclude a diagnosis of PD. There are four motor symptoms which are considered cardinal in PD: tremor, rigidity, slowness of movement and postural instability. Common presentations of the disease are usually easily diagnosed. Diagnosis can be difficult when the symptoms are not fully typical of PD since Parkinsonism can occur due to a range of causes, and the difference with PD may be subtle, particularly in the early stages when symptoms may be mild.

Iodine-123 (I-123) Ioflupane (DaTscan) is a novel proprietary radiopharmaceutical marketed by GE Healthcare that became commercially available following U.S. Food and Drug Administration approval in June 2011. Prior to release in the United States, DaTscan had been widely used in Europe with over 100,000 recorded procedures since 2002. DaTscan is indicated for striatal dopamine transporter visualization using single photon emission computed tomography (SPECT) brain imaging to assist in the evaluation of adult patients with suspected Parkinsonian Syndromes (PS). DaTscan may be used to help differentiate Essential Tremor (ET) from tremor due to PS (idiopathic PD, multiple system atro-

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By now, most of us have been introduced to the Image Gently campaign. The goal of Image Gently is to increase awareness of opportunities to reduce radiation dose when imaging children. The consensus guidelines for administered radiopharmaceutical activities, published in the February 2011 issue of The Journal of Nuclear Medicine, have been implemented at major children’s and academic hospitals. These guidelines, based on patient weight, are consistently providing high quality imaging with reduced radiation dose to pediatric patients. But what about children who are imaged at other institutions and clinics? What can you do to ensure the administered activity is low and quality high?

First, look at the child’s medical and imaging history. If there are questions about the appropriateness of the imaging study ordered, your nuclear medicine physician can consult with the referring physician to ensure that you are performing the right exam, at the right time, at a low radiation dose to the patient.

Second, incorporate the new weight-based pediatric dosing consensus guidelines into your protocols. If you don’t have pediatric-specific protocols or if your protocols need updating, you can go the SNM Web site to find the procedure guidelines (http://interactive.snm.org/index.cfm?PageID=772). You will find protocols for many of the most frequently ordered pediatric exams.

Third, really communicate with your patient and/or family. Let them know that their exam is being performed by a professional. As nuclear medicine technologists, we are trained to ensure we are giving the patient the lowest dose possible while still obtaining diagnostic quality images. If they have questions, answer them if you can or arrange for your nuclear medicine physician or medical health physicist to consult with them. Make sure they know where to go for trusted medical information. One of the best resources is www.imagegently.org. Here they will find specific information on nuclear medicine exams, including positron emission tomography.

It is important that protocols be reviewed at least annually and that administered activities in the consensus guidelines are used. The Image Gently campaign has developed a poster—“Go With the Guidelines”—that includes dosing information for pediatric nuclear medicine procedures. The poster will be available in the coming months for technologists to display in their hot laboratories. For more information about the Image Gently campaign, visit www.imagegently.com.

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Ioflupane is a phenyltropane compound which is a family of drugs that are cocaine analogs. Because of its chemical composition, I-123 Ioflupane (DaTscan) is a federally controlled substance (Schedule II). Drug Enforcement Administration (DEA) Schedule II drugs include opiates, stimulants, depressants, and hallucinogens. A DEA license is required for handling or administering this controlled substance. This aspect of DaTscan affects not only who can offer DaTscan; but also how you order the pharmaceutical, and how you order the administered activity.
dispose of the medication as well.

All patients should be scheduled for their DaTscan studies. A physician’s order for DaTscan with a diagnosis of PD or Parkinsonisms is required. DaTscan is currently only available through its manufacturer GE Healthcare. All orders must be placed no less than three business days prior to the study date. As part of the DEA requirements, a DEA Form 222 must be on file to order, receive and handle DaTscan. Thyroid blockade via oral administration of Lugol’s/SSKI/Potassium Iodide is recommended to minimize unnecessary uptake of radioiodine in the thyroid gland. A single dose with the equivalent of 100 mg of iodide is administered no less than one hour prior to the DaTscan injection.

