



**ORAL HISTORY PROJECT**

**Avroy A.  
Fanaroff, MB,  
BCh[RAND], FRCP[E],  
FRCPCH**

**Interviewed by  
Lawrence M. Gartner, MD**

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**William L. Nyhan, MD, PhD**  
Interviewed by Laurence Finberg, MD

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## **PREFACE**

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.

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## **ABOUT THE INTERVIEWER**

Lawrence M. Gartner, MD

Lawrence M. Gartner was born and grew up in Brooklyn, New York. His undergraduate education was at Columbia University, followed by medical education at Johns Hopkins University, where he received his medical degree in 1958 and pediatric internship from 1958 to 1959. Returning to New York, he continued his pediatric residency at the Albert Einstein College of Medicine, where he was Chief Resident in Pediatrics from 1961-62. He continued at Einstein, doing a fellowship in hepatology, neonatology and research. In 1964 he became a faculty member, rising to Professor of Pediatrics and Director of the Divisions of Neonatology and Gastroenterology and of the Pediatric Clinical Research Center. During this period he carried out a major research program in neonatal bilirubin metabolism. In 1980, he became Professor and Chairman of the Department of Pediatrics at The University of Chicago and Director of Wyler Children's Hospital. In 1998, Dr. Gartner retired from the University of Chicago. He now lives and works from his ranch in Valley Center, California (San Diego), continuing lecturing and writing in neonatal jaundice, breastfeeding and history of neonatology.

In 1956, he married Carol B. Gartner, who subsequently became Professor of English at Purdue University and Dean of the College of Arts and Sciences at the Calumet campus. She also writes and lectures on the history of medicine, sometimes with her husband. She also assists in the oral history project, with specific responsibility for the video recording and photographs that accompany each oral history. They have two children, Alex Gartner, a movie producer, and Madeline Gartner, a breast and endocrine surgeon.

## Interview of Avroy [A.] Fanaroff, MD, FAAP

DR. GARTNER: We are here in Dr. Avroy Fanaroff's home in Shaker Heights, Ohio, just outside of Cleveland. Thank you for agreeing to be interviewed by the American Academy of Pediatrics Oral History Project.

**DR. FANAROFF: It's my pleasure, and it's in fact an honor.**

DR. GARTNER: It is October 28, 2008. And it's a slightly gray.

**DR. FANAROFF: This is a typical Cleveland sky.**

DR. GARTNER: Is it?

**DR. FANAROFF: This is very typical for a lot of the area. Gray is the natural color. In fact, one of the sporting teams called themselves the Cleveland Grays.**

DR. GARTNER: Oh, really?

**DR. FANAROFF: One of the soccer teams.**

DR. GARTNER: I didn't realize that. Well, we had a good dose of rain yesterday.

**DR. FANAROFF: I came from San Diego yesterday, and we were delayed because of fog.**

DR. GARTNER: In San Diego?

**DR. FANAROFF: In San Diego, after a week of glorious weather with the Santa Ana raising temperatures.**

DR. GARTNER: Right. We do get fog occasionally.

Well, there are three major goals we have for this oral history today. First, you're a major figure in American pediatrics. We want to know something about you, your early life, your education, your career and your family. How did you get to where you are? Second, we want to record for future researchers scientific, clinical and scholarly contributions to the field of pediatrics. And third, this is a

neonatology oral history, because we're interested in understanding how the field of neonatology developed, its major achievements, and where you see it going in the future. You're one of the creators of the field of neonatology. We want to know your role in this field, and your memories of how the field began and how it developed.

The interview process is a relatively simple one. I have a script which we have used, with some modifications, for all the people we have interviewed. This gives a structure to the interview and allows us to cover the same material with each interviewee. By putting together the answers to each of these questions by each interviewee, we hope to be able to reconstruct the evolution of the field and identify neonatology's major achievements. Thus, I'll ask questions, but that's just an outline. You're free to wander off the topic if thoughts come to mind that are tangential. Please feel free to say whatever you wish. You will have a chance to edit the transcript for accuracy and for content. We hope you'll not remove anything and make any changes except for reasons of accuracy. I will also be editing the transcript, but only to make it readable and smooth and remove some of my own remarks which are not necessary. But I will not change anything you have said.

We are recording this interview both on digital audio disc for transcription and on digital video with sound to have an archival record of this interview, including your image, the setting here in your home, and to show any artifacts or pictures that you would like to share with us — pictures of family, places you've been and so forth.

We can expect the interview will take nearly the entire day. There is no time limit. We want this interview to be as complete and comprehensive as possible. Whenever you want to stop, just let me know, and we will take a break. And we should break for lunch, as well. So relax and enjoy a day of remembrance.

**DR. FANAROFF:** [Laughs]

DR. GARTNER: And reminiscing. Now, what I'd like to do is first have you tell us about your origins — parents, ancestors, where you were born, siblings, family life, early schooling.

**DR. FANAROFF:** Okay. I was born in Bloemfontein, South Africa, which was at the time one of the capitals. There were various capitals, and this was the judicial capital. I only stayed there for 18 months. My father, Jack Fanaroff, emigrated from I think Latvia. We were never entirely clear. I

think the family came from near Riga in Latvia, a little town called Dagda. He came via the United Kingdom, where his fare was paid by the equivalent to the Jewish Community Federation. He, his father and his brother came in 1910, to South Africa. He was 12 years old at the time. He never wanted to share anything about his early life, mainly because it had been very unpleasant. There had been a lot of pogroms, there had been a lot of beatings, and the family basically had to get out. He was one of eight siblings, all of whom came to South Africa. But a large part of the family, I subsequently learned, came to the United States. About a decade ago, Roslyn, my wife, and I attended a family reunion and were able to establish where we fitted into the family.

My mother's family came from Lithuania. Her father, after whom I'm named, died very young, age 57, from diabetes and complications thereof. Her mother, Sarah died three days after my fifth birthday. I remember her very well.

We moved from Bloemfontein to Johannesburg when I was 18 months old. My father was a very erudite man. He'd studied Latin, and French, and Greek and the classics. In fact, he taught for a year after he graduated from high school in Bloemfontein. He could not afford to go to college. It was the wartime, and he got a business as a gas station operator in downtown. My mother used to help him in the business. We lived in a suburb which was called Yeoville. We were two houses away from one of my mother's sisters, so it was a very close family.

I have one sibling, Melanie, who is an occupational therapist. She's married to a general practitioner from Australia. They live in Western Australia, in a little town called Bunbury. I don't know, later we can maybe talk a little about what it's like to be in a little town as a family doctor.

We lived in a very modest home. In fact, one of my mother's sisters lived with us. My sister and I shared a bedroom. I went to an elementary school called Yeoville Boys [Primary] School. My mother had wanted me to go to another school, which was called King Edward [VII] Preparatory School, which was a "fancier" school. But when I interviewed there, they said no, there was no space. Basically, they didn't want people who lived on the wrong side of the tracks. We lived on the wrong side of this main road, and that was sort of the differentiating point. So my mother was quite persistent, a very wonderful woman, so she said, "Well, you'll stay at preschool another year," which I did. It was called kindergarten in South Africa. I was turning

six. We went back to interview at King Edward, but the headmaster came up with the same response, “No, we won’t take your boy.” And so I went to Yeoville Boys.

On the first day of school they tested me, and because I’d had two years in kindergarten, I was more advanced than the normal children going into first grade, so they double-skipped me and put me into the equivalent of third grade. This was not intellectually a problem, but physically and emotionally later it did become a problem, because when I changed high schools, which we’ll come to later, I was 11, and there were boys of 14 and 15 in the same school.

I did reasonably well in school. I was an enthusiastic sportsman, and played cricket and soccer. In fact, our soccer team won the equivalent of the state soccer championship. I had a wonderful time in the school, made terrific friends and did the usual things that you do.

The family had very little resources, so vacations were sparse, but we would occasionally go by train down to Cape Town to a resort called Muizenberg, which had a wonderful beach. We have very pleasant memories of those early days.

DR. GARTNER: Your father continued to run the service station?

DR. FANAROFF: My father was really a frustrated academic. He’d wanted to go to medical school, but could not afford to go to college, so he ran this gas station always with the point of view that his son would be educated and would go to medical school.

DR. GARTNER: So you fulfilled his wish.

DR. FANAROFF: Yes.

DR. GARTNER: [Laughs]

DR. FANAROFF: I think from the time I was six, I knew that I was going to go to medical school.

DR. GARTNER: Did he actually say this to you and encourage you to go to medical school from early on?



**DR. FANAROFF:** Not in as many words, but he always talked about his regrets that he never was able to do it, and he held physicians on a pedestal. In fact, he was a terrible businessman, hardly made a living. He used to run this gas station with parking, and he used to provide a service so that the physicians would be driven to their offices and then picked up. He didn't charge nearly enough to cover his own rent, but, you know, there are more important things in life than money.

We had a terrific family life because my mother had a number of sisters and a brother, and my father had a number of brothers and a sister, so there were a large number of aunts, uncles and cousins, and we spent a lot of time together.

**DR. GARTNER:** Were any of these uncles, or aunts or others a significant influence on you?

**DR. FANAROFF:** Later in life, when I was in high school, my mother's sister married a physician. He was very prominent in South African politics, too, and had the United Party been elected in 1948, he would have been the minister of health. He was one of the leaders in the field of rehabilitation medicine, and he was a senator in South Africa. His name was Ben [Ephraim Benjamin] Woolf. He and I spent a lot of time talking. The main thing that he pointed out to me was you can never rest with just your basic medical degree, you have to specialize. And early on, even before I even went to medical school, he instilled in me the thought that medicine is lifelong learning. That was reinforced at our medical school, which we'll come to later, where at the sort of keynote lecture to our final year of class, we had some excellent lecturers, and the main point they were making was that the half-life of medical knowledge is short. You have learned *how* to learn, and those are the tools that you need to continue to work with. And I think that lessons holds very true today, and this is what we're still trying to instill in our residents and fellows.

**DR. GARTNER:** Very much so, right.

**DR. FANAROFF:** Anyway, we were still in elementary school. We're having fun. I used to walk to school. It was about four or five blocks, and I would spend a lot of time in the playgrounds, a lot of time on the soccer fields. I started playing tennis at that time, as well. This elementary school didn't have a high school with it. You got distributed to a high school. My

**mother wanted me to go to King Edward [VII] School, which was four blocks away, but on the other side of the road. As I said, we were on the wrong side of the tracks. You had to fill in a form as to which high school you wanted to go to, and we filled in King Edward, 1; King Edward, 2; King Edwards as a boarder, 3. Needless to say, I was sent to Athlone [Boys High School], named after Lord Athlone — Alexander Cambridge, 1<sup>st</sup> Earl of Athlone — which was a full-block walk, a tram ride and then a bus ride.**

**DR. GARTNER:** Oh, my goodness.

**DR. FANAROFF:** Now, my father used to drop me off at school because he could do that on his way to work. He worked in downtown Johannesburg. But coming back, it was a bus, then the tram and then a walk. The school was fine, and I had good friends there.

**In the fifth month of the first year in high school, my mother somehow found out that a child had been transferred out of King Edward School, and using some influence that she never cleared, came to Athlone one day and said, “You’re being transferred.” I got called into the headmaster’s office. I was totally confused as to why I was going there. He said, “We’re very sorry, you’re going to be transferring. We’ve enjoyed having you.” And so that afternoon, we went off to go and get the school uniform for King Edward. Early the next morning we arrived there. I was sitting outside the headmaster’s office, and my mother was in there, and she was having a debate with this headmaster.**

**DR. GARTNER:** [Laughs]

**DR. FANAROFF:** The headmaster was saying, “I don’t know what you’re doing here. We have no room for your boy.” And she said, “Well, I’ve got the papers here saying that he’s been admitted.” He said, “I don’t care where you got these papers. He’s not coming here.” And then my mother asked him — his name was Frank Bicheno — “Aren’t you married to So-and-so?” He said, “Yes.” She said to him, “I was at school with her.” He said, “Oh, okay, we’ll take your boy.”

**DR. GARTNER:** [Laughs]

**DR. FANAROFF:** That was actually a very difficult time, because I transferred in the middle of the year to a different school that had a totally different system. I was the youngest kid in the class. There were some kids

who had been held back, who were already 15, well into puberty, bullies, and when you came and you were a new boy, you were the target.

DR. GARTNER: Right.

DR. FANAROFF: And so I had a rough time transitioning, but I also transitioned into a class that had [Michael] Jeffrey Maisels, who's now one of the prominent neonatologists and pediatricians, and Arthur [H.] Rubinstein, who was the chair at the University of Chicago and is currently the dean at Penn University [University of Pennsylvania School of Medicine – aka: Penn Medicine]. We became very good friends then and stayed good friends through high school, medical school and on into the future.

My mother was right. This was a terrific school. It's the school that has really graduated a lot of the leaders in South Africa. A lot of the leading sportsmen, as well, including golfer Gary Player, who was at high school with us. I got an excellent foundation, and after the first year really enjoyed the high school.

DR. GARTNER: Was it a public school or a private school?

DR. FANAROFF: It's a public school. It had at the time about 60 percent day boys, as we were referred to, and 40 percent in boarding school, which was a good admixture. It was an English-speaking government school. The schools were divided by language. So if your home language was Afrikaans, then you went to an Afrikaans school. If your home language was English, you went to an English school. And it was an all-boys school. Most of the schools were unisex. It taught you to be a man. It taught you integrity. There was a lot of emphasis on being absolutely honest. I still have awfully good memories of that school. And, in fact, we're planning a 55th reunion. There are about a dozen of us from that high school class who live in the United States and Canada, and we're planning to get together next summer for the 55th reunion.

DR. GARTNER: How nice! Have you ever done that before?

DR. FANAROFF: They did it for the 50th, and I was going to go, and Jeff Maisels's, who's a very good friend of mine, daughter died —

DR. GARTNER: Oh, yes, right.

**DR. FANAROFF:** And so that kiboshed those plans.

In high school I played a little cricket, a lot of rugby, and loved rugby, and started playing squash, as well, and continued to play tennis. So I had a lot of activities and a lot of excellent friends. The classes were divided according to the topics that you studied. There were really only three options. There wasn't the variety like kids have today. You either did Latin and history, Latin and geography, or geography and history.

**DR. GARTNER:** [Laughs]

**DR. FANAROFF:** That was in addition to math, and science, and the languages English and Afrikaans. In the Latin-history class, there were 26 boys, and eight of us went to medical school, so it was a very strong academic class. The interesting thing is that in South Africa you have to make a career choice when you're in high school, so you have to apply for medical school. It's quite daunting when you consider that I was 16, graduating high school, and I had to make a decision on a career. Quite frankly, when I got to university, the first year I was really very discombobulated. I was participating far too heavily in the activities of the university and not hardly at all on how to study and how to learn.

It's also very competitive once you're in, because they fail students with abandon. Only 10 percent of our first-year class failed, but in the second year, when we did anatomy and physiology, 45 percent of the class failed. Now, some of them would not have to repeat the year, because there would be a supplementary examination in November and January. Before school started again, there was a supplementary exam. If you pass that, then you continued with your class. But as I said, nearly half the class had to do that or had to repeat the year. Then in third year, which was basically pathology and pharmacology, the same thing — another 40 percent. So when you look at our graduating class from medical school, only about 50 percent of the starters had finished in six years. It was very competitive.

**DR. GARTNER:** So when you entered college or university, you actually started right off with medical studies. You didn't have two years of pre-medical?

**DR. FANAROFF:** There's no classic education. In the first year, we did chemistry, physics, botany and zoology. Now, we'd already done chemistry and physics in high school, and quite frankly, the course that we did at college was not that much more difficult, except for the organic chemistry.

There's an interesting aside to this. The organic chemistry professor was a gentleman by the name of Professor Sam [Samuel S.] Israelstam. I went out to play rugby, and I was talking to this person that I was playing rugby with. We were both in the scrum. We were in adjacent positions. When we were talking afterwards he said, "Well, what do you think of organic chemistry?" I said, "It's pretty tough. I don't think I know what's happening yet, but I'm sure I'll learn in due course." He said, "What do you think of the professor?" I said, "He's tough as nails." He said, "Do you like him?" I said, "Yeah, I quite like him." He says, "He's my dad."

DR. GARTNER: [Laughs] You said the right thing.

**DR. FANAROFF:** So the bottom line is that this was his son, Dennis [Manfred Israelstam]. Dennis and I became good friends, and Dennis and I are married to sisters.

DR. GARTNER: Oh! [Laughs]

**DR. FANAROFF:** So he is my brother-in-law.

DR. GARTNER: He is your brother-in-law.

**DR. FANAROFF:** And he is an obstetrician.

DR. GARTNER: In the US [United States of America]?

**DR. FANAROFF:** No, he —

DR. GARTNER: He stayed there?

**DR. FANAROFF:** Yes, although he's emigrating to the US now. But he and I — I mean, you think about the coincidence.

DR. GARTNER: Yes. That shows you have to be careful what you say, also. [Laughs]

**DR. FANAROFF:** Many a guy put his foot in his mouth with him. His father was really a very good teacher, but they expected us to have read the material before coming to class. They did roll call in all the classes, and they did it by assigning you to seats, so all they had to do was dot the empty seats. And also, he would call you, not by name but, "M6, stand up." And then M6

**was in deep trouble. I mean, ignorance was bliss. College students in the first half of the year were really having a good time, and partying was more important than studying.**

**DR. GARTNER:** You didn't tell us what the name of this university is.

**DR. FANAROFF:** Oh.

**DR. GARTNER:** Which is important.

**DR. FANAROFF:** All right. The King Edward VII High School. The university is the University of [the] Witwatersrand. That's a jawbreaker. Wit, pronounced "vit" in Afrikaans, is white; water, pronounced "vater," is water, and rand, pronounced "rahnd," is a ridge. So translated, it's a ridge of white waters. Now, the amazing thing is that this ridge of white water really referred to the ridge of gold. I don't know if you've ever been down a gold mine.

**DR. GARTNER:** Yes, once.

**DR. FANAROFF:** But you go down into the depths of the earth, and you look at this rock, and you say, "You're getting one ounce of gold out of a ton of rock. How did you know that there was gold there?" I was absolutely amazed that the pioneers were able to know that this was a whole ridge of gold. Johannesburg, when I was growing up, was dotted with these so-called mine dumps, where you had this yellow powder that had been extracted from the mines, and they became ridges. They were actually eyesores. They also created a lot of dust, because every time the wind blew, these particles blew. But they've now grown stuff on them and stabilized it. And in fact, gold at the time, and for many years, was \$35 an ounce, and it wasn't worth getting the gold out of that dust. But when gold goes to \$900 an ounce, it becomes worth extracting the gold from it.

**DR. GARTNER:** Are they actually digging these back?

**DR. FANAROFF:** I don't think so, but they could. You asked me about family. I have a sister, Melanie, who is two and a half years younger than I am. She trained as an occupational therapist, and then went to work in London where she met and subsequently married her husband, Mashie, who was from Western Australia. They have three children, one of whom lives in the United States. He teaches at Drew University in the English department.

**The second one is an actor, and the third one is getting her PhD in psychology. They moved to Bunbury, Australia, in 1968. He was part of a group of family practitioners. He did the anesthesia for the group and did a lot of the obstetrics, as well. He's now retired. They have a retirement farm with a gorgeous home in the Ferguson Valley, which is where a lot of the vineyards are now in Western Australia.**

DR. GARTNER: Is this near Perth?

**DR. FANAROFF: It's 150 miles south of Perth. It's absolutely beautiful country.**

DR. GARTNER: Yes, it's nice country.

**DR. FANAROFF: Beautiful country. But when we used to go and visit them, and we haven't been there often, it was interesting for me, because a patient would come and see him and bring him two bushels of apricots as barter, or somebody else would bring corn. When we went to get milk, we would get in the car, go to some dairy farm, take a hose, fill a number of containers, and then he'd say, "Oh, I think this is about \$2 worth." He'd put the money into a can, and then we'd drive off. Any time we went to be entertained, it was really a homestead, and everything that was served was grown or lived on that homestead.**

DR. GARTNER: Do they still live that way?

**DR. FANAROFF: They're more gentrified now, but there are still people who are living that way. The Aussies have a very laissez-faire attitude of, "Never do today what you can do tomorrow."**

DR. GARTNER: [Laughs]

**DR. FANAROFF: And, "It's never too early to have a drink."**

DR. GARTNER: [Laughs] It's a nice country,

**DR. FANAROFF: Beautiful.**

DR. GARTNER: Well, anything more about the early life?

**DR. FANAROFF:** As medical students we used to travel a lot, and we used to travel cheaply. We went everywhere by car. We used to, on a regular basis, go off work on a Friday and drive up to Kruger National Park. We'd go in first thing on Saturday morning, spend the day at Kruger, then exit near sunset, cross the border into what was Portuguese East Africa [In 1975, East Africa became independent from Portugal and is now known as the Republic of Mozambique], Lorenzo Marques [now known as Maputo, the capital of Mozambique], spend a night in Portuguese East Africa, come back on Sunday morning, spend the day in the game park, and then it would be a five hour drive back to Johannesburg. Or we would drive to the Drakensberg Mountains, which is in the eastern part of the country, and spend three or four days there hiking, playing squash, playing some tennis. Or we'd go down to Durban for the weekend, which was a 400-mile drive, and spend a weekend at the beach.

We also had one wonderful experience when six of us drove up to the Victoria Falls, which was in then Rhodesia and now Zimbabwe [since 1980]. At the time, the road, once you crossed from the South African border, which was a strip road, was two strips about 15, 18 inches wide, and you got your tires in there. But when a car was coming, you had to pull over, so you had maybe one wheel on the thing. We'd arranged to stay in some little huts, very inexpensively. There were 6 medical students going in my father's 1948 Chevy [Chevrolet]. We got to the border with Rhodesia, and the border guard said, "Okay, you've got your papers. How much money you got?" I said, "I've got about \$10." He said, "You got traveler's checks?" "No." "You got relatives there?" "No." And so he moves to the next guy and gets the same set of answers. So he said, "I can't let you in." "Why not? We've got our food. We've got our accommodations taken care of." He said, "What if your car breaks down?" "No, this is a very reliable car. It's not gonna break down." He said, "I'm sorry, you don't have the resources. I cannot let you into the country." So we said, "Well, actually, now that you mention it, we do have a relative." We had somebody who was in our class from medical school. We decided that they were relatives in Bulawayo, so he said, "Okay." So we got in the car, and the car wouldn't start.

**DR. GARTNER:** [Laughs]

**DR. FANAROFF:** So we had to push the car. If you can picture the scene of five guys pushing the car to get it started to cross the border. Anyway, the car gave us no trouble, and we were in Rhodesia. Victoria Falls are absolutely magnificent, and we wanted to see them from the air, but we



didn't have the money. So we went to the place where they were doing the flights, and found out how much it was. We said, "Okay, well, what if we pay for one and six of us go?" He said, "No, it doesn't work that way." Anyway, to cut a long story short, we convinced him that if one was going, it was already going to be up in the air, and so he took all of us.

DR. GARTNER: [Laughs]

DR. FANAROFF: And we had an absolutely magnificent flight over the falls and through the gorges. As you can tell, we could do this very inexpensively.

I think our experiences as medical students were really unbelievable, because we're talking about 1954 to 1960. It was the era of apartheid, so we worked at white, and at black and at colored hospitals, getting varied experiences. But as medical students, we got to do a lot. So procedure-wise, we became very adept at doing procedures, and also seeing a lot of pathology, and physical diagnosis was a very important part of training. We were also pretty eager for extra tuition, so we used to identify the best teachers and then our group — we worked in groups called firms — would arrange for extra tuition, whereby they would pick out some complicated cases, have us examine them, then present it to them, and then we would discuss it. It was an integral part of our learning, but it's what really, I felt, took us to the next level.

