Selected References


Carolina’s Contributors to Nephrology

CARL W. GOTTSCHALK, MD
Kenan Professor of Medicine and Physiology

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Dr. Carl William Gottschalk, the 1990 Norma Berryhill Distinguished Lecturer, is Kenan Professor of Medicine and Physiology and Acting Chair of the Department of Physiology in the School of Medicine. He is a Career Investigator of the American Heart Association.

Recognized worldwide for his fundamental and generative contributions to the understanding of renal physiology, Dr. Gottschalk has revolutionized his science and inspired some of the most brilliant and productive investigators in the field. He is one of this university’s—indeed, one of this country’s—most eminent medical scholars and statesmen.

A native of Salem, Virginia, Dr. Gottschalk received his undergraduate degree at Roanoke College and earned his medical degree at The University of Virginia. Following an internship in medicine at Massachusetts General Hospital, he joined the US Army Medical Corps and collaborated in studies of the effects of extreme cold on human endurance and performance.

Dr. Gottschalk returned to Boston as a Research Fellow in Physiology at Harvard Medical School and then served a residency in medicine at Massachusetts General Hospital.

In 1952, he and his young family joined several of his friends and colleagues who had come to Chapel Hill that year to help establish the clinical program of The University of North Carolina School of Medicine, which was expanding from a two-year to a four-year curriculum. He joined the faculty as a fellow in Cardiology.

As a cardiologist, Dr. Gottschalk was particularly interested in the mechanisms involved in congestive heart failure and other heart problems related to the excretion of salt and water. He had studied hemodynamics of the kidney during his fellowship at Harvard and was intrigued by the relationship between the physiology of the two organ systems. Shortly after coming to Chapel Hill, he resumed his stud-
ies of renal physiology and began work on the countercurrent theory of urinary concentration.

The countercurrent theory explained how the kidney is able to excrete a fluid that is osmotically more concentrated than any of the other body fluids. The theory, to which few physiologists in the mid-1950s subscribed, held that the concentration of urine varies as it flows in opposite directions through parallel tubes of the nephrons of the kidney.

Dr. Gottschalk was the first to prove the countercurrent theory, using a technique called micropuncture, which he helped revive. The micropuncture technique had been developed in the early 1920s by Dr. A. N. Richards at The University of Pennsylvania. Using small glass pipettes to puncture nephrons and extract fluid from frog kidneys, he made important discoveries about the function of the kidney.

(Dr. Richards’ original collaborator and coauthor of the first paper on micropuncture was Dr. Joseph T. Wearn, who later became Chief of Medicine at Western Reserve University in Cleveland. Dr. Wearn’s first medical resident was Dr. Reece Berryhill.)

The micropuncture technique showed early promise, but because of difficulties in using it to study mammalian kidneys, its usefulness as a research tool was limited. By the end of World War II, virtually no one was using it. Dr. Gottschalk was among those who recognized its potential, and he refined the technique so that it could be used to study the complex segments of mammalian kidneys.

In demonstrating the validity of the countercurrent theory, he proved the enormous value and almost limitless application of micropuncture. His work literally turned the field of kidney physiology around.

Dr. Gottschalk’s refinement of micropuncture permitted, for the first time, detailed study of the function of individual nephrons, the precise location of various processes along the nephron, and an examination of how these activities are disturbed in kidney disease.

In 1961, when Dr. Gottschalk was made a Career Investigator of the American Heart Association, he chose to devote his energies entirely to research and teaching rather than to continue as a practicing physician.

For many years, Dr. Gottschalk’s laboratory was the world’s most popular and prestigious training ground for renal physiologists. Scientists who were already well established in the field—and who are now its leaders—came from Paris, Frankfurt, and Munich to work with Dr. Gottschalk and to learn his techniques.

In addition to his landmark discoveries involving urine concentration, Dr. Gottschalk has made significant contributions to the understanding of the mechanisms of urine acidification, the dynamics of water and electrolyte transport in the kidney, the regulation of renal blood flow, and the homeostatic regulation of sodium excretion.

Because of his exceptional scientific achievements, Dr. Gottschalk was named a charter member of the Institute of Medicine in 1973 and was elected to membership in the National Academy of Sciences in 1975. He is also a member of the American Academy of Arts and Sciences.

In 1966, he was one of ten scientists selected by Modern Medicine magazine to receive its Distinguished Achievement Award. He received the North Carolina Award for outstanding scientific achievement in 1967, the Homer W. Smith Award of the New York Heart Association in 1970, and the National Kidney Foundation’s David M. Hume Award in 1976. Also in 1976, he was elected President of the American Society of Nephrology.

