MULTIPLE PERSPECTIVES ON THE FUTURE OF NUCLEAR MEDICINE TRAINING

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INTRODUCTION

One of the most difficult aspects of this article was to reflect on my own career choices, the current state of my profession, and what perspective might add to the myriad prior review articles and committee statements regarding the field of nuclear medicine. I considered the Confucius quotes, “The beginning of wisdom is to call things by their proper name” and “Choose a job you love, and you will never have to work a day in your life,” and decided that this article should include the perspectives of several other individuals, as my enthusiasm for what I do currently should not cloud my choice of a “name” for its future direction. I have asked my Chief Resident (trainee), a lifetime diplomat and leader in the field, and finally, a neutral health care management consultant to join me in this task. To complete this feat, we three nuclear medicine physicians have each submitted our perspectives to the consultant to form a coherent summary, and have finally circled back to propose a brief set of action items agreed on by all authors.

J. R. OSBORNE

Personal introduction

I consider myself one of the first trainees in Steven Larson’s “Janus Project,” the concept of combining related training perspectives (such as radiology) and scientific rigor into nuclear medicine (NM). (1) To that end, I am dual-boarded by the American Board of Nuclear Medicine (ABNM) and the American Board of Radiology (ABR). I also completed a PhD in Biochemistry at Columbia University prior to my post-doctoral training in Molecular Imaging at Memorial Sloan Kettering Cancer Center (MSK) 13 years ago. Although the training period was long, I can see no better path to being the Program Director at MSK and a clinician scientist. I am, however, conflicted about a concept that led to this article: If this is my path, why has it worked for me while others are reluctant to go down the same road? If leadership is needed, how exactly do I
lead others down a road that will result in career satisfaction? As Martin Luther King, Jr. said, “A genuine leader is not a searcher for consensus but a molder of consensus.” It follows then that one should mold rather than search. And to paraphrase Winston Churchill, “The optimist sees the opportunity in every difficulty.” So I am indeed in the right place.

**Perspective**

Motivation to enter training is both altruistic and financial. Trainees want to do what they enjoy, but must also know what may be at the end of the rainbow. The lack of jobs and role models has been and will continue to be a problem at the beginning of the pipeline. One can attract and influence the altruism of the aspiring medical student, but students need to know what will be available to them in 10 years. I would suggest that if the influence peddlers in our profession are less than 10 years from retirement, their audience may be limited unless mid-career physicians who have intermediate timeline goals are in the conversation. A joint message affirmed by both categories of stakeholder is likely to be the optimal answer.

My sense is that our most recent focus on computerized tomography (CT) as the technology that separates the nuclear medicine resident from the radiology resident is misguided. The gap is considerably greater and the maturation of MRI, ultrasound, fusion technologies, and big data make this disconnect even more profound. We must shift the conversation from one of obvious deficits to one of obvious strengths (2), which must be actionable and reimbursable. The most clear and pressing need is investigational agents and therapy.

At the time of writing this article, a joint ABR-ABNM task force statement (June 3rd, 2015) has been released for comment and, if accepted, would create a singular pathway for the joint trainee. Admittedly, I had thought that such a statement was not forthcoming and that continued dual Board mission would remain for at least another few years. Although key details are
missing from this proposal (which may be more apparent by the time this article is in press), it would seem that the initial seeds have been planted by both Boards.

If the path is then to be decided by the ABR and the Nuclear Medicine/Diagnostic Radiology (NM/DR) trainee, perhaps there will be more uniformity in training. On the other hand, it will diminish the past workforce diversity with stakeholders entering from internal medicine and other paths. I would suggest creating a Biodesign-type impetus where the trainees participate in the process of achieving FDA and CMS approval of the most impactful imaging and therapy agents—this will change the field. This requires an unprecedented effort of strategic planning, data sharing, and grassroots practical action. It would enhance the value of the appropriately credentialed stakeholder. Our current advantage is that we are relatively small. The construction of this type of effort will require a nucleus of like-minded physicians prepared to take a National Oncologic PET registry (NOPR) approach to the next steps in the field. And unlike prior efforts, it would have to be bottom-up rather than top-down.

