Oral history has its roots in the sharing of stories which has occurred throughout the centuries. It is a primary source of historical data, gathering information from living individuals via recorded interviews. Outstanding pediatricians and other leaders in child health care are being interviewed as part of the Oral History Project at the Pediatric History Center of the American Academy of Pediatrics. Under the direction of the Historical Archives Advisory Committee, its purpose is to record and preserve the recollections of those who have made important contributions to the advancement of the health care of children through the collection of spoken memories and personal narrations.

This volume is the written record of one oral history interview. The reader is reminded that this is a verbatim transcript of spoken rather than written prose. It is intended to supplement other available sources of information about the individuals, organizations, institutions, and events that are discussed. The use of face-to-face interviews provides a unique opportunity to capture a firsthand, eyewitness account of events in an interactive session. Its importance lies less in the recitation of facts, names, and dates than in the interpretation of these by the speaker.

Historical Archives Advisory Committee, 2006/2007

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ABOUT THE INTERVIEWER

John R. Gosche, MD

Dr. Gosche earned a Doctorate of Medicine from the University of South Florida College of Medicine in Tampa, Florida in 1985. He served as an intern and resident in general surgery at the University of Louisville Associated Hospitals in Louisville, Kentucky from 1985 through 1992 under the direction of Dr. Hiram C. Polk. While at the University of Louisville, Dr. Gosche earned a Doctorate of Philosophy in Cardiovascular Physiology through the Department of Physiology and Biophysics at the University of Louisville School of Medicine. Dr. Gosche then served as a resident in pediatric surgery at the Columbus Children’s Hospital in Columbus, Ohio from 1992 through 1994 under the directorship of Dr. Donald Cooney. In July of 1994, Dr. Gosche joined the faculty of the Yale University School of Medicine as an Assistant Professor of Surgery and Pediatrics in the Division of Pediatric Surgery. In July of 2001, Dr. Gosche assumed the position of Chief of the Division of Pediatric Surgery and Associate Professor of Surgery at the University of Mississippi Medical Center in Jackson, Mississippi. Dr. Gosche presently is Professor of Surgery and Chief of the Division of Pediatric Surgery at the University of Nevada in Las Vegas, Nevada.

Dr. Gosche has known Dr. Dudrick since 1994, when both he and Dr. Dudrick were faculty members in the Department of Surgery at the Yale University School of Medicine. Dr. Dudrick has been an influential support throughout Dr. Gosche’s academic career. At the time this interview was conducted, Dr. Gosche was Chief of the Division of Pediatric Surgery at the University of Mississippi Medical Center in Jackson, Mississippi.
This interview of Dr. Stanley Dudrick is being conducted for the oral history project, American Academy of Pediatrics. Dr. Dudrick was the 1988 recipient of the [William E.] Ladd Medal from the Section on Surgery of the American Academy of Pediatrics. Today’s date is December 15th [2006]. This interview is being conducted in the home of Dr. Stanley and Mrs. Dudrick in Naugatuck, Connecticut.

Dr. Dudrick, thanks again for agreeing to participate in the oral history project.

My pleasure and my honor, John. I’m grateful for your having made the big trip from Mississippi up here today in less-than-ideal conditions, and I’m delighted to spend this time with you.

Thank you. If we may, let’s begin at the beginning. Could you tell us a little about your childhood?

I’m a Pennsylvanian. I was born in Nanticoke, Pennsylvania, in the heart of the hard coal region on the Susquehanna River at the base of Wyoming Valley, below Wilkes-Barre and Scranton. My parents were first-generation Americans. Their parents, my maternal and paternal grandparents, all emigrated from Poland in the late 1800s, early 1900s. They actually had intended, I believe, to be more Midwestern and in the farm country but were attracted to the Pennsylvania coal mine area by many of their friends, who were virtually imported to mine the coal with the experience that they had in Europe. And so my grandfathers both worked in the coal mines of Pennsylvania for more than 40 years, somehow lived into their 80s, but also were self-sufficient. They had farms and essentially raised their own food and had dairy cattle and milk and sheep and did all the things that people did in those days to be self-sufficient.

My father and my uncles all had to work in the coal mines from when they were 13, since their parents were almost indentured servants. And when they got to 21, they would leave the coal mines, and my uncle, who was my godfather, and my father both went to University of Pennsylvania after having gotten the equivalent, I guess, of high school degrees on their own, in what we call GED today, I guess. But they both graduated from the Wharton School at Penn [University of Pennsylvania]. My uncle went on to law school. The Depression came about that time, and my father couldn’t continue in law school because of finances, and [he] became an accountant and an insurance broker. And then when I was born, that really sealed the deal, and—
But I had a wonderful childhood growing up in that small town of about, at that time, 36,000. Now it's about half that size. There was a great sense of family. Both sides of my family were all there. My father and mother came from families of seven siblings—six siblings, seven all together, and so being the first-born of either side of the family, I had about 14 sets of parents. Simultaneously, being the first-born son and, quote, "the apple of their eye," unquote, I also was [chuckles] under close scrutiny all the time, too, so they really invested a lot in my development and education, and I greatly appreciated that.

I was educated throughout the city school system; graduated from Nanticoke High School in 1953. I guess I started working on my grandfather’s farm when I was 10, and I remember working six days a week, 10 hours a day for 10 cents an hour, and having a wonderful time. I got to learn about planting seeds and growing crops, and I plowed with the horse. I remember the thrill of having the first tractor in the family and then driving the first tractor. I milked cows. I actually participated in the undesirable things of having to finish off chickens and swine to provide meat. But it was a fascinating growing up, and I learned an awful lot.

My father was a jack-of-all-trades. He virtually could do anything. He was competent in electrical wiring, plumbing, carpentry. We built a home, he and I, virtually ourselves, a small four-room home next to our home, I believe as a property investment. I dug the basement by hand with a pick and shovel and a wheelbarrow when I was 12 years old and put the roof on the house virtually by myself, so I had a lot of practical teaching from Dad, who was, as I said, a white-collar worker but a great blue-collar talent and a perfectionist. I guess that’s probably the most important thing in his background with me was he was a perfectionist, and he wouldn’t let me get away with anything less than my best. And he was a strict disciplinarian. He was not an obsessive-compulsive; he was not a workaholic in the sense of being off the deep end, but he worked hard for everything he got in life. He was honest as the day is long, had high moral and ethical values, and really was my first true mentor. I didn’t appreciate him as much at the time as I do now, but—

My mom was the most loving type person, salt of the earth, everybody’s best friend, kind—I never heard an unkind word uttered by her. She just loved everybody. She gathered people, young children. The young boys in town just loved to come to our home, and she was kind of a second mother to most of them when they got afoul of their own parents. I’ll never forget her funeral. I think there must have been 300 men at her funeral that were boys growing up with me who remember her. It was a great tribute.

She taught me an awful lot. She was the humane side of my life and actually the stimulus for me to go into medicine. When I was six and my first sister was two, my mother contracted rheumatic fever. You have to remember,
there was no penicillin in those days, and rheumatic fever was a major killer. She survived, even though my father and my aunts and uncles were preparing me for my mother’s death and reminding me that I would have to take care of my younger sister and I’d have to be a good boy because “your mother is ill.”

And I was very impressed at that time by the doctors who came to see my mother, because they made house calls, and I just thought that was what doctors did, and they did in those days. So she had two or three doctors that came to see her, two general practitioners, we called them, and one was a rheumatologist because she got rheumatoid symptoms from the rheumatic fever. Several things impressed me. One, their kindness, the fact that they would come and be nice to me. They always would spend a minute or two with me, and then they would sit administering to my mother’s needs, and I was very impressed with their demeanor, and they were just great role models for me.

But even more so, before they would come, whenever they were going to make a house call, my aunts, one of whom was my godmother, would insist that I take a bath and that I had to put on my Sunday-go-to-church clothes because [voice drops to a reverent whisper, in imitation of her tone] the doctors were coming today, and they’d even start to whisper, “The doctors are coming, so you have to clean up and be a good boy.” And I thought, Gee, who are these guys? They’re whispering. I have to take a bath; I have to put on my Sunday clothes. They must really be important. And so those were the memories I had. Literally I was six or seven years old when I decided, When I grow up, I want to be one of them.

And then, when my mother lived, after I was being literally prepared for her death, my gratitude and my awe about these men who accomplished that, in my mind, just made me want to be like them. And I never wavered from that. Oh, at one point I wanted to be a cowboy, probably a fireman and a policeman like everybody else, but fundamentally I wanted to be a doctor. And I talked about it all the time.

I had an aunt who was a nurse, but there were no other medical people in the family. She served on a hospital ship in the Pacific during the war, the Second World War, and she encouraged my obvious interest in medicine by buying me books and doctor kits and things for me to play doctor.

I then deviated a bit, because at one point in my high school career, the representative, Dan [Daniel J.] Flood, to the Congress from our district took a shine to me, and he wanted to appoint me to [the United States Military Academy at]West Point or to the [United States] Naval Academy since they have positions that they are allowed to appoint people to, and he thought I’d make a fine officer. I actually took the examinations and went through the
pre-admission drills at West Point and was fascinated by that for a while, because of the discipline and the idea of serving the country. I wanted to both be perhaps an officer serving the country and a physician, and I wasn’t quite sure if that was possible, so I had the audacity, as a high school senior, to make an appointment, myself, with the dean of the medical school at the University of Pennsylvania. And he, John McK. Mitchell, a pediatrician by trade and a wonderful being, actually gave me an appointment. So I drove down in the family car, which wasn’t easy in those days, about 120 miles or 130 to Philadelphia, and had an appointment with the dean of the medical school.

After a wonderful half hour or so, in which he was completely relaxed and seemed to be enjoying it as much as I was, he said, “Well, what is it, Mr. Dudrick, that you want from me today?” And I said, “Well, I have this West Point appointment or I could go to Annapolis if I would like to, but I think I’d prefer West Point. It’s a free education, and I was wondering if I could get the education there, could I then get into medical school and fulfill my ultimate goal to become a doctor.” And he looked at me, and he paused and looked around the room, and he said, “Well, Mr. Dudrick, if you could rationalize for me spending four years of your life learning how best to kill people and then paying them back the four years you owe them by getting on-the-job training in how to even better kill people in order to then go to medical school to learn how to keep people from dying, I’ll answer your question.” So then I stopped and thought, and I said, “Dean Mitchell, I think you just answered my question.”

DR. GOSCHE: [Laughs]

DR. DUDRICK: And at that moment, I decided I wasn’t going to go to West Point and that I would pursue a medical career, and I told him that, and he said, “Well, you get yourself a good liberal arts school to prepare yourself for medical school,” and he said, “God willing, if I’m still alive,” he said, “I’d like to see you apply here, and we’ll talk about it.”

Well, to finish that story off, I eventually did go to Franklin & Marshall College, a school I had never heard of before Christmastime, about this time of year, of my senior year in high school. But it had such a good reputation for producing physicians—not there, but by getting them into medical schools—that I went down to look at the place, and I fell in love with it, and that’s where I wanted to go, and I matriculated there and had a wonderful education.

But for continuity purposes, when I finished there, in getting into my senior year, I of course applied to Penn [University of Pennsylvania School of Medicine] because that’s where I wanted to go; that’s all I heard in my family, was “Penn, Penn, Penn” all the time. And I didn’t hear anything
from them. Many of my classmates at Franklin & Marshall were being interviewed at Penn, and I didn’t get an interview invitation. So I called the dean’s office, and I said who I was and didn’t want to be impertinent but I wondered if there could have been a mistake or did I do something wrong that I didn’t get an invitation to be interviewed for a position at Penn. And the same lady [Mrs. Householder], who was the secretary to the dean when I visited three years before, said, “Oh, Mr. Dudrick, we have note in a file that Dean McK. Mitchell made for you when you visited here as a high school senior. He put a note in your file saying that ‘if this young man ever applies to medical school here, take him.’”

DR. GOSCHE: [Laughs]

DR. DUDRICK: And she said, “I discussed this with Dean McK. Mitchell a few months ago, and he said we don’t need an interview, that his interview with you three years ago would suffice.”

DR. GOSCHE: Wow. You were accepted three years earlier.

DR. DUDRICK: Yes. And so I said, “Well, golly,” I said, “I really want to go to Penn, and I only applied to Jefferson [Medical College, Philadelphia]. That’s the only other school I applied to, and they’ve already accepted me, and I only have a week or so left on the time that I’m supposed to accept or reject, and I don’t want to be impolite [to Jefferson Medical College], and I don’t want to be impolite to you, either.” And she said, “I’ll mention this to Dean McK. Mitchell. I imagine you’ll be hearing from him soon.” And within 48 hours, I had a telegram from the dean, accepting me to the medical school, which was followed up by a letter, asking me to give him a phone call, which I did. It was just the middle of August, the summer between my junior and senior years, and so I started my senior year at F&M [Franklin & Marshall College] completely free of concern, and had a marvelous last year, filling in with a lot of liberal arts courses and got ready to go to Penn Medical School.

But what an influence people like that are on you! When I went to medical school, then Dean John McK. Mitchell was the dean the entire time I was there, and I just loved having him there. He seemed like a surrogate grandfather for me and a wonderful role model: [a] kind, gentle, idealistic person, a true dean in the sense that he was elected by the faculty, which is what the deans in the old days were. Nowadays the dean is virtually an MBA and a whole bunch of other things, and a business manager, and it’s a shame because we don’t have that type of academic chain of command that we used to have. But times have changed.

I began working in the Pocono Mountains when I was 16. I actually lied about my age, I’m ashamed to say, and told them I was 18, and I got a job
first as a busboy and then as a room waiter and then as a wine steward, which was illegal; you had to be 21 to do that, but it was a private place, Skytop Lodge in the Poconos, and one of the nicest places in the area. And I worked there for five summers and literally paid my way through Franklin & Marshall College by working there.

But the big bonus about that was in the third year that I was there, my wife-to-be, Terri (Theresa), also in college at College Misericordia in Pennsylvania, came up for the summer to work as a waitress, and we met and had a marvelous summer together, and then we kept [in] communication with each other for the next four years, and then got married after my freshman year in medical school.

So the experiences I gained of, oh, being somewhat independent at a young age and having a wonderful background at home and on a farm and then working in a service organization like a resort hotel, I think, prepared me in a great measure for what we do as physicians. We’re interested in life, we’re interested in high ideals, and we’re interested in service. I inadvertently received three big doses of that as I was growing up.

The best years I had in my life, the very best four consecutive years of my life were those that I spent at Franklin & Marshall College. I love that institution. It had a transforming effect on me. I ended up in an idyllic type town, Lancaster, Pennsylvania, which was clean, rural, influenced by the Pennsylvania Dutch [actually Amish and Mennonites of German descent] discipline and ethic and culture; and farms that were out of storybooks: clean and wonderfully maintained in the old style, and having come from a town that was a hard coal, dirty, dusty, smoky, smelly [sulfur from coal mine fires] place, although I love it, I just thought I died and went to heaven when I went to Franklin & Marshall College. Here, it had all this history, founded [as Franklin College] by Benjamin Franklin in 1787, and it was a grand old place. At that time, I think it was the eighth or tenth oldest school in the country.

The mentors and the role models that I had there were outstanding. Dean Richard [Honodel] Winters, the admissions dean; [James McCown] “Mac” Darlington, the chair of biology; [Harold] Harry Lane, the professor of anatomy and embryology; Dr. [Fred A.] Snavely, who was in inorganic chemistry; and [Robert Pershing] Bob Cross, the chair of the Department of Chemistry [who] taught us organic chemistry. These men were just superb scientists, educators and so dedicated to us. The entire ethos of Franklin & Marshall College infected me and transformed me from a kid from the coal regions to an avid would-be scholar. They just imbued in me the importance of knowledge, that nothing was more precious than to gain knowledge and then to pass it on to others.
I did my first research projects there, of all things, growing tomato plants hydroponically and studying the effects of magnesium doses in the fluid [in Dr. Snavely’s laboratory] and being fascinated by that because I grew thousands of tomato plants on my grandfather’s farm, and then to see these things growing in fluid in a sense later influenced me because I was growing plants in liquid. Subsequently, we grew human beings with liquid. I had no idea that was going to happen at the time.

That project was with Fred Snavely. And then, later, I had another project with Harry Lane, in which I was studying the effect of hypoglycemic agents, oral agents, which were brand new, and we worked in conjunction with Eli Lilly [and Company] on a project studying carbutamide, tolbutamide and another agent, and we showed that carbutamide was effective but caused too many congenital defects in chick embryos. We were working in chick embryos with a binocular dissecting microscope, studying blood sugar in the omphalomesenteric veins in the yolk sac.

And so, again, here I was, working with these microscopic blood vessels and doing microtechniques and measuring blood sugars. What we learned in that project was that the chick pancreas kicks in with [develops functioning] beta cells on the 13th day [of development as an embryo], which was unknown till that time. We also showed that [neither] the tolbutamide nor the carbutamide would have a hypoglycemic effect until the beta cells matured, so it [the observed hypoglycemia] was not a direct effect on blood sugar and metabolism, but on the beta cell: It stimulated the beta cell. And carbutamide was rejected in part because of our studies, because of the congenital anomalies that it would cause in these chick embryos, which were kind of a cleft palate, and the beaks were different [grossly malformed], and the phocomelia and abnormal feet and wings and feathers. Whereas tolbutamide was well tolerated, and tolbutamide became Orinase®, the first effective oral hypoglycemic agent, and we were one of the 12 or 13—I don’t know—beta sites, I guess you’d call them today—to [help] develop that. Again, I didn’t realize the significance of it at the time, but I did enjoy the technical and metabolic experiences that I had working in a laboratory, but especially the patience and kindness, honesty and brilliance of Harry Lane, the principal investigator and my mentor. We became very good friends.

Then I guess I moved on from there to medical school, having graduated from F&M [Franklin & Marshall College] in 1957. That’s a long story about my childhood, I guess, but—

DR. GOSCHE: That's why I'm here. Let's change directions.

END OF TAPE 1, SIDE A

DR. GOSCHE: And your medical school career?
DR. DUDRICK: Medical school was also a wonderful experience for me. I was a little more fearful of medical school than I probably needed to be, and that perhaps was more due to lack of self-confidence, but I should have had more confidence in Franklin & Marshall College’s reputation because the fact was that my freshman year of medical school was easier than any of the years at Franklin & Marshall College. So Franklin & Marshall taught us how to study, taught us how to learn, taught us good habits for acquiring knowledge, and hard work and self-discipline. Indeed, in medical school I really thrived.

I didn’t have the courage to get married after graduating from Franklin & Marshall College because I was afraid that if I didn’t do well in medical school that perhaps friends and family might blame Terri or say, “It’s because you got married and you got your interests split.” So we patiently waited another year, and right after my freshman year in medical school, Terri and I got married in 1958, and medical school after that was even more fun because I did even better, because I just relaxed and had a wonderful life. We, during medical school, had two children. There weren’t many people married in medical school in those days, and we had a couple of children besides. There were 125 of us in our medical school class. I think there were nine women, which was the most, by far, that Penn ever had. I think the previous high was about four, and that was several years prior to that. And the other thing was that I believe we had eight or nine married students, which was unprecedented at Penn, but it started a new era.

The medical school experience for me was, as for everybody else, one of impatience initially, because it’s a continuation primarily of basic science for the first two years and you’re there into your third year before you really are putting your hands on people and learning the craft of medicine. But I kept myself occupied by immediately inquiring about working in the laboratory. At that time, I wanted to be a heart surgeon because that was the new thing. I remember a picture on the front page of *Time* magazine of Dr. Charles [P.] Bailey of Hahnemann [now Hahnemann University Hospital, Philadelphia] after he had done the first successful mitral commissurotomy after 13 patients in a row had died, and I was just astounded by his courage and his persistence despite failure and despite criticism from his colleagues. And as I read that story in the *Time* magazine, he immediately became an inspiration for me and actually helped mold my philosophy, because I remember not only the adulation and admiration that people gave him, but I also remember the other half, which was not very complimentary to him, because he lost people. And it taught me that not everything you do was going to be welcomed, even though you had good intentions, and you might eventually get good results. There will always be detractors and critics, and at first that offended me and bothered me.
But I learned later on, especially with the help of Jonathan [E.] Rhoads, my major mentor, that some of the best help or some of the best friends you may have will come from or will be critics, and as long as they are not mean-spirited, people who criticize what you say or criticize your thoughts or your work honed your thoughts and perhaps encourage you to do even better than you did do, and that still affects me, and I try to pass that on to my students and residents: Never be self-satisfied. There’s always more you can do. You can always do better. And critics help you become better. That’s really important, as you know, when we’re trying to teach our students and residents to prepare manuscripts and present them.

But to get back to early days at Penn, I went to a heart surgeon, Charles [K.] Kirby, and asked him if I could work in his laboratory because I knew he had an active laboratory going. He was one of the younger heart surgeons. And he lined me up with Dr. [Lysle H.] Peterson, who was a cardiac physiologist, and between the two of them, I learned a lot about cardiac physiology. I actually learned [virtually] everything that there was to know about cardiopulmonary bypass and the Mayo-Gibbon heart-lung machine [at that time].

Since when I was growing up, in high school, I could take automobiles apart and put them back together, taught by my father, that’s what I did with the heart-lung machine in the laboratory, and eventually I became the main technician running the heart-lung machine while the heart surgeons at Penn performed heart surgery. I eventually taught technicians how to do that with the heart surgeons and with engineers that they had there. But whenever they had a tough case, they’d get me excused from my classes to run the heart-lung machine for them. And I actually made some flow meter contributions and some oxygenation suggestions in the technology, and worked together with the people in the Moore [School of Electrical Engineering] and the Towne[School of Civil and Mechanical Engineering] at Penn and had a wonderful time. My fellow medical students couldn’t believe what I was doing, and neither could some of the other people, but it was just all related to initiative. There was no previous model for what I was doing, but I learned an awful lot.

There was a man in the laboratory at that time, Horace MacVaugh, [III], about a third- or fourth-year resident, similar to what we do now at Yale [University], who was in the laboratory also, and I’m grateful to him because he taught me how to operate. He taught me how to use every instrument in the animal laboratory so that as a medical student, I actually put heart valves into cows, and into dogs. I actually transplanted hearts in calves, ran the heart-lung machine while operating on these animals, and by the time I got into my internship or residency, they didn’t have to teach me how to operate in terms of how to use the instruments; they just had to teach me the indications and the techniques of the particular operations and the judgment
as to when and what to do. But I knew how to do it if they told me, “Sew this in.” I knew how to sew it in. “Cut this out.” I knew how to cut it out.

So I had a big advantage over most of the other people in my residency because I already had developed those skills working every summer in the laboratory and working on some of my elective time in the laboratories of the heart surgeons and pulmonary physiologists. I also worked with John R. Senior, who was a prominent gastroenterologist, who was working on intestinal projects, and I actually had done a lot of bowel work with him in bowel adaptation.