Dr. Gottschalk was the 1978 recipient of the O. Max Gardner Award, given annually to the faculty member in the 16-campus University of North Carolina system who is deemed to have made “the greatest contribution to the welfare of the human race.” In 1990 he shared, with two other renal physiologists, the A. N. Richards Award of the International Society of Nephrology for their work on the countercurrent mechanism.

Dr. Gottschalk’s magnificent contributions to biologic science, to clinical practice, to teaching, and to the development of the School of Medicine, the University, and North Carolina reflect his brilliance, his wisdom, his standards and values, and his commitment to the welfare of humankind.

His scientific contributions, important in themselves, have opened great new fields of understanding. His clinical contributions have changed the thinking and practice of nephrology. As a true statesman of biologic science and medicine, Dr. Gottschalk has shaped science and society. His marks are enduring.

Editors’ Note: Not recorded in the original biographical sketch of Dr. Gottschalk was his leadership in chairing the national committee that recommended to the federal
government that funding for chronic dialysis be provided to those Americans suffering from chronic renal failure. Congress authorized such a program and it has provided care for hundreds of thousands of patients since that time. The 1967 report of the committee he chaired is cited in the Selected References and a copy is available in the Health Sciences Library on the campus of The University of North Carolina at Chapel Hill.

Dr. Carl Gottschalk died suddenly in Chapel Hill on October 15, 1997. During his professional career he assembled one of the world’s most renowned private collections of rare books and manuscripts on the anatomy and physiology of the kidney. After his death his widow, Susan Fellner, MD, and Gottschalk’s three children, Carl, Walter, and Karen, donated the collection to The University of North Carolina Libraries. It is now housed as the Gottschalk Collection in the Rare Book Room of the Wilson Library on the University’s main campus. The collection has been indexed and is now accessible to scholars around the world through the Internet.

Carolina’s Contributors to Nephrology

Dean Bondurant, Mrs. Berryhill and family, my family, Dr. Hershey, Dr. Rendleman, new members of the faculty, and friends:

It is a great honor and privilege to give the Norma Berryhill Lecture, and I am deeply grateful for the honor and the opportunity. My only regret, and I’ve discussed this with Norma earlier, is that Reece [Berryhill] and [my wife] Helen can’t be here. But although I can’t spot them in the audience, we know they are with us.

Soon after my young family and I arrived in June 1952, Helen had a visit from Mrs. Berryhill to welcome us to Chapel Hill. The visit was especially appreciated since I was only a fellow. Mrs. Berryhill was sincere and hospitable, which we came to realize were only two of Norma’s many outstanding qualities. Norma’s personal efforts did much to create the atmosphere which makes The University of North Carolina School of Medicine such a special place. Later, Norma and Helen were both staunch members of the Chapel Hill Investment Club. The name is impressive, but the stakes penny ante, and I hope the Berryhill fortunes were increased more than ours were.

I’ve chosen to talk about Carolina’s contributors to nephrology. For our nonmedical friends, let me define nephrology. Nephrology is the scientific study of the kidney, its anatomy, physiology, pathology, and those disturbances which can be medically treated, including by dialysis. This is in contrast to urology, which concerns itself with the surgical treatment of diseases of the kidney and lower urinary tract.

My colleagues and I soon realized that the UNC School of Medicine was well known outside of Chapel Hill for three areas. One was the area of hemostasis and hemophilia, led by our two distinguished colleagues, Dr. Kenneth Brinkhous and Dr. John B. Graham, the first Norma Berryhill lecturer. The second area was psychiatry.
Dr. MacNider was born in Chapel Hill in 1881 and lived there almost his entire life. He graduated from the University in 1899 and, in 1903, received an MD from the University's School of Medicine in Raleigh. After two years of postdoctoral studies, he was appointed Professor of Pharmacology and Bacteriology. In 1918 he was one of the first five faculty members to be honored as Kenan Professor. From 1937 to 1949 he served as Dean of the Medical School. Dr. Berryhill was the Assistant Dean and, I suspect, actually ran the dean's office. Dr. MacNider died in 1951. I regret very much that I did not have the chance to meet him.

