Several important topics were covered at the ACNM Annual Meeting in Orlando, Florida, January 26-29, 2012. Highlighted sessions included key issues in the diagnosis of Alzheimer’s Disease, PET oncology, musculoskeletal disease, guidance on integrating PET imaging into therapeutic clinical trials, and translating molecular imaging into clinical practice. I will review three topics for those who were not able to attend: a summation of the annual ACNM banquet dinner, an update on the NRC thyroid cancer therapy regulations, and a clinical review of investigational 68Galium-DOTATE imaging.

The annual ACNM banquet included the awarding of several honors. Awards for resident abstracts and mentor of the year were given and are detailed elsewhere in this issue of the Scintillator. The president’s award was bestowed upon Dr. Lorraine Fig for her support of Dr. Ghesani during his presidency, and the distinguished service award went to Dr. Harolds for his dedication to the ACNM and his desire to better the nuclear medicine and radiology community. Fellow inducted included Dr. Bhargava, Dr. Klitzke, and incoming ACNM President Dr. Janowitz. Of note, the new board of directors also includes Dr. Jadvar as president-elect, Dr. Bartel as secretary, Dr. Ghesani as the immediate past president, and Dr. Subramaniam as treasurer. The food and drink were outstanding, and I recommend you put next year’s annual banquet on your calendar.

Dr. Ghesani presented an update on Nuclear Regulatory Commission (NRC) regulations regarding thyroid cancer treatment. In 1997, the NRC changed regulations to allow more thyroid cancer patients to be treated as outpatients. However, there are people opposed to this strategy, such as U.S. Representative Edward Markey (D–Massachusetts), who feels that this puts the general public at risk for radiation exposure. In a letter to the NRC dated October 20, 2010, Rep. Markey discusses his many objections to outpatient thyroid therapy (http://pbadupws.nrc.gov/docs/ML1030/ML103000287.pdf). However, many of these concerns are addressed by prohibiting staying in hotels and using public transportation after treatment with I-131. The ACNM and SNM feel strongly that for most cases, continuing to treat thyroid cancer patients on an outpatient basis is best for the patient and safe for the general public. Members of these groups continue to argue that point to Congress and the NRC. This continues to be an active, ongoing debate, so keep your eyes open for updates and consider notifying your congressperson that you want to keep thyroid therapies outpatient.

I have chosen to include a synopsis of the research by Dr. Ronald Walker (Vanderbilt University Hospital and Nashville VA) because it demonstrates the future of molecular imaging and the potential for growth within our field. Dr. Walker has been imaging patients with neuroendocrine tumors (NETs) with 68Ga-DOTATE. Although he has imaged only seven patients thus far, four of them have had a change in treatment based on their findings. Images from one of his patients are shown here. The patient had a neuroendocrine tumor with known liver lesions by 111In-Octreoscan. There was also a questionable lesion in L3 (metastasis versus bone island). 68Ga-DOTATATE scan demonstrates 6 bone metastases (skull base, two in the spine, a left rib, and two in the pelvis), more metastases in the liver than previously appreciated, nodes in the base of the right neck, and a metastasis in a muscle of the right shoulder. The 68Ga-DOTATATE scan resulted in a major change in treatment, with the patient changed from a possible candidate for surgical extirpation (which would have been futile) to a candidate for 177Lu-DOTATATE peptide receptor radionuclide therapy (PRRT). In the future, Dr. Walker would like to seek approval for 68Ga-DOTATATE PET/CT scanning and 177Lu-DOTATATE treatment in the United States; both are currently available in several medical centers in Europe. This work exemplifies the growing role nuclear medicine can play in day-to-day clinical practice.

Karen Ayres, MD
NMRO President
The ACGME is moving toward the next accreditation system. To keep you up to date, this system, which is still being formulated, has to do with “milestones.” If you think back to your pediatric rotations, you remember that the baby at so many months is supposed to roll over, walk, etc. You can think of the ACGME milestones in this manner as well. This system is used to map the resident development of the resident at different stages. The initial meeting to begin nuclear medicine milestone development was in February 2012.

