ALFRED P. WOLF TO RECEIVE HEVESY NUCLEAR MEDICINE PIONEER AWARD

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ALFRED P. WOLF, PhD, A pioneer in the development and use of radioactive tracers, will be the 32nd recipient of the Georg Charles de Hevesy Nuclear Medicine Pioneer Award given by The Society of Nuclear Medicine (SNM). The Award was established in 1960 and its title was modified in 1979 to commemorate Georg Charles de Hevesy, PhD, DSc, the Hungarian chemist who developed radiotracer technique.

Dr. Wolf will receive the Award during the plenary session of SNM's 38th Annual Meeting in Cincinnati, Ohio. Joanna S. Fowler, PhD, senior chemist at Brookhaven National Laboratory, Upton, New York, who has worked with Dr. Wolf for 20 years at Brookhaven, will present the Award.

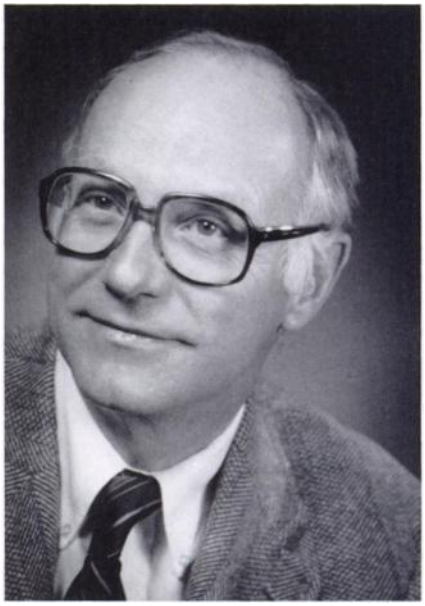
Dr. Fowler lauds Dr. Wolf's contributions to positron emission tomography (PET), stating that his work has had a profound and far-reaching influence on basic research in the neurosciences and on the practice of nuclear medicine. "Wolf's pivotal role in the development and application of ^{18}FDG to the study of neurological and psychiatric disease is largely responsible for the current worldwide growth in the use of PET for basic and clinical research. His rigorous mechanistic approach to problems in both the chemical and biomedical sciences combined with his intellectual curiousity, imagination, and enthusiasm has stimulated and inspired dozens of scientists around the world who have worked with him over the years. Indeed, most of the cyclotron PET centers around the world have one or more individuals who, to their great advantage, have spent part of their careers at Brookhaven working with Al Wolf."

SNM President Naomi P. Alazraki, MD, co-director of the division of nuclear medicine, Emory University Hospital, and chief of nuclear medicine, VA Medical Center, Atlanta, Georgia, who selected Dr. Wolf as the Hevesy Award recipient states that Dr. Wolf's greatest contribution to PET imaging was his role as a pioneer in the development of fluorine-18-labeled fluorodeoxyglucose (^{18}FDG). "Dr Wolf's creativity allowed him to see the potential of ^{18}FDG as a metabolic imaging agent, and his rigorous approach to his research studies provided the framework for success in labeling the compound FDG."

Dr. Wolf trained as a physical organic chemist, receiving his doctorate from Columbia University in 1952. His education was interrupted by World War II, during which he worked for the U.S. Army on the development of the atom bomb, known as the Manhattan Project. Through his participation in this project, he gained an extensive awareness of radiochemistry. When the war was over, he decided to combine his radiochemistry experience with his previous organic chemistry research, and he entered the field of radiopharmaceutical research.

Hot Atom Chemistry

Dr. Wolf joined the the chemistry department at Brookhaven National Laboratory in 1951 and has continued his research there for forty years. In the early 1950s, he worked on methods of preparing organic molecules labeled with radioactive isotopes. He broke new ground with his studies on the chemistry of carbon atoms, using carbon-14 and later carbon-11 (^{11}C) and he conducted studies on the production and reactions of fluorine-18 (^{18}F) and oxygen-15 (^{15}O), short-lived positron emitters. Dr. Wolf and his colleagues determined the absolute yields of nuclear reactions producing the desired radionuclide and measured many of these reaction yields. He developed labeling techniques that utilized reactions of "hot" atoms, so named because of their extremely high translational energies produced by recoil from nuclear reactions. Wolf and his colleagues conducted experiments on the mechanism of these hot atom processes, studying organic reactions at these high energies. These studies led to important



Alfred P. Wolf, PhD

advances in chemical kinetics theory. The methods Dr. Wolf developed for producing short-lived radiotracers at very high specific activities provided the necessary foundation to conduct tracer studies in humans with PET.