V. BEYLERGIL

Personal introduction

I recently completed an Accreditation Council for Graduate Medical Education (ACGME)-accredited nuclear medicine residency preceded by a nuclear oncology fellowship at MSK. Having had prior experience in nuclear medicine, I can safely state that I am a strong believer and advocate of nuclear medicine and molecular imaging. However, I decided to proceed with a diagnostic radiology residency. I had read Dr. Larson’s excellent essay (1) on the “Janus Project” and was well aware of the job market when I started my nuclear medicine residency. It is probably true that the job market for recent NM graduates is dismal. (3) Furthermore, only about one quarter of NM studies performed in the U.S. are read by nuclear physicians; the rest are shared by diagnostic radiologists and cardiologists (4), further decreasing the job availability
for nuclear physicians. However, my decision was not solely based on the job market or downward trending figures; my ultimate motivation was to become a better hybrid imager in the long term. I believe that “building one’s own combined residency” is one of the viable options for recent graduates of NM programs, although not necessarily the most efficient way.

**Perspective**

Although there is a downward trend in the number of existing NM residency programs, the emphasis on hybrid imaging and CT training has increased significantly in existing programs. However, cross training and certification for CT are only palliative measures that do not address future challenges. Although in its infancy, PET/MR might change the current situation, requiring a major overhaul of existing cross-training. Joint programs leading to ABR and ABNM certifications seem to be a logical way to proceed in the long term, similar to the Arkansas experience (5).

Albert Einstein said, "In the middle of difficulty lies opportunity." Indeed, molecular imaging and therapy are exciting opportunities in the midst of existing challenges. Our department’s name was recently changed to “Molecular Imaging and Therapy Service” to emphasize these opportunities and to acknowledge the changing scope of nuclear medicine. I believe there will always be academic jobs for nuclear physicians with academic goals and research interests. The practice of nuclear medicine in Europe is very different and academic nuclear medicine is thriving, thanks to advances including, but not limited to, peptide or PSMA-based theranostics.

However, private practice also has an important role in shaping our practice parameters and may prefer to hire radiologists, as discussed above, simply because it is a more cost-effective decision, when considering emergency and cross-modality coverage. Vendors also have a considerable influence on our practice. If a hybrid system is more cost-effective to manufacture,
marketing efforts and further research will be channeled to that device; if a specific name for a device is better for marketing purposes, they will name the device accordingly.

Many concerns cited by trainees in Larson’s 2011 essay are, unfortunately, still valid today. Both societies should work together to address these issues and indeed, there has been significant effort and sincere attempts (6). In the meantime, I think that recent graduates of NM residencies who do not want to proceed with radiology training should focus on an academic nuclear medicine career and exploit the advantages of molecular imaging and therapy. There will always be a place for well-qualified clinician scientists with adequate training in molecular imaging, theranostics, dosimetry, and pharmacokinetics. Academia and research have always been strong suits of nuclear medicine. To quote Larson, we may have to “give up the Escalade in the driveway” and that is okay—you can always hail one with your smart phone. As trainees, it is also our responsibility to add unique qualifications to our resumes and make it stand out among thousands. Medicine has never been a nine-to-five job; rather, you sign up for life-long learning when you choose medicine.

The good news is that a joint ABR-ABNM task force has started building a platform to resolve this issue. At the time of writing this article, this initiative might be closer to completion. The proposal involves eventual dissolution of ABNM and creation of a new discipline of diagnostic radiology/nuclear medicine under the umbrella of ABR. I think a consensus that will satisfy both parties is achievable. During this transition, appropriate actions should be taken to preserve vital clinical research in molecular imaging and targeted therapy.

Regardless of issues regarding reimbursement or job market, fellow clinicians need us for critical decisions on patient care. A time might come when an omnipotent doctor like Dr. McCoy of the fictional series *Star Trek* would diagnose all ailments known to mankind using their hand-held “tri-corder.” This would obviously result in a significant change in the practice of radiology.
Even then, I would be confident in the ability of imaging professionals to adapt. To quote Albert Einstein again, “The measure of intelligence is the ability to change.”

M. M. GRAHAM

Personal introduction

I entered nuclear medicine after training in electrical engineering and biophysics. The biophysics was done at the Donner lab at UC Berkeley, where Hal Anger was down the hall working on his next device. I received a letter of recommendation for medical school from John Lawrence. While I did not fully appreciate it at the time, I had the ideal background to succeed in nuclear medicine. After medical school at UCSF, I completed residencies in both internal and nuclear medicine at the University of Washington. The director of nuclear medicine and my mentor was Wil Nelp, who also mentored Steve Larson a few years before. My subsequent career included a lot of research, some R01s, and increasing involvement in the Society of Nuclear Medicine. In the 2000s, I was appointed to the ACGME Nuclear Medicine RRC and was elected to ABNM. This put me in a position where I was involved in nuclear medicine education at all levels, from program director to policy maker.

