

Remembering Roy K. Greenberg, MD

Friends and colleagues share fond memories of Dr. Greenberg and consider the legacy of an extraordinary vascular pioneer.

When we learned that Roy K. Greenberg, MD, had passed away in December 2013, we were deeply saddened. For the beautiful family he cherished above all; for the friends who savored every moment with him, long before they knew he was sick; for the students whose abilities to save lives were enhanced under his eye; for the next generation of students, who will not have that opportunity; for the countless lives he has prolonged, and the many more he has made more enjoyable, either directly or by extension.

Dr. Greenberg was a giant of a man with elite skill, intellect, acumen, and above all, an eternally kind and generous heart. We will never be without his inspiration—his firm encouragement to strive for more and better. We are fortunate to have counted Dr. Greenberg as a friend and trusted advisor. In the pages that follow, we offer thoughts on his profound legacy and some personal memories, shared by just a few of the many close friends he made throughout his career.

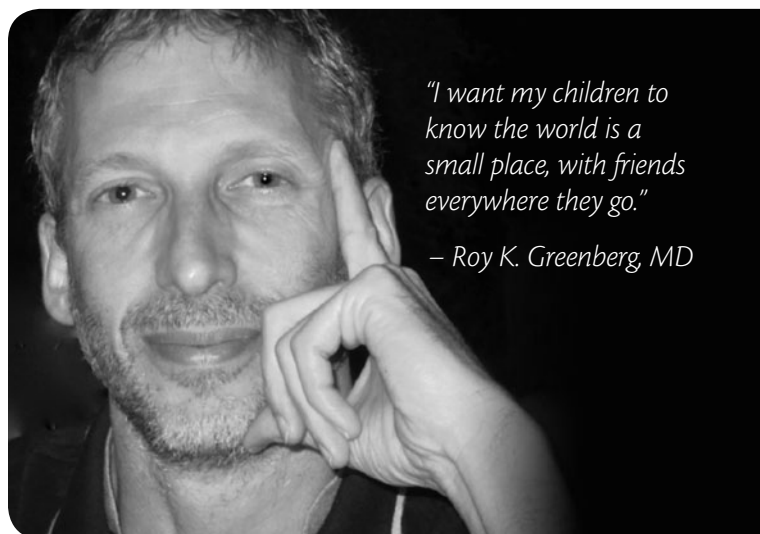
ROY'S LEGACY

Matthew Eagleton, MD

Vascular Surgeon at the Cleveland Clinic

There are a number of items that can be labeled as the legacy of Roy Greenberg; some of these are professional in nature, and others are personal. Certainly, from a professional standpoint, he will be remembered for his efforts at promoting the evolution of endovascular treatment of complex aortic aneurysmal disease. I think, however, his most important legacy is related to the passion he had for aortic disease, and the passion for this that he instilled in the people he trained and worked with. Roy had the ability to pull you in, to get you excited with what he was excited about. He got people involved at all levels—from high school students to medical students, from residents to fellows, and from young faculty to seasoned investigators. His passion was infective.

Many of the students he incorporated into his research program have gone on to medical school and surgical residencies. The residents and fellows have gone on to become



"I want my children to know the world is a small place, with friends everywhere they go."

– Roy K. Greenberg, MD

successful vascular surgeons, and the junior faculty have developed into world leaders in aortic disease and are now busy training students of their own. Not only did he help to develop these individuals academically, he developed strong and lasting friendships with many of them. They will have memories of work and fun times with Roy. They will share these memories with others—both professional and personal. That will be his legacy.

David Hartley

Retired, Consultant to Cook Medical, and Manager of Cook R&D WA in Perth, Western Australia

Roy will be remembered as a hugely talented surgeon and endovascular clinician, a tremendously gifted speaker with incredible recall of detail and data, and a gifted innovator and inventor. To me, his legacy is that he recognized a need for new and inventive concepts that would improve the treatment—and the well-being—of patients. And, he had the talent and energy to both devise new devices and take up inventions of others, and within the regulatory constraints of the industry, improve, develop, and prove these devices and make the new concepts achievable and accepted.

With a prodigious workload, Roy nevertheless kept meticulous data, and with his gift for presenting a point of view backed up by impeccable and convincing data, he was an impressive advocate for these new technologies. Roy Greenberg has been a major influence in the acceptance of endovascular techniques as being both feasible and, in many instances, the first choice of technique for the treatment of disease from the aortic valve to the profunda artery. He has advanced the cause of evidence-based medicine immeasurably.