The professors were so-so. But the registrars, the name for a person before becoming an attending, were spectacular. They were all studying to do their boards, and so they were just encyclopedic in their knowledge. That's whom we learned a lot of medicine from. There were also some outstanding teachers. The one gentleman that I worked for as an intern in internal medicine, by the name of Mosie [Moses Meyer] Suzman, was the leading internist. He was the internist's internist, so whenever they got a complicated case that they couldn't solve, he would be the one they would go to. Gosh, you could ask him any question, and then he'd go like this, [pantomimes action], and press on the bridge of his nose and say, "*Journal of Endocrinology*, March-April 1956," and you could take that to the bank. That's where it would be. He had a better library in his office, almost, than they had at the medical school library. He used to come to the United States on a regular basis. He was also ahead of his time in thinking, because he anticoagulated patients with myocardial infarctions when it was not fashionable to be doing it. He was a big influence. There were a couple of

**other people. There was a medical registrar by the name of Hyam Isaacs, who became authoritative on neuromuscular disorders. We used to very much enjoy going to listen to him speak.**

**As students, we got a lot of front-line duty. For example, there was a clinic in one of the so-called townships which was entirely run by medical students. There was a supervising physician, but it was really somebody who had retired, and who never did anything. We used to have to make house calls. You were supposed to make them on a bicycle provided by the clinic, but there were so many mangy and rabid dogs in the neighborhood that none of us would go on the bicycle. We used to go by car.**

**DR. GARTNER:** This was general medical service?

**DR. FANAROFF:** This was general medicine, yes. Then you'd be on at night, and there was no phone in the room. When they wanted to summon you, the night watchman would come with his nightstick and bang on the window. We used to see terrible pathology. But it was a lot of fun. You know, those are the best days of your life.

**DR. GARTNER:** It's true. It's true.

**DR. FANAROFF:** And your learning curve is just so steep.

**DR. GARTNER:** Yes. Now, you didn't say anything about pediatrics in medical school. Did you have pediatrics?

**DR. FANAROFF:** Pediatrics, when I was in medical school, was part of the department of medicine. We had a pediatrics rotation at the Children's Hospital [Transvaal Memorial Hospital for Children - incorporated into the Johannesburg Hospital in 1978], and there were actually three excellent departments of pediatrics. There was the Transvaal Memorial Hospital for Children, which was run by 4 attendings, none of whom were full time, and then there were 2 full-time attendings, who were there, but they were not the chiefs. Then there was the Coronation Hospital, which was for coloreds and Indians, and then there was Chris Hani Baragwanath Hospital, which was for the blacks. The hospital had 18,000 deliveries, and just huge wards. And I'll come back to that, because that's going to be after I've graduated from medical school. We had a 5-week rotation in pediatrics, which was very good. The teaching was excellent. During medical school, I knew that I did not want to be a surgeon. I wasn't sure whether I was going to do internal

medicine or pediatrics, and started leaning in my senior year toward pediatrics, because at the time, there wasn't a lot you could do in internal medicine. Yes, there was insulin and there was cortisone, but if you had blocked coronary vessels you were doomed, and if you had a stroke, there wasn't anything that anybody could do for you. Neurology was an interesting diagnostic exercise, but then what did you do? Whereas, I felt that in pediatrics, you had children who had their whole lives ahead of them, and even though there were some terrible things, like leukemia that carried a fatal prognosis —

I need some water.

DR. GARTNER: Okay. I'm going to stop.

[Recording Interruption]

DR. GARTNER: We're back on, and we're still I think in medical school.

**DR. FANAROFF:** So we were in medical school, making a decision to do pediatrics. But, there were no mechanisms for really training in pediatrics a lot. When you graduated medical school, you had to do an internship in medicine for 6 months and in surgery for 6 months, which is what I did. I had really made up my mind that pediatrics was what I was going to do and had secured a job at the Children's Hospital in Johannesburg. I graduated in 1960, in December, so in 1961, I did 6 months in medicine, then 6 months of surgery. Then I had 6 months where I wasn't sure what I was going to do, so I went down to Durban, Natal [KwaZulu-Natal], and I worked in a hospital called Addington Hospital, which was really right on the beach. It had a small pediatric department. There was a professor, Harry [Henry Leonard] Wallace, who was a Scotsman, who ran the place. It was not a very good program. There were 3 residents and 3 registrars. A week after we started, one of the residents, a female, decided she wasn't going to work, so there were 2, and instead of the registrars picking up some of the slack, we ended up with alternate night call. Now, it was something I was already used to, because that's what we did in medicine and surgery, so alternate night call was nothing unusual. I got some training, but not very good.

But then in July of 1962, I started at the Children's Hospital, Transvaal Memorial Hospital for Children, and I was working for Seymour [Charles] Heymann. That's Michael Heymann's father. And he and Sam [Samuel] Javett were the leading pediatricians in Johannesburg. He was nominally

head of the pediatric department. There was no professor in pediatrics, as I said, pediatrics was under internal medicine. I got superb training there from him and from his partner, Sam Javett, who was the leading pediatrician. Sam Javett's mind was like a steel trap. He solved everything in algorithms. It was very clear. So let's say you had a child with hepatomegaly and eosinophilia. He would say, "Well, there are X causes of hepatomegaly. There are Y causes of eosinophilia. This is where they transect. Therefore if we do these tests, we will determine what the underlying problem is." And you'd get there. He was always able to cut to the chase.

We were seeing a lot of hemolytic-uremic syndrome at the time, and he kept telling the people that ran the Pathology Institute [South African Institute for Medical Research (SAIMR)], "There has got to be a bacteria or bacterial product that is responsible for this disorder." They were chasing the viruses all over the place and couldn't come up with the answer. As you know, the bacterial toxin was discovered. But he was a very fragile man. He'd had malignant hypertension, and he'd had bilateral sympathectomies, which was one of the treatments that they used for that, and he also had had a myocardial infarction, so he moved very slowly, but his words were always pearls.

I remember him coming in one night. It was one of his private cases. The kid was not that sick, and the father said to him, "Doctor, spare no expense. Do everything." And after the father stepped aside, he told me, "What you have to realize is that when they tell you, 'Spare no expense,' they're not going to pay you."

DR. GARTNER: [Laughs]

DR. FANAROFF: But they were wonderful days there. The Children's Hospital had approximately 100 medical beds. When I was there, there were 2 residents and a senior resident. The senior resident was really the registrar, so we were on alternate nights. My rotation was Monday, Wednesday, Friday, alternate Sundays, so that meant that every second week I started on Sunday morning, and I got off at 5:00 pm on Tuesday. In many respects, it was probably cruel and unusual treatment. You fell asleep sitting at a desk writing a note, you woke up, and you continued. Hopefully, we didn't hurt any kids, because in addition to being on just for the regular ward, every fourth night from 10 pm you were also responsible for the emergency department, so you admitted patients to yourself. The benefit

was that you really got enormous experience, and you were not afraid of doing anything. You were training in infectious disease, you were training in hematology, oncology.

Neonatology didn't exist. There wasn't a newborn unit. The premature babies were admitted to this one floor, and the head nurse there controlled whatever happened with these premature babies. They tended to be put in a little space where there were double doors to get to them, and she didn't encourage the residents to go there. The attendings used to write the feeding orders every day. They would be very complicated feeding orders because they weren't prepared formally, so those that worked on human milk would be getting a combination of things. Invariably, the premature infants were getting condensed milk or sweetened condensed milk, which, I don't know, must have had about a zillion calories per ounce. And then they would add a couple of drops of lactic acid to the formula. If you asked, "Why are you doing that?" they would say, "Well, because this seems to settle them, and they tolerate it well." But you weren't seeing any very immature babies. A lot of the small ones that survived were the small-for-gestational-aged infants. Across the road there was a maternity hospital with close to 4,000 deliveries, but we only got the babies after they were born. At the time I started as an intern there, there were no services being provided.

DR. GARTNER: At the maternity hospital.

DR. FANAROFF: At the maternity hospital. Later in my career, when I came back as a registrar to this hospital — but there's a lot of turf in between — I said, "This doesn't make any sense that the newborn babies belong to the obstetricians. The obstetric residents are responsible for them. They have no knowledge, they have no interest, they have no desire to do anything with them. Why don't we get involved?" I managed to persuade one of the attendings, so we would go over every day and examine all the newborns and record any of the minor abnormalities, et cetera. From it, I actually also started a little project on looking at babies with single umbilical arteries to see what was the pathology associated with that. I actually presented that at a national meeting. But neonatology in the early 1960s, just didn't —

DR. GARTNER: Didn't exist.

DR. FANAROFF: Didn't exist.

DR. GARTNER: What did they do with the preemies or sick babies who were in maternity?

**DR. FANAROFF: They transferred them over to the Children's Hospital.**

DR. GARTNER: Okay, so they didn't run a separate neonatal unit of any kind over there?

**DR. FANAROFF: No, no. There was a minor transitional care nursery, which in retrospect was for some of the late pre-term babies, but families were not in to visit the babies. The normal deliveries were staying for 7 days, the C-sections [Caesarean section] were staying for 10 days. The obstetric service bent over backwards not to do a Caesarean section, so the Caesarean section rate was in single digits, and every Caesarean was reviewed as to whether this could have been accomplished otherwise. It's a far cry from what we have today.**

DR. GARTNER: We've gone the other way.

**DR. FANAROFF: We certainly have.**

DR. GARTNER: You mentioned the babies were getting human milk in the preemie nursery. Many or just a few? How did they do that?

**DR. FANAROFF: Well, at the Transvaal Memorial Hospital, a few of them would get milk, but they would express it and it would be pasteurized. At Baragwanath Hospital, which is a whole other story — it's a little later in my career — we had two 40-bed premature wards. This hospital was an old army barracks, and so the wards had these pot-bellied stoves in the middle, and that's what we used to heat the ward. We had one incubator, but it was bad news if the baby went into the incubator. The babies were kept in bassinets. They were all wrapped in cotton wool. The mothers had to stay in an adjacent ward. They expressed milk, and we used pooled, pasteurized milk to feed all these babies. We had one sink in the ward, so we had little basins in between all the bassinets. Hand hygiene was meticulous. The people that set this up, Sam [Samuel] Wayburne and Eric Kahn, were fastidious about hand washing, and God help any med student, resident, or nurse who didn't wash before and after dealing with a baby.**

DR. GARTNER: That was good.

**DR. FANAROFF:** They would be severely rebuked. And the outcomes were actually quite remarkable. I know I brought the data when I came to the United States in 1969, and the survival rates were really very comparable for the low birth weight babies. Now, under a kilo [kilogram], nobody had good results. Nobody was trying very hard. But the most remarkable thing about Baragwanath Hospital is it was started, as I said, from an old army barracks around 1948, at which time the infant mortality rate in that region was 250 per thousand.

DR. GARTNER: Wow.

**DR. FANAROFF:** Within five years, with a set-up of what was called a drip room, an IV rehydration center, plus the premature nursery, that had dropped to 60, and within a decade it was down to 30. You don't need high tech to be able to very rapidly drop. Now, to get from 30 to 10, or to get like in the United States, from 7 to 5, that is a major undertaking. But the simple things can make a huge difference.

DR. GARTNER: Let's stop for a moment.

[Recording Interruption]

DR. GARTNER: I have another question. Were Transvaal and Baragwanath hospitals divided by racial groups?

**DR. FANAROFF:** Absolutely. Transvaal Memorial Hospital for Children was white only, Baragwanath was black only. Not any more — I mean, since the last, what, 12 years or so. But the quality of care was outstanding and was, in many respects, better at Baragwanath, because you had more full-time and senior staff there. But it was also really pretty weird. There were classmates of ours, who were now working as a team. We've got an attending, we've got registrars, we've got interns. Tea breaks are part of the lifestyle there, and so we stopped rounds, and would go to the cafeteria, and where we sat depended on skin color of the physicians. Those were the rules. You could not bend them, break them, et cetera. All the nursing staff at the black hospital would be black. All the nursing staff at the white hospital would be white.

DR. GARTNER: Did black doctors serve at the white hospital, at Transvaal?

**DR. FANAROFF:** No. No. Not allowed to. They were not allowed to set foot there. In fact, in my medical school class, one of our firm mates was an Indian gentleman, and he was, in fact, arrested because — It didn't take much to get arrested in those days.

DR. GARTNER: So you had black students in the university.

**DR. FANAROFF:** We had black students.

DR. GARTNER: In your medical school?

**DR. FANAROFF:** In our medical school class, yes, but they could only do their training at the black hospital.

DR. GARTNER: In the black hospitals. Hmm.

**DR. FANAROFF:** And when they graduated, they could see anybody. If a white person wanted to see them, that was fine, but not in medical school.

Now, we were also there during Sharpeville [Massacre], which is where there was a riot and a lot of people were shot. We were actually working at Baragwanath Hospital. And most of the gunshots were in the back.

DR. GARTNER: Hmm.

**DR. FANAROFF:** But that's all part of the infamous history.

DR. GARTNER: True. Did you spend any time in military service in South Africa?

**DR. FANAROFF:** No. When you were 18, you registered for the military, and if you were at medical school you were exempt — when I was 18. Subsequently, everybody went into the military, but our generation, they just let us carry on with our studies, which was very fortunate.

DR. GARTNER: Yes.

**DR. FANAROFF:** So I did 6 months medicine and 6 months surgery, then 6 months in Durban, then 6 months in Johannesburg. Well, when I finished the 6 months in Johannesburg, they asked me to stay on as a registrar, even though I was really pretty young. So I did another few months still at the



Transvaal Memorial Hospital for Children and was trying to make a decision of what career path to go. How could I best train? Life is a series of “what ifs.” So I decided to join the physiology department. I was going to teach physiology, and I was going to start studying to become boarded in internal medicine. I actually got an appointment in the physiology department, and then I got a call from the department of medicine at Baragwanath Hospital asking if I would come and do a registrarship there in internal medicine. I said, “Oh, this is too coincidental. That’s really what I want to do. I’m going to go and do internal medicine with a view to doing pediatrics.” I was going to have to go to the UK, Scotland or England, to do my boards. So I went to Baragwanath, and I started working in internal medicine.

I’m going to paint a picture just so that you get an idea. We had a male and female medical ward, each with 50 beds. I was the registrar, there was one other registrar, there were two attendings, and we had five interns. Every fourth day, we were on intake, so whatever was admitted to the medical service came to us. We might start the day with 4 to 6 empty beds, and we would take in an average of 50 to 60 new patients.

DR. GARTNER: A day?

DR. FANAROFF: A day.

DR. GARTNER: Wow.

DR. FANAROFF: And they would come in waves, so you were under the gun. Initially, what we would do is we’d put stretchers between beds, and then some of them who were less sick, the walking pneumonias, if you will, even though it was lobar pneumonia, would be put in chairs in the middle of the ward. By the next morning, the place looked like a battleground, because you’d started with 46, you added another 50, plus you had 50 on the other side, so you had about 150 patients to be seen, and you had to clear them out in the next three days. Now, a lot of it would be tuberculosis, and you’d be able to send them off to sanatoria, but it was a huge challenge.

The good news was that pneumonia responded very well to penicillin, and one good dose of penicillin, and they were mended and better. But we were seeing the whole spectrum of disease, everything that was in the textbook, some things not yet in the textbooks. There was a condition called mental confusion that was a total mystery. These absolutely healthy looking mine workers or non-mine workers would come in, and they would be labeled as

**confused, and you could find absolutely nothing. None of the tests were abnormal, and some of them would die, and at autopsy we would find nothing. We suspected that there were toxins. We never found them. We suspected that there was some witchcraft, because many of them would have the signs of having visited the witch doctor. But it was a very disturbing set of patients to take care of.**

DR. GARTNER:     Hmm. Were there many of these?

**DR. FANAROFF:   Regular basis. We used to have to put a label on their forehead, you know, “If found, return to such-and-such a ward.”**

DR. GARTNER:     My Gosh! That’s strange.

**DR. FANAROFF:   Also, there was a paraplegic ward, and most of the paraplegics were the result of stab wounds. It was excellent training in internal medicine. I was learning a lot, but I did not really enjoy the work environment, it was just a challenge. So in 1964, my current brother-in-law, another friend and I decided to travel for six months. We started in Israel. We had 3 weeks there, and we went through Greece, Italy, Belgium, Holland, France, and arrived in England, by which time I was restless, and I was ready to settle down. So I started a course at the Hospital for Sick Children Great Ormond Street [Great Ormond Street Hospital for Sick Children], and I did the Diploma in Child Health from the Royal College [of Physicians], and then in April of 1965, it must have been — I can’t remember.**

DR. GARTNER:     1965?

**DR. FANAROFF:   Either 1964 or 1965. I did the membership at the Royal College of Physicians up in Edinburgh, using pediatrics as my subspecialty.**

DR. GARTNER:     What did you have to do there to be eligible?

**DR. FANAROFF:   You could just enter the exam.**

DR. GARTNER:     Oh, just the exam.

**DR. FANAROFF:   Yes. But the exam was pretty challenging in that two-thirds of the people didn’t pass.**

DR. GARTNER: This was just a written exam or an oral?

**DR. FANAROFF:** It was written, clinical and oral, all three components. The written exam had mainly essays. In fact, they were all essays. The way that they knocked out a lot of the delegates was as follows. If you'd asked any of them in the room — and two-thirds of them came from India and Pakistan, and they would memorize the textbooks — so if you asked them, "What are the complications of aspirin therapy," they'd recite r[']s The Pharmacological Basis of Therapeutics – Laurence L. Brunton, John S. Lazo & Keith L. Parker] back to you. Instead, the question that they posed to us was, "Aspirin should be removed from the pharmacopoeia. Discuss."

DR. GARTNER: [Laughs]

**DR. FANAROFF:** Which is really, in other words, saying what are the benefits and what are the risks of aspirin therapy? But that's not in Goodman and Gilman's.

DR. GARTNER: No.

**DR. FANAROFF:** So —

DR. GARTNER: [Laughs] Clever.

**DR. FANAROFF:** My clinical examination is indelibly imprinted in my mind. My adult patient, long case, was a woman who was an epileptic, who'd had a seizure, who'd aspirated, who had a lung abscess. She had hepatomegaly, and just, by the way, she had sub-acute combined degeneration. And this was all detected during a 45-minute history, physical, and then grilling by the people.

For the pediatric cases, I traveled by train from Edinburgh to Dundee. That's where the examination was held. My long case there is also very memorable, because they gave a card that said, "This 9-month-old has delayed milestones." And the kid didn't look typical of anything, but was clearly delayed. The head was not particularly small. So we got into a discussion of what the possibilities were, and we talked about prenatal, intrapartum and postnatal, and then we got back to the prenatal, and he asked, "What do you have in mind?" I said, "Cytomegalovirus." And he said, "What would you do?" So I said, "I'd look at the urine." He said,

**“Come, let’s go.” And there, for the first time, I saw an owl’s eye. So that was good.**

**They then post the examination results, I think about two days after you finish, and you get a lot of ecstatic people, and you get a lot of very sad people. I was in the ecstatic group. I then went back to London and worked there in locum [tenens] positions for almost a year. I worked at St. Mary’s Hospital, I worked at the Princess Louise [Hospital – closed in 2006], Kensington, and I worked at the Middlesex Hospital [the facility closed in 1994 and services were moved to University College Hospital], where I had a really nice job. Usually if you did the locum, you would be appointed to the registrarship. The attending was a terrific guy. He came in one morning and said, “Fanaroff, my boy,” he said, “I just had a call from Professor Sir Alan Moncrieff. His son wants to do pediatrics.” I said, “Ah. I get the message.” His son was going to be coming to the Middlesex. So I went back to talk to Thomas E. Oppe, who was the head at St. Mary’s, and he said, “Why don’t you go to Denver? They have a great program there.” And I said, “Denver? No, I’m going back to South Africa.”**

**DR. GARTNER: [Laughs]**

**DR. FANAROFF: “I’m going to go and find me a wife. I’m going to go work in South Africa.” I’d always made a commitment to myself that I was not going to get married until I’d done my training. I’d watched some of my colleagues who had gotten married the day they’d finished medical school, and the pressure on the family was really just enormous. So I packed up, and I went back to South Africa, and I started working at Baragwanath with Sam Wayburne in the neonatal unit there. Now, we had no ventilators. We could do a blood gas, but it took five ml [milliliters].**

**DR. GARTNER: What year was this that you went back?**

**DR. FANAROFF: This is now 1966.**

**DR. GARTNER: Okay.**

**DR. FANAROFF: And so we started studying temperature on admission and outcome in these low birth weight babies, and showed that hypothermia was not good, which confirmed what people were writing about. There wasn’t a lot we could do. These were deliveries that were occurring**

unattended in the fields, and these babies were being brought in cold. The lowest I had was a kid who came in with a temp of 81[Fahrenheit].

DR. GARTNER: Whew!

DR. FANAROFF: The kid actually survived, remarkably enough. We used to warm them slowly. We'd also seen a lot of cold injury in the adults when I was doing internal medicine there.

DR. GARTNER: Did you have incubators at that time?

DR. FANAROFF: No, we had one incubator.

DR. GARTNER: Still just one.

DR. FANAROFF: We warmed them with cotton.

DR. GARTNER: Near the stove.

DR. FANAROFF: And the ward was warm. I mean, you were sweating when you were in the ward. You know, South Africa's got a great climate.

DR. GARTNER: Yes.

DR. FANAROFF: So in the summer, when you've got a pot-bellied stove going —

DR. GARTNER: It's hot.

DR. FANAROFF: It's pretty warm. We actually presented this work on low birth weight and hypothermia, as we called it, at the South African Paediatric [Association] Congress. Millie [Mildred T.] Stahlman was the invited guest to the conference, and so I got to meet and talk with Millie. It's either at that conference or another one in Johannesburg where Vincent [C.] Harrison presented his work on grunting. This was some of the classic work in which he showed that grunting increased oxygenation, and that if you intubated them and stopped them from grunting, their PaO<sub>2</sub> fell. The paper was entitled, "The significance of grunting in hyaline membrane disease." [Harrison V C, Heese H de V, Klein M. (1968) *Pediatrics* 41: 549–559] That was the precursor to [George A.] Gregory's big breakthrough in the use of CPAP [continuous positive airway pressure]. Vincent was part of the group

**in Cape Town. The Cape group was really very good, and in some ways ahead of their time in that they were ventilating babies. They were one of the first groups to be ventilating babies. Pat [Patrick Montrose] Smythe was the one who'd initiated it for neonatal tetanus. We used to see a lot of tetanus, and so these were bigger — these were term babies. It was about the time that chlorpromazine came out, and they were starting to finally get some survivors from neonatal tetanus, which is your big interest to history.**

**DR. GARTNER:** I have an interest in that. It's true. [Laughs]

**DR. FANAROFF:** The history of tetanus. Then Max Klein and Harrison, Atties [F.] Malan and Boet [Hans de Villiers Heese] — which was the team in Cape Town — started ventilating babies with hyaline membrane disease. And Vincent and Atties both spent time with Millie Stahlman in Nashville, so the connection was made there.

**DR. GARTNER:** What kind of ventilators did they use?

**DR. FANAROFF:** They used Bird's [Products Corporation, invented by Forrest Bird] and Bennett's [now Puritan Bennett]. The Bennett was a big problem, because the Bennett had a minimum volume when you turned it on of 200 ml. So you needed less than a full turn-on, because you wanted it somewhere around 20 ml. That's what you were looking for. And so pneumothoraces occurred in probably half the babies that were receiving assisted ventilation. But the understanding of the significance of grunting really was the big thing that came from there.

And then the other important work related to the newborn that came out at that time came from Christiaan [Neethling] Barnard who did the first heart transplant. He worked with the surgeon in Cape Town, Jannie [H.] Louw, and he was able to reproduce atresias of the bowel by clamping mesenteric vessels and showing that ischemia is part of the mechanism of producing these gut atresias. That was all that same national meeting.

**DR. GARTNER:** And this was in the 1960s, late —

**DR. FANAROFF:** This was in the 1960s. Now, I was still at Baragwanath Hospital, and then I transferred to Transvaal Memorial Hospital for Children as a registrar and was working again with Seymour Heymann and Sam Javett. Then in probably 1967, they appointed the first chair in pediatrics in Johannesburg, and that was Boet de Heese.