I remember John Senior asking me to work together with him in trying to show absorption of different nutrients in the small intestine of dogs, and the only way he thought that we could do that would be to take the bowel out of the dog, and we developed a Pyrex chamber to keep the bowel alive and moist and at the right temperature, and I used my knowledge of cardiopulmonary bypass to keep the bowel alive by pumping oxygenated blood through the bowel, and we actually collected lymph and could collect the venous blood to measure the difference in nutrients, and it was a fascinating exercise to keep the bowel alive for up to five or six hours [and study its function] under these artificial conditions. I would suspect that eventually the main thing that caused the bowel to decline was we didn’t have a kidney process to eliminate metabolic wastes. That was going to be the next step we were going to take, but then I got into my residency and internship, and I had to put those experiments aside for the time being, and I never did return to those with John Senior, but we have remained friends to this day. As a matter of fact, he was a co-author with Dr. Rhoads and myself on the very first paper I ever wrote in 1964, and that was actually in the Medical Clinics of North America, on surgical nutrition.

But when I started looking at internships in my senior year at Penn, I was fascinated by the new curriculum at Cleveland Clinic, and then I thought a bit about the University of Chicago and UCLA [University of California, Los Angeles] and several other prominent institutions, but every place I went to be interviewed, everybody wanted to know about how Dr. I. S. Ravdin, who had been the chairman during most of my medical school years, in surgery, or Dr. Rhoads did their operations or how did they take care of their patients. I was embarrassed because, in reality, I didn’t know. I was a medical student, and, although I assisted them in procedures, I didn’t have enough experience to discuss what their philosophy was about how they did their major cases. But I was impressed that everybody else around the country thought that they were top drawer. And I got thinking, I better hang around here for a while [chuckles] and find out more about my alma mater before I go elsewhere.
Plus by that time, we had had two children, and Terri was pregnant with our third, and although I kind of was titillated by the university hospitals in Cleveland and at Case Western Reserve, because they had this dynamic new curriculum and faculty, I decided to try to stay at Penn, and I actually had a rotating internship. I was one of the last rotators. Shortly after, within a year or two after my internship, Penn went to the straight system. But at the time, I was an intern, and we had a rotating internship.

It was a marvelous year. I would do my internship again if they let me. We had pathology and medicine and cardiology and surgery and pediatrics, and we did all kinds of things that kind of polished our rough diamond from medical school. And then I was selected at that time [for residency training in surgery] by Dr. Rhoads, who had taken over the chair from Dr. Ravdin—and both of these men, by the way, were enormous influences on me. Dr. Ravdin is credited by many for being one of the most important people in the country to encourage surgeons to be physiologists. Prior to his time, in the 30s, surgeons were anatomists, pathologists, technicians, and physiology was of interest to some of them, but Ravdin was a strong advocate that you had to be concerned about the pathophysiology that indicated the operation and then the post-surgical physiology that you create in trying to overcome the pathophysiology. And surgeons were not used to thinking that way.

Another man who was influential in the country at that time, in the same vein, was Owen [H.] Wangensteen from Minnesota. As a matter of fact, Owen Wangensteen and I. S. Ravdin [virtually] both started the journal Surgery. They’re [two of] the founding editors. And the original purpose of that journal was to report papers on physiology, physiologic surgery. And then, of course, Owen Wangensteen went on to establish a PhD program in surgery, which still exists.

But Dr. Ravdin was one of the most powerful influences in American surgery. He obtained the funding for the Harrison Department of Surgical Research at Penn [the University of Pennsylvania], which was the first funded or endowed research surgery department in the country. And there were a lot of firsts at Penn. Penn was the first medical school, 1765. It used Pennsylvania Hospital initially, which was the oldest hospital in the country, 1751. And then, when Penn built the hospital at the University of Pennsylvania [1874] after running out of space in downtown Philadelphia and moved west to its current site, they built the very first medical school hospital. And then Ravdin got the first endowed surgical research department from the Harrisons.

The Harrisons were an interesting family, because there was a grandfather, a father and a son, who were all professors in the Department of Chemistry at Penn. And they actually started a company manufacturing chemicals south of the university, and one of them I think rose to become the dean or the
president [actually the provost] of the university, and still to this day, the chemistry department in the undergraduate school is [referred to by some as] the Harrison Department of Chemistry.

But the interesting piece of history is that the Harrisons’ company became a family company which after a while kind of outgrew them. They were more interested in being academics, and they sold the company to, of all people, the DuPonts. The DuPonts were just down the river, down the Delaware [River], in Delaware, and making dynamite, and they were looking to diversify, and so what allowed DuPont [de Nemours & Co.] to become the company that said, “Better Things for Better Living...Through Chemistry” was when they bought the Harrisons’ chemical works. And, of course, now the DuPont company is very big in pharmaceuticals and many other things.

Well, with all the money that the Harrisons made selling their company, Dr. Ravdin tapped into some of that because he had operated on some of them, and they gave millions to endow the department [the Harrison Department of Surgical Research]. And I mention that because it was important that that was where I got the money to begin my studies, from the endowment funds. And then we parlayed that into the basis for NIH [National Institutes of Health] grants and continued support of our nutritional research.

So Ravdin started this [emphasis of the relationship of] physiology and surgery, the journal Surgery, the Harrison Department [of Surgical Research], and he was a strong advocate of pre- and post-operative care and nutrition. He was fascinated by anesthesia because he felt that anesthesia allowed us to be surgeons and to do large general surgical procedures. His work was interrupted by the Second World War, when he went into the China-Burma-India theater with the University of Pennsylvania battlefield hospital, and he became a one-star [brigadier] general, working over there in the Pacific theater. He had the best medical outfit in the Pacific, with [General Joseph Warren] Stilwell and the [Wingate's] Raiders and all the over-the-Hump Flying Tigers and all that. He serviced all those people and brought back a fantastic unit of people when he returned after the war, and then he became chairman of the Department of Surgery and ultimately the vice president for health affairs at Penn, and a leader throughout the country.

He stressed nutrition because he was impressed that the things we were using for general anesthesia, such as ether, chloroform and then later on agents like halothane and cyclopropane all caused liver damage, and he thought that if we gave better nutritional support, we might reduce the liver damage. And to some extent that was the case with ether and chloroform, but with the more sophisticated agents, there were toxic effects that even nutritional support could not overcome. But those thoughts and ideas were the basis of his early work in the Harrison department.
Plus the other thing he was interested in was wound healing. So I was brought up in a very fundamental research environment. Surgeons have to be able to operate with pain-free patients, so you have to be interested in anesthesia; therefore, you have to be interested in pulmonary support, and you have to depend upon adequate wound healing or else you may as well not operate. So these were very fundamental concepts that Dr. Ravdin proposed to us.

With that background, he first piqued my interest in nutrition, because as a student I was aware of the major changes that cardiopulmonary bypass caused in patients. Also he was one of the first [clinical investigators for], I guess, beta sites for Lipomul®, which was the first practical fat emulsion that was produced in this country by—the Southern [Regional] Research Laboratories, the U.S. Army Research and Development Command, and the Upjohn Company—together they produced this cottonseed oil emulsion.

As a medical student and then later as an intern, Dr. Ravdin had me bird-dogging the clinical application of intravenous Lipomul®. Well, I have to admit to you, the first time he gave me this bottle of pure white milk-looking stuff and said, “Stanley, I want you to start an IV on patients and give this over a six-hour period, and I want you to take their signs every 10 minutes and record it all on this sheet,” and he gave me the protocol sheet, and I thought, Oh, my God! I’m gonna put this white milky stuff into somebody’s veins. It’s gonna kill ‘em. I remember being terrified at the thought of giving this “milk” by vein.

As it turned out, I did dozens of patients in his project, and I then became fascinated by the whole idea that we could put this stuff into people’s veins and they metabolized it, and it just piqued my interest in, you know, what the whole absorptive, digestive and assimilative processes were all about. And that we can bypass digestion and absorption and just give it by vein.

Well, the problem was with the Lipomul®, the emulsion was not standardized enough. We found that the droplets, fat droplets in the emulsion were anywhere from one micron to ten microns [in diameter], and of course with the average capillary being seven microns in size, you could see that the larger particles were going to block up the capillaries, and that’s what they did, and it caused people to have pains and aches and renal problems and liver problems, so Lipomul® never made it in the big time as an IV food, so—but Dr. Ravdin stimulated me. And then Dr. Rhoads, when he inherited Dr. Ravdin’s chair, he had also been interested in nutrition and had done work with Vitamin K and wound healing and hypoproteinemia and bone healing and metabolism, so he saw that I had an interest in nutrition and wanted me to continue that.
During my internship, a very profound thing happened to me which influenced my life, and that was that I was on Dr. Rhoads’ service in November of my intern year in 1961, and I was in the trench as the on-call person, and that was in the days when we were on call every other night and every other weekend, so I was on the whole weekend: Saturday, Sunday and all day Monday. Over the weekend, on Saturday and Sunday, I had a catastrophic experience because three of Dr. Rhoads’ patients died, for various reasons. They were all complicated, reoperative patients. That’s what he would attract. When he came in on Monday, everybody else was busy in the operating room, and I had to take Dr. Rhoads on rounds. He had been away for the weekend, giving a talk someplace.

He noticed, I guess, on rounds that I wasn’t as enthusiastic as I usually was, and he said, “Stan, is something bothering you?” And I said, “Well, as a matter of fact, Dr. Rhoads, you’re very perceptive. There is.” He said, “Well, what is it?” I said, “Well,” I said, “I really don’t think I’ve got what it takes to be a surgeon.” And I said, “I’ve been trying to figure out how to tell you that.” And he said, “What do you mean?” He said, “Come over here.” And he took me aside. There was kind of a deacon’s bench there in the hallway of the hospital. And we sat down.

He said, “What’s troubling you?” And I said, “Well, you know, I lost three of your patients this weekend.” I said, “All three of these patients died on my watch.” And I said, “I worked as hard as I could possibly work, and fought, did everything I possibly could to keep them alive, and they all died anyway.” And I said, “I helped you with those cases, not very actively, but down at the end of the table, and from my point of view, you did a beautiful job operating on them. I can’t imagine anything technically [that went wrong], and yet they all died.” And I said, “I figure it must be my fault.” And he said, “Oh, no, Stanley,” he said, “it’s not your fault.” I said, “Well, I was the one you left to take care of them. You trusted me, and I didn’t make it.” And I really felt terrible.

He said, “Now, wait. Let’s just analyze these patients.” And he logically, systematically taught me first of all that he knew everything there was to know about those patients. Probably the chief resident had kept him informed by phone. And he then went through a litany of each of their case histories, and he said, “Now, if you notice, every one of these cases was a bit on the elderly side. They had had one to three operations before they came here in the previous six months. They were already debilitated from their procedures and their malnutrition, and we had to reoperate on them, and the best chance to operate on people is the first time. And the common denominator was multiple complex problems and malnutrition.” He said, “Those patients died from malnutrition and its complications.”
And I said, “Well, Dr. Rhoads, then why didn’t we feed them better?”—a stupid, naïve novice’s question. And he said, “Well, we did the best we could, but it just wasn’t enough.” And I said, “Well, why can’t we give people more?” He said, “Gastrointestinal tracts don’t work, as you know,” and all this.

END OF TAPE 1, SIDE B

DR. DUDRICK: Well, continuing with my talk with Dr. Rhoads. I said, “Well, Dr. Rhoads, it seems to me that we ought to be able to feed people better by vein,” and he said, “Well, a lot of people have tried,” he said, “including me.” And he said, “We haven’t been able to do it,” and he said, “You can only give so much fluid. You can only give so much concentrated nutrients. We don’t have a lot of sophistication in ways of giving people IV fat or amino acids and protein, and the science just isn’t there.” And I said, “Well, I really think it should be a priority, because,” I said, “I see on the Jack Paar show, he gets a laugh every time he says, ‘Well, the operation was a success, but the patient died.’” And I said, “I don’t think that’s funny.” And I said, “As a matter of fact, it offends me. I like Jack Paar, but,” I said, “I hate it every time he says that because I have a feeling he’s mocking our ineptitude.” And I said, “I think we ought to do something about feeding people so that when they have good operations technically, that they can get through. Otherwise, why are we doing the operations?” He said, “Because that’s all we can do right now.” And I said, “Well, I’m having a hard time accepting that. Maybe I should be doing something else besides being a surgeon. That’s why I mentioned what I did today.” And he said, “If you decided to quit surgery, that would be the saddest day of my life.”

That stopped me cold. I thought, My God! This great man cares enough about me, an insignificant intern, enough that if I didn’t go into surgery that would be one of the saddest days in his life? I said—it made me a little ashamed, and it got me thinking. And then he said, “You know, if you really feel that strongly about this, why don’t you plan on taking off a year or two in the laboratory and doing something about it instead of quitting?” Whoo! So first he hits me with “the saddest day in his life,” and then he implies that I might be a quitter. I said—boy, that got my attention. I said, You want a motivator? There it is. And he took me from a low to a want-to-get-up-and-fight kind of position. And so I said—

[Recording interruption.]

DR. GOSCHE: We’re back on.

DR. DUDRICK: Well, after Dr. Rhoads fired that one across my bow, I really kind of felt ashamed of myself, and so I put my tail between my legs and thanked him, and as I sauntered off, he said, “Well, why don’t you come
down to the office later on this afternoon, and we can talk about some ideas.” So I actually went down later that afternoon, and we sat and talked about how we could get more food into people by vein, and we thought we could increase the concentration peripherally maybe from 5 percent, which is isotonic, to maybe 10 percent. Although we knew that was going to burn the veins, we thought that if we changed the needles regularly—and we had needles in those days, not catheters; we had no catheters—and we thought we’d minimize the phlebitis and the thrombosis, although I was skeptical.

And then we decided that we might be able to give more intravenous fluid, to go from two to three liters to maybe four or five, knowing that that would limit us, because not many sick people can take five liters of fluid. So then we decided we would try something like that with the protein hydrolysates that were available. There were two of them. One was a casein-based hydrolysate, and one was a fibrin-based hydrolysate, and both casein and fibrin are complete proteins, so the reason that they are used is the amino acid ratios and quality of the amino acids, the profiles are complete, and it’s logical: If you just drank milk protein, that’s all you’d ever need to live on, and fibrin, for some reason, is also a complete protein. So they had [commercially available] hydrolysates of those. One was an acid hydrolysate, which was the casein, and one was an enzymatic hydrolysate, which was the fibrin. Both of them were supplemented with crystalline amino acids, which are very expensive, to make sure that the mixtures were perfect or as good as they could be [after the hydrolysis process].

But there were also dipeptides and even decapeptides in the hydrolysates, which caused problems. We worked with that for a while, and then we tried—the diuretics that were available at that time were either oral, which were the new ones, DIURIL® and HydroDIURIL®, or they were intramuscular or subcutaneous, which were the mercurial diuretics: Thiomerin® and mersalyl. Now, when we tried to give those diuretics to people who were receiving large volumes of water, they didn’t seem to work. However, if you had somebody who had pulmonary edema and you gave him [or her] Thiomerin®, and that was kind of the diuretic of choice at that time, and they would have a diuresis, which would help their congestive [heart] failure or their pulmonary edema. But when we tried to induce diuresis of exogenously administered water in patients, it didn’t work [effectively for our purposes].

So we went to the laboratory, and actually Jonathan [E.] Rhoads, Jr., who’s been a surgeon trained by [William A.] Altemeier of [the University of] Cincinnati, and he’s been at York [Hospital], Pennsylvania, for years as chairman and program director there—but Jack Rhoads, Dr. Rhoads’s son, was a student, and he spent the summer in our laboratory and actually was studying adult dogs receiving different kinds of diuretics to see what we could do about improving diuresis and using the water as a vehicle to take in
the nutrients but then getting rid of the water while retaining the nutrients. That was the theory of that approach.

Well, Jack Rhoads couldn’t make the diuretics work in dogs any more than we could make them work in human beings, and so we did learn that, but we were a little taken aback. And about a year later, I saw an article in the *New England Journal of Medicine* on intravenous HydroDIURIL®, or maybe it was intravenous DIURIL®. That had been developed. And so I thought, *Well, maybe we can try this, and it might rejuvenate our experiment and our experience.*

I tried to call the people in Boston who were working with it, and I couldn’t get through, so I just picked up the phone—I’m a very practical person. I picked up the phone and called the [hospital] pharmacy, and I said to the pharmacist, “Have you ever heard of intravenous DIURIL®?” And he said, “Yeah, Dr. Dudrick. This is an amazing coincidence. We just received our first shipment today. I’m actually unpacking the boxes.” I said, “You gotta be kidding. You *have* it here?” He said, “Yeah, it’s brand new, just been released, and I’m adding it to the formulary.” I said, “Wow! May I come down and see it?” And he said, “Sure.”

So I actually hung up, and I went down to the pharmacy, and he showed me his multi-dose vial of DIURIL®, intravenous chlorothiazide, and I asked him if I could have one of the package inserts, and he said, “Here, you can have a vial.” So he gave me the vial, the box and the package insert, and I read it and I thanked him for his generosity. And so I called up Dr. Rhoads and told him that there was a new intravenous diuretic on the market and he might be interested. So he again asked me to come down [to his office]. Usually it was in the afternoon, at the end of the day—you know, five o’clock or so. Before he’d make evening rounds, why, he usually had a low period when there was a little peace and quiet, so I treasured those hours with him.

I went down, and I started telling him about this *New England Journal of Medicine* article. I had gone to the library, because the library always got it before we did, and I went to the library and made a copy of the *New England Journal of Medicine* article, in those days a thermofax copy. We didn’t have Xerox® machines. And I was talking to Dr. Rhoads about it, and he said, “Gosh, if you can get me a copy of that,” and I handed it to him. He always liked that. So I gave him a copy, and he started looking at it. And he said, “Do you think we might be able to get some of this stuff?” And I said, “Yes. As a matter of fact, we have it here. We just got it today in the pharmacy.” He said, “Really!” And I said, “Yeah, here’s some.” I took it out of my pocket and gave it to him, and of course he just loved that kind of stuff, because he loved people to be prepared when they talked to him; he loved people to do their homework, and he hated it when you just brought him problems. He wanted the problem solutions.
And so he was, like, literally—I don’t think I ever saw him that happy. He was like a young man or a young boy with a new toy. And he’s looking at this DIURIL®, and we read the package insert together, and we actually sat down, right then and there, and wrote out the constituents of a five-liter program of 10 percent solute, and we decided we’d give DIURIL® in the second and the fourth bottle each day. We didn’t have bags then. Within a few days, I started giving these five liters of 10 percent solution, which had about 2,000 calories and 100 grams of amino acid/peptide equivalent or protein equivalent. And that became known as the "five-liter program."

We began using it in people who had cancer. They were the most cachectic. And also another reason for using it in cancer patients is we used it in patients who had nothing else that we could do for them except to maybe give them nutritional support. Even chemotherapy was in its infancy in those days. We had 5-FU [fluorouracil], and we had Cytoxan® and methotrexate; 6-MP [mercaptopurine] was coming along, but there was no really organized medical oncologic, chemotherapeutic program until later on; during the residency, it did develop.

But we then actually worked together. They had a nurse who was the chemotherapy administering nurse. She would give the chemotherapy IV to these patients, and so I kind of worked together with her to get suitable candidates who might benefit from nutrition if you could improve their nutrition. And I think we did about 37 to 39 cancer patients. We got a little bit of pulmonary edema in one patient, but that quickly resolved, with appropriate pullback in the dose and increased diuresis. We didn’t permanently hurt anybody. We don’t think we killed anybody. We approached nitrogen balance, but we didn’t get positive nitrogen balance, so we reduced the amount of their weight loss and [the] amount of their continuing negative nitrogen balance, but we really didn't see them recover as impressively as we later did with the more concentrated TPN [total parenteral nutrition].

Although we didn’t have to use a catheter, [and] we didn’t have to give it central venously, it was an enormously labor intensive process that we didn’t think was going to catch on, because surgeons were already pretty overworked. We didn’t have to use an indwelling catheter, but we had to have an indwelling resident, which was me. And I had to make the solutions myself, and we didn’t have a manufacturing pharmacy, and we thought that it might be better to go to a laboratory to see if there were other ways that we might be able to solve this problem.

But we were encouraged by the fact that by trying to give more nutrients, we seemed to be decreasing the negativity of the nutritional status and the nitrogen balance. So that gave us hope that we might be able to find some
way to do it in the laboratory. And I guess after three and a half or four clinical years in the residency with Dr. Rhoads, I took a year off to go to the laboratory to see if we could show that you could feed adequately by vein. Prior to doing that, I tried to prepare myself by reading everything I possibly could in the literature and in the textbooks, and I actually catalogued more than 600 articles or chapters on five-by-seven cards. We had no computers. And I had a little abstract on every article I had read. I classified them according to the nutrient or whatever and cross-referenced them. I still have those cards someplace up in the attic of this house.

I didn’t feel I could go to the laboratory and just try to do experiments. I had to know more about nutrition, and there was nobody [apparent or available] to teach it to me, so I had to teach myself. The dieticians pretty much were [focused on] oral [nutrition]. We didn’t have much enteral nutrition. The enteral nutrition problems were as bad then as the TPN ones became later, because we didn’t know what kind of nutrients to give into the small bowel. We knew what to give to the stomach, but then you couldn’t always use the stomach.

Well, at any rate, I went to the lab thinking that we might try to grow animals from birth through adulthood, and that was one protocol we thought we might follow. Another one was to try to feed adult animals and see if we could measure nitrogen balance, but we knew that if we tried to measure weight or nitrogen balance, that most people would be skeptical about it. And then we thought about getting into deuterium and tritium, the heavy-water techniques, and then the isotopic carbon and nitrogen molecules that we might measure. But, again, we really felt that surgeons and clinicians were going to be skeptical about anything that they couldn’t really see or feel, and thinking about body composition based on isotopic distribution in the total body water and into various [body] compartments is just not something that, as you know, our surgical colleagues cherish as fact. They’re fascinated by it, but they want to see it [in the form of clinical results].

So we thought if we could have a practical demonstration of the efficacy of IV nutrition, it would be to not only maintain an adult animal for a long period of time, but even better, if we could grow one. However, we knew that if we took an immature animal of any species, it was going to take probably twice as much nutrition per gram of body weight as it would to maintain an adult. As you know, the pediatric neonatal requirements are much higher for protein than they are for people our age, and that meant giving more of the nutrient and maybe more concentration or more water.

But at any rate, we thought we would try it. So I spent several months in the laboratory first of all trying to put together intravenous complete nutrient solutions based on what information I had read, to see if I could duplicate, for intravenous feeding, what I presumed might be what was in the portal
vein in the way of nutrients after a balanced meal, and then we’d have to give
the fat separately, just as the lacteals absorb fat separately and pump it into
the subclavian veins or innominaates, through the thoracic duct.

Simultaneous with trying to get these individual nutrients into solution and
trying to find different cationic forms of the necessary anions or different
anionic forms of the necessary cations, I had to go through a lot of chemicals
in the laboratory, [Harold M.] “Harry” Vars' laboratory. Harry Vars, a
wonderful man, was the distinguished professor of biochemistry who worked
with us in the Harrison Department. He knew everything there was to know
about nutrition and biochemistry, and he was an invaluable asset to me, a
walking encyclopedia. I used the resources in his laboratory to literally take
chemicals off the shelf and dissolve them and purify them and sterilize them
and try to mix them together. And I would spend hours at the Mettler
balance or actually the swing balance. We didn’t have the automatic ones
then. And just as we did in quantitative analysis, I’d get the right amount of
each of the chemicals and then add them to the combination of hypertonic
sugar and protein hydrolysate, and sometimes I’d add two, three, four, five,
six, sometimes 10 or 15 and then all of a sudden the whole thing would
precipitate.

