A Story of Opportunity in American Academic Medicine

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By

Myron L Weisfeldt

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In Appreciation for Support of
My Wife, Linda, Our Daughters,
and my many mentees.

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PREFACE:
THE ENGINES OF AMERICAN ACADEMIC MEDICINE

In a career spanning more than five decades, I had the great fortune to work at some of America's top academic medical institutions. Now five years into retirement from my full-time faculty position at Johns Hopkins School of Medicine, this book is an opportunity to explore the aspects of American Academic Medicine that provide remarkable opportunities for career success.

I am particularly proud of my leadership of the Cardiology Division at Johns Hopkins beginning at age 35 and extending for 16 years. The Division grew from 7 or so full-time faculty to 25 faculty and 25 fellows during that time and produced some of the most important research achievements in cardiology. We performed the definitive randomized trial of the clot dissolving drug, TPA, to establish the value of the drug in acute heart attack, and we performed the first implantation of an automatic defibrillator in a human being. That device, the automatic defibrillator, is now implanted in 110,000 patients yearly in the United States today.

I am also pleased at my success at broader leadership of Departments of Medicine at Columbia and Johns Hopkins Medical Schools. In a decade at Columbia research revenue doubled and clinical programs in Cardiology and Cardiac Surgery thrived also to become arguably the leading surgical and interventional center in the country. Also, research revenue, mostly from the NIH, doubled. The Department achieved top 10 Department status in the US at the time of my departure back to Hopkins. At Hopkins as William Osler Professor and Chair of the Department of Medicine research revenue increased from $100 to $200 million per year and overall income from $200 to $400 million per year. Endowment also doubled to $120 Million with successful fundraising. Faculty in the Department at Hopkins increased from 410 to 570 Full-Time (salaried) Faculty including 120

tenured Professors. There were over 700 resident and fellowship trainees. The last year of my tenure we again were number one Department of Medicine in the United States in US News.

As I reflect on my own life experience and success in academic medicine, three themes seem most important to discuss. The first theme focuses on academic medicine policies and procedures in the United States and how strikingly different they are from other countries. I believe this difference is of profound importance to individual success, academic achievement, and progress toward improving human health in our country. In other countries, it is common for academic scientists and physicians committed to basic research or clinical academic medicine to remain at the same institution for most of their careers, from training to retirement. In my travels, particularly in Japan, it was apparent that resources supporting faculty were extremely limited and that faculty rarely moved to different institutions. It appeared that talented associate professors looking to move up in the ranks had to hope for the incapacity of the one professor in each unit. The full professors essentially had a life-long appointment. The younger faculty were frustrated because professors were not reviewed for productivity, contributions to science, human health, or unit leadership. Assistant professors also experienced a lack of upward mobility, and in addition, they endured cramped spaces, a lack of technical support, and low compensation.

I saw many of the same issues in Europe, but they were perhaps less intense than in Japan. There appeared to be more competition for talent in Europe, where pure medical research institutions vied with universities for talent. These institutions had a narrower commitment to research and made less effort in education than medical schools.

By contrast, my story demonstrates the remarkable freedom to move during training and career advancement in the United States. This freedom is an outgrowth of the competition for talent among institutions in the open market. Institutional success leads to remarkable direct support for research efforts and funds for infrastructure and large equipment purchases. Trainees and junior faculty of high quality seek the institution because of its reputation, its success in career development, and its success in research

toward the prevention of human illness and more effective care of patients with diseases.

Premier Institutions expect trainees and other young faculty to have a strong commitment and serious desire for research. This expectation is demonstrated by the commonly asked question: “what are you doing?” and its anticipated answer. The questioner does not mean “what care are you providing?” or “what are you teaching?” Instead, they want to know, “what research are you doing or thinking about?”

Also reflecting the importance of research is the notion that successful faculty are expected to have a presentation ready to deliver to a professional audience at any time. It is presumed its content will focus on current, new, or not widely understood material. It must be updated consistently to stay “ahead of the field.” It should concentrate, at least in part, on the faculty member’s research efforts and, ideally, recently published papers.

Other aspects of academic medicine in this country may also play a role in success. One is simply the level of compensation for researchers who succeed. The level of direct compensation increases rapidly with higher academic appointments and success. The ability to move from one institution to another in America is related to the valuation of a faculty member as a researcher. Recruitment-related commitments increase with success. Appointments frequently include laboratory or unit leadership titles and endowments that may stand behind those programs.