Dr. MacNider's main professional interests and investigations related to the effect of a toxic heavy metal, uranium, on the structure and function of the kidney. He found that the administration of uranium to dogs produced various forms of acute and chronic nephritis, the course of which he followed by microscopic observations on kidney tissue and measurements of blood and urine composition. Although the uranium salts which he used were nonradioactive, they became of interest to the biologists studying the effects of ionizing radiation from uranium during the development of the atomic bomb. In fact, our long-term colleague, Dr. Thomas Barnett, became familiar with Dr. MacNider's work in the early 1940s when he was working with the Manhattan Project.

Dr. MacNider identified several types of repair of kidney tubules injured by uranium. Very interestingly, he demonstrated that a particular microscopic pattern of cellular repair was associated with good functional recovery. Furthermore, and surprisingly, a kidney, once damaged, acquired resistance to injury from subsequent insults with uranium. As happens not infrequently in science, this phenomenon has been rediscovered in recent times, but the mechanism of resistance is still uncertain. Dr. MacNider made another observation early on that he returned to repeatedly, namely, the influence of age on the susceptibility of animals to the toxic effects of uranium and volatile anesthetic agents. In his acceptance remarks following presentation of the prestigious Kober Medal of the Association of American Physicians in 1941, Dr. MacNider attributed this discovery to the keen attention of the laboratory janitor who served as his part-time technician.

These scientific observations were the credentials for Dr. MacNider's election to membership in the National Academy of Sciences, the American Philosophical Society, and the American Academy of Arts and Sciences.

Dr. MacNider's early observations on the influence of age on susceptibility to various toxic agents became an increasingly active part of his scientific thinking and, in his later years, he was instrumental in the establishment of geriatrics as a discipline. He insisted that there should be a clinical specialty that dealt with the aging population, just as there was a specialty, pediatrics, for care of people in their early years.

Throughout most of the time he was conducting his laboratory research, he remained involved in the practice of clinical medicine and was revered as the true country doctor whose readiness to care for the sick never lessened.

In his memorial tribute, Chancellor House said "I know of nothing of any significance in any department or field of university effort which Dr. MacNider had not lovingly and thoughtfully considered and advised on with perfect frankness and sincerity."

Dr. MacNider's love of his garden and his flowers was legendary, and, in his thoughtful way, he frequently made presents of a particularly beautiful flower or other small gift to his friends, with or without some occasion to celebrate. Religion meant much to Dr. MacNider and the famous but crusty renal pharmacologist, Dr. A. N. Richards, whom he greatly admired, has been quoted as saying, "He was on startlingly intimate terms with Jesus."

The present nephrology program began in 1952, when Dr. Charles Hoyt Burnett came to Chapel Hill as Chair of Medicine and Chief of the Medical Services at the newly opened North Carolina Memorial Hospital. The founding chairs recruited by Dean Berryhill were inspired selections. With Dean Berryhill, they established the high standards for the clinical departments and directed the development of a small two-year medical school into one of the most outstanding medical schools in the country.

Dr. Burnett was born in 1913 in Colorado and received his AB and MD from the University of Colorado. Following this he came east for training in pathology at the Presbyterian Hospital in New York and in medicine at the Boston City Hospital and the Massachusetts General Hospital. His interest in metabolism, a combination of
endocrinology and nephrology, began while he was a resident at the Massachusetts General Hospital and working with Dr. Fuller Albright, a pioneer in metabolic bone diseases. Dr. Burnett had a distinguished career in the Army Medical Corps in Europe during World War II and was a member of a group that studied the severely wounded. The observations of this task force shed light on the use of blood in treating shock and the effects of shock on kidney function.

I first met Chuck in January 1946. I was an intern at the Massachusetts General Hospital, and Chuck had come back as Chief Resident in Medicine to refresh his general medical skills. I remember him so well as a vigorous, take-charge young man. He was highly motivated and dedicated to the care of the patient as an individual and, at the same time, interested in the pursuit of new knowledge by clinical investigation. He was quite a role model for me and many others. For the next three years he was a member of Dr. Chester Keefer’s staff at Boston University, where he pursued his studies of the complicated interrelations between bone disease and the kidney. He described the milk-alkali syndrome, now known as the Burnett syndrome, which is the result of overuse of alkaline salts and excessive ingestion of milk, and, with others, provided the first description of vitamin D–resistant rickets. He continued his interest in rickets with Dr. Graham and others while at UNC.

During his 13-year tenure as chair, he recruited faculty of the highest caliber and set standards that were high because they were his own. He was a gentle man, but a dynamic and forceful leader who had the ability to bring together diverse views. He felt strongly about the importance of the Medical School’s link to the University and believed that medical scholars should associate themselves with the humanists. Unfortunately, while at the height of his powers, he was afflicted with a chronic debilitating illness that resulted in his death in 1967 at the age of 54.