The DaTscans doses arrive in a ready-to-administer single use vial. DaTscan should be assayed in a syringe as there are profound geometric differences in activity when measured in a vial as opposed to a syringe. At the time of this writing, most customers receiving DaTscan will have their doses arrive directly from GE’s production facility in Arlington Heights, IL, as opposed to one of GE’s network of local radiopharmacies.

The dose range for DaTscan in adult patients is 3-5 mCi. DaTscan is administered intravenously via peripheral IV access. The DaTscan injection should never be injected using a “straight stick” method. Following the injection, the dose should be flushed using at least 10 ml of normal saline. There are no restrictions following the administration of DaTscan; however, patients should be encouraged to hydrate liberally following the injection in order to permit frequent voiding thereby reducing radiation exposure to the bladder. The patient is allowed to leave and instructed to return to the department for SPECT imaging three to six hours following the injection.

The used DaTscan syringe should be placed into a radioactive sharps bin. The syringe can be disposed of according to facility policy after it has reached background levels of radioactivity. Unused DaTscan shall be allowed to decay and disposed of in accordance to hospital policy for Schedule II drugs. Current standards require unused Schedule II drugs be rendered unusable. At most facilities this would require pouring the unused DaTscan medication down the sink after it has decayed to background levels. Due to DEA Schedule II regulations you cannot send the syringe/vial back to the manufacturer.

A modern SPECT imaging camera in either a dual or triple head configuration equipped with LEHR or UHR collimators should be used for imaging DaTscan. Proper positioning of the patient includes restraining the head to minimize patient movement. It is critical that the radius from the patient to the detector be as small as possible throughout the study. On average a scan radius of 13 cm is acceptable.

Special consideration should be given to patients with profound tremor and/or patients who are extremely kyphotic. Patients with profound tremor can prove difficult to scan particularly when if the head/jaw are affected. Kyphotic patients with severe curvature of the spine are often unable to lay supine and extend their neck in sufficient fashion for their heads to be positioned using the typical head immobilization devices provided by the camera manufacturers. This may lead to inadequate scan radiiues and poor or nondiagnostic studies; therefore, it may be necessary for the technologist to improvise when scanning/positioning this group of patients.

A SPECT acquisition is conducted with the following parameters:

• Orbit – Noncircular
• Radius of rotation – As small as possible, the range should not exceed 16 cm
• Acquisition type – Step and shoot
• Step parameters – Dual head camera: 64 steps per head, 30 seconds per step (each head will complete 180 degrees of rotation)
• Matrix Size – 128 x 128
• Zoom – Zoom factor set to provide a pixel size of 3.5-4.5 mm
• Photopeak/energy window – Centered on 159 keV with a 20 percent energy window
• Total counts – For a technically adequate DaTscan study at least one million total counts are desired. In practice, most DaTscan procedures acquired using these parameters will yield 2.2-3.5 million total counts.

SPECT reconstruction can be performed using a number of parameters. For facilities without iterative reconstruction algorithms, a Filtered Back Projection (FBP) method can be used to generate slice data:

• Filter – Butterworth
• Filter order and cutoff frequency:
  o Order: 5-10
  o Cutoff frequency: 0.4-0.6 cycles per cm
• Attenuation correction – Linear attenuation (Chang Method) should be used. Typically a 0.11 cm-1 nominal value is used for the attenuation coefficient.

The preferred method of SPECT reconstruction for DaTscan is performed using any of the proprietary commercial 3D iterative reconstruction techniques or 2D iterative reconstruction using OSEM. At our facility, we utilize the Siemens Flash 3D product with eight subsets and 10 iterations over a 360 degree field.

Tight scanning radiuses and no patient motion are critical in the formation of quality DaTscan images. A large scan radius or a study with patient motion artifacts can yield a false positive DaTscan study. It is imperative that the technologist report an abnormally large scan radius or patient motion to the interpreting physician so that this information can be included in the final report.

