

**COMMENTARY**

## THE FUTURE OF NUCLEAR MEDICINE: AUTONOMY OR INTEGRATION?

*During the recent annual meeting in Toronto, two of the Society's past presidents debated their views on the organizational design of nuclear medicine. Newsline asked Henry N. Wagner, Jr., MD, and B. Leonard Holman, MD, to recap their views in individual commentaries for this issue of the Journal. Dr. Wagner takes the position that nuclear medicine departments should be autonomous. Dr. Holman supports integrating nuclear medicine with radiology. We invite readers to forward their own views to the Newsline Editor, Journal of Nuclear Medicine, for possible publication in future issues.*

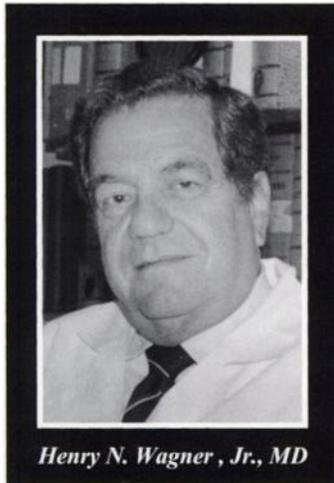
### Toward Autonomy in Nuclear Medicine

**A**LL OF US ARE justifiably worried about recruitment of physicians into nuclear medicine. Only one-third of physicians certified by the American Board of Nuclear Medicine end up with careers in nuclear medicine. The other two-thirds seek opportunities elsewhere, many returning to internal medicine, from which over half came. Why? Because these physicians cannot get positions in nuclear medicine.

In many community hospitals, the people hired to perform nuclear medicine procedures have far less training than that required by the American Board of Nuclear Medicine, and they spend a small fraction of their time doing nuclear medicine procedures. They are radiologists hired primarily because they are able to carry out other activities in a radiology department, including coverage of all radiology procedures during the day, in the evenings, and during vacations. We thus conclude that there exists a large body of fully trained nuclear medicine physicians unable to meet nuclear medicine needs because they cannot get jobs within the existing organizational structure of hospitals.

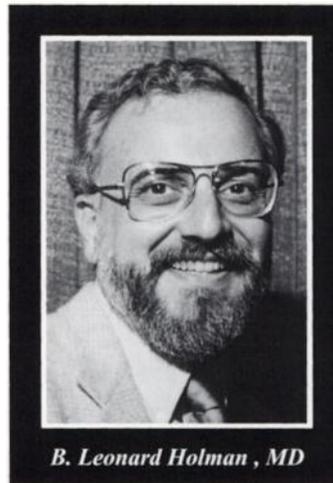
The status of nuclear medicine in the United States must be changed. Fortunately, as health care reform becomes a major focus of public and political interest, we have the opportunity to take a giant step forward. But first, we must change the way we think about ourselves. We must learn to view ourselves as

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*Henry N. Wagner, Jr., MD*

### Integrating Nuclear Medicine with Radiology



*B. Leonard Holman, MD*

**I**T IS INDEED TRUE that the practice of nuclear medicine in American is usually part-time and often performed by individuals who are inadequately trained. However, the reason that nuclear medicine is often poorly performed in community practice is because community practice is not conducive to full-time nuclear medicine. The United States, even in urban areas, is composed of very small

hospitals and multihospital practices that use small imaging services, each with only a few radiologists. There is only time for a nuclear radiologist between 4 P.M. and 5 P.M., after fluoroscopy in the morning and chest-film readings in the afternoon. Nuclear medicine studies are read much later in the afternoon, whether primarily visual or highly complex functional studies.

But I would argue that there is a major change overtaking us. As managed care moves the health care industry toward more integrated systems and much larger practices, imaging groups will also become larger. Smaller hospitals will pass by the wayside, particularly in urban areas, and we will see a resurgence in the full-time practice of nuclear medicine. The question is whether this practice should be independent or integrated with radiology. I argue for integration with radiology because I believe integration to be the only way in which to provide high-quality, efficient and cost-effective patient care.

Current nuclear medicine practice is based on perceptions  
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autonomous specialists in "molecular nuclear medicine." The key word here is "autonomy." We do not necessarily need independence from other departments, as long as we have functional autonomy. If this is not possible, then autonomy and independence must be our goals.