DR. GARTNER: What was his name?

**DR. FANAROFF:** His name is Boet — B-O-E-T — de Villiers Heese — capital H-E-E-S-E. He was a neonatologist and nutritionist, and he was very friendly with Paul [R.] Swyer and Leo Stern. We'll come back to that. Anyway, when he came for the first time, he was going to organize the department so that there would be subspecialists. Before that, everybody did everything. So you did cardiology, you did hepatology, you did infectious disease. He was going to introduce the American way of subspecialties.

I told you, I had already, shortly after I started there, started providing service at the maternity hospital, and I used to go over to Queen Victoria Maternity Hospital every day and examine all the babies. I was also available for resuscitations. The resuscitation unit that I used was called a Blease Samson [resuscitator], B-L-E-A-S-E Samson, and it was made by an anesthesiologist by the name of [Heyman Harold] Samson. When you looked at it, it looked like a bulb suction unit with a little mask at the end, but you could also attach an intratracheal tube to it, and it came with it. So, you could start off by bag and mask, and if that wasn't doing the trick, you intubated, and you had the same little bulb to ventilate them. He wrote that up in the *Lancet* at about that time. But relatively speaking, they called us very seldom. It was usually after the fact. Asphyxia was prevalent. Mid- and high forceps was not uncommon, so traumatic injuries were not uncommon. But it was enjoyable going over there, and they really appreciated it. The obstetric residents were absolutely delighted.

DR. GARTNER: So that was the beginning of your real commitment to neonatology.

**DR. FANAROFF:** That was the beginning of my commitment to neonatology. And then Heese came, and he said, "You should go and do a fellowship."

DR. GARTNER: Who was this? Who came?

**DR. FANAROFF:** This is the chairman. He said, "You should do a fellowship with Paul Swyer in Toronto. So I wrote to Paul, as did he, and Paul said, "Yeah, fine, you can come and do a fellowship." Meantime, I got engaged, and I got married in September 1968, so we were going to go and do a fellowship in 1969. And then Paul Swyer wrote back and said, "I'm sorry,

you'll have to come the following year, because my fellows are staying on, and I don't have funding." So I picked up *The Journal of Pediatrics* that month, in which all the fellowships in neonatology were advertised. So I sprayed off a bunch of letters and heard back. Millie offered us a job immediately. She had met me and remembered me, and Roz said, "I ain't goin' to Nashville."

DR. GARTNER: [Laughs]

DR. FANAROFF: I then got a very warm letter from Marshall [H.] Klaus in Cleveland. We had no idea where Cleveland was. We had no idea where Ohio was. We looked it up in the *Encyclopaedia Britannica*, and it said, "Seventh largest city in the country." Showed this big lake. It looked very nice, and so I thought, "Okay, this is a good possibility." [Arnold] Jack Rudolph in Houston said, "Come, but I'm not sure I've got funding." Nick [Nicholas M.] Nelson said, "You can come, but bring your own money."

DR. GARTNER: [Laughs]

DR. FANAROFF: The [Johns] Hopkins [University] and Yale [University] people said, "Don't call us, we'll call you." Peter [A. M.] Auld in New York offered me a position. Roz and I thought it would be too tough to come to the US and start in New York. We were country bumpkins, and we thought we shouldn't be in New York. Maybe right, maybe wrong. I'll never know. We didn't hear from Stanford [University], so I accepted the position here in Cleveland. A couple of months later, I got the letter from Stanford with an acceptance. There'd been a shipping strike, and they'd sent the letter surface mail.

DR. GARTNER: Oh, dear.

DR. FANAROFF: So that's serendipity, you see?

DR. GARTNER: Yes, yes.

DR. FANAROFF: That's fate.

DR. GARTNER: Yes.



**DR. FANAROFF:** And so Toronto was out. We were coming to Cleveland [Case Western Reserve University]. And then we discovered that my wife would be expecting a baby.

**We need to stop for a second.**

[Recording Interruption]

**DR. GARTNER:** Okay. We're back on camera and on recording. I'm not sure exactly where we left off.

**DR. FANAROFF:** I think we were looking at options for fellowship.

**DR. GARTNER:** Yes, that's right.

**DR. FANAROFF:** So we elected to come to Cleveland. The thinking was that this was a one-year fellowship, which is what the appointment was. We were happy. This was going to be an adventure. We knew nothing about the politics of Cleveland. It had the first black mayor in the country at the time, Carl [Burton] Stokes, and we were all excited. Then we learned that we were going to be having our first child in July, and I was expected to start the job in July. But being young and innocent, we didn't think very much about it. I did write to Marshall Klaus and asked, "How much does it cost for a day in the hospital?"

[Recording Interruption]

And he said, "\$144." And I thought he had misplaced a decimal, because in South Africa \$10 a day is what you paid in private hospitals. But we anticipated that everything would be fine, which was anticipating wrongly, because Jonathan was born with a bad case of iatrogenic meconium aspiration syndrome. I saw it happening. I couldn't prevent it. Anesthesia gave pressure without first clearing the airway.

**DR. GARTNER:** Ooh!

**DR. FANAROFF:** He was very, very sick. We did not have ventilators in Cleveland at the time, but he was in 80-plus percent oxygen, and he had an umbilical line in place. Had it been ten, 15 years later, he would have been on the whole gamut, including assisted ventilation, probably nitric oxide, if that were available. He was hospitalized for three weeks. I didn't have the

**cash to pay for that length of hospitalization, but fate took a kind turn, because I was actually appointed as chief resident, not as a fellow.**

**DR. GARTNER:** Ah.

**DR. FANAROFF:** And the hospital rules stated that chief residents had health coverage from the first day, and he was born on the fifth of July, so we had coverage, and his 3-week sojourn in the intensive care unit was all covered. It was very traumatic for us. You can't imagine what it's like not knowing anybody, not having a support system, and to have a critically ill baby. But strong steel is made in the fires, and I think it made Roz and me, in the long run, better and stronger people. It certainly gave me a different perspective on what it's like to be a parent in the intensive care unit. And I hope that over my career, I've been able to translate that into better caring for, and on behalf of the families. I think you learn a lesson from everything. It's a hard lesson to learn.

**DR. GARTNER:** Right.

**DR. FANAROFF:** But it does make you a better physician.

**DR. GARTNER:** I'm sure it does.

**DR. FANAROFF:** Now, Carol [Carol B. Gartner] had asked where I met Roz.

**DR. GARTNER:** Right.

**DR. FANAROFF:** Roz is the sister of a good friend of mine's wife, and so I had met her over the years. She was younger. She's 7 years younger than I am. She was dating somebody at the time that I met her, but then we started dating, and we had an on-off-again romance. I was ready to settle down, she wasn't. We went our separate ways for a while, because I had reached a stage where I said, "It's now or whatever." Not necessarily never. And then we got together again, and a month later we got engaged and married.

Now, there's a little drama related to the wedding. My father was diagnosed with metastases from colonic cancer a month after we got engaged. Our wedding invitations were out, and we were meant to get married the 15th of September, but ten days before the wedding, I came to my future in-laws, and I said, "He's not going to make it. We need to bring the wedding

forward a week.” My mother-in-law went into near panic, but Roz and I said, “Look, we know who’s been invited. They’re all coming. We have the temple. We have the hall. We have the band. Everything else can happen a week earlier.” So we called everybody and said, “Same venue, just a week earlier.” He was given some steroids by his physician, and he was there, and he died on the 15th of September.

DR. GARTNER:     Hmm.

DR. FANAROFF:    So we did have a happy wedding. Our photographer didn’t have any film in his camera, so —

DR. GARTNER:     [Laughs] Oh, dear!

DR. FANAROFF:    The recording of the wedding is very limited. It was something to that effect. We had 4 pictures from the wedding.

DR. GARTNER:     Oh, dear. But they’re in your head. [Laughs]

DR. FANAROFF:    And we’re still married 40 years later.

DR. GARTNER:     Good.

DR. FANAROFF:    Which is good. Jonathan was born in Cleveland, and I started my fellowship. It was really remarkable, because in South Africa medicine is based on the British system. It’s a very dictatorial mode of teaching. Juniors would never challenge a professor. You may ask why, but you would never directly challenge a professor. I arrived here and found a much more Socratic method, and I also found young residents and medical students challenging the professor. In fact on one occasion, there was an interchange as follows. Marshall, who is an absolute expert on surfactant, because he’d done some of the original work on the structure of surfactant, made a statement, and this medical student who happened to have a PhD in biomedical engineering, said, “That’s bullshit.” And I looked, because in South Africa that would have been the last day that this person was at medical school. And Marshall calmly asked “Why did you say that?” And he made his point, and Marshall said, “Well, you’re wrong and for this reason.” He very calmly took out a piece of paper and drew everything down, and they had an amicable discussion. And I walked away from that scratching my head, because this was something totally new.

It was also the era of the Vietnam War, and the med students were very rebellious. In fact, there was a group at Case Western Reserve University School of Medicine who refused to go to class, who refused to take the exams. They wanted to self-study and do examinations when *they* wanted to do it, and they wanted to be taught by whom *they* selected. I mean, this was a very bright group of 7 or 8 who graduated very successfully and went on to have very successful careers.

But it was an eye opener for me to see this different approach and also to see a greater depth of study on particular situations. There was a small faculty, but they were really very elegant and very nice to work with. John [H.] Kennell, who is one of the great people in developmental pediatrics, was on the faculty, and there was a metabolic expert by the name of Tom [Thomas M.] Teree, who introduced me to some of the inherited disorders of metabolism, especially the hyperammonemia syndromes. We had a couple families that we grappled with. I wish we had the knowwithall that we have today, because it was very sad to watch full-term babies, vigorous, turn yellow and lethargic and go into a coma as they were fed and as the ammonia levels went into the thousands.

My fellowship began with Marshall presenting me with a challenge that the previous fellow had started on, and that was that they suspected there were some tiny babies who were losing excessive amounts of fluid through the skin. So what we did was we measured evaporative water loss by weighing these babies using a Mettler [Toledo] balance. The studies went very well when they weren't sabotaged by some of the nurses. You would say, "Look, for the next 6 hours we're not going to give any meds unless you weigh them." And they would come and give shots and stuff, and they hadn't weighed them. That would ruin a 6-hour study.

But we did establish that there was a dissociation between water loss through the skin and metabolic rate, something that had not been recognized before, until I presented it at the Society for Pediatric Research in Atlantic City. Larry [Laurence] Finberg stood up and said, "That is absolute rubbish. That cannot be true. They cannot sustain metabolic rates with that amount of transepidermal water loss." And I calmly said, "We're saying there's a dissociation. They're losing water, and it's unrelated to what the metabolic rate is. It's a reflection on the immaturity of the skin." And it has been subsequently confirmed.

**But it was a terrific experience doing the research, presenting it at the PAS [Pediatric Academic Societies] at a time when there weren't a million meetings going on, so when you stood up on the platform there was a room full of people, a room full of very critical people, and it was a great atmosphere and a great learning experience.**

**I also had the pleasure at the first Pediatric Research meetings that I went to in Atlantic City to listen to the speaker at the newborn dinner. That was Bill [William A.] Silverman giving his classic talk on thermal regulation and the history of thermal regulation.**

DR. GARTNER: At the newborn dinner?

**DR. FANAROFF: At the newborn dinner.**

DR. GARTNER: In Zaberer's Restaurant [in Egg Harbor, NJ].

**DR. FANAROFF: At Zaboras, with about 200 people there at the time. That newborn dinner, as you are aware, grew until it became unmanageable and had to be stopped.**

DR. GARTNER: I know. I ran them for a number of years. [Laughs] Too bad. They were fun.

**DR. FANAROFF: They were.**

DR. GARTNER: No question. Atlantic City was fun. Well, was this the first time you did research in a formal sense?

**DR. FANAROFF: It was the first formal research that I had really done. I had written some papers, I'd written some case reports, I'd put together a series of patients with absent umbilical artery, but this was really the first time that I had done something in which I was measuring something in a baby.**

**Now, during that time, too, I had a wonderful experience. We had no mechanical ventilators, and somebody came into the office and said to Marshall, "Here, I've just built this new ventilator. It's ready for prime time. It's ready to be used on babies." And Marshall said, "We don't use anything on babies that we haven't tested out." We set up something in the**

**Polymer lab and showed that this ventilator indeed could be used to ventilate a baby, *if* you only wanted every second breath to be giving them some air.**

**DR. GARTNER:** [Chuckles]

**DR. FANAROFF:** With alternate breaths, there was absolutely no air flow whatsoever. In fact, it looked like it was sucking air *out* of the lungs.

**DR. GARTNER:** Oh, dear.

**DR. FANAROFF:** So that ventilator didn't make it. I switched, after doing the work on evaporative water loss. There was a perinatologist by the name of Silvio Aladjem, originally from Argentina, who was doing placental biopsies, and we started collaborating to see whether there was a relationship between the placental biopsies and the clinical condition of the baby. We actually showed that by looking at the placenta using a phase contrast microscope, and looking at the vascularity of the villi, and looking at the amount of glycogen and edema of the villi, you could predict which babies would get respiratory distress syndrome [RDS]. That, too, was presented at PAS, with equally cynical comments from the pathologist, Bill [William A.] Blanc, from —

**DR. GARTNER:** Columbia [University].

**DR. FANAROFF:** — Columbia, who said, “Your problem relates to sampling. How do you know that you've got adequate sampling?” My response was, “I agree with you absolutely. In the placenta, you may take from one area and it's absolutely normal, in another area it's not. However, we still found a correlation.” So even with the limitation of sampling bias, there was something that could be learned from the placenta and related to respiratory distress syndrome. Obviously, it wasn't practical. Silvio moved on, left Case Western, and I did not pursue that roll. But Irwin [R.] Merkatz came from Cornell [University] to Case, and he and I then started working on regionalization.

Now, I should mention that during my fellowship, I had the opportunity to meet Jim [James M.] Sutherland from Cincinnati. Jim is really one of the unsung heroes of maternal-fetal neonatal-perinatal medicine, because Jim was really in on the ground floor. He made some of the key observations related to the chloramphenicol disaster. He'd also done the key work on vitamin K deficiency and the relationship to hemorrhagic disease of the

newborn. But above that, he had built an empire in Cincinnati. When we in Cleveland had 2 attendings, they had 13 in Cincinnati. We met with them to discuss regionalization in its most primitive form in that the major centers would go out to the smaller centers to educate the people in the care of the newborn. We set up a series where at least 2 attendings would go, so one from Cincinnati, one from Cleveland, or one from Columbus, one from Cincinnati, but each place was double-teamed. We had a syllabus that was very basic. It covered oxygenation, thermal regulation, prevention of infection, and feeding. We would put on a one-day course at some of the hospitals where we might have six people in attendance, but we were trying to get the grass roots involved and aware.

At the same time, Marshall and I taught a course in Cleveland for practitioners, one day a month for about 6 months. They had to come with their nurse. We were committed to teaching them theory, but they would also get hands on, so they would resuscitate models. They would put lines into placenta. They would learn how to apply the [intracardiac] impedance monitors, how to measure a blood gas and to interpret a blood gas, et cetera.

DR. GARTNER: These were hospital-based physicians or practitioners?

DR. FANAROFF: No. These were practitioners who were out in the community. For example, a practitioner in Oberlin was the one who was being called to the hospital. There was no neonatologist. Morris Dixon from Wooster. We had the group from Lake County. The people from [Primary Health System (PHS)] Mt. Sinai Hospital [Medical Center (closed in 2000)]. So this became a very nice course for these people. We then decided that we'd put this on on a regular basis, but that we would invite some other lecturers.

At this time, we also made a decision that we were going to write a book, which turned out to be *Care of the High-Risk Neonate*. In outlining this book, we met with the division of research and medical education [the Office of Medical Student Research] at Case, so they gave us a little help in terms of secretarial support. We outlined the book, and we started this course, and we invited Gerry [Gerald B.] O'Dell from Hopkins. Gerry came and gave some talks, and we said, "Now, wait a minute. This is strange. We do things one way, he does them another, and we both seem to get the same results." This was in the anecdotal era, before we had evidence-based medicine.

For example, Gerry never used sodium bicarbonate to correct acidosis, we were. He was saying the underlying cause was hypoxemia — correct the hypoxemia. Well, we weren't that good at correcting the hypoxemia. We didn't have ventilators at the time. He also said that phototherapy was dangerous, and we were using phototherapy. So we realized that if we were going to write a chapter, we couldn't be very dogmatic. We then had Leo Stern come and give some lectures, and Leo was even more controversial than Gerry O'Dell. So we sat down, and we said, "You know what?"

[Recording Interruption]

**DR. FANAROFF:** So Leo was even more controversial. We decided that in the chapters we should put in the contrary point of view. So in the absence of evidence, each could put what they would like, and we added comments. We also felt that people liked to learn from cases, and so we introduced cases with new material at the end of each chapter. This made the reading of the chapters that much easier, and it changed the pace. We started this work probably in 1971. Marshall went on sabbatical, and he spent some time in Switzerland with Sam [Louis-Samuel] Prod'hom, and so our first 3 commenters were Gerry O'Dell, Sam Prod'hom and Leo Stern.

Now, where there was evidence, then we stated it. For example, there was no doubt that keeping babies warm saved lives, so we could present the evidence that Silverman and others had accumulated. It became interesting doing it this way. People liked it. And before we went to a publisher, we tested it on the residents. We had them read through it, and we field tested it with some of the people who had done the course with us. It, in fact, became the course material.

Then, who was going to publish it? The division of research and medical education wanted to publish it out of Case, but Marshall and I thought we should go beyond that, and so we did an experiment. We went into our colleagues' offices and said, "Let me see your book collection. Which publisher seems to be doing the best job?" We sent it, actually, to a few publishers. Lea & Febiger [sold to Waverly, Inc. in 1990, in 1993 placed under the Williams & Wilkins name] said, "We like the content. We don't think there's a market."

**DR. GARTNER:** Oh, really? Well, they were wrong. [Laughs]



**DR. FANAROFF:** [W. B.] Saunders [Company] [now Saunders and part of Elsevier, Inc.] said, “We like it. We’d like to publish it.” They were already doing a series of books which sort of related to neonatology. Mary Ellen Avery had one on pulmonary disorders. [Marvin] Cornblath and [Robert] Schwartz had one on hypoglycemia. David [W.] Smith’s book came out on malformations. They didn’t want it in that series, but they were willing to publish it. The 1st edition of the book was published — I’m not sure. You can tell me from my CV [curriculum vitae] — in either 1973 or 1975 [first edition published in 1973]. I do know it cost \$15.

DR. GARTNER: It’s a wonderful book. I remember it well.

**DR. FANAROFF:** It went over very well because it was very easy to read. It had a lot of practical material.

DR. GARTNER: Right.

**DR. FANAROFF:** And because we also added practical hints into each chapter.

DR. GARTNER: It’s a really good book. To this day, it’s a good book.

**DR. FANAROFF:** I’m actually working on the sixth edition at the moment. It doesn’t get easier.

DR. GARTNER: No. [Laughs]

**DR. FANAROFF:** Chapters take a lot of time to write, and in the academic process, they’re the lowest reward. But it’s really been a terrific ride with that book, and I think there’s nothing more gratifying than for somebody from Brazil, or Venezuela or Argentina or Iraq to come up to you and say, “You know, you were my only companion during the night that I was on call in the intensive care unit.”

DR. GARTNER: I can see that. Was that the first book on neonatal intensive care?

**DR. FANAROFF:** I don’t really know the answer to that. I think the first book that was devoted to neonatology was Alex [Alexander J.] Schaffer’s book, which was entitled *Neonatology*.

DR. GARTNER: That's true.

**DR. FANAROFF:** In fact, he coined the term “neonatology.” But I don't know that he had much in terms of practicalities, and I don't think that he had intensive care, but I would give him credit for the first book. Once our book came out, there were a flurry of other books that came out. Gerry [Gerald B.] Merenstein and Lillian [R.] Blackman had a book. Books by Jay [P.] Goldsmith and Ed [Edward H. Karotkin] also came out. They all looked very similar, but we've been lucky that we've been asked to revise it, and revise it and update it. As I said, we're going into the 6th edition, and my son is going to help me. He will be the co-editor, because Marshall is really retired and doesn't want — I'm not going to say any part, because he'd still like to update the care of the parents. Although things change, they don't change that much in that arena.

DR. GARTNER: So will the book be Fanaroff and Fanaroff?

**DR. FANAROFF:** It'll be Klaus and Fanaroff, edited by Fanaroff and Fanaroff.

DR. GARTNER: Oh. It's a great book. You did a good job.

**DR. FANAROFF:** Well, thank you.

The next book that I got involved with — Dick [Richard E.] Behrman became chairman in Cleveland after LeRoy Matthews, and Dick's father-in-law was Waldo [E.] Nelson.

DR. GARTNER: Yes.

**DR. FANAROFF:** Dick was starting to take over Nelson's [*The Textbook of Pediatrics*] from Waldo Nelson. He'd written a book called *Neonatal-Perinatal Medicine* and had taken it through 2 editions. It was very nice. He'd used most of the people in Illinois where he'd been the chair, and Columbia [University], where he'd been the chair, as well. But it was just okay. It wasn't spectacular. He called me in and asked me, “Would you like to take over this book?” And I said, “Thank you very much, but I have Klaus and Fanaroff [*Care of the High Risk Neonate*], I'm busy. I've got some research that we're just starting to put together, this huge trial on regionalization, and no, thank you.” About ten days later, he called me back in again and asked, “Would you like to take over this book?”

DR. GARTNER: [Laughs]

**DR. FANAROFF:** And I gave the same response.

DR. GARTNER: Right.

**DR. FANAROFF:** When he called me the third time —

DR. GARTNER: [Laughs]

**DR. FANAROFF:** — I realized that he wasn't asking if I wanted to do it. It was a matter of, "Yes, sir, I'd very much like to take this over. But I can't do this alone. May I use the others in the division?" Around about that time, the other members of the neonatal division included Maureen Hack, Richard [J.] Martin, Bill [William B.] Pittard and Bob [Robert M.] Kliegman. Only Richard was interested. In fact, he stepped forward and said, "I would like to be involved." The others said, "No, we don't want to be involved." So I said, "Fine." So Richard and I took over in the 3rd edition [*Behrman's Neonatal-Perinatal Medicine*], and we're currently working on the 9th edition [*Behrman's Neonatal-Perinatal Medicine: Diseases of the Fetus and Infant*]. Chapters are coming in even as we speak. Every time the e-mail dings, it's to announce that another chapter has arrived. It's now two volumes, it's about 1,800 pages, and it's a real tour de force. We've been blessed to have great contributors and an in-house editor. One of our research nurses, Bonnie Singer, is just an absolute godsend. She is so talented. After a while, when you read something, you don't see everything, whereas she comes with fresh eyes and will find typos, and errata, and things transposed, and all sorts of things that we've read and not picked up on, and so she is our in-house editor.

Ethics was not an issue when we first started. It's now important, so we've also tried to keep abreast of that. And medical-legal has been added. Because of the globalization of medicine, we now have international chapters. The pathophysiology of all the disorders has undergone dramatic changes. We try to change between 20 to 25 percent of the authors in each edition to get a fresh look to a topic, and we've called on a lot of our European colleagues to do this, so it's been a terrific collaboration. It so happened that the 3rd edition, which is the first one that Rich and I did, got the American Medical Writers [Association] Award as the Book of the Year [Medical Book Awards].

DR. GARTNER: Oh, very nice.

**DR. FANAROFF: I don't know what we did differently. I think it's interesting, as we've now merged into reading and getting information online, that people still want textbooks. The textbook includes a CD that contains all the tables and figures. I anticipate that in the future you'll be able to have vignettes with movies and cases, et cetera, and I think it'll be a good way of learning.**

DR. GARTNER: But it's still selling as well as it has in the past?