A positive DaTscan study is indicative of idiopathic Parkinson’s disease, multiple system atrophy, and/or progressive supranuclear palsy. DaTscan cannot distinguish between these disorders. For this reason DaTscan is considered an adjunct to other diagnostic evaluations.

According to Robert A. Hauser, MD, MBA, director of the University of South Florida’s Parkinson’s Disease & Movement Disorders Center, “Accurate diagnosis of patients with suspected Parkinsonian syndromes is critical to predict the disease course and select appropriate therapies. Misdiagnosis can lead to unnecessary disability if effective treatment options are not instituted and inappropriate therapies may unnecessarily expose patients to the risk of potential side effects.”*

Studies have shown that even experts are wrong in the diagnosis of early PD in approximately 10 percent of cases. The availability of DaTscan as an adjunct to the clinical evaluation will greatly enhance diagnostic accuracy for patients with suspected Parkinsonian syndromes. ■

The Formation of the SNMTS Technologist Advocacy Group

By Cindi Luckett-Gilbert, MHA, CNMT, PET, FSNMTS, Advocacy Committee
Sub-Chair, State Technologist Advocacy Group (TAG) Team

Back in the early 2000s, the Advocacy Committee created the grassroots effort of State Health Policy Liaisons, better known as SHPLs. Since that time, the committee has learned what worked well and what needed to be changed. As a result, a new group of advocates are born and they are part of the SNMTS Technologist Advocacy Group, or the TAG team.

The SHPL effort consisted of technologists, physicians, scientists and industry representatives who acted upon calls to action for political issues at both the state and federal levels. When an issue such as a licensure question was identified at the state level, an action alert was sent out via email with bullet points to discuss with state representatives and their staff. National concerns, such as the Department of Energy budget reinstatement for research, the CARE bill, the American Medical Isotope Production Act and others, were handled in the same manner as state issues, just on the federal level. From its inception through 2009, the SHPL program worked rather well. Then, it became evident that technologists have different needs and different priorities than physicians, scientists and industry representatives.

On the national level, issues such as coding and reimbursement, stable supplies of Molybdenum-99, regulations for PET drugs and Nuclear Regulatory Commission release regulations required most of the time and attention of the SNM. While these issues directly impact technologists, some of the other more immediate needs of the technologists at the state level were not being addressed as nimbly as thought necessary. Thus, the state Technologist Advocacy Group (the TAG team) was initiated. Global issues will continue to be addressed through email blasts so SNM members can help influence national representatives, but state concerns will be handled by the TAG team.

In addition to politics, the TAG team members will communicate with others in their respective states to learn of the latest Joint Commission survey results, Centers for Medicare and Medicaid Services survey results, mock survey results, radioactive material inspections and more. This will allow the SNMTS to identify trends and issues arising in the states and the data will be housed in the SNMTS database. If a situation presents itself, such as in Nebraska where nuclear medicine technologists are not allowed to administer oxygen, then the SNMTS can assist in the resolution. Another example is when New York City Mayor Michael Bloomberg proposed requiring anyone who used a survey meter to have a special permit. When drafting this law, his staffers did not make an exemption for medical personnel. The SNMTS sent a letter to his office asking for the exemption and the issue was resolved.

The TAG team will also share information coming from the SNMTS with others in their respective states who are not members of the society. We hope that this will foster greater communication with those on the local level and will allow more needs to be addressed.

Each state will have one leader in its TAG team to expeditiously coordinate the sending and receiving of information for his or her team. Many times calls come into SNM with state-specific questions. With state TAG team leaders already identified, answers can be sent out quickly and efficiently. While there is one leader identified, many members are expected to be in each TAG team. The more members participating, the more ears that will be available for listening and hands available for action.

To date, some state TAG team leaders have been identified but not all. If you are interested in becoming a state TAG team leader or member, email hpfa@snm.org or call 703-708-9000 and ask for Jesse Schoolnik, SNM government affairs manager.

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will have retired. Closing our current allied health technology schools may severely impact the supply of NMTs in 2020. Additionally, many new graduates in nuclear medicine technology are equipped with appropriate credentials that may be mandated by 2020, including a Bachelor of Science degree or NMAA, in addition to an NCT, PET or CT certification.

