



**ORAL HISTORY PROJECT**

# **Philip Sunshine, MD**

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

**January 9, 2000  
Portola Valley, California**

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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 Philip Sunshine, MD**

DR. GARTNER: This is Dr. Lawrence Gartner interviewing Dr. Philip Sunshine as part of the American Academy of Pediatrics history of neonatal-perinatal medicine project, on January 9, 2000, in Dr. Sunshine's home in Portola Valley, California, near the Stanford University campus. This is a 2-part interview, but the parts will undoubtedly overlap. One part concerns you and your personal and professional history. The other part is designed to gain an understanding of how neonatology, as a medical discipline and as a subspecialty in pediatrics, originated, developed and evolved. Your own contribution to that evolution is very important and will be central to this interview. We're also interested in others who contributed to that process, your views of their contributions, as well as the nature and importance of those contributions. Feel free at any time to wander off into areas that I don't necessarily ask you questions about. This is very open-ended, and we want to get as much information as we can, both about you and the field. Don't be restricted by what I ask. You can, of course, stop at any time if you want to take a break. Just tell me and we'll stop the tape. My estimate is that this interview will probably be somewhere between 5 and 7 hours in total, and I think we'll have enough time to cover everything that I hope you want to tell us.

So, we'll begin. I have some questions that I will use as a general guide. You'll see we use the same questions with each of the people we're interviewing, so we'll have some uniformity in the areas that we cover. But, as I said, that shouldn't restrict you. What I would like to do is start with the early history, your personal early history. That is, tell us something about your parents, where you were born, your siblings, if any, and your early life.

**DR. SUNSHINE: I was born in Denver. I am an only child. The joke is, my brother was an only child. [Laughter]**

**My dad was born in Poland and came to United States when he was 17 years of age. In a very short period of time, he learned the language, finished high school, went to college, and became a pharmacist. It's amazing, even though he was born in Europe, he spoke English perfectly, without any accent. My mother's parents came from Russia. I asked her, "Where in Russia?" She said, "It's an old town called Lubovnia." I asked, "Where is that?" She said, "It's in Russia," which has 11 time zones. But, we think it's some place in Ukraine, now called Lubomol.**

**My parents met in Denver and were married, and I grew up in that environment. My dad worked for various pharmacies, and then bought his own store. After about 5 or 6 years, he had my mom take a course, which was at a place called Capital College of Pharmacy in Denver. After 6 months she became an assistant pharmacist. So, they were both pharmacists, and I grew**

up in that environment.

We lived in a wonderful part of town called West Denver. We used to say, “*Omnes Denver dues partes divisa est*”. All of Denver is divided into 2 parts — the west side where we grew up and the other side. [Laughter]

I had many, many friends and we’re still very close. We keep in touch. In fact, every few years we return to Denver, relive the good old days which keep getting better every year we talk about them. I led a very fortunate life because I grew up in a wonderful community, had wonderful parents. Unfortunately, my dad died when he was rather young. He was only 57 years of age. My mom is still alive. She is 90 years old — still going strong. [She passed away 5 years after this interview, at age 95.]

I went to the University of Colorado, then the University of Colorado School of Medicine. When I graduated in 1955, I left Denver to intern at a hospital called Sinai Hospital in Baltimore. So, the old joke was that I spent a decade in Baltimore one year.

DR. GARTNER: [Laughs] You were there just one year?

DR. SUNSHINE: One year. Harry [H.] Gordon was there, and he was the reason I went there. He had been the professor and chairman of the department of pediatrics at the University of Colorado. Everybody loved him. He was a wonderful teacher, built a great department, and when Edwards A. Park retired and passed away at Johns Hopkins [Harriet Lane Home for Invalid Children], he thought that he was probably going to be the heir apparent to take that job. Unfortunately, he didn’t get the job at Hopkins; but, he convinced a friend of mine, who was first in our medical school class, and myself to come to Sinai Hospital in Baltimore, which he felt was the best rotating internship in the country. So, we went there. My friend came back to Colorado and went into internal medicine and then into neurology. The chairman of pediatrics when I was at the University of Colorado the last 2 years was Robert Hamilton Alway. Bob had left Colorado to become chairman, and subsequently the dean at Stanford University School of Medicine.

I knew I would have to go into the military service, and so I wrote to him and said, “I’d like to come to San Francisco for a while until I have to go into service. Please give me a job.” So, he gave me a job in pediatrics, and I’ve been in pediatrics ever since.

DR. GARTNER: Had you thought that you were going to be a pediatrician from the very beginning of your medical education, or even before?

DR. SUNSHINE: I like pediatrics. I really like surgery. And I thought I’d



end up being a surgeon, but — you may have to edit this out — I always said I was going to be accepted into a program in surgery, except they found out my mother and father were legally married. [Laughter] And they wouldn't give me a job.

DR. GARTNER: We can leave that.

DR. SUNSHINE: But after spending a year with Dr. Alway in San Francisco, I was really hooked on pediatrics. I went into the service for 2 years and I came back to Stanford. By that time, Bob Alway became the dean of the medical school and recruited Norman Kretchmer to be chairman of pediatrics. I just lived a charmed life. I worked with 2 wonderful people. Norman Kretchmer, who really became my patron, helped develop my academic career far above or beyond what was expected of a normal mortal. And I had the opportunity of working with some really wonderful people the whole time that I remained at Stanford. I did spend almost 4 years at Children's Hospital in Los Angeles, as vice chairman of the department of pediatrics.

DR. GARTNER: We'll go into that in more detail. Did you think you would be a physician and would go into medicine when you were a younger child? Or is that something that came later in your years?

DR. SUNSHINE: I always knew I'd be a doctor. Initially, I thought I'd be a practitioner in a small town of Colorado, be in family practice and do cancer research on the side. But then, going to school, and eventually ending up in pediatrics, I thought I'd practice pediatrics. It was an interesting situation, because when I finished my residency, I stayed on another year as chief resident. One of the people I worked with as a resident, was Birt Harvey, who was a wonderful individual to work with. He had a wonderful practice in Palo Alto. He said, "One of my partners is going to go into pediatric psychiatry in a few years. Why don't you come in with us when he leaves?" So that was a year, 2 or 3 away, and Norman talked me into doing a fellowship. Might as well spend a couple of years doing fellowship, before going to practice. Well, I never did go into practice after that. I was fortunate because everything that I started to work on, just turned out to be rewarding.