Michael Lawrence-Brown

Emeritus consultant vascular surgeon to Royal Perth Hospital, Western Australia; colleague in the Cook Medical Global R&D Zenith Endovascular Stent Graft Team

Roy will live on in his children, Zachary and Lucas, who are his life after death and whom he loved so much, and his presence will be forever felt by his wife, Alicia. His professional legacy will endure for as long as vascular surgery and the Cleveland Clinic have a role in cardiovascular disease. His contribution was innovative, has been central, and will endure because he was an endovascular pioneer.



Roy was part of a new breed of vascular surgeon with proficient catheter, wire, and open surgery skills—an individual who stood above the members of his teams. After training in interventional radiology and vascular surgery techniques and participating in the earlier years of stent graft development in Europe and Australia, he graduated to the role of physician to the Cleveland Clinic, where he took the baton for development of aortic stent graft technology to run the final lap to win. His legacy is secure in the hands of those he trained and taught from all over the world and who, in exponential fashion, will pass on his ethic, skills, and passion to those who follow.

Kenneth Ouriel, MD

President, Syntactx, New York

Some of my most memorable times with Roy Greenberg were at our lake house in upstate New York with friends

and family. Roy taught our children to waterski. He would float in the water behind them, holding their waist to keep their heads above water while I gunned the throttle. Roy would glide through the water with them, holding them afloat until the precise moment when the speed was enough that the upward force of the skis won out over gravity, and they rose out of the water. Roy would release them, having provided at least a momentary feeling of elation over the accomplishment.

Roy was no different in the hospital. He employed similar didactic techniques in the angio suite as he did with waterskiing. While we often complained that Roy didn't share his "secret sauce," he was always "in the water" with the trainee. He knew the precise moment when (or if) "releasing" a trainee to total independence was appropriate and safe. The trainees rose to become skilled endovascular surgeons, in large part because of the guidance they received from Roy. The Cleveland Clinic was and continues to be a magnet for endovascular training, in large part due to the presence of Roy Greenberg, Dan Clair, and others.

Education was, in my view, Roy Greenberg's greatest contribution to endovascular therapy. He developed new devices and techniques, rarely explicitly but often subliminally imparting his ideas to others. An excellent surgeon can enhance the lives of many patients one patient at a time, but an excellent teacher improves the lives of countless patients in an exponential fashion. Roy Greenberg's mentees continue to espouse his concepts, adding their own modifications as time progresses. The originator of tips and tactics is often forgotten with the passage of time, but the impact of these techniques endures forever. Roy's influences on endovascular therapy continue to evolve through the hands of his trainees. Whatever progress the field has made has been and will continue to be accelerated through the accomplishments of Roy K. Greenberg.

MEMORIES OF ROY

Richard Green, MD

Columbia University College of Physicians and Surgeons; Program Director during Dr. Greenberg's Vascular Surgical Training

About 18 months ago, I had my last dinner with Roy. I knew by his reflections that there probably would not be any more times shared together. He treated, and for him, there was closure. Not so for me. I left dinner trying to understand what made him so unique and so special. I recalled his first day of internship, when on rounds he demonstrated more understanding of a patient with renovascular hypertension than anyone else in the room. OK, I thought, he is very smart. By the time the rotation was over, he had explained the significance of centerline flow and how he was going to use his understanding of imaging to recreate vascular surgery. Although I didn't understand

what he was saying, I knew that there was genius in front of me, and I, like so many others, got on for the ride.

Roy possessed a unique ability to solve problems in a rational fashion and took the tools he needed regardless of who had them. He somehow crossed every specialty boundary—vascular surgery, interventional radiology, interventional cardiology, and cardiac surgery—without becoming immersed in the territorial battles. In doing so, he redefined a specialty, and the seemingly impossible became possible.

Krassi Ivancev, MD

Professor, Royal Free Vascular, Department of Vascular Surgery, London, close friend and colleague

Roy came to me in 1996, when I was working in Malmö, Sweden. He was a very young vascular surgeon with a strong interest in endovascular repair of aortic aneurysms (EVAR). I immediately took a liking to him, as he was curious and highly analytical with regard to everything he observed in the work we were doing. He instantly grasped the value of personally reviewing the images of the cases we did, as opposed to having the radiographers print them. Based on the results of the reviews, we would have a debriefing to identify what could have been improved. He jokingly also noticed that any time I did not know what the next step would be, I would ask for the patient to be given more heparin, as this gave me more time to ponder the problems.