DR. GOSCHE:   [Chuckles].

DR. DUDRICK:   I’d say, Oh, golly. So I’d have to start all over again,
either [in different form or] with a different order of adding them.
Sometimes I took the individual components and I dissolved them in water
first and added them in liquid form rather than adding them in crystal form.
I changed the order in which I added them. I changed the salts. I tried a lot
of different combinations until I finally got the solution stable. And then I
found I couldn’t sterilize it, because if I’d sterilize it, the whole thing turned
into caramel. The [Maillard] browning reaction occurred, the esterification
of the carboxyl groups with the amino nitrogen groups, and that’s how you
make caramel. So it was either the Maillard [browning] or the
caramelization. I then knew that I wouldn’t be able to sterilize the solution
with the autoclave and that we’d have to find another way of doing it.

So at that time, we had the old asbestos sterilization process, where you can
make asbestos sheets by adding it to a suction apparatus, and then you could
actually sterilize that apparatus and it would filter and provide a sterile fluid,
but that was complicated, and of course by that time asbestos was getting a
bad name for causing the thoracic—

DR. GOSCHE:   Mesothelioma.

DR. DUDRICK:   Mesotheliomas. Thank you. So then I actually
consulted the pharmacy, and I asked, “How do you people sterilize the
radioactive materials you give for tracer studies?” And they said, “Oh, we have these Millipore® filters.” I asked, “Millipore® filters? What are they?” So they explained to me what Millipore® filters were. They were usually an inch in diameter, in an apparatus that supported them, and they [the radiopharmacists] would draw up their radioactive nuclides in a 10-, 20-, 50-ml [milliliter] syringe, and then they’d put this Millipore® filter on it, and then they would squirt the solution through that filter, under mild pressure, into a sterile container, and that’s how they sterilized the radionuclides because you wouldn’t dare put them in a steam autoclave and then disseminate the radioactivity all over the place.

And they said, “As a matter of fact, this is how we do prescription eye drops.” Well, I hadn’t ever thought about it, but if you—in the old days, you would write prescriptions for eye drops that would have perhaps various antibiotic[s] in them or mydriatics or whatever, and so you could write an eye drop prescription and it would be usually only 15 or 30 ml. And the way the pharmacists would do that is they’d draw it up in a syringe, according to the prescription, squirt it into a sterile bottle with a sterile dropper, through the Millipore® filter. It was low-volume sterilization of pharmaceuticals. And I was fascinated by that because I had no knowledge of that whatsoever, and I was sure most of my colleagues didn’t have any, either.

So I said, Well, gee, that has some application. I said, “Can you get bigger ones so that I can sterilize a liter of solution or so?” They said, “Well, we don’t have it, but, you know, you know the people who use this most? The beer and wine industry.” I said, “Really.” They said, “Yeah.” They said as a matter of fact, if you go back in history, [Louis] Pasteur’s work was subsidized by the French wine industry, and later the German beer industry because they were upset with their beer or their wine spoiling. And his investigation into why it was spoiling led to the association of bacteria with pathologic processes, which was Pasteur’s first contribution.

So he said the beer industry and the wine industry have been using Millipore® filters here in this country for years, and so I investigated it, and sure enough, I found out that I could buy a six-inch-in-diameter or bigger [filter], if I wanted it—I didn’t need anything bigger—and a tripod and kind of a pressure cooker apparatus, and you put your TPN solution into this kind of pressure cooker, and although it doesn’t cook, you just increase the pressure, and then it pushes it [the fluid] through this filter, and out the bottom end of the filter comes sterile TPN solution.

So I was delighted with that because it solved a major problem for me, and so what we did was with that, we actually could get dry sugar and add it to the liquid five percent hydrolysate solution, which was the highest concentration they had at that time, and that would save us some volume, because otherwise we would have had to add 50 percent sugar, and that would take
up more volume. So we were happy with that. And then we added our other nutrients. I sterilized some of them separately, in two different batches, and then I would combine the two sterile batches into one, and I found out that I had less problem with precipitation that way.

But that took months of just tedious labor in the laboratory. While doing that, I was also trying to modify and develop a better intravenous swiveled, counterbalanced apparatus for infusing the dogs. We originally were going to try to infuse them by peripheral vein, because Dr. Rhoads felt very strongly that clinicians would never accept central venous feeding. And he said, “I don’t think we should do that.” So I tried to feed the dogs peripherally by hindpaw or forepaw veins, but that was difficult. I added steroids to reduce inflammation. I added procaine or Xylocaine® to the solution. I added heparin. And none of them really did it. And Dr. Rhoads also then said, “Well, Stan, they’re not going to like adding those products to the nutrients, either.”

I started to feel stymied, and so I just decided that I was going to go central and see what happens. So I bought a couple of dogs from the pound. They were a couple bucks apiece, and as a trial I put a central [venous] catheter in through the jugular vein. By that time we had a more sophisticated apparatus that we developed. Harry Vars was ingenious in getting collaboration from our Towne School of [Civil and] Mechanical Engineering and the Moore School of Electrical Engineering [both of the University of Pennsylvania], and they had magnificent facilities there for tool and die work, and they made these lovely stainless steel swivels. And then we erected an apparatus over the top of—

END OF TAPE 2, SIDE A.

DR. GOSCHE: You were saying about the apparatus.

DR. DUDRICK: So while we were working on the solubilities and the components and the sterilization, we were also working on the mechanical apparatus.

[Recording interruption.]

DR. GOSCHE: Go ahead.

DR. DUDRICK: We actually tried to feed these two puppies by vein, by central vein, with a catheter placed in the superior vena cava, through the jugular—came out between the scapulae of the dog, and we didn’t have a sophisticated apparatus for those animals. We just tried to keep them quiet in the cages. They were pretty well behaved, and they were small. I actually began to feed them [entirely by vein]. Over the 24-hour period you had to
feed them 24 hours to get the maximum amount of food in per day. And I was delighted to see that they were growing. So I actually had them growing for 24 days. Now, they weren’t controlled. They were just two dogs getting intravenous feeding, but they were growing, and I had weight-gain curves and some pictures of them, just candid pictures, and I got some nitrogen balance studies on them. They were in positive balance.

We had a Harrison Department of Surgical Research monthly meeting, which we always had on a Wednesday night in the department, and we usually had 40 to 50 people come to the meeting. Dr. Rhoads always ran those meetings, and he always had at least three investigators reporting their work, plus we took care of administrative details and other things. After that meeting, I asked Dr. Rhoads if he would come by and take a look at something I had in the laboratory, so he walked down to my lab, and I showed him these puppies, and I had my graphs and my work all lined out there for him to see, and he said, “That’s very impressive, Stanley.” He said, “Good for you,” he said, “and what peripheral vein are you using?”

DR. GOSCHE: [Laughs]

DR. DUDRICK: And I thought, Oh, my God! I’m gonna get fired right here tonight. I said, “Well, Dr. Rhoads, I’m using the external jugular as access, but I actually run the catheter down into the superior vena cava.” He said, “Oh, so you’re infusing them by central vein.” I said, “Yes, sir.” I said, “The solution is about 25 to 30 percent solute, and there’s no way you can give it by peripheral vein.” I said, “I’ve actually put it in my own vein,” and I showed him my arm, where I had put some in my own vein, and it still was a bit indurated even two or three weeks later, and I said, “It burns like liquid fire, Dr. Rhoads. We can’t possibly put that in a patient, and you don’t want me to use Xylocaine® or any other local anesthetic. You don’t want to use heparin; you don’t want to use a steroid. So I don’t know any other mechanism for now except central venous, depending upon the dilution there, rapid dilution.” And I said, “I’ve calculated that, judging from blood flow and judging the rate at which we’re giving this [formulation] that the solution is really dissolved, like, 200 or 300 to one per minute.” And I said, “If you’ll excuse the expression, sir, it’s like whizzing in the ocean.” I said, “Everybody does it, but everybody still goes in the ocean.” It just gets diluted.

So he said, “Well, I guess you can’t beat success.” I said, “Can I take that as an endorsement to continue, Dr. Rhoads?” He said, “You can”—or “You may.” And I said, “Well, then, I’m going to have to invest in some expensive pedigreed beagles for control, in order to do it right, because these are just mongrel puppies.” And he said, “Well, you better go ahead and put in the order.” Of course, the beagle puppies were, I don’t know, something like
$300 apiece, which in those days was a lot of money, but we did buy the puppies eventually.

In the meantime, I had to get improvements in the apparatus. I knew I’d have to protect the catheter or the intravenous line coming down through the top of the cage. We originally had a plastic outer covering over the inner plastic catheter or administration tubing, and so I actually went to Pep Boys—Manny, Moe and Jack, the Pep Boys on 43rd or 44th and Market Street. It was walking distance from the laboratory. And I bought some speedometer cables that I thought would be great, and we incorporated [the cable into the swiveled infusion apparatus]—well, while I was there, I was looking at some plastic tubing, and I asked them about the tubing. I had to buy 1,000 feet of Irvington® brand polyvinylchloride tubing that I thought might be a good tubing to run through the speedometer cable. They wouldn’t sell me small amounts; I had to buy [a roll of] 1,000 feet of it. I’ll never forget it: Irvington® brand’s polyvinylchloride tubing, which was designed for insulation for wire. And I never knew that you don’t put insulation around the wire, you actually thread the wire through the tubing, which is some kind of a fascinating thing to me that we have the machinery to do that. But that’s how they do it. So this was an unthreaded, unwired insulation tubing.

I then was studying all different kinds of plastic for inflammatory potential, and every piece of plastic that we had, whether it was polyvinyl or polyethylene or the new Teflon® catheters, which were very hard and rigid—couldn’t use them. But I tried every one, and they all caused reactions in the vein, and I actually planted some of them subcutaneously, and they all caused induration in the subcutaneous spaces of both dogs and rats. But I did buy this polyvinylchloride at Manny, Moe and Jack’s and the speedometer cable and went back to the laboratory. I sterilized the polyvinylchloride, which you could do in the autoclave; it will withstand sterilization. And I put it in some veins and some subcutaneous spaces, and it didn’t cause a reaction.

So it was the first plastic tube that I could use as a catheter and have confidence that it wasn’t going to be thrombogenic or inflammatory. So I cut it up in little pieces and sterilized them, marked them and then threaded them into the beagle puppies, and it worked beautifully. And eventually we used the very same tubing in the first baby that we fed and in many of our adult patients until industry caught up with us to make what we asked them to make earlier. The Deseret® [Pharmaceutical Company] [now part of Becton, Dickinson and Company] people out in Utah, I guess, provided some of the first catheters that we used for central venous catheterization, and I had to deal with industry, whether I liked it or not. It had nothing to do with their making money, it had to do with their providing for me what I needed.
for my experiments, and then eventually my experiments in human beings and then for the clinical application of it. I couldn’t live without them.

So it was a pure, collaborative effort. And I should say that I never took anything from industry free, nor did I ever take any money from them, so I still have all of the bills that I paid for every bottle of nutrient that I ever gave to any of the puppies. I paid for them because I didn’t want anybody to accuse me of saying that this worked in order for the companies to make a profit. And that really served me well later on, because there were some people who said, “Well, how much money did they pay you, Dudrick, to say that this is a good amino acid solution?”

DR. GOSCHE: No conflict of interest.

DR. DUDRICK: No, there was absolutely no conflict of interest, and I had all the bills to prove that. Now today that would probably be considered stupid by most doctors, but who knows? I was more interested in maintaining my scientific credibility and my trustworthiness and my honesty with my colleagues than I was in any kind of money or patents, so we never patented anything, and we never took any money for doing that work. There were a couple contract projects that I did years later, which I thought had mutual interest, and I said, “The only way that I can do them is if you pay for the expenses of it,” and I’d get some of my residents or fellows to do the experiments, to try different variations in solutions or technology. But other than that, which was really a pittance compared with what it cost us to do this work, I never, quote, “made any money,” unquote, on the TPN.

We had four males in the first set of puppies that we began to feed. They were all littermates. And we tried to get arrangements with the animal supplier, which was a very reputable outfit north of Philadelphia. As a matter of fact, the owner of the animal farm used to deliver the beagle puppies in his Cadillac. I always got a kick out of that, meeting him at the loading dock in his beautiful Cadillac car and getting these puppies out of the back seat that he would deliver, at any rate, freshly separated from the mother.

We originally tried to feed puppies from birth, and I actually had pregnant dogs brought to the Harrison Department near whelping, a couple days before they were going to deliver. We’d get the vets [veterinarians] to see them and clear them, and then I actually would stay with the animals or be right close to them so that when the mother would be ready to deliver the puppies, I could be there to help her and to see that she didn’t feed them anything, because I really wanted this to be pure. I didn’t want anything by mouth for these puppies. And they were little puppies. They were 200 to 250 grams, which would be about the size of a big rat. I miniaturized the
technology for them and the delivery apparatus, and I began to try to grow the puppies from birth.

But then I had problems because I had—first of all, to get the puppies I literally would sleep in the animal quarters with them. I’d set the alarm to wake me up every hour to see if the mother was okay or the mother-to-be was okay, and when I’d wake up I’d have roaches and mice and rats running around my body because they came out at night, and that was kind of fun. And I actually then suspended an Army cot from the ceiling with four piano wires so that I could lie on this cot away from the vermin, but they would crawl [down the wires]—[Chuckles]. I don’t know how they did it, but somehow they’d get on me anyway. So I lived through that a month or two. But it was “fun.”

And I tried to grow these puppies, and all of them would die [after] about two to three weeks. I got isolettes from the pediatricians. I got used, old isolettes, but I had to be like a pediatrician or pediatric surgeon. I was there 24 hours a day, sleeping in the laboratory, trying to see the puppies every couple hours to see that they were okay. And they’d all die in two to three weeks, and I autopsied them, and I couldn’t figure out why they died. I noticed that all of them had fluid in their bellies. I also noticed that there was nitrogen in that fluid, but I thought, *Well, I guess apparently a body fluid has nitrogen in it.* And since I had the ability to measure it, I did.

The veterinary school was just across the street from our laboratory, and I asked the veterinarians if they’d come over and see my puppies that were dying. And so they came over, and they autopsied the animals with me, and they said, “Well, all these animals have ruptured bladders.” And I said, “Really?” I mean, I didn’t even recognize that these teeny-weeny bladders in the pelvis, that they were ruptured. I just didn’t even notice it, because I wasn’t trained to do it, but the veterinarians picked up on it right away. They said, “All these bladders are ruptured, and this free fluid is probably urine.” Of course, we then confirmed that it was urine, and I felt dumb. But I said, “Why are the bladders rupturing?” And they said, “Well, you’re giving them a big water load.” They said, ”Did you ever notice that they had little, teeny-weeny urethras?” I said, “Well, what do you do about that?”

They said, “What happens is that the crystals form, uric acid crystals and other crystals form in this little meatus, and it blocks off exit from the bladder, so it’s an external obstruction.” And they said, “Did you ever notice that the mother of puppies licks their genitalia?” And I said, “Yeah, I’ve always seen that.” They said, “Well, that’s why she does it. She licks away the salts from their genitalia so that they don’t get urinary tract obstruction, and it’s an intuitive thing, but that’s what keeps the puppies alive.” And I said, “Well, I want this experiment to work, but I’m their [surrogate] mother and I’m not going to do that.” [Laughs]
Of course, we all laughed about it, but I actually then for a while would wash off their urethras every three or four hours with a warm, moist cotton swab, and sure enough, as sure as I washed it off, they’d always provide me some urine. I actually would collect it. But it was such a labor-intensive project, I really realized that my purpose was not to show I could grow puppies from birth, my purpose was to show that you could give adequate nutrition by vein to grow them. So I had to take a step back, because I was trying to do too much.

So then we thought the next logical time to do this was after the mother weaned the puppies, which is usually at six to eight weeks, but for beagles it was eight weeks. So at eight weeks I'd get the puppies delivered, then I would feed them for four weeks with a standard puppy oral diet, and I’d watch their growth rates. The owner would tell me what the birth weights of the puppies were, so I had those for the first eight weeks, not sequentially but I knew what they were born at and I knew what they were when I got them, and that’s all that mattered. And then from there I’d weigh them every day for four weeks while they ate an allegedly ideal diet. And then from birth I divided them up as best I could to get them comparable, and I put two of them on intravenous feeding with catheterization of the central vein, and the other two I just continued them on their puppy diet.

That seemed to be the next logical point, and that was fine because by that time, the puppies were about two to three kilos in weight, instead of 200 to 300 grams, and bigger and easier to work with. People ask, “Well, why did you pick beagles?” I picked beagles specifically for several reasons. One, I found out in my reading about nutrition that the U.S. government had a pamphlet on animals, and puppies and dogs, and they had one specifically on beagles because the Atomic Energy Commission used beagles as the experimental canine when they set off the atom bomb in Bikini. On Bikini Atoll they had animals of all kinds, and plants, to study the effects of irradiation from the atomic blast. In order to get the maximum data from that, they wanted to know everything there was to know about beagles to start with, so they learned about their body composition and they learned about their nutrient requirements better than any other dog. And obviously you don’t feed a Chihuahua the same thing that you feed a St. Bernard, although they’re both canines. And so beagles have their own little special diets. So I took advantage of having precise information about what beagles need to grow ideally, according to the Atomic Energy Commission.

Then I liked beagles because they were not too big. They only get to be about 25 pounds when they’re adults. They have short hair and they’re clean. They’re a pretty standard breed. They do have some dyschondroplasias that come out every once in a while in the breeding process, but usually the
owners will get rid of those animals. And they’re well-mannered, friendly. So for many of those reasons, I chose beagles, and it worked out very well.

I began to feed them by vein, and they did very well. I knew that if I put a catheter in, that the biggest problem was going to be how do you keep it sterile, because you’re in an animal laboratory first of all, and the catheter goes through the skin and into the central vein, so I was putting antibiotic ointment around the catheters and trying to keep the exit site clean. And I had a couple dogs develop candidemia. I had the veterinarians help me with that. They actually came over and looked in their eye grounds, and they saw hyphae in the eye grounds, so they had candidiasis in that first set. And we decided that the reason they were getting that could perhaps have been because of the high sugar content in the solution, but then I tried to grow fungus in the TPN, and it would grow but not that great. It didn’t seem to be particularly susceptible to fungi if it’s a fungal overgrowth. And so then we thought that it might be because I was sterilizing the external catheter of bacteria and then fungus was growing on the animal’s skin. And sure enough, we cultured around the catheter, and the catheter exit site grew all kinds of fungus. And so then we decided that we should probably put [on] an antifungal [ointment] as well as an antibacterial [ointment], and that seemed to work.

Another thing that we did at that point, then, was to put in a final filter, a Millipore® filter, in the apparatus right before the swivel, so the tubing came down through the pump and out to a Millipore® filter, a final filter, before that filter then plugged into the swivel and then down through the speedometer cable to the dog’s back, to the catheter. And we thought just in case there were fungi getting introduced through the lumen, the final filter would filter them out, because fungi are big, much bigger than bacteria. I used the very same final filter that the ophthalmologists or radionuclide pharmacists use to sterilize their solutions. It was a perfect size. And then I subsequently had them make a special stainless steel apparatus for it, because the commercially available ones were in a [relatively fragile] plastic apparatus.

The Millipore® filters are .22 microns, [that] is their average pore size, and that’s small enough to filter all bacteria. The only bacteria that can get through a .22-micron filter is a *Pseudomonas*—some species of *Pseudomonas*—if the *Pseudomonas*, being a rod, lines up with the pore.

DR. GOSCHE: Properly.

DR. DUDRICK: Properly, it can go through. So what the Millipore® people have done technologically is this little, paper-thin wafer actually has kind of a 90-degree pathway. In other words, the pores aren’t straight through, like a sieve; the pores are all angled, so a *Pseudomonas* can get in,
but then can’t make the corner. So we used the final filter, and that was a thought I actually got from the Amoco [Corporation] gas people. The Amoco gasoline company, or petroleum company, had an advertising campaign about: Use the Amoco gasoline; it’s the only gasoline with the final filter, and you will not have problems with your fuel injection system.

Now, you may recall about that time, 40 years ago, we started getting these fuel injection systems that the Germans had invented, and that was a much better system than the regular kind of internal combustion mechanism we had in our carburetors. The problem with the fuel injection system is that if you have any particulate matter in your fuel, it’ll block up the little tiny hole in the little spritzer that spritzes the gasoline into your piston chamber. So they said that in the process of processing the gasoline, you might have rubber come off or little pieces of material that get into the gasoline to block your fuel injection system, so if you final-filter your gasoline at the pump, this will not happen to your car.

So I thought, *Hmm, we'll get a final filter into the intravenous infusion system,* and that’s what we did, and I’m not sure what did it, but we stopped having trouble with the candidemia. I suspect it was more the catheter exit site than the solution because the solution was prepared freshly, and the pharmacists did it eventually for me. I started doing it for the first year, but then the pharmacists began manufacturing it for me, and that was a big boon.

DR. GOSCHE: When did you know that you were successful?

DR. DUDRICK: I’m sorry?

DR. GOSCHE: When did you know? Was there a time when you said, *Oh, my God! We’re successful. This is gonna work!*

DR. DUDRICK: I thought it was going to be successful after about the first two or three months growing the beagle puppies. I knew I was going to have problems with the delivery apparatus, and I knew I was going to have to work out some things, but I knew that the hypothesis that you could put enough nutrients to support growth into enough fluid and then infuse it into the central vein of these dogs over the entire 24 hours, combining all of those prerequisites, that we’d be able to give them enough to grow and develop, because I saw them virtually double in size from two or three kilos to four to six kilos in that time period, and I didn’t have any major trouble except in this one animal with the candidemia. But simultaneous with the trouble I had in that one, I didn’t have trouble in the other one, so I knew it had to be an idiosyncratic thing perhaps related to the catheter rather than the fluid.

So from the standpoint of animals, I knew I was going to be successful there, and I felt the excitement of discovery. And people in the laboratory started
getting interested in coming around. Everybody was interested in the animals. Everybody likes puppies anyway, so it was—there were some people that said, “Oh, Dudrick’s being mean to these puppies.” And other people said, “No, he’s growing them, and it’s going to mean a lot for medicine and surgery.” But generally it was very positive. A lot of people got excited about it.

Even Arthur [E.] Baue, who had a laboratory next to mine. He was studying pig homografts as replacements for aortic valves. He had come from Harvard to Penn, and he then became chairman of the Department of Surgery at Yale. And he’s still here. He lives on Fishers Island [New York] now with his wonderful wife, who’s a minister there. But people like that would come by, looking at my puppies every day and were fascinated by it. And later Arthur did a lot of work with his coworkers on the metabolism in the heart and magnesium and phosphates and used some of the technology that he learned from us. Other people would come by and try to learn how to do this.