With Dr. Burnett’s selection of Louis Gordon Welt as Chief of the Division of Metabolism, the Department of Medicine’s position as a leader in nephrology was assured. Lou was a product of Yale University and proud of it. He received his MD and his clinical training there. In 1942 he joined the 39th General Hospital, the Yale Unit, which was dispatched to the Pacific theater of operations. He had a distinguished military career and was awarded the Bronze Star for his contributions to military medicine. He returned to Yale and was associated with Dr. John P. Peters, his “medical father.”

Following Chuck’s retirement in 1965, Lou took over as Chair of Medicine and served until 1972, when he left to become Chair of the Department of Medicine at Yale. He died on a Sunday evening in 1974 while at work in his office. At the time of his death Lou was the most outstanding nephrologist in this country; witness his position as President of the American Society of Nephrology, Chair of the Scientific Advisory Board, and President of the National Kidney Foundation, member of the Council of the National Institutes of Arthritis and Metabolic Diseases, member of the Institute of Medicine, and author or coauthor of the two best American books on nephrology. In fact, his pioneering text, Diseases of the Kidney, which he coedited with his longtime friend and colleague Dr. Maurice B. Strauss of Boston, did much to establish the practice of nephrology as a recognized specialty. Lou’s stature resulted from a constellation of achievements in research, in teaching, and at the bedside; through his writings and by his leadership in affairs of nephrology on the national scene; and from his powerful personality.

Early on he was interested in disturbances of body fluids and electrolyte metabolism and their effect on kidney function and, in later years, the introduction into the clinical sphere of the fundamental concepts of membrane transport and the consequences to the patient of disturbances of membrane phenomena. It is in this latter area as the “translator,” to use Lou’s term, that I think he made his major contributions. Lou was comfortable as a clinician and as a laboratory investigator and was usually adept at wedging the principles of basic science to the art of clinical medicine.

On their arrival in Chapel Hill, Drs. Burnett and Welt immediately established training programs. The first year, 1952–1953, there were two trainees in the Department of Medicine; Dr. Oscar Thorpe worked for Dr. Welt, but left the field of nephrology for hematology and has had a distinguished career at The University of Virginia. I was the other trainee, a fellow in clinical cardiology working for Dr. Ernest Craigie, who was the Cardiology Division.

For 35 years there has been an NIH-sponsored training program in nephrology, which, from the beginning, as determined by Lou, has emphasized an intensive experience in bench research. Since more than 100 individuals have received their post-doctoral training in the Nephrology and Renal Physiology Divisions, it is impossible to comment on each of them; I can tell you that their number has been large, their quality high, and their careers successful.

However, I do want to mention several people. In the second year of Lou’s program he had two outstanding trainees: Drs. Walter Hollander and T. Franklin...
Williams. Walter was primarily interested in electrolyte disturbances as they affected the kidney. He became the first Director of our Clinical Research Unit and, at the time of his retirement, was Professor of Medicine. Frank Williams, although interested early on in membrane transport, became a leader in the field of gerontology and is the Director of the National Institute of Aging. You will recall that Frank was the principal speaker when Taylor Hall was dedicated just a year ago.

Dr. Christopher C. Fordham III was also one of Lou’s trainees. After his research training and practice of nephrology he followed up his flair for administration. As you well know, he has had an extremely distinguished career, including service as Dean of the School of Medicine, Vice Chancellor for Health Affairs, and Chancellor. Last year we were glad to welcome Chris back to the division when he retired as chancellor.

Following the departure of Dr. Welt for Yale, Dr. William B. Blythe became Chief of the Division of Nephrology. For 17 years Bill has been the intellectual and organizational force behind the Nephrology Division. Following completion of the two-year medical program here in 1951, he transferred to Washington University, St. Louis, for his MD. He returned to Chapel Hill for his clinical training and a fellowship in nephrology under Dr. Welt. Bill has conducted important studies on the control of salt excretion by the kidney and on other subjects. He is the consummate physician’s physician and, with his interest in clinical investigation, it was only natural for him to succeed Dr. Hollander as Director of the Clinical Research Unit.