After 5 or 6 months, Roy told me he was going to a Latin American country. This came as a bit of a surprise to me, as he had specifically asked to be involved in as many EVARs as possible. Then I heard that the purpose for his trip to Latin America was to learn how they were using Palmaz stents for the treatment of coarctation. This made a very lasting impression on me. I realized that he was not just blindly following what he was learning from us, instead constantly keeping his eyes open to what the endovascular field could offer for other conditions of the aorta.

I will always remember Roy as a gentle and compassionate friend who would extend his hand to me whenever I asked him for advice or for his opinion. One time he literally saved my life, extending his hand to me when I was about to drown while swimming in the Mediterranean Sea. He calmly told me not to panic, to relax and breathe and let the salty water carry me, which it did, thanks to his outstretched hand.

Most of all, I will remember Roy for his sense of curiosity and his desire to explore what could be done to improve the techniques, whether it be predicting the positioning of stent grafts, defining flow patterns in branched stent grafts, or simply understanding the underlying diseases of the aorta, be it atherosclerosis or connective tissue disease.



Dorothy B. Abel

Regulatory Review Scientist, US Food and Drug Administration

Roy and I started working together around 1998. The first of the many great times I shared with Roy was in Arizona when we realized that we both had a passion for foosball. Roy was determined to put our skills to the test, tracked down a table in Tempe, and organized the transportation for us to go. What Roy didn't consider was that it was Mardi Gras in a college town. Needless to say, the venue was extraordinary; a shame that Stuart's hand was stepped on while attempting to secure beverages. It was a memorable time, not only because we crushed our competition, but because I began to know Roy as a person and not just as a gifted surgeon and innovator. Probably not many people have established a foundation with foosball, affording the building of a treasured friendship and exceptional collaborative opportunities like the Stent Summits. Though others have tried, few have been as successful as Roy in bringing together engineers, clinicians, and regulators to tackle challenges in the development and evaluation of vascular devices. Roy's accessibility and kindness was not limited to my colleagues at the Stent Summits, but also extended to my friends and family. For that I will always be grateful.

When Roy stepped away from the table that night in Tempe, the guys we were playing summed him up well when they said, "Wow. That kid is good." They were close. That kid was great.

Stuart Rodger

Retired, formerly Vice President, Clinical Affairs, Vascutek

I had the privilege of knowing Roy in a professional capacity, where his endovascular experience and insight was invaluable. I was also fortunate to spend so much time with him socially, in a variety of exotic (and some not so exotic) locations worldwide.

One of the more "exotic" locations was Sydney Harbour, where I spent a wonderful afternoon sailing with Roy and Geoff White (another endovascular pioneer whose com-

pany we lost too soon). We had a fascinating discussion about Roy's latest bright idea—about whether it was a “flash of genius” or a “moment of incandescent lucidity.” Roy was definitely opting for the latter, believing it sounded much grander. Later that evening at a barbecue at Geoff's, Roy approached Geoff with a glass of red wine in his hand and asked “Well?” expecting a definitive answer to the afternoon's debate. Geoff raised his own glass toward Roy and said, in his own inimitable fashion, “I reckon you were just bloody lucky.” Roy simply clinked glasses, smiled, and as he walked away, said over his shoulder, “You're probably right.”

Blayne Roeder, PhD

Director of Product Development - Aortic Intervention, Cook Medical

There are so many great memories with Roy, his family, and his friends that it's hard to name just one! Several years back, our families shared an all-too-short time together in Perth, Australia. City Beach was beautiful on Australia Day. I can still see everyone's smiling, sun-drenched faces and feel the warm sand on my feet.

Later that year, we had breakfast, checked news and weather forecasts, and made futile attempts to find flights home from London because of the ash cloud. We ultimately settled on doing “smelly” yoga each day while we waited it out. We finally escaped on the Eurostar, heading south for ash-free air, or the Mediterranean, whichever came first. Cherrie Abraham was the only one of us who was able to secure an assigned seat. He apologized for taking it and boarded the train. Roy had other plans. He talked his way into a solution whereby he and I went from having no seat assignments in coach into a pair of vacant first class seats. We didn't miss the opportunity to share our good fortune via messages and pictures. Finally out of London and hopeful to get a flight the next day, the three of us had a wonderful dinner in Paris that evening. Thank God we made it home the next day! Even if we hadn't, Roy was prepared. We already had train tickets to Switzerland and another set of flights booked for the following day. His preparation was legendary, regardless of the task at hand.

This is a simple but characteristic memory of the times we spent together, watching patients being treated with new endovascular devices and techniques, attending meetings, and seeing many great friends and colleagues. And all the while, we were making new friends along the way. In between, there was more yoga, a memorable walk back from one class with our German friend, and then more discussion and debate on new concepts for endovascular grafts. I am forever grateful for the many great friends made along the way: Stephan, Tim, Tim's friend, Tara, Matt, David, Krassi, and many others.

