

DANISH PIONEER IN CEREBRAL BLOOD FLOW STUDIES TO RECEIVE 1990 HEVESY AWARD

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Niels A. Lassen, MD, PhD, a renowned leader in the field of regional cerebral blood flow (rCBF), will be the 31st recipient of the Georg Charles de Hevesy Nuclear Medicine Pioneer Award given by The Society of Nuclear Medicine (SNM). The Award is to be presented in June during a plenary session of SNM's 37th Annual Meeting in Washington, DC.

Established in 1960, the Nuclear Medicine Pioneer Award was modified in 1979 to commemorate Georg Charles de Hevesy, PhD, DcSci, the Hungarian chemist who developed the radiotracer technique. Dr. Lassen's Award shall be presented to him by his friend and colleague, Marcus E. Raichle, MD, professor of neurology, radiology (radiation sciences), and biomedical engineering, Washington University, St. Louis, Missouri.

Having authored or co-authored nearly 600 internationally published scientific papers during his illustrious medical career, Dr. Lassen has made prominent original contributions in the sphere of regional blood flow. The primary thrust behind his work was in developing new techniques to measure blood flow in the brain, heart, kidney, and peripheral tissues. The sum of his accomplishments has bridged the realms of clinical research and practice and the theoretical and mathematical

derivations of the basic laws of human physiology.

"It was easy to select Niels Lassen because of his contributions and character," says SNM President Richard A. Holmes, MD, who selected the Hevesy winner. "Dr. Lassen's initial and continuing work using radiotracer methodology to evaluate regional cerebral blood flow in disease states affecting the brain has contributed greatly to our knowledge of neurophysiology and has paved the way for many of the regional cerebral blood flow radiotracers now being used throughout the world." Dr. Holmes adds that in keeping with the philosophy behind the Award, Dr. Lassen is a "true pioneer in medicine."

Dr. Lassen has occupied the post of chief of laboratory of the Clinical Hospital, Bispebjerg Hospital, Copenhagen — which is affiliated with his alma mater, the University of Copenhagen Medical School — since 1962. He regularly teaches both graduate and postgraduate courses in the University's clinical physiology section.

After securing his medical degree in 1951, Dr. Lassen performed his residency for ten years in the departments of medicine and neuromedicine. He served as a specialist in internal medicine, nuclear medicine, and clinical physiology.



Niels A. Lassen, MD, PhD

He says he was drawn to the field of blood flow measurements after witnessing a patient die from elevated blood pressure. "When I was a young doctor, I saw a patient with very high blood pressure who soon died from hypertensive brain disease," recalls Dr. Lassen. "I was puzzled by this and could not understand why he died like that. And so, I was led to studying the areas of blood pressure and circulation."

Among Dr. Lassen's earliest scientific studies was a treatment that introduced the application of radioactive krypton to clinical

investigations of human cerebral blood flow. An extension of this study led to his 1959 doctoral thesis: "Cerebral blood flow and oxygen consumption in man determined by the inert gas diffusion method."

During 1957-1958, Dr. Lassen spent 15 months as a visiting scientist at the National Institutes of Health (NIH), Bethesda, Maryland, where he came into contact with fellow Hevesy recipients, Seymour S. Kety, MD, and Louis Sokoloff, MD. Dr. Kety, now senior scientist at the National Institute of Mental Health, Professor Emeritus, Harvard University, Cambridge, Massachusetts, told *Newsline*, "Dr. Lassen came to work at my lab to further develop the nitrous-oxide technique of measuring blood flow that I had created several years earlier."

Dr. Lassen's studies during his NIH tenure furthered his research into blood flow and yielded papers that described the autoregulation of cerebral blood flow. One particular study, born of the NIH experience, examined the relation between cerebral blood flow and oxygen uptake as well as signs of dementia in elderly, senile patients.

In 1961, in collaboration with David H. Ingvar, MD, professor of clinical neurophysiology at the University of Lund, in Sweden, Dr. Lassen began to develop and refine methods for studying and measuring regional blood flow in the living human brain, based on the application of radioactive inert gases. Initially, these studies were conducted on animals, but a long series of studies on humans ensued, culminating in several important analyses, including one that discussed the increases in function-related local blood flow in active cortical regions of the brain.

"Niels and David Ingvar were the first to measure the region of clearance of radioactive krypton in brain blood flow studies. Later they substituted krypton with xenon-133, which gave a better resolution image," says Dr. Kety. "The brain is heterogeneous.

There are regions of rapid flow and very slow flow. Drs. Lassen and Ingvar discovered that the average rate of blood flow at a given region of the brain could be extrapolated from the tangent of the slope of the radioactive gas clearance curve at zero time. This discovery had wide clinical applications, for example, in the fields of neurology, psychiatry, and cerebral infarcts."

Dr. Lassen's recent research efforts have centered around the atraumatic, single photon emission computed tomography (SPECT) recording of cerebral blood flow in man. The tomograph algorithm displays the concentration of tracer and measures the rate of blood flow in the brain. These studies led to the development of the fast-rotating, ultra-sensitive gamma camera systems widely used today. "Initially, this technique was based on inhalation of xenon-133 tracer," says Dr. Kety. "However, other tracers [notably technetium-99-labeled oxime and iodine-123-labeled isopropylamphetamine] are now more commonly used."

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Dr. Lassen also coined the term "luxury perfusion" to describe the phenomenon of the regions of hyperemia that occur frequently in patients with brain tumors, head trauma, and apoplexy following spontaneous thrombolysis. The "luxury perfusion syndrome" was observed to be related to acute metabolic acidosis localized within the brain.