Due to his extensive work with cyclotrons in the 1950s, Dr. Wolf was prepared to participate in the development of cyclotron technology that occurred in the 1960s. Dr. Wolf and Fulvio Cacace, PhD, then a postgraduate student, department of pharmacology, University of Rome, Italy, currently professor, department of pharmacology, University of Rome, published the first excitation function for ^{11}C in 1960, and by the mid-1960s, Dr. Wolf had become the leading expert in the hot atom chemistry of ^{11}C. In 1966, the National Institutes of Health (NIH) in Bethesda, Maryland, contacted Dr. Wolf and asked him to attend an on-site visit at Johns Hopkins Medical Institutions, Baltimore, Maryland, to discuss an application for funding of a cyclotron at Johns Hopkins, made by Henry Wagner, MD, professor of medicine, radiology, and radiological health sciences, Johns Hopkins Medical Institutions. Johns Hopkins did not receive an NIH-funded cyclotron until 1980, but the on-site visit resulted in funding for four cyclotrons through the Atomic Energy Commission (later to become the Department of Energy). The cyclotrons went to the following institutions: The University of Chicago; the University of California, Los Angeles; Massachusetts General Hospital in Boston; and Memorial Sloan-Kettering Cancer Center in New York City. This equipment further paved the way for the emergence of PET technology.

Development of ^{18}FDG

Dr. Wolf played a key role in the synthesis of ^{18}FDG. As Dr. Wolf recalls, "December 13, 1973 was the day that ^{18}FDG got started." That was the day he and his colleagues met with a research team at the University of Pennsylvania in Philadelphia that, in collaboration with the NIH, was studying measurements of brain glucose metabolism in animals. (The following researchers were working at the University of Pennsylvania at the time of this study, with the exception of Dr. Sokoloff who was working at the NIH.) The team, consisting of Louis Sokoloff, MD, chief of the laboratory of cerebral metabolism, NIH, David Kuhl, MD, professor of internal medicine and radiology, and chief of the division of nuclear medicine, University of Michigan Medical Center in Ann Arbor, Martin Reivich, MD, director of the Cerebrovascular Research Center, and professor of neurology, radiology, and psychiatry, University of Pennsylvania, and several other researchers, wanted to develop a method that would allow the research team to do quantitative studies of brain in living people. The researchers asked Dr. Wolf to create an appropriate radiotracer for their study.

Dr. Wolf, in collaboration with Dr. Fowler, other members of the Brookhaven research team, and Tatsuo Ido, PhD, then a staff member, radiopharmaceutical chemistry laboratory, National Institute of Radiological Sciences, Chiba, Japan, currently professor, Cyclotron and Radioisotope Center (CYRIC), Tohoku University, Sendai, Japan, designed the FDG molecule and developed a method for rapidly incorporating ^{18}F. They synthesized the first batch of ^{18}FDG for human studies in August 1976 and delivered the radiotracer to the University of Pennsylvania, where Dr. Kuhl and his colleagues used the tracer to produce the first pictures of metabolic processes in the human brain. Commenting on Dr. Wolf's contribution to this historic project, Dr. Reivich says, "Dr. Wolf's knowledge and expertise brought the project to fruition. Without his ability to label FDG, the project could not have been done."

Dr. Fowler notes that the synthesis of ^{18}FDG and its application to measurement of regional glucose metabolism in the human brain was a particularly important milestone. "This tracer is now routinely used in virtually every PET center in the world, providing unique basic and clinical information, such as identification of the focus in seizure disorders, the selection of patients who will benefit from cardiac bypass surgery, the selection of appropriate cancer therapy, and the monitoring of response to treatment."

PET Research

By the late 1970s, Dr. Wolf had become the director of the PET program at Brookhaven, where he continues to spearhead many PET research studies. Fritz Henn, MD, chairman of the department of psychiatry, State University of New York at Stony Brook, and Nora Volkow, MD, a psychiatrist in Brookhaven's medical department, are collaborating with Dr. Wolf on a joint Stony Brook/Brookhaven program that studies cocaine and alcohol abuse. In 1988, Drs. Wolf and Fowler labeled cocaine with ^{11}C, allowing the first direct examination of the binding sites and kinetics of cocaine in the living human brain. According to Dr. Volkow, "Dr. Wolf stimulates a high level of interaction and feedback between the chemists and the clinicians, which leads to a highly integrated team and provides an atmosphere that lends itself to creativity and insights."

Dr. Wolf also collaborates with research physicians on techniques to use PET in the study of schizophrenia, Alzheimer's disease, and brain tumors. Dr. Sokoloff states that "Dr. Wolf has done some of the best research in PET. He's currently exploring new directions in PET research, specifically, measurement of receptor occupancies in the brain."

Nuclear Medicine Proponent

Dr. Kuhl notes that Dr. Wolf was "one of the first chemists of significant stature to associate himself entirely with nuclear medicine." Dr. Wolf continues to show his commitment to the discipline of nuclear medicine through his many consulting and advisory activities. Dr. Henn spoke succinctly of the man and his accomplishments. "Al is a dedicated scientist who is determined to make a difference. And he has made a great difference."

Joan Hiam