At any rate, to answer your question more definitively, I guess I knew that we really had something when we grew the baby, because the significance of that baby was that, although we didn’t plan that, it just happened serendipitously that an ideal candidate came to fruition right there in Philadelphia at the right time. It was almost, you know, God’s will, if you will, that this happened. You couldn’t help thinking that there’s some greater force than us giving us this opportunity.

DR. GOSCHE: Tell me about the baby.

DR. DUDRICK: The baby was a direct application or translation of fundamental basic science and practical basic science in the laboratory to the clinical situation, and although I was motivated by adults requiring the nutrition, when the baby came along after we had already done six adults—

END OF TAPE 2, SIDE B.

DR. DUDRICK: The baby was born in Vineland, New Jersey, perhaps about 40 miles from Philadelphia, and was brought to Children’s Hospital [of Philadelphia] with a catastrophic congenital anomaly that didn’t allow her to be fed. She had a Christmas tree mesentery, which indicated just a terminal, single vessel with side branches feeding the bowel rather than having the arcades that we normally have. As the bowel twisted around this vessel, it strangulated, and she lost most of her bowel, on an exploratory operation, and then I think she had a second one in which the rest of the bowel was taken so that she just had her duodenum anastomosed to two or three centimeters of terminal ileum. That’s all she had. She also had some sort of a stricture in her rectum, so that a colostomy was brought out to
bypass this area. She had a gastrostomy tube to decompress her and to perhaps try to feed her eventually. But after about a month in Children’s Hospital [of Philadelphia], on Dr. “Harry” [C.] Bishop’s service and tended to by Diller [B.] Groff, who’s now a pediatric surgeon of some prominence in the country—Diller Groff was there as a fellow in pediatric surgery, and he and I were interns together at Penn, and you may recall I said we were rotating interns. Diller, also known as Dick, left Penn to go to his home medical school at George Washington, I believe, or Georgetown—I’ve forgotten which—and took his general surgery there, and then finished earlier than I did because I was in the laboratory, and [he] became a fellow with Dr. [C. Everett] Koop at Children’s [Hospital of Philadelphia]. We had maintained our friendship. And he had heard about our puppies, and he was taking care of this baby, and he was watching this baby die, and he knew that they had tried everything they could to feed the baby by vein and by mouth, and it was not working, and she was five and a half pounds when she was born; she was now four pounds, and she was moribund. She was really just pooping along.

Diller called me up, and he said, “Stan,” he said, “I’ve heard about your work with the beagle puppies. Would you mind coming down here to Children’s [Hospital of Philadelphia] and giving us a talk on that tomorrow morning?” I said, “Yes, I’ll be happy to.” I was flattered. So I went down, and they had this grand rounds, jam-packed, and I’m showing them my puppy data that I had, which was not complete at that time, but it was enough to be impressive. At the end of it, people had a lot of questions, and Dick asked, “Could you play your puppy trick on a baby that we have here?” That’s how he said it. I’ll never forget: “Can you play your puppy trick on a baby that we have?”

And he told me about the baby there, and I said, “Goodness, she sounds like an ideal candidate.” I said, “We’re not in a position to have a technology that we can apply immediately.” I said, “We’d have to feel our way here if you want to do it, though.” But I said, “You know, this is going to be a huge undertaking, and there’s going to be a lot of pluses and a lot of minuses involved with it.” And I said, “If we want to do this, there’s going to be a lot of effort on my part, too, to try to take care of this baby with you four miles from my home plate, and I have other responsibilities up there. But if you can get your staff to buy into this and really support it, I’ll consider coming down and working with you.”

And what I had essentially inadvertently done is created an ad hoc institutional review board, because there wasn’t any such thing there at that time. They might have had one at Yale, because I know they had the first one there ever was in the country at Yale, but I didn’t know much about institutional review boards or ethics committees, and I told them that I would be happy to talk to anybody and everybody at Children’s Hospital [of
Philadelphia] to explain what we’re [doing] and why, if they wanted us to do it. I said, “I’ll share everything I know.”

And so we did. The next day we had the whole day set aside in one of the meeting rooms there, and people came in and out. There must have been 200 or 300 people that came in and out, and I would go over again and again and again what we were doing and why and what the risks were. And I said, “The likelihood of success is almost zero, because there are so many potholes along the way that we don’t know about. It’s uncharted waters.” And I said, “But I need everybody’s support. I can’t have naysayers or I can’t have people who don’t want this to work on the team. It has to be dedicated people who want to make it work. And if at any point in time people aren’t comfortable about it, we’ll meet again, talk about it again, change plans, quit, whatever, but I have to have your support. I can’t have people shooting at me while I’m trying to do this, because I’m a guest here. I’m not even a full member of the staff here. I’m just a resident in surgery at Penn. I was chief resident.

And so we got the go-ahead to do it, and so I came down. I brought one of my Manny, Joe and Jack catheters and decided we’d put the catheter in through a jugular, as we did the dogs, and that we would thread the catheter behind the ear and come out in the scalp up here [demonstrates], similar to the dog except out of the scalp rather than the back, because the baby would be lying on her back most of the time. And that would give us a longer catheter tract. I actually got a Kirschner wire that the orthopedic people use when using wires in [fracture of] the fingers and wrists, and was able to thread the catheter over the end of the wire, and then I could run the Kirschner wire subcutaneously and pull it [the catheter] out to do minimal trauma. But we kind of had to use practical things that were available.

Once I got the catheter in, I started adding—you know, first we added amino acids into the sugar and, you know, the usual salts: sodium, potassium, some vitamins. And then every day we’d add something more: calcium, then our phosphorus. I actually used glycerophosphate, which was off the [research laboratory] shelf. I brought it down. We didn’t have an organic phosphate, so we had organically tied up calcium, as calcium gluconate, and so I got glycerophosphate, and I could mix them together and they wouldn’t precipitate. We never did use the glycerophosphate in adult human beings; we just depended upon the dilution and the sodium or potassium phosphate not precipitating the calcium, although it does, to some extent, microscopically.

Dr. Douglas W. Wilmore, a third year surgical resident, who was working with me at that time in the Harrison department laboratories on an NIH [National Institutes of Health] career development award, eagerly agreed to participate with me in the baby project. A fortuitous bit of serendipity was
that he lived fairly close to the Children’s Hospital, and he could check on the baby relatively conveniently and help in monitoring and managing the baby’s treatment. Between the two of us, we virtually made rounds on the baby four or more times a day for several months in addition to our other clinical and laboratory responsibilities at the University of Pennsylvania, in order to ensure the safety of the baby and the efficacy of the intravenous feeding technique.

And we got the baby to start growing. We didn’t have any major problems with infection during the first 45 days that we fed the baby. And so at that 45-day period or 47-day period, whatever it was—but it was six weeks—that baby had grown from four pounds to six and a half pounds, and she increased in length two or three centimeters. Her head circumference was increased by four or five centimeters; her chest circumference, four or five centimeters; and I guess length increased three to four centimeters. I’ve forgotten the exact numbers. And she was vigorous and active and looked normal in every way. And I knew that we had accomplished something.

And at that point, we actually were encouraged by people to submit those findings for early publication, which is what we did, as a case report, because it was more than just a simple case report; this was a complex metabolic clinical study. And the people at Children’s [Hospital of Philadelphia] felt strongly that we just couldn’t keep this among ourselves, that we had to let people know that it was possible to keep these children alive and that if we could do it by scraping things together there, that other people could—there were practical, other people motivated to do this at Hopkins or Harvard and other places, Yale.

And so in addition, [M.] Judah Folkman was there, spending his six months of pediatric “token” residency to get his [official] credentials as a pediatric surgeon prior to his professorship at Harvard, and he had an intense interest in what we were doing, and when he went back up to Harvard, he got [Robert] “Bob”—oh, I forgot—

DR. GOSCHE: Shamberger?

DR. DUDRICK: No, the man who eventually went up to Sick Children’s Hospital in Toronto. [Robert M. Filler] His right-hand man came down, and we taught him how to do what we could do with the babies, and he began doing it up at Boston Children’s [Children's Hospital Boston] and then a little bit later John [H.] Seashore was sent by [Robert J.] “Bob” Touloukian from Yale to come, and we taught him how to do it, and he took the technique to Yale. The people from Hopkins—oh, how could I—I’m blocking his name.

DR. GOSCHE: Haller.
DR. DUDRICK: Haller. [J.] Alex Haller [Jr.] happened to be on an immunologic kind of sabbatical in the Wistar Institute at Penn [the University of Pennsylvania], and he heard about the baby, so he came and took the technique to [the Johns Hopkins] Children’s Center, so it started spreading like wildfire. We had submitted it for publication to the AMA [American Medical Association] journal, and I was astounded because it was printed three weeks later. [Wilmore DW and Dudrick SJ: Growth and development of an infant receiving all nutrients by vein. *JAMA* 203:860-864, 1968.] They put it on a fast track, because the editor at *JAMA* [Journal of the American Medical Association] thought that this was important to get out there. That just changed my life. It just [makes sound signifying speed] grabbed me by the ear and swung me around from that time on. I was just overwhelmed with phone calls and letters and all kinds of communications because everybody wanted to know about growing this baby.

We knew we still had problems, and we did. For example, we had no way to give the baby fat. So she started getting the kind of redness of the skin and kind of a dandruff [dander] of the skin that you get when you’re fat deficient, dry skin. It looked like she had total-body dandruff, very fine, and when you rubbed it off, it [the underlying skin] was red. And so we started rubbing linoleic acid onto her skin, and that was kind of messy. And we found out that her mother and her father were both O positive, and her type was O positive, so we got the mother and the father to eat a big meal for breakfast of buttered toast, eggs, sausage, milk, and then we drew blood in less than an hour from them after they ate and spun it down, and we got this beautiful, creamy plasma full of fat micelles, and after we spun it down, we packaged the fat into 30 to 60 mls, small packets that they used for platelets and other things for babies, and so we used blood transfusion or blood-bank technology, and then we actually infused the red cells back into the mother and father. We didn’t want them; we wanted to see if we could grow the baby without that [transfusing red blood cells], which we did. And that way, we made a physiologic fat emulsion, so in once-a-month drawing from the mother and the father, we would get enough physiologic fat emulsion to keep the baby in fat nutrients, and the skin cleared up, and the baby continued to grow and develop.

Another thing that happened, that we learned was that the baby started acting funny with one of her arms, and it was broken. She had broken her arm. We got an X-ray of it, and she had really very poorly calcified bone, and we were giving her a lot of calcium, but we were not giving her Vitamin D, and the reason we weren’t giving her Vitamin D is [that] there was no Vitamin D available for intravenous use at that time. We subsequently got some. And when we talked to experts in nutrition, they said that Vitamin D is only needed to absorb calcium from the gut, so you don’t have to give intravenous Vitamin D after giving intravenous calcium and phosphorus.
Well, that actually was not correct, and we found out inadvertently, by our studies, that Vitamin D is also used to incorporate calcium and phosphorus into the matrix to calcify bone, so that was kind of a little side thing about TPN [total parenteral nutrition]. I never made a big deal about it, but that was one of the first absolute proofs that you needed Vitamin D for more than just absorption [of calcium from the intestine].

So then, when we studied the rest of the baby, we found that she had some tibial plateau microfractures, and she had a rachitic rosary that we had not picked up on, so she had full-blown rickets. And so we added the Vitamin D, and then it helped us figure out how much Vitamin D the babies needed, because that’s different from adults. And so we inadvertently caused a problem which she then helped solve for future babies: how much Vitamin D to give a newborn by vein. And that [dose] was different, so we ended up getting a special vitamin mixture for intravenous-fed babies and a special vitamin mixture for adults, and babies’ therapeutic and maintenance and adult maintenance and therapeutic, so there were four different vitamins [vitamin mixtures] that were generated from that.

And then I think over the 22 months that we fed her by vein, we had 14 different catheters, because the catheters either mechanically had problems or we suspected catheter sepsis, and we were learning how to try to minimize that. We learned, in combination with pediatricians, because we were using Polysporin® and—[pauses] an anti-fungal cream—I’m blocking it. I’m having TIAs [transient ischemic attacks] here.

DR. GOSCHE: Mycostatin®?

DR. DUDRICK: Mycostatin®. So we had Mycostatin® ointment and Polysporin® ointment that we would mix together almost like epoxy around the catheters, and then there were some pediatricians working together with a company that came up with Betadine®. We asked them, “Could you make a Betadine® ointment that would kill all the bugs?” because iodine kills everything, fungi and bacteria; it even kills algae. So all unicellular organisms will be killed by the iodine that’s released when Betadine® breaks down. So we began using Betadine® on the baby, and everybody started using Betadine® ointment on all the catheters, and that was a much better solution [at that time] to the problem. And then, of course, Betadine® became a prep for surgeons and a prep for hands of surgeons, et cetera. So a lot of stuff came out of the TPN [total parenteral nutrition] project. We had all these people that were living proof of the efficacy.

As the baby grew and developed, then we learned—we learned more about infant [intravenous] nutrition from that baby than perhaps we learned the next five or six years from all the babies. We probably learned 95 percent of
what we know about infant nutrition from that one baby. Subsequently, when they built the new children’s hospital in Philadelphia next to Penn and moved it up there next to Penn, they dedicated the huge atrium, lobby of the hospital, to the baby and to her family. There’s a brass plaque up there that dedicates the lobby to Keleen [Lee] Burgess and her family as the first TPN [total parenteral nutrition] baby grown. That baby—she was an enormous project.

And finally, we would have liked to send that baby home on TPN, and we wanted to do that, but the world wasn’t ready for it yet, and by that time we had a more formal ethics committee, and they met and decided that the baby should be fed only by standard of care and no longer experimentally, and they stopped the TPN. As a result of that decision, they just fed her as best they could by mouth—by that time she could take about 40 percent of what she needed by mouth—and by intravenous supplementation, and she died of starvation in a month. That was a very sad moment for me because I did not agree with the decision. I wanted to send her home, but I had to go along with the people who really were in charge of her; I was a guest. What I was doing was as a consultant. If you do that today, you’ll go to jail, but back in those days, 1968 to 1970, that was standard of care. So we’ve come a long way in 35 years or 40.

Stop at this point for a second.

[Recording interruption.]

DR. DUDRICK: I had mentioned the development of Betadine® ointment and its importance in what we do surgically and with TPN, as a stimulus to industry by what we were doing and the way you have to work hand in glove with industry if you want to apply or translate your fundamental research to clinical application. And although the development of the TPN in the laboratory and subsequently with the baby was labor intensive, overall I would say that half of the work was the puppies and the baby, and the other half of the work was to get the puppy knowledge adapted for broad-spectrum use in human beings. And in order to get there, we had to go through industry to provide us with the tools, because we couldn’t do any more mom-and-pop TPN using reagents from the shelves.

And actually, we were fortunate to be able to do what we did do at that time. I really consider myself one of the right people in the right place with the right mentors, the right support at the right time to make this work, because you wouldn’t be able to do this today with all the regulations and the IRBs [institutional review boards] and HIPAA [Health Insurance Portability and Accountability Act provisions] and all of the things that are counter to experimental clinical work.
However, a couple items that were of interest to me: I already talked about the Millipore® membrane as a way to sterilize without autoclaving, and although my memory had failed me earlier, I was trying to describe a Seitz [pronounced sites] filter, S-e-i-t-z; a Seitz filter was the asbestos filter that preceded the Millipore® filter and that you could prepare for laboratory use. When I wanted to have final filters produced for use clinically after showing that they worked or appeared to work in the animal laboratory, I called the Millipore® company, which was in Massachusetts, and asked them if I could talk to them about developing a new product that I needed for human use, and I needed them to make it for me.

And they were kind, and I got a delegation of three people: an engineer, a finance man and a marketing person. And they came and visited me. I showed them what I was doing in the animal laboratory, and I told them what I wanted and why, to try to get a final filter that we could incorporate or add to intravenous administration lines for adults or babies. And they said that that would require quite a retooling operation in their assembly line and would probably be costly, and they said the major problem that they saw was that there was no market. And I said, “Well, I’m going to create the market.” And they said, “Well, you know, after you create it, it might be easier for us to convince our leadership to do this.” I said, “Well, that’s a chicken or egg thing. You know, you have to take risks,” I said. Of course, they were conservative, and they were kind, and about a week or so later, I got a communication from them, saying that it would cost more than a million dollars front-end investment to use an unproven technology clinically, and maybe no market. I was a little upset about that, but I understood.

So I thought, Well, everybody has a boss. I had talked to somebody when I made the phone call, and he referred me to these three people. I wanted to talk to their boss. So I went to the pharmacy, where they have books on all the companies that they deal with, and they have a library of books. I got out the book for filters or filtration or something, and there was Millipore® in there. It had their CEO, it had board members, it had their previous annual report and all that, a lot of stuff about their company. And I looked up the CEO. The CEO was actually the founder of the company, and I’m blocking his name right now, too. [Transcriber’s note: John H. (“Jack”) Bush.]

But I found out that he was a bomber pilot in the Second World War; he had flown 24 missions or 25 missions and that he had come back and had started doing something else and didn’t like it, and he somehow got into creating this company, and had built it into a success. And I found out that he was a Haverford graduate, Haverford College in suburban Philadelphia, and I found out not only that, but he was on the Haverford board of trustees. And who do you think was a Haverford graduate and a member of the Haverford College board of trustees but Jonathan Evans Rhoads, my mentor. Not only
that, Dr. Rhoads was chairman of the board of trustees. I thought, *Oh, that’s interesting.*

So [chuckles] I asked Dr. Rhoads for an appointment, went over to see him and asked, “Dr. Rhoads, how well do you know John”—I’m blocking his name. He said, “Stanley, I know him very well. How do you know him?” I said, “Well, I don’t really know him except by his Curriculum Vitae.” I said, “I know that he’s the chairman and the founder of Millipore® Corporation, and we use Millipore® products to try to grow our puppies, and we use them in the sterilization of our TPN.” And I said, “I need them to make me a filter to put in the IV lines.” And I said, “I noticed that he’s a Haverford graduate and on the Haverford board of trustees with you, and I was hoping you might introduce me to him or give me a chance to talk to him, unless that sounds too audacious, to see if I can get him to do this for me.”

He said, “Well, have you tried anybody else in the company?” I said, “Yes.” I told him the story, and I said, “I already have gone through the other steps that would be appropriate, and I haven’t gotten anywhere. But I don’t want them to shut the door in my face until the boss says so.” And so he smiled and said, “Well, as a matter of fact, Stanley, I’m going to see him tomorrow. We have a board meeting at the college tomorrow.” And I said, “I would really appreciate it if you would give me entrée to him.” I said, “I promise I won’t embarrass you.” And he said, “Of course.”

That was a Wednesday I met with Dr. Rhoads. Thursday they had the board meeting. I got a call nine o’clock Friday morning in the lab from the CEO of Millipore®. He said, “Well, Dr. Dudrick” he said, “I saw my good friend Jonathan Rhoads yesterday, and I must say he really thinks highly of you and your work. You come highly recommended.” I said, “Aw, thank you very much.” I said, “Dr. Rhoads is a very generous man.” And he said, “No, no,” he said, “Jonathan said that you had a problem that I might be able to help you with.” So I told him my story, and I told him that I had talked to his people, and I told him what the importance of it was in saving babies’ lives and everything. And on Monday morning, the same three men who had turned me down a month or so before, or a few weeks before, showed up—

END OF TAPE 3, SIDE A.

DR. DUDRICK: So the following Monday, the same three men who had been to see me a few weeks before called for an appointment. They came—I guess my mother would say with their tails between their legs. [Chuckles] They looked like puppies who had been squirted with a hose or admonished. I felt almost bad for them, because they had a completely different attitude than they had come with the first time. And they listened to me, and we went over it again, and in three weeks I had what I wanted in my hand.
I tell that story to show that it’s not just what you do in the laboratory, it’s not just what you do in the library, it’s not just what you do clinically, but that you have to really be involved enough and believe in what you’re doing enough to not let anything stand in your way to get it. I derived a great deal of satisfaction from being able to get a company to change the way it did business, to satisfy my need for my patients and our need as a profession for that service and that product. And I try to use it as a story for students and residents: not to let anything unreasonable stop them from a reasonable goal.

A second story is that there were no fat-soluble vitamins. The only fat-soluble vitamin that was available for parenteral use was Vitamin K, and it was crude; it was not an intravenous, it was an intramuscular [form]. AquaMEPHYTON®, I believe, was the name of it. It was a Vitamin K. And there was another one, Synkavite®, and then eventually they got an intravenous form, which was an emulsion, really. We had B-complex and C, and U.S. Vitamin and Upjohn were the two companies that were making it. Upjohn was trying to get out of the vitamin business, the IV vitamin business. U.S. Vitamin was the major supplier of vitamins, and they were bought by a cosmetics company, Revlon. The Revlon name comes from the Revson family, R-e-v-s-o-n, and the Revson matriarch, the mother, was the founder of the company or at least she was running the company, and she had a son, Lance Revson, who liked to race Indianapolis-type cars and indeed, I believe, was in a couple of Indianapolis races. His name was often in the sports pages because he was the scion of a famous, wealthy woman and industrialist.

I called the man [sales representative] from U.S. Vitamin to ask him if he could make me some complete vitamins: A, D, E and K in addition to B-complex and C. And he said, “Well, I’m just the detail representative.” But I showed him what I was doing, and he was impressed with the puppies growing, and he said, “I’ll see what I can do in my company.” And so he came back and said, “My supervisor doesn’t think that there’s any market for this right now, from what they could tell.” And he said, “I believe in what you’re doing, Dr. Dudrick, and I want to help you, but I can’t go much further.” I said, “What if I go up the line? What if I bypass you guys? Is your boss gonna get mad at us?” He said, “It wouldn’t matter. If you can get the company to go along with it, everybody’s going to line up.”

And so I called Lance Revson on the phone. He was out in Hollywood or someplace. He was quite a playboy. And he called me back. I said, “Mr. Revson, I’ve read a lot about you in the sports pages of the paper and I’ve seen you on television, and I have great admiration for your family and what they’ve done to supply us with vitamins.” And I said, “I have a problem. Would you mind listening to me and seeing if you could help me?” He said, “I’ll do the best I can.” He said, “You know, Mom runs the company.” I said, “Yeah, but I have a feeling that you might be able to influence her, and I don’t want to call her directly.” I said, “I’m not a race car driver, but I
used to be a bit of a jock.” I said, “You’re a bit of a jock.” And I said, “Obviously you’re a risk taker.” And I said, “I’m obviously a risk taker, and so I thought we might have some common ground to talk, so that’s why I’m talking to you, because it’ll take a risk.”

And so I told him what I needed, and he said, “It sounds to me like a very legitimate request.” And he said, “It sounds to me like something that Mom would be interested in.” And so I thanked him very much, and he said he’d be in touch. He never did call me back, but the representative, our representative came by and said, “God, I don’t know how you did it, but,” he said, “you really have the company hummin’ about this new vitamin market.” And I told him what I had done, and he said, “It’s completely different from when I talked to him [his supervisor] before.” And within six months or less, I had the prototype for what is now MVI®, multiple vitamin infusion. They were in, like, 20 ml ampoules, where you cracked off the glass top, and I think he brought me about two dozen of them. I started using them in the puppies, and then subsequently, since they didn’t seem to cause any problems, we started getting more for the babies.