Our debates often led to my being wrong. Roy would rarely start a debate he couldn't win. Regardless, I always

cherished the opportunity to learn. He provided constant reminders that our new designs must be based upon solid data and evidence. To further the field, Roy generated more data on advanced EVAR than anyone in the history of endovascular medicine. His attention to detail was incredible. His continual dreaming, discussion, and debate resulted in progress, even though it was never as fast as he would have liked. His diligence in endovascular graft design, clinical care of patients, and mentoring of many future leaders in the field has benefited thousands upon thousands of patients and will continue to benefit countless more in the future. Finally, there were more trips to Cleveland than I can recall. During these trips, we would see a case, work together on many new ideas (some yet to be realized today), do a yoga class, and then have a nice dinner, many times at his home with his family. Unfortunately, the one I recall the most is the one missed, the last trip to Cleveland to say goodbye and thank you to my friend.

John A. DeFord, PhD

Senior Vice President of Science, Technology & Clinical Affairs, C.R. Bard, Inc., formerly with Cook Medical, Aortic Intervention, and a close friend; excerpted from his eulogy to Dr. Greenberg

I will always remember how Roy defined friendship. About 20 years ago, he said to me, “I define a true friend as someone I can call at 3:00 AM when I'm stuck on the side of the road with a flat tire, and I know the person will come without hesitation, would not feel put upon, and would be hurt if I didn't call.” That's the kind of friendship we shared, and that's saying a lot. A true friend, as Roy said, doesn't count the cost of that friendship. He rushed to my flat tires many times. One was the acute appendicitis of my son, Mark, when we lived in Cleveland. I called Roy to get his advice, and he said “I'll meet you at the front door of the Clinic. I'll make sure we have someone ready to get him right in.” Mark went on to work in Roy's lab for three summers and is now a physician in his own right and in residency—due in significant part to Roy's influence.

There was my own cardiac ablation. Roy's voice was the first I heard after that of my wife. There was the illness and passing of my father. Roy was there whenever I asked—and often when I didn't—with his pragmatic approach and tender touch. He never counted the personal cost for that friendship and never hesitated to make those precious sacrifices of time, energy, compassion, and empathy. Roy taught me that that's what friends do. We shared each other's lives, and we knew each other as only friends who have shared life's every twist and turn can. I was also blessed to be with Roy for his 3:00 AM flat tire.

I can count on less than one hand the number of friends I've had over the entire course of my life that would meet Roy's definition, and losing him hurts deeper than I can describe. ■

“What Were You Thinking...?”

Three students reminisce about a master teacher.

BY TARA MASTRACCI, MD; TIMOTHY A. RESCH, MD, PhD; AND STÉPHAN HAULON, MD, PhD

Anyone who was fortunate enough to serve as Roy Greenberg's fellow would agree that Saturday morning was, hands down, the best time of the week. Meeting for coffee at the hospital café and then leisurely strolling up to the ICU to round on the FEVARs from the day before, the conversation could range from last night's dinner at Cleveland's latest hot spot to the effect of stent graft compliance on the baroreceptors of the arch. His uniform khaki pants, baggy polo shirt, and deck shoes would set the tone, and inevitably, after some of the richest bedside teaching a trainee could ever want—where he could deftly translate his meticulous read of the literature and his keen eye for experiential details into a perfectly engineered clinical care path—the stroll would make its way back to his office. The small dirty couch that was somehow crammed into an office overflowing with books, partially written papers, patent applications, and devices in various stages of development, was the perch from which you could observe as he would clean his fish tank, and unravel the mysteries of the aorta. Although he was notorious for multitasking and could rarely have a conversation without simultaneously writing emails and measuring aortas, anyone who met him will attest to the fact that you came away from every interaction with Roy with a deeper understanding of aortic disease, and to some extent, the world. The calm, gentle and light-hearted manner he used to navigate the universe was reflected in every action. He was always moving, except for the rare instances when, with a sudden and intent focus, he would lean back in his office chair, put his hands behind his head, and truly consider a point that you'd made. That moment, when your world briefly stopped, knowing that you'd caused Roy a moment of pause as he considered how your piece would fit into his puzzle of the understanding of the world, is what kept each of us striving to learn and know more.

As Roy's fellows, we have come to understand that he taught us more than techniques and facts. “Roy's rules” were developed over time with experience and data, and they will continue to evolve in the years to come as we



keep applying what he was teaching us. In the spirit of Roy, who would never pass up the opportunity to share his vision of aortic disease, we can review his life through his aortic philosophies.