Senior appointments often include a designation to hold a “chair.” This is not something you sit on! It is an endowment that produces specific funding for a specific position. The corpus money of the chair is invested by the trustees, and if they invest wisely, it will pay out a known fixed amount as a percent of the corpus per year. The trustees will also put a significant percentage of income back into the corpus to keep the chair valuable over the lifetime of the Institution. The payout may include guaranteed direct support for the faculty member’s salary or funding for the program. Holding a chair indicates to the world that the institution places great value on the work of its holder. The chair may be named after a scientist, a clinical scholar, or a wealthy person who made the original donation. I held the first

Robert Levy Professorship (Chair) at Hopkins while heading Cardiology. Levy was a prominent New York cardiologist trained at Johns Hopkins. I was granted the Samuel Bard Professorship or Chair at Columbia, the oldest chair in America, dating back to 1821, and the William Osler Chair when I returned to Hopkins.

In America the public believes in the value of research to improve human health. Individuals with wealth are proud and pleased to provide remarkable financial support to human health research committed medical schools and pure research institutions and programs. American Institutions engaged in top-notch research have achieved the philanthropic and grant-writing success that provides for a robust research infrastructure. This infrastructure includes laboratory space, shared equipment, and animal housing facilities that are easy to use at relatively low costs. In addition, there are skillful and willing core collaborators across departments such as pathology, laboratory services, and radiology. These attributes depend on the commitment of state governments to state-owned institutions. Often, states will support "not-for-profit" private institutions within their borders. Increasingly states also support direct research, usually funding programs in areas like stem cells that have captured politically and financially committed donors as well as the voting public. Many states also finance medical business development by academic faculty. In both state and private medical schools and research institutions, the National Institutes of Health (NIH), philanthropic foundations, and individual donors bankroll the core costs of biomedical research. Not-for-profit American health philanthropies such as the American Heart Association are committed to funding forward-looking research. These organizations have a distinct commitment to young investigators early in their careers.

The second theme of this writing focuses on the research and discovery itself. I explore the excitement of pure discovery and its importance in career success. Often, uncovering a scientific fact unknown to the rest of the world can generate an exhilaration that exceeds that of competitive athletics or physical achievement. However, the excitement is fleeting since scientific discovery must be validated. It is subject to publication, critiques of the manuscript, and dissemination through secondary articles and commentary. The results of the experiment must also be reproducible by other scientists.

Once satisfying those steps, the discovery is accepted, and the joy of the initial breakthrough is only a memory. What is next?

The pathway toward scientific advancement generally requires a specific reproducible scientific experiment performed a limited number of times. The discovery of new treatments or preventive strategies demands a much more complex series of measurements and experiments. Proving clinical value begins with small clinical experiments, testing only a few people. The investigation is then expanded over time to involve thousands of carefully observed patients and data obtained over a prolonged period, weeks to years, not hours to days, as in the experimental laboratory. This process of discovery and recognition leads to rewards and adherence to an academic medicine career. Examples from my studies will be annotated, hopefully with clarity, throughout the book.

Finally, the third issue I explore is the mentoring or a mentoring environment and its role in the career success of the trainees and younger faculty in the academic medical community. Are a person's intelligence and commitment the most essential characteristics driving success, or is the mentoring atmosphere consistently surrounding and stimulating the elements that fosters lifelong success? My experiences also suggest that the trainees' growth and long-term advancement are at least in part related to the resources available to them.

Did my mentorship of others have a significant role in their career success? As I will detail, my research program in cardiology included or had as investigators two faculty who were ultimately Directors of the National Institutes of Health, five who became principal deans of medical schools, four in the US and one in Israel, plus a vast number of mentees who became successful academic leaders. So, what is the reason for such frequent individual success of trainees? Is it the recruitment of exceptionally talented people or the environment and mentoring they receive early in their professional training and career? Among my colleagues in academic medicine, there is no firm agreement on the answer to that question. Later in this book, I will make a case that, based on my evidence, the mentoring received or not received has the greatest impact on a trainee's success.

ONE

GETTING INTO ACADEMICS

I grew up in Milwaukee, Wisconsin. My mother had several miscarriages during my childhood, and we became a very tight family of three. My parents went to college during the great depression. My mother, Sophia, graduated from Teachers College at the University of Wisconsin and taught in upstate Wisconsin for several years. She married my father after he graduated from Marquette Medical School and completed postgraduate primary care training. Mother never worked again after their marriage but aided greatly in my father's adventures into commercial investments and building a small shopping center in Milwaukee. My father volunteered for the army during World War II. My mom and I followed him to various US military facilities for two years until he was shipped overseas to the Japanese theater. He oversaw the set-up and building of field hospitals. He was part of the US Army's second wave landing on the Island of Luzon in the Philippines. Upon returning home to Milwaukee in 1945, he opened a practice with his brother Lewis, a surgeon, and a friend, physician Leonard Rothman.