**DR. FANAROFF: It sells at a steady pace, yes. I mean, you're not going to get rich from writing medical textbooks, but the book sells somewhere around 6,000 copies an edition.**

DR. GARTNER: That's quite impressive.

**DR. FANAROFF: Which is very nice.**

DR. GARTNER: It's a really fine book.

**DR. FANAROFF: Let's get the books all out of the way.**

DR. GARTNER: Okay.

**DR. FANAROFF: In 1986, Year Book [Medical Publishers – now published by Elsevier Health Sciences] approached Marshall and said, "We'd like to add to the Year Book collection a book on neonatal-perinatal medicine," and so he said, "Yeah, Av [Avroy] and I would love to do it." [Year Book of Neonatal and Perinatal Medicine]**

DR. GARTNER: [Chuckles.]

**DR. FANAROFF: So we started then, and then after a few years, he said to me, "I'm done," so I added David [K.] Stevenson and Jeff Maisels, and they have just told me that they're done.**

DR. GARTNER: [Laughs]

**DR. FANAROFF:** So we're revising the editorial board. Joe [Joseph] Neu, Michele [C.] Walsh, Steve [Steven M.] Donn, Rich [Richard A.] Ehrenkranz and Jon [Jonathan] Hellmann are all going to help with it. But it's been a really interesting phenomenon. It's been very frustrating in that I've not had the same editor for two years in a row recently. There's a lot of turnover in the —

DR. GARTNER: Right, Yearbook.

**DR. FANAROFF:** — in the book industry. The other thing is that the Klaus and Fanaroff was published with Saunders, who got bought by Harcourt, who got bought by Elsevier.

DR. GARTNER: Oh, that's right.

**DR. FANAROFF:** *Neonatal-Perinatal Medicine[: Diseases of the Fetus and Infant, 2-Volume Set]* Fanaroff and Martin's book was published by [The C.V.] Mosby [Company]. Mosby got bought over by Elsevier. Year Book got bought by Mosby, and it got bought by Elsevier. So Elsevier now —

DR. GARTNER: Is doing all of this.

**DR. FANAROFF:** — controls everything, and there's just huge turnover there. It's difficult to get a relationship with an editor. But the Year Book is what's really helped me to keep abreast, to read articles that I would normally not see. It's the only time that you can write and free associate. Without going wild, you can really "vent the spleen," as Bill Silverman would say. It's nice to be able to have the freedom to do that. Predicting the future is impossible, but you do see articles which really show we're really breaking through. This is a new barrier that's opening up. It's exciting to look back and say, okay, in 1987, which was the first volume, where were we with surfactant and where are we today? Who knew about SP-B [surfactant protein B] and all its role or SP-A [surfactant protein A], and what about the ABC [transporter] [ATP cassette binding transporter], 1s through 8s, et cetera? It's really fascinating. The whole unfolding of the human genome and explaining what used to be mysterious makes our life so interesting and rewarding.

DR. GARTNER: Indeed. Yes. Good. How much of the writing in the Year Book do *you* do?

**DR. FANAROFF:** I've taken a major load in that. There are 200 articles that we review each year. When Jeff Maisels and David Stevenson were co-editors, they were responsible for 60 each. I was responsible for 80. I would invite somewhere around 15 to 20 contributions. I would do the rest, myself. From November through February, this is what I would be doing every year. We'd go on vacation, with the Internet, with the access to the libraries. As long as you've got your computer, you can be working, and that's how I do it.

DR. GARTNER: That's right.

**DR. FANAROFF:** But about five years ago, I got an e-mail from Tom [Thomas] Lissauer at St. Mary's Hospital in London. He asked if I would like to collaborate with him on a book in the *At a Glance* series and to do *Neonatology At a Glance*. Each chapter can be no longer than two pages, and it's basically going to be bullet points, pictures, X-rays, et cetera. It took us almost 4 years to do this. We used Michael Weindling from Liverpool and Rick [Ricardo J.] Rodriguez, who was with us at Cleveland, as associate editors, and it was published about 2 years ago. It's a wonderful book, even if I say so myself, for med students, for first-year residents, for nurse practitioners, even for the practitioner who wants to get a quick look at the topic and to see the highlights. I'll show you a copy of it later. I'm not sure if you've seen it.

DR. GARTNER: I've not seen it.

**DR. FANAROFF:** It's fun. It's a very easy read. And they want us to revise this now, as well. That's going to be a major undertaking.

DR. GARTNER: Any other books?

**DR. FANAROFF:** No.

[Laughter]

DR. GARTNER: You've done a lot. You've done certainly more than anyone else in the field.

**DR. FANAROFF:** Rich [Richard A.] Polin really needs to be congratulated, because Rich, with his *Pediatric Secrets* [The Secret Series] and the Polin-[William W.] Fox [*Fetal and Neonatal*] *Physiology*, and now a

**new whole series of books, has done a spectacular job. He was justly awarded the [Neonatal] Education Award from the Perinatal Section [Section on Perinatal Pediatrics – American Academy of Pediatrics] a few years ago.**

DR. GARTNER: I saw that, yes. Any other comments on the book scene in neonatology?

**DR. FANAROFF: There's a lot of competition in books. In the major texts, Mel Avery's book with [H. William] Taeusch was taken over by Roberta [A.] Ballard, and I think that there's a new group taking over again. Gordon [B.] Avery's book was another huge compendium of material on neonatology. The British have texts. So to be able to survive in that market — Alan [R.] Spitzer did a text on neonatology. And there are handbooks by the score that seem to come out. It's a good exercise, and the publishers certainly benefit. The authors may not see much in return, but the publishers certainly do.**

DR. GARTNER: Have any of your books been translated into other languages?

**DR. FANAROFF: Yes, now that you mention it, that had occurred to me to tell you that starting from Klaus and Fanaroff, the 1st edition was translated into Spanish, and Portuguese, and French, and German and Japanese. And subsequent versions have been done in the same languages, as well as Indonesian. Fanaroff and Martin was translated into Spanish.**

DR. GARTNER: That's a big undertaking.

**DR. FANAROFF: Yes. I don't know why. [Laughs]**

DR. GARTNER: Good. Well, let's see. We haven't really talked about your research and what your research career aspects have been.

**DR. FANAROFF: After the evaporative water loss, George Gregory reported on CPAP, and so we embarked on what was the first randomized, controlled trial of CPAP. The only difference was that we were doing it by putting the body at negative pressure and leaving the airway at positive. We used a diaphragm from the old incubators to get the head through. The body was in this chamber with two diaphragms on the side for access, and the baby was lying on a little pillow that was on two struts. We could then hook**

**this chamber to a vacuum and create the negative pressure, which was equated to the continuous positive airway pressure. It's called CNEP [continuous negative extrathoracic pressure]. And we, in fact, did this randomized trial, and like many others subsequently showed that CPAP improves oxygenation, but didn't change mortality. It was not surprising, because by this stage we were not losing big babies, and the babies that we were studying were really probably at a median birth rate of about 1.7 kilograms.**

**Now, we did have some little ones in there, as well, but Marshall got back from his sabbatical, and he said, "You know, I saw in both Sweden and Italy, they give CPAP through the nose." John Kattwinkel, a fellow at the time, had a background in engineering, and so we hooked with the biomedical engineers, and in the course of 6 weeks probably went through 6 prototypes before eventually coming up with the silicone nasal prongs that have been used on a worldwide basis. We were not very good businessmen. At least Marshall wasn't. It was costing us \$5 to make the nose piece in silicone, silica. We would sell them for \$5, but we would also give a lot away —**

**DR. GARTNER:** [Laughs]

**DR. FANAROFF:** — to our friends, and we also absorbed the cost of mailing it.

**DR. GARTNER:** Oh, dear.

**DR. FANAROFF:** So it was really very good when Sherwood Medical [Co.] came along and said, "We'll take this over, and we'll manufacture it." In fact, the royalties from that paid for a lot of the little things in the division of neonatology, for research and fellows, over the years.

**DR. GARTNER:** Oh. That's nice.

**DR. FANAROFF:** That was very rewarding.

**DR. GARTNER:** That's very good.

**DR. FANAROFF:** I then got heavily involved with Irwin Merkatz and regionalization, worked with the Robert Wood Johnson [Foundation]. We got a grant from them that helped regionalize care, here and on a general basis. And then I became interested in the outcomes of the babies, so I



worked with Irwin and Maureen Hack and started focusing in on the borders of viability and published quite well, a lot of it in the *New England Journal [of Medicine]*, on our results on the low birth rate babies, with follow-up.

Then realized that I wanted to be more involved in clinical trials. I did some with our fellows, but at that point, which was in the mid 1980s, the NICHD [National Institute of Child Health and Human Development] advertised for the NICHD Neonatal Research Network, and we became one of the founding members of the NICHD Neonatal Research Network. There were 8 members in the first go-around, and that was the beginning of some of the very elegant, large studies that have been done by the network. I think that the network has really set the tone on how collaborative, prospective, randomized intervention trials should and can be done, and the fact that we have standardized everything to the nth degree so that each center is reporting in the same way — everybody is trained. There are criteria you have to meet before you can start enrolling, and careful follow of the protocol. Then in recent years, all of the end points include neurodevelopmental outcome, which involves long, long studies. But we have maintained a capture rate of 90-plus percent so that the results become meaningful and hopefully generalizable.

DR. GARTNER: That's 90 percent for all the centers?

DR. FANAROFF: Ninety percent for all the centers. Our center has actually been the leading center in follow-up.

DR. GARTNER: And Maureen Hack is still involved?

DR. FANAROFF: Dee [Deanne] Wilson-Costello has taken over from Maureen as our network PI [Principal Investigator]. Maureen is doing her own studies. Maureen trained with us, then went back to Israel, and then came back to head our neonatal follow-up program. My opinion was, and still is, that follow-up is the yardstick by which you measure the quality of the work that you're doing in the ICU [intensive care unit]. Follow-up never paid for itself, so it was always an investment that we had to make from the division, and I'm really glad that we made such a large investment over the years.

Maureen was recently recognized with the [Neonatal] Landmark Award from the American Academy [of Pediatrics] for her work in follow-up, and

she and I have collaborated over the years. She, in fact, is bringing back now a cohort aged 27 to 30 years, and she's got pretty good retention in that cohort.

DR. GARTNER: That should be interesting.

**DR. FANAROFF: Time out.**

DR. GARTNER: Okay, break.

[Recording Interruption]

DR. GARTNER: Okay, I just have a couple of more personal —

**DR. FANAROFF: So we're beginning at the network there.**

DR. GARTNER: Oh, yes, right. Finish that.

**DR. FANAROFF: I mentioned how successful the network has been. The early days were really interesting because the initial members were Miami, with Charlie [Charles Ronald] Bauer, a Principal Investigator; Birmingham with George Cassady; Detroit with Ron [Ronald L.] Poland, subsequently Seetha Shankaran; Cleveland with myself; Dallas, with Jon [E.] Tyson; Vermont and New Hampshire with Jerry [Jerold F.] Lucey; Jeff [Jeffrey D.] Horbar for Vermont; and Bill [William] Edwards for New Hampshire — not New Hampshire —**

DR. GARTNER: For Dartmouth [College].

**DR. FANAROFF: For Dartmouth. I have left out somebody — oh, Memphis, Shelley [Sheldon B.] Korones. Bill [William] Oh was the chair of the group. We had to decide on two things. Firstly, did we want to keep a database, which we subsequently called the generic database, and secondly, which trials should we do first? We argued long and hard, and there were some very heated discussions about whether to have a generic database. The one group said it was a fishing expedition. The other group, to which I was a member, said we needed this information to know if and how we could do other trials and what trials are needed. Eventually the latter group prevailed.**

The generic database has really been a very rich source of data and has resulted in many interesting publications, not the least of which are the publications on neonatal sepsis that Barbara [J.] Stoll has published that are landmark papers; the gender paper by David Stevenson addressing the issue of why girls do better than boys; and a twin study done by Ed [Edward F.] Donovan from Cincinnati who later came into the network, and so on and so forth.

The first trial that we picked was actually the trial that Cleveland had submitted as a demonstration of what a trial might be. It was going to be on white cell transfusions for neonatal sepsis. We were halfway down the road with this protocol when I realized that it wasn't practical. It was not going to work, and we did not want the network getting off to a bad start. So I came in with an alternative proposal, which was the prophylactic use of intravenous immunoglobulin, for which there is a strong amount of literature supporting its use. Well, history shows that we enrolled 2,400 babies, and although there was a 10 percent difference with the prophylactic immunoglobulin, it wasn't worth it, and there was also the potential that it was increasing necrotizing enterocolitis [NEC].

It was the first, it was large, and it also was one of many where there were stops and pauses along the way, so the Data and Safety Monitoring Committee stopped us halfway because of concerns of NEC. In the second half of the trial, we were not allowed to use placebo infusions. The subsequent trials, also on very firm evidence in small trials, showed that when you got the numbers right, it didn't work, so antenatal phenobarbital to prevent intraventricular hemorrhage didn't pan out.

I think that the network will continue to flourish. I think the problem is that although the trials they do are really good, they take a long time, and we'd really like to be doing others. The pipeline is filled with ideas. Next week, and by next week I'm talking about the last week in October 2008, the aggressive versus conservative phototherapy trial will be published in the *New England Journal of Medicine*. The current trial is going to be going on support, which is oxygen and CPAP versus surfactant and ventilation, and is going to take another few years. That will be followed by Inositol to prevent retinopathy and BPD [bronchopulmonary dysplasia]. All of these great ideas, but we have to sequence them in. And so maybe the network has to reformat and involve other units who get trained specifically for studies so that we can complete them sooner.

DR. GARTNER: So you can do more simultaneously?

**DR. FANAROFF: Do more simultaneously?**

DR. GARTNER: Yes. In designing the network, did you rely at all on the NICHD phototherapy trial as a model for collaborative neonatal research?

**DR. FANAROFF: That was back in the early 1980s, and that was the background for the current phototherapy trial, but I'm not sure that's what was used for the design of the other trials. You had to be in the Network. The Network shares its data, but you didn't participate in the trials.**

DR. GARTNER: I just meant as a generic thing in which multiple centers did collaborative research and whether any of those —

**DR. FANAROFF: Well, that was a good example.**

DR. GARTNER: — or the NICHD used any of that methodology, because we spent many years developing that trial. [Laughs]

**DR. FANAROFF: I think we started from scratch again.**

DR. GARTNER: Oh, okay.

**DR. FANAROFF: We rediscovered the wheel, or re-broke the wheel, whichever.**

DR. GARTNER: Are you willing to say anything about the phototherapy trial that's about to be published?

**DR. FANAROFF: Yes. It was presented at the pediatric research meetings, and I think those who had favored aggressive will continue to favor aggressive. From my perspective, the aggressive phototherapy group — and these are all babies under a kilo [kilogram] and started with phototherapy between six and 36 hours of life — had less BPD, and they had fewer hearing problems. Now, there were more deaths in that group, but not statistically significant. The conservative group, which started treatment at a bilirubin of eight, had more BPD and more deafness — again, not statistically significant on the deafness. There's no difference in neurodevelopmental outcome. So, you know, the whole issue of whether bilirubin is a powerful antioxidant and**

**is needed versus bilirubin as a potential toxin will remain a point of discussion.**

DR. GARTNER: [Laughs]. We'll keep working on it. Good. Anything else about the collaborative network that you want to add?

**DR. FANAROFF: It's been a great source of information on neonatal-perinatal medicine, and there's a lot to be learned from negative trials as much as positive. The network concept has proliferated, so Vermont Oxford [Network] now has over 600 members. There's a Texas network, there's an Australia-New Zealand network, there's an Italian network, there's an Israeli network, and all of them are doing good things. The bottom line is that the new buzzword is "quality improvement." And quality improvement has come out of the networks.**

DR. GARTNER: Now, the other networks, at least the Vermont Oxford, do not do actual trials. They collect data. Is that true?

**DR. FANAROFF: They do do some trials. They've done surfactant trials. They're doing some various trials, but they do a lot of quality improvement, and they also set the yardsticks against which you can measure yourself.**

DR. GARTNER: Right.

**DR. FANAROFF: I particularly like the ability to say, okay, this is our result with, let's take sepsis. We think we're doing well, but in Vermont Oxford we're in the 21<sup>st</sup> or 50<sup>th</sup> percentile. We'd like to be in the top ten. What can we do to get there? There is and has been a collaborative that's looked at this, and if you apply these basic principles, I think you can get there.**

DR. GARTNER: Yes, I thought that was really the major thrust, at least of that network.

**DR. FANAROFF: Yes.**

DR. GARTNER: Okay. I did want to ask a few more things about your personal career issues, and one of them is to talk a little bit about some of the awards that you've received over the years.

**DR. FANAROFF:** It started back in medical school, where I received an award in public health for getting the top grade in the class, and it was a total shock, because I didn't think that I knew a hill of beans about public health and public health issues. But I did get an award, and it was worth \$15. I could buy a book with it. The book that I bought was *Harrison's [Principles of Internal Medicine]*. I think most of the awards that I've had were through the Academy. I was elected to the *Cleveland Magazine* Medical Hall of Fame, which includes a handful of physicians each year — five to seven. That was nice.

I received the [Maurice] Saltzman Award from The Mt. Sinai [Health Care] Foundation, which is a very prestigious award, again, for devotion in your career to enhancing of the lives of others in this community. I received an honorary MD [doctorate of medicine] from my alma mater, in recognition of the accomplishments in my career.

And I received an honorary doctorate, also an MD, from the University of Turku in Finland. This was a spectacular event. The Europeans really know how to celebrate a graduation, and part of their graduation includes wearing a very elaborate hat that they make for you for receiving the sword. So the hallmarks of their ceremony are diploma, sword and hat. You also wear tails for the ceremony, and then the whole academic procession marches from the music hall to the cathedral. It's about a kilometer. All the townspeople are out and applauding, and then you go into the cathedral for a ceremony. Obviously, you can't take a sword into a cathedral, so you check your sword.

DR. GARTNER: [Laughs]

**DR. FANAROFF:** Then when you come out, they're lying there in alphabetical order to retrieve the sword. Then they have a banquet in the evening, which is very formal, and everybody is in full gear, with hats and swords. A number of the other honorary doctorates already had awards from their countries, including an Order of the British Empire, and somebody had got some Danish award. I mean, I've never seen so many badges, and ribbons and things.

DR. GARTNER: [Laughs]

**DR. FANAROFF:** But that was a lot of fun.

DR. GARTNER: So where is your sword now?

**DR. FANAROFF:** My sword is now at the house in Florida, with the hat. I also was very happy to be made an honorary member of the Royal College of Paediatrics and Child Health. Now, I had a fellowship with the Royal College of Paediatrics and Child Health from England, and then I got an honorary fellowship, as well. In alternate years, the duchess attends, but she wasn't there the year that I was induced. Again, the British are very good at pomp and ceremony.

From the Academy, I got a teaching award in the 1990s, which was like the general education. I was very proud of that. Then I received the Education Award from the American Academy of Pediatrics, Neonatal-Perinatal Section [Section of Perinatal Pediatrics], and then the [Virginia] Apgar Award, which is the pinnacle, and that was in 2002.

DR. GARTNER: Good.

**DR. FANAROFF:** Those are some of them that I remember.

DR. GARTNER: [Laughs] Those are significant.

**DR. FANAROFF:** There's also — well, locally the Golden Stethoscope Award is given to faculty [Case Western Reserve University's Pediatric Clinical Faculty]. Every 2 years somebody is appointed, and I received that many years ago, with a stethoscope with gold on it.

DR. GARTNER: [Laughs] Now, before we leave your personal life, we have to hear about the children and grandchildren.

**DR. FANAROFF:** Okay. I am blessed with three children, all of whom are now married. Jonathan [M. Fanaroff], who got off to the tumultuous start, was a five-and-a-half-pound SGA [small for gestational age] with meconium aspiration syndrome, but is now a thriving neonatologist. He has an MD, as well as a JD [juris doctor or juris doctorate] from the University of Virginia. His undergrad work was at Tufts University. And what I can say is he did pick the most expensive schools.

DR. GARTNER: [Laughs]

**DR. FANAROFF:** Tufts was in the top five when he was there. But he is well educated. He did a year of obstetrics before doing pediatrics, and a

neonatal fellowship, all with us in Cleveland. He's the associate director of the NICU [neonatal intensive care unit] and has expertise in, obviously, medical-legal issues, but also biomedical ethics, which is his area of concentration. He's married to Kristy, who is a neonatal nurse practitioner. They will be celebrating their first anniversary November 2008.

Jodi is my middle daughter. She was born eleven months after Jonathan. Irish twins, if you like.

DR. GARTNER: [Laughs]

DR. FANAROFF: And we had our hands full. We were new immigrants. We had no support system. My wife is a saint for what she was able to accomplish. Jodi went to the University of Michigan, got a degree in graphic design, and then went on to work in graphic design. Then she went back to school and did a master's in art therapy. Shortly after, in fact while getting the master's, she also married Peter [C.] Tucker [Esq.], who is a lawyer who works with my brother-in-law in the timber business. They have 2 children, Austin, age 11, and Morgan, age 9. So if you ask Austin what he wants to be — Three out of four grandparents are physicians. His grandfather on the other side is also an MD/JD, his uncle is an MD/JD; there are 2 Harvard grad JDs, and 3 other MDs. So he says he's going to be a rock star and an MD.

DR. GARTNER: [Laughs]

DR. FANAROFF: He's actually quite a talented musician and loves to play piano. His sister, Morgan, who's just turned nine, is an accomplished gymnast. I don't know what she's going to be when she's big. Both are the apple of their grandpa's eye, or their "Pop-Pop."

Amanda, our youngest, is ten years younger than Jon. She is an outdoors person. She lettered in tennis for four years. She led the outdoor leadership group. She climbed the Tetons. She ice climbed in Alaska, and when she did that, I wanted to know whether she had any genes from me. She's married. She went as an undergrad to Cornell, got a degree in human ecology. Whatever that is. It used to be called psychology, I think.

DR. CAROL GARTNER: No, it used to be called home ec [home economics].

DR. GARTNER: Home economics.



**DR. FANAROFF:** Home economics? And then she went to law school at Northwestern [University] and is working in real estate law in Chicago. Her husband, Jason, took his undergraduate degree at Miami [University] in Ohio, and then went to Kent Law [Chicago-Kent College of Law] and he's also working as a lawyer in Chicago. They're expecting their first child in March 2009.

DR. GARTNER: How nice.

**DR. FANAROFF:** We have a terrific family.

DR. GARTNER: Sounds like a wonderful family. Good. Now, what I'd like to do is turn a little bit away from your personal life and talk a little bit about some general areas, and first about general pediatrics. You've been a chairman. You've experienced a lot about general pediatrics over the years, so I'd like to talk a little bit about that, and particularly just ask you, in general, what your view is of pediatrics as it has evolved, and where you think it's going?

**DR. FANAROFF:** Okay. If we have a chance, I'd also like to just talk a little about the Organization of Neonatal[-Perinatal Medicine] Training Program Directors.

DR. GARTNER: Okay.

**DR. FANAROFF:** While we're talking about general pediatrics, I'm going to talk a little about RRC [Residency Review Committee] and ACGME [Accreditation Council for Graduate Medical Education]

DR. GARTNER: Talk about that. We'll come back to the neonatology in a moment.

**DR. FANAROFF:** Right. And also maybe a little on the Committee on Fetus and Newborn and the Perinatal Section [Section on Perinatal Pediatrics, American Academy of Pediatrics].

DR. GARTNER: Yes, we'll get to those general areas.

**DR. FANAROFF:** Okay.

DR. GARTNER: Yes.