Base Everything on a Strong Foundation: “Strive for a parallel-walled aorta.”

This message is the singular guiding principle behind the development of branched and fenestrated technology. Relinquishing the arbitrary boundaries of branch vessels and sealing in the healthiest portions of aorta would provide a more durable repair. Roy's emphasis on stable foundations was also present in his practice. In spite of his unmatched technical skill, he always demanded a strong and stable scientific foundation for his work. He insisted on generating strong evidence and encouraged us all to do the same. He was able to negotiate the regulatory pathway of the United States to deliver early generation devices to his patients, and yet he strove to do this in a safe and evidence-based way. The development of the engineering lab, and the insistence on performing his own testing was a testimony to his need for strong foundations. He applied this philosophy to his family and friends as well.

Teaching and Sharing: “Focus on durability.”

Roy was steadfast in sharing his belief that aortic devices needed to last for the lifetime of a patient, even if it meant they were slightly more difficult to implant, and this was often a topic of discussion and debate with us. He had a long view of disease treatment, and always had a plan to fix device failure. Roy valued the education he gained by being surrounded by great innovators such as Krassi Ivancev, Tim Chuter, David Hartley, and Michael Lawrence-Brown during his formative years. He was committed to sharing his expertise and knowledge with the younger generation. He was generous with his time and teaching, and humble in his approach—he always was open to hearing a younger person’s view because he found value in many different perspectives. Roy did not focus on the path of training a person took before entering his office—engineer, cardiac surgeon, cardiologist, vascular surgeon, radiologist—all were equal potential contributors and colleagues in his eyes. He taught us all to open our minds to many possibilities, and he was excited to work with anyone who had a passion for the aorta, but mostly for excellence. He was perpetually grateful that he had been welcomed by Krassi, an interventional radiologist, and he wanted to do the same for others. “You are radiologists trained as surgeons, just like me,” was a favorite line exhibiting just this indifference to where we came from but focusing on where we were going. His aortic fellowship became widely known as one of the richest learning opportunities in this field, largely because of his generosity of time, and his earnest desire to create a group of people who would go out into the world and continue to innovate. He encouraged us to go out and innovate and then expected us to come back and share, just like he did.

Be Willing to Change and Adapt: “Given an infinite lifespan, the whole aorta will become aneurysmal.”

From the beginning, Roy taught us to see aneurysms not as a segmental disease of the aorta, but rather as a vessel wall disease and to provide endovascular repairs that would keep further repair options open. Even healthy portions need to be considered when planning for repair, as they may need future repair. This view drove him to innovate endovascular solutions for the entire aorta, even when a solution to the arch took him out of his scope of training and deep into the world of cardiac surgery. Roy’s career was an uncharted course, and he urged us all to try to predict the future, but also to be open to deviations and be willing to embrace change. He taught his fellows that you need to learn from the past—but urged us to think critically about the problems we faced to find new and creative solutions. When approached with a problem, frequently created



by one of us, his first response would always be “What were you thinking...” in his own wry and sarcastic tone. Although we knew this was an indictment, we also knew that he was devoted to figuring out the thought processes that lead to a situation so he could understand before he would move forward.

Be Open to New Experiences: “Never stop innovating.”

The devices Roy designed evolved as he gained experience. Similarly, Roy’s love of travel brought him to so many new and exciting places throughout the world. He loved interacting with people from every jurisdiction and had friends in many ports of call. This global vision allowed him to gather ideas and innovations and get a bigger picture of the field. As his children grew, he frequently included them in his travels, but before they accompanied him, he would bring his fellows. As his fellows, we cherished these trips with him—one-on-one time to explore his thinking and get to know him better. He had a near-photographic knowledge of the best yoga studio and the largest aquarium in any city in the world, and travelling with him was a constant adventure. He taught us to take time away from work to enjoy life. He instilled in each of us a desire to work hard but play harder, and he was happiest when surrounded with a group of people who were as open to the world as he was, in some rare and exotic location, laughing and loving life.

Roy’s life is a gift to us all. His unparalleled genius and skill is likely something we will all only encounter once in a lifetime. He taught us about the aorta, but more importantly, he taught us how to live and seek out ways to make the most out of any experience. He lived without regret and tried to instill the same philosophy in his students. He often told us he only went to meetings to see his friends. In the same way, our friendship with him made the practice of endovascular surgery better. Our gift back to him will be to do the same for someone else.

That is his legacy. Namaste. ■