

In memoriam: Gerhard Giebisch, MD, 1927–2020

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Gerhard Giebisch, MD. Used with permission from Giebisch GH. A long affair with renal tubules. *Annu Rev Physiol.* 2011;73:1–28.¹ Copyright © 2011 by Annual Reviews. All rights reserved.

Gerhard Giebisch, MD, Sterling Professor Emeritus of Cellular and Molecular Physiology at the Yale University School of Medicine, passed away on April 6, 2020, at the age of 93. One of the giants in the history of renal physiology, he was legendary for not only his enormous scientific contributions but also his extraordinary personal qualities as an academic leader, mentor, teacher, and friend. We are fortunate that Gerhard himself provided a detailed account of his background, training, and scientific work,¹ and gave a video interview about his life that is available online (<https://www.youtube.com/watch?v=hJKpkhb4DQE>). Accordingly, this tribute will only briefly summarize his biography, while focusing principally on his enormous impact on nephrology, which he was too modest to describe himself.

Gerhard was born in 1927 and raised in Vienna, Austria. His father was a high school teacher of German and French literature, who had a special interest in history. His mother had a love of literature and music and encouraged him to play the piano. Gerhard credited his parents for his lifelong interest in history, literature, and the arts, especially music.

Favorably impressed by the careers of 2 uncles who were physicians, Gerhard chose to pursue medical education at the University of Vienna, from which he received the MD degree in 1951. Gerhard's original career goal was to be an internist. But the influences of 2 memorable teachers were to change the course of his professional life. The first was Franz von Brücke, the Chair of Pharmacology, whose superb lectures convinced him of the importance of physiology as the foundation of medicine. The second was an internist, Erwin Deutsch, who also emphasized basic science as the basis of medicine and advised him to first get 2 years of basic science research training before beginning clinical training. Gerhard fulfilled that requirement by working in the pharmacology department under von Brücke.

While still a student, Gerhard was first introduced to renal physiology by reading a copy of Homer Smith's Porter Lectures that he had been given. He was completely enthralled by the brilliance of Smith's studies using clearance methods to elucidate aspects of renal

physiology and pathophysiology. He then wrote to Homer Smith to request a free copy of Smith's comprehensive book *The Kidney*, and Smith graciously responded by sending it to him. Gerhard also read a book by Otto Spühler on modern methods to study renal function, which led him to contact Spühler and arrange to spend a 3-month period working in his laboratory in Zurich. Gerhard credited this period with Spühler as pivotal to his final decision to devote his life to renal physiology. He returned to Vienna, finished his medical studies, and was appointed Instructor in Pharmacology in 1951. His first original paper was on the effects of mercurial diuretics and was published in 1952. However, Gerhard was becoming increasingly interested in visiting the United States to learn the newest methodologies in renal physiology.

To improve his English, Gerhard had been corresponding for 5 years with a young woman named Ilse Riebeth, the daughter of close family friends who had emigrated from Austria to Milwaukee, Wisconsin. She was an outstanding pianist, and they shared a love for music. The Riebeth family helped arrange for Gerhard to obtain a rotating internship at the Milwaukee Hospital during the 1952–1953 academic year. He and Ilse were married in 1952, the beginning of a wonderful life together that lasted 56 years until her passing in 2008.

After completing his internship, Gerhard moved to the Department of Physiology at Cornell University Medical College in New York to train as a postdoctoral fellow with Robert Pitts from 1953 to 1954. Gerhard was Instructor in Physiology at Cornell during 1955–1956, and then returned to Austria to become Assistant Professor of Pharmacology at the University of Vienna in 1956. After only 1 year, he returned to the Department of Physiology at Cornell, where he was Assistant Professor from 1957 to 1960, Associate Professor from 1960 to 1965, and Professor from 1965 to 1968. In 1968, he was recruited to Yale as Professor and Chair of Physiology. Gerhard was named Sterling Professor of Physiology, Yale's highest honor, in 1970. He served as Chair of Physiology from 1968 to 1973.