**DR. FANAROFF:** So general pediatrics. As I look at the landscape in 2008, I'm not very happy at what I see. I think we're admitting into pediatrics a much better quality of student than we did one to two decades ago, but I'm finding that the change in work rule hours has been accompanied by a general attitude of me-first. Rather than wanting to dive into things, to learn, to give of themselves, it's all about, "Okay, it's 11:00 pm. I should be off now. I have to get out of here, otherwise, I'm in violation." They are very bright, they are very smart, they learn very easily, but I don't see the same dedication and commitment that I saw before. I cannot see, for example, the same phenomenon as when I mentioned I started as a resident and there were 3 of us — one went out, so we took alternate nights call. In the modern era, if you've got every fourth night call and somebody drops out, well, you better find a substitute. You better pay somebody to come and do that.

I also am deeply disturbed by their lack of being able to do anything with their hands. They don't start IVs [intravenous], because there's an IV team. They don't put in chest tubes, because there are not enough to do. They don't do enough spinal taps. And so they graduate, and they're technically very limited in what they can do. I feel that 30 years ago, the residents coming out of training were able to go and run a Level II nursery. They could intubate, they could put in catheters, they were comfortable drawing blood, doing arterial sticks, et cetera. The current group of residents is not capable of doing that.

But I think part of it is our fault in that we don't make them. And because it's been so competitive to attract pediatric residents, we're bending over backwards to make it comfortable for them. The way to remedy this is to use a lot more simulation. The role of simulation in pediatric education is only going to expand. I think it's good. We should be supervising them in much greater depth, starting early on. We don't supervise enough how they take a history, how they do a physical exam. We assume they're asking the right questions in the correct manner, and by using simulation, we'll be able to really hone their skills in that.

**DR. GARTNER:** Is it like the use of models?

**DR. FANAROFF:** Using models, yes. Models, and cases, and actresses and actors.

DR. GARTNER: Oh, right. That's good. What do you think are, or have been, the really major achievements of pediatrics in the last 50 years let's say, or over your career in pediatrics? What do you see as the big achievements, outside of neonatology?

**DR. FANAROFF: I think it's across the board. With the development of all these vaccines, I think pediatrics equals prophylaxis. That's how I always think of pediatrics, and we've been very successful in that regard. It's very disturbing when you get these people against vaccines. Now, I am equally disturbed by the epidemic of autism. In my training, I saw one autistic kid. Autism is now all over the place.**

DR. GARTNER: That's interesting. I saw a lot of them when I was in training. I don't know why, but we did.

**DR. FANAROFF: I've seen autistic adults, but I did not see autistic children when I was in training.**

**Prevention and the whole scale. I look back on my early career with the meningococcal meningitis, with the pneumococcal meningitis, with Haemophilus influenza [type b (Hib)] meningitis, then I think back to our residency and all my friends who got hepatitis.**

**I look at the ability now to diagnose all the neurologic disorders, whereas when I started, it was an anatomic exercise of trying to relate whatever the deficit was with what the lesion might be. Now you've got exquisite images. It's like holding the brain. The whole field of imaging, whether it's ultrasound or CT [computed tomography scan], or MRI [magnetic resonance imaging], or functional MRI, or PET [positron emission tomography] scan. I mean, this was beyond our imagination when we were students. In fact, I remember at one of the first Ohio regional perinatal conferences in 1970, somebody was trying to detect where the ventricles were and was looking on an M-mode [ultrasonography] and looking at some waves. Now, 40 years later, you know not just where the ventricle is, but what the shape is, what the dimension is, what is in it, what the texture is, whether this is old, new, resolving, bleed, is there PVL [periventricular leukomalacia] — the whole spectrum. The imaging is really spectacular.**

**Then there's the whole spectrum of diagnoses that come together. The microdeletion 22 brings together a whole lot of things that didn't make sense before. Then you can explain the DiGeorge [syndrome], and the velo-**

cardio[-facial syndrome (VCFS)] and stuff like that. So that then has been pretty amazing, as is the ability to treat some of the inherited metabolic disorders. Not just with the single replacement therapy when there's a deficiency, but to be able to sustain and grow them, to come up with all the specific diets.

The whole screening. To go from no screening to screening for PKU [phenylketonuria], and thyroid, and what have you, to now where, with tandem mass spec [spectrometry], pick, you've got as many as you like. I mean, whatever the state determines.

DR. GARTNER: Thirty.

DR. FANAROFF: I'm disappointed in that I thought when we identified the CF [cystic fibrosis] gene, within a decade we would be able to replace it. It's clearly a lot more difficult than the CF experts imagined.

DR. GARTNER: Yes.

DR. FANAROFF: But again, I think we're sitting on a threshold again where the envelope will be pushed. There'll be a breakthrough, and then once you can do it with one gene, you'll be able to do it with many. So I think that's another area.

The minimally invasive technology. You mentioned you had herniorrhaphy. I had a herniorrhaphy. I could have gone to work that day. I remember friends of mine who, ten days later, were still walking bent over in agony [after an open surgical reduction].

DR. GARTNER: Oh, yes.

DR. FANAROFF: The women who had their gallbladders removed were hospitalized for ten days. Now they're home within 4 hours. So this whole ability to minimally invade the body and do a maximum amount of surgery, it's intriguing. I was at a lecture the other day, and they were talking about using the natural orifices to do surgery.

DR. GARTNER: Really?

DR. FANAROFF: I don't know. I'm still old fashioned. I don't mind seeing a little scar. To go through the stomach to go and take out an

appendix or whatever, I'm not sure I'm ready for that. But, you know, technology advances. When you and I were early in our careers, we were doing exchange transfusions on a weekly if not on a —

DR. GARTNER: Daily basis.

DR. FANAROFF: — daily basis, and today, we don't do exchange transfusions.

The immunoglobulins — Rho-GAM, the respiratory syncytial [virus] immunoglobulin, and a whole host of others, are now being used for a far-reaching number of disorders, including MS [multiple sclerosis]. So as we're better understanding pathophysiology, we're better at taking care of these disorders.

And then the cardiac disorders. Firstly, the diagnosis. I mean, now you can toss your stethoscope away because the ultrasound is going to tell you the real things. The ability to manipulate the duct, to keep it open, keeping babies alive in the ductal dependent lesions. And the amazing things that they've done with surgeries —

DR. GARTNER: Yes.

DR. FANAROFF: — in congenital heart disease, and the better management of diabetes, and understanding the better management of the inflammatory bowel diseases. In every field, we've seen progress and continue to see it.

DR. GARTNER: What do you see as the big challenges now in pediatrics? Disease-wise or developmental-wise?

DR. FANAROFF: The biggest challenge in pediatrics is on the neurologic disorders, and I'm not talking about the severe neurologic impairment, but the ones that deviate just a little from normal. I don't think we have the tools to appropriately diagnose, and certainly we don't have the ability to treat. The whole ability to test all children and help those that need help from an early stage, because that clearly seems to make a difference. That's the biggest challenge.

Obviously, on a world-wide basis the challenges of getting rid of birth asphyxia, which is accounting for, what, there are 4 million neonatal deaths a

**year. Birth asphyxia is probably a quarter, infection is another quarter. In the last statistic I saw, neonatal tetanus is still 7 percent.**

DR. GARTNER: That's appalling.

**DR. FANAROFF: Which is disgraceful.**

DR. GARTNER: Appalling. I know. I agree.

**DR. FANAROFF: For pennies, that can be eradicated.**

DR. GARTNER: Yes, right.

**DR. FANAROFF: And then obviously, prematurity. Rather than going away, is going north even more.**

DR. GARTNER: Yes, that astonishes me. What do you think the pediatrician of, oh, 25 years from now will be doing? Do you have any view of that or thoughts?

**DR. FANAROFF: You know Maureen's thing from Bruno Bettelheim that those who predict the future are really silly?**

DR. GARTNER: [Laughs]

**DR. FANAROFF: I think we're going to be doing a lot more PCR [polymerase chain reaction] gene-type measurements. So rather than just looking at, "Oh, yeah, you've got a Group A strep [streptococcal]," it will be, "The reason you have a Group A strep is that this gene is not turned on, and to turn this gene on I need to do the following." I see, at least I hope I see, that the next generation of pediatricians will be able to practice not evidence-based medicine, but medicine-based evidence or personalized medicine, so that you will be able to say, "Larry, your grandchild has a 60 percent chance, according to statistics, of having this disorder. However, I can do this test and tell you with 100 percent certainty whether he will or won't." And you say, "Good, I'd like to know that, because then I can make decisions."**

**I think, in addition to this host of vaccinations, their armamentarium will include better nutritionals, should I call them, because obviously there are certain elements in our diet that could enhance growth and neurodevelopment. We just don't know which they are, and what the**

quantity is, and when we may do harm by giving large amounts. But I think 25 years from now those answers will be known, and we will be able to apply to humans a lot of what's currently going on in rodents and other animals. I saw this interesting presentation where they could turn off the appetite in rodents.

DR. GARTNER: Yes, I saw that.

**DR. FANAROFF:** Or they could turn it on so they became obese in double-quick time.

DR. GARTNER: Yes.

**DR. FANAROFF:** They're not necessarily changing consumption, so it's a matter of being able to turn on the metabolic rate.

DR. GARTNER: I did see that. New research. Well, anything else about pediatrics in general before we turn to the field of neonatology?

**DR. FANAROFF:** I think that we have to look at the recipe we're using for training pediatricians. We're using one size fits all. That everybody's got to go through every rotation and this is the amount of time that you spend. I think that in the same way as people have said, "I want to be an intensivist" or "I want to be a surgeon," we should be able to tailor make the training. I think we're going to have to go that route. Now, it may involve another year of training, because I think there are so many things we're now trying to jam into the training, and we've cut the amount of time. I mean, the time in years is the same, but the time available for us to interact with the residents is less. In order to cram everything in, and to produce what the individual coming in would like to be when they go out, I think it's going to take more time.

DR. GARTNER: Some people have taken things away from the pediatric residency training, such as reducing the amount of time in neonatology or neonatal intensive care. Are there other things that we're doing in our training that shouldn't be there?

**DR. FANAROFF:** I'm not sure that we're doing things that shouldn't be there, because I happen to think that the PICU [pediatric intensive care unit] and the NICU teach them applied physiology. I'm not thinking that I'm training a resident to be a neonatologist, but I'm teaching them a discipline of applied physiology and of a meticulous approach to a problem. I'm

**teaching them more than just how to take care of an 800 gramer. That's not the lesson I'm trying to impart to the person who's going out into practice. And so I don't see stuff to take out. But if you need time where you're also supervising, you have to have done something basic. I can't just appoint you as supervisor when you've not had the basic experience.**

DR. GARTNER: Right. I agree with you. I think there's a lot to be learned in the NICU for the general pediatrician. Well, let's turn to neonatology in a broad sense and look at the field. I guess first I have to ask, as a historian, what's your perspective on the historical origins of neonatology? When did it start? What were its earliest manifestations?

**DR. FANAROFF: I'm becoming more interested in the history, but I really have a very short-sighted focus. I'm really starting with [Ignaz P.] Semmelweis and going into [Pierre] Budin and the French in the turn of the 20th century. That's where we get our beginnings and some of the fundamentals. The courageous people in the 1940s, who started doing the exchange transfusions, really started to put lines into umbilical vessels were the next phase forward.**

**And then we come into the whole respiratory management, and it was intriguing. I mean, I vividly recall my teacher saying, "This baby's got hyaline membrane disease." We put a funnel with 100 percent oxygen running under his face, probably giving him inadvertent CPAP, and saying that, "This disease will declare itself in 3 days, and either it'll get better or we'll lose him." When you look today at how sophisticated the management is, and the exquisite detail on replacement of surfactant, and monitoring oxygen and saturation and PaO<sub>2</sub> [partial pressure of oxygen in arterial blood], et cetera, it's just a revelation.**

DR. GARTNER: And yet 25 years from now, they're going to look back on this era and say that we were being naïve.

**DR. FANAROFF: Good!**

DR. GARTNER: Right. [Laughs]

**DR. FANAROFF: That means that there's further progress.**

DR. GARTNER: Yes.



**DR. FANAROFF:** Because, we recognize that we cannot emulate the in utero environment.

DR. GARTNER: Right.

**DR. FANAROFF:** We pat ourselves on the back because most of the babies above a kilo, we now have the ability to take care of. So the ones that we don't are really, what, 0.2 percent of the total population. In most of the world, nobody even tries with those.

DR. GARTNER: Right.

**DR. FANAROFF:** We're talking about developed countries where we're making a major thrust with these tiniest babies.

DR. GARTNER: Is it worth doing? Should we be pushing that hard on these very small babies, or are we going too far?

**DR. FANAROFF:** We've not looked at it in the right way. We've not looked at what resources are really needed and whether we have the resources. We've just assumed that we have the resources and that we push forward. When you're in a third-world, developing country, they have maybe 20 doses of surfactant for the year. They're going to want to target that for babies who have a really good chance. Now, it's all part of the self-fulfilling prophecy, but we come back to this question where we started it, do you have the resources? And it's not just a matter of whether the baby is going to survive the neonatal course, or whether the baby is going to be discharged from hospital, but what the baby is going to be like afterwards. And if the baby has a handicapping condition, do they have the ability to assist the baby? Is there somebody to take care of the baby?

DR. GARTNER: Right.

**DR. FANAROFF:** We've not got to that point. We're still looking at big numbers. I think society in general looks askance at what we do. Their perception is that we produce a lot of bad babies, and that we're a burden on society.

DR. GARTNER: Are we?

**DR. FANAROFF:** In some respects, yes. But we also benefit society enormously, because if you look at the total picture, which is what you have to do, all these great babies that we've given to families that are doing brilliantly. There is no price you can put on that.

DR. GARTNER: Right.

**DR. FANAROFF:** And when a society like ours invests the amount that it does in intensive care of octogenarians, then they have no room to point fingers at a group that's doing the same for less than 5,000 children a year, because the octogenarians are many more thousands. I watch them dialyzing, and ventilating, and putting in shunts and all sorts of things when they shouldn't be. The game is over.

DR. GARTNER: Yes. That's a good perspective. What are the major factors that led to the earlier development of neonatology as a field? What was driving that back then?

**DR. FANAROFF:** We're really talking about a very short period of time.

DR. GARTNER: Right.

**DR. FANAROFF:** Because until the 1960s, there was no field, so we're talking about a 50 year time period. It's a group of individuals such as you and I who had an interest in the care of these newborn babies and didn't like to see them totally neglected. Maureen labeled the era of the 1950s, the era of benign neglect and disastrous interventions, and that's not far from the truth, because we weren't doing much, and what we did was harmful. Not intentionally, but it turned out to be harmful.

DR. GARTNER: Right.

**DR. FANAROFF:** When you think about it, there was no formal training in neonatology, and although I did a fellowship, it was really very much of an informal fellowship. Yes, I attended a course in statistics and studied design at the university, but that was the only formal course. The clinical component, I really picked up a lot before I came. I'd had a lot of experience, and so it was a matter of learning how to do research. I wanted to do clinical research. I had no desire to do bench research. I love taking care of patients. A lot of individuals in different parts of the country started doing this, and then we spread the word by teaching these courses, by writing

**books. What was the workforce in neonatology in 1970? It's not known, but by today's standards it was a handful.**

DR. GARTNER: Oh, yes.

**DR. FANAROFF: There was no such thing as a neonatologist at a community hospital. A Level I hospital with a neonatologist in-house? No way. The number of neonatologists on faculty at the various medical schools? Pitiful. By showing that it was an exciting field, by the research that was going on, by the teaching, more and more people came into the field. Today there are more board-certified neonatal-perinatal people, I think, than most of the other subspecialties.**

DR. GARTNER: It's the largest.

**DR. FANAROFF: I think cardiology, because they've been going longer.**

DR. GARTNER: I think neonatology is the largest, by far, of the subspecialties, in number.

**DR. FANAROFF: But we're still a handful compared to, like, ophthalmology.**

DR. GARTNER: Oh, yes.

**DR. FANAROFF: Dermatology, gastroenterology.**

DR. GARTNER: The adult ones are very different. We haven't talked about the relationship between pediatrics and OB/GYN [obstetrics and gynecology]. How that has both influenced the development of neonatology, and where we are going with that.

**DR. FANAROFF: I think that's a key omission so far, but it's also a key admission. We talk about neonatal-perinatal medicine, but the relationship between neonatal medicine and obstetrics, maternal-fetal medicine in most centers is not as strong as it should be. I personally enjoyed a wonderful relationship with Irwin Merkatz when he was here. In fact, we went to the dean and said, "We'd really like to form a department of neonatal-perinatal medicine." The dean rejected it, because obviously the OB side is the breadwinner in the obstetric department and neonatology is the breadwinner**

in pediatrics. The dean was Dick Behrman at the time, so he knew that very well. He rejected it.

**But my office was next to Irwin Merkatz's office, not next to somebody in endocrinology, because we had so much more in common. We had so many more ideas to exchange. And we did. We worked very closely together. Since he left, which is 25 years ago, I've not enjoyed that same relationship. I have a comfortable relationship, but not the same. The beauty of what he and I did was that we challenged each other, in conferences, in open forum, so that we pushed the field. Today, it's not the same, and it doesn't happen. The fact that the [NICHD] Maternal-Fetal [Medicine Units (MFMU)] Network does studies that don't involve the Neonatal [Research] Network when they have combined sites is a reflection of the disorder that really needs to be remedied.**

DR. GARTNER: That's a good point. I agree with you. I had a similar relationship with our chief of OB/GYN, Harold Schulman. One of the things that we came up with, which I'll ask you about, is that we had the idea of having joint or a specialized residency, which would be neonatology and obstetrics, or obstetrics without the gynecology, and neonatology without the rest of pediatrics, and do that as a new residency to prepare people for a career in perinatal medicine, in the broader sense. We never could get anyone to back that idea.

**DR. FANAROFF: Yes, it's hard to do that.**

DR. GARTNER: What do you think of that?

**DR. FANAROFF: It's hard to get traction on new ideas. I obviously haven't had time to think about it, but you want to make sure that you're training somebody who is global and is not thinking just in a narrow fashion. I'm not sure that just doing neonatology and obstetrics wouldn't do that, or if it would make them too narrow-sighted.**

DR. GARTNER: The reason it was always rejected was we were picking out the two toughest areas of work, physical work, and that when you got older, what were the people going to do? Obstetricians do gynecology when they get too old to deliver babies, and neonatologists can do general pediatrics, and many do! [Laughs] So it was rejected on practical terms.

**DR. FANAROFF: Is it time to stop?**

[Recording interruption.]

DR. GARTNER: Okay. The other affiliated area is pediatric surgery, and we didn't talk about that relationship, and how that's developed and what it means to neonatology.

**DR. FANAROFF: We've enjoyed the benefits of having tremendous pediatric surgeons. We also enjoyed a relationship where they did the surgery, and we took care of the patients. Now the new generation of pediatric surgeons want to do the surgery, and they want to take care of the patients, and you may get some conflict between neonatology and surgery.**

DR. GARTNER: That's true.

**DR. FANAROFF: Although, we're lucky in Cleveland. We've actually maintained a good dialogue and ability to keep things on an even keel. I'm impressed as they've developed their new techniques, taking care of Hirschsprung's [disease], and doing total surgery on the sixth day, seventh day of life is pretty damn amazing. Doing it endoscopically is, to me, a miracle. I am constantly in awe of what the cardiothoracic surgeons can do on these button-sized hearts, and how well the kids do. I remain mystified at why we're having an epidemic of anterior abdominal wall defects in the US, and hope we'll find an answer, and hope it's not going to be another Thalidomide or Thalidomide-related substance. But in looking at your outcomes, surgery is very important. The ability to maintain lines, and the fact that your neonatal nurse practitioners form the main guard of the PIC [percutaneously inserted central] lines is something that's really good.**

**When you're talking surgery, you need neurosurgery, you need cardiovascular surgery, you need plastic surgery, you need orthopaedic surgery, so it's the whole kit and caboodle.**

[Recording interruption.]

**DR. FANAROFF: Anesthesia is absolutely vital. It is disturbing when you look at the long-term outcomes that the babies who had surgery do worse than those that didn't. Whether this is the anesthesia or the underlying condition is at this point not entirely clear.**

DR. GARTNER: In what way are you thinking worse?

**DR. FANAROFF:** Neurodevelopmentally. If you look at the patent ductus, certainly that group that needed ligation did worse. But there are other papers just looking at babies who had surgery versus those that don't, and just the surgery is having a negative neurodevelopmental impact.

DR. GARTNER: That's an interesting challenge, certainly.

**DR. FANAROFF:** We were talking earlier about the future. Specifically the ability to recognize, understand and control pliability is going to be a major step forward. They're starting to understand pliability and what allows a portion of the brain to recover and take over another function. Once you understand that, then maybe you'll be able to direct and control it.

DR. GARTNER: There's obviously a great deal we don't know about how the brain develops and functions. No question. My own experience, and I think in many places in the development of neonatology in modern history, was that it was the evolution of neonatal intensive care out of premature infant care. I just wondered what your experiences have been in that evolution, in that transition. Did you get involved in that to any significant degree?

**DR. FANAROFF:** I think we spend more time with the premature babies. They're there longer. Their problems are more complex. They're more multi-system. They're multi-factorial. The term babies often would have unidentifiable problems that you could resolve or not. So if hypoglycemia was the problem, and you were LGA [large for gestational age], and I reversed it, you were good and you were on your way.

DR. GARTNER: Right.

**DR. FANAROFF:** In the premature babies, it's not that simple. You may be hypoglycemic, but then I'm going to have to deal with your nutrition, I'm going to have to deal with your potential NEC, I'm going to have to deal with your patent ductus, your BPD, your IVH [intraventricular hemorrhage], the whole alphabet soup. That's not necessarily true as you look today in the NICU. You're getting more malformed babies with complex malformations. Those are very trying.

DR. GARTNER: I guess I was trying to probe into a slightly different area. Originally, the units in hospitals were preemie units and premature infants, and full-term infants were out on the wards or getting their care in other settings. And then the preemie units became —

**DR. FANAROFF:** Neonatal intensive care.

DR. FANAROFF: — neonatal intensive care units. That transition has always been significant, and I just wondered whether you experienced that either here or in South Africa.

**DR. FANAROFF:** In South Africa, the preemie unit was nonexistent at the Children’s Hospital. It was at Baragwanath Hospital. But when I came here, we had a premature ward, which was 23 beds, and we had another unit which had the term babies with different problems. They were still separated when we built our new hospital in 1971, but by the time we moved into the next NICU in the mid-1980s, they were all melded together.

DR. GARTNER: Was that because of state law issues? Because I know in many states babies had to be separated.

**DR. FANAROFF:** I think this was convenience for us in the medical staff.

DR. GARTNER: That’s interesting. That was a late transition, certainly. What do you think about the development of this concept of neonatal intensive care? You’ve read Lou [Louis] Gluck’s oral history. He takes credit for inventing the idea of intensive care for newborns and also, to some extent, for everyone. Whether he was the one who invented it or not — [Laughs] — was it an invention? Did we really make a big step?

**DR. FANAROFF:** It’s an evolution rather than an invention. You look back on some of these things and realize how you’ve subtly changed. Some of it is evolution, some of it is revolution. I wouldn’t argue with Lou Gluck, although I did on a number of occasions. He had very fixed ideas, and if you didn’t agree with him, then you were his enemy.

DR. GARTNER: Yes.

**DR. FANAROFF:** But he was very smart, and very innovative and contributed substantially to the field. Unfortunately, after his wife had a stroke, he became a very bitter man, and he hurt the careers of a number of people through his medical-legal involvement, is what I’m going to say. But I think the take-home message, as I look at the history, the broad sweep of the brush, is that in 1970, 70 percent of units didn’t allow families in to see their babies, and today that would be heretic. If I said to you, “Dr. Gartner,

**your grandchild is in this unit. You're not allowed to go in," you would go ballistic.**

DR. GARTNER: Yes.

**DR. FANAROFF: How did we, as a public, tolerate things, just accept them? That is because medicine was very paternalistic.**

DR. GARTNER: Yes.