My father was a primary care physician typical of that era. Unlike today's primary care doctors, who primarily handle urgent care visits, chronic care, and disease prevention, he treated patients with acute illnesses like heart disease and delivered babies. Ultimately, he became involved in industrial medicine, treating on-the-job injuries and doing pre-employment physical exams to be sure employees could do the job. He had a forceful and dominant personality, feeling free to offer serious advice to relatives and friends during his relatively short lifespan. He died of generalized chickenpox infection after radiation treatment for lymphoma at age 60. My mother lived into her mid-80s.

Milwaukee is renowned for its beer and German bratwurst, but unfortunately, it is also a city with historically strict racial separation. We lived in the

entirely white northern suburbs in a home my father built using plans he got from a relative in Denver. We moved into the house as I entered fifth grade. I always resented having to pound nails into floorboards while the house was being built, a strong indication that a career in construction was not in my future. In fact, by the time I was 12, I had decided to pursue a career in medicine. The choice reflected an interest in biology that developed in my early schooling and, probably more importantly, how biology related to my father's daily work. I was inspired by the kind, personal care he showed his patients and the impact he had on their lives. I also noticed the free time he had to golf with my mother and engage in his other interests in the business world. Additionally, I was captivated by the respect everyone showed him because of his status as a physician.

I witnessed some serious family illnesses, and I have no doubt this contributed to my career choice. My father’s brother and practice partner, Lewis, had a terrible smoking habit. I remember him coming to our house and seeing his yellow fingers stained from tobacco. Lewis’s smoking contributed to a medical downfall. As with many heavy smokers, my uncle began having heart trouble. He experienced severe chest pains and ultimately had a heart attack. Nevertheless, he kept on smoking. He was only in his early 40s when he died suddenly in bed. I was affected by his death, the gravity of heart disease, and its deadly consequences. My Uncle’s untimely death likely stimulated my lifelong commitment to improving the prevention and treatment of heart disease, specifically my work in preventing sudden cardiac death and improving the practice of Cardiopulmonary Resuscitation from an episode of sudden death. But those efforts would come later.

My passion for academia also revealed itself in my formative years. In high school, I favored academic activities over sports. I did try running cross country one or two fall seasons, but I was not too fond of the feeling of pushing myself physically. Instead, I found enjoyment in extra-curricular activities. I joined the debate team and worked on the school newspaper, becoming co-editor my senior year. I still have that whole year issue of the newspaper bound as a keepsake.

I had many friends in high school and was part of a group that participated in school activities and attended school events. Once we turned 16 and could drive, many in the group started dating. However, for me, academics remained a priority. I made the National Honor Society and was in the top 10 of my graduating class. I did relatively poorly on the SAT exam, which we all took once or twice for college applications. I remember my score was somewhere around 1300. I didn't apply to many schools, only Harvard, Northwestern, and the University of Wisconsin in Madison. I was not accepted at Harvard and was very disappointed. However, I would end up there for the final phase of my medical education.

I chose to attend Northwestern for undergraduate work. I understood it was a quality school and was not far from home. I took the standard pre-med schedule of classes at college, four courses in the first three quarters, with a break from classes in the fourth quarter, which aligned with the summer months. I took German as my language requirement. I studied Spanish in high school and learned that Spanish did not fulfill the requirement of some medical schools for admission. I liked the basic science courses, and I remember also liking economics. I did well at Northwestern and received A's in all my classes.

I made time for more than just coursework at Northwestern. The football team had a great young coach, and Saturday afternoon games were great fun. The stadium was a few miles away from campus, and we had 50-yard-line seats. Greek life was a big part of the social scene on campus in those days, and I wanted to be a part of it. There were two sororities and two fraternities geared to Jewish students, who made up roughly 10 percent of the student body. As part of that 10 percent, I was invited to join one of the Jewish fraternities and developed many life-long friendships from that experience. Elsewhere on campus, Jews were not wholly accepted, and I faced hurtful instances of discrimination because of my religion. Many of my fraternity brothers were gay and part of the theater program. Living and socializing with them was a new experience and had a long-lasting impact on me. At the same time, the Black student population at Northwestern was disturbingly small. It was made up of almost exclusively male varsity athletes, and even fewer Black women on campus. The exposure to inequalities and prejudices that I experienced at Northwestern laid the

foundation for a career devoted, in part, to ending discrimination. I would go on to receive national recognition and local acclaim for my work on the issue of underrepresented minorities in medicine.