After the framework is developed and ready for review, it will undergo a public comment period; during this time, it is very important to voice your opinions on any elements you think should be changed. The expected effective date for implementation of the milestones system will begin July 2014.

I would like to introduce the next resident to the ACGME Nuclear Medicine Residency Review Committee, Gauri Khorjekar of Washington Hospital Center. I’m confident she will do her best to represent the NM resident viewpoint at the upcoming meetings for the next two years.

FDG PET/CT in a Case of Uterine Artery Embolization

A 52-year-old female with T-cell acute lymphoblastic leukemia/lymphoma presented for FDG-PET/CT to evaluate a mediastinal mass. Although the mediastinal mass was FDG-negative, PET/CT images demonstrated an interesting pattern of FDG uptake in an enlarged uterus: a rim-shaped uptake with central photopenia (images A and B). Incidental note was made of diffusely increased FDG uptake consistent with treatment response.

Review of patient’s history showed that the patient developed extensive vaginal bleeding from thrombocytopenia and uterine fibroid after chemotherapy. Bilateral uterine artery embolization was conducted 16 days before the PET/CT study. For comparison, a pre-embolization PET/CT image is shown in panel C that demonstrates enlarged uterus with heterogeneous FDG uptake. This case demonstrates a specific pattern of FDG uptake in uterus after uterine artery embolization. Recognition of this image pattern will help the nuclear medicine physician interpret PET/CT studies.

Yuxin Li, MD, PhD. VA Greater Los Angeles Healthcare System. Case obtained from the UCLA Ahmanson Biological Imaging Center.
2012 ACNM Abstract Awards

Every year at the ACNM Annual Meeting/SNM Mid-Winter Meeting, residents and fellows who are interested in research present their original research findings to compete for the ACNM Abstract awards. Despite the challenge we are facing these days, more than 40 abstracts were submitted, the highest number in the history of the ACNM meeting. This is really exciting and encouraging, as research continues to play a crucial role in the future development of nuclear medicine. Out of all the submissions, 12 were accepted as oral presentations and 22 were accepted as poster presentations. Five residents/fellows were awarded for their outstanding research and excellent presentations. At the award banquet dinner, which was held on Thursday, January 26 during the meeting, the abstract awards were announced, along with the ACNM best mentor award, the present’s award, and the 2012 ACNM fellowship.

The ACNM abstract award is a wonderful opportunity for the residents who plan to conduct research during their residency training and as part of their future careers. In addition, for the first time, the awardees will receive an expedited review if they submit the full manuscript to the Clinical Nuclear Medicine Journal, the ACNM’s official publication. We thank the ACNM for providing us this precious opportunity to present, to learn, and to compete. This is a great chance for residents to demonstrate their competency as clinical investigators or faculties. Such ability is obviously important to find an academic job. All residents should take this opportunity to prove themselves.

The following presentations received 2012 ACNM abstract awards.

**Travel Grant Award (poster)** to Hongju Son, MD, University of Rochester Medical Center, for “INTRATHORACIC TUMOROUS OR INFECTIOUS/INFLAMMATORY PROCESSES SEEN ON F18 FDG PET/CT WITH PATHOLOGICAL CORRELATION.”

**Best Essay Award (poster)** to Chiayi Ni, MD, VA Greater Los Angeles Healthcare System, for “EFFECT OF PREVENTATIVE INTERVENTION ON FRAX INDEX IN PATIENTS ON ANDROGEN-DEPRIVATION THERAPY.”

**Travel Grant Award (oral)** to Guido A. Davidzon, MD, Stanford University Medical Center, for “COMPARISON OF FIVE DIFFERENT IMAGING RESPONSE CRITERIA IN PATIENTS WITH DIFFUSE LARGE B-CELL LYMPHOMA USING PET/CT.”