**DR. FANAROFF: "Sir, you're not allowed in there. We don't allow families in there. You have bugs and germs, and you're going to harm the baby." "Okay, I'm not going in there." I was at an event, and there was a mother there who 32 years ago delivered. She was not allowed in to visit her child and still bears anger and frustration about that.**

DR. GARTNER: And rightfully so. We had an open visiting policy 24 hours a day. This was back when I was in the Bronx at Jacobi Hospital [Medical Center]. One morning I came in early and on the glass door in front there was a big handwritten sign that said, "No parents tonight." So I went to the nurses, and I asked, "What's all that about? Why no parents?" "Well, we're too busy." [Laughs] So I went ballistic. [Laughs] And that never happened again.

**DR. FANAROFF: I remember very distinctly in South Africa at the maternity hospital that if the baby went into the sick baby area, the family didn't go in there, and the baby reemerged a day, two, five, a week later, and that's when the family got to see the baby.**

DR. GARTNER: Right. It was not good. No question. What do you think have been the major clinical advances in neonatology? We've talked a little bit about a number of these.

**DR. FANAROFF: It starts in the delivery room. The Neonatal Resuscitation Program is a spectacular success. It's an offshoot of the Perinatal Section, which is where I want to get to, and I think it's a dramatic example of worldwide collaboration. And there are now over 2 million people who have been trained. The fact that we don't know in 2008, whether you should be resuscitated with room air, or oxygen or a blend somewhere in between, it doesn't really matter. We have been able to reduce the number of badly asphyxiated babies with a uniform approach.**



**On the respiratory front, I don't know what the biggest advance has been. I suppose mechanical ventilation, which covers everything. When I started here in Cleveland, we had no ventilators. We had a baby with severe ventilatory compromise. We set up a roster to hand-ventilate the baby through the night. We've had advances and the development of all these new ventilators, but particularly making ventilators specifically for babies. The pulse oximeter, the intra-arterial continuous O<sub>2</sub> [blood gas] monitors, inhaled nitric oxide all give us the ability to fine tune babies with various respiratory problems. PGE1 [Prostaglandin E1] has saved the lives of many babies who could be transported, who otherwise would have died en route with closing of the duct. Pushing more babies to have human milk, and I know that's a subject near and dear to your heart.**

**DR. GARTNER:** Dear to my heart.

**DR. FANAROFF:** But, you know, all the evidence is just overwhelming that there are both short and long-term benefits. And even if you can't prove that wheezing is less at age 2 years, who cares? If you asked your residents, "What do you need to support?" And that's what the WHO [World Health Organization] desires, to have more women not only initiating, but continuing breast feeding.

**DR. GARTNER:** I'm glad that message is getting through.

**DR. FANAROFF:** And then the whole radical change from babies don't feel pain to pain management. From surgeons who said, "I did a laparotomy without any anesthesia." "Well, you're a savage." So that's another big advance.

**Hand hygiene is still the best thing for infection. I think we're confused on other infection prophylaxis.**

**Over all, I think one of the remaining big questions to answer is how best to nourish these babies. What is the optimal rate of weight gain, and are we sowing the seeds for the metabolic syndrome in the care of these premature infants? I was just at a meeting, and Neena Modi showed two MRIs of two 27-year-old women of the same height and weight. One was an ex-preemie, the other was a full-term. Both of them were on the chubby side, okay? Their BMIs [body mass indices] were around 27. When you looked at the MRI and looked at the fat distribution and calculated the liquid fat content, the ex-preemie had a half a liter more fat than the non-preemie. It was sort**

**of scary, just looking at how much chub-a-lub there was in the surrounding mesentery and retroperitoneal space.**

DR. GARTNER: Is that generally true for preemies?

**DR. FANAROFF: We don't know.**

DR. GARTNER: Oh, we don't know.

**DR. FANAROFF: We don't know. I said this is anecdotal, and I said the question is, are we sowing the seeds? Now, Maureen Hack, in the 18 to 20 year-old follow-up, showed that the girls not only had caught up, but there was a tendency to obesity in the ex-preemies, so she's now looking at the 27- to 30 year-old cohort. It'll be interesting to see whether this still holds true.**

DR. GARTNER: That's going to be a big challenge to figure out.

**DR. FANAROFF: Oh, no question about it. Retinopathy was a mystery when we first started. We wavered on what the different factors were. Those are now clearly elucidated, and the treatment has been very well organized. That series by the retinopathist we've studied has been spectacular.**

[Recording interruption.]

DR. GARTNER: What particular treatments have been so effective?

**DR. FANAROFF: I think the CRYO-ROP [cryotherapy for retinopathy of prematurity] study first, and then the laser. But I think above all the ability to monitor these kids and identify them before they are blind, so that when you look at the follow-up outcomes, I think blindness is much less of an issue than it was in the past.**

DR. GARTNER: In terms of numbers of blind children or severity?

**DR. FANAROFF: Yes, and we've got smaller kids surviving.**

DR. GARTNER: I've always been disappointed that we're still seeing it at all. I guess I had a fantasy that we could eliminate it completely, but clearly not. How about the regionalization issue that you've talked about, and that you've done research in that as one of your early interests?

**DR. FANAROFF:** Regionalization was a major step forward. I think you saw a decline in mortality rates, and there were significant cost savings. And then we had a re-look at the economics, and hospitals resented transferring babies to regional centers, and we've had deregionalization. Part of the escalating costs relate to the fact that every Level I hospital wants an in-house neonatologist, but they don't want to pay for it. They don't want to give up the revenue for the patient, but they don't want to pay for the physicians that provide the care. This is a theme that you'll hear over and over again. We're involved at a number of hospitals. None of them pay the true costs of keeping a neonatologist available 24/7. With the downturn in the economy, you're going to have less insured people, you're going to have insurance companies that are going to continue to fight you, and this problem is only going to escalate. This deregionalization has been one of *the* biggest negatives. In fact, it's probably the main one that I see in the field.

DR. GARTNER: Interesting. Does the state of Ohio have state laws on these issues? Have there been any attempts to regulate it through that means?

**DR. FANAROFF:** No. The state of Ohio used to have a certificate of need regulation so you could not declare yourself a Level III unit. They abandoned that more than a decade ago, so you can put up your shingle, say and do what you like. I think the public is going to start taking note. Groups like [The] Leapfrog [Group] are stepping forward. The data are very, very strong. Ciaran [S.] Phibbs and Jeff [Jeffrey B.] Gould have clearly shown that if you have a smaller unit, you have a much greater chance of a baby dying. Unfortunately, Jeff Gould also showed recently that the time you're admitted to the unit is also important, in that if you're admitted in the evening, you don't have as good a chance as if you're admitted during the day. It relates probably to the numbers and experience of the people that are in-house.

DR. GARTNER: That's true. Any other major areas of achievement?

**DR. FANAROFF:** I think that the growth of the field resulted in another offshoot from the Perinatal Section, which is the Organization of Neonatal Training Program Directors. From a very informal group, we became much more formal. We had elections, we elected officers, and there is a rich annual meeting now, and the group works very well together. They're working towards compiling a syllabus and making available all the materials

**that you need to be training in the field of neonatal-perinatal medicine. I think that's a good step forward.**

DR. GARTNER: Standards of training? Is that what you're talking about?

**DR. FANAROFF: Yes, but also to avoid you having to rediscover the wheel. How do you teach career choices? Do you want to go into practice or do you want to stay in academia? What are the pros and cons? How do you interview for a job, et cetera? The Section has actually put together material on this, which is available on the [World Wide] Web. These are all nice steps to help the person who's embarking on a career.**

DR. GARTNER: People are being trained in training programs for both research careers and clinical careers. How is that being done, and how do you feel about that?

**DR. FANAROFF: This is now pretty much self-selection. Everybody coming into fellowship tells you that they want to do research, and that they want to end up in an academic medical center. But when you look at the statistics, half of them are not going to be doing that. In fact, it may be 60 percent. I don't know what the exact number is. But if they come in and tell you, "I want to be a practicing neonatologist," you say, "Why don't you go and train somewhere else?"**

DR. GARTNER: [Laughs]

**DR. FANAROFF: They know that.**

DR. GARTNER: Yes.

**DR. FANAROFF: We have been successful, I suppose, if half of our fellows stay in academia and go on to good careers and get grants, but I think that most programs find that a good percentage go out into practice.**

DR. GARTNER: Yes.

**DR. FANAROFF: There are driving forces for that. The average medical student coming out has a debt of somewhere between \$150,000 and \$250,000. They start their residency with a silver lining in their eyes and, "I'm going to be this" and "I'm going to be altruistic," et cetera, then reality starts hitting, and they get pressures from the wife and family. Many people come into**

**their fellowship, as well, and they say, “Look, I’d love to do academia. I just can’t afford to. I have to go out and make more money than I’ll make in academia.”**

DR. GARTNER: I’ve seen that many times.

**DR. FANAROFF: That’s very sad, but that’s the reality.**

DR. GARTNER: How about the training, itself? As far as I recall, we’re still requiring people to do research as part of their fellowship training. Is that a good idea? Is that something we should be doing, or should we change programs to recognize the reality that many of them will become clinicians?

**DR. FANAROFF: I think they should still do the research just so that they can critically evaluate what comes in the literature. I feel very frustrated when I see somebody clearly on a clinical track, who has been given umpteen months of research time, because basically I think that’s a cop-out. If you’re going to have 2 tracks, and you’re on a clinical track, then we should devise some special things that you do during the clinical track. You need to spend more time on the follow-up. You need to learn how to do echoes [echoradiography] and functional echoes. You need to know how to do brain ultrasounds. You need to learn other, specialized things. For them to just have free time for research, and then you say, “Well, what did you do? Let me see your research project,” and there’s no research that’s been done, is an awful waste of time and money.**

DR. GARTNER: So you’d actually opt for two tracks.

**DR. FANAROFF: I’d opt for two tracks.**

DR. GARTNER: Is there an exam for doing that?

**DR. FANAROFF: No.**

DR. GARTNER: Can you do it within the rules?

**DR. FANAROFF: No.**

DR. GARTNER: No? [Laughs]

**DR. FANAROFF:** Because apparently the rules are that they have to do 12 months of clinical in 36. They get three months of vacation, so they get 21 months of research, whether they do any research or not. Now, the research they may be doing is preparing talks. It's costing me a lot of money to keep them there.

DR. GARTNER: Would you shorten the fellowship to 2 years for those who are going to go into clinical work?

**DR. FANAROFF:** I think you easily could.

DR. GARTNER: That would certainly save money and effort. Nobody's moving in that direction, though.

**DR. FANAROFF:** You know, somebody with courage has to take that step, because you're going to have to take on the [American] Board [of Pediatrics]. The Board will love it, you know. Each person it's trained becomes another continuing contributor to the welfare of the Board.

DR. GARTNER: Quite so. [Laughs] An industry. Let's see. We've talked a little bit about the economics and health care delivery for newborns. Anything more to say about the economics?

**DR. FANAROFF:** Firstly, we're in an ugly time period, in which RVUs [relative value units] are playing a major role in academic departments. Neonatology doesn't lend itself well to the RVU system. Neonatology is not done by individuals, it's done by teams. I also think that the data on RVUs for neonatology are suspect at best. It is very anxiety-provoking to bring in a member of your faculty and say, "Look, you're supposed to be doing 15,000 RVUs. You've only done 4,000. What the hell are you doing?" Well, NICU depends on who's in there, and you could be there in the slow period, and you come out and somebody else gets all the RVUs. So you really need to group them, is what I think.

On the other hand, the Academy Practice Group [Committee on Practice] from the Perinatal Section has been spectacular. [Section Coding Committee leaders] Gil [Gilbert I.] Martin and — I'm blocking — from Seattle. [Richard Molteni]

DR. GARTNER: I don't know.

**DR. FANAROFF:** I'll think of it in a minute. He's just retired. He's a Dodger fan.

DR. GARTNER: [Laughs]

**DR. FANAROFF:** Anyway, they have led the coding seminars and the coding training, and I think that they have helped neonatology across the country in a huge way, so that you know what to bill for, how to bill for it, what code to use when they're outliers, et cetera.

DR. GARTNER: Yes, though I must say I get discouraged when I see so much of the Academy meetings devoted to coding.

**DR. FANAROFF:** But that's reality.

DR. GARTNER: I know. We talked a lot about the individuals who have influenced you and whom you've worked with. Who else in neonatology have been the big contributors? Again, we're speaking historically.

**DR. FANAROFF:** Is this to me or in general?

DR. GARTNER: In general, in a broad perspective. No, not to you. I mean, if you want to mention those for yourself.

**DR. FANAROFF:** No. When you look at the list of Apgar winners, you're really looking at the Who's Who of neonatology, perhaps with some few exceptions, people who didn't get it, like Marshall Klaus who got the Landmark, but didn't get the Apgar Award. But Clem [Clement A.] Smith and Bill [William H.] Tooley, Stan [Stanley L.] James, Lula [O.] Lubchenko, Fred [Frederick C.] Battaglia were all the people who led the field. Those were the generals who moved us forward.

Stan [Stanley Norman] Graven was recently recognized. Stan played a big, but quiet role, certainly not as much on the research side. I think as you look at that group, you get a nice balance between basic science, clinical science and politics. Joe [L. Joseph] Butterfield played as important a role as anybody in the field of neonatal-perinatal medicine. If you looked at Joe's curriculum, you wouldn't say, "Oh, this guy was close to Nobel Prize in basic science research." Shelley Korones is an interesting individual, just by his longevity in the field. I mean, Shelley was part of the first studies that were done in the 1960s, which were the Perinatal Collaborative [National

**Institutes of Health - National Institute of Environmental Health Sciences (NIEHS) Collaborative Perinatal Project]. Dick Behrman has been a mover and shaker. Millie Stahlman continues to be the grand dame of neonatology.**

**We must recognize some of our international colleagues, such as Oz [Osmund] Reynolds in the UK, [Sir J.] Peter [M.] Tizard, Jon [W.] Scopes, Pam [Pamela A.] Davies, John [Bunnell] Davis, and the people we used to meet with, Bent Friis-Hansen from Denmark, the group from Stockholm, Alex [Alexandre] Minkowski and the French group. Everybody has made a contribution that has helped us move forward. Claudine Amiel-Tison was actually an amazing teacher.**

DR. GARTNER: Yes.

**DR. FANAROFF: We made some videotapes of her examining some patients that were not known to her, and her clinical assessment and evaluation of the problem were nothing short of spectacular.**

DR. GARTNER: Yes, she was, right. She visited with us, I remember very well.

**DR. FANAROFF: The only mistake we made was we let her read the script at the end.**

DR. GARTNER: [Laughs]

**DR. FANAROFF: But she is a lovely lady.**

DR. GARTNER: Oh, yes. Well, that's a good list. Thank you. Any others you want to add to that?

**DR. FANAROFF: Paul Swyer should be on the list. Paul didn't get the Apgar Award. Pam [Pamela M.] Fitzhardinge, Sid [Sidney] Segal out in Vancouver.**

DR. GARTNER: Right. Good.

**DR. FANAROFF: There are two others who have not yet been recognized, Rod [Roderic H.] Phibbs and Joe [Joseph A.] Kitterman. That group there at U Cal [University of California], San Francisco have done spectacular work.**



DR. GARTNER: That's true. Over the years, neonatology has been marked by a number of episodes of errors, disasters and so forth, which I'm sure are part of the growing efforts of the field, but I wondered if you wanted to comment on that whole issue of errors, misconceptions and disasters. What are we doing now, and how can we avoid them?

**DR. FANAROFF:** We're not learning the lessons that we should because we are dealing with such a vulnerable population. Yes, Bill Silverman gave penicillin and sulfa [sulfisoxazole] and created an epidemic of kernicterus, but it was localized, it was recognized. You can make a remedy and you don't give sulfonamides, and you learn from that. Giving intravenous Vitamin E — the Cinnati group. Again, localized, a small number of patients. No less disastrous. But to me, the example that worries me the most is the DES [diethylstilbestrol, a synthetic estrogen], because there it goes multiple generations.

What, if anything, are we doing now that can cross generations? What I worry about the most is the endocrine disrupters, the plasticizers. You know, you've just seen this disaster in China with the melamine, but what else leaches out of these plastic bottles? Why have we seen, in Denmark, a drop in their fertility rates, so much in vitro needed, so much more cryptorchidism than in the neighboring country of Finland? I worry whether that's from the fish and from the contaminants. These contaminants work in parts per billion, so it's not a matter that you can do a serum level or even measure it in the water and know that it's happening. I just hope we're not setting up something down the line because we're making lots of changes. We think all of them are safe, but only time will tell.

DR. GARTNER: Let's look at the shorter term issues in the nursery. Should we be doing essentially a controlled trial or at least a monitoring of every new thing, no matter how minor, that we do in the nursery?

**DR. FANAROFF:** Yes, and we need to record it. We're not very good at recording all these changes. We're building a new nursery, and we'll be moving in April 2009. The new nursery is going to be one patient, one room. Each room will have space for the family, for the nursing staff and for the baby, and will be as environmentally friendly as is possible, given the current state of the knowledge in terms of light, and sound, and wall materials and floor materials, et cetera. If we change anything, we need to document it,

**and we need to keep tabs on who all were in those rooms, et cetera. We don't.**

[Recording interruption.]

**DR. GARTNER:** Okay, we're back on. We haven't really talked fully, although we talked a little about the role of parents in neonatal intensive care, and their isolation in the earlier days, and now their increasing involvement. What do you think about that, and how do you see parents playing a role?

**DR. FANAROFF:** It's an interesting transition from having no role, from not being allowed in, to being very much an active participant. It's been interesting to watch. The Internet has revolutionized the whole field of medicine, and so we're getting inundated with extremely difficult questions as parents search the Internet and come up with questions. We don't always have the answers. It just reinforces the approach to parents, which goes back to what Marshall Klaus and John Kennell were saying 40 years ago, you have to be entirely honest with them. Marshall used to say, "Look, I'll tell you what I know. I'll not tell you what I'm thinking. You can ask me as often as you like the same questions. That's okay. I hope I'll be consistent with the answers. We understand how precious your child is to you, and we will do our very best to ensure that the outcome is as good as possible. But in biologic systems there are no guarantees, and despite everything that we do, sometimes things don't turn out well." When they asked for numbers, he would never give percentages. He would work with the numbers zero to ten, but he would never work with a percentage. So he would say, "Look, on a scale of zero to ten, we're at an eight in terms of how sick your baby is." "Well, what are the chances of the baby surviving?" "No, I don't like to give you numbers. It's just a guess, and it doesn't mean anything."

**DR. GARTNER:** Parents are playing more a physical role, a presence in the nursery now in neonatal care. How do you see that evolving? Do you think that's increasing?

**DR. FANAROFF:** I think this is good. The fact that we have kangaroo care or modifications thereof is excellent. I think the father needs to be involved other than just standing in the background, going to the cafeteria and buying the coffee. We don't realize, until we've experienced it, how traumatic it is to have a very sick baby in the neonatal intensive care unit. You cannot put yourself in their shoes, and anything that you can do to enhance and facilitate their attachment, and to make the experience better

**for them, you should do. So if they want to have to skin-to-skin [contact] because they read it's good, fine. Now, I draw the line, okay? If a parent comes to me and says they want one of these underwater deliveries, I'm not going to encourage that. I'm going to strongly discourage it. From time to time, we do get bizarre requests, but we have to recognize everybody's different, and we try to accommodate them.**

DR. GARTNER: Good. What about the role of nurses and nurse practitioners in neonatal intensive care? I mean, they've always had a presence. They've always been important.

**DR. FANAROFF: The head nurse has always controlled the neonatal intensive care unit.**

DR. GARTNER: [Laughs]

**DR. FANAROFF: Oh, yes. You may think the director of nursing does. And I think Bill Oh expressed it beautifully when he wrote that piece on —**

DR. GARTNER: On [Evelyn] Lundeen, the head nurse.

**DR. FANAROFF: Lundeen. But the neonatal nurse practitioners have really become *the* stable workforce in the neonatal intensive care unit. The residents are transients. The fellows change every 3 years. The nurse practitioners are a constant, and they're a blessing. They're limited in what they can do, but they know their limitations, and they work within their limitations. They're technically really good, and they're there the whole day. Now, they're not worked that many hours, but they're there the whole day. The residents are here, they're everywhere. I love dealing with the nurse practitioners. Now, in the old days when we first started having nurse practitioners, we were concerned that they couldn't take care of the more complex patients. We realized that that's no longer the case.**

DR. GARTNER: Right.

**DR. FANAROFF: They are an integral part of the neonatal workforce, and I only see their role expanding.**

DR. GARTNER: They're obviously involved with a lot of the technology, from IVs, and arterial lines, and all the rest of it, and machinery. Do they play a

role in decision making? Do they play a role on rounds, in the active care of the child?

**DR. FANAROFF:** They play an active role on rounds in terms of their information gathering and transmittal to the team. Do they play a major role in decision making? Not most of the time, but they do play a role. They're not withering flowers. They really do have some experience. When a nurse practitioner says to me, especially one who's had experience, "This baby looks different to me," I sit up and take note. That's like the mother telling me, "This baby is not right." So their role is expanding all the time.

DR. GARTNER: Have they replaced fellows to a significant degree? Are you able to get along with fewer fellows because you have more nurse practitioners?

**DR. FANAROFF:** No.

DR. GARTNER: No.

**DR. FANAROFF:** They've not replaced fellows. They've replaced residents. In fact, when we look back at the history at our hospital, we started the neonatal nurse practitioners because the residents were complaining that it wasn't exciting being on this one floor, which was the step-down floor. So now we have one resident, and the rest are all practitioners on the step-down floor. But this was 20 years ago that they were complaining. I'm glad they did, because otherwise we wouldn't have had this team of nurse practitioners.

DR. GARTNER: We've had the same experience. What about the role of the general practitioner, the general pediatrician in the NICU? Do they have any role? Should they have a role? How should they participate, if at all?

**DR. FANAROFF:** They've abrogated any role they ever had. When I started as a neonatal fellow, we had an open unit, and all the babies belonged to these private practitioners. They would come in, find out from me what was going on with their baby, then go and tell the mother, and then leave. If anything happened during the day or night, I was responsible. When I became director of the NICU, I closed the unit. I said, "These patients belong to the full-time staff." There was a little whimpering, not that much, and they have no interest now. In fact, when you send them summaries, the

**shorter the summary the better. They really just want to know the high points and what they have to do. They're busy. Time is money.**

DR. GARTNER: Yes. Busier.

**DR. FANAROFF: They used to come and round, but now they don't, because there's the trip to the hospital, and then there's the trip to the office. You can be in the office seeing patients all that time.**

DR. GARTNER: What about the role of other clinical care people, rehab [rehabilitation] services, social workers, psychologists? Do they have a role in the neonatal intensive care unit?

**DR. FANAROFF: Social workers are the backbone of the NICU, depending on what your patient population is. Before we can discharge a baby, we're heavily dependent on them to help with insurance, as well as with disposal, and decisions on whether the family has a home, and whether the home has electricity and heat. The social worker is a very integral part of the team.**

**The psychologist is a very important member of the follow-up squadron. They are particularly helpful there. They have been less helpful in the NICU. But we as neonatologists have to recognize that we can only do our job if we have a great group of subspecialists to refer to. So we need cardiology, we need neurology, we need infectious disease, we need endocrinology, gastroenterology, and so on and so forth. We're the quarterbacks, but if you don't have any wide receivers, there's nobody to catch the ball. We take a lot of credit when this is a magna team effort.**

DR. GARTNER: Good. We haven't really talked about the ethical issues. There are a lot of them. They're obviously important. Anything you want to say about this whole area of ethical dilemmas, ethical problems, decision making?