Two other members of the Nephrology Division, Drs. Arthur L. Finn and Hillel J. Gitelman, were also trainees of Dr. Welt before joining the faculty. In addition to his participation in clinical activities, Arthur has a primary interest in volume regulation in isolated epithelia and the physiology of chloride channels. As you know, hypertension is now treated by drugs that block calcium channels.

Hill continues his longtime interest in metabolic bone disease in renal failure and has made important studies regarding aluminum, calcium, and phosphorus metabolism.

Dr. William D. Mattern has long been interested in clinical aspects of acid/base balance and treatment of kidney failure by dialysis. Like Dr. Fordham, he has a flair for administration and for some years has served as Associate Dean for Academic Affairs.

Dr. William E. Finn joined the faculty following a training period in the Micropuncture Laboratory, where he was involved in studies of acute renal failure of the type that interested Dr. MacNider. He has continued these studies in imaginative ways and is now the Medical Director of our Renal Transplant Program.

Dr. Ronald J. Falk, a graduate of our School and a clinical trainee in our division, received training in immunology at The University of Minnesota. He is interested in the basic immunological aspects of vasculitis and glomerulonephritis and has established the North Carolina Glomerular Disease Collaborative Network. I find it a very positive development that our division is collaborating with nephrologists in private practice to establish new directions for clinical care and research.

When I was in medical school, I became interested in cardiovascular-renal pathophysiology, especially the pathogenesis of hypertension and of congestive heart failure. I remember so well when the famous paper by Jim Warren and Gene Staud was published in 1944, proposing a totally new view of the mechanism of excess accumulation of salt and water in congestive heart failure. I spent two years as a research fellow in the Harvard Medical School’s Physiology Department, which had a strong cardiovascular orientation. It was only natural that I should study the excretion of salt and water as determined by the blood flow and pressures in the kidney. While there, I completed a study of the renal tissue pressure, but my techniques were crude; it was properly called a "crowbar study." I knew that the study should be redone by micropuncture; that is, by using a very small pipette to measure the pressures in single capillaries and at various points along individual nephrons of the kidney. The nephron is a long, thin, tubular structure which filters blood and forms urine. Each human kidney has about one million nephrons.

I was determined to perform micropuncture experiments at the earliest opportunity. Thanks to Ernie Craige’s enlightened view of what were proper investigative activities for a young member of the Cardiology Division and two grants, each for $1,000, from the Edgecombe-Nash Heart Association, I was able to obtain the required equipment and started my research career at Chapel Hill with a study of the hydrostatic pressures in the capillaries and tubules of the rat kidney.

I did not realize at the time how fortunate I was when Ms. Margaret Mylle, who had a master’s degree in biology from Mount Holyoke, came by looking for a job. It soon became apparent that Peggy would be far more skillful than I at all of the micromanipulations. In addition to her marvelous technical skills, she made substantive and imaginative contributions to our research.

Micropuncture studies of kidney function were begun in the 1920s by Dr. Joseph
T. Wearn and continued in the laboratory of Dr. A. N. Richards at The University of Pennsylvania until the start of World War II. When Dr. Wearn took over as Chair of Medicine at Western Reserve in the 1930s, he recruited Dr. Berryhill as his chief resident. During Dr. Wearn’s visits to see Norma and Reece in the late part of the urinary tubule.

Medicine at Western Reserve in the 1960s and 1970s they made sure I had the opportunity to become acquainted with him and to demonstrate our micropuncture efforts to him.

In the 1950s, one of the great mysteries in renal physiology was how the mammalian kidney was able to elaborate a urine that is osmotically more concentrated than all of the other fluids in the body. The conventional wisdom, that of Dr. Homer W. Smith, the dean of renal physiology, was that it occurred by active transport of water out of the last part of the urinary tubule. Smith recognized that there was a problem with his hypothesis since there are no proven examples in the animal or plant kingdoms of the active transport of water. In essence, water was supposed to flow uphill against its activity gradient. A totally different hypothesis, the countercurrent mechanism for urine concentration, which required no active transport of water, had recently been proposed by the Swiss physical chemist Dr. Werner Kuhn and his physiologist associate Dr. Heinrich Wirz. Their data were not conclusive and, since the hypothesis disputed the gospel as proposed by Smith, it was rejected out of hand.

Having had no training in renal physiology, I found the countercurrent hypothesis attractive. It proposed that only a small area in the interior of the kidney, the medulla, would be made osmotically concentrated by the pumping of salt out of the loop of Henle, the hairpin-shaped section of the nephron that dips into this part of the kidney. The final urinary concentration was postulated to result from the simple diffusion of water out of the last part of the kidney tubule into the hypotonic medullary interstitium.