**Best Essay Award (oral)** to Yuxin Li, MD, PhD, VA Greater Los Angeles Healthcare System, for “PROGNOSTIC VALUE OF METABOLIC TUMOR VOLUME VERSUS SUV IN SMALL CELL LUNG CANCER.”

**Best Essay Award (oral)** to Ankit Agarwal, MD, Boston University Medical Center, for “IMPACT OF CONTRAST ENHANCED INTEGRATED FDG PET/CT ON UTILIZATION OF CT AND MRI IN THE MANAGEMENT OF PATIENTS WITH HEAD AND NECK AND LUNG CANCERS.”
SNM Awards & Grants

2012 can be the year you win one of the many awards and grants still available through the Society of Nuclear Medicine (SNM) and the Education and Research Foundation (ERF) for SNM. The improvements on the SNM website and in the award and grant review process make the process more transparent and applicant-friendly.

The SNM and the ERF have awards and grants available at all levels for 2012 through 2013:

<table>
<thead>
<tr>
<th>Program</th>
<th>Opening Date</th>
<th>Application Deadline</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012 Comparative Effectiveness Research Program</td>
<td>Now Open</td>
<td>April 20, 2012</td>
<td>$50,000</td>
</tr>
<tr>
<td>2012 Mitzi &amp; William Blahd, MD Pilot Research Grant</td>
<td>July 2, 2012</td>
<td>Nov 5, 2012</td>
<td>$25,000</td>
</tr>
<tr>
<td>2012 SNM Student Fellowship</td>
<td>July 2, 2012</td>
<td>Nov 5, 2012</td>
<td>$3,000</td>
</tr>
<tr>
<td>2013/2015 SNM Wagner Torizuka Fellowship</td>
<td>TBA</td>
<td>TBA</td>
<td>$24,000 annually</td>
</tr>
<tr>
<td>2013 Robert E. Henkin Government Relations Fellowship</td>
<td>TBA</td>
<td>TBA</td>
<td>$1,000 + expenses for the week</td>
</tr>
<tr>
<td>2013 Postdoctoral Molecular Imaging Scholar Program</td>
<td>TBA</td>
<td>TBA</td>
<td>$60,000 over 2 years</td>
</tr>
<tr>
<td>2013 Molecular Imaging Research Grant for Junior Medical Faculty</td>
<td>TBA</td>
<td>TBA</td>
<td>$100,000</td>
</tr>
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These grants/awards are designed to help jump-start your career in research while simultaneously promoting the field of nuclear medicine. There is a new $50,000 grant this year, promoting bench-to-bedside research, to bring more radiotracers into clinical practice. Many of these grants are as prestigious as NIH grants; however, since they are focused on nuclear medicine or molecular imaging, there are far fewer applicants, so there is a much better chance of getting the award or grant. This should help those looking for jobs distinguish themselves from the pack; for those starting out in academic practice, this will help with the process of getting tenure.

There are several new changes in the application process. First, the website has been recently updated so all the award/grant information, including opening and closing dates, is easily accessible, and you can click on the title of the grant to get full application information. Second, the turnaround times have been reduced significantly; even the largest awards will have a turnaround time of less than 120 days. Third, we have made the review process more transparent, with timely notifications, a ranking for the smaller grants/awards and feedback for the larger grants. These changes will greatly improve the application process.

2012 Mentor of the Year presented to Douglas Van Nostrand, MD

“I would like to thank ACNM for having a mentorship award for those who deserve it for the recognition of outstanding work in the field of nuclear medicine. Dr. Douglas Van Nostrand, even though he does not need an introduction for his dedicated work for the society of Nuclear Medicine as well as for the nuclear medicine residency program at the Washington Hospital Center, Washington D.C., I would like to put few good words why he deserves to be awarded as a Best Mentor of the Year.