But I’ll have to tell you something that I did that you might find hard to believe, but in the dogs, I noticed that they got a bit of fatty acid deficiency and maybe some vitamin deficiency without the fat solubles, and I wasn’t sure—because it’s hard to tell in a dog—that they had kind of funny dander. They had a lot of dander. And I was giving them fat. I was using Lipomul®, the cottonseed oil fat emulsion, in the puppies, so I thought it might be vitamins. And I took Poly-Vi-Sol®, the liquid vitamins that pediatricians use, the .6 ml that you drop into the baby’s mouth or into their milk, and I pushed the Poly-Vi-Sol® through a Millipore® filter, and I gave it IV to the puppies. And it worked and didn’t get them in any trouble that I know of. And I actually did the same thing for the baby.

DR. GOSCHE: Really.

DR. DUDRICK: Can you imagine doing that today? No way. But about that time, while the baby was still being fed, I got the legitimate U.S. Vitamin product, and then we worked together with them to make it more applicable to babies and to have four different mixtures, therapeutic and maintenance for babies and [therapeutic and maintenance] for adults. And we worked with the AMA [American Medical Association] and the Food and Nutrition Board of the AMA to legitimate the development of that, because we were starting to get into the big time, and people wanted to know what the national controls were, and the AMA helped us, first with the publication and then with their Food and Nutrition Board, which I then became a member of until it was disbanded.
I guess another development was the silicone rubber. When we were trying to get longer catheter duration and were thinking about sending people home, we knew that silicone rubber was the least reactive material, but silicone rubber had a couple of disadvantages. One, it was very pliable, and to use it, it was almost like trying to thread wet spaghetti through a keyhole. And it was not radiopaque. And so we wanted them to try to stiffen it up and to make it radiopaque. And they tried putting wires into the catheter, and they tried other techniques to make the catheter radiopaque, but it wouldn’t work. And I said, “Well, why don’t you add something to the rubber to make it radiopaque?” And they said, “Well, everything we add makes it brittle.” I said, “Have you tried barium?” “No.” Thinking about barium enemas, I said, “Have you tried barium sulfate?” And they said, “No, I don’t think we have.” I said, “Why don’t you try adding some barium sulfate to the silicone rubber?” I said, “Certainly it’ll make it radiopaque, because we use that all the time [as contrast material] in radiology. I don’t know what it’s going to do with the physical characteristics of the rubber.”

Well, they added the barium, and that’s why we now have white silicone rubber catheters that are radiopaque. It did not change the physical characteristics of the silicone rubber appreciably, except it made it a little stiffer. So by adding the barium for radiopacity, we got a two-fer: we also got it to be a little more substantive so you could thread it better. So we were very happy with that. But that didn’t just happen. We had to participate in the decision-making and in the suggestions for industry to make us a proper catheter.

And then later, when we were trying to get the catheter to not migrate and to perhaps be more antibacterial, we thought of putting a Dacron® cuff around it, which was an idea that we got from the cardiovascular surgeons. Actually, I think Michael [E.] DeBakey was the first person to work with Dacron®. He made Dacron® prosthetics for vessels and for valves, and then he got into the Dacron® wool, which is the fuzzy stuff that you put around the silicone rubber catheter for the tissue to grow into it, to secure the catheter, and we hoped to prevent infection, maybe mechanically, by inducing the ingrowth of the tissue into the Dacron® wool cuff, [which] might have impeded the progress of bacteria along the catheter tract. That was the theory, and it seems to work.

But that’s how those things came to pass. I always get a big kick or satisfaction out of knowing how that occurred. Most people don’t know and don’t particularly care; they just take it for granted. But I know what it was like before that. I know what the problems were. I knew what we were trying to do to make the technology more effective, and I participated actively with the companies to produce it—again, never taking any money, being grateful that they took the risks and then let them get the reward of
profit for taking the risk to help get me what I needed for our patients. And so I figured that was a good enough reward for me.

There are many other things that we did to help industry. For example, when we first started in industry, making protein hydrolysates, as I said they were either made by hydrolyzing casein or fibrin with acid or with pancreatic enzymes, and both of them had pluses and both of them had minuses. But they both ended up with products that could support all of the needs for protein substrate. However, people craved to have a crystalline amino acid solution, and so did I, because with crystalline amino acid solutions you could alter the [individual amino acid] doses if you wanted to, and they’d be all crystalline so you’d have precise, reproducible formulations every time.

With the hydrolysates, every lot number was a little bit different, but they all seemed to work. So we published our results using hydrolysates, and then people came up with these crystalline amino acid solutions, and they of course wanted me to say that the crystalline amino acid solutions were just as good, and I said, “Well, I can’t say that until I try them. I can’t endorse a new crystalline amino acid solution unless I put it in puppies and run it through the same studies,” because you can’t just assume that the crystalline amino acids are just as good or better than the hydrolysates because that’s your gut feeling. There might be something intangible in the hydrolysates. I gave them my strict scientific evaluation of their thoughts, and I did run a couple crystalline amino acid solutions through the drill, and I found out that a couple of them were not good, and they never did make it on the market. And so I’m glad—you can’t just make the assumption that purifying something will make it better.

Subsequently, the Japanese did purify everything, and [we had] crystalline amino acid solutions that were affordable. The way they did it was they tried something like 30,000 species of bacteria [individually] mixed together with a kind of a molasses substrate, and they found out that there were unicellular organisms that would mix, that would metabolize some sort of a molasses substrate, and when they got finished metabolizing it all, and all the bacteria would then die after all of the substrate was used, they could then filter it or distill it and come up with fluid that would be pure glycine or pure phenylalanine or pure arginine, because that was the waste product of the bacteria: very simple organisms, with simple chemical processes that sustain their lives.

And so that’s how the crystalline amino acids [are produced] that we use today—they are not synthesized by getting carbon, oxygen, hydrogen and nitrogen and synthesizing them in the laboratory, because it’s too expensive. It would cost us thousands of dollars a bottle to produce amino acids that way for intravenous use. But over in Japan they have these huge—they look like oil tanks full of substrate charged with a certain species of bacteria, and
it’s all, I’m sure, a very hush-hush, secret process, but they control the market; 90 percent of the market, they control for amino acids. I think the Germans have about 10 percent. And they do it bacteriologically, so the use of bacteria in medicine is kind of fascinating, and that’s how we get affordable amino acids.

Well, to get back to the main part of the story, they then put out a crystalline amino acid solution which was pure, nothing in there but precisely those amino acids and water. They began using it in Japan and Australasia, in Australia and New Zealand. And then I started getting calls from Australia, particularly, saying, “Hey, Dudrick, you never mentioned anything about the zinc deficiency that you cause with TPN.” I asked, “What zinc deficiency?” They said, “Almost all of our patients, long-term patients, get a zinc deficiency, and we make the formula just like you say.” I said, “Well, what are you using?” “We use the same thing you do.” I said, “No, no, tell me what you’re using.”

And they were telling me about this new crystalline amino acid solution that they got from Ajinomoto in Japan. Ajinomoto is the biggest supplier of, oh, the soy sauce—monosodium glutamate. So glutamate comes from glutamic acid, and that’s how the Japanese got into [the] amino acid [business]. They were making sodium glutamate or potassium glutamate. And Ajinomoto in Japanese means “the essence of taste.” That’s what that word means, “the essence of taste.” So Ajinomoto then, instead of making [only] glutamic acid and glutamate, they started making all the other amino acids.

And I said, “Well, I’ve never published anything on that amino acid mixture. All of our publications come from hydrolysates.” Well, one of the cofactors used to make, for example, the enzymes for Aminosol®, which is what my main product was, is zinc. You use zinc and pancreatic enzymes, and in the process—plus the water that they were using in the factory to make amino acid mixtures went through galvanized pipes, just like probably the old pipes in this house. Galvanized iron is zinc and iron. And so zinc was probably leaching out into the water, plus there was probably some zinc left over from the pancreatic hydrolysis, and it turned out that when we measured the zinc in a daily dose of protein hydrolysate, because I never had done that, I’m ashamed to say, it turned out to be about two milligrams of zinc, which was the daily requirement.

So I talked to my Australian and New Zealand colleagues and said, “Well, it turns out we’re giving zinc in our hydrolysate. Are you giving any zinc?” And they said, “No, we have no zinc whatsoever.” I said, “That’s the problem.” I said, “I guess we’re going to have to start adding zinc if we’re going to use crystalline amino acids.”
But they actually were at first miffed at me and virtually accused me of maybe not being honest in how I reported my results, but we were inadvertently giving enough zinc, serendipitously, to satisfy the zinc requirement. Subsequently, when we began using crystalline amino acids, we had to add zinc, and subsequently, when we switched from the old water pipe type supply to the manufacturing companies—and there were only four of them in the country. There was Abbott [Laboratories], Baxter [Travenol Laboratories, Inc., now Baxter International, Inc.], Cutter [Laboratories]—the "ABC"—and McGaw, Inc. [now a subsidiary of B. Braun Medical, Inc.]—the "ABCM". And some of them switched into plastic tubing, transmission tubing; some of them went to stainless steel; some of them went to glass or glass-lined transmission systems and vessels to make their solutions in.

But in the process, as they did that, they reduced all of the contamination, and the solution became so pure that you then had to add everything, and you couldn’t get any [collateral trace element] benefit—and we had to make trace element solutions. At one point, one of the companies had some copper or brass piping [incorporated in their process], and there was too much copper in the solution, and the copper would cause hemolysis in rats and dogs, and we couldn’t use their solution. Then we measured the copper. The copper concentration in their solution was so high that the people in our laboratory said the peak [in their analytic print-out] was probably 20 stories higher than the building. And so we had to get rid of that. We had to get rid of brass and copper fittings and piping and [the] vessels that they mixed the solution in.

So it was amazing what we had to do to help industry do the best thing. And in that story, some of the companies got into aluminum pipes because they were cheaper than stainless steel, easier to maintain than glass or other products. So what happened is aluminum starting leaching into the TPN, into some of the additives, including the amino acids. And then aluminum, on the periodic scale, will replace calcium, and what started happening is in the long-term patients and even some kiddos, they started getting demineralization of the bone because aluminum would be incorporated into the matrix, the cartilaginous matrix of the bone rather than calcium.

And then during this period in the history of the development of TPN, in order to overcome [the osteopenia]—we didn’t know what was happening for sure, but since there was demineralization, we just added more calcium, and we were adding as much calcium as you possibly could to TPN without precipitating it, and it was sometimes three or four ampoules per liter, which was just bordering on precipitation. And even though we were giving large amounts and there were large amounts coming out in the urine, which we worried about, causing nephrocalcinosis, there was still demineralizing of the
bones. And the more calcium we added, the more demineralization there was. So I said, “There has to be a problem here.”

So we started analyzing things, and we found out that there were large amounts of aluminum in the hydrolysates and the amino acid mixtures, because they were moving these things through aluminum transmission tubes. And we figured that out, but we still had a problem. Of all places, guess what was also contaminated with aluminum: the calcium. So the more calcium we were giving, the more aluminum we were giving, and we were defeating ourselves until I finally wised up. It took me a few months to go through the analysis of things to come up with the cure that I thought I was giving us the problem. We got them to start making the calcium in other vessels and get rid of the aluminum transmission portion, and then—you don’t hear [as] much about osteopenia now related to TPN as you used to 20 years ago or 10 years ago, and that’s how that problem got solved.

And I’m sure there are still other things that, as we get more and more finite information about [it] at the cellular level, we will find other defects in TPN. I do not think it’s perfect by any means. And I think we’re going to find improvements in TPN that are going to take us to the next level. There’s a whole vista for TPN [research]. The problem for me as an investigator now is that a lot of bright, young investigators aren’t interested in working with [the] fundamentals of TPN because they think all the work has been done, but it hasn’t. It’s a Model T Ford, which is better than a horse and buggy, but it’s no Lamborghini and it’s no Mercedes or whatever.

And what we need now are conscientious, motivated people to try to fine-tune the TPN for different disease processes and conditions, for different age groups, the whole geriatric population. We have no idea what we should be doing for people my age, even. All the nutritional data has been based on geriatrics being 50 to 65. Well, that doesn’t even touch me. I think geriatrics is 65 to 100. And we don’t have data for that age group; all we have is extrapolation data, and that’s not good enough. Extrapolation data won’t do it, just like you can’t extrapolate from a child to an adult. There are different sets of requirements in those different age groups.

DR. GOSCHE: Stop for a second?

END OF TAPE 3, SIDE B.

DR. GOSCHE: Can you discuss how your family has affected your career and how your career has affected your family?

DR. DUDRICK: I had mentioned earlier the influence of my parents and family in my growing up, but my [immediate] family, consisting of my wife and children, have been quite involved in my research and my career.
development because without them and their understanding, I wouldn’t have been able to spend the time and effort to get all the work done and still try to fulfill my responsibilities to them.

My wife, Terri, is a very special person. I can truly say that she has never, ever interfered in any way with my ability to achieve my potential as a physician, surgeon, investigator, educator. She has always supported me 100 percent. She’s a Latin and English teacher, and she used to say to me, “Quo vadis” when I’d ask her something, and that literally means, I guess, “Wither thou goest,” and she really has lived that type of relationship with me. Whatever I’ve wanted to do, she has supported. When I asked her pointed questions about her opinion, she would tell me, but they were always geared toward the positive, half-full rather than half-empty point of view. She was wise enough, I think, to recognize that if we were going to have interpersonal happiness in a relationship, that I had to be happy in my professional career, because that’s what we spend most of our time doing, which is working and practicing our profession, and if you’re not happy and fulfilled in that aspect of your life, it’s hard to be fulfilled at home, so to speak. And I think she has always realized that and has tried hard to support me. Although I’m sure I’ve tried her patience and tolerance on many occasions, she has never in any way indicated that to me. And so she’s been a great partner.

I think she’s also provided an invaluable service by explaining to our children as they were growing up that if I wasn’t there in support of them at an athletic contest or a recital or a concert or some other performance of theirs, it was because some person, perhaps a child, was ill or injured and required my help more than they required me to be there pridefully witnessing their accomplishments. And I think that probably was related, to some extent, with disappointments at times, but Terri always made it okay for me with the kids. The kids never would come up to me and indicate unhappiness with me for not having been there, and I appreciated that greatly, because I never would have willfully not participated with them.

Now, having six children and having them pretty close to each other—there were six in seven years—they were like a swarm. They kind of took care of each other, and they mentored each other, monitored each other; they had their own little form of self-governance, and by and large they were good kids. They’ve all turned out very nicely. They have a lot of similar characteristics, but they have enormous individuality.

When I was working in the laboratory with the puppies, which took a lot of time, the year I was in the laboratory, I never had any more than three hours’ sleep at a time because I saw the puppies every four hours around the clock every day, seven days a week throughout the time that they were getting TPN or even in between times. I had a lot invested in them. I wanted to make sure that they got optimal care. I wanted to make sure that if the
project failed, it didn’t fail from lack of attention by me, that it would have failed only because we made the wrong hypothesis or had no basis or had no resources. But hard work and my availability were not acceptable as an omission for success. And so I had no guilt about that. I paid my dues in terms of taking care of those puppies meticulously and conscientiously.

In fact, Terri said on more than one occasion that I have three families. I had a biological family, which was she and the kids; and I had a professional family, which was my own faculty and teachers, my fellow residents and my students and other colleagues in surgery and medicine; and then I had a laboratory family, which were various beagle puppies, rats, mice, sheep, cows, calves, mice—I guess I said that. And my children and my wife had no doubt about the fact that they were number three on the list of families[chuckles], and that clearly during the year in the laboratory the beagles were my No. 1 family. And they really were like family. They had personalities, and they sensed that I was, I guess, a surrogate mother or father to them. They got a lot of attention. I was interested in their well-being.

A couple of specific areas where Terri was a big help: I had to make harnesses for the puppies, and so I actually used paper, actually the hand towels that they had in the laboratory, as templates to draw out patterns, like a dressmaker, for the harness that would hold a support apparatus on the puppy’s back to support the attachment [of] the infusion apparatus to the catheter. And you have to fit this harness around their legs so that it didn’t cause chafing or pressure phenomena or irritation. After I made the pattern with paper, I then got a soft canvas material, and I kind of hand sewed it, and then put the thing together with some safety pins. (We didn’t have Velcro® in those days. Velcro® would have been nice.) We put safety pins and adhesive tape—surgeons love adhesive tape—to keep things protected and secured, and then as they grew out of the harnesses and—as the experiment succeeded, they actually grew out of their harnesses, and I actually have one slide that shows a succession of six sets of harnesses, showing how much bigger the harnesses had to get in order to accommodate the increasing growth and size of the puppies, as an indirect measurement of success. After I did the first set of the harnesses, Terri saw me fumbling around and said, “I could help you with that.” And so when we made the future harnesses, she actually made them and used her sewing machine and made all those harnesses for us and put fancy edges on them, and the puppies never had it better. And so I appreciated that because it was one less time-consuming thing for me, and she did it better than I could, anyway. And she enjoyed being part of it.

Another contribution she made was inadvertent. I remember one Sunday we were planning on going to church with the kids at about ten, eleven o’clock, and I wanted to take pictures of the puppies, and one of the most difficult
parts of that experiment was to get the puppy to stand in front of a wall that had a grid. I had a big cardboard placard with a grid I guess every four inches, behind it, to show the puppy growing, with the grid in the background. To try to get a puppy to stand still long enough to get a photograph is really a feat. I would struggle, trying to distract them, and I’d try to hold the puppy with one hand, and I had a tripod and a camera, a Polaroid camera there, so once I got the puppies lined up, I’d try to quickly take a picture. But it was frustrating.

This one particular day, they were really giving me a bad time, and Terri showed up with the kids, to go to church at the time I asked her to meet me, and I was nowhere near ready, and I was exasperated at the puppies, because they were frisky, and she said, “Let’s see if I can help.” So she walked over and just kind of touched the puppy underneath his jowls, and I couldn’t believe it. The puppy just kind of stood there, still. I said, “Wow!” I said, “Can you do that in front of this grid here?” So literally we got all [the] puppies’ pictures taken probably in six shots, and it was bam, bam, bam, bam. She had some kind of a calming effect on those puppies, and I don’t know what it is, pheromones or hormones or a motherly or matronly somehow characteristics that she was able to transmit to them, but we got everything done, went off to church.

I was happy as a clam we got those pictures taken, because then I would use the individual pictures in a format that you’ve probably seen, a composite, to show the growth of the puppies. That was probably one of the most effective reports of data for people to see those puppies growing. I asked her if she’d come every week to get those pictures taken, and she did, and it was magic. As soon as she came in, they behaved. To them I was a plaything. Maybe to her they felt responsibility, or this was a mother figure or something, and they behaved. But it was a great contribution that never shows anywhere. People would never think that maybe one of the most difficult parts of the experiment was to take the photographs rather than all the other things we had to do, but it was.

And the kids. What I did to try to be humane to the puppies, I released the puppies every day from the intravenous feeding, put a little bit of heparin in that I had calibrated to fill the catheter, put a plug in the catheter, a sterile plug, and I let them run around for about a half an hour. Or I sometimes put leashes on them and I took them outside on the lawn adjacent to the [Alfred] Newton Richards [Medical Research] Building, where we had our laboratories [at the University of Pennsylvania], and I found that the best time to do that was in the evening, because during the day you had a lot of kids on the campus, students, and a lot of distractions, and the puppies attracted attention.
I didn’t want them to in any way get disrupted, so I would sometimes take a quick trip home, just a few miles away, get a bite to eat at supper, and then bring the kids down to the lab with me. And they just loved it. They loved to see the puppies. They all would want to take them for a walk outside, and so I’d go with them, of course, to make sure everything was okay and they weren’t doing anything they shouldn’t be doing. To the kids it was a joyful thing, an entertaining thing, and they liked it. They liked to be with Dad and the puppies, and then they understood what I was doing. They understood I was trying to make them grow, and they saw them growing, and they kind of got excited about it, even though they were literally children, two, three, four, five, six years of age. And they appreciated afterward and especially appreciate now that they were there. They had touched those puppies. They had played with them. They saw them growing. They knew what their dad had to do to get them to grow. They have their own little sense of pride in the whole project. I kind of enjoyed that.

I think you never can do anything by yourself. Nobody ever does anything by himself. We all, as everybody says, stand on the shoulders of our predecessors, and we all get ideas from each other, and it’s hard to determine who was the first to get an idea or who was the first to do something. I think I was fortunate enough to have a lot of input, a lot of unsolicited and solicited advice from people.

For example, I mentioned earlier the Vitamin D thing. Well, when I wanted to learn about Vitamin D, I just went across the wall to Philadelphia General Hospital, and there was Paul György, and Paul György was at that time the world’s expert in calcium and Vitamin D metabolism. And to just walk across the wall and get him to talk to me about everything he knew about [it]; that was fantastic.

When I wanted to talk about pediatric requirements for nutrients, I went to [Lewis A.] “Lew” Barness in pediatrics. When I was trying to figure out what to do with hypophosphatemia, which was a problem we were having with puppies and with copper, with red cell hemolysis, I could go to other pediatricians who were actually working in these fields, and they could give me their advice. I got a lot of laboratory studies done by clinical pathologists—Howard Rawnsley, who would do any laboratory test I’d want and wouldn’t charge me, because he knew I had a limited budget.

These were all wonderful things that they had at Penn that I’m not sure many places have today, the collegiality, the fellowship, the fraternity, sorority of science and education and scholarly activity. I think we’ve become more Masters of Business Administration-oriented and not enough science for the joy of discovery. I can’t think of anything I’ve done in my life that has given me more satisfaction than discovery. I try to tell that to students and residents, that “you know that when you do something in the
laboratory that results in new data that were never before at least recorded by anybody, much less discovered, that for a brief period of time, that research is an educational experience [uniquely] for you.”

Research is the ultimate education. There’s not a sharp line between one [and the other]—education segues into research, and research becomes self-education by producing new data. And the joy that I used to have for knowing, for a brief period of time, an hour, a day, a week or even longer, that I’m the only person in the world, in all likelihood, that knows this. It just gave me, oh, the feeling that for a while I had the most precious piece of gold or diamond available, and it was all mine until I decided to share it by a publication or a presentation or just telling somebody about it. And I’m not sure that the average medical student or resident has that perception about research and discovery and the joy of adding new, useful knowledge to the body, to the pool, of knowledge available in the universe.

I’ve had a lot of other experiences personally taking care of patients, as a clinician, that are different from academic or scholarly experiences, and even more precious because there’s a value to human life that is much beyond gold or diamonds so that it’s a whole different area. But growing the baby or knowing that babies can be supported as a result of some of the fundamental and clinical discoveries that we participated in gives me an enormous satisfaction.

Another story: I remember giving a talk at the American Pediatric Surgical Association (APSA), and at that talk, they actually made me an honorary member or elected me to honorary membership in the APSA, and I was the first non-pediatric surgeon to be elected to honorary membership in APSA. All previous honorary members of APSA were pediatric surgeons of international acclaim but were elected by the Americans into the American Pediatric Surgical Association. I’m very proud of that. I’m very, very proud of that.