The route to independence is demonstrable effectiveness. We need to become agents of change, not victims of change. We need to demonstrate the effectiveness of our procedures on decision-making and outcomes. We must address those who are becoming increasingly responsible for providing effective health care, including managers of health systems and insurance companies—those who will monitor and run these health systems.

We need to create a public image. I started to say, "We must *improve* our public image," but, frankly, we do not *have* a public image. Not only does the public not know, but most physicians do not know what nuclear medicine is. We must present our ideas, concepts and capabilities with clarity and passion as well as intelligence. We must document the consequences of our studies on patient welfare and cost. Our new customers are the public and managers of "accountable health plans." We cannot count on other specialists to present our case to health care planners. We will not be able to sustain our own positions and meet increasing competitiveness in the health care field if we do not fight our own battles. Other people will not adequately explain what we do and what we need to do.

Of course, we must increase communication links with referring physicians and radiologists, but we need to transmit awareness of our capabilities far beyond such communication links. We must ensure that nuclear medicine procedures are incorporated into effective practice guidelines, already being developed in some states and soon to be developed at the national level as comprehensive health care plans are implemented.

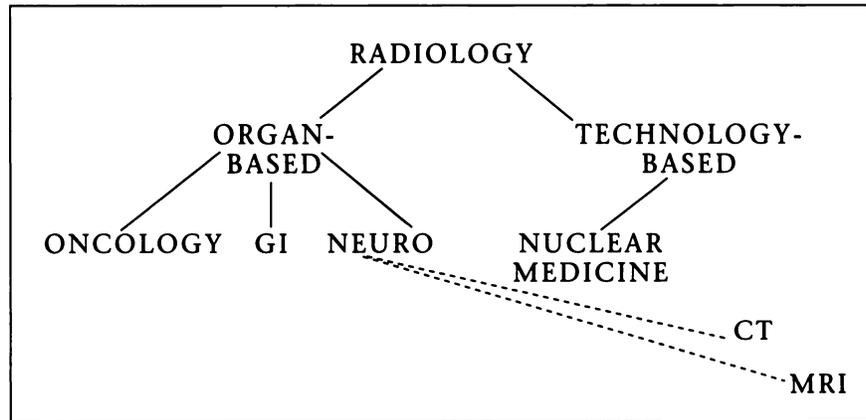
As I read excellent articles on the problems facing radiology and actions that radiologists need to take—articles published in *Diagnostic Imaging*, *Radiology Today*, and *Administrative Radiology*—nowhere do I read that nuclear medicine is even considered in this picture of the future. We must show how our procedures affect patient care. We need to be certain that the public demands appropriate nuclear medicine procedures. Patients and planners must demand nuclear medicine procedures from providers, or patients won't get them. Recently, a

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that no longer are true. In 1963, radiology was almost entirely made up of analog x-rays and fluoroscopy; algorithms for patient diagnosis and management had very few decision points and the addition of a nuclear medicine study created only one more step in the workup. In 1993, radiology is extraordinarily complex as the result of new technology, including MRI, magnetic resonance angiography, CT, ultrasound and image fusion. So too have algorithms become more complex,



**Figure 1.** Dr. Holman's illustration of a matrix organization in which nuclear medicine is integrated with the department of radiology.

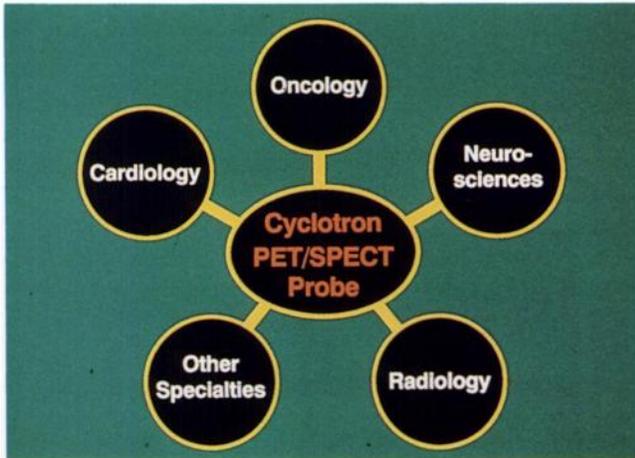
and the clinician is no longer able to sort out the most effective algorithm. The person who interprets a nuclear medicine image must also be adroit at interpreting the CT and MRI so that imaging data can be incorporated into a single, integrated consultation.