I have been working with Dr. Van Nostrand since mid 2009. Dr Van Nostrand appointed me as a Clinical Research Fellow in the Division of Nuclear Medicine. Under the guidance of Dr. Van Nostrand I learnt a lot about nuclear medicine and its mainstream branches that year. It was because of this research experience Dr. Van Nostrand decided to appoint me as a PI (Principal Investigator) in many of his research projects. Dr. Van Nostrand demonstrates leadership qualities and has always positively motivated me to write atleast 12 abstracts for poster presentations, conduct oral presentations for the mid winter ACNM meeting-2011. Thus, with the ingenious support of Dr. Van Nostrand, my involvement in various research projects has resulted in the reception of several awards and publication in a number of journals, and now writing a chapter for one of his textbooks. Dr. Van Nostrand is one of the top physicians for treating thyroid cancer in the world. He is very hardworking, responsible, meticulous, and always eager to teach. His teaching has widespread not only to the nuclear medicine residents but also to the residents and fellows from different specialties. Dr. Van Nostrand has always guided me in a right direction and with a perfect instinct. Under the umbrella of Dr. Van Nostrand and with his vast experience and knowledge I strongly believe that I have matured myself with abundance of knowledge and experience in all aspects of nuclear medicine.

Dr. Van Nostrand has been the biggest contributor to the SNM annual meetings for the past several years. He has been involved in many performance improvement projects as he believes in quality practice. He has always highly emphasized on research and ensured that each and every trainee has his or her own project and has the opportunity to collaborate with other departments of medicine. Dr. Van Nostrand has all the qualities that a best mentor and a leader should have and therefore I strongly feel that he should receive an award for ACNM Best Mentor of the Year.”

Gauri R Khorjekar, MD
Nuclear Medicine Resident, Washington Hospital Center
Letter to the Author: The Great Job Hunt

Dear Erin,

I liked your article very much and wanted to contribute some additional strategies that may help our job-seeking colleagues.

1. Job selection: When applying for jobs, one should cast a wide net. Apply for any advertised nuclear medicine position, even if they want a radiologist or cardiologist.

   a. Nuclear medicine: If a job description calls for a radiologist to read PET/CT and/or nuclear and includes reading other modalities/procedures and taking call, apply and offer to do just the PET/CT and nuclear or but not the other modalities or call. What you offer to them in return is that the asking salary is then negotiable at a lower rate. You get paid less, but for doing less. You will be available to deal with their nuclear volume every day without getting burnt out from call or dividing your responsibilities among other things. This is a two-tier system, but in this economy some practices may view this as a sound strategy. For less money, they hire someone who is always there primarily for their PET/CT and nuclear volume, especially if it is mostly outpatient.

   b. Nuclear cardiology: Apply to places seeking a noninvasive cardiologist and offer your services doing nuclear stress tests (and if you have taken any of the vascular ultrasound exams, that is an added bonus for some cardiologists who are doing these). This is a similar tactic to that described above in part A, where you will do less than a full-fledged cardiologist but also be compensated less. It is an interesting approach to a job search, and obtaining RPVI certification is an added bonus (see below). State also that you can supervise the stress exams and read the EKGs if needed.

   c. Teleradiology: Apply to teleradiology groups that specialize in PET/CT or nuclear coverage or larger teleradiology firms with positions specializing in that field.

   d. Research: If you have a PhD or pharmacology (or other science) background, you might be able to do some basic research in an academic setting or in industry. This past year this was discussed at the Young Professionals Committee session at San Antonio, and one piece of advice we were given is that for industrial jobs, a PhD is not required, but some small animal imaging experience is helpful.

   e. Finance: Some jobs exist in the financial world where you can utilize your nuclear medicine (or general medical) background. Opinions on this may vary, but I have been told it is best to have a business background as well.

