PHYSICIST AND PET RESEARCHER RECEIVES TETALMAN MEMORIAL AWARD

Kimberlee Kearfott, ScD, engineer, scientist, and teacher, is developing a radiological engineering training program based at Georgia Tech, researching quantitative SPECT, and planning a new PET facility with a radiation protection design at Emory University.

PHYSICIST AND CLINICAL PET investigator, Kimberlee Kearfott, ScD, received the Tetalman Memorial Award in June at the annual meeting of the Society of Nuclear Medicine in Cincinnati, Ohio. SNM's Education and Research Foundation presented the award to the associate professor of nuclear engineering and health physics, Georgia Institute of Technology, and associate professor of radiology, Emory University School of Medicine.

"Dr. Kearfott has been an engineer, a scientist, a teacher, and an excellent public relations person between nuclear medicine and the society at large. We need to pay more attention to people like her. She represents an increasing number of women that are coming to advanced levels in the science profession," says Michael E. Phelps, PhD, Chief of Division of Nuclear Medicine & Biophysics at the UCLA School of Medicine, and a colleague of Dr. Kearfott's for almost ten years. "She has a very advanced level of fundamental knowledge in engineering, physics, and mathematics, combined with an extremely high degree of enthusiasm and tenacity."

Clinical PET

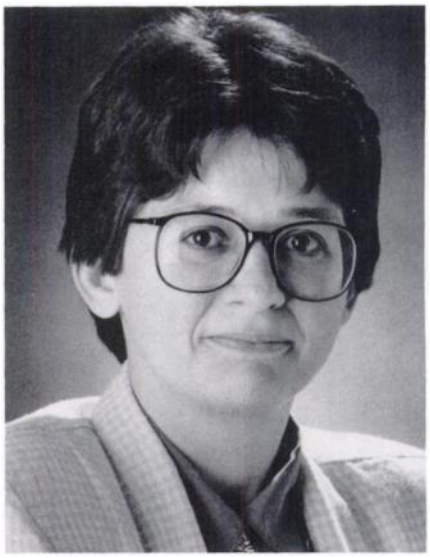
Early in her career, Dr. Kearfott began helping other researchers understand the basic principles of positron emission tomography (PET), an imaging process then in its infancy. She believed that PET systems had to be pushed past research into the clinical arena.

When she moved to Memorial Sloan-Kettering Cancer Center in 1980, she "single-handedly" redesigned and rebuilt their first PET imager, according to Harrison H. Barrett, PhD, Professor of Radiology and Optical Sciences at the University of Arizona. She has improved PET instrumentation on many levels — from creating a new head holder for positioning patients to altering circuitry and software for better imaging.

Dr. Kearfott has proven a leader beyond lab and clinic. While living in Arizona in 1987, she became interested in a local radon problem and her leadership helped ease mounting fear of the radioactive gas. It had been known that radon gas produced from uranium deposits in Navajo lands permeated houses at low levels. Dr. Kearfott developed a way to measure these doses. However, one house she checked displayed a record high level of radioactivity. She said it affected the people who lived there as would a 200 pack-a-day smoking habit.

Easing Radon Fears

Media reports of this unusual finding panicked many people about radon in their homes. Dr. Kearfott organized several short lectures to inform the public about the incident and radon gas in general. She explained that the house in question was an isolated case — its water source came from a well built directly through uranium-rich rock — and that the low counts of radon in their houses were safe. "She was very good in helping them understand that issues of radon gas have to be determined scientifically and not emotionally," Dr. Phelps recalls.



Kimberlee Kearfott, ScD

Many of Dr. Kearfott's scientific accomplishments come from extensive work with radiation dosimetry. Her goal is to achieve accurate quantitation, integrity of data, and proper images. Her approaches range from in vivo dosimetry to external measurements with thermoluminescent detectors (TLDs). Dr. Kearfott developed the first system for positionally sensitive TLD plate imaging. She has conducted glucose assays with 2- and 3- fluorodeoxyglucose labeled with fluorine-18, and created a mathematical model for the estimation of tissue pH with carbon-11 labeled DMO. Her early work led to a number of quality control procedures and measurement

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Tetalman

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approaches that are used today. Several of her published papers on the radiation dosimetry of labeled compounds remain standard references.