Early at Northwestern, I began planning for medical school. Acceptance at most medical schools required four years of undergraduate work. There were, however, exceptions. Both the University of Wisconsin and Marquette Medical School in Milwaukee allowed application and admission after only three years of college. My father had actually attended only two years of undergraduate studies before moving on to medical school. In our family discussions, he made it clear he had no intention of paying four years of undergraduate tuition for me. I quickly resigned myself to my father's plan, which meant attending medical school back home at one of the two medical schools. I could apply after my junior undergraduate year.

To be prepared, I decided to take the Medical School Aptitude test, just for practice, as a sophomore and then planned to retake it as a junior. After taking the exam, I received a catalog of all medical schools in the US. The testing company sent this catalog to all exam takers so they could decide which medical schools they wanted to receive their scores. Lo and behold, I found a surprising prescription for my future in the pages of that catalog. Looking through the publication, I discovered a "new program" that was only in its first year at the Johns Hopkins School of Medicine. After just two years of undergraduate education, Hopkins would admit students to medical school. The plan required participants to take an intense Hopkins science program in their first year, followed by four years of standard medical school. The Hopkins Medical School charter allowed admittance only to students who had completed an undergraduate degree. To comply with this requirement, students in the new program were granted an undergraduate degree after the first two years of medical school. However, to meet the qualifications for that 'early' undergrad diploma, some early medical courses were counted in both medical school and undergraduate school. This two-year then five-year program would take the same time to complete as my father's original plan: seven years. This meant I could meet his objective but also go to what I thought, by reputation, was the best medical school.

There was, however, one flaw with this fantastic idea. By the time I discovered this program, the application deadline had already passed. I thought, “why not see what they would do if I tried to apply late.” I quickly got a hold of the application and filled it out. I had to provide a list of my college courses and grades, which were all A’s, but there was no requirement for a transcript. In the application, I noted that I had already taken the Medical School Aptitude test and had requested that the grades be sent to Hopkins. I also explained that I planned to do research for the first time that summer. A week after applying, I followed up with a phone call to the admissions office. I was fully prepared to hear, “sorry, you are too late." Instead, the answer was the opposite. “All of our applicants for the five-year program are taking the aptitude test at the same time you took it, so we are accepting your application, and you will need to come to Johns Hopkins for an interview in the next few weeks and send us your aptitude scores.”

I called my parents and shared the news about Hopkins. They very quickly agreed to drive me to Baltimore for my interview. Obviously, my father knew of Johns Hopkins and its reputation. While I interviewed, they had time to explore the Johns Hopkins Hospital, the Medical School buildings nearby, and the Welch Medical Library, where they saw the Sargent painting of the four founding doctors of Hopkins. That portrait included William Osler, whose textbook of Medicine my father had used during medical school. This textbook is world-famous as the first comprehensive textbook of medicine. It was updated over time but remained as Osler’s Textbook of Medicine.

At the end of that visit, my father made one of the most perceptive comments I’d ever heard from him. He said, “if you are accepted to Hopkins Medical School, I know you will never return to Milwaukee to be a doctor.” He did not include the words “with me,” but returning home to practice medicine with my father had always been my life plan. I balked at his statement right then but realized in retrospect that he was ahead of me in understanding the effect Hopkins would have on my future. I have always believed that at that moment, he was immediately proud that I would embark on a broader and perhaps more impactful career than his own had been. My father would only witness the very early stages of my career before he died

of complications of lymphoma treatment at age 62. I was finishing my training in cardiology and was able to share the news that I had been offered a faculty position at Johns Hopkins. Still, he never had a chance to see what I would "do with the Hopkins opportunity." My mother survived in Milwaukee well into her 80s, hoping I might return home one day. For at least 20 years after I returned to Hopkins as faculty, she would send me cutouts from the hometown paper about medicine in Milwaukee.

My interviews at Hopkins, with one exception, have been long forgotten. My most extensive interview was with a physician/researcher W. Barry Wood. I remember him focusing on my understanding of science and research. He was stimulated by my intent to do a summer of direct research before I would come to Baltimore if accepted. I do not remember what I said, but it must have been good! Dr. Wood, I was told, kept tabs on me during my entire medical school career. When asked, he approved allowing me to deviate from the routine medical school program to have a year of research experience—another pivotal event in my academic career.