   f. A useful website for getting into (d) and (e) is the Dropout Club or “D.O.C.” (See http://www.dropoutclub.org/.) This is a site where physicians, scientists and business come together. There are posts about nonclinical (but science/medical related) jobs and networking events in various cities. There are also recruiting firms that specialize in this. Also see http://www.nonclinicaljobs.com/2010/03/dropout-club-linking-physicians.html, as well as the “Society of Physicians with Non-Clinical Careers” at http://www.nonclinicaljobs.com/.

   g. Consider several part-time jobs doing nuclear medicine in more than one place, moonlighting (or, if you are medicine-trained, working part-time as an internist or hospitalist).

   h. Depending on what else you are interested in doing, become familiar with radionuclide treatments—I-131, Sr-89, Zevalin, Bexxar, SirSpheres, Theraspheres, etc. Some places may do little of this, and others already do a lot. In the case of the former, they may want to build up in this area—and you can help them. In the case of the latter, it will help them if you already know how to do these procedures.

2. To make yourself more attractive, consider applying for additional professional certifications:

   a. Certified Clinical Densitometrist (CCD(tm)) exam from the International Society for Clinical Densitometry (ISCD) (http://www.iscd.org)—This will certify you to read DXA exams. Any physician can take the exam, and it is cheaper for residents and fellows.

   b. RPVI exam (http://www.ardms.org/credentials_examinations/physicians_vascular_interpretation_pvi_examination)—This allows you to interpret vascular ultrasound examinations. Any physician can take the exam, and it is cheaper for residents and fellows.

   c. CBNC exam (http://www.cccvi.org/cbnc/)—This is the certification test for nuclear cardiology that cardiologists take. Nuclear medicine physicians are eligible to take it with proper documentation; it is helpful as it shows cardiologists that you have taken the same exam that they do. It
emphasizes more patient management than the nuclear medicine boards do, so they also appreciate that as well. It is offered in December. If you are already internal medicine–boarded and are training in nuclear medicine, you can take this test during your residency (but will receive the final certificate after you are board certified in nuclear medicine). If you are nuclear medicine trained only, you need to wait until you are board eligible. You already know most of this material, but you get a chance to get further qualified for it with little extra effort (and sitting for another exam).

d. Coronary CT (http://scct.org/)—Nuclear medicine physicians are eligible to read these after taking an exam. Submitting a case log (including live cases) is required to take the test. The best way is to either take a course (expensive) or do dedicated high-volume rotations or even a fellowship in advanced cardiac imaging. This is generally less valuable outside academic settings, but it is still something you are eligible for. (See http://www.cccvi.org/cbcct/content_187.cfm?navlD=62.)

3. Once you have started on the above paths, get your resumes and cover letters adjusted and tailored for a variety of positions and send, send, send!

a. Contact anyone you or your program knows personally or through networking.

b. Submit to any recruiter you can find for radiology, nuclear medicine or cardiology. Make sure any recruiter knows the kind of things you are looking for. Email or call them back quickly, as they will be more likely to help you then—they are busy and are trying to find places for many people at once.

c. Try job sites from professional organizations (i.e., the SNM, RSNA, JAMA, ACC) and commercial search engines (monster.com, jooble.com, indeed.com, doccafe.com); even these have some things.

d. “Cold call” places in geographic locations where you want to work. Investigate those hospitals or practices’ websites and find their nuclear person. Call or email them. You can get some people’s email addresses by in the SNM member directory; just be sure to mention that in the email or in the phone call.

e. Try the “careers” pages for large healthcare/hospital networks or health-related companies (pharma, biotech, health/medicine-related financial companies, etc).

4. Fellowships also offer possibilities. Consider applying for imaging fellowships including PET/CT (if you need volume), advanced cardiac imaging (often meant for radiologists or cardiologists, but some places will take a nuclear medicine person; these often focus on cardiac CT and MRI but may include PET/CT, MPI, echo and peripheral vascular imaging) and research fellowships.