Perspective

It was apparent by the early 1990s that nuclear medicine was beginning to have difficulty attracting the high-quality resident applicants we had seen in the past. In late 1993, amidst increasing discussion about the rapidly rising costs of health care, primary care physicians in some areas of the country tried to reduce costs by ordering fewer imaging exams. At the University of Washington during the month of November 1993, volume dropped by 50%. It returned to normal the next month, but a powerful message had been sent and many physicians
in nuclear medicine, radiology, and other specialties thought this marked the end of nuclear medicine. At the annual meeting the following June, a single advertisement appeared on the job opportunities board – at King Faisal Hospital (Saudi Arabia).

During the same year, in 1993, ABNM dropped the requirement for two clinical years to one year. The apparent impetus was an attempt to increase the number of individuals entering the field. The fact that the number of physicians becoming certified by ABNM did not increase in the subsequent years suggests that the change was not as effective as had been hoped.

In 2007, the residency requirements changed again, to include three years of nuclear medicine after one clinical year. Although this has strengthened the training, it has not sufficiently solved the problem. Over the past two decades, nuclear medicine programs, with a few notable exceptions, have been relatively lax in the quality of the applicants accepted into the programs. The result has been similar to the economic maxim that bad money drives out the good. The good applicants have avoided nuclear medicine and we have been left with the less capable.

Over these decades, we have failed to train enough high-quality academic physicians to replace the existing ones. Increasingly, we are being replaced by radiologists who are perfectly capable of doing an excellent job in clinical nuclear medicine and training, but who have little training, tradition, or understanding about how to conduct research.

However, nuclear medicine will not go away. The continuing need for nuclear medicine physicians to interpret studies remains, and numerous new agents are being developed that will need to be ushered through to FDA approval. With few exceptions, successful nuclear medicine physicians will need to have training and board certification in both nuclear medicine and radiology. Pathways are in place to integrate nuclear medicine into the radiology curriculum, by focusing on radiology first, followed by one year of nuclear medicine, or by doing nuclear medicine first, followed by three years of radiology within a five-year program, i.e., training
residents in both specialties in an interleaved fashion. The latter is the optimal approach, but is not publicized adequately in most radiology programs. The Janus program described above by Osborne is an ideal program, but is unlikely to be widely available.

The evident solution is identifying the interested, capable, and motivated medical students and educating them about the career pathway of academic nuclear medicine. These individuals could become radiology residents in a combined program and would have the potential to become future leaders in our field. This is not simple. In most medical schools, students are only exposed to nuclear medicine in a one-hour lecture. This solution will require a dedicated educational effort during medical school training, which requires time and is often politically difficult to arrange. Realistically, the only feasible approach will be to identify interested radiology resident applicants and accept them into a dedicated five-year program as part of the resident match system. Once a radiology resident has decided they are interested in combining nuclear medicine with radiology, it will be essential to have frequent contact and involve them in a long-term research project during their training. Otherwise, they will see conventional radiologists as their role model and will lose interest in nuclear medicine.

Only if radiology program directors are truly invested in transforming the training path can this be successful. It is unlikely that this will happen as a result of efforts at the local level only—it will require real commitment and leadership at the highest levels at SNMMI, ABNM, and the RRC, as well as collaborative efforts with their counterpart radiology organizations.

C. SAMITT

Personal introduction

Like Dr. Osborne, I received my MD degree from Columbia University College of Physicians & Surgeons. Subsequently, I received my MBA from the Wharton School and completed my clinical training in internal medicine at Brigham and Women’s Hospital.
I am currently Partner and Global Provider Practice Leader at Oliver Wyman after serving as President and CEO of HealthCare Partners, a subsidiary of DaVita HealthCare Partners, and as CEO of Dean Health System, one of the largest integrated delivery systems in the Midwest. I am currently in my fourth year as a commissioner on the Medicare Payment Advisory Commission (MedPAC) and I have a keen interest in the transformation of health care from a volume-based into a value-based system.

**Perspective**

I was invited to contribute to this article so that the sometimes disparate opinions can be distilled into a set of action items, which I will enumerate further below.