So Peggy and I embarked on the odyssey of learning how the kidney osmotically concentrates urine. We first confirmed and extended earlier studies and were finally able to achieve the ultimate goal of obtaining for the first time by micropuncture samples of fluid from the loop of Henle itself. As postulated by the countercurrent hypothesis, the tubular fluid was initially osmotically concentrated in the descending limb of Henle’s loop, then diluted in the ascending limb by the sodium pump, and finally concentrated in the terminal part of the tubule as it exited through this part of the kidney. All water movement was by diffusion. The results were unequivocal. The countercurrent mechanism was established, and the former hypothesis for the osmotic concentration of urine had to be abandoned. The precise details of how it all works remain elusive, but the course of events was certain.

Our micropuncture techniques allowed us to tackle many more problems concerning transport functions of the several parts of the nephron in normal kidneys and in kidneys of animal models of human disease. The difficulty is that with micropuncture you can obtain only a vanishingly small sample of fluid—literally microscopic in volume. It was obvious that radioactive isotopes, which had become available by then, would allow us to study many substances without the necessity of developing chemical techniques that had to be tailor-made for each. In 1958, my long-term colleague, Dr. William E. Lassiter, joined us as the first trainee in the Micropuncture Laboratory. Bill brought skills in the use of radioactive isotopes. This opened new frontiers for us, and these techniques are still in use worldwide today.

There are three other individuals who are independent investigators in the Chapel Hill Micropuncture Laboratory. All began as trainees and because of their exceptional talents became members of the faculty and then advanced to senior positions. They are Drs. William J. Arendshorst, Romulo E. Colindres, and Nicholas W. Moss.

In recent years Rom has been most interested in the control by the renal nerves of salt and water excretion and the interrelations between neural and humoral mechanisms. He is a pioneer and a recognized expert in this field. The neural control of kidney function has been a major interest in the Micropuncture Laboratory for approximately 15 years. I had stumbled onto the problem when I was a research fellow in the Harvard Physiology Department working with Dan Tosteson, then a medical student and now Dean of Harvard Medical School. For many years I had wanted to come back to the topic, but thought it wise to wait until we had an expert group of neurophysiological mechanisms. This Dr. Edward Perl and his colleagues in the Department of Physiology have done.

Dr. Moss has added a new dimension to the study of the renal nerves. Previously we had studied only the effect of nervous impulses going to the kidney from the central nervous system. Nick has studied the nerves carrying impulses from the kidneys to the central nervous system and has described two previously unknown classes of neuroreceptors. These studies continue in normal rats and in rats with spontaneous hypertension, which serve as a model of essential hypertension in the human. The study of these animals is of particular interest to Dr. Arendshorst, and he has made significant contributions to the neurohumoral mechanisms involved in the genesis of
their hypertension. Bill has also made very fundamental studies of filtration dynamics in the glomerulus and the feedback mechanism which couples the two major functions of the kidney, the rate of glomerular filtration and the rate of tubular reabsorption.

In closing, I want to tell you about a very promising development in the Division of Nephrology. As all of us are well aware, these are difficult times for academic pursuits. The national and state economies are in decline and state support of the University has been severely reduced. The funding of biomedical research through the National Institutes of Health and the National Science Foundation has reached the disaster stage. No longer can investigators count on their grants being funded, even though they come up with new ideas, work diligently, and have a strong track record of research productivity.

At what could not be a more propitious time, Dr. Blythe has designed a plan to establish the Center for Excellence in Nephrology to ensure that the Nephrology Division's status can be maintained and strengthened. The Center of Excellence will be a valuable source of information and assistance for the nephrologists of North Carolina and the world. It will teach and train future nephrologists, ensure the continuation of an excellent investigative unit, and be a leader in patient care. The objectives will include a professorship in nephrology, a faculty endowment fund for clinical and basic research, fellowships for training in nephrology, and the establishment of a Practicing Nephrologist in Residence Program, whereby nephrologists in practice can come to Chapel Hill for a period of intellectual stimulation and refurbishment while their practice is covered by one of our clinical fellows.

Bill has organized a group of outstanding nephrologists from across the state, chaired by our longtime colleague Dr. Joseph D. Russell from Wilson, to accomplish this. The group has already raised an impressive amount of their initial goal of $2 million. The effort could not be more timely, and it leaves me with great confidence in the future of nephrology at The University of North Carolina.

Thank you very much.

Selected References