DR. GARTNER: Now, this fellowship which you took with Norman Kretchmer was a neonatology fellowship, or was it not called that then?

DR. SUNSHINE: No, there was no such a thing as a neonatology fellowship. It was a fellowship in metabolism. And actually, it was studying the development of the gastrointestinal tract. You and I were about the same ilk.

DR. GARTNER: Yes.

**DR. SUNSHINE:** You went into the liver aspect, and I went into the GI [gastrointestinal] aspect. At that time, neonatology was a field to which people brought certain expertise. Mostly it was pulmonary or cardiology. A few brought hematological backgrounds, and you and I brought GI and nutrition into the program.

At that time, of course, there was no reimbursement for neonatology. So, one had to have another interest, essentially. So, I was doing GI and nutrition, and then I'd spend time in the nursery whenever I had a chance to do so. Actually, about 3-quarters of the way through fellowship, I thought I'd go into endocrinology or metabolism because I was working with Bob [Robert E.] Greenberg, Sumner [J.] Yaffe, Irv [Irwin A.] Schafer, and Norman Kretchmer, of course. One morning, Norman called me at his office, and said, "I want you to do GI." So, I said, "Fine," and I read up as much as I could. I was always interested in malabsorption and problems like that. I started reading and taking care of patients, and then after about a year, I told Norman, "I need to take a fellowship." I was not versed in the technical aspects of GI and, I really needed to take off a couple of years for training in GI. He said, "I'll send you to my friend Murray Davidson. You work with him for 3 months. He'll teach you everything you have to know about GI."

DR. GARTNER: [Laughs] Three months!

**DR. SUNSHINE:** Beth [Sara Elizabeth Sunshine] and I had a baby at that time, so we went back to New York. We lived with her parents in New Jersey. I used to drive in every morning to Bronx-Lebanon Hospital. Occasionally I went to Jacobi Hospital with Murray.

DR. GARTNER: Jacobi?

**DR. SUNSHINE:** Jacobi. He would be at Jacobi Hospital, in the Bronx. He would also attend at New York Hospital. I followed him around for 3 months, learned a lot of GI, and came back and set up a GI clinic. I continued to do both GI and nursery until 1980 when I felt I could no longer run the GI clinic and do neonatology. At that time my chairman was Irving Schulman and we brought in one of my fellows to run the GI program. And within a very short period of time, he built it up into a large program.

DR. GARTNER: Who was that?

**DR. SUNSHINE:** John Kerner. Because doing both neonatology and GI, I could only run a consultative service. I would see patients, make diagnoses, outline plans of treatment, and then send them back to their primary care physicians. If they ran into problems, then I would see them again. I was able

to run a service that had 2 afternoon clinics a week. Well, after John took over the program grew at a phenomenal rate. Many doctors don't like to take care of kids with chronic inflammatory bowel disease, or other complicated GI problems, so he became their primary care physician.

DR. GARTNER: Correct.

DR. GARTNER: Let's go back to the nursery at Stanford and what it was like when you first got there and how it evolved. Because that's one of the earliest developments of neonatology as a discipline.

DR. SUNSHINE: When I returned from the service, actually the first year of residency, we were up in the city. It was a little nursery attached to San Francisco General Hospital and a small nursery attached to the Stanford Hospital; 2 separate units. They would take care of preterm babies and a few sick babies; but if they were really sick, they had to go to the ward. When I came back to Stanford after I completed my naval duty, Lou [Louis] Gluck had just arrived and he was put in charge of the nursery. He was a tremendous teacher, and clinician, and investigator. And we had the first premature infant nursery at Stanford.

DR. GARTNER: That was in Palo Alto?

DR. SUNSHINE: Yes, Stanford had moved from the city down to Palo Alto in 1959. The unit opened up in December of 1959. And Lou ran the nursery.

Neonatology used to be sort of boring. We would examine a bunch of well babies, talk to parents, and once in a while get a sick kid; and if he or she were really sick, they would go to the ward. Lou taught me so much about newborns and he made it so interesting because you could examine a baby and realize this baby has so many qualities that you never understood before.

He started to do some studies here. One of the first studies he did was with Sumner Yaffe and with Harold [J.] Simon. At that time, in 1959, and actually several years before, the biggest problems of nurseries and newborns was staph [*Staphylococcus aureus*] infections. Kids would get these staph infections and they would go in to staph pneumonia and empyema. There were always kids on the ward with that problem. They felt that the baby picked up the staph during the delivery process in the delivery room, so they start bathing babies with pHisoHex in the delivery room. Then the babies would come to the nursery and get another bath. They published their paper after about a year and a half later showing there was no staph in our nursery. Of course, people said, "Well, staph comes and goes." But that was one of the first clinical studies I was involved in and I just thought that the way it was set up and carried out was terrific. So, that was another

**interaction I had with Lou.**

**DR. GARTNER:** At that time, the nursery that you had was for both sick and well prematures and for older, full-term, sick babies. Or no?

**DR. SUNSHINE:** All there were newborns. There was a newborn nursery, and then there was a preemie nursery.

**DR. GARTNER:** Right.

**DR. SUNSHINE:** We had nursery for premature babies where premature babies could then be brought in. If it was a full-term baby who was ill, most of those babies would be taken care of on the pediatric ward. In California there was Title 22 [Title 22 California Code of Regulations Division 5] that had regulations regarding which babies could be admitted to premature infant nurseries. A baby could be transferred in from another hospital and be cared for. If they were bigger babies and were no longer preemies they had to be cared for in a different area. If the baby left the hospital and had to be readmitted, they could not be readmitted to the premature unit. We were really strapped with these regulations. We didn't know how to get around these.

Lou, at the time, was offered a terrific job by Milton [J. E.] Senn at Yale. So he went back to Yale, and over a short period of time, built their nursery. I remember talking to him one day and I was telling him about the regulations and all the problems. And he said, "Don't have a premature nursery. Have an intensive care nursery for babies. Change the name, change the setup. Then you won't have to follow those regulations."