And at that meeting, in introducing me after dinner, the president [Dr. Thomas Santulli] of the American Pediatric Surgical Association said, “Ladies and gentlemen, you remember that story about your dean in school or medical school saying, ‘Look to your right and look to your left because in four years only one of you is going to be here.’ And I want you to do that tonight. We have about 300 or 400 pediatric surgeons here tonight, and I want you to look to your left and look to your right because one of the three of you probably would not be here if it weren’t for the work of our honoree tonight.” He said that he had done some work—

[Recording interruption.]
DR. DUDRICK: Well, the president of APSA did say for each of the members of the association to look to the member to their left and to the [member to their] right because one of them wouldn’t be there if it weren’t for the work that the honored guest that evening, which was myself, had done on total parenteral nutrition. He said that he had, together with his staff, surveyed the previous year’s pediatric surgical experience, as best he could, in the country, and he said that really one-third of all the major pediatric surgery done probably would not have been able to be undertaken or undertaken successfully without TPN support. So he said, “This is just one measure of [the] impact of somebody’s efforts, and we’re deeply grateful to Dr. Dudrick for having done that.”

I had never thought of that, and when he said that to me, it was a bit overwhelming. As a matter of fact, it was difficult for me to get up and begin my talk after that introduction, because he had such an impact on my thought processes. I had never thought of that as a measure of one’s contribution, and I’ve been grateful to him ever since. And I can’t help [but] thinking that the pediatric surgical community really treats me extremely well. Whenever I go anywhere, the people who come up to me who give me the greatest joy are the pediatric surgeons, who always have a story or two to tell me about some great case that they had that they used TPN on in either some new way or a better way or a novel way that was helpful. They’re a very genuine group of people. And I’m enjoying doing this today with you. It’s interesting that, again, the pediatric surgeons would be the ones to ask me to relay a history.

DR. GOSCHE: As you look back over your career, is there anything you wish you would have had more time to do or maybe would have done a little differently?

DR. DUDRICK: Yes, that is a great question. Clearly for the past five to ten years I have done a lot of thinking about what if, what if, what if. But to go back in my career, so many things in my career I can’t help [but] think were almost predestined in a way, and I don’t mean predestination; I mean that it just seemed to me that the decisions were almost dictated by the circumstances and that I either had to make the right decision and do what was presented to me or make the wrong decision and not do it, because it always seemed to me that things were stacked up in such a way that opportunities came on that I would almost be foolish not to take advantage of, and yet every opportunity I took advantage of was a sacrifice from what I was doing.

For example, when I finished my residency at Penn, I had planned on spending a third of my time clinically at Penn, at the hospital [Hospital of the University of Pennsylvania], a third of my time in the laboratory and a third of my time at Philadelphia General [Hospital], which was a city-county
hospital that was eventually closed down and their population amalgamated by other teaching institutions. In April of my chief year, Penn was asked by the VA [United States Veterans Administration, now United States Department of Veterans Affairs] to take over total control of the Philadelphia VA Hospital [now Philadelphia VA Medical Center]. Up until that time, five medical schools shared the VA in individual services. That was to be fair to the five medical schools, but in reality, when you take a 488-bed hospital and divide it up five ways, nobody has enough of a piece of pie to really care much about it. They did it out of duty, but it was not a significant teaching arm of any of the schools, except one, we found out, and that was Woman’s Medical College of Pennsylvania, which was eventually then changed to Medical College of Pennsylvania and which is now, I believe, part of the Drexel University College of Medicine.

However, when Penn was asked to take over the Philadelphia VA because the VA perceived dividing it up into five services was not good for care, Penn agreed, but then Woman’s Medical asked if they could keep their service because they really needed it for lack of teaching material, and Dr. Rhoads, who was the person who had to make the decision in that regard at Penn, kindly invited Woman’s Medical to keep their service so that Penn essentially took over 80 percent of the VA. They took over the whole VA administratively, but there was a Woman’s Medical [College] service.

Dr. Rhoads very dutifully offered every member of his surgical faculty the opportunity to be the chairman of surgery at the VA. There were 22 or 23 people on the brass [name] plates in the Department of Surgery office, and Dr. Rhoads went right down by seniority, and every one of them turned the job down because they already had pretty established practices and schedules, and so he came to me [chuckles] and said, “Stan, I’d like you to consider going over to be chairman of the Department of Surgery at the VA.” I said, “Dr. Rhoads, I’m just finishing my chief residency.” He said, “I’m aware of that, Stanley.” [Laughs] And he said, “I’ll be honest with you, I’ve asked everybody else. Nobody wants to go over there, and I’ve already obligated us to take that over.” He said, “I really need your help.” He said, “I need you to go over there.” He said, “I’ll support you all I can, and you can ask anybody to come over in consultation, but,” he said, “I need somebody over there full time.” I said, “Wow.” I said, “If you think I can do the job.” He said, “Of course I do.”

So we then had to go down to Washington to find out from the VA [U.S. Department of Veterans Affairs] if they were going to accept us, and they were not too eager to do so because I was, to them, just a kid with no experience, no track record, a chief resident, no board certification, so [chuckles] I’ll never forget the chief of surgery for the VA telling Dr. Rhoads, “Well, Jonathan, if you believe that this boy is the person you want to run the VA [hospital] in Philadelphia, we’ll trust your judgment, but we’ll have to
keep a pretty close look at things.” And so with Dr. Rhoads’s assurance that they wouldn’t be disappointed, on June 30th, 1967, I was a chief resident, and [on] July 1st I was chief of surgery of the Philadelphia VA [Hospital]. I never had a chance to grow up. I literally went to work July 1st at the VA. I didn’t get home until July 14th, Bastille Day, you may recall. I thought that was appropriate.

I was there for two solid weeks, day and night, because there was nobody there to help me take care of more than 200 surgical patients, no house officers, no students, no faculty. It was me and the nurses. I grew up in a hurry. As it turned out, I eventually got a fourth-year resident and I got an intern, and I was delighted that while the—

END OF TAPE 4, SIDE A.

DR. DUDRICK: —because nobody was in the research laboratory, and we started building all aspects of the VA, and within a short period of time I really grew up in a hurry with all the experience I had there, and it was a wonderful polish to the diamond, the rough diamond that I got from my training at Penn. So at first I was almost panicky about that opportunity, but it turned out to be wonderful because the five years that I spent at the VA were spectacularly productive years in terms of both basic and clinical research.

By the end of the second year at the VA, 95 percent of all the medical students at Penn elected to be on my service at the VA to the point that both Dr. Rhoads and the dean called me in for a conference to find out why that many students would want to come with me at the VA, which was not Penn, proper, and I was the least distinguished member of the faculty. And I said, “I guess it’s because I’m teaching, gentlemen, and that’s what they want.” So that was an interesting meeting for me, to be called to task for too many people wanting to be with me and what am I doing that might not be kosher, so to speak, to get them to come there. And so no good deed goes unpunished, and that was an interesting object lesson for me.

I never did regret going to the VA. I really had the run of the place surgically, and I know we had a positive impact on it. As a matter of fact, to brag off a little bit, one year I won the award for making the most outstanding contribution to patient care in the entire VA system, and actually once some executives from the VA came up from Washington to present this to me as a surprise. I was operating and doing a portacaval shunt, and I didn’t show up at the luncheon that they had planned for me to give me this surprise certificate. I ended up finding out that evening, when I got out of the operating room, that I had stood up the hierarchy of the VA, and as a result, they had to stay overnight in a hotel because they wanted to be there to give it to me, and they were planning on giving it to me the next
morning, and they hoped I was going to show up this time. [Chuckles] And I said, “Well, if you told me about it instead of trying to make it a surprise”—I said, “I certainly didn’t do it intentionally. I was trying to take care of the patient, doing what I’m supposed to be doing.” They had mixed emotions about that.

But those are just little side stories. Subsequently at the VA, there were a lot of people clamoring to get me to come and look at jobs around the country because the TPN gave me such instant, massive notoriety, I guess is the word to use, that people wanted me to come and entertain possibilities for positions. I talked to Dr. Rhoads about them, but I knew that I didn’t want to go from an assistant professor to be a professor in some place without seasoning a little bit more, and I was a bit apprehensive about taking such a giant step, and Dr. Rhoads really wanted me to stay with him until he finished his tenure as chairman, which would have been 1972.

I did agree with him that I would stay at Penn at least until he retired, because we had a marvelous relationship. He, in a very paternalistic manner, treating me like a son, just wanted me to be there with him. And I wanted to be with him, too, so we had a great relationship. And he really is my second father. My dad died in 1970 at age 63, and he and Dr. Rhoads were born the same year, within one month of each other, and they actually knew each other; he had operated on my dad. So they both meant an awful lot to me.

Then I had an opportunity to be interviewed for a job at the University of Texas as chair of a brand-new medical school [University of Texas Medical School at Houston], and that offer came out of the blue. I was told I was one of the five finalists. I didn’t even know I was being considered, and so I actually almost reluctantly went down to look, but I did. And when I went down to Houston, I was amazed at the opportunity that I thought I saw down there. And, although at that time, in 1972, I had the absolute best and most enviable job in the Department of Surgery at the University of Pennsylvania—I cannot imagine it being better—I had to look at that job. And when I saw it, it turned my head. To be able to be the first chair of a department in a new medical school—it was too titillating from a historical point of view to pass up.

I thought I had enough self-confidence that I could pull it off. Plus by that time I had enough experience, I thought, to want to do some things differently than they were being done, and I thought this was a great place to do it. As it turned out, I did make it to the top of the list, and they offered me the job, and then I got the usual cold feet that you get right before you have to make a decision like that, and I delayed my decision, but the dean down there really recruited me hard, and I decided I would take the job.
I learned a couple of things from that. It was interesting to me how many people at Penn thought that was a wonderful opportunity for me, but 50 percent felt that I was deserting them, so it was an interesting object lesson for me that half of the people that I considered my friends and colleagues really kind of turned me off as soon as they knew I was leaving. It was fascinating to see that people just treated me like I had snubbed them or that I had rejected them and thought that I was going to someplace better. They didn’t appreciate that I was extending Penn to a whole new medical school, which is what I saw it as. They wanted me down there because [of] what I accomplished at Penn, and they wanted me to bring part of the Ivy League background to the new medical school in Houston. So I weathered that okay.

I guess another thing that I learned is I thought that if I went down there, I’d be able to imbue that institution with a philosophy such that everybody would be interested in nutrition and metabolism and that we would have a school that was really going to get into nutrition and metabolism in a big way, because we were going to start it from scratch. Well, that’s what everybody said when we first got there, but pretty soon I realized everybody pursued whatever they were doing before they got there. And although almost all of the people that I recruited to surgery, virtually all of them, had an interest in nutrition and metabolism, that interest was not in medicine or in other specialties.

And so my disappointment in my tenure as chair at that school is that I was not able to accomplish as many things as I wanted to in nutrition and metabolism, even thinking I was in control. You’re never in control. You may be the administrative head of something or you might even think you’re governing the philosophy, but you’re not. People have their own inherent motivations and philosophies and knowledge bases and goals and objectives, and temporarily they may work together with you, but then they branch off, appropriately, I suppose, into their own major interests. And so that was a maturation for me.

On the other hand, we accomplished some wonderful things down there. To bring in people like [Edward M.] “Ted” Copeland [III], who was my best friend in the residency program and with whom I had wonderful experiences during our training. He was two or three years my junior, but we did a lot of things together. He went off to Vietnam, won the Bronze Star, came back, went to M.D. Anderson [Hospital and Tumor Institute; now M.D. Anderson Cancer Center] in cancer, and he was in Houston while I was being recruited. I got inside information from him about the University of Texas, because he was part of a University of Texas unit. So when I hired him as my first hire, it was the best thing I had done because he was a wonderful colleague, my right-hand man, and eventually became full professor there.
and then became the professor and chairman at Florida. He trained our oldest son, Paul.

When he left to go to Florida, he took five or six of our great people with him, with our blessing: [Timothy] Tim Flynn, who’s now the chairman, I believe, of the American Board of Surgery and had been the president of the Association of Program Directors in Surgery. “Chip” Souba, who was one of our first students and residents out of our program, who became the first surgical oncologist up at Harvard, officially at the MGH [Massachusetts General Hospital]—or the Brigham [and Women's Hospital]; I’m not sure which—both of them; and then subsequently a chair of [the Department of Surgery at Penn State Medical College and surgeon-in-chief] at [the Milton S.] Hershey [Medical Center] and now a dean at Ohio State [University College of Medicine]. We had John Daly, our first intern, who had spent 13 years with me all together, starting at Penn when he was an undergrad at LaSalle, who then became the first surgical oncologist and Jonathan [E.] Rhoads Professor [of Surgery] at Penn after he left us, and then he became the chairman [of surgery] at [Weill Medical College of Cornell University], and he’s now the dean at Temple [University School of Medicine]. Ted Copeland became dean for two years at the University of Florida, and he’s now a director or president of the Shands Cancer Center at University of Florida.

So from that faculty and student body that we had, or resident body in that little new school, three distinguished chairs became deans and other chairs. [Thomas A.] “Tom” Miller became chair at [the] University of St. Louis after I gave him his first job in surgery and physiology. So you can go on and on with the great people that we had there. [Bruce D.] Browner, one of our full-time chiefs of orthopedics, became the chairman of orthopedic [surgery] at UConn [University of Connecticut Health Center]. And [Randolph] “Randy” Bailey was my first chief resident, and he became chief of colorectal surgery and a professor of colorectal surgery on our faculty down there [University of Texas Medical School at Houston].

But last year and a few years before then, we had Ted Copeland as president of the board of regents of the American College [of Surgeons], and Browner and Bailey. Three members of the board of regents were on my faculty. And I only mention that to show the quality of the people that we attracted and had the privilege of working with and helping give them opportunity to achieve their potential. And if you asked me what I derived the greatest pleasure out of doing, it’s doing everything I can to help bright young people achieve their maximum potential. And if I’ve done everything with the resources at my disposal to help somebody achieve their maximum potential, I feel that I’ve done everything I can, and they can’t ask me for much more. And if I don’t do that, then shame on me, and I really take that very seriously. And I hope that all they’ll do is carry that philosophy the next
step, and then they might make the whole field and the whole world a little bit better.

On the other hand, if I feel that the recipients, the students and residents or junior faculty are not doing everything that they can do to achieve their full potential or maximum potential, that they’re sinning against their creator, whoever or whatever they think that is. With my tongue in my cheek, I tell them that, “when Moses came off the mountain, you might recall he dropped some of the tablets and picked some of them back up and went back up and retrieved some of them, but he missed one, and it’s the 11th commandment, which is: Thou shalt do everything thou possibly can to achieve thy maximum potential. And the extent to which you are not doing that is the extent to which you are sinning against your God. If you want to be a sinner, that’s up to you. But I just want to let you know that I’ll do everything I can to help prevent you from being a sinner.” And I derive no better joy than to see the success of the people that I’ve been associated with. And what a privilege it has been.

I guess in other disappointments that I’ve had, I would have liked to see nutrition accepted more readily as a scientific endeavor. Nutrition somehow has a little bit of a stepchild status in science. It’s not pure biochemistry; it’s not pure physiology; I guess it’s not pure, hard science, and somehow people just don’t pay enough attention to food, I guess. Everybody thinks they’re an expert in their diet because they choose their diet. Everybody thinks they’re an expert in food. They like it or don’t like it, eat it or don’t eat it. And maybe the familiarity with food is such that people just don’t give it enough respect. I’m not sure what the reason is. But there’s not enough respect given to nutritional science, in my opinion, and I wish that medical schools would spend more time in their curriculum [on that].

But I think what we’ve done is we have relegated nutrition to the spouse of the patient or to the children, the grandparents. We’ve relegated it to nurses. You have to remember Florence Nightingale was not only the mother of nursing, she’s the mother of dietetics. She was the first dietician and the first nurse. And we relegate food and nutrition to the dietician, and we as physicians don’t take enough personal responsibility for nutritional status and maintaining or restoring it or correcting it. We delegate it, and when you delegate it, you almost imply, by delegating it, that it’s not important enough for you to do yourself. And that whole feeling kind of trickles on down to everybody, and everybody talks about a good game, but they don’t play a good game. So that’s a disappointment for me.

On the other hand, when people ask me what is the best thing I think I ever did in the laboratory or with discovery, it’s not that I put a catheter under the clavicle or that we put together a TPN technology that worked; it’s we showed beyond a shadow of a doubt the relevance of nutrition to achieving
excellent outcomes, because we took the sickest, most malnourished, critically ill patients that most other people were willing to discard to the morgue, and by feeding them, converted them from impossible risks to reasonable risks, and then went ahead and proved it by operating on them and getting the patient over the operation, rehabilitated and out of the hospital.

So to me, that’s the greatest contribution I think I helped achieve. We showed the relevance of nutrition to achieving excellence in clinical outcomes and kind of underlying that every time we get another patient through. I remember at one point in time having overheard a couple residents talking about “the garbage man did it again,” and I asked [the] chief resident, “Who’s this garbage man that I hear people talk about?” And he looked at me with that look on his face, and I said, “They’re talking about me, aren’t they?” And he said, “Yeah, Chief.” I asked, “But why do they call me the garbage man? What have I done to them for them to call me the garbage man?” He said, “Chief, they’re complimenting you, because they say that what everybody else throws into the garbage, you reach in, pull out, rehabilitate them, resurrect them and restore them to life, and everybody else throws them into the garbage.” And so what I thought was an insult ended up being, to me, one of the greatest compliments I ever got from the residents, because they thought I could turn garbage—although you never want to refer to patients as garbage; I know what they were saying, but it’s kind of the vernacular of the night call. [Chuckles]

But I guess another disappointment that I’ve had is we have not fulfilled our attempts to show that you can reverse atherosclerosis intravenously as well as we wanted to. That’s kind of an unfortunate regulatory/financial support/industry stockholder interest casualty. I have no doubt in my mind that atherosclerosis is reversible nutritionally. Obviously, it’s easier to reverse it by vein because you can absolutely control the diet, but once you’ve shown that beyond a shadow of a doubt—which I think we’ve done, but it just hasn’t been accepted with validated data of others because nobody wants to support it—then you could convert the IV to an oral equivalent in the reverse order that we converted the oral feeding into an IV equivalent to create TPN. So I know it’s possible, but we just have to figure out what it is we would have to do to special foods or supplements such that after they are digested and absorbed from the gut it will simulate in the peripheral circulation what we can do by direct infusion intravenously. And if we did that, we’d be able to put people on special diets or dietary supplements for months at a time, and those who really wanted to get well and have their atherosclerosis reversed would do the same as people who truly want to lose weight: They would follow the diet, and I think might find that a better answer to their problem than to get stents or angioplasties or coronary bypasses, or to be on a lot of medication.
So I think that’s going to be a future challenge, and I think it will come. In what time I have left, I’m going to try to spend some energy and resources in following that up, because I think the field for that kind of research is more fertile now than it was 20 years ago, because I first published on this I believe in 1987, which is almost 20 years ago. It has lain [virtually] fallow since then because of a lack of enthusiastic support, and perhaps I haven’t shown enough leadership either, but that would be a nice thing to follow up.

I would have liked to have more surgeons interested in clinical biochemistry than they are, and if we think of nutrition as clinical biochemistry, then perhaps we might have a more sophisticated attitude toward it, and say, Well, I’m really practicing clinical biochemistry, not nutrition support, so I’m not just being a super dietician or a super nutritionist, I’m really practicing clinical biochemistry. And we don’t seem to be ashamed to practice clinical immunology for the support of infectious diseases or for the support of immunosuppression for transplantation, so I think we should be able to provide support for clinical biochemistry and really attempt to maintain oral, enteral and/or IV diets in such a manner that’s commensurate with the high-tech surgical techniques that we’re applying now, with minimally invasive surgery and laparoscopic surgery, videoscopic, et cetera.

My ultimate goal, if I could have it, would be to be able to devise a diet or diets, both intravenous and through the alimentary tract, that would provide the nutrient substrates in ideal ratios and quantities to guarantee that each cell in the body would receive optimal substrate in order to perform the functions for which the cells were designed…on call, so to speak, so that if you can get optimal function from optimal substrate, that should lead to optimal health. And wouldn’t that be wonderful if we could come up with diets that will allow maximal performance, cognitively, physically, even in our skin and our complexion, how we look and our attractiveness to each other, our very inner functioning of the digestive tract, the genitourinary tract and the cardiovascular system, the pulmonary system? How wonderful it would be if we ever could take maximum benefit of our potential. We are loaded with so much potential that we don’t use.

And I wonder sometimes: Were we created to hold things in reserve? How much reserve should we have? How hard should we work? How hard should we think? When is it enough? These are of course philosophical questions, but I think if you had the physical capacity, the bottom line of which has to be biochemistry, but if you had optimal biochemistry, you [would] have the optimal capacity for cell function, and then nobody could ask us for any more because everybody would be performing at optimal potential or rates or results or outcomes. That might be such an idealistic goal that it might not be attainable, but to my way of thinking, anything is attainable if you think about it. It’s just a matter of working it out with time,
resources, priorities, education. It may take generations, but these are the things that bother me at times.

And there are so many things. For example, I really feel that everything we’re saying, listening, observing, thinking about right now, you and I together, is governed by a chemical reaction. Every thought is mediated by a chemical reaction, and so we are skin-covered test tubes which contain countless numbers of simultaneous chemical reactions going on, the end result of which we interpret as life. And that sometimes boggles my mind, because you wonder what we are here for, what are we all about, what are we doing, what are we supposed to be doing.

Then I have other things that bug me. What is it about tears? What is it about tears that keep our eyes from getting infected? I know they talk about lysozymes, but what are they? Why do we have countless numbers of bacteria hitting our corneas or our conjunctiva every day, and why don’t we have infections of our eyes all the time? When was the last time you had an eye infection? It blows my mind. It has got to be something we’re not taking advantage of.

I work with dogs, and dogs don’t have a need for Vitamin C. Vitamin C is not a vitamin for dogs. They don’t need it. Ascorbic acid, they don’t need. However, dogs need PABA. Para-aminobenzoic acid is a vitamin for dogs, and if you don’t provide it to the dogs, their metabolism gets adversely affected. Now, what used to keep me awake at night was thinking about the fact that the very first sunscreen that I ever heard about to block ultraviolet light from burning my skin or causing damage to my skin was PABA. So we used to rub PABA, some dermatologic preparation containing PABA, on our skin and it acted as a sunscreen to block ultraviolet light, that very same—

END OF TAPE 4, SIDE B.

DR. DUDRICK: — reality, and that just blows my mind at times. And how do we seem to get energy from light? Why do we have depression in the winter when we don’t have enough sun? Is it the sun? It probably emanates from the sun, but is it some other form of energy that’s transmitted to us in ray or microparticulate form that actually goes through our bodies or into our bodies and changes how we act, feel, think, work, perform?

