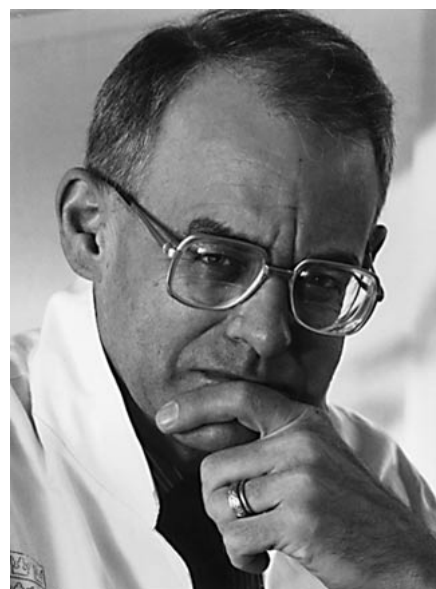


In memoriam

David H. Ingvar

David Henschen Ingvar, one of the major figures in brain physiology and circulation of the 20th century, passed away on September 27, 2000. He was born in Lund, Sweden, February 3, 1924, where he received his school education, including medical school (1943–1950). After research fellowships at the Montreal Neurological Institute (1951–1953), at the Nobel Institute for Neurophysiology (1953–1955) and for the Swedish Medical Research Council (1956–1958), he became Associate Professor of Clinical Neurophysiology and head of the Laboratory of Clinical Neurophysiology in Lund in 1963, and chief of the Department of Clinical Neurophysiology in 1966, a post he kept until 1990. In the meantime, he stayed as a visiting scientist and Fogarty scholar at the NIH (1979–1983), before being appointed Professor of Clinical Neurophysiology at the University of Lund in 1983 and Professor of Organizational Psychology at the Stockholm School of Economics in 1990. Among the numerous offices he held and awards he received, he was Editor of *Human Neurobiology* (1982–1987), President of the International Society of Cerebral Circulation and Metabolism (1983–1985), President of the Swedish Society of Medicine (1984–1985), and recipient of the prize of the Swedish Society of Medicine (1972), the Hugo Spatz award of the German Neurological Society (1979), the Zülch Preis of Max Planck Gesellschaft (1995) and the lifetime achievement award of the International Society of Cerebral Circulation and Metabolism (1997), apart from being appointed Chevalier des Palmes Académiques (1976). He was Doctor of Medicine, honoris causa, from the Universities of Montpellier (1988), Cologne (1989) and Copenhagen (1997).



A primary period in David H. Ingvar's scientific activities was devoted to clinical neurological studies on epilepsy, head injury, EEG and other neurological topics. In Montreal, with Professor Penfield and Jasper, decisive observations were made on the coupling between brain function and brain blood flow. This theme was to be the core object of Ingvar's subsequent brain research.

Late in the fifties and with a first publication in 1961 with Niels A. Lassen, Ingvar devised a new ratio isotope technique to measure regional cerebral blood flow (rCBF)

in animals and man. This technique introduced a new era in experimental and clinical brain research in which rCBF measurements were used to measure variations in regional brain function. Probably more than 1000 publications from laboratories all over the world are based upon this technique. The contributions from Ingvar's laboratory include:

- Important correlations were established between the frequency content of EEG and rCBF and cerebral metabolism. Normal and abnormal EEG patterns could thus be expressed in cerebral metabolic and circulatory terms.
- The function of consciousness could be more deeply analyzed clinically. Special consideration was given to patients with chronic stuporous and comatose states. These studies formed the basis for the author's contribution to the Swedish Government Commission Definition of Death. The conclusions of this commission were conveyed to the Pontifical Academy in Rome.
- Most importantly, the numerous clinical rCBF studies from the author's and adjacent laboratories enabled several new and general conclusions as to the functional organization of the human cerebral cortex. It was found that normal consciousness was accompanied by a seemingly specific distribution of cortical activity which has been termed hyperfrontal. Apparently, frontal mechanisms, responsible for the serial organization of neuronal activity were playing a primary role for the conscious state.
- In 1974, Ingvar presented for the first time new regional cortical patterns related to language perception and production. These observations, later confirmed by others, have prompted a reevaluation of the classical 'Broca/Wernicke' models for cortical speech functions. New lines of immediate implication for neuro-linguistics are at present being worked out.
- Clinical studies in association with Niels A. Lassen included large groups of patients with cerebral vascular disorders, brain tumors, head injury, and epilepsy. New findings were made which in many cases have been the basis for new therapeutic guidelines.

- In the early seventies, a series of papers together with Dr. G. Franzen were published on schizophrenia. For the first time, it was shown that this disorder may be accompanied by a specific 'hypofrontal' rCBF pattern. This finding has been amply confirmed by other workers. It signals a reduced activity in the frontal/prefrontal structures which are responsible for the serial organization of cognition. This 'schizophrenia' pattern may disappear in patients improved by treatment. This is still considered a major working line in the research on this enigmatic disorder.
- Ingvar worked on correlations between various rCBF patterns and symptomatology in dementia. The general CBF level was found to be proportional to the degree of intellectual deficit, with symptoms of dementia correlating with specific regions of reduced rCBF. These studies have been continued most successfully by J. Risberg and L. Gustafsson.
- Lately, Ingvar devoted interest to personality variables and alcohol, with special concern given to will, i.e. the functional pattern in the brain which accompanies willful acts. Here again, prefrontal structures appeared to play a leading role in the internal vision and concepts which precede the enactment of willful movement of speech. It was also observed that the cerebellum participated in willful acts.

Overall, the research conducted by David H. Ingvar encompassed fairly wide sectors of the clinical neurosciences. Together with his collaborators, he has in many ways opened new vistas in clinical neurological as well as neuropsychiatric research. Several of the new findings have brought new light of the pathogenesis of e.g. cerebrovascular disease, head injury and organic dementia, with therapeutic implications.

David H. Ingvar is survived by his wife Elisabet and four children. He will remain as a leading figure in the exploration of the central nervous system during the second half of the 20th century, and also one of the initiators of the reunification of studies of blood circulation, brain and mind.

J. Bogousslavsky, Lausanne