**DR. GARTNER:** [laughs]

**DR. SUNSHINE:** That sounded like a great idea, so we changed the name to be intensive care nursery. Then we could admit babies from the outside, we could take care of sick babies. And it got very, very interesting.

**DR. GARTNER:** What year was that?

**DR. SUNSHINE:** About 1960 to 1961. Lou had only been gone for about a year or a year and a half. I would keep in touch with him. I would call him periodically about some patient I had trouble with. He always gave me some great ideas and great answers on how to take care of them.

When Gluck left, Sumner Yaffe took over. One was sort of ordained, "You're going to be the head of the nursery." And Sumner did a great job, but his wife really did not want to live in the West. She wanted to go back to the East Coast. After a few years she finally prevailed, and Sumner left and

went back to Buffalo.

He went back and Irv Schafer took over. During this period of time, Norman Kretchmer, who always seemed to have vision and knew what was going to happen 5 and 6 to 7 years down the road, had been pushing to develop a research center that was oriented to premature babies. Working with the [US] National Institutes of Health, just bugging them periodically. He finally got a call. I've forgotten the gentleman's name who was head of the research center division. He said, "If you can get me a grant application within 3 or 4 weeks, I will present it, and we will see if we can get it through." So, Norman mobilized all the faculty, all the secretaries, and over a 3-week period, we put out a grant. He was smart enough to bring in people from neurology, surgery, infectious diseases. All of these people sat down and wrote proposals to do clinical studies. Secretaries worked many hours a day to type this up and there was no Xerox at that time. There were 5 copies, so if you made a mistake you had to go back and erase everything. We got the grant in and it was funded. We had a site visit. Initially we asked for 10 beds, and when they visited us, they said, "Do you think you could fill up 10 beds?" I said, "We'll be lucky if we can fill up 6." [Laughter]

So, they let us have a unit that had 8 beds. That was the beginning of a wonderful experience because we were able to bring babies in and do anywhere from 1 to 5 studies on the infants. All of the proposals had to go through the Protection of Human Subjects committee. We were able to pour out numerous papers using a multidisciplinary approach. We had investigators such as Sumner who did studies on the development of renal function in preemies. Irv Schafer, who looked at various types of amino acid abnormalities in babies. The neurology group included Gilbert Frank, who did developmental studies on EEG changes as the baby developed. The infectious disease group really did the first pharmacokinetics of various antibiotics in babies like kanamycin and, later, gentamicin. So, we never really ran into problems with drug toxicities because we could measure the levels. And so those studies were very, very efficacious.

DR. GARTNER:       What were your own studies at that time?

DR. SUNSHINE:     Mostly nutrition. We were concerned about the tendency to feed babies very high-protein diets. We were able to show, which had been shown previously, that the babies' blood urea nitrogens would go way up, showing that they were not utilizing the protein, but were actually utilizing the protein for energy and then having to get rid of the urea. We set up a micro method of measuring ammonia metabolism so that we could show that in some of these babies the ammonia level was going up. Not into the toxic ranges that you would see, say, with an inborn error of metabolism, but enough that we were concerned about what does ammonia do to tiny infants. We worked out those studies and we were able to show that the lower protein

intake was probably pretty safe for babies, and that breast milk, although it didn't provide all the nutrients, was probably the safest to use for babies.

DR. GARTNER: Were you using breast milk at that time?

DR. SUNSHINE: We started. I was really lucky because I had a group of nurses who were very committed to breastfeeding. They would urge the parents to bring in breast milk for the babies and work with them and get them pumps, so that by the time I took over the directorship of the nursery in 1967, almost every mom in there was feeding breast milk.

DR. GARTNER: That was really unusual at that time.

DR. SUNSHINE: It was very unusual. But it did several things for us. One is that we got the parents involved in the care of the babies. They were contributing something that the doctors couldn't contribute. It gave them sort of a golden light to provide this material. We realized it didn't provide enough nutrients, so we would fortify it with some formula. And with that came a woman by the name of Maria Teresa Asquith. She developed the milk bank down in San Jose. She was a super woman who just worked like the devil to get this program going. Going through all the state and federal regulations, she single-handedly set up the milk bank. And we use it all the time.

DR. GARTNER: Is it still working?

DR. SUNSHINE: Yes, it is still working. She's retired. But the cost is great now, most people don't use it. But, we did. We used it for babies who were preemies, kids with GI allergies. I have to tell you a great story about that because we had a baby who had just a terrible GI allergy and the only thing that worked was breast milk. And we were running out of breast milk, so, I called the *Palo Alto Times*, and told them about our need. They published an article about the need of women to bring in milk to donate. Beth was at home and receives a call. The caller says, "This is Linus Pauling and I've been reading in the paper where your husband needs breast milk. I am developing, or in the process of developing a substance called Vivonex-100, which is a synthetic formula. And I was wondering if he would like to use that. So, please have him call me. It's really important. My name is Pauling, P-A..." My wife said, "I know how to spell it". [Laughter] Vivonex was fine, but breast milk was best.

DR. GARTNER: Yes.

DR. SUNSHINE: So, those were my contributions really.

DR. GARTNER: In what year did you become the director?

**DR. SUNSHINE:** Oh, let me go a little back. Lou was there for a year. Sumner took over for about 2 years. Then Irv Schafer was the director—he and I were. We really wanted somebody who knew neonatology because we were both learning at that time. Norman was able to hire Marshall. [H.] Klaus. Marshall was sitting in his office in February back in Cleveland. It was snowing; it was cold. Norman said, “How would you like to come out and visit?” So, Marshall came out and took over as the director of nurseries in 1964.

Before he could come, he had to finish up the study that he started in Singapore with aerosolized surfactant. He was collaborating with Avron Y. Sweet, Bill Tooley, John A. Clements, Ernest K.] Cotton, and [J.] Chu whose name is first in that famous article. Marshall was able to get aerosolized di-palmitol lethicin to treat babies with RDS [respiratory distress syndrome]. Eugene Robillard had done some work with an aerosolized material previously and said it didn’t work. Although if you looked at his paper, which was in *Canadian [Medical Association] Journal*, I think 8 babies survived, and many of these babies were under 1000 grams. So, even though he didn’t see them getting up and walking away after they got the drug, he had a very good survival rate. I kept looking for his name in publications. I think he became a dean, and then he stopped doing research.

