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The Johann Jacob Wepfer Award 2011 of the European Stroke Conference to Professor Wolf-Dieter Heiss

Biography

W.-D. Heiss was born in 1939 in Austria. He went to school in Salzburg and studied medicine at the University of Vienna from 1958 to 1964. Very early on, he became enthralled by neurophysiology. He began as a research assistant at the Institute of General and Comparative Physiology in Vienna, a place to which he often returned for scientific work during his clinical education in neurology at the Department of Neurology and Psychiatry of the University of Vienna. In the first years after medical school, he followed an intensive academic trajectory taking in research fellowships at the Massachusetts Institute of Technology (Cambridge, Mass., USA), the Institute of Physiology (Stockholm, Sweden), the Neurosensory Laboratory, State University of New York (Buffalo, N.Y., USA) and the Department of Neurology, State University Minnesota (Minneapolis, Minn., USA). In 1973, he certified for neurology, psychiatry and nuclear medicine. From 1976 to 1978, he was associate professor of neurology at the University of Vienna, and was Head of the Department of Neuro-Nuclear Medicine. In 1978, he became the successor of K.J. Zülch as director of the Max Planck Institute (MPI) for Cerebral Vascular Research in Cologne-Merheim Germany, and Head of the Department of Neurology in Cologne-Merheim, a tertiary care hospital. Two years later, he became director of the newly created independent MPI for Neurological Research in Cologne. This institute was built under his supervision and was in this way connected to the Department of Neurology in Cologne, which in 1985 he headed as a chair. With this unique double affiliation, W.-D. Heiss was able to realize his vision of clinical research – from bench to bedside!

Scientific Vita

In a *quantitative manner*, W.-D. Heiss's scientific vita is impressive, with 544 peer-reviewed publications listed in Pubmed, many of them in high- to very-high-impact journals, including contributions to *Science* and *Lancet*. It is important to note that about 75% of these publications are original contributions, and thus bear witness to a continuously innovative scientific approach. Among the numerous books he has edited or co-edited, *Positron Emission Tomography*, *NeuroPET* and *Textbook of Stroke Medicine* represent milestones in their fields. There are too many honors and prizes to be listed. Among them, however, the 'Bundesverdienstkreuz' 1st class, the Kuhl Lassen Award, the Zülch Award and the WSO Leadership in Stroke Medicine Award deserve special mention. As President of the International Stroke Society (1992–1996), Chairman of the Program Committee (1997–2001) and President of the European Federation of Neurological Societies (2001–2005), he has influenced stroke education, science and treatment on a national as well as international level.

In a *qualitative* manner W.-D. Heiss's contribution to stroke medicine was of utmost importance and may be represented by three major issues:

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Stroke as a Treatable Disease. Growing up in an era in which stroke was neglected by the 'classical' school of neurology and was considered an untreatable disease from the field of internal medicine, W.-D. Heiss was one of the driving forces to pull stroke medicine out of the therapeutic shadow. His scientific contributions to brain perfusion in ischemia, the time concept of ischemia and the viable tissue paved the way for modern stroke therapy, putting pathophysiological knowledge into clinical action: the concept of a neurological intensive care unit in Cologne, one of the first in Germany, was complemented by a ward specialized for stroke patients. This precursor of the today's stroke units was built as early as 1990. More important, the Cologne Project ('Kölner gegen den Schlaganfall') was established in 1990 as one of the first community networks to realize fast and specific stroke treatment and to introduce the 'new therapy' at that time – intravenous thrombolysis. The enormous logistic effort and strong visionary enthusiasm invested in this effort were well rewarded within the Cologne Project; it was a huge success and served as a reference for many community projects to follow.

Development of PET Imaging. Clinical neuroimaging in 1980 was quite limited when compared to the current portfolio. CT scanning was the only method available in routine clinical practice. Although clinically relevant (as it still is today), it could not reveal the complex patterns of stroke pathophysiology in humans. It was the fusion of neurology and nuclear medicine represented by W.-D. Heiss that opened the door to an innovative approach. It is one of his most prominent achievements to have introduced new imaging techniques into stroke medicine. Positron emission tomography (PET) imaging was, and still is, the gold standard for measuring the main determinants of human ischemia. Driven by the quest to find the best imaging modality for human stroke pathophysiology, W.-D. Heiss constantly supported the development of human and experimental PET scanners. A pivotal part of this vision, and a unique feature of the Cologne stroke era, was the use of PET scanners close to the patient. Cerebral blood flow changes and the presence and development of penumbral tissue as the therapeutic target were described, and therapeutic approaches were validated in human stroke in this 'pre-MRI era'. The Cologne PET facility harbored various PET prototypes, and was the 'place to be' for many international companies in the field of PET imaging. Since then, we have seen an exceptional fusion of clinical application and theoretical knowledge.

Penumbra: From Experimental to Human Evidence. Whereas the name of W.-D. Heiss is associated with PET in neurological diseases in general, there is a 'liaison fixe' to the PET-based concept of penumbra. The close cooperation of experimental and clinical groups within the MPI in Cologne paved the way for a unique process of translation from bench to bedside: the concept of the penumbra was visualized in animal PET studies and then applied to human stroke. Various PET tracers were introduced for its use in human stroke, and helped us understand the presence and fate of hypoperfusion (^{15}O-water), viable tissue (^{18}F-FDG, ^{15}O-oxygen, ^{11}C-flumanzenil) and penumbral tissue (^{15}O-oxygen). Some of the milestones were: the first metabolic brain image with ^{18}F-FDG in Germany; the first ^{11}C-FMZ imaging in clinical stroke; the first description of serial changes of perfusion and metabolism early after stroke with and without reperfusion in humans; and the quantitative assessment of the penumbra as the hallmark of the tissue at risk.

W.-D. Heiss's extraordinary scientific vita was always accompanied by a tight clinical affiliation. His clinical presence was formative in the fields of general neurology, neurointensive care and the stroke unit. This combination of clinical neurology and science influenced a new generation of stroke neurologists. In 2005, he retired from his clinical position, but his scientific activity is ongoing. He is involved in current PET imaging studies and in the development of new PET technologies such as the new generation of combined PET-MRI scanners.

We therefore honor an extraordinary personality with an impressive scientific vita. His pioneer work in imaging and treatment of brain ischemia has greatly influenced the current therapeutic concept of stroke. In this respect, he has continued the idea of J.J. Wepfer in its best tradition.

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