So how did the research go that summer? Not so good. I was responsible for passing avian (bird) malaria from one chicken to another and keeping the cages clean. By the time I left the laboratory, the infection was dying-off, and all the chickens were doing fine. My exploratory research job was to try to grow the malaria parasite on a totally artificial medium. The medium was sterilized by passing it through a bacteria-catching filter called Millipore. The problem was that each filter was isolated from the following filter by a separator of paper. I spent the summer filtering through the separator rather than the filter and saw all my efforts contaminated. The plates grew bacteria beautifully but no parasites—quite an impressive start.

That summer did produce one essential start. On the 4thof July, I encountered two high school girls waiting outside my fraternity house for the fireworks show to start. One of the girls needed to use a restroom and rang the frat house doorbell. I answered the door and invited them in, and then I went with them to watch the fireworks across the street from the frat house. When the fireworks ended, I took the phone number of both girls. I have often joked with my wife that I called the other girl first, but her line was busy, and then I called Linda. We dated that summer, and Linda became

a student at Northwestern that fall. We remained in contact throughout her three-plus years at Northwestern. She graduated in December of her senior year, and we married in Chicago on Dec 29, 1963, at the Sheraton-Blackstone Hotel ballroom.

To keep our relationship going after I'd left Northwestern, I spent my first two summers of medical school in Milwaukee, working in research at the Allan-Bradley laboratories of Medical College of Wisconsin (formerly Marquette Medical School, where my father graduated). I worked for a cardiac surgeon, Dr. Derward Lepley, who, along with colleague Dr. Dudley Johnson, were treating patients with coronary artery disease and chest pain by inserting vein bypass grafts during open-heart surgery. The first attempt at an operation like this was credited to a Cleveland Clinic surgeon, but he had minimized its potential. It was Lepley and Johnson who first demonstrated that this procedure was one answer to the common problem of chest pain due to obstruction of coronary arteries. They included me in viewing the pre-and post-surgical angiograms of the coronary circulation. The post-op angiogram showed blood with dye going around the obstruction in the native coronary artery through the vein graft. Observing this groundbreaking procedure fortified my interest in cardiology and the heart. It made me wonder if my uncle Lewis would have survived had this operation been available for him. It even got me to consider becoming a surgeon, an idea I did not toss away entirely until after medical school when I chose an internship in internal medicine rather than surgery. But I did apply for one surgical internship to hedge my bet for a couple more months!

My laboratory project that summer was to study hemorrhagic shock (shock due to blood loss) in animals with various solutions of salt water and/or a chemical called low molecular weight dextran in a salt solution. The dextran was to help keep blood flowing during shock when there was not much blood flow, particularly to the gut. I measured, among other things, blood flow in the gut. The work resulted in my first scientific paper being published in a surgical journal. Lepley was the first author, and there were several other surgical authors I had barely met! One was the senior (last author) of the paper Dr. Ellison, head of the Department of Surgery at

Marquette and famous for describing a diarrheal disease named Zollinger-Ellison syndrome.

My first year at Hopkins was great. I could load up with courses because grades no longer "mattered" as long as I passed. I was required to take three science courses that year and took art, religion, economics, and Soviet history at the undergrad campus. Two of these courses were graduate classes, but the professors let me take the class when I explained that this was my last chance to study with them at a graduate level before starting medical school. Despite the load of physics, biochemistry, and physical chemistry, I did well and made Phi Beta Kappa honor society on only my Hopkins performance. The following year, the first year of regular medical school was demanding and again heavy on science. At least all my courses were taught on the medical school campus. The second year of medical school was all about preparing for clinical medicine. My studies included pathology of human disease, pharmacology of drugs, and some elementary exposure to physical diagnosis and the patient interview. I was still conducting research each summer, but no more classes-free summers after the first two years of medical school.

Two

Pivotal Experience: Laboratory of Stanley J. Sarnoff, MD

My first three years of Medical School at Hopkins were demanding academically. There was much to study and more facts than I could ever imagine memorizing. The summers without coursework were a welcome break, even with working in the laboratory in Milwaukee. I tried to spend as much time as possible in Evanston with Linda.