Because of the complexity of imaging in 1993, most large radiology departments have moved to a matrix organizational approach (see Fig. 1). Most radiologists specialize in an organ or a system; it may be the brain for the neuroradiologist, cancer for the oncoradiologist. Nevertheless, we haven't abandoned our technological base. Radiology departments must maintain a technical director in charge of CT or MRI—a director responsible for day-to-day operations and for developing and expanding technology. Most of our imaging technologies have been integrated with the organ-based component of the department, so that CT images of the brain are read by a neuroradiologist and a musculoskeletal MRI is read by a bone radiologist. The only component yet to be integrated into this model is nuclear medicine. That nuclear medicine is not integrated is to its detriment because it creates a nonoperational work unit.

In today's hospital, the patient is managed by a work unit built around a disease process. For example, patients with CNS disease will be evaluated and treated by a team comprised of a

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**Figure 2.** Dr. Wagner's concept of an organization in which nuclear medicine is a central autonomous core.

friend with contained carcinoma of the prostate told me his urologist would not perform surgery because of a vague history of angina in the patient. I suggested that my friend ask the physician, who had performed a bone scan (negative), to do a gated blood-pool study. The physician told him he had never heard of such a test.

Modern medicine's orientation is changing toward an interest in molecules as causes of disease. Increasingly, diseases are shown to be the result of abnormal messages—i.e., disease as dissonances. I believe that this approach is highly preferable to dividing the body into organs and having organ specialists who try to master all technical developments. Although specialists do not provide overall care to the patient, they often erroneously believe that the patient suffers from a disease of "their" special organ, because they are organ-focused.

As medicine becomes more competitive (because, unfortunately, of managed competition) and the water starts to rise as a consequence of this competition, we don't want to be sitting at the bottom of someone else's peak. We will drown if that happens. We need to further develop our own peak if we are to avoid fragmenting nuclear medicine into the exciting, ever-growing fields of nuclear cardiology, nuclear neuroscience, and nuclear oncology. We must develop a strong autonomous central core of nuclear medicine that can build strong bridges to strong pillars in these other, organ-oriented fields. Nuclear medicine should be the central core, with firm bridges to cardiology, oncology, neurology, psychiatry, and radiology (see Fig. 2).

We must win the battles that will occur in reforming the health care system. To do so, we must fight them ourselves. If we have weak nuclear medicine departments, if nuclear medi-

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neurologist, a neurosurgeon, or a psychiatrist, who will turn to the neuroradiologist for guidance in diagnosis and workup. Nuclear medicine is left out of the picture, which is a primary reason why neuronuclear medicine, despite new and exciting agents, has barely caught on. Because it is not part of the diagnostic and treatment work unit, neuronuclear medicine practice has not extended beyond large academic centers.

In 1993, we need imaging consultants: the complexity of the imaging process demands it; managed care will insist upon it. We need such consultants to work through the diagnostic strategy, determine the appropriate imaging algorithm and decide when imaging is not necessary. Imaging consultants will very likely be paid to tell the clinician when not to perform an examination, just as we now are paid only to do the examination. The person who will serve best as an imaging consultant is one who is organ-based. In my view, the nuclear physician of the future must be organ-based or system-based. He or she will manage the technology and delegate reading and interpreting some examinations to organ-based radiologists.

Integration is also crucial for the success of research in nuclear medicine and radiology. Advocates of independent nuclear medicine often are swayed by another false axiom—that radiology equals anatomy and nuclear medicine equals function. This axiom is obsolete. It is true that radiologic research has been largely descriptive, nonquantitative and structural. But that is changing very fast. We are beginning to see departments of radiology that are largely functional in the nature of their laboratory research. At the Brigham and Women's Hospital in the late 1960s, Herbert L. Abrams, MD, chairman of the department of radiology at the time, saw that radiology research should be physiologic. He hired a physician who was a nephrologist because he couldn't find a radiologist who was interested in physiology.