Although the group in Singapore had little success with the aerosolized spray, John Clements suggested that they try acetylcholine to improve perfusion of the lungs of the infants with RDS. It worked amazingly well.

When Marshall came back from Singapore he was very excited about the acetylcholine. I must say working with Klaus was a really interesting situation, because I learned so much from him. Except for Lou, he was the first other neonatologist I worked with. He taught me how to put in umbilical catheters, taught me how to monitor blood pressures, taught me how to recognize and care for sick babies. We were able to teach him how to ventilate babies because he had never been successful ventilating neonates. I’ll come back there in just a little bit. But Marshall came with this acetylcholine protocol, and it was a disaster.

**DR. GARTNER:** [Laughs]

**DR. SUNSHINE:** Initially it looked like the babies were getting better, they would just flush. Then their blood pressures would plummet, and then they would get worse. We must have treated, I think, either 16 or 18 babies. Finally, the house staff and myself said, “We’re not going to do this anymore, because we don’t think it helps.”

**DR. GARTNER:** What was the hypothesis?

**DR. SUNSHINE:** At that time, it was that hyaline membrane disease was really a disease of hypoperfusion. Clements actually pointed out that these kids would get what looked to be the poor perfusion of the lungs, and if you could open up the lung perfusion, they would do better. They wrote that paper. It took them about 3 years to write it, called it pulmonary hypoperfusion syndrome. That was the basis of using acetylcholine. Marshall had many other studies going. He knew pulmonary physiology because he had studied up at University of California San Francisco. His contemporary was Bill Tooley.

I think the study that really turned him on the most, of course, was letting parents into the nursery. It was sort of an interesting situation because we had a family at that time whose father was a resident in radiology. He and his wife would be there every evening. He was catching up on his work, and she would sit outside the nursery looking at the baby who was on a ventilator. At that time parents could not come in. Thomas K. Oliver had done a study about not using mask and cap and gown to go into nursery. He hadn't published it yet, but he talked about it at the Western Society for Pediatric Research. I remember a picture of him standing in the nursery without a gown or gloves talking about not increasing the incidence of sepsis.

So, Marshall came with one of our senior residents and said, "I would really like Mrs. Samu to be able to come into the unit and care for her baby." We all said, "You know, it's a great idea. This is nuts to keep the parents out." Luckily, Marshall got hold of Clifford R. Barnett who was an anthropologist, and Herbert Leiderman who was a psychiatrist. These were really hardheaded scientists who said, "We really have got to study this. This is a great study." They worked out this study. You couldn't let half of the parents come in and half not, so they worked out a situation where for 4 months they let the parents in and then 4 months where they wouldn't. The really interesting thing is that they would call it the "Touch Study." Marshall made unbelievably astute observations during this period of time. The parents, he noticed, all followed a routine when they came into see their baby. They would all begin by just touching the baby's hands, just feel the hands, count the toes, and then gradually put their hand on the rest of the baby. Then they would talk to them. And of course, they wore a cap mask and gown and gloves.

The first part of the study showed that there was no increase in the incidence of infection. That was a major breakthrough. It just went to show that the parents could be involved in the care of the babies. I think this study really changed Klaus's focus to bonding. Then he and John H. Kennell would do many other studies.

**DR. GARTNER:** Yes.



**DR. SUNSHINE:** I just think it had opened up a whole new vista for him. And it did for our staff too. It was interesting to watch the nursing staff. Marshall picked up on this right away, too. The nurses would do the respiratory, heart rate, temperature—all the vital signs at once. And then they would go on to the next baby. When the parents first came in, Marshall noticed that the nurses would come over while the parent was there and take the temperature. Ten minutes later she would be back taking a pulse. Then she would come back and take the respiratory rate. They were sort of vying for the care of the babies.

The other thing that Marshall set up that was really helpful was that we had a nurse-doctor meeting. The nursing staff and the faculty would meet to discuss problems that were occurring during the Touch Study, so we could remedy these. And that became a tradition called the Nurse-Physician Meeting. They were wonderful, because the nursing staff started to bring up a lot of other issues that they wanted to discuss.

So, we would be with them and it would really be a tell-off session. They would bring up things like: this doctor doesn't talk to parents, treats parents badly, this one treats nurses badly, this one treats housekeeping badly, these doctors don't respond when we call. That really opened our eyes to a lot of problems that we were having. We were able to identify issues and solve them early. So, he really changed the nursery. He changed everything. Marshall was not the easiest man to work with because he had certain, definite ideas of how things had to be done. And I remember with the acetylcholine study he was going to continue forever. [Laughter] Then we said, "No Marshall, it's not going to work."

**DR. GARTNER:** He was chief of nursery from...

**DR. SUNSHINE:** He was chief of nursery from 1964 to 1967. He and Norman didn't get along well. Actually, Norman was very fair with him, but Marshall used to say, "You know, Norman has his sons and his stepsons." And he always felt he was the stepson. Bill [William] Weil wanted Marshall back very badly in Cleveland. He made Marshall a great offer as an associate professor. Norman said, "I'm filling out the papers, I can make you an associate professor, too, and your salary is going to go up." Well salaries in those days were not too great. [Laughter] But he thought it over, and Norman, said, "Where are you going to be happiest? Whom do you really want to work with?" And he said, "Well, you want to work with Bill Weil." So, Marshall left.

**DR. GARTNER:** Yes.

**DR. SUNSHINE:** At that time, we started looking around for another

director of nurseries. Norman said, “You’re going to do it.” I was really frightened. I didn’t know what to do because I knew how to take care of babies, but I didn’t have any idea about administration. So, I called Bill Tooley, who was up at UCSF [University of California, San Francisco]. I said, “Bill, would you come down to help me out a little bit and tell me what’s important. And we’ll pay honorarium; you will be like a speaker.”