There was a lot at Hopkins that was also unsettling. Overt racial segregation of patients was accepted as the norm. The newborn nursery and the blood bank were finally integrated during my first year. The surgical service was the last to integrate its teaching service and patient care activities. A "private" surgeon's faculty service was white, and the white and black patient teaching services were segregated. Two floors were dedicated to white patients, one for men and one for women. The two black floors were not segregated by sex. They were open wards with only curtains that could close to separate patients. Even more disturbing, there were two chief residents in surgery. Each held the position for a year, but they alternated, with one starting six months after the other. The chief resident was assigned first to the black service while learning independent surgical skills. After six months, that resident rotated to the white service. This system had gone on for many years, and every graduating surgeon and faculty surgeon knew that surgery "was learned" on black patients before operating on white patients.

There was also considerable anti-Jewish sentiment at Hopkins. Trained Jewish doctors did not practice at Hopkins Hospital; instead, they practiced across the street at Sinai Hospital. Certain staff members even seemed proud when acknowledging that no known Jewish faculty member had ever been promoted to full professor or head of a department. There was not much to make me happy at Hopkins. A huge statue of Jesus Christ was posted at the

hospital entrance, where it still stands today. I incorrectly believed for years that Hopkins was a religiously founded institution. I still cannot understand why such a powerful symbol of one religion greets Jews, Muslims, Buddhists, and people of all faiths who enter a hospital committed to universal patient care.

Early in my third year of medical school, I learned about a selective "accelerated" program at Hopkins Medical School. This program allowed students to leave their class for a year by taking all their electives together in one year. During the elective year, fellowship students did not pay tuition. On their return, however, they might have to accelerate in order to graduate from medical school with their class. I was very interested in taking advantage of this program. I asked around about the country's best heart physiology or heart function laboratory. I was told there were two excellent laboratories. I read papers from both of them. One was on the west coast, and one was at the National Institutes of Health (NIH) main campus in Bethesda, Maryland, an easy drive from Hopkins. I contacted the NIH laboratory called the "Laboratory of Cardiovascular Physiology," directed by Dr. Stanley J. Sarnoff. Sometime later, I learned Sarnoff had graduated from Hopkins Medical School himself, took training in surgery, and published extraordinarily important studies characterizing how the heart worked and how its function was regulated. I did not know until much later that everyone on his laboratory staff was either an independent scientist with a doctoral degree (not an MD) or a fellowship surgical trainee who had already completed cardiac surgical training but wanted additional research experience. As surgeons, they were good at operating on experimental animals and creating unique, novel, and precisely controlled heart preparations for scientific physiological and pharmacological studies.

About 20 years later, Bernardine Healy, a friend and Vice Dean of the medical school, rifled through my student file, and found my application letter for this fellowship and returned it to me. I am copying it here as it captures much about how I saw my future in 1963.

"Dear Dr. Wagner:

This letter is to make it known to you formally that I would like to participate in the accelerated program and to explain the reasons for this request.

Firstly, I shall outline the program I have in mind. I would like to proceed with my formal medical training for one quarter after Year III from April 15, 1963 to June 22, 1963. Starting in July 1963 and proceeding for one year, I wish then to pursue my interests in cardiovascular physiology in the laboratory of Dr. Stanley J Sarnoff at the National Institutes of Health in Bethesda, Maryland. I would return to my formal training at the beginning of the summer session 1964 and continue until July of 1965 when I would be eligible to graduate with my class.

There are a number of reasons for my desire to accumulate my elective time and to make use of it in this way. I have noticed that my interest in research has steadily grown in the last three years. It has now reached the point where I feel that an exposure to research for a full year would provide both a test of my ability to do this type of work and a test of this interest. During the past two summers, I have had an opportunity to work under Drs. Erwin Ellison and Derward Lepley in the Surgery Department of Marquette Medical School on an animal research project of theirs. Although I found this experience enjoyable and profitable, it was also frustrating in many ways. One can only go such a short way during a period of 10 weeks. Thus, the advantages of spending a longer and continuous period of time on one project are evident to me.

The reason for my choice of cardiovascular physiology has, of course, to do with my current interests and future plans. I have been most attracted by the function and diseases of the cardiovascular system and plan to pursue this in the future either from the surgical or medical aspect. Most likely my research in the future either will be of a more clinical nature. I feel that an experience with the type of conditions and problems faced in more "basic" work should be a part of my background. I am afraid that if I do not take the opportunity to do this now, it may not come again. Of course, one's interest can change, but I think that I must work from the premise that it will not in order to come to a decision as to the most profitable way to spend my elective time.