**DR. FANAROFF: All I'd like to say is that it's a very complex problem.**

DR. GARTNER: [Laughs]

**DR. FANAROFF: There are no easy solutions. It's an unusual set of problems, because this is the only group of individuals — i.e., extremely premature babies — where we make decisions not to offer care, as opposed to withdrawing care. None of us like to play God. We all went to medical**

**school and took the Hippocratic Oath so that we'd be able to help people. It comes down to really tough decisions, but you have to make them.**

**For example, at 22 weeks gestation, I don't believe that there is any chance of intact survival. Now, the numbers may be 0 to 5 percent. I'm counting that as zero. So I don't want to do anything at 22 weeks. Now, if you've got a family that's pressuring me and saying, "We want everything done," I've got to tell them, "Look, I'm the wrong pediatrician for you. I'm the wrong neonatologist. You need to go to somebody else, because I'm not comfortable doing this. I don't want to do it. I'm not going to be forced into doing it." I don't want to violate the Born Alive Infants Protection Act, and I don't want to violate the other rules, but I also don't want to be contributing to the prolonged dying of a baby, and that's what I see most of the time.**

**DR. GARTNER:** Okay. You've talked about this, and maybe I'm repeating, but what do you see as the future of neonatology? Where are we going to go? Long-term future. Crystal ball. I know you can't predict the future.

**DR. FANAROFF:** It's murky.

**DR. GARTNER:** [Laughs]

**DR. FANAROFF:** The crystal ball is absolutely murky.

**DR. GARTNER:** [Laughs]

**DR. FANAROFF:** It's going to be incremental rather than monumental. There is nothing on the horizon that says, "This is the next antenatal corticosteroids, this is the next surfactant." It's a matter of consolidation, quality improvement, doing the things that we know are right. But we also have to continue to measure and be able to answer critical questions like, what is the right oxygen saturation to grow a baby? What are the right nutrient supplements we should be giving these babies? Can we prevent infections? Can we prevent necrotizing enterocolitis? How can we preserve brain function using the whole host of things? It will be application of all of these things that is in the immediate future. In the distant future, which I think we talked about, is the ability to apply the human genome in individualized medicine.

DR. GARTNER: You don't see babies with artificial placentas, you know, *Brave New World* [by Aldous Huxley], babies in bottles, that kind of fanciful technology?

**DR. FANAROFF: I don't, but if that happened and that was good, that's okay. I'm not going to have to run them.**

DR. GARTNER: [Laughs] Okay. Future research you see largely focused in genetics? In what areas?

**DR. FANAROFF: I think the future is in genetics, in applied genetics. I think it's in pharmacogenomics or -genetics, whatever you call that. I don't know what the current term is. I think pharmacogenomics is what they like to call it. I also anticipate a lot more of the multicenter, multinational trials. I sense a much better and freer communication across the Pacific [Ocean] and across the Atlantic [Ocean], and I think this is very encouraging. There are no borders for science, and the data that we gather, we hope is global and generalizable. And if we do trials that involve patients from across the globe, then we've proven what we set out to prove.**

DR. GARTNER: Are there any new types of people, personnel, expertise that we need in neonatology in the future?

**DR. FANAROFF: That is a very interesting question. We would like to see the bridge between fetal-maternal and neonatal medicine narrowed, so that's the kind of person that I would like to see.**

DR. GARTNER: More cross-over in training?

**DR. FANAROFF: More cross-fertilization of maternal-fetal and neo-peri [neonatal-perinatal].**

DR. GARTNER: Are there any other disciplines within medicine that neonatology should be relating to that we aren't now?

**DR. FANAROFF: We should encourage fellows in training to be free to go beyond the boundaries of working with people in their own division and department. To take advantage of the medical school, to take advantage of the pathology, and the physiology, and the pharmacology and the biochemistry departments, so that we can better utilize all the resources of the school. Interestingly, we interviewed somebody the other day, a neonatal**

**fellow currently, who's doing some research on nitric oxide and arginase, and he said he would like to meet with somebody from the anthropology department. Richard Martin, who was organizing the interview, said, "Why?" He said, "Because she's an expert on arginase. She studies it across societies, and whatever." And so the meeting was arranged. Here was a resource within our own faculty that we had no idea was doing work that was very parallel to work that was going on in our neonatal lab.**

DR. GARTNER: There are a lot of opportunities within universities, broadly, for collaboration. We have collaborations with the divinity school, law school, economics, Chinese studies. I think there are great opportunities, I agree. That's a good example.

Okay. Any advice you have for the next generation of neonatologists?

**DR. FANAROFF: You know, Bill Oh and Reggie [Reginald C.] Tsang put together a booklet many years ago on how to succeed in academia, and they wanted quotes from a lot of people, so they asked me, "Can you send a quote?" What I said essentially, if not in exactly the same words, was that to succeed in academia, you need the skin of a pachyderm, you need to be as diplomatic as a career diplomat, that you had to, above all, have and maintain a sense of humor, and time management was of the essence. That's the advice that I would give to somebody coming into the field. Be able to take criticism. Don't take it personally. Listen and learn. Laugh. Laugh often. And carefully plan your workday, because time is a thief. All too soon, your fellowship and your early career will be gone, your [NIH] "K" award is over, and you're struggling to get an [NIH] "R" [award], so you need to set a timetable and stick to it. ["K" awards are "Career Development" awards intended to develop the research careers of investigators who are in training to become independent. "R" awards are "Research Project" awards funding targeted research investigation by independent investigators.]**

DR. GARTNER: Good advice. Anything else that we haven't covered that you think we should mention?

**DR. FANAROFF: Well, you started the interview with family. Do you want to end by saying, whatever you do, you need to balance family and work? That, at times, takes a lot of skill.**

DR. GARTNER: Sure.



**DR. FANAROFF:** The thing that needs to suffer is your own sleep, if necessary, but you can never take away from the family time.

DR. GARTNER: Good advice. Well, thank you very much for a wonderful interview.

**DR. FANAROFF:** Thank *you*. Thank you.

DR. GARTNER: Lots of good information and good advice, and we appreciate it. Thank you.

**DR. FANAROFF:** It's been my pleasure.

[End of interview.]

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## CURRICULUM VITA

Revision Date: September 24, 2010

**AVROY A. FANAROFF, MB, BCh [RAND], FRCP[E], FRCPCH**

**DATE/PLACE OF BIRTH:** May 22, 1938  
Bloemfontein, Republic of South Africa

**MARITAL STATUS:** Married: Wife, Roslyn  
Children: Jonathan, 1969; Jodi, 1970; Amanda, 1979

### POSITIONS:

2005-2008 Gertrude Lee Chandler Tucker Professor, Case Western Reserve Univ, Cleveland, OH  
2004-2008 Chair, Department of Pediatrics, Case Western Reserve Univ, Cleveland, OH  
2000 Eliza Henry Barnes Professor in Neonatology  
1998 Co-Director, Neonatology Division, Rainbow Babies & Children=s Hospital, Cleve, OH  
1985 Professor, Reproductive Biology, Case Western Res Univ Sch of Medicine, Cleve, OH  
1981 Professor, Pediatrics, Case Western Reserve University School of Medicine, Cleve, OH  
1975 Director of Nurseries, University Hospitals of Cleveland, Cleveland, OH

### EDUCATION:

1960 MB, BCh, University of the Witwatersrand, South Africa  
1965 Member, Royal College of Physicians of Edinburgh  
1965 Diploma, Child Health, Royal College of Physicians and Surgeons, London  
1980 Fellowship, Royal College of Physicians of Edinburgh  
1998 Fellow, Royal College of Paediatricians and Child Health, London, England

### TRAINING:

1961-1962 Medical and Surgical Intern, Johannesburg General Hospital, Johannesburg, SA  
1962 Pediatric House Physician [intern], Addington Hospital  
1962-1963 Pediatric House Physician [intern], Transvaal Memorial Hospital for Children  
1963-1964 Internal Medicine Registrar [resident], Johannesburg, South Africa  
1965 Pediatric Registrar [resident], Middlesex Hospital, London, England  
1965 Pediatric Registrar [resident], St. Mary's Hospital, London, England  
1965-1967 Pediatrician, Baragwanath Hospital, Johannesburg, South Africa  
1967-1968 Pediatric Registrar [resident], Transvaal Memorial Hospital for Children  
1968-1969 Pediatric Consultant [pediatrician], Baragwanath Hospital, Johannesburg, SA  
1969-1970 Pediatric Resident and Fellow, Case Western Reserve University, University Hospitals of Cleveland, Cleveland, OH  
1970-1971 Ford Foundation Post-Doctoral Fellow, Case Western Reserve University, University Hospitals of Cleveland, Cleveland, OH

### HOSPITAL APPOINTMENTS:

1971-present Attending Pediatrician  
1973-1975 Associate Director of Nurseries, University Hospitals of Cleveland, Cleve, OH  
1975-1998 Director, Neonatology Division, Rainbow Babies & Children=s Hospital, Cleve, OH  
1975-present Director of Nurseries, University Hospitals of Cleveland, Cleveland, OH  
2003-2004 Interim Chair of Pediatrics, University Hospitals of Cleveland, Cleveland, OH  
2004-2008 Chair of Pediatrics, University Hospitals of Cleveland

**ACADEMIC APPOINTMENTS:**

- 1969-1971 Teaching Fellow, Dept Pediatrics, Case Western Reserve Univ Sch Med, Cleveland, OH  
1971-1975 Assistant Professor, Pediatrics, Case Western Reserve Univ Sch Medicine, Cleve, OH  
1973-1974 Assistant Director, Department of Pediatrics, Rainbow Babies & Children's Hospital, University Hospitals of Cleveland, Cleveland, OH  
1974-1975 Assistant Professor, Reproductive Biology, Case Western Reserve University School of Medicine, Cleveland, OH  
1974-1981 Associate Professor, Pediatrics, Case Western Reserve University, Cleveland, OH  
1975-1981 Research Associate, School of Engineering, Case Western Reserve University, Cleveland, OH  
1975-1985 Associate Professor, Reproductive Biology, Case Western Reserve University  
1981-present Professor, Pediatrics, Case Western Reserve University School of Medicine  
1985-present Professor, Reproductive Biology, Case Western Reserve University School of Medicine  
1985-1990 Vice Chairman, Department of Pediatrics, Case Western Reserve University School of Medicine  
2007-present Professor, Center for Clinical Investigation, Division of General Medical Sciences, Case Western Reserve University School of Medicine

**CERTIFICATION:**

- 1972 State of Ohio - FLEX  
1975 American Board of Pediatrics [April]  
1975 Board-Certified Pediatrician, South African Medical and Dental Council  
1975 American Board of Pediatrics: Sub-Board of Neonatal-Perinatal Medicine [Nov]  
1989 American Board of Pediatrics: Recertification, Core and Neonatal-Perinatal Medicine  
1996 American Board of Pediatrics: Recertification, Core and Neonatal-Perinatal Medicine

**AWARDS AND HONORS:**

- 1958 Prize Public Health  
1976 The Central Association of Obstetricians and Gynecologists  
1978-1979 *House Officers Faculty Teaching Award*, Rainbow Babies & Children's Hospital  
1980 Fellow, Royal College of Physicians [Edinburgh]  
1983 1<sup>st</sup> Place Prize, Physicians Category, American Medical Writers Association for *Behrman's Neonatal-Perinatal Medicine*, CV Mosby  
Honorary Member, South African Pediatric Society  
1987 Honorary Member, Argentinian Perinatal Association  
1987 Honorary Member, Columbian Perinatal Association  
1990 *Golden Stethoscope Award* for Outstanding Contributions to Clinical Pediatrics, presented by Case Western Reserve University's Pediatric Clinical Faculty  
1992 Honorary Member, Pediatric Society, Concepcion, Chile, South America  
1992 *The Best Doctors in America*, 1<sup>st</sup> ed., Woodward/White  
1994 *The Best Doctors in America*, 2<sup>nd</sup> ed., Woodward/White  
1994 American Academy of Pediatrics *Professional Education Award*  
1996 *The Best Doctors in America: Midwest Region*, Woodward/White  
1998 *The Best Doctors in America*, 4<sup>th</sup> ed., Woodward/White  
1999 *National Neonatology Education Award*, American Academy of Pediatrics, Perinatal Section  
2002 *Virginia Apgar Award*, American Academy of Pediatrics, Perinatal Section

**AWARDS AND HONORS:** [cont'd]

- 2003 Cleveland Magazine Medical Hall of Fame Inductee
- 2004 Who's Who in Medicine and Healthcare – 5<sup>th</sup> Edition
- 2004 Honorary Medical Degree, University of Witwatersrand, Johannesburg, South Africa
- 2005 Honorary Fellowship, Royal College of Paediatrics and Child Health
- 2006 Cleveland Magazine's "The Best Doctors" – March 2006
- 2006 Honorary Medical Degree, University of Turku, Finland
- 2006 Annual Maurice Saltzman Award, Mt. Sinai Health Care Foundation, Cleveland, OH
- 2008 Legends of Neonatology Award, presented at The Conference for Neonatology, Orlando, FL
- 2009 Distinguished Physician of University Hospitals Award, Cleveland, Ohio
- 2009 Founder's Award, presented at the Annual MWSPR, Chicago, IL
- 2009-2012 Best Doctors in America

**TEACHING FILMS AND AUDIOTAPES:**

- 1976 Examination of the Newborn, Health Sciences Communication Center, Case Western Reserve University.
- 1976 *Neurologic Examination Through the First Year of Life*, with Dr. C. Amiel-Tison Health Sciences Communication Center, Case Western Reserve University. Consultants: A. Fanaroff and M. Hack.
- 1978 Chemical Dependency, Megahertz TV Program, Health Sciences Communications Center, Case Western Reserve University.
- 1988 American Academy of Pediatrics - Audiocassette panel discussion: *Pediatric Update: Prematurity vs Growth Retardation*, Volume 8.
- 1990 American Academy of Pediatrics - Audiocassette panel discussion: *Pediatric Update: Issues on Breast Feeding*, Volume 11.
- 1991 American Academy of Obstetrics/Gynecology - *Pediatric Update: Developments in Respiratory Distress Syndrome*, Volume 16.
- 1994 Audio-Digest Pediatrics, *Neonatal Sepsis: What's New?*, Volume 40.

**SOCIETIES:**

- Member, The American Pediatric Society
- Member, British Medical Association and South African Medical Association
- Member, Society for Pediatric Research
- Member, Midwest Society for Pediatric Research
- Fellow, Royal Society of Medicine, London
- Member, Society of Critical Care Medicine
- Fellow, Academy of Pediatrics
- Member, Perinatal Section, Academy of Pediatrics
- Member, Perinatal Research Society
- Member, Academy of Medicine of Cleveland
- Member, American College of Nutrition
- Member, European Society for Pediatric Research
- Member, Association for the Care of Children's Health
- Overseas Fellow, Royal College of Paediatrics and Public Health, London, England

**COMMITTEES:**

Departmental

- Academic Planning Committee, Department of Pediatrics

Chairman, Appointments, Promotion and Tenure Committee [1985-1987]  
Financial Task Force, Department of Pediatrics [1991]  
Contracts Committee, Department of Pediatrics [1991]  
Faculty Benefits Committee, Department of Pediatrics [1993]  
Reorganization Task Force, Department of Pediatrics [1994]  
President, Children's Research Foundation  
Education Committee, Department of Pediatrics  
Chair, Committee on Appointments, Promotions, & Tenure [2001- 2003]  
Chair, Children's Research Foundation of Cleveland, Inc. [2003 – 2008]

University Hospitals Case Medical Center

Member, OB-GYN Administrative Committee, MacDonald Women's Hospital  
Member, Neonatal Intensive Care Unit Operating Committee, Rainbow Babies & Children's Hospital  
Member, Clinical Council, University Hospitals of Cleveland [2003-2008]  
Member, Rainbow Babies & Children's Hospital Subcommittee of University Hospitals Case Medical Center Board of Trustees [2003-present)  
Member, University Hospitals of Cleveland Steering Committee for Navigant Consultants [2003]  
Member, Steering Committee, University Hospitals Medical Group [2003-2007]  
Member, Insurance Advisory Committee [2003-present]  
Member, President's Advisory Committee [2004-2007]  
Member, Master Facilities Planning Committee [2005-2007]  
Member, Executive Committee, Rainbow National Leadership Council [2005-2008]  
Member, University Hospitals Medical Group Compensation Subcommittee [2005-2007]  
Member, Rainbow National Leadership Council [2005-present)  
Member, University Hospitals Faculty Services Board of Directors [2006-2007]  
Member, Leadership Council, Center for Emergency Medicine [2006-present)  
Member, Board of Directors, University Hospitals Medical Group [2008-2008]

University Hospitals

Member, Development Task Force [2003-2004]  
Member, Search Committee for Senior Vice President of Development [2003-2004]  
Member, University Hospitals Health System Board of Trustees [2004-present]  
Member, Development Subcommittee of University Hospitals Health System Board of Trustees [2004-present)

Case Western Reserve University School of Medicine

Committee on Continuing Medical Education [1980-1985]  
Appointment, Promotion and Tenure Committee, School of Medicine [1987-1990]  
Search Committees for Chair of Reproductive Biology and Chair of Radiology [1991]  
Council of Clinical Chairs [2003-present]  
Search Committee for Chair of Surgery [2004]  
Search Advisory Committee for Associate Dean for Research Administration [2004]  
Review Committee for Centers within Division of General Medical Sciences [2004]  
Symposium 2005 Planning Committee [2004-2005]  
Search Committee, Associate Dean for Development and Alumni Relations [2004]  
Search Committee, Chair of Department of Surgery [2004]  
Unified Practice Plan Committee [2004-2006]  
Member, General Clinical Research Center Advisory Committee [2004-2007)



Local

Regional Pediatric Emergency Care Advisory Committee  
Cleveland Regional Perinatal Network Advisory Committee

State and Regional

Fetus and Newborn, Academy of Pediatrics, State of Ohio, 1971-1986  
Chairman, Fetus and Newborn, Northeast Ohio Pediatric Society, 1975-1985  
Ohio Perinatal Consultants, Advisory Committee, State Department of Health for Governor  
Northeast Ohio Emergency Medical Services  
Medical Advisory Committee, Hattie Larlham Foundation, Mantua, Ohio

National

Chair, Sub-Board, Neonatal-Perinatal Medicine, American Board of Pediatrics [1989-1990]  
Examiner, Sub-Board, Neonatal-Perinatal Medicine, American Board of Pediatrics [1978-1981]  
Scientific Review Committee, Indiana University [1982-1986]  
Member, Sub-Board, Neonatal-Perinatal Medicine [1987-1994]  
Member, National Board of Medical Examiners [1987-1989]  
Member, Board of Directors, American Board of Pediatrics [1990]  
Executive Committee, American Board of Pediatrics [1991-1993]  
Board of Directors, Contemporary Forums [1991-present]  
National Institutes of Health, Neonatal Research Group [1987-present]  
    Member, Steering Committee  
    Chairman, Generic Database Committee  
    Chairman, Publications Subcommittee  
    Chairman, Intravenous Immunoglobulin Subcommittee  
Program Co-Chair, Fetus and Newborn, State of the Art Care Annual Meeting, 1985-present  
Committee on Fetus and Newborn, American Academy of Pediatrics, 1992-1998  
Residency Review Committee [1993-1999]  
Organization of Neonatal Training Program Directors [1995-2000]  
Chair, Organization of Neonatal Training Program Directors [1996-2000]  
Member, Acute Respiratory Illness Association [ARIA] for Infants and Children, Inc.  
Chair, Midwest Neonatal Advisory Group, MedImmune, Inc. [1999-present]  
Chair, Paradigm National Neonatal Committee [2001-present]  
Member, American Pediatric Society Nominating Committee [2005-2006]  
Member, American Academy of Pediatrics Strategic Planning Task Force [2006-present)

**EDITORIAL BOARDS:**

Editorial Board, Journal of Perinatology

**REVIEWER:**

Pediatrics  
Journal of Pediatrics  
New England Journal of Medicine  
American Journal of Obstetrics & Gynecology  
Journal of Perinatology

**VISITING PROFESSOR/LECTURER:**

- 1986 Mead Johnson Visiting Faculty, Michigan Osteopathic Medical Center, Detroit, MI  
1986 Riley Scientific Review Committee, Indianapolis, IN  
1986 Postgraduate Course, University of Cape Town, Cape Town, South Africa  
1986 *Priorities in Perinatal Care*, 5<sup>th</sup> Annual Conference, Rustenburg, South Africa  
1986 Statewide Perinatal Conference Teaching Day, Westchester County Medical Center, New York Medical College, NY  
1986 *"Evening of Medicine"*, Cleveland Bar Association, Cleveland, OH  
1986 *New Horizons in Perinatology*, Tulsa, OK  
1986 Pediatric Grand Rounds, Aultman Hospital, Canton, OH  
1986 Society for Pediatric Research Meeting, Washington, DC  
1986 National Conference on Neonatal Nursing, San Francisco, CA  
1986 11<sup>th</sup> Annual Perinatal Seminar, Medford, OR  
1986 XVIII International Congress of Pediatrics, Honolulu, HA  
1986 2<sup>nd</sup> Annual Fetus and Newborn Conference, San Diego, CA  
1986 Neonatal Nutrition Conference, Cleveland, OH  
1986 Eighteenth Memphis Conference on the Mother, Fetus and Newborn, Memphis, TN  
1986 Perinatal Research Society, Carefree, AZ  
1986 Pediatric Grand Rounds & Pedi/OB Talk, Worcester Mem Hosp, Worcester, MA  
1986 93<sup>rd</sup> Ross Conference on Pediatric Research, Phoenix, AZ  
1986 *II Simposio de Actualizacion en Medicina Perinatal*, Monterey, Mexico  
1987 *"Medical Ethics - The Jewish Perspective"*, Cleveland, OH  
1987 Ninth Annual Conference on Management of the Tiny Baby, Orlando, FL  
1987 Children's Hospital Medical Center, Akron, OH  
1987 National Conference of Neonatal Nursing, Chicago, IL  
1987 15<sup>th</sup> Annual Perinatal Medicine Conference, Callaway Gardens, GA  
1987 Neonatal Intensive Care Collegium, Sardinia, Italy  
1987 Wyoming Perinatal Association Annual Meeting, Jackson, WY  
1987 National Conference of Neonatal Nursing, Washington, DC  
1987 Neonatal Nutrition Conference, Cleveland, OH  
1987 3<sup>rd</sup> Annual Fetus and Newborn Conference, San Diego, CA  
1987 Second Argentinian Congress of Perinatal Medicine, Buenos Aires, Argentina  
1987 9<sup>th</sup> Annual Las Vegas Seminars Pediatric Update [AAP], Las Vegas, NV  
1987 *"The Leading Edge of Perinatology: Challenges and Controversies"*, Charleston, SC  
1988 23<sup>rd</sup> Annual Pediatric Postgraduate Course, Miami, FL  
1988 100<sup>th</sup> Anniversary of the Junta de Beneficencia, Guayaquil, Ecuador  
1988 *How Small is Too Small?*, Pediatric Grand Rounds, Children's Hosp-Oakland, Oakland, CA  
1988 National Conference of Neonatal Nursing, San Diego, CA  
1988 Visiting Professor, Children's Hospital Medical Center, Akron, OH  
1988 15<sup>th</sup> Neonatal and Infant Respiratory Symposium, Vail, CO  
1988 High-Risk Pregnancy Symposium, Louisville, KY  
1988 International Symposium in Neonatal-Perinatal Medicine, Italy  
1988 14<sup>th</sup> Benjamin Rose Symposium in Neonatology, Montreal, Quebec, Canada  
1988 4<sup>th</sup> Fetus and Newborn Conference, Washington, DC  
1988 *"Hyperbilirubinemia in the Neonate"*, Robinson Memorial Hospital, Ravenna, OH