5. Another residency: Most obvious is radiology if possible; if not, then radiation oncology, as it has some crossover with nuclear medicine. Psychiatry or neurology is an additional possibility (mainly if you have an interest in neuroimaging). Internal medicine is probably easy enough to find, but you will be less likely to use your nuclear experience (unless you incorporate it into your medicine practice by getting an in-office camera and doing a small to moderate volume of bread-and-butter nucs and/or stress testing, or really persist and also do an oncology, cardiology or endocrinology fellowship).

In terms of choosing between doing another residency and doing a fellowship—it really depends on what will make you more hirable when your training is done. If a fellowship will make you a great candidate or will set you up for specific jobs (probably academic), then that may be the way to go. Otherwise, the second residency might be better just to give you something else to work with (with or without your nuclear training). You do need to take into account how many years of postgraduate training funding you have left from the government to fund your residency training; if you switch residencies or do more than one, you may find yourself having doors closed to you simply because you have been in training for too long. This is not as much of an issue with many fellowships, as many are not ACGME-accredited (as opposed to residencies, where this often is a problem).

In some cases, you can do a fellowship and then use that to get into a second residency; these fellowships are often non-accredited but will open doors for you. You do need to remember these specialties (i.e., radiology and radiation oncology) are competitive, and you still need to have good scores and numbers to get past the basic selection for an interview; people will not simply hand you a second residency in a competitive field. This is where your prior experience, connections and research (and additional fellowship training if you pursue it) will help.

Casting a wide geographic net will also help you in general; if you are willing to go anywhere for a job, residency or fellowship, then you will have an easier time with many more options.

Above all, remain optimistic and do your best to explore all options. Hopefully some of the things in this letter and Dr. Grady’s article will be of use to you in your search.

Good luck to all!
Investigational Radiopharmaceuticals

Match the radiopharmaceutical with the disease process that it images, or with the therapy that it provides.

____ 1. 18F-Fluorothymidine  
____ 2. 188Re-HEDP  
____ 3. 18F-Florbetaben/Florbetapir  
____ 4. 99mTc-Annexin  
____ 5. 68Ga-DOTATATE  
____ 6. 18F-Fluciclatide  
____ 7. 18F-Choline/Acetate  
____ 8. 177Lu-DOTATATE  
____ 9. 18F-Flurpiridaz  
____ 10. 18F-MISO, 62Cu-ATSM

A. Proliferation  
B. Apoptosis  
C. Neuroendocrine Tumor Imaging  
D. Neuroendocrine Tumor Therapy  
E. Hypoxia Imaging  
F. Therapy for Prostate Bone Pain  
G. Coronary Artery Disease  
H. Alzheimers Disease  
I. Angiogenesis  
J. Prostate Cancer Imaging

Physics Corner

1. A sample of technetium has an activity of 15 mCi when prepared. What will be the activity in 4 hours when it is administered to the patient?

2. Technetium has a biological half-life of one day. Twelve hours after the above patient is administered the dose, how much activity will remain?

Answers:  
1. \[ A = A_0 \times e^{-\lambda t} \]  
   \[ A = \text{activity}, \ A_0 = \text{activity at time zero}, \ \lambda = 0.693/t_{1/2} \]

   \[ A = 15 \text{mCi} \times e^{-0.693/6\text{h}} \times 4\text{h} \]
   \[ A = 9.5 \text{mCi} \]

2. Effective half life:
   \[ T_{\text{Effective}} = \frac{1}{T_{\text{Physiological}}} + \frac{1}{T_{\text{Biological}}} \]
   \[ T_{\text{Effective}} = \frac{1}{1/24\text{h}} + \frac{1}{1/6\text{h}} \]
   \[ T_{\text{Effective}} = 4.8\text{h} \]
   \[ A = 9.5 \text{mCi} \times e^{-0.693/4.8\text{h}} \times 12\text{h} \]
   \[ A = 1.7\text{mCi} \]