Well he came down and spent about 3 or 4 hours with me and went over different aspects of administration, different aspects of patient care and teaching. He was wonderful, just wonderful. He did that on, I think, 3 separate occasions, and would not take any honorarium for it. At that time, we developed a very close relationship of the nurseries between UCSF and Stanford. We would go up and make rounds with their team, and they would come down and make rounds with our team. Of course, they were so well versed in cardiopulmonary physiology, it was like having visiting professors come through. It was a great program.

DR. GARTNER: Bill Tooley was head of the nursery at UCSF.

DR. SUNSHINE: He and Marshall were fellows together. Later on, I found they didn’t like each other too well. [Laughter] That’s why Bill was never down. But Tooley was probably one of the kindest, warmest people you’ll ever meet. He was a towering guy of about 6’5”, and if he got in a situation where he was ill at ease, he would sort of protect himself by becoming a little pompous and arrogant. But, that was Bill Tooley. And he did so many wonderful things for people over the years. He was a great, great help to me. So, a couple of things happened before this that might be of interest to you.

DR. GARTNER: Okay.

DR. SUNSHINE: We had an anesthesiologist by the name of Vernon Thomas, D. Vernon Thomas, who was a terrific anesthesiologist. He kept watching these babies who had hyaline membrane disease die. They would go into respiratory failure and die. And of course, the mortality rate was 50 to 60%. He kept saying that if he could intubate and ventilate those babies, they would survive. Part of me said, “Yes, but then we’ll end up with a kid who is going to have all sorts of problems afterward. That’s not worth doing.” Sumner was opposed to it. We didn’t want to do it. So, one week Sumner and I were back East for a meeting. William J. R. Daily was a senior resident, and a young man by the name of William McSweeney was a senior resident. McSweeney went into radiology. Vern Thomas got a very critically ill baby. Her mom was diabetic, she weighed about 3 pounds at birth, was in respiratory failure, and ashen. They intubated the baby, put her on a Bird Mark 7 ventilator, and she survived.

Of course, when Sumner and I came back, we were amazed that these docs had shown they could actually get a baby to survive with ventilator support. We didn't know how to initiate therapy. Joe Daily was a senior resident at this time. Bright as all get out—still is—he is probably smarter than most people give him credit for. We would wait for the baby to be really ashen. We just started using the measures of pH with the Astrup Radiometer. So, we could measure pH but we couldn't really measure pO<sub>2</sub>, since we didn't have the oxygen electrodes then.

Vern Thomas left to go to another hospital and Penelope Cave Smith, came in. Joe and she developed a scoring system for deciding which babies would go on a ventilator. If they reach a certain pH, if they reach a certain pCO<sub>2</sub>, pO<sub>2</sub> [partial pressure of carbon dioxide, partial pressure of oxygen], and we used that to determine which babies would go on.

Eventually when we started using the oxygen electrode, if the pO<sub>2</sub> was 40 or less, while on 100% oxygen, those babies would go on the ventilator. We initially used the old Mark 7, and then we had a Bennett PR-2 respirator. We had 3 oxygen concentrations we could use: 100%, 40% or room air. So, we would intubate the baby, ventilate him and watch the baby. And this baby got pinker. If the pH corrected itself, and the baby was acting well, we could come down to 40%. If they were on 40% and they were doing pretty well, then we could either take him down to room air or extubate him. It would sort of be a ritual, we would sort of dance around the crib and incubator at that time and say, "Do you think he's ready?" [Laughter] And then we would extubate. At that time, if the baby made it, great, if they didn't, we wouldn't reintubate him. We wouldn't ventilate any baby under 1000 grams because we knew they wouldn't survive.

When Marshall came he hadn't seen ventilation work. By the time he came, this was 2 years after we started ventilating babies, we had about a 40% survival rate in babies. Of course, they were all over 1000 grams. We had a negative-pressure ventilator, but you couldn't use it on kids under 1500 grams.

DR. GARTNER: Was that the Air Shields? [Air Shield incubator-respirator]

DR. SUNSHINE: Yes, the negative pressure ventilator. The best success was in the big babies who had a T-E fistula, who would sort of dwindle and die, and the kids who had emphysema or pulmonary abnormalities. The early heart lesions that Norman Shumway would repair, we could support those kids on the ventilator. And they did really well.

DR. GARTNER: Better than the RDS [respiratory distress syndrome] babies?

**DR. SUNSHINE:** Although the bigger babies with RDS, that were over 1250 grams. We had about a 40% survival of all kids with hyaline membrane disease. A couple of things happened that were interesting. One is the use of CPAP [continuous positive airway pressure], which really did help out a lot. We were able to take on the old Bennett PR-2 and put the outlet valve under a water seal. Then you could generate positive end expiratory pressure, (PEEP)

**DR. GARTNER:** Oh, yes.

**DR. SUNSHINE:** You couldn't measure the PEEP on the ventilator dial. By putting in a transducer and a monitor you could then gauge what the end positive pressure was. And we also noticed that there was one ventilator we loved that had a sticky valve. I told the RT's "Whatever you do, don't fix that valve, because it would give us a longer inspiratory time"

And the babies on that ventilator did much better. Boyd [W.] Goetzman, who was a fellow with us at that time, took the Bennett PR-2 and modified it by putting in a couple extra little cardboard cusps, and he was able to get a little longer inspiratory time. And it was as good as anything that we had until Bob [Robert A.] deLemos and Kirby and Dr. [Forrest] Bird, developed the Baby Bird ventilator. Except our hospital wouldn't buy us any new ventilators, so we were still using the Bennett PR-2s for years before we would get Birds.

**DR. GARTNER:** What was going on in other institutions around the country? Were you way in advance of other places in terms of ventilation?

**DR. SUNSHINE:** We thought we were, however, Mildred T. Stahlman was using a Monaghan which was a negative pressure ventilator. When she was able to ventilate bigger kids over 1500 grams, then they did really well. Paul Swyer started to use a positive pressure ventilator. And I never did find out what his results were, but when I talked with him he thought that there was great potential. Maria Delivoria-Papadopoulos put a baby PPV about 3 months before we did. I think she used the old Mark 7 and had the babies survive. I always thought she was brilliant and she always had creative ideas. So, those were the only places. Everybody else who used ventilation, including people at Cal, felt that it was wasted. They came at it a different way, with the continuous end positive pressure (CPAP) approach. But if you remember the old CPAP diagrams, the baby could receive positive pressure ventilation via an anesthesia bag attached to the unit.