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Trainees

J. Aceves	J. Horisberger	M. O' Regan
S. Agulian	M. Hropot	Y. Ridderstrale
J. Bahlmann	M. Hunter	S. Sansom
M. Bailey	P. Jaeger	L. Schild
F. Beck	B. Karlmark	J. Schnermann
J. Beck	K. Kawahara	A. Schwab
B. Biagi	R. Khuri	M. Sohtell
E. Boulpaep	R. Klose	K. Spring
G. Capasso	F. Knauf	B. Stanton
A. Cassola	B. Koeppen	N. Strieder
D. Cemerikic	M. Kubokawa	J. Sullivan
Y. Chan	T. Kubota	L. Sullivan
B. Cohen	D. Landwehr	K. Tsuchiya
M. de Mello-Aires	J. Leipziger	R. Unwin
J. Diezi	R. London	C. Wagner
C. Duarte	A. Lopes	T. Wang
M. Field	M. Lu	W. Wang
J. Geibel	G. MacGregor	P. Welling
S. Glabman	C. McNicholas	S. White
E. Gonzales	J. Merot	G. Whittembury
J. Graf	G. Malnic	M. Wiederholt
A. Grandchamp	Y. Matsumura	C. Wilcox
R. Green	S. Muto	F. Wright
W. Guggino	H. Oberleithner	A. Zweifach
S. Gullans	A. Omerovic	

Figure 1 | List of trainees.

For over 60 years, Gerhard devoted his scientific career to the study of the mechanisms of renal electrolyte and acid–base transport and their regulation. Although he made major contributions to the understanding of sodium, chloride, and acid–base transport, his favorite electrolyte was clearly potassium. Upon coming out of anesthesia after major surgery some years ago, his first words were “How is my potassium.” It was not immediately clear if he was asking about his serum potassium level or the welfare of a beloved old friend.

As a young scientist at Cornell, Gerhard had become fascinated by the renal handling of potassium, which had been postulated to occur by sequential filtration, reabsorption, and secretion, based on the results of clearance and stop-flow studies. He decided that to investigate this problem directly he would need to learn how to study single tubules by micropuncture methods. This was a courageous decision that required Gerhard to go beyond the clearance methods then in wide use by the foremost renal physiologists of the day, including his mentor Robert Pitts. Gerhard spent 6 months learning micropuncture methods from Phyllis Bott in Philadelphia, who herself had learned the techniques from A.N. Richards. In addition to learning how to puncture tubules *in vivo* in anesthetized animals and to collect nanoliter quantities of tubular fluid, there was the additional challenge of measuring the amount of sodium and potassium in the tiny samples. Gerhard became aware that Paul Müller had

developed a method for measuring Na and K in single nodes of Ranvier, and he enlisted Müller's help to build an ultramicro flame photometer that could be used to analyze tubule fluid samples. Following their design, similar instruments facilitated micropuncture studies in laboratories around the world. The rapid adoption and adaptation of new techniques would prove to be an enduring characteristic of Gerhard's research career. Gerhard's first postdoctoral fellow was Gerhard Malnic from Brazil. Their initial paper together used these recently adapted micropuncture and micro-analytical methods to map sites of reabsorption and secretion of potassium along the nephron,² a study that has been recognized as a classic in renal physiology.³

Over the subsequent years, Gerhard and his group were the leaders in applying diverse methods to define the molecular and cellular events in potassium transport and its regulation. Examples of their contributions included use of electrophysiological methods to determine driving forces for potassium transport across individual cell membranes of tubule cells, development of a cell model for potassium secretion in the distal nephron, description of the factors that regulate potassium secretion in the distal nephron, and use of patch-clamp methods to define the properties of apical membrane channels responsible for potassium secretion and the molecular mechanisms of their regulation. Although using progressively more reductionist techniques,

Gerhard's goal was always to gain an integrated understanding of overall potassium homeostasis. Indeed, taken as a whole, his work is largely responsible for much of our current understanding of the mechanisms underlying the physiology and pathophysiology of renal potassium excretion.

Gerhard's monumental contributions to renal physiology were recognized by many national and international honors, including the Homer Smith Award of the American Society of Nephrology in 1971, the Johannes Müller Medal of the German Physiological Society in 1980, election to the Austrian Academy of Sciences in 1981, election to the American Academy of Arts and Sciences in 1983, election to the National Academy of Sciences in 1984, election to the Deutsche Akademie der Naturforscher Leopoldina in 1988, the Franz Volhard Medal of the German Nephrological Society in 1988, the Ernst Jung Prize for Medicine in 1990, the A.N. Richards Award of the International Society of Nephrology in 1993, the Robert W. Berliner Award of the American Physiological Society in 1994, the John P. Peters Award of the American Society of Nephrology in 2006, and honorary doctorates from Uppsala University, the University of Bern, the University of Lausanne, the University of Vienna, and the University of Connecticut.