**VISITING PROFESSOR/LECTURER [cont=d]:**

- 1988 Consultation Site Visit, Division of Neonatology/Pediatric Pulmonology, Children's Hospital and University of Southern California Women's Hospital, Los Angeles, CA
- 1988 Neonatal Infections and the Role of Immunotherapy Symposium, Sawmill Creek Resort, Huron, OH
- 1988 *Perinatal Dilemmas*, Jackson Hole, WY
- 1988 Neonatal Nutrition Conference, Beachwood, OH
- 1988 Neonatal Perinatal Association, San Diego, CA
- 1988 Pediatric Grand Rounds, Aultman Hospital, Canton, OH
- 1988 HH Shuman Annual Perinatal Lectureship, Springfield, MA
- 1988 Schick Symposium, Brookdale Hospital Medical Center, Brooklyn, NY
- 1989 Obstetrics, Gynecology, Perinatal Medicine and the Law
- 1989 American Society of Law and Medicine, Acapulco, Mexico
- 1989 *Perinatal Dilemmas*, Ft. Lauderdale, FL
- 1989 University of Miami School of Medicine, Miami, FL
- 1989 Combined Southern California Pediatric Postgraduate Meeting on Clinical Pediatrics, American Academy of Pediatrics, Palm Springs, CA
- 1989 *Continuing Care of the High Risk Infant*, Lutheran General Hospital, Park Ridge, IL
- 1989 National Health Service Corps' Perinatal Progress Conference, Beachwood, OH
- 1989 Postgraduate Symposium: Pediatrics, Baylor University, Houston, TX
- 1989 *Current Concepts in Fetal and Neonatal Care*, Rhode Island Medical Society 12<sup>th</sup> Annual Seminar, Newport, RI
- 1989 International Neonatal Intensive Care Colloquium, Alberta, Canada
- 1989 Israeli-American Neonatology Symposium, Jerusalem, Israel
- 1989 5<sup>th</sup> Annual Fetus and Newborn Conference, San Diego, CA
- 1989 American Heart Association Neonatal Hypertension Symposium, Bethesda, MD
- 1989 Neonatal Infections Workshop, Bern, Switzerland
- 1989 *Management of the Low Birthweight Infant*, Turin, Italy
- 1990 National Conferences of Neonatal Nursing, San Francisco, CA
- 1990 6<sup>th</sup> Annual Children's Hospital Medical Center ECMO Symposium, Breckenridge, CO [keynote speaker]
- 1990 Humana Hospital, Las Vegas, NV
- 1990 American Academy of Pediatrics' 15<sup>th</sup> Annual Symposium. Long Beach Memorial Hospital, Long Beach, CA
- 1990 Visiting Professorship, University of Turku, Helsinki, Finland
- 1990 *Perinatal Dilemmas*, Jackson Hole, WY
- 1990 Annual American Academy of Pediatrics Meeting, Boston, MA
- 1990 6<sup>th</sup> Annual Fetus and Newborn Conference, Washington, DC
- 1990 Twelfth Annual Mississippi Postgraduate Course, Jackson, MS
- 1990 *Hot Topics '90*, Ross Laboratories Special Conference, Washington, DC
- 1990 Respiratory Care Journal Conference, Cancun, Mexico
- 1991 Sixteenth Annual Care of the Sick Newborn Symposium, Long Beach, CA
- 1991 Southeastern Conference on Perinatal Research, Miami, FL
- 1991 National Institute of Perinatology, Lomas Virreyes, Mexico
- 1991 8<sup>th</sup> Annual Reunion of the Instituto Nacional de Perinatologia, Mexico City, Mexico
- 1991 International Perinatal Collegium, Oslo, Norway
- 1991 *Committee on Fetus & Newborn*, AAP District II, Chap III Teaching Day, West Point, NY

VISITING PROFESSOR/LECTURER [cont=d]:

- 1991 *Kliniksymposium*, Ninth Annual International, Department of Pediatrics, University of Vienna, Vienna, Austria
- 1991 Progress in Neonatology - IX Internationales Kliniksymposium, Vienna, Austria
- 1991 3<sup>rd</sup> Annual NICHD Conference on Fetal-Neonatal Medicine, Aspen, CO
- 1991 Valley Children's Hospital, Fresno, CA
- 1991 7<sup>th</sup> Annual Fetus & Newborn: State-of-the-Art Care, San Diego, CA
- 1991 Academy of Pediatrics Annual Meeting, New Orleans, LA
- 1991 Cornell University, Grand Rounds, New York, NY
- 1991 Pediatric Grand Rounds, Mount Sinai Medical Center, New York, NY
- 1991 *Hot Topics in Neonatology, '91*, Special Ross Conference
- 1992 Idaho Perinatal Project, Boise, ID
- 1992 Mid-Atlantic Neonatology Conference, Hidden Valley, PA
- 1992 Fifth Annual Pediatric Progress Conference, Milwaukee, WI
- 1992 International Course on Neonatal Pediatrics, Concepcion, Chile
- 1992 8<sup>th</sup> Annual Fetus and Newborn Conference, Washington, DC
- 1992 European Society for Pediatric Research, Uppsala, Sweden
- 1992 Tenth National Kaiser Permanente Pediatrics Conference, Hawaii
- 1993 Fifteenth Annual Meeting, Management of the Tiny Baby, Orlando, FL
- 1993 Mid-Atlantic Neonatology Conference, Hidden Valley, PA
- 1993 4<sup>th</sup> Ann Conf, *The Prevention of Prematurity and Neonatal Mortality*, San Diego, CA
- 1993 20<sup>th</sup> Neonatal and Infant Respiratory Symposium, Vail, CO
- 1993 *Developmental-Behavior Disorders: Update 1993*, Hilton Head, SC
- 1993 Surgery Grand Rounds, University Hospitals of Cleveland, Cleveland, OH
- 1993 International Perinatal Collegium Conference, Chatham, MA
- 1993 The Sick Newborn, Medical College of Georgia, School of Medicine, Augusta, GA
- 1993 *The Newborn - Update 1993*, McGill University, Montreal, Canada
- 1993 9<sup>th</sup> Annual Fetus and Newborn Conference, San Diego, CA
- 1993 *The At-Risk Newborn: What The Practicing Pediatrician Needs to Know*; 23<sup>rd</sup> Annual Fall Conference, Monterey, CA
- 1993 Annual Neonatal Lecture Series, Saint Vincent Health Center, Erie, PA
- 1994 5<sup>th</sup> Annual Conf, The Prevention of Prematurity & Neonatal Mortality, Orlando, FL
- 1994 Schneider Children's Hospital of Long Island Jewish Med Ctr, New Hyde Park, NY
- 1994 Society for Pediatric Research, Seattle, WA
- 1994 Inland Northwest Regional Perinatal Conference, Coeur D'Alene, ID
- 1994 10<sup>th</sup> Annual Fetus & Newborn Conference, New Orleans, LA
- 1994 University of Iowa Grand Rounds, Iowa City, IA
- 1994 Pediatric Grand Rounds, Lakewood Hospital, Cleveland, OH
- 1994 Perinatal Medicine in the 21<sup>st</sup> Century Symposium, University of Texas-Houston Medical Center, Houston, TX
- 1995 City-Wide Grand Rounds, Northern Ohio Pediatric Society, Cleveland, OH
- 1995 National Neonatal Convention, Acapulco, Mexico
- 1995 Mid-Atlantic Neonatology Conference, Hidden Valley, PA
- 1995 Neonatal and Respiratory Symposium, Vail, CO
- 1995 Society for Pediatric Research, San Diego, CA
- 1995 International Perinatal Collegium, Amsterdam, The Netherlands
- 1995 International Seminar in Neonatal Medicine, Santiago, Chile

VISITING PROFESSOR/LECTURER [cont=d]:

- 1995 11<sup>th</sup> Annual Fetus and Newborn Conference, San Diego, CA
- 1995 Care of the Sick Child Conference, Orlando, FL
- 1996 Groote Schuur Hospital, University of Cape Town, South Africa
- 1996 International Perinatology Collegium, Hong Kong
- 1996 23<sup>rd</sup> Neonatal and Infant Respiratory Symposium Conference, Maui, Hawaii
- 1996 Oregon Health Sciences University Neonatal Seminar Series, Portland, OR
- 1996 10<sup>th</sup> Annual Conference of Southeastern Assn of Neonatologists, Palm Beach, FL
- 1996 Controversies and Dilemmas in Perinatal & Neonatal Medicine Cruise to Alaska
- 1996 Visiting Professor, The University of Chicago, Diana Woo Memorial Lectureship
- 1996 12<sup>th</sup> Annual Fetus and Newborn Conference, Washington, DC
- 1997 Mead Johnson Neonatology Conference, Nemaacolin Woodlands Resort, PA
- 1997 Academy of Pediatrics, Military Section, San Antonio, TX
- 1997 Shadow Resort, Scottsdale, AZ
- 1997 Speaker, International Perinatal Collegium, Quebec, Montreal, Canada
- 1997 Visiting Professor, Henry Ford Hospital, Detroit, MI
- 1997 Mayo Clinic, Rochester, MN
- 1997 13<sup>th</sup> Annual Fetus and Newborn Conference, San Diego, CA
- 1997 American Academy of Pediatrics, New Orleans, LA
- 1997 Neonatal Physiology Course, Rainbow Babies & Children=s Hospital
- 1997 Pediatric Grand Rounds, Columbus Children=s Hospital, Columbus, OH
- 1997 Guest Lecturer, NOPS/OB-GYN Society, Cleve Hilton South, Independence, OH
- 1997 Pediatric Grand Rounds, Henry Ford Hospital, Detroit, MI
- 1997 Hot Topics 97. Washington, DC
- 1998 Annual Midwest Neonatal Symposium, Chicago, IL
- 1998 Guest Lecturer, Mead Johnson Neonatology Conference, Nemaacolin Woodlands Resort, Nemaacolin, PA
- 1998 *Morbidity & Mortality of Very Low Birth Weight Infants*. Pediatric Surgery Grand Rounds, Rainbow Babies & Childrens Hospital, Cleveland, OH
- 1998 *NICHD Neonatal Research Network & Its Impact on Newborn Care*. Pediatric Grand Rounds, Mt. Sinai Medical Center, Cleveland, OH
- 1998 *Neonatal Jaundice: Changing Perspectives and Oxygen Therapy*. The Tiny Baby Conference, Orlando, FL.
- 1998 Annual Winter Meeting, Ohio State University, Vail, CO [3/8-14]
- 1998 1998 Workshop, Perinatal Practice/Comm on Fetus & Newborn, Scottsdale, AZ
- 1998 Society for Pediatric Research, New Orleans, LA
- 1998 *Neonatal Problems: Cerebral Palsy - Causes and Effect and Care of the Low Birthweight Infant: Update on State-of-the-Art*. 16<sup>th</sup> Annual Conference on Developmental-Behavioral Disorders and A Spectrum of Pediatric Challenges, Hackensack University Medical Center, Hilton Head, SC
- 1998 Neonatology Conference, Ancona, Italy
- 1998 Perinatal GBS Conference for Family Practice/Pediatrics, Southwest General Hospital, Middleburg Hts., OH
- 1998 *Problem Cases in the Delivery Room, The Newborn with Respiratory Difficulty, Neonatal Infections: Prospects for Prevention, and Early Discharge and Neonatal Jaundice*. Summer Pediatric Update at Vail. Phoenix Children's Hospital, Vail, CO
- 1998 Conference on Perinatal Dilemmas, Big Sky, Montana

**VISITING PROFESSOR/LECTURER [cont=d]:**

- 1998 Perinatal Meeting, Buenos Aires, Argentina, SA
- 1998 Fetus & Newborn, Washington, D.C.
- 1998 Pediatric Grand Rounds, Medical College of Wisconsin, Milwaukee, WI
- 1998 Pediatric Congress, Salvador, Brazil, SA
- 1998 Hot Topics, Washington, D.C.
- 1999 Mead Johnson Neonatology Conf, Nemaocolin Woodlands Resort, Nemaocolin, PA
- 1999 *Limits of Viability and Hot Topics in Neonatology*, Perinatology/Neonatology Seminar, Kansas City, MO
- 1999 *Ethical Challenges at the Limits of Fetal Viability*, Pediatrics Today, Rainbow Babies & Children's Hospital, Cleveland, OH
- 1999 *Hyperbilirubinemia*, Pediatric Grand Rounds, Rainbow Babies & Children's Hospital, Cleveland, OH
- 1999 *Cost Effectiveness of Implementation of Guidelines for Preventing Early Onset Group B Streptococcal Infection at MacDonald Women's Hospital*, Society for Pediatric Research Annual Meeting, San Francisco, CA
- 1999 13<sup>th</sup> Annual SAN Conference, Marco Island, FL
- 1999 Speaker, International Perinatal Collegium, Villars, Switzerland
- 1999 Speaker, St. Mary's Hospital, London, England
- 1999 Speaker, AAP NeoPrep, San Antonio, TX
- 1999 Coordinator/Speaker, Fetus & Newborn Conference, La Jolla, CA
- 1999 Annual Meeting, American Academy of Pediatrics, Washington, DC
- 1999 3<sup>rd</sup> Annual Neonatal Critical Care Symposium, Cincinnati, OH
- 1999 NIH Workshop, MetroHealth Medical Center
- 2000 Annual Winter Meeting, OSU, Neonatal & Infant Symposium, Vail, CO
- 2000 Speaker, Workshop, Perinatal Practice/Fetus & Newborn Comm, Scottsdale, AZ
- 2000 Society for Pediatric Research, Boston, MA
- 2000 SUN Conference, Johannesburg, South Africa
- 2000 Speaker, Fetus & Newborn Conference, Washington, DC
- 2000 Speaker, Very Low Birth Weight Infant: Delivery & Initial Care Conf, Prague
- 2000 Speaker, Autumn in New York Conference
- 2000 Speaker, Hot Topics, Washington, DC
- 2001 Speaker, Tiny Baby Conference, Orlando, FL
- 2001 Speaker, Hong Kong International Conference, Hong Kong
- 2001 Speaker, Ross Labs sponsored Neonatology Meeting, Garden City, NY
- 2001 Perinatal Section Meeting, American Academy of Pediatrics, Scottsdale, AZ
- 2001 Society for Pediatric Research, Baltimore, MD
- 2001 Speaker, SAN Conference, Marco Island, FL
- 2001 Speaker, International Perinatal Collegium, Marco Island, FL
- 2001 Speaker, NeoPrep, American Academy of Pediatrics, Boston, MA
- 2001 American Academy of Pediatrics Annual Meeting, San Francisco, CA
- 2001 Speaker, Fetus & Newborn Conference, La Jolla, CA
- 2001 Hot Topics, Washington, DC
- 2002 Perinatal Section Meeting, American Academy of Pediatrics, Scottsdale, AZ
- 2002 Pediatric Academic Societies Annual Meeting, Baltimore, MD
- 2002 American Academy of Pediatrics Annual Meeting,
- 2002 Speaker, Fetus & Newborn Conference, Washington, DC



**VISITING PROFESSOR/LECTURER [cont'd]:**

- 2002 Hot Topics, Washington, DC
- 2003 Perinatal Section Meeting, American Academy of Pediatrics, Scottsdale, AZ
- 2003 Pediatric Academic Societies Annual Meeting, Seattle, WA
- 2003 11<sup>th</sup> Annual Neonatal Conference, Middlesbrough, UK
- 2003 Fetus & Newborn Conference, New Orleans, LA
- 2003 11<sup>th</sup> Newborn/Pediatric Symposium, Kosair Children=s Hosp, Univ Louisville, KY
- 2003 20<sup>th</sup> Annual Fall Conf, Neonatology 2003: Clinical Advances, U Mich, Ann Arbor, MI
- 2003 American Academy of Pediatrics Annual Meeting, New Orleans, LA
- 2003 27<sup>th</sup> Ann Internat=l Conf - Neonatology 2003, Univ Miami, Key Biscayne, FL
- 2003 Hot Topics, Washington, DC
- 2003 Speaker, 23<sup>rd</sup> Annual Convention of The National Neonatology Forum, Hyderabad, India
- 2004 Speaker, The Best of Hot Topics in Neonatology 2003, Shanghai, China
- 2004 Perinatal Section Meeting, American Academy of Pediatrics, Scottsdale, AZ
- 2004 Pediatric Academic Societies Annual Meeting, San Francisco, CA
- 2004 Speaker, Primer Congreso Iberoamericano de Neonatologia, Galapagos Island, Ecuador
- 2004 Speaker, The 5<sup>th</sup> World Congress on Controversies in OB/GYN & Infertility, Las Vegas, NV
- 2004 Perinatal Section Meeting, American Academy of Pediatrics, San Francisco, CA
- 2004 Speaker, New Concepts in Neonatal Intensive Care, Columbia University, NY
- 2004 Co-Chair, The Fetus & Newborn Conference State of the Art Care, LaJolla, CA
- 2004 Speaker, 21<sup>st</sup> International Symposium on Neonatal Intensive Care, Milan, Italy
- 2004 Speaker, Department of Pediatrics, University of Siena, Siena, Italy
- 2004 Speaker, March of Dimes Ohio Summit on Prematurity, Columbus, OH
- 2005 Speaker, 21<sup>st</sup> Annual Conference on OB/GYN, Perinatal Medicine, Neonatology and the Law, Los Cabos, Mexico
- 2005 Visiting Professor, Stanford University School of Medicine, Stanford, California
- 2005 Speaker, 13<sup>th</sup> National Neonatology Congress, Kayseri, Turkey
- 2005 Speaker, 25<sup>th</sup> McLemore Birdsong Pediatric Conference, University of Virginia Department of Pediatrics, Charlottesville, Virginia
- 2005 Speaker, Pediatrix 2005 Annual Medical Directors' Meeting, Pediatrix Medical Group, Aventura, Florida
- 2005 Co-Chairperson and Speaker, Fetus and Newborn Conference, Boston, Massachusetts
- 2005 Speaker, Grand Rounds, Department of Pediatrics, University of Alabama at Birmingham
- 2005 Speaker, 5<sup>th</sup> Annual Farrokh Shahrivar, M.D., Lectureship, Division of Neonatology, Department of Pediatrics, St. Luke's-Roosevelt Hospital Center, New York, New York
- 2005 Speaker, Grand Rounds, Department of Obstetrics and Gynecology, St. Luke's-Roosevelt Hospital Center, New York, New York
- 2005 Speaker, The 19<sup>th</sup> Alexis F. Hartmann, Sr., M.D. Lecture, Department of Pediatrics, Washington University in St. Louis, Missouri
- 2005 Speaker, The 3<sup>rd</sup> Annual Enrique M. Ostrea, Jr., M.D. Endowed Lectureship, Department of Pediatrics, Wayne State University and Hutzel Women's Hospital, Detroit Medical Center, Detroit, Michigan
- 2006 Speaker, Grand Rounds, William Beaumont Hospital, Royal Oak, Michigan
- 2006 Speaker, 32<sup>nd</sup> Annual Meeting of the Swiss, Austrian and German Society of Neonatology and Pediatric Intensive Care Medicine, Vienna, Austria
- 2006 13<sup>th</sup> Annual Donald V. Eitzman Lecturer, University of Florida, Gainesville
- 2006 Keynote Speaker, Neonatology and the Law Conference, Anaheim, California

**VISITING PROFESSOR/LECTURER [cont'd]:**

- 2006 Conference Co-Chair and Speaker, The Fetus and Newborn: State of the Art Care, San Francisco, California
- 2006 Evanston Hospital Annual Lectureship, Evanston, Illinois
- 2006 Speaker, Hot Topics in Neonatology, Washington, D.C.
- 2007 Speaker, 13<sup>th</sup> Annual Conference-Current Topics and Controversies in Perinatal and Neonatal Medicine, Coronado, California
- 2007 Speaker, International Conference on Meconium Aspiration Syndrome and Meconium-Induced Lung Injury, Chicago, Illinois
- 2007 Speaker, 1<sup>st</sup> International Conference on Chronic Diseases in Children, Jerusalem, Israel
- 2007 Speaker, 21<sup>st</sup> Annual Southeastern Association of Neonatologists Conference
- 2007 Speaker, NeoPrep Conference, Atlanta, GA
- 2007 Invited Speaker, Fisher & Paykel Healthcare, Auckland, New Zealand
- 2007 Invited Speaker, New Zealand-Australia Neonatology Association, Auckland, New Zealand
- 2007 Conference co-chair & Speaker, The Fetus and Newborn: State of the Art Care, Orlando, FL
- 2007 Invited Speaker, Swedish Embassy, sponsored by BabySwede, LLC, Washington, DC
- 2007 Invited Speaker, 31<sup>st</sup> Annual International Neonatology Conference, Miami, FL
- 2007 Moderator, Hot Topics in Neonatology, Washington, DC
- 2008 Invited Speaker, 4<sup>th</sup> EURAIBI International Meeting, Siena, Italy
- 2008 Invited Speaker, 23<sup>rd</sup> International Symposium on Neonatal Intensive Care, Milan, Italy
- 2008 Invited Speaker, 32<sup>nd</sup> Annual Perinatal Symposium, Oaklawn, Illinois
- 2008 Conference co-Chair and Speaker, The Fetus and Newborn Conference, LaJolla, CA
- 2008 Keynote Speaker, 14<sup>th</sup> Annual Symposium: Advances and Controversies in Neonatal Medicine, Vanderbilt University and Medical Center, Nashville, TN
- 2010 Speaker, *Morbidity and Mortality in the LBW Infant*, Bangkok International Neonatology Symposium, Bangkok, Thailand
- 2010 Speaker, *Meconium Aspiration and Its Complication*, Bangkok International Neonatology Symposium, Bangkok, Thailand
- 2010 Speaker, *Changing Epidemiology of Neonatal Sepsis*, Bangkok International Neonatology Symposium, Bangkok, Thailand



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174. Kabra N, Schmidt B, Roberts R, Doyle L, Papile L, Fanaroff AA, and TIPP Investigators: Surgical closure of a patent ductus arteriosus (PDA) is associated with increased neurosensory impairment in extremely low birth weight (ELBW) infants. Presented at the 2005 Pediatric Academic Societies Annual Meeting.
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GRANT SUPPORT

NIH Training Grant

Project Title: Neonatal Respiratory Research Training Project

Project Director: Avroy A. Fanaroff

Budget: 8/1/78-6/30/88

Ohio Department of Health

Project Title: Perinatal Regional Education Team [Ohio Region V] Project

Project Directors: Irwin R. Merkatz and Avroy A. Fanaroff

Budget: \$108,750 over a 3 year period

Robert Wood Johnson Foundation

Project Title: High Risk Pregnancy Care

Project Directors: Irwin B. Merkatz and Avroy A. Fanaroff

Budget: \$2,225,000 over a 5 year period

Robert Wood Johnson Foundation

Project Title: Post Perinatal Care: A Continuity of Follow-up for Infants, Mothers and Families

Project Directors: Irwin R. Merkatz and Avroy A. Fanaroff

Budget: \$494,999 over a 3 year period

Department of Health and Human Services-Maternal and Child Health Project

Project Title: Neonatal Nutrition Training Grant

Project Directors: Avroy A. Fanaroff and Robert Kliegman

Project Period: August 1, 1978-September 30, 1988

Budget: \$52,000/year direct costs

NIH

Department of Health and Human Services

Project Title: Cooperative Multicenter Network of NICUs

Project Director: Avroy A. Fanaroff

Project Period: April 1, 1996-March 31, 2001

Budget: \$594,532 for total project

NATUS Medical, Inc.

Project Title: Diagnosis of Increased Bilirubin Production and Prediction of Hyperbilirubinemia  
\$95<sup>th</sup> Percentile in Near Term and Term Infants

Project Director: Avroy A. Fanaroff, M.D.

Project Period: March 1, 1998 - March 1, 1999

Budget: \$35,000.00

GRANT SUPPORT: [cont=d]:

**NABI**

**Project Title: An Open-Label, Dose-Escalating, Two-Center Study of the Safety and Pharmacokinetics of an Anti-*Staphylococcus aureus* Immune Globulin Intravenous [Human] [StaphGAM] in Very-Low-Birth-Weight Neonates**

**Project Director: Avroy A. Fanaroff, M.D.**

**Project Period:**

**Budget**

**NIH**

**Department of Child Health and Human Services**

**Project Title: Cooperative Multicenter Network of NICUs**

**Project Co-Director: Avroy A. Fanaroff, M.D.**

**Project Period: April 1, 2001-March 31, 2006**

**Budget: \$644,621 for total project**