SNM and SNMTS leadership have joined together, creating a task force to peer into the crystal ball of 2020. As part of this initiative, ten working groups were created, one of which focused on technologists’ issues. The technologist working group was charged with discussing and addressing the following:

• What are some of the strengths of the NMT that will position us for the future?
• What are the weaknesses of the NMT that might hasten our demise?
• How can the SNMTS position itself to ensure the survival of the profession?
• What must we do individually as professionals and a professional society to better equip ourselves for 2020?

These are difficult times for us all. The ups and downs of the economy are playing havoc with all of our budgets. However, your continued membership in your professional society is vital to our survival. Your membership dues go beyond securing a copy of the *Journal of Nuclear Medicine Technology*. A collective voice to Congress supporting the CARE bill, responding to decreased reimbursement by the Centers for Medicare and Medicaid Services and seeking a solution for unstable radiopharmaceutical supply are a few major advocacy issues funded through your membership dues. We are stronger together than separately.

Ann Marie and I want to hear from you. You can contact us directly or through your National Council representative. In order to speak on your behalf, we must know what you are thinking. From time to time, surveys will be sent via email to you, asking for your opinion or to gather information. Please respond as quickly as possible. These surveys assist us in directing our future resources. Remember, those who speak up will be heard. Your voice can influence the decision-making process. If you present a problem, try to offer a reasonable solution. If you present a complaint or criticism, help us by offering a possible resolution.

I look forward to meeting you during your chapter, regional or grassroots meetings to share ideas, to debate our current position and to discuss our future.
American College of Radiology Endorses Nuclear Medicine Advanced Associate Program

A resolution accepting the roles and responsibilities that accompany the Nuclear Medicine Advanced Associate (NMAA) program was officially passed by the American College of Radiology (ACR) this past May (http://interactive.snm.org/docs/NMAA_Scope_of_Practice_Approved_May2011.doc). With approval from the ACR, states can now jump-start the process to allow NMAA graduates to practice, paving the way for the future of the NMAA program.

The SNM and SNMTS leadership have been working diligently with ACR on this issue in an effort to get the ACR Council to adopt the roles and responsibilities of the NMAA. This past year, with the guidance of the Paul Ellenbogen, MD, ACR Commission on Human Resources chair (the Commission on Nuclear Medicine falls under the Commission on Human Resources), the ACR leadership and Brad Short, ACR senior director of membership, the resolution was approved by the ACR Board of Directors in January 2011. It was then submitted as a resolution to the ACR House of Delegates in May 2011. The SNMTS would like to thank Martha Pickett, MHSA, Director of Education, at npickett@snm.org. For more information on SNMTS efforts with the NMAA, please contact Nikki Wenzel-Lamb, SNM director of leadership, at nwenzel@snm.org.

Continuing Education Goals for 2011-2012

The Continuing Education Committee is involved with all phases of continuing education activities to ensure the SNMTS education program meets the needs of its members. The committee has developed education goals listed below from SNM’s strategic goals. VOICE Box articles will highlight education activities developed from these goals.

2011-2012 Education Goals

• Increase the number of online and live educational offerings for technologists
• Expand SNM Clinical Trials Network education for technologists
• Ensure that all educational programs have updated content for nuclear medicine/molecular imaging
• In conjunction with the Nuclear Medicine Advanced Associate Council, develop online education and continuing sessions for NMAAs at the SNM Annual Meeting
• Develop programs for MRI imaging education
• Ensure all educational topics meet technologists’ needs at entry-, mid- and advanced-levels

Center for Molecular Imaging Innovation and Translation’s “Breast Cancer Imaging: State of the Art 2011” Symposium Lectures Available Online

Are you a technologist that would like to learn about the synergy between diagnostic radiology, nuclear medicine, and the new molecular imaging modalities as they are applied to the care of breast cancer patients? If you are, SNM’s Center for Molecular Imaging Innovation and Translation has online lectures available from the “Breast Cancer Imaging: State of the Art 2011” symposium held in April. Presentations address:

• Benefits and risks of breast cancer screening and staging techniques such as MRI
• Benefits and risks associated with the various treatment options for breast cancer
• Novel strategies in the response evaluation of breast cancer
• New therapies in the treatment of the disease

The SNMTS has reviewed and approved this activity for 15.75 VOICE (Category A) credits. For more information visit www.snm.org/education and click the online lectures link.
Now that the summer has come to a close it’s back to school time! A new class of future nuclear medicine technologists is starting their coursework and is eager to get as much information as they can about what to expect from their chosen career path. Luckily, the SNMTS is here to help!

Nuclear medicine technologist students are offered a free two-year trial membership to SNMTS to help them further explore the profession. As a student member, soon-to-be technologists have online access to *The Journal of Nuclear Medicine* (JNMT) and study guides for entry-level and specialty examinations for the Nuclear Medicine Technology Certification Board and the American Registry of Radiologic Technologists. They can also participate in the New Professionals Group and receive quarterly eblasts that include important SNMTS updates, as well as the SNM Smartbrief, sent daily, which serves as an instant research tool with articles and news within the field of nuclear medicine and molecular imaging. Finally, students have access to the SNM online job bank and a Career Road Map which outlines the path for students beginning with graduation through getting a job and becoming involved in leadership opportunities. If you know of any nuclear medicine technologist students, encourage them to take advantage of their free trial membership by asking their program director for more information, or by contacting the SNM Membership Department at memberinfo@snm.org or at 703-652-6793.

Starting this fall, the SNMTS will also be offering a new membership rate for students during their first year after graduation (only students participating in the free-trial program are eligible for consideration). Currently, when students graduate from their program, upon joining the SNMTS they must pay the full technologist member dues of $104. The retention rate for free-trial students transitioning to full members is, on average, 38 percent.

The SNMTS Student Membership Task Force believes that by reducing the membership fee for the first year following graduation, more students will continue their membership within the SNMTS. With the current economic pressures, it is harder for students to find work immediately upon graduation and, in most cases it takes six to eight months for them to find a permanent employer. The reduced fee will allow them to keep the benefits they need and will show that the SNMTS is still supportive of them during their transition period.

During the 2011 Annual Meeting, the SNMTS National Council of Representatives and the SNMTS Executive Board voted to create a transition member dues price of $52 for free-trial students who are transitioning to technologist members. During this transition year, the individual would continue to receive the online only version of the JNMT; all other benefits of SNMTS members would be available to them.

We have experienced some tough times in our field in the past years. The SNMTS is not only here to support students and recent graduates, but also our current members. Too often, individuals don’t take full advantage of everything their professional organizations have to offer. Take some time to reacquaint yourself with the SNMTS—our education offerings, grants and scholarships, practice management resources and more. If there is something you don’t see, let us know at feedback@snm.org and we will evaluate adding it to our list of benefits and programs.

### Calendar of Events

**September 30, 2011**

2011 PET Review and Mock Exam; St. Louis, MO
Host: SNM
Contact: SNM Meetings Info, (703) 708-9000, ext. 1229
MeetingInfo@snm.org

**October 15-16, 2011**

Central Chapter – SNM Fall Educational Conference;
Traverse City, MI
Host: Central Chapter – SNM
Contact: Merle Hedland, (630) 323-6880, mhedland@bacon-hedland.com

**October 22, 2011**

Mid-Eastern Chapter 41st Fall Meeting; Annapolis, MD
Host: Mid-Eastern Chapter Technologist Section – SNM
Contact: Eleanor Dicks, (301) 897-2942, eleanor4me@msn.com

**October 27-30, 2011**

36th Annual Western Regional Meeting; Seattle, WA
Host: Pacific Northwest, Northern California, Pacific Southwest and Pacific Southwest Technologist Chapters – SNM
Contact: Sue Hogeboom, (425) 893-8410, wrrsnm@cs.com