I guess other things that blow my mind are to think of molecular structure in our bodies or in anything, even the inanimate things about us, that—you know, 95 to 99 percent of all structure that we think is hard, like [knocks on table twice] this table surface here, is really space, and if you look at the molecules in a piece of wood, for every little atom there’s five to ten times more space in every direction than there is in the mass occupied by the atom. And all of these atoms together form molecules, and then these molecules
together form mass, and a mass is mostly space. So our bodies are probably the same at the molecular level, and a lot of things can happen in and out of these spaces.

We’re learning more about membranes now and how the membranes work and the importance of the lipid components of membranes for solubility and for transfer in and out of the cell. And maybe I’m being too optimistic or too hopeful to think that that is within the realm of a surgeon, but I firmly believe it is, because I think surgeons, more than any other specialists, are interested in the matter of the human being. We’re interested in matter. We’re interested right now in tangible, solid, physical matter. But if we just keep going down further and further into the components of matter, that’s our business. Just because we can’t cut it with a knife doesn’t mean it’s not surgical; there are other kinds of knives we can cut it with, that we’ll invent if we don’t have them yet, just as we invented minimally invasive and laparoscopic surgery and endoscopy and endovascular ultrasound and endovascular technology for visualizations and capsules that we swallow to take video pictures of the working[s] of our GI tract. There are so many things that need to be done, and we need bright, young people to continue to be challenged by these things and go into surgery to advance us.

I guess my biggest regret in life is I will not be around to witness some of the consummation, if you will, or realization of the things that now, to me, are just dreams or fanciful-sounding thoughts, because I think they’re all going to come true some day. You can’t live forever, and you can’t see everything come to fruition, but I can only envy today’s bright young medical students and surgeons for the transformation that they will see in health care and especially in surgery in the next 50 years. And when I just think of what I’ve witnessed in 50 years, because in June of 2007 it will be my 50th year from when I graduated from college and entered medical school, so I’ve actually been associated with medicine for 50 years if you count medical school. And what I have seen in those 50 years and lived through is absolutely phenomenal. And when you think what’s going to happen in the next 50 years, it’s almost beyond my imagination.

So I don’t really have any substantial regrets. I don’t think you can look back on your life and say “what if” or “I shoulda, coulda, woulda.” I think you have to live it as it comes, and if you feel that you did the best you could with what you had at the time you had it to make life better not only for you and your family but for your fellow human beings, I’m not sure that you can do much better than that. We each have our own unique ways of making our contributions. But if you want to make the contributions, and you do make them, and you make sacrifices to make the contributions, it’s a very satisfying thing.
I tell our students that I don’t do what I do for gratitude, and I never expect any gratitude, and I don’t really want it because gratitude comes with a price. I’m not willing to pay that price. I do what I do for self-gratification, meaning that if I at the end of the day say, I think I did a pretty good job today and these are the good things that happened either to me, because of me, with me, around me or that I might have had something to do with, and I feel good about myself for that day’s activities of life, that’s all the self-gratification I need. I don’t teach people for them to thank me. I don’t take care of patients for them to say how wonderful I am. I’m just doing my job. And if I’m doing my job as well as I can and they’re doing their job, whatever it is, as well as they can, then I think we’re both self-gratified and we don’t need to feel indebted to each other. And yet you feel a bond which is not indebtedness but a bond of both understanding and feeling good and knowing why you feel good about what you do.

And so I tell my residents, “Never expect gratitude from any patient or family or from anybody for whom you perform a service, and you’ll never be disappointed. If you’re looking for gratitude, do something else. Maybe you want to be a performer and maybe you enjoy applause, and I know there are people that live for that, but I think those are shallow or superficial objectives in life. A person who’s in medicine should know better and not be disappointed if people don’t thank them, or not be disappointed when people sue them, even when you’ve saved their lives, because that’s human nature, and you can’t change much about that.”

I guess being useful and being of service—I think the ethos of service is very important for us to transmit to our students and residents. We as physicians are service organizations. The only thing we create is new knowledge, so that’s an academic or an educational or a research venture. It’s sort of tangible, but by and large we don’t build bridges, we don’t build rockets to go to space, we don’t invent new iPods or energy sources; we are service organizations. We serve the people who do those things, and we try to keep them healthy. When we can’t keep them healthy, we try to restore them to health. When they get into trouble with injury or some other calamitous condition, we try to retrieve them and restore them to health and rehabilitate them, get them through convalescence, et cetera. But we are a service organization, and I think when people go into medicine who don’t understand that they are a service organization, that’s when we get into trouble, because they’re looking for how soon they can get off call, out of work, out of the hospital, out of the operating room.

Why would anybody who really loves what they do want to do that? I hate to leave the operating room. I love it there. And my people will tell me they always know when I’ve just returned from the operating room, because they say they never see me happier. I guess by and large that’s true. Every once in a while, things don’t go well in the operating room, and I think another
thing I try to let people know is that there are injustices that occur, about which we can’t do much. And that’s important in the philosophy of teaching, that there are days when we play a fantastic game in the sense of we go in the operating room and we do a great operation and everything is just textbook—you wish you had a videotape of it to show to everybody. And the patient goes sour; they have a myocardial infarction, they go into failure, they go into multiple-systems organ failure, they have a wound infection, they have a dehiscence, everything falls apart. No justice. No justice.

Another patient comes in with multiple gunshot wounds; he’s a drug addict; he’s drunk; poo-poo all over the belly. We clean it all up the best we can, sew things together, and we’re just happy to get out of the operating room in one piece and say, “Oh, God! Thank God we got him off the table.” The person doesn’t turn a hair. Gets well. He gets up and out of the hospital in a week, and—no justice. And you don’t know why one of these happens and why another one doesn’t. And so you just have to play the game as best you can every time you suit up and know that you played the game as best you can, and then you’ve got to accept, to some extent, things about which you can do no more at this point in time and hope that you can learn something from the bad experiences to get the good judgment that we hope we’ll have in avoiding [problems] in the future.

But these are the kinds of thoughts that I like to try to transmit to students and residents, and challenge them. I don’t want them to just do good, I want them to do well, and by doing good they will do well. They won’t have to worry about doing well if they do good, and to enjoy what they’re doing and I guess to appreciate what a privilege it is to be able to walk into a small eight-by-ten room to meet a perfect stranger that you never knew before and by the end of 20 minutes or a half an hour, you end up making a compact or a contract with that stranger, which allows you to render them senseless and to render them out of control of themselves and to violate their bodies. Wow! Wow!

Do students ever think about that? They should. What a spectacular act of faith, trust, and what a spectacular privilege for the surgeon to have somebody allow them to do that. And I don’t think there’s any other specialist that gets that kind of instant trust or faith, and that takes talent. That takes people who really care and can transmit their caring to the patients, and I think it should be taken very seriously, and I think that’s what makes surgeons so much different from the average physician, because there’s that tangible thing: We violate their bodies. They allow us to. That, in itself, is great enough. And then to do it and do it in a meaningful, helpful way, with a great outcome, that has got to be self-gratifying beyond anything else I can think of—for me. That’s how I look at the world.

[Recording interruption.]
DR. GOSCHE: If we may, one final question, Dr. Dudrick. If you were writing your epitaph today, how would you like it to read?

DR. DUDRICK: I have thought about that on a few occasions. It’s difficult to try to write a nice, short epitaph when you have so much that you would like to say to let people know how much you appreciated the opportunity to be here and enjoy life and enjoy other people with you. I guess it would be a bit of plagiarism, but I’d have to consider saying that I truly tried to be as useful as I could possibly be for as long as I could be, and that’s, of course, a takeoff on some of the teachings of Benjamin Franklin and Jonathan Rhoads.

I guess something else I might want to say is that I always tried to do the best I could with what resources I had available to me, to do good for my family, my friends, my teachers, my students, my patients, and I guess, immodestly, myself. And I hope that I would be remembered as somebody who truly, greatly appreciates the privilege of having spent a wonderful life with wonderful parents, family, teachers, mentors, colleagues, residents, fellows, students, staff, friends and patients, who have contributed so much to enrich my life and to allow me to feel that I might have achieved some of my own goals and aspirations, and whatever the purpose or purposes were of my creator.

DR. GOSCHE: Thank you. Thanks again for participating in the oral history project. Thanks also for the honor of being allowed to conduct this interview. I really appreciate it.

DR. DUDRICK: John, thank you. It’s been wonderful to spend the day with you, and I appreciate your coming here all the way from Mississippi in less than ideal circumstances to spend the day, and I genuinely hope that this might have some use in your series, and thank you again for your kindness and generosity of time and effort with me.

DR. GOSCHE: Thank you.

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CURRICULUM VITAE

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EDUCATION:
Nanticoke High School, Nanticoke, Pennsylvania, 1949-1953
University of Pennsylvania School of Medicine, Philadelphia, Pennsylvania, 1957-1961

 DEGREES:
B.S., Biology Honors, Cum Laude, Franklin and Marshall College, 1957
M.D., University of Pennsylvania School of Medicine, 1961
M.A., Honoris Causa, Yale University, 1999

INTERNSHIP:
Hospital of the University of Pennsylvania (Rotating), July 1961-June 1962

RESIDENCY:
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FELLOWSHIP:
Research Fellow, Harrison Department of Surgical Research, University of Pennsylvania
School of Medicine,
July 1962-June, 1967

MEDICAL LICENSURE: Pennsylvania, July 1962, MD
                Texas, January 1973
                Connecticut, November 1994

CERTIFICATION: American Board of Surgery, January 29, 1968

CURRENT POSITIONS: Professor of Surgery, Yale University School of
                    Medicine, 1995 –
Chairman, Department of Surgery, St. Mary’s Hospital/Yale Affiliate, 2004 –
Director, Program in Surgery, St. Mary’s Hospital/Yale Affiliate, 2002 –
Director, Graduate Medical Education, St. Mary’s Hospital, 2002 –
Attending Surgeon, St. Mary’s Hospital/Yale Affiliate, 1994 –
Attending Surgeon, Bridgeport Hospital/Yale New Haven Health System, 2002 –
Attending Surgeon, West Haven VA Hospital, 1998 –
Consultant in Surgery, Yale New Haven Hospital, 2004

PAST FACULTY APPOINTMENTS AND POSITIONS:

University of Pennsylvania School of Medicine (1962-1972; 1988-1993)
Assistant Instructor in Surgery, July 1962- June 1966
Instructor in Surgery, July 1966-June 1967
Associate in Surgery, July 1967-June 1968
Assistant Professor of Surgery, July 1968-June 1969
Associate Professor of Surgery, July 1969-July 1972
Professor of Surgery, July 1972-Sept 1972
Research Fellow, Harrison Dept of Surgical Research, July 1962-June 1967
Scientific Staff, Harrison Dept of Surgical Research, July 1967-Sept 1972
Chief of Surgery, University of Pennsylvania Division, Philadelphia Veterans Administration Hospital, July 1967-August 1972
Acting Chief of Surgery, Philadelphia Veterans Administration Hospital, July 1968-August 1972
Associate Surgeon, Hospital of the University of Pennsylvania Surgical Staff, July 1967-Sept 1972
Assistant Attending Physician, Philadelphia General Hospital, July 1967-Sept 1972
Clinical Professor of Surgery, Nov 1988 - July, 1993

The University of Texas Medical School at Houston (1972-1988; 1990-1995)
Chairman, Department of Surgery, The University of Texas Medical School at Houston, July 1972-Sept 1980
Chairman, Department of Surgery, Hermann Hospital, July 1972-Sept. 1980
Professor of Surgery, The University of Texas Medical School at Houston, July 1972-Jan 1982
Clinical Professor of Surgery, The University of Texas Health Science Center at Houston, Jan 1982-Sept 1995
Chief of Surgical Services, Hermann Hospital, July 1972-Sept 1980
Attending Surgeon, Hermann Hospital, July 1972-June 1988
Surgeon in Chief, Hermann Hospital, Houston, May 1990 - May 1993
Director, Nutritional Support Services, Hermann Hospital, May 1990 - May 1993
Director, Nutritional Science Center, Hermann Hospital, May 1990 - May 1993
Director, Center for Cardiovascular Disease, Hermann Hospital, May 1990 - May 1993
Medical Director, Hermann Nutrition and Human Performance Center, May 1990- May 1993
Active Staff, General Surgery, Hermann Hospital, May 1990- July 1995
Senior Consultant in Surgery and Medicine, Texas Institute for Rehabilitation and Research, July 1974-June 1988
Director, Nutritional Support Services, St. Luke’s Episcopal Hospital, Dec 1981-June 1986
Attending Surgeon, St. Luke’s Episcopal Hospital, Sept 1981-June 1988
Attending Surgeon, Texas Children’s Hospital, Sept 1981-June 1988

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Consultant in Surgery, Dept of Surgery, July 1972-June 1988
Consultant to the Office of the President (General Surgery), Sept 1982-1988

Pennsylvania Hospital (1988-1990)
Chairman, Department of Surgery, July 1988-May 1990
Director, Residency Training Program in General Surgery, July 1988-May 1990
Surgeon in Chief, July 1988-May 1990
Surgeon to the Hospital, Active Staff, July 1988-May 1991
Surgeon to the Hospital, Honorary Staff, October 1991-

Program Director, Dept. of Surgery, St. Mary’s Hospital, Waterbury, CT Nov 1994 – Jan 2000
Associate Chairman, Dept. of Surgery, St. Mary’s Hospital, Nov 1994 – Jan 2000; Aug 2002 – June 2004
Clinical Professor of Surgery, Yale University School of Medicine, New Haven, CT Jan 1995 - June 1999
Director, Graduate Medical Education, St. Mary’s Hospital, Waterbury, CT Jan 1995 – Jan 2000
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Director of Surgical Education, Bridgeport Hospital, Bridgeport, CT Jan 2000 – August 2002

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Attending Surgeon, Yale-New Haven Hospital, New Haven, CT June 1999 -
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Surgeon to the Hospital, Honorary Staff, Pennsylvania Hospital, Philadelphia, PA Oct 1991 -
PRESENT MEDICAL SCHOOL COMMITTEES:
Yale University School of Medicine
Liaison Committee, Department of Surgery, November 1994 -
Board of Permanent Officers, July 1997 -
Surgery Grand Rounds Committee, Chairman, 1998 -2001
Surgical Education Committee, July 1998 –
Executive Committee, Department of Surgery, July 1999 –
Promotions, Appointments, and Tenure Committee, Department of Surgery, July 1999 –
Surgery ACGME Accreditation Committee, February 2000 -

HOSPITAL COMMITTEES:
Saint Mary’s Hospital/Yale Affiliate
Institutional Review Board
Graduate Medical Education Committee, Chairman
OR Committee
General Surgery Section Committee
Medical Leadership Committee
General Surgery Teaching Committee, Chairman
Library Committee
Surgical Section Chiefs Committee, Chairman
Ethics Committee
Trauma QA/QI Committee
Patient Rights Committee
Trauma Service Executive Committee
ICU Joint Conference Committee
Performance Improvement Plan Committee
Quality Assurance/Surgical Pathways Board Planning Committee
Performance Improvement Steering Committee
Medical Records Committee
OR Leadership Committee
Medical Executive Committee
Infection Control Committee
Management/Leadership Council

Saint Mary’s Health System:
Strategic Planning Committee

Bridgeport Hospital/Yale New Haven Health System
2000 Program Directors Planning Committee
Cardiology/Cardiovascular Task Force Committee
Clinical Risk/Mortality Review Committee
Continuing Medical Education Committee
Credentials Committee
Critical Care Committee
Graduate Medical Education Committee
Main OR Committee
Mill Hill Medical Executive Committee
Nutrition Committee
Performance Architecture 20005 Committee
Primary Care Center Clinical Directors Committee
Primary Care Center Operations Committee
Professional and Quality Review Committee
Quality Council
Radiology/Operating Room Utilization Committee
Surgery Department Chairmans Committee
Surgical Research Committee
Surgical Section Chiefs Committee, Chairman
Surgical Services Committee, Chairman
Medical Advisory Board of the Peripheral Vascular Institute, Chairman
AWARDS AND HONORS:
Franklin and Marshall College, Williamson Medal, 1957 (outstanding member of graduating class)
Rawnsley Science Prize, 1957
Sparks Medal, 1957, (highest average in Chi Phi Fraternity)
Black Pyramid Senior Honorary Society, 1957
Phi Beta Kappa, 1957
Biology Honors, 1957
Permanent Class President, Class of 1957
University of Pennsylvania School of Medicine, Eben J. Carey Award (excellence in anatomy), 1958
President, Class of 1961
President, Undergraduate Medical Association, 1961
Roche Award (outstanding student of medicine), 1961
Intern of the Year, Hospital of the University of Pennsylvania, 1962
Outstanding Young Men of America, 1968
Honorable Mention for Scientific Exhibit, Surgical Division, AMA Scientific Convention, 1968
Sigma Xi, University of Pennsylvania, 1970
AMA Joseph B. Goldberger Award in Clinical Nutrition (co-recipient with Jonathan E. Rhoads, MD), 1970
Veterans Administration Citation for a significant contribution to medical care, 1970
Da Costa Orator, Philadelphia County Medical Society, 1970
James IV Surgical Traveler, 1971, James IV Surgical Association
SAMA-Squibb Award for Scientific Exhibit (co-recipient with Ezra Steiger), 1972
Mead Johnson Award for Research in Hospital Pharmacy (co-recipient with Herbert L. Flack John A. Gans and Stanley E. Serlich), 1972
Seale Harris Medal of the Southern Medical Association for important accomplishment in the broad field of metabolism, endocrinology and nutrition, 1972
Alpha Omega Alpha, Honor Medical Society, Founding Member, The University of Texas Health Science Center at Houston, Medical School Chapter, 1975
AMA Brookdale Award in Medicine, "In recognition of his outstanding contribution to the nutritional care of critically ill or injured patients. His development of parenteral nutritional support of patients has been widely accepted as a standard technique and has suggested new areas of research." 1975
Great Texans Award, National Foundation for Ileitis and Colitis, Inc., Houston Gulf Coast Chapter, 1975
Honorary Texas Citizen, awarded by Governor Dolph Briscoe, 1975
Modern Medicine Award for contributions to developing parenteral hyperalimentation and other refinements in nutritional and metabolic support for surgical patients, 1977
Admiral in the Texas Navy, appointed by Governor Dolph Briscoe, 1978
Schaufus Technology Achievement Award of the Parenteral Drug Association, 1978
Honorary Fellowship in the Philippine College of Surgeons, 34th Annual Convention, Manila, Philippines, 1978
First Arvid Wretland Lecturer-European Society of Parenteral and Enteral Nutrition, Stockholm, 1979
Who's Who in the South and Southwest, 1975-1996
Who's Who in America, 1980-
Who's Who in the World, 1982-
Who's Who in Cancer: Professionals and Facilities, 1985-
Who's Who in American Education, 1992-
Who's Who in Science and Engineering, 1992-
Who's Who in the East, 1996-
Who's Who in Medicine and Healthcare, 1996-
Wisdom Hall of Fame, 1980
WHO Houston, 1980
American College of Surgeons Board of Governors, 1979-1985
Honorary Fellow, American Pediatric Surgical Association, 1980 -
Distinguished Alumnus Citation, Franklin and Marshall College, 1980
Edward D. Churchill Lecturer, Excelsior Surgical Society, American College of
Surgeons, New Orleans, Louisiana, 1981
Southwestern Pennsylvania Chapter of the American College of Surgeons Annual Award
for Extraordinary performance as a physician in the service of mankind, 1981
Virginia Kettering Kampf Lecturer-Wright University, Dayton, Ohio, 1981
Frank Stinchfield Award of the Hip Society of the American Academy of Orthopaedic
Surgeons (co-recipient with Jack E. Jensen, MD and Taylor K. Smith, MD) for
"Nutritional Assessment of Orthopaedic Patients Undergoing Total Hip
Replacement Surgery." 1981
Chairman and Course Director, First Pan-American Congress on Parenteral and Enteral
Nutrition, Guadalajara, Mexico, 1981
Distinguished Guest Award of the State of Jalisco, Mexico, 1981
Harry M. Vars Award of the American Society Parenteral and Enteral Nutrition
(co-recipient with Charles W. Heard, Jr., MD, R. Bryan Griffith, MD, Taylor K.
Smith, MD and John M. Daly, MD) for "The Positive Impact of Nutritional
Support on Fracture Healing. February, 1982
Samuel David Gross Lecturer, University of Louisville, February, 1982
Gordon Reid Gross Lecturer, Edmonton, Canada, March, 1982
Sommer Memorial Lecturer, The University of Oregon Health Science Center, Portland,
Oregon, April, 1982
Grace A. Goldsmith Award of the American College of Nutrition, co-sponsored by the
Outstanding Humanitarian Award, American Society of Nutritional Support Services,
Las Vegas, Nevada,
January, 1984
Annual Therapeutic Frontiers Award, American College of Clinical Pharmacy, San
Diego, June 1984
American Men and Women in Science, 1985-
University of Pennsylvania Nutrition Alumni Society President, 1985-1986
Jonathan E. Rhoads Lecturer in recognition for major contributions in the field of
specialized nutritional support, Annual Clinical Congress of the American
Society for Parenteral and Enteral Nutrition, Miami Beach, Florida, February,
1985
Annual Stanley J. Dudrick Research Scholar Award of the American Society for
Parenteral and Enteral Nutrition awarded annually and named in Dr. Dudrick's
honor in recognition of research leadership and developing TPN, initiated
January, 1985
Board of Trustees, Franklin and Marshall College, Lancaster, PA, June, 1985-
Vice Chairman, 1994-2002
Development Council, Chairman, 1987-1990
Chairman, Campaign for the College, 1996-2002

Albion O. Bernstein, M.D. Award of the Medical Society of the State of New York,
March 1986
The Cosmos Club, elected to membership, June, 1986
Honorary Membership in Dietitians in Critical Care of the American Dietetic Association
awarded in recognition of his advocacy of dietitians practicing critical care
nutrition and his contribution to the science of nutrition support, June, 1986
Award from the Instituto Mexicano del Seguro Social in recognition of his outstanding
scientific and academic achievements and for significant contributions to
nutritional support therapy during the 25 years of his professional life, July, 1987

Phi Beta Kappa Associates, 1988
Honorary Fellow, American Academy of Pediatrics, 1988
Ladd Medal, Surgery Section, American Academy of Pediatrics, 1988
University of Pennsylvania Medical Alumni Society Steering Committee, 1989
Thomas Pollock, M.D. Memorial Lecturer, University of Pennsylvania, Department of
Surgery, 1990
Honorary Fellow, College of Medicine and Surgery of the Republic of Costa Rica, 1990
Award from The University of Texas Medical School at Houston in recognition of true
interest and enthusiasm in the recruitment of able students to the field of
medicine, Dec, 1992
Award from the Federacion LatinoAmericana de Nutricion Parenteral Y Enteral in
recognition of his contribution to the development of artificial nutrition, Sept, 1993
Award from the Asociacion Mexicana de Alimentacion Enteral Y Endovenosa in
Reconocimiento por su Contribucion al Desarrollo de la Nutricion Artificial,
Sept, 1993
Reconocimiento por ser pionero en la ciencia de la alimentacion artificial descubrimiento
que ha generado nuevas esperanzas y vertido enormes beneficios a la
humanidad, en la ciudad de Morelia, Mich., Mexico, C.P. Sergio Magana
Martinez, Presidente Municipal, Sept, 1993
Award from the Mexican Association of Enteral and Intravenous Alimentation in
recognition of the value of his scientific contribution of the advancement of
nutrition in Mexico with much gratitude, V Congreso Nacional, Acapulco,
Mexico, October, 1994
Honorary Member, Mexican Association of Enteral and Intravenous Alimentation,
October, 1994
Award in Recognition of Excellent and Dedicated Surgical Teaching, Surgical Residents,
St. Mary’s Hospital, June, 1995
Hospital of The University of Pennsylvania Surgical Resident Graduate of the Year
Award, April, 1996
D. Hayes Agnew Lecturer, University of Pennsylvania Department of Surgery, April,
1996
First Chairman, National Alumni Council, University of Pennsylvania School of
Medicine, May, 1996- May, 2001
University of Pennsylvania Medical Center Alumni Service Award, May, 1996
American Surgical Association 1997 Flance/Karl Award to Stanley J. Dudrick, M.D. and Jonathan E. Rhoads, M.D. “For their seminal contribution in basic laboratory research as applied to parenteral nutrition.”