Things are quite different in 1993. Virtually all laboratory research in our department is now performed by full-time scientists, whether MDs or PhDs. But equally important is that individuals practicing full-time laboratory research are as interested in physiology as they are in anatomy. Those who manage our MR facility are as interested in functional applications of MRI to study blood flow and metabolism as they are in its application to disease.

How do these changes in the practice of medicine affect training? The American Board of Nuclear Medicine model that required two years of clinical training prior to entering a nuclear medicine training program is nonoperative; we lost very good people by not competing for them in medical schools. But neither are current minimal criteria for taking the certifying examination of the American Board of Nuclear Medicine adequate for training an individual as an imaging consultant in 1993. Without adequate training in other imaging

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cine procedures are provided by part-time physicians, if we do not have physicians who spend 150% of their effort in nuclear medicine, we will not be able to give anything of value to nuclear cardiologists, nuclear oncologists, and other physicians who have ready access to patients. These physicians will have mastered nuclear technology far beyond that possible by someone who spends a few months with each of the increasingly complex imaging technologies. We need to have physicians who are dedicated full-time to nuclear medicine.

It has been said that nuclear medicine in a community hospital does not require a full-time physician. To say this is to be completely unaware of what has happened in nuclear medicine over the past 20 years and what has been documented at annual Society meetings. It also has been said that there are not enough nuclear medicine specialists to have one in every community hospital on a full-time basis. But we have also said that there are many nuclear medicine specialists who cannot get jobs in the field and who return to their original specialty.

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modalities, such an individual will find it very difficult to compete in the workplace.

A four-year training program in nuclear medicine is a very attractive option but must include a year of radiology and time on clinical rotation. I would limit the clinical and radiological training to one or two imaging fields to ensure organ-based competence. Variations of this model are working well at Albert Einstein School of Medicine and other centers.

When Brigham set aside a diagnostic radiology training slot for a nuclear radiology candidate this year, we were pleasantly surprised to discover individuals with outstanding credentials—backgrounds in chemistry and physiology—who are

Since the American Board of Ophthalmology was formed over 50 years ago, every new medical specialty developed in the United States has been the child of another specialty—for example, pediatrics from internal medicine, radiology from surgery. There has always been and always will be resistance to releasing the new specialty from the parent.

I do not call for *independent* nuclear medicine departments but for *autonomous* nuclear medicine departments. If that autonomy can be obtained within a radiology department, so be it. However, there are many radiology departments in the United States, in both academic and community hospitals, in which one cannot have sufficient autonomy without independence. They need to be given their independence by health care providers, deans, and department heads. Managers of health care systems, hospital directors, and deans of academic institutions need to hear the case for an autonomous nuclear medicine specialty that can fund itself, fight its own battles, get research funds and continue to advance this wonderful field of ours. ■

interested in such a program. However, they are interested only while still in medical school, not two years later. This program alone will not solve our needs. Our current radiology fellowship programs offer no training in radiotracer techniques. If the neuroradiologist of the future has the tools to integrate all brain-related imaging procedures, neuroradiology fellows will have to rotate through nuclear medicine.

To conduct the type of integrated practice that will be fundamental to the health care system of the future, we must integrate these programs and train people accordingly. To find jobs in the “new” marketplace, nuclear medicine specialists must be trained broadly across imaging domains. ■

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cessful, we will promote our specialty through renewed emphasis on the unifying concepts of research and education, excellence in clinical practice and provision of high-quality patient care. We will work to reduce regulatory excess, to strengthen our specialty by acquiring increased research funds and resources and to garner fair reimbursement for our professional and technical services.

It is impossible to estimate what one can accomplish in one year. But what I *can* do is not only keep up the momentum, but also build a new and higher momentum. I consider it a privi-

lege and challenge to be the 41st president of the SNM. It is an honor to serve you, and I appreciate the confidence you have expressed in my ability to represent you and to lead the Society of Nuclear Medicine, the largest and most influential nuclear medicine organization in the world. I state to you unequivocally that I will not falter or waver from my commitment to fulfill your expectations for our specialty during the coming year.

*Richard C. Reba, MD*  
*President of the Society of Nuclear Medicine*