**DR. GARTNER:** Yes, right. Intermittently. [Laughs] Interesting.

**DR. SUNSHINE:** I think it changed the way that the people took care of infants. But, of course, there were no controlled studies. We looked at the

data and we found that any infant in an incubator requiring 100% oxygen in the hood, if they could not keep their pO<sub>2</sub> above 40 they died. Millie would say that every now and then she had a couple of kids who survived, but most of them died. Then we found, as we were doing the ventilation, that if the baby reached pO<sub>2</sub> of 50, they all went down to 40. And then we found that out of 15 babies, 2 who hit 60 were able to be taken care of in oxygen alone. But the rest of them required ventilation.

Daily and Penelope Smith did several studies evaluating whether rates of pressures are more important. They presented and published these studies, and then they were invited to submit all their studies to *Anesthesia & Analgesia*. So, they published a series of 5 papers, including historical aspects, guidelines, and techniques for doing it, plus their other studies. And I thought these were really excellent papers.

DR. GARTNER: So, that was the beginning in putting it on a scientific basis. On a measured basis.

DR. SUNSHINE: That's right. But, I think that changed the whole field of neonatology. It allowed us to provide a form of intensive care that had not existed. William A. Silverman was very critical with the publications, as none were controlled studies. He and his co-workers evaluated 3 different approaches to caring for babies with RDS: PPV, negative pressure ventilation, and controls. He showed that ventilation did not cause complications.

DR. GARTNER: Okay. We'll come back to your later career development and work, but I wanted to get a little bit of further perspective on the development and field of neonatology. I guess some of it is personal, some of it is the field itself. When did you first recognize that you had become a neonatologist? Do you remember having a time when you realized that you became an expert in newborn medicine?

DR. SUNSHINE: I never felt that way until I suddenly was asked to serve on the first sub-board. That was in 1975. Up until that period of time, I felt we were sort of sloshing our way through [Laughter] newborn care and doing the best we could. Of course, when you went to the Society for Pediatric Research and the American Pediatric Society meetings, neonatology was a small part of that. We noticed that every year, the number of neonatology papers kept increasing. Pretty soon it became the dominant subspecialty. I think I'm a slow learner, so it was really about 1975 when I realized, you know, there's a field there.

The American Board of Pediatrics wanted to have a sub-board as obstetrics developed the specialty of fetal-maternal medicine. Initially I felt the same way that Millie Stahlman did. I thought it was a big mistake because she

said, “The beauty in neonatology is that people with varied backgrounds come to the field and bring their expertise with them. Once we start having a fellowship and educating and training doctors in this field, we’ll become a bunch of cookie-cutters. And they’re all going to be cut out of the same cookie mold.” She was really opposed to it. And I thought, you know, she’s right. But the people in OB [obstetrics], people in fetal-maternal medicine were creating their sub-boards. And I think the American Board of Pediatrics said we better have a sub-board too because we don’t want them taking over our field. Up until that period of time, every sub-board that was started was created because the people in that discipline wanted a sub-board. And in this discipline, the parent board wanted it. So, they appointed Stan [Stanley] Graven as the head of the committee. The first committee consisted of Stan Graven, Stan [L. Stanley] James, Dick [Richard E.] Behrman, Millie Stahlman, Tim Oliver, Bill Tooley and myself. It was the most interesting group you ever went to work with [Laughing].

Millie fought the boards. I think she’ll fight them until the day that she no longer can breathe, and it’s hard to take Millie on in an argument. We met and we were educated in a 2-day session of how to write exam questions. Each person was then given a discipline to write the questions in. Most of us had never written questions before, or, if we had, they were for our students. We sent them in, and then we had to take the exam on the questions that the other people had submitted. We finally were able to put together an exam that was mediocre at best. Anybody who cared for babies could take the exam, as long as 50% of their time was spent in the nursery.

DR. GARTNER: Oh, I took the first exam. It was a horrible exam.

DR. SUNSHINE: We had to throw out over 25% of the questions. We sat down and decided what the cutoff would be. Usually, you had a reference group and you would take 1.7 standard deviations below that reference group average, and that would be the cutoff. Anybody below that failed.

DR. GARTNER: Right.

DR. SUNSHINE: The board wanted us to use a 1.3 cutoff. Three of us wanted to do that, and 3 wanted to use a 1.7. We spent 2 days arguing till we got the business where the cutoff would be. Millie wouldn’t vote because she was against the boards. And so finally, at the end of the argument back and forth, we decided on 1.7, and that was the final cutoff.

DR. GARTNER: Did Millie finally join in the vote?

DR. SUNSHINE: No. She could’ve broken the tie. She wouldn’t do it.

DR. GARTNER: She wouldn’t do it.

**DR. SUNSHINE:** After that the questions became a lot better. People had a lot more experience, and we brought in people from the different disciplines to write questions.

DR. GARTNER: And we had a larger number of people. Well, if the idea for the neonatology board came from the American Board of Pediatrics, who was in it [from] the American Board of Pediatrics? There must've been someone who conceived of neonatology as a discipline.

**DR. SUNSHINE:** I don't know the answer to that. I know Bob Browning was very much involved in that, but I can't remember who else. I think some of the people worked at the board.

DR. GARTNER: Was any one in the field of neonatology thinking at all in that direction?

**DR. SUNSHINE:** If they were, I didn't know about it.

DR. GARTNER: Right, and I don't know of any either.

**DR. SUNSHINE:** I didn't know about them. I couldn't believe that they actually chose me to be on that board up there. "What's going on here? They need a flunky?"

DR. GARTNER: [Laughs] How about the naming of neonatology? Do you have any idea where or who named it neonatology?

**DR. SUNSHINE:** First one was Schaffer, Bucky [Alexander John] Schaffer.

DR. GARTNER: Old Schaffer, yes.