**October 28-30, 2011**

Northeast Regional Meeting – SNM; Newport, RI
Host: Greater NY and New England Chapters – SNM
Contact: Mitchell Stromer, (718) 405-8468, mitch360@aol.com

**December 3, 2011**

Mickey Williams Memorial Meeting; Duarte, CA
Host: Pacific Southwest Technologist Chapter
Contact: Susan Gavel, (818) 676-4107, ksthomas0412@msn.com
SNMTS Abstract Award Winners 2011

The following individuals were recognized for outstanding research during the SNM’s 58th Annual Meeting in San Antonio, TX:

Tech Oral Presentation Awards

1st Place
Danny Basso: #2036 – “A comparison of the repeat rate in myocardial perfusion imaging between Tc-99m sestamibi and Tc-99m tetrofosmin.”

2nd Place

3rd Place
Jozef Nycz: #2326 – “SPECT/CT: Increase your diagnostic potential.”

Tech Oral Cardiovascular Presentation Awards
(funding from Cardiovascular Council)

1st Place
Danny Basso: #2036 – “A comparison of the repeat rate in myocardial perfusion imaging between Tc-99m sestamibi and Tc-99m tetrofosmin.”

2nd Place
Ted Pozniakoff: #2305 – “Count statistics of myocardial perfusion imaging using solid-state cadmium-zinc-telluride technology.”

3rd Place
Ill Sang Moon: #2308 – “Quantitative evaluation of ejection fraction with gated FDG-PET, gated cardiac SPECT, and echocardiography.”

Tech Oral Nuclear Oncology Presentation Award
(funding from Nuclear Oncology Council)

1st Place
Karlie Gottwald: #2302 – “Molecular breast imaging: Can it adequately image breast tissue relative to mammography?”

Tech Poster Presentation Awards

1st Place
Naoyo Ikeno: #2351 – “Simultaneous dual-isotope 123I-BMIPP and 201TlCl myocardial imaging using cardiofocal collimator.”

2nd Place
Hijime Ichikawa: #2359 – “A novel phantom for evaluating contrast resolution in SPECT.”

3rd Place
Stephanie Krause: #2373 – “Workflow to track I-125 seed from receipt to storage.”

Student Oral Technologist Presentation Awards

1st Place
Jeremy Musch: #2420 – “Calibrator assay of I-123 using a commercially available copper filter.”

2nd Place
Stacy Kadrich: #2405 – “Parathyroid SPECT imaging: Is it advantageous to patients?”

3rd Place
Katherine Martin: #2413 – “Stability evaluation of [18F]FDG at high radioactive concentrations.”

Student Nuclear Oncology Presentation Award
(funding comes from Nuclear Oncology Council)

1st Place
Joseph Novotny: #2401 – “Prerequisites for treatment of hepatic malignancy with Yttrium-90 microspheres.”

Student Poster Technologist Presentation Awards

1st Place
Kelsey Richmond: #2455 – “Optimizing a F-18 NaF and FDG cocktail as a preclinical cancer screening tool for molecular imaging.”

2nd Place
Brieanne Wienhoff: #2456 – “Development of site-directed radiopharmaceuticals for treatment of prostate cancer.”

3rd Place
Wegahta Ghebretensay: #2458 – “Subtraction Ictal SPECT Co-registered to MRI (SISCOM).”

Student Category Awards

Cardiology
Katie Frank: #2433 – “Regadenoson versus adenosine: A patient’s perspective.”

PET
Lauren Ernest: #2427 – “Whole body PET scans for head and neck cancers.”

General Nuclear Medicine
Stacy Kadrich: #2405 – “Parathyroid SPECT imaging: Is it advantageous to patients?”

Radiation Safety and Patient Care
Amina Turnadzic: #2423 – “Same day appointments after FDG PET/CT: A potential radiation exposure to medical personnel and general public.”

Radiopharmacy
Jeremy Musch: #2420 – “Calibrator assay of I-123 using a commercially available copper filter.”
Learn about pharmacologic stress testing in patients with bronchoconstrictive disease in the latest *Tech Tips*.

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