International Association for Surgical Metabolism and Nutrition “For his outstanding academic achievements that have contributed to the development of surgical metabolism and nutrition.” August, 1997

Roche Visiting Professor - University of Miami School of Medicine, Trauma/Surgical Critical Care, December 1997

Annual Lecturer, Surgical Historical Society, December, 1997
Honorary Guest Lecturer, Seattle Surgical Society, January, 1998
Honorary Member - Seattle Surgical Society, January, 1998
Faculty Recognition Award, Continuing Medical Education, St. Mary’s Hospital, January 1998

Award as Honored Guest Lecturer from the City of Loja, Ecuador, May, 1999

Award in Recognition of Excellent and Dedicated Surgical Teaching, Surgical Residents, St. Mary’s Hospital, June, 1999

The J.D. Ashmore Visiting Lectureship, Greenville Hospital System, Greenville, South Carolina, June, 1999

Venezuelan Society of Parenteral and Enteral Nutrition Award “In Recognition for Pioneering Work in the Field of Clinical Nutrition,” Caracas, Venezuela, October, 1999

Crohn’s and Colitis Foundation of America, Award in Recognition as Founder, Houston Chapter (founded in 1975), November, 1999

Roswell Park Medal Award, Buffalo Surgical Society, March, 2000

Honorary Degree, Master of Arts, Yale University, April, 2000

Nos Magni Nominis Umbra Teaching and Research Award – Yale Residents in General Surgery, 2000

Honorary Membership, Los Angeles Surgical Society, January, 2001


William J. Pokorny Memorial Surgical Science Lectureship, South Texas Chapter, American College of Surgeons, March, 2001

America’s Top Doctors, Castle Connolly Medical Ltd., March, 2001


America’s Top Doctors, Castle Connolly Medical Ltd., March, 2002

Commencement Speaker, Bridgeport Hospital School of Nursing, Program of Surgical Technology, June 2002


America’s Registry of Outstanding Professionals – Lifetime Member, June, 2002

Alumni Medal of Franklin & Marshall College “For Outstanding Volunteer Service to Franklin & Marshall College”, October, 2002

America’s Top Doctors, Castle Connolly Medical Ltd., March, 2003


Visiting Professor and Lecturer University of Texas Medical Center, June, 2003

The Stanley J. Dudrick, M.D. Surgical Education and Research Fund “In Recognition of Dr. Dudrick’s Teaching and Research Accomplishments”, June, 2003

Honorary Membership in the Polish Society of Parenteral and Enteral Nutrition, September, 2003

Medal of The Polish Lifeline Foundation (Linia Zycia), For the Support of Home TPN Patients, September, 2003
American College of Surgeons Fellows Leadership Society – Life Member, October, 2003
America’s Top Doctors, Castle Connolly Medical Ltd., March, 2004
Top Doctors: New York Metro Area, Castle Connolly Medical Ltd., March, 2004
The James H. Foster Lecture, University of Connecticut School of Medicine, October, 2004
The William H. Erb, Sr. Lecture, Philadelphia Academy of Surgery, January, 2005
The Jonathan E. Rhoads Lecture, American Society for Parenteral and Enteral Nutrition, January, 2005
The Walter J. Pories Honor Lecture in Surgical Education, Brody School of Medicine, East Carolina University, March, 2005
America’s Top Doctors, Castle Connolly Medical Ltd., March, 2005
Top Doctors: New York Metro Area, Castle Connolly Medical Ltd., March, 2005
The American College of Surgeons Jacobson Innovation Award, June, 2005
The Association of Mexican Surgeons Lifetime Achievement Award, November 2005

EDITORIAL ACTIVITIES:
Editorial Consultant, Journal of Trauma, 1974
Editorial Board, Infusionsterapie and Klinische Ernahrung, 1974
Associate Editor, Nutrition in Medicine, 1975-
Editorial Board, Annals of Surgery, 1975-
Senior Member, 2002-
Editorial Board, Nutrition and Cancer, Founding Member, 1978-2000
Editorial Board, Practical Gastroenterology, 1978
Editorial Board, Infusion, 1978
Editorial Advisory Board, Correspondence Society of Surgeons, 1978
Co-Editor, Manual of Surgical Nutrition, American College of Surgeons, 1975
Horsham, PA.
Editorial Board, Nutrition Support Services, 1980
Editorial Consultant, Nutrition Research, 1981
Editorial Advisory Board, Texas Health Letter, 1981
Editorial Advisory Board, Diseases, 1981,Intermed Communications, Inc., Horsham, PA.
Editorial Advisory Board, Diagnostics, 1981,Intermed Communications, Inc., Horsham, PA
Editorial Advisory Board, Professional Guide to Diseases, Intermed Communications, Inc., Horsham, PA.
Editorial Advisory Board, Drugs, Intermed Communications, Inc., Horsham, PA., 1982
Editorial Advisory Board, Assessment, Intermed Communications, Inc., Horsham, PA., 1982
Editorial Advisory Board, Professional Guide to Drugs, Intermed Communications, Inc., Horsham, PA., 1982
Editorial Advisory Board, Procedures, Intermed Communications, Inc., Horsham, PA., 1982
Editor, Manual of Pre and Postoperative Care, American College of Surgeons, 1983
Editorial Advisory Board, Definitions, Intermed Communications, Inc., Horsham, PA., 1983
Editorial Advisory Board, Nursing Now Series, Shock, Springhouse Corp., Springhouse PA., 1984
Editorial Advisory Board, Nursing Now Series, Hypertension, Springhouse Corp., Springhouse, PA., 1984
Editorial Advisory Board, Nursing Now Series, Drug Interactions, Springhouse Corp., Springhouse, PA., 1984
Editorial Advisory Board, Nursing Now Series, Cardiac Crises, Springhouse Corp., Springhouse, PA., 1984
Editorial Advisory Board, Nursing Now Series, Respiratory Emergencies, Springhouse Corp., 1984
Library Advisory Board, Cine'-Med Incorporated, Woodbury, CT., 1984
Editorial Board, Nutrition in Clinical Practice, 1986
Medical Advisory Board, Five Alice Newsletter International Association for Enterostomal Therapy, 1986
Editorial Board, Postgraduate General Surgery, 1992
Editorial Board, Metabolism y Nutricion Artificial, Mexico City, Mexico, 1993-
Editorial Consultant Board, Handbook of Therapeutic Interventions. Springhouse Corp, Springhouse, PA, 1994
Editorial Board, Journal of Metabolism and Nutrition (Revista de metabolismo Enutricao) Porto Alegre - RS, Brazil, 1994-
Editorial Board, Current Surgery, 1999 –
Editoral Board, Polish Journal of Surgery, 2003-

MEMBERSHIP IN ACADEMIC, HONORARY PROFESSIONAL MEDICAL AND SCIENTIFIC SOCIETIES NATIONAL COMMITTEES:
Alaska State Medical Association, (Honorary)
Alpha Omega Alpha Medical Society, University of Texas at Houston, Secretary-Treasurer, 1982
Allen O. Whipple Surgical Society
American Academy of Pediatrics, Honorary Fellow
American Association for the Advancement of Science
American Association for the History of Medicine, Inc.
American Association for Laboratory Animal Science
American Association for the Surgery of Trauma
American Association of University Professors
American Board of Surgery
   Board of Directors, 1974-1984
   In-Training Examination Subcommittee, 1974-1978
   Multiple Choice Subcommittee (MCS), 1979-1984, Chairman, 1982-1984
   Examination Committee, 1982-1984
   Committee on Issues (COI), 1979-1984
   Joint Chairman for Surgery of the Hand,1984-1987
Senior Member, American Board of Surgery, 1984-
American Burn Association
American Cancer Society Board of Directors, Harris County Unit
Medical and Scientific Committee
Public Education Committee
American Cancer Society, Board of Directors, Philadelphia Unit
Professional Education Committee
American College of Emergency Physicians
American College of Nutrition
American College of Surgeons, Fellow, 1971-
Board of Governors, 1979-1985
Credentials Committee, State of Texas, 1979-1988
Pre- and Postoperative Care Committee, 1974-1980
Executive Committee, 1974-1977
Vice Chairman, 1975-1977
Editorial Subcommittee for Manual of Surgical Nutrition
Chairman, Editorial Subcommittee for Manual of Pre- and Postoperative Care, 3rd edition
South Texas Chapter, Director, 1977-1986
Committee on Medical Motion Pictures, 1981-1990
SESAP '94-'95, PMP Committee #2, 1991-1993
SESAP '96-'97, MCI Committee #4, 1993-1995
Co-Chairman, 1993-1995
American Federation for Clinical Research
American Gastroenterological Association
American Institute of Nutrition
American Medical Association
Council on Foods and Nutrition, Executive Committee
Subcommittee on Total Parenteral Nutrition
Subcommittee on Quality Control of Parenteral Solutions
Ad Hoc Committee on Nutrition Teaching in Medical Schools
Surgical Criteria Project
General Surgery Criteria Committee
American Radium Society
American Society for Clinical Investigation, 1978 -
American Society for Clinical Nutrition
Membership Committee
American Society of Contemporary Medicine and Surgery
American Society for Nutritional Sciences
American Society of Nutritional Support Services, Board of Directors, 1982-1987
President-Elect, 1983-1984
President, 1984-1985
American Society for Parenteral and Enteral Nutrition
President, 1977-1978 (Founding President)
Board of Advisors, 1978-
Chairman, 1978-1979
Public Policy Committee, 1984-1986
Research Foundation Study Committee, 1990-
American Surgical Association
American Trauma Society (Founder's Group)
Anatomical Board of the State of Texas
Association for Academic Surgery (Founder's Group)
Association of American Medical Colleges
Association of Program Directors in Surgery, 1988-
  Board of Directors, 1998-
Association of Veterans Administration Surgeons (Founding Member)
Beaumont Medical Club of Connecticut, 1999 -
College of Physicians of Philadelphia, 1990-
Collegium Internationale Chirurgiae Digestivae
Connecticut Society of American Board Surgeons, 1994-
Connecticut State Medical Society, 1995-
Connecticut Society for Parenteral and Enteral Nutrition (CONNSPEN), 1995-
Crohn's and Colitis Foundation of America
Doctors' Club of Houston
Ethicon General Surgery Advisory Board
Federation of American Societies for Experimental Biology
Halsted Society Senior Member, 1986-
Harris County Medical Society
  Emergency Medical Services Committee
  Medical and Scientific Committee
Houston Academy of Medicine
Texas Medical Center Library Scientific Advisory Committee, Chairman
Houston Gastroenterological Society
Houston Ostomy Association
Houston Surgical Society
International Federation of Surgical Colleges
International Platform Association
International Society for Digestive Surgery
International Society for Parenteral Nutrition
  President-Elect, 1975-1978
  President, 1978-1981
  Executive Committee, 1975-1984
John Morgan Society, University of Pennsylvania (Honor Society for Medical Research)
  Lifeline Foundation, Inc.
  Board of Directors
Medical Club of Philadelphia, 1990-
Minneapolis Surgical Society (Honorary Member)
National Cancer Institute, National Institutes Health-Diet, Nutrition and Cancer Program
  Advisory Committee; Chairman, Diet, Nutrition and Cancer Program
National Foundation for Ileitis and Colitis, Houston Gulfcoast Chapter
  Medical Advisory Board, Houston Gulfcoast Chapter
National Institutes of Health
  Surgery, Anesthesiology and Trauma Study Section, July 1982-June 1986
National Research Council, National Academy of Sciences
  Food and Nutrition Board
    Committee on Clinical Nutrition
    Task Force on Clinical Nutrition
New England Surgical Society, 1996
New Haven County Medical Association, 1995-
New Orleans Society of Parenteral and Enteral Nutrition, Board of Advisors
New York Academy of Sciences
Nutrition Today Society
Pan American Medical Association
Pan-Pacific Surgical Association
  Vice President, General Surgery Section, 1985-1988
Philadelphia Academy of Surgery, 1988-
Philadelphia County Medical Society, 1988-1990
Pennsylvania State Medical Society, 1988-1990
Ravdin-Rhoads Surgical Society
Sigma Xi, Rice-Texas Medical Center Chapter
Societe Internationale de Chirurgie
Society for Surgery of the Alimentary Tract
Society of Clinical Surgery
Society of Laparoendoscopic Surgeons
Society of Surgical Oncology, Inc.
Society of University Surgeons
  American Board of Surgery Representative, 1974-1984
  Executive Council, 1974-1978
  Councilman-at-Large, 1974-1978
Society for the Advancement of Blood Management, 2002-
Southeastern Surgical Congress Associate Fellow, 1977
Southern Gut Club
Southern Medical Association
  Section on Surgery, Chairman-Elect, 1983-84,
  Chairman, 1984-1985
Southern Society of Clinical Surgeons
Southern Surgical Association
Southwestern Surgical Congress
Stanley J. Dudrick Surgical Society (Honorary Member)
Surgical Biology Club II
Surgical Historical Society, 1997-
Surgical Infection Society (Charter Member)
  Membership Committee, Chairman, 1987-1990
Texas Gulfcoast Chapter of the American Society for Parenteral and Enteral Nutrition
Texas Medical Association
  Committee on Nutrition and Food Resources
Texas Delegation to the AMA
Texas Medical Foundation
Texas Surgical Society
United Ostomy Association, Houston Chapter
United States Pharmacopeia Committee on Revision, Advisory Panel on Electrolytes and Parenteral Therapy
University Association for Emergency Medical Services
Venezuelan Society of Parenteral and Enteral Nutrition
Western Surgical Association

MEMBERSHIP IN NON MEDICAL SOCIETIES
American Museum of Natural History, Associate Member
Association of Governing Boards of Universities and Colleges, 1985-
Athenaeum of Philadelphia, 1990-
Chairman of Class Agents, University of Pennsylvania School of Medicine (Medical Annual Giving), 1971-1972
Class Agent, Class of 1961, University of Pennsylvania School of Medicine, 1961-
Cosmos Club, 1986-
Ducks Unlimited
Franklin Inn Club, Philadelphia, 1990-
Franklin and Marshall College, Lancaster, Pennsylvania
  Board of Trustees, 1985-
    First Vice-Chairman, Board of Trustees, 1994-1999
  Vice Chairman, Board of Trustees, 1999-2002
  Board of Overseers/Executive Committee, 1986-
    Leadership/Major Gifts Committee, 1986-1991
  Development Council, Chairman, 1986-1991
  Student Life Committee, 1986-1994
  William A. Schnader Society, Charter Member, 2000-
    Founder, 1989
    Honorary Co-Chairman, 1998-
  Trusteeship Committee, 1990-
  John Marshall Society, 1991-
  Alumni Programs and Development Committee, 1991-1994
  President's Regional Advisory Council, Southwest Council, 1992-1993
  Art Collections Committee, 1994-1996
  Education Services Committee, 1994-1996
  Committee on the Office of the Presidency, 1996-
    Marketing and Communications Committee, 1994-1998
  Finance Committee, 1994-1998
  Investments Committee, 1994-1998
  Leadership Gifts Committee, 1993-
    Co-Chairman, Physical Sciences Building Committee, 1994-1999
  Chairman, Campaign Executive Committee, 1996-
    Academic Investments Committee, 2003-
    Facilities Planning and Public Safety Committee, 2003-
    Co-Chairman, Trustees Campaign Committee, 2003-
  George H. Hermann Society, Hermann Hospital, 1990-1992
  Charles Curtis Harrison Society, University of Pennsylvania, 1996-
  Houston Grand Opera
  Houston Museum of Fine Arts
  International Platform Association
  National Cowboy Hall of Fame
  National Football Foundation and Hall of Fame
  National Historical Society
  National Society for Historical Preservation
  Order of Saint John of Jerusalem
  Phi Beta Kappa Alumni of Greater Houston
  Philadelphia Museum of Art
  Republican Senatorial Inner Circle
  Smithsonian Society
  Teikyo Post University – Business Advisory Council, 2003-
The Forum Club of Houston
The Friends of Franklin, Inc.
The Franklin Institute, Member
University of Pennsylvania School of Medicine
Class Agent-Class '61, 1961-1994
Annual Giving Steering Committee, 1989-
Trustee Development Committee, 1994-
The Campaign for the Future of Medicine, 1994-2001
Campaign Steering Committee, 1994-2001
National Alumni Council, 1994-
Chairman, 1994-2001
Waterbury Symphony Orchestra, Board of Directors, 1999 –
Exploratory Committee (Development), Chairman, 1999-

PAST MEMBERSHIP IN ACADEMIC, HONORARY, PROFESSIONAL MEDICAL NATIONAL COMMITTEES:
American Medical Association
Chairman, Committee on Nutrition in Medicine
Association for Academic Surgery
Co-Chairman, Local Program Committee, Philadelphia
Doctors’ Club of Houston
Board of Governors
Second Vice-President
Finance Committee, Chairman
Entertainment Committee
Employees Association of the Veterans Administration Hospital, Philadelphia
Pennsylvania State Medical Society
Alternate Delegate from Philadelphia
Philadelphia County Medical Society
Emergency Transportation Committee
Nutrition and Metabolic Committee
Philadelphia Regional Committee on Trauma
Philadelphia Pre- and Postoperative Care Committee
Sigma Xi, University of Pennsylvania Chapter
Society of Surgical Chairman
Trauma Surgeons Advisory Panel, Ethicon, Inc.
Veterans Administration National Research Service
Merit Review Board of Surgery

PAST HOSPITAL ACTIVITIES AND MEDICAL SCHOOL COMMITTEES:
Pennsylvania Hospital
Executive Committee of the Medical Staff
Clinical Chiefs Committee
Operating Room Committee
Finance Committee of the Board of Managers
Kitchen Cabinet of the Board of Managers

The University of Texas Medical School at Houston
Medical Service, Research and Development Plan, Board of Directors,
Vice Chairman, 1975-1976
Laboratory Animal Care Committee, 1976-1978
Administrative Council
Clinical Chairmen's Committee
CNS Trauma Center Group
Clinical Affairs Committee
Development Board
Policy Review Committee
Smith-Klein and French Lectureship Committee, Chairman

The University of Texas Medical Associates
Board of Directors, Chairman
Executive Committee
By-laws Committee
Fringe Benefits Committee
Ambulatory Care Committee
Space Committee
Long Range Planning Committee

Hermann Hospital
Ambulatory Care Committee
Clinical Chiefs Committee
Medical Board
Emergency Medical Services Committee
Long Range Planning Committee
Joint Conference Committee
Nutrition Committee, Chairman

University of Pennsylvania School of Medicine
Advisory Committee to the Curriculum Committee for Introduction to Clinical Problems
Bioengineering Committee, University of Pennsylvania
Committee for Evaluation of Human Research
Faculty Advisory Committee
Medical Student Advisor
Student Recommendation Committee
Task Force on Educational Policy and Professional Manpower
Department of Surgery Executive Committee
Course Coordinator, Surgery 200 and 300, Pennsylvania Hospital
Nutrition Curriculum Committee

Veterans Administration Hospital, Philadelphia
Budget Committee
Dean's Subcommittee for Academic Affairs, Chairman
Infection Committee, Secretary
Medical Executive Committee
Medical Library Advisory Committee
Personnel Committee
Professional Standards Board
Research and Education Committee, Chairman
Space Committee
Therapeutic Agents Committee
Tissue and Transfusion Committee

St. Luke's Episcopal Hospital, Houston
Admissions and Utilization Committee
Dietary Committee
Intensive Care Committee
Medical Education, Research and Publications Committee
Pharmacy and Nursing Services Committee
Patient Education Committee

PAST MEMBERSHIP IN NON-MEDICAL SOCIETIES AND ACTIVITIES:
Foundation for Children, Inc. (Houston)
    Board of Directors
Hunters Creek Elementary Parent Teachers Association
Lakewood Yacht Club
Memorial Drive Country Club
Spring Branch Junior High School Parent Teachers Association
University Faculty Club, Inc., Charter Member, The University of Texas
BIBLIOGRAPHY


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hyperosmolality with different osmotic agents in endothelial cell. J. Cell Biochem., 76:567-571, 2000
576, 1999 Reprint In: Selected Readings in General Surgery, Miscellaneous Small Bowel Diseases, 29:1-7, 2002


ABSTRACTS


134. Maloney SP, Edwards RE, Kiran PR, Richi A and Dudrick SJ: Outcomes of Patients Over the Age of 80 Years Treated for a Perforated Viscus in a Community Hospital Setting Over a Ten Year Period. Connecticut Chapter of the American College of Surgeons, p53, November, 2003


143. Rabbi JF, Gersten G, Kiran PR, Dudrick SJ and Dardik A: Early Results with Infrainguinal Cutting Balloon Angioplasty Indicates Limitation of Distal Dissection. 14th Annual Winter Meeting of the Peripheral Vascular Surgery Society, February, 2004

144. Paszkowiak JJ, Teso D, Wang XJ, Kelley L, Sumpio BE, Dudrick SJ and Dardik A; Rapamycin Inhibits Neointimal Hyperplasia in Low Flow States In Vivo Without Affecting Vessel Inward Remodeling. 56th Annual Meeting of the Southwestern Surgical Congress, p122, April, 2004


155. Teso D, Fratini J, Dudrick SJ and Dardik A: Carotid Endarterectomy in 1,650 Patients Under 60 Years Old: Implications for Screening. Scientific and Annual Meeting of the Connecticut Chapter of the American College of Surgeons, p45, November, 2004


163. Teso D, Edwards RE, Frattini J, Dudrick SJ and Dardik A: Safety of Carotid Endarterectomy in 2443 Elderly Patients; Lessons from Nonagenarians – Are We Pushing the Limit? Connecticut Medicine, p625, November/December 2004

164. Fancher TT, Malkin BS, Palesty JA and Dudrick SJ: Should Breast Self Examination Really be Optional? Scientific and Annual Meeting of the Connecticut Chapter of the American College of Surgeons, p27, November, 2005


169. Qureshi IQ, Nicastrī GR and Dudrick SJ: Superior Mesenteric Artery Syndrome:Review and Case Study. Scientific and Annual Meeting of the Connecticut Chapter of the American College of Surgeons, p90, November, 2005


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