What is remarkable about the challenges facing the Society of Nuclear Medicine and Molecular Imaging and NM training programs is that it reflects a parallel trend experienced in many other clinical sectors in the health care industry. When family medicine physicians in my generation pursued residency training, they fully expected that their expertise in Adult Medicine, Pediatrics, Hospitalist Services, Obstetrics & Gynecology, and General Surgery would consistently be applied to afford a persistent comprehensive clinical portfolio throughout their career. Little did they know that their roles would mostly evolve to Adult Medicine/Pediatrics primarily with very little reliance on other areas of expertise. Likewise, when many U.S. hospitals were constructed with the premise that a wide array of cardiovascular procedures, surgical specialties, post-acute care needs, long-term intensive care services, and minor-acute/urgent care services would all be fully utilized for years to come, the progressive improvement in technological capabilities, clinical safety protocols, and alternative treatment settings have eroded the use of hospital services for many of these clinical needs. What all of these physicians, disciplines, and societies did not prepare for is the progressive march of clinical advancement, the creation of new technological modalities, and the desire for society to demand evidence-based solutions that
assure better care at a lower cost. In short, change happens. And such change will inevitably affect physicians and other health care stakeholders, both now and long into the future.

What is also remarkable about the overview Drs. Osborne, Beylergil, and Graham offer above is the general absence of any reference to the patient or the payor, and an understanding of what the consumers (whether utilizers or funders) expect from the health care community. As our clinical world evolves, also inevitably, to one that is retail-focused, inclusive of high-deductible and transparent marketplaces for purchases of health care services, and innovative lower-cost clinical disruptors, it will be essential for providers to think as retailers do, and develop products that meet consumers’ needs. As such, what solution would NM residency programs and societies develop if charged with starting with the consumer first and determining how best to develop clinical expertise to deliver high-quality, efficient, evidence-based, low-cost care? In all reality, this may mean the erosion (or obsolescence) of some clinical disciplines and the rapid expansion of others. At the end of the day, this should not be about preservation of certain clinical disciplines, but rather what is ultimately in the best interests of the patient.

I would agree that there will always be a role (at least in the foreseeable future) for physicians singularly focused on Nuclear Medicine, but it will likely be a far smaller discipline characterized by a focus on academics, research, and highly specialized clinical expertise. For those physicians with a love for that discipline, they should be afforded the opportunities to invest their full career in it. Those who wish to have a wider choice of job opportunities will likely see that joint training and generalization/diversification will be the better avenue to pursue. Again, this trend is not unlike similar choices about optimal paths that other stakeholders in our industry face. For hospitals that generally see an erosion of inpatient services as our industry shifts to population health, they must choose between the path of “traditionalism as volume player” and the path of “innovation and transformation as a value leader.”
In closing, I believe that any action items pursued should have the following general principles: a) the discussion about optimal steps should focus first on what is best for patients and what is best for society; b) the presumption should be that the world will shift to value and those services that offer better outcomes, more accurate diagnostics, higher safety and lower cost should be growing disciplines; and c) jointly developed solution, through breaking down of silos will always serve stakeholders better than competing sectors that focus on the success of their own individual silos.

ACTION ITEMS

1. The fusion of the ABR and the ABNM as proposed in different ways by Drs Osborne, Beylergil and Graham is a significant opportunity to merge into an entity that clearly creates the potential for additional value – the task force recommendations should proceed with targeted amendments.

2. The new pathway should dominate the value added components of the imaging specialties. Advocacy for the FDA and CMS sensitive items should be handled by the most knowledgeable stakeholders.

3. When possible programs should merge or close. Eliminating redundancy and the training pathways that will not produce practitioners should proceed rapidly. Although change is difficult, one cannot jump a twenty foot gorge with two successive 10 foot jumps.

4. Top down will not work. Good change will only be effected with input from all stakeholders. Traditional grassroots may not work, but innovation from stakeholders at the beginning of training needs to be brought to the fore.
CONCLUSION

It is with some degree of trepidation that our group submit these recommendations as the ABNM/ABR task force statement has not been adopted at the writing of this letter. It will, however, likely exist in some modified form at the printing of this article. It is important to state that our perspective is not an endorsement of the dissolution of the ABNM. We believe that if the Board proceeds down this road a very transparent “neutral zone” will need to exist where some of the most important issues will need to be addressed. It is clear, for example, that there is a large gap between the 4-month Nuclear Medicine trained DR diplomat and the draft NM/DR diplomat who will have at least two years of Nuclear Medicine training. The issues have been raised at recent townhall style events, but will need at some juncture to include the ABNM diplomats who have training in Radiology, Nuclear Medicine, and Internal Medicine to inform the Board of the needs of the ongoing and future diplomats. Indeed, there will be many changes and iterations in the next 12 months alone as to the future of training and the practitioners our art. It is with that notion intact that we summarize our thoughts. Change is inevitable and the practice of training and medicine in general is at a point where value and quality is of utmost importance. The determinant of value and quality will also change how we face the uncertainty of a major change in how future physicians are trained in nuclear medicine. As always, optimism and the opportunity that comes from embracing the challenge always win the day.
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