My activity in Dr. Sarnoff's laboratory would be divided between (1) working with other persons in the laboratory on experiments involving an

isolated heart preparation and (2) investigating a program of particular interest to me, dealing with the regulation of cardiac function.

I have requested that my program be as outlined above with two factors in mind. I would prefer to divide my formal work more evenly than three quarters this academic year and six straight quarters when I return. Also I would prefer to transfer my residence to coincide with the school year so that my future wife will be able to obtain a teaching position both in Bethesda and Baltimore.

You should have received letters from Dr. Milnor, my faculty advisor and Dr. Sarnoff with regard to my program.

Thank you for your consideration.

Sincerely,
Myron L Weisfeldt"

Here is the full text of Dr. Sarnoff's support letter for my application.

"Dr. Wagner:

I am writing to state that I would be very pleased to have Mr. Myron Weisfeldt join the staff of this laboratory for one year starting July 1963. I believe that I understand the objectives of your committee and would be most pleased to provide you with an evaluation of Mr. Weisfeldt's performance at the end of that year. It would be my intention for Mr. Weisfeldt to join (A) one of the team efforts in the laboratory probably experiments in the isolated supported heart preparation so as to have direct contact with an ambitious type of experimental design and the desirability of incorporating the elements of control in physiological experimentation and (B) invite him to undertake an independent project of his own choosing, the nature of which should not be precisely decided in my view until after he has been here for a while and we have had a chance to talk at more length than has been possible up to the present.

Please let me know if I can be of any further help.

Sincerely yours,
Stanley J. Sarnoff MD
Chief Laboratory of Cardiovascular Physiology
National Heart Institute

PS: I am enclosing a review article from the American Journal of Medicine which may perhaps give you an idea of the general area of activity in which Mr. Weisfeldt is likely to be involved."

I became a technician at Dr. Sarnoff's Laboratory, an appointment I pushed for because it provided income that would help pay for my upcoming marriage. It was common knowledge that Dr. Sarnoff had divorced his wife Lolo and married another woman, who he then divorced and remarried Lolo. Linda joined me in Baltimore shortly after Dr. Sarnoff's second trip down the aisle with Lolo. When Linda met Dr. Sarnoff for the first time, he greeted her by saying, "we newlyweds need to stick together." That moment is among many fond memories Linda and I share of our time with Dr. Sarnoff.

In the laboratory, part of my work focused on just one weekly experiment every Wednesday. The plans for the Wednesday experiment were put in place the previous Thursday as part of the review of the prior week's experiment. It took from 7 a.m. to 2 p.m. on Wednesday to prepare the isolated supported heart preparation. This was a dog heart in an open space (removed from the body) supplied with oxygenated blood from a second or support dog. For the isolated heart, one could manipulate or keep constant the preload (blood pumped by the heart), the afterload (blood pressure against which the heart ejected blood), the heart rate, and the coronary blood flow, which provides oxygen and nutrition to the heart. You could give the support dog drugs or hormones that would eventually reach the isolated heart, but the nerves were unavailable in this preparation. Sarnoff arrived at 2 p.m. and sat at the control center, conducting the experiment of the day. He would reappear at about 2 p.m. on Thursday when it became my job to present detailed results of the previous day's investigation. These were didactic sessions for everyone in the laboratory, with many questions about heart function thrown at me. Everyone else was extremely relieved that it was my job to handle these queries. This laboratory experience taught me what a controlled experiment was all about and how to ask the right questions to get precise answers. The second notable aspect of the laboratory experience focused on the importance of publication and the need for precision and clarity in scientific writing. Dr. Sarnoff had to approve *all* our papers before they could be submitted. I endured no less than three

detailed red-pen reviews by Dr. Sarnoff, even after passing my senior co-author reviews.

There was also great mythology surrounding Sarnoff's laboratory and how competitive he could be toward others who worked or had once worked in his lab. Edward Sonnenblick was a fellow in the laboratory about two years before I arrived. His contribution was the force-velocity relationship of isolated cardiac muscle. Sarnoff was deeply tormented with Sonnenblick because he waited until he left the laboratory to submit his singularly important paper on this relationship. Sonnenblick did so without Sarnoff's review and did not include Sarnoff as a co-author. Suffice it to say; no one dared mention Sonnenblick when Sarnoff was present.