Contributions in Renal Blood Flow

A 1958 collaboration with a Georgetown University research group that included Lawrence Lilienfeld, MD,

and John Rose, MD, led to a scientific treatise on the diverse distribution of red cells and albumin in the dog kidney, which disproved the original version of the "plasma skimming" theory of intrarenal blood flow. "Dr. Lassen demonstrated that in very thin blood vessels and capillaries the plasma layer contributes a significant portion of the total blood flow," Dr. Kety told *Newsline*. A subsequent study of human kidney blood flow in 1961 resulted in a finding that oxygen uptake of the kidney was closely correlated to its reabsorption of sodium.

Dr. Lassen has also made significant contributions in the study of blood flow in the peripheral tissues, particularly in the measurement of distal blood pressure in occlusive vascular disease of the legs. Dr. Lassen initiated the use of local radioisotope injections in these measurement procedures. A much-quoted 1964 paper on the measurement of blood flow through skeletal muscle that appeared in the British medical journal, *Lancet*, introduced the technique of intramuscular injection of radioactive inert gases to aid in the quantification of peripheral tissue blood flow.

Tracer Kinetics

In association with the late professor William Perl, Dr. Lassen produced the prominent 200-page textbook, *Tracer Kinetic Methods in Medical Physiology* in 1979. Published by Raven Press, New York, the collaborative work showed the relation of blood flow to metabolic flux and rigorously developed Kenneth Zierler's stochastic (non-compartmental) models.

Reviewing the textbook in the June 1980 issue of *The Journal of Nuclear Medicine*, E. James Potchen, MD, professor and chairman, radiology department, Michigan State University, Lansing, Michigan, remarked, "I would strongly urge that it be read by every specialist in nuclear medicine and by many medical and

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physiology students. A broader understanding of tracer kinetics may... provide a stimulus toward a wider application and the development of diagnostic tests related to regional physiology. This knowledge is prerequisite to realizing the potential of cyclotrons and emission computed tomography since their application requires a thorough understanding of the tracer method." Dr. Potchen hailed Dr. Lassen as a "major authority on the application of tracer kinetics" and noted that this textbook provides a clear "understanding of an intellectual discipline that has now become a cornerstone of both medical

physiology and applied nuclear medicine."

According to Dr. Marcus Raichle, Dr. Lassen is a man with diverse interests and his intellectual pursuits have not been restricted to the confines of the laboratory. As an example, Dr. Raichle cited Dr. Lassen's involvement in a study of high-altitude physiology. "Dr. Lassen and a British investigative team conducted studies on people afflicted with diseases living in mountain areas of the Alps and the Andes," says Dr. Raichle. "This unusual opportunity provided further insight into the regulation of brain blood flow and its relation to the oxygen-poor air of high altitudes." Dr. Raichle adds that

the main body of Dr. Lassen's career achievements have "influenced an entire generation of researchers and investigators of brain disease."

Adds Dr. Kety, "Dr. Lassen's primary contributions are in the physiology of cerebral vascular disease. He developed physiological principles extracted from mathematical equations."

In acceptance of the Award, Dr. Lassen says, "I would like to extend my deepest appreciation to the nuclear medicine community for giving me this honor. I am very pleased to be recognized for my efforts by my friends, peers, and colleagues of many years."

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people do without thinking twice."

Government Relations Efforts

As part of its government relations efforts during the Meeting, the Society will conduct a "guest host program," in which SNM members will conduct tours of the exhibit hall for representatives from key Congressional committees and government agencies that work closely with the nuclear medicine community, such as the Food and Drug Administration, the Environmental Protection Agency, and the Health Care Financing Administration. The Society also will invite these Congressional and agency representatives to attend selected programs during the Meeting.

In addition, the SNM and American College of Nuclear Physicians Government Relations Office urges members to take full advantage of the Washington location by contacting their Congressional representatives to discuss issues affecting nuclear medicine. Congress will be in session during the Meeting and the Capitol Building is not far from the Conven-

tion Center. If you need help making an appointment with a member of Congress, contact the Washington Office.

'Tour de Force'

In the Meeting's final session, Henry N. Wagner, Jr., MD, professor of medicine, radiation, and environmental health sciences at Johns Hopkins Medical Institutions, an SNM past president, will summarize his views of the highlights of the Meeting for the 13th consecutive year. (Dr. Wagner's written summary will appear in the August 1990 issue of *Newsline*.) Dr. Kirchner calls this session a "tour de force with a large, loyal following; although it is the Meeting's final session, many members stay to attend it."

Prior to the start of the Meeting, the SNM Committees will gather on Sunday, June 17, and the Board of Trustees will convene on Monday, June 18. During the Board Meeting, outgoing President Richard A. Holmes, MD, chief of the nuclear medicine section, department of radiology, University of Missouri Hospitals and Clinics in Columbia, will

swear in Naomi Alazraki, MD, co-director of the division of nuclear medicine, professor of radiology, Emory University School of Medicine, chief of nuclear medicine, Veterans Administration Medical Center, Atlanta, Georgia, as President of the Society. The other new officers also will be installed during the Board Meeting.

The Technologist Section Committees will meet on Friday, June 15. On Saturday, June 16, the National Council will convene, and President Author J. Hall, CNMT, nuclear medicine manager for Numed, Inc. in Denton, Texas, will swear in Bradley K. Pounds, CNMT, technical director of the department of nuclear medicine at St. Luke's Episcopal Hospital in Houston, Texas, as President of the SNM Technologist Section. The other Technologist Section officers also will be sworn in during the National Council Meeting.

For further information contact: Department of Meetings Services, The Society of Nuclear Medicine, 136 Madison Avenue, New York, NY 10016-6760, (212) 889-0717; fax: (212) 545-0221.