Dr. Kearfott continues to pursue better protocols for PET. She is most interested in developing ways for doctors to scan and sample to get information they want. She believes that these protocols will be crucial to the role PET will play in a clinical setting. "It's exciting to see an imaging technique go from research to making a difference in hospitals concerned with diagnosing diseases. And to watch it grow from childhood to a healthy adolescence in only ten years. . ."

Dr. Kearfott was born in Oakland, California in 1956. She took a master's degree in nuclear engineering at the University of Virginia and a doctorate at M.I.T. After her work at Sloan-Kettering, she came to Arizona State University, moving from assistant to associate professor in 3 years. With limited resources, she designed a biomedical engineering program located between the main campus and the medical school.

Sought-After Speaker

Dr. Phelps says that Dr. Kearfott is a sought-after keynote speaker at conferences. "I've always been impressed when I watch her give a presentation," he says, "she is a person of great integrity and honesty. She knows what's what. She's able to present rigorous scientific information in a way that captures the audience's attention. She also helps the public see the good in nuclear medicine so that they are no longer afraid of it."

Several doctors who recommended Dr. Kearfott for the Tetalman award noted her talent in securing funds for large projects. She has succeeded in finding many forms of support, from NIH to commercial companies to private contributors.

Dr. Kearfott is the eleventh winner of the Tetalman award, which commemorates Dr. Marc Tetalman, a highly respected clinician and researcher who was killed in a robbery at an annual SNM meeting in 1979. Every year the prize is given to the nuclear medicine investigator under the age of 36 who is judged "most promising."

Dr. Kearfott says she is spending most of her time lately teaching and developing a radiological engineering training program based at Georgia Tech and roughly one-quarter working on quantitative SPECT and planning a new PET facility with a radiation protection design at Emory University.

"Dr. Kearfott has a tremendous belief in and passion for what she does," Dr. Phelps says. "She will always find a way — she's very self-reliant."

Alysa L. Zelman

Facing AIDS

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high risk for developing dementia. "If there is a pattern that would indicate risk, then you might start patients on as vigorous a treatment as possible," says Dr. Rottenberg. "We don't even know yet what the risk factors are for developing dementia other than the infection itself."

Although cautious, Dr. Rottenberg is enthusiastic about the potential of PET. Experimental results thus far have yielded insights into the way HIV causes dementia. "There is a lot of dispute about how AIDS produces the dementia," says Dr. Rottenberg. "We believe the virus itself is important." Researchers have proposed that toxic products of the infection, or the body's own immunologic reactions to the virus, rather than viral invasion and replication, are responsible for AIDS dementia complex. Evidence against direct viral action comes from examination of brain tissue from AIDS victims. "You don't see all that much evidence of viral infection," says Dr. Rottenberg. The PET evidence, however, indicates that the virus somehow subverts cellular metabolism, he says. "We don't know the biochemical details, but the PET patterns we've pulled are consistent with viral infection."

It's also possible that the virus, the immune system, toxic byproducts, and other factors conspire to cause dementia. "There are probably multiple etiologies," says UCSD's Dr. Dupont. PET or SPECT may prove clinically useful in distinguishing these etiologies. Both techniques, however, remain far from clinically useful in managing AIDS patients, she and other researchers agree, until more studies are completed.

Anti-Retroviral Probes

Even farther from clinical application is the use of radiolabeled probes for the presence of the virus itself. Dr. Rottenberg and colleagues are developing what he called an "anti-retroviral probe" to visualize the primary infection. He declined to give further details of the project because the work is in a very preliminary stage. Such a probe might, for example, allow researchers to correlate PET and SPECT images of presumed viral effects on brain metabolism with images of the actual viral distribution.

Despite these promising, forward-looking studies, for practical purposes, reminds Dr. Kramer of NYU, "A physical neuropsychometric exam is still a lot cheaper than PET — although it may not be as pretty or elegant." Nuclear medicine scans have attained critical importance in the management of AIDS related opportunistic infections. Perhaps, she allows, functional brain imaging of AIDS dementia will as well.

J. Rojas-Burke

Sources

(1) Masur, Parillo, Pizzo, Shellhamer: *Respiratory Disease in the Immuno-Compromised Host.* Philadelphia, J.B. Lippencott, 1991.