When I arrived, Eugene Braunwald had just set up his independent cardiology program at the National Heart Institute. Some of Braunwald's most critical early papers came from his training period in Sarnoff's laboratory. One example of that work is the time-tension index, relating heart functional parameters to oxygen consumption by the heart. Essentially, the heart-generating pressure required more energy or oxygen, whereas ejecting volume or more cardiac output requires low energy. These were essential concepts in dealing with patients with the common condition of coronary artery obstructive disease: lower blood pressure and lower oxygen demand, and less chest pain from coronary artery obstructions, or high blood pressure, more oxygen consumption, and chest pain.

Despite this trainee-mentor relationship between Braunwald and Sarnoff, the two now independent laboratories were intensively competitive. After leaving Sarnoff's lab and publishing his major paper, Sonnenblick went to work for Braunwald. There were allegations of spying and stealing data, and worse. I was never the problem!

Monday and Friday were my time for independent research. I worked with two wonderful teachers and scientists. Joe Gilmore was a full-time career member of the Laboratory and a PhD scientist. We did a project on hemodynamic control of urine output. The second mentor was Willard (Bill) Daggett, a cardiac surgery fellow with whom I studied the drug digitalis and its impact on a normal dog heart. The study showed that digitalis increases

in contractile strength of the heart in the normal dog but resulted in the withdrawal of sympathetic drive to the heart. If you blocked the nerves, you could see the increase in heart function from digitalis. Several years after this work, Bill would play an even more significant role during an essential part of my formative years as a researcher when I entered his laboratory at Massachusetts General Hospital. The paper on the digitalis study was submitted by "both of us" to the American College of Cardiology and published in their journal after winning the Young Investigators Award of the College in 1963. Not bad, being named a co-winner while still in medical school! Bill would prove to be generous in my support again and again.

There is much more to say about my special relationship with Sarnoff during and following that foundational year. For example, as a member of the American Physiological Society, only one abstract paper from Sarnoff Laboratory could be presented at the Society annual meeting. The year I worked in his Laboratory *my* paper was selected as *the* one. As I remember the meeting, my 10-minute presentation took place in a hotel basement in Chicago. Dr. Louis Katz, one of the other leaders of heart physiology, was in the audience. During the five-minute question and answer period, he grilled me; and it seemed unmerciful. After leaving the microphone in a cold sweat, Dr. Katz came over and gave me a handshake and a hug that I remember to this day. That was truly the event that sealed my fate as a researcher. I understood what it meant to know something scientifically, a fact that no one else in the world knew at that minute of discovery. I felt the thrill of convincingly standing up and sharing my discovery with the rest of the world.

I want to highlight two long-term aspects of my continuing relationship with Dr. Sarnoff. Of course, when it came time for internship and fellowship applications, I called on Sarnoff for letters of support. I do not remember how, but I received a copy of one of his recommendation letters. As these letters go, this one is short, but it offers an overwhelming amount of excessive praise and could be the most valuable document ever assessing my work.

Here I share the letter with you in its entirety.

"One of the major satisfaction rewards to be derived from a scientific career is available to me in writing of this letter. Mr. Myron L Weisfeldt is a young man of such high native intelligence and great diligence that it becomes a privilege for me to contribute in whatever manner I can to a furtherance of his opportunity for creative activity in medicine and, I hope, cardiovascular research.

During his year in this laboratory, he made substantial contributions to the solution of problems on which we were already working and also the solution of problems which he formulated. I include the latter among his several important strengths. In addition to this he has a strong and certain grasp of the complexities of experimental design. His instructive and thorough understanding of the importance of the element of control in physiological experimentation leaves little to be desired.

I support Mr. Weisfeldt's application without reservation. Should you see fit to accept him I can predict with confidence that you will acquire the same pride in having him associated with your institution as I have as a result of having had him work in this laboratory. I have less question about his ultimate success than any young person of his age I have ever known. The only question to be resolved is the field in which such success will occur.

Please let me know if I can furnish any further information.

Sincerely yours,
Stanley J Sarnoff MD
Chief, Laboratory of Cardiovascular Physiology
NATIONAL HEART INSTITUTE"

The attributes of this letter include its brevity and its precision. I have no question of its value to my long-term and short-term success.

About two years after I left the laboratory, Dr. Sarnoff had a massive heart attack. He was hospitalized at the NIH Clinical Center and treated by Larry Cohen, a fellow there. Larry was put on the case because Sarnoff refused to let Eugene Braunwald, the head of the Clinical Section, take care of him. The rejection was likely due to the lingering animosity Sarnoff felt toward Braunwald, as discussed earlier in this chapter. Larry would later become the head of Cardiology at Yale and offer me a position at the end of fellowship training.