Above and beyond his monumental scientific contributions, Gerhard arguably had even greater impact on international nephrology by virtue of his role as an extraordinary mentor. A list of his trainees, which may be incomplete, is shown in [Figure 1](#). Gerhard cared very deeply about his trainees as people, and they in turn revered him as an older brother, father, or grandfather figure, depending on their age. Dozens of his trainees achieved success as professors and department chairs around the world. As they pursued their independent careers, many of his trainees continued to collaborate with Gerhard, in some cases over the span of decades. In addition to his powerful positive impact on the careers of his direct trainees, Gerhard was widely known for providing encouragement and advice to young investigators who had never been in his lab but whose talent he recognized. Many of these individuals also became his close friends.

Closely related to his commitment to training future leaders as a mentor, Gerhard was very strongly committed to service and excellence as a teacher. In addition to teaching physiology to medical students at Yale, he

frequently was guest lecturer in physiology courses in medical schools around the world, including the University of Vienna. Moreover, Gerhard regularly participated in renal physiology master classes and courses around the world for trainees and young investigators, an activity he maintained into his late 80s. His educational contributions also included co-editorship with Donald Seldin of the leading textbook in the area of renal physiology, *The Kidney: Physiology and Pathophysiology*, first published in 1985. A byproduct of their work together on this book was that Seldin became one of Gerhard's closest friends.

Gerhard also made enormous contributions to nephrology as an exemplary academic leader at the local, national, and international levels. As mentioned, he was recruited to Yale to be Chair of Physiology. Yale had a strong tradition of kidney research in the Department of Medicine dating from the era of John Peters, but there had been little if any kidney research in the Department of Physiology at Yale prior to his recruitment. In his roles as chair and then as director of a large program project grant, Gerhard was the driving force behind the growth of the department into one of the world's leading centers for kidney physiology research. Indeed, reflecting his influence, over the past 40 years, the department has had a succession of outstanding kidney physiologists as chair, including Emile Boulpaep, Walter Boron, Steven Hebert, and Michael Caplan. Beyond Yale, his many positions included service as President of the American Society of Nephrology and President of the Society of General Physiologists, as well as innumerable editor and editorial positions, study section memberships, and council positions in academic societies. Gerhard served the International Society of Nephrology as a member of its Executive Committee, and he was the founding director of the society's *Forefronts in Nephrology Symposia* that brought access to the latest advances in kidney research to investigators and trainees all over the world.

On a personal level, Gerhard was widely admired and respected for his humility, integrity, kindness, and generosity. He had insatiable intellectual curiosity and read widely about philosophy, history, and economics in addition to science. He instinctively rejected dogma and dogmatic thinking whether in politics, economics, or renal physiology. Perhaps this perspective came from his observations of the devastating effects of dogmatic political and

economic movements (e.g., nationalism, fascism, communism) during his lifetime. But this way of thinking also reflected his predisposition to expect and accept the complexity that underlies the real world. Some years ago, there was a heated dispute between 2 prominent investigators about whether proximal tubule chloride transport was virtually all paracellular or transcellular. Gerhard's comment was that "someone from Vienna would surely know it is a little of this and a little of that." Moreover, at the core of his humility was his intellectual gift for acknowledging and embracing uncertainty in our state of knowledge. He liked to point out that answering questions in science leads to new questions, so "we remain confused but confused on a higher level." He was fond of quoting Montaigne: "Le beaucoup savoir apporte l'occasion de plus douter" (a lot of knowledge brings the opportunity to doubt more).

Gerhard sought and appreciated beauty in multiple forms. He appreciated the beauty to be found in not only the intricacies of renal physiology but also art, literature, and music, especially opera. He enjoyed the beauty of

driving his old second-hand Porsche along the semi-rural roads of Connecticut. He took special pleasure in the beauty of nature, particularly as observed in his annual mountain climbing expeditions in the Alps with his dear friend Heini Murer.

Gerhard enjoyed the love and support of his family, as he was a devoted husband, father, and grandfather. He is survived by his daughter Christina Giebisch and her husband Peter Mohrer, by his son Robert Giebisch and his wife Ninrong Giebisch, and by his four grandchildren, Daniella and Marisa Mohrer, and Allison and Daniel Giebisch.

Gerhard was also loved and is survived by his worldwide academic family, who will remain forever grateful for the gift of the magnificent life he lived.

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