**DR. SUNSHINE:** In his book, called *Diseases of the Newborn*, published in 1960, he was the first person to mention neonatology and neonatologist. Up until then I don't think anybody ever used that term, or if they did it wasn't publicized.

DR. GARTNER: Was Buck Schaffer the first neonatologist?

**DR. SUNSHINE:** I don't think he was a neonatologist. I think he was a very general practitioner. When I spent a year in Baltimore as an intern, I interacted with him on several occasions. Amazing guy. He and [Milton] Markowitz were partners together. He just knew everything about pediatrics. They invited me back at the Sinai, back in about 1970. They honored Bucky Schaffer.

DR. GARTNER: He was a great teacher. He was my teacher, too. He was a wonderful teacher.

**DR. SUNSHINE:** He graduated high school, I think, when he was about 13 years old. They had the 50th reunion of his high school class. Of course, he was one of the youngest people there, 5 years younger than most of the other people.

DR. GARTNER: How would you define neonatology now, looking back historically, as well as what we're doing these days? What would be your definition of the field?

**DR. SUNSHINE:** I think it's a specialist who cares for babies up until the age of, I would say now, close to 2 or 3 months. So, it's the general pediatrician for these tiny babies, often in an intensive care environment. It isn't that you're able only to ventilate babies, but you're also able to take care of their heart defects, or be involved in that, their metabolic defects, and you bring in subspecialists from all fields to help you.

I just think the things that have changed from my perspective, the primary one is the nursing involvement. Our nurses have always been very important caretakers. All through my career I've worked with a nursing staff that often would recognize problems in the baby before the physicians would, and they still do that now. Well, we were learning neonatology together. Of course, the nurses have developed expertise in nursing and caring for these babies, and we as physicians have developed our own sets of care techniques. We still have contact, but they still have developed different approaches and different ideas and different sets of observations. I used to be able to do everything a nurse could do when we first started out. I can't even come close to that now.

The other thing that's improved is the care of the fetus. That's been, I think, one of the primary benefits that we've reaped. They no longer give us a horribly moribund newborn. The baby they give us, even if it's 23 or 24 weeks, it's usually in pretty good fetal condition. We have something to work with. And they've been the ones who have really helped us take care of the really tiny babies. Of course, the nursing staff, who are not intimidated by these babies anymore, made a big difference.

DR. GARTNER: What did the obstetricians do to change the condition of the newborn as we got them?

**DR. SUNSHINE:** Well, I think, first of all they created the fetal-maternal medicine people to whom they referred a lot of babies. And second is the intense observation that they can provide with doing Apgar scores on the fetus. The biophysical profile. They recognize the diseases in the mom that



affect the outcome. They recognize infection in the mom early. You know, 15% or more of women in the early stages of labor or early stages of pregnancy, 24 or 25 weeks, have chorioamnionitis. Less than 10 or 15% of them actually have overt clinical manifestations. They're able to pick up these women by various techniques. Treating them, prolonging pregnancy in a beneficial state, and keeping the fetus out of the hospital environment.

DR. GARTNER: Knowing when to deliver.

DR. SUNSHINE: I think that has made a tremendous difference.

DR. GARTNER: Let's talk a little bit about your own research areas over the years. You started out telling us about some of your work in the GI area. Tell us how that's evolved and what your major areas of work and contributions have been.

DR. SUNSHINE: I still stayed in the GI, but then I sort of used up all the clinical studies. The best clinical study I've ever set up was a study on nutrition evaluating different protein intakes at various gestational ages. By the time I had all my data, I suddenly realized that one group of babies were 80% female patients, the other group 20% females. I didn't take that in consideration when the study was set up. That paper was never published. But most of the time, my studies were primarily in the laboratory working on the development of the gut and various factors that affected that, such as turnover rate of intestinal epithelium. My clinical studies were primarily those that were involved in care of the newborn, so there were various studies evaluating ventilation.

Bill Tooley said, "You know, Phil, you always told me you didn't know much about pulmonary physiology and you've been successful in learning as little about pulmonary physiology as anybody else has ever done."

DR. GARTNER: [Laughs]

DR. SUNSHINE: So, a lot of the studies that came out of my nursery that I was involved in were studies on various aspects of ventilatory care, recognition and treatment of various newborn problems. I think we were really the first group to recognize pulmonary hypertension in the newborn. That was different than the usual meconium aspiration. We'd get a baby with meconium aspiration whose lungs, on x-ray, did not look bad. And we would think that something else was going on with this baby. At that time there was no echocardiograms, so we had to take the baby to the cardiac catheterization lab. We had a cardiologist who really didn't like to catheterize babies, so we finally got him to put a cath in, and then we found the baby had tremendous pulmonary hypertension. We said we've got to do something to alleviate this. Well, Boyd [W.] Goetzman, who had been a

fellow with us, went back and read some of Ernie Cotton and Bob [Robert F.] Grover's earlier work on tolazoline. The first baby we tried it on, one of our cardiologists actually put in the catheter. It looked like it was going into the pulmonary artery. We gave 2 mg of tolazoline, the baby got bright red and the blood pressure plummeted, and the baby died. We went back and reviewed the films and what they had actually done was that the catheter was no longer in the pulmonary artery.

DR. GARTNER: Oh.

DR. SUNSHINE: All the drug had gone systemically. So, working with Goetzman, we suggested that instead of giving the drug through the umbilical vein or umbilical artery, we put it in a superficial vein of the head or the right arm, so it would go into the right ventricle and then out through the pulmonary vessels. And it worked.

For the first couple of babies we tried this on with pulmonary hypertension, we got unbelievable results, but unfortunately there were side effects such as GI bleeding, hypotension and things like that. Then when echo came out, we were able to make the diagnosis of pulmonary hypertension very easily. By just injecting a cc of saline, you'd see tiny bubbles form on echo. If there was pulmonary hypertension, you would see the bubbles in the left side of the heart, otherwise they went to the pulmonary circulation and dissipated. We were able to make quick diagnosis, and initiate treatment.

A young man by the name of William Benitz, who's still on our faculty, started looking into nitroprusside, and that really made the difference. So, with the use of nitroprusside and with the use of vasopressors, such as dopamine or dobutamine, we were able to really get a very good outcome on some of these babies before ECMO [extracorporeal membrane oxygenation]. Then of course when ECMO came, it changed everything. We don't use nitroprusside, nitroglycerin, any of that stuff anymore. Just use nitric oxide.

DR. GARTNER: How about your laboratory research? You continued your GI studies?

DR. SUNSHINE: I continued that really until about 1987 or 1988. Well, you came out and remember we had that program project?

DR. GARTNER: Yes, I remember that.

DR. SUNSHINE: But after that, Ken Tsuboi relieved me on the lab, and we would work together. We were able to continue a lot of the work that I started when I worked with Norman Kretchmer about how a lactase develops as it migrates up the intestinal villi. We were able to show that in a newborn the turnover rate of intestinal villi was very slow. It's sort of

interesting going back and looking at the recommendations now for care of babies with necrotizing enterocolitis. We wait 10 days before we start to feed them, based on our laboratory studies of turnover rate of intestinal epithelium in rats. It took 10 days for the cells to regenerate. I guess that's probably a pretty good idea, and that's been pretty much what I did.

DR. GARTNER: Then you stopped in, around 1987? Stopped doing the lab studies.

DR. SUNSHINE: 1987, 1988. And then that's when I left. I left to go down to LA Children's in 1989. That's when I found out I wasn't a very good administrator.

DR. GARTNER: It's a tough job. [Laughter] A thankless job. You were there in LA for 4 years?

DR. SUNSHINE: Three years, 10 months and 2 days. Of course, who's counting.

DR. GARTNER: What was it about the administrative experience that you didn't like?

DR. SUNSHINE: It was just so horrible. It was just a horrible time because up until about the late-1980s, CHLA [Children's Hospital Los Angeles] was doing really well. Faculty were given good bonuses, and, I think, about 65% of the patients were paying patients. Then suddenly over a period of about 2 or 3 years, when managed care started to take over, and it took over very quickly in LA, we stopped getting the referrals of paying patients. It became primarily a hospital that took care of Medi-Cal patients. Salaries dropped. Hospital problems developed, and people were very, very unhappy.

I worked with Robert Bahner, who was chairman at that time. I was the vice chairman at CHLA. Nothing that he did was right according to the unhappy faculty. Bob was the most unselfish, hardworking, person I've ever seen. They were just very, very unhappy with the way things were going. It had to be the medical leadership that was involved. I just saw no future there because I could not make people happy. I thought with my personality, I get people to work together and like each other. We had to cut nursing staff, and I suddenly realized that we were cutting out people who had been there for 25 and 30 years. I had just come there and I was making decisions, and not necessarily about faculty, but other people who would have to leave. That's very distasteful. So, I went in and spoke with the hospital administrator and I said, "You know, one of the ways we could save money is to get rid of my position." I thought he'd probably talk me out of it, but it took him about 30 milliseconds, and he said, "Great idea." [Laughs]

DR. GARTNER: Oh dear! Oh well, then you came back.

**DR. SUNSHINE:** I didn't realize that when David [K.] Stevenson took over from me, he had worked out an agreement with the dean. "I know. Phil's going to want to come back. I want to be able to hire him back without going through a search." And the dean agreed.

DR. GARTNER: And you came back. That was in what year?

**DR. SUNSHINE:** 1993.

DR. GARTNER: In 1993. What have you been doing since?

**DR. SUNSHINE:** Clinical care, teaching, and I've been involved in the clinical studies that have been going on. I think I had 2 papers since 1993. Not very many. But I'm able to do a lot of clinical work, so that some of the bright people can spend more time doing research.

DR. GARTNER: That's useful. What kind of clinical studies? You said you've been doing some. What areas?

**DR. SUNSHINE:** Nitric oxide studies. There's a multi-center study evaluating its treatment. We just have started a study evaluating the use of glutamine as an adjunct of nutrition. We now developed a study of permissive hypercarpna in the ventilation of babies. I'm involved with these, as are all faculty who are taking care of sick babies. And as you know, Stanford is part of the neonatal network.

DR. GARTNER: Yes, right.

**DR. SUNSHINE:** So many studies that are going on with these are part of that network.

DR. GARTNER: How do you see that? Is that working?

**DR. SUNSHINE:** Oh, it's working, terrifically.

DR. GARTNER: Networking.

**DR. SUNSHINE:** I think it's really hard to get 18 centers to agree on a single protocol. The most difficult one that we were involved in has been completed. That was a retrospective study to evaluate babies with retinopathy of prematurity going into the threshold or pre-threshold phase.

DR. GARTNER: Right.

**DR. SUNSHINE:** We put them in high oxygen or let them stay. In other words, keep their saturations high versus those where you let their oxygen saturations remain between 85-95%.

**DR. GARTNER:** Right.

**DR. SUNSHINE:** They just completed it. That was the most difficult study I've ever seen because it's easy to keep the high oxygen group in the high saturations, but the low ones that bounce all over, these kids don't read the text books, so the nurses are there every 10 minutes, readjusting the oxygen levels. You just know that it wasn't that carefully executed a study. It's going to be interesting to see what the data show because they now are analyzing that. And it's going to be very difficult to interpret.

**DR. GARTNER:** You see that becoming more and more the mode of clinical research as collaborative studies.

**DR. SUNSHINE:** I think it's very difficult to do in a single center. But if you look at the studies that have really have importance over the last say 10 years, or even longer, this is a fact. I'm studying Exosurf, developed by John Clements. One of the best studies ever carried out. Burroughs-Wellcome [Co.] did an unbelievable job of going to every center and collecting the data. And they would make sure that the investigators were blinded. If a patient was not included, why was a patient dropped? And it had unbelievable power and that set the standards for excellence in clinical investigation. And then of course the surfactants are being evaluated as well. The study of using prenatal phenobarbital did not prevent severe IVH [intraventricular hemorrhage]. I think studies that have a strong power and are carried out in multiple centers are going to be the way of the future. The way of the present and the future.

**DR. GARTNER:** You talked some about your family early on, but you really didn't tell us about when you got married, children, grandchildren. Let's go back to sort of catch up on your family a little bit.

**DR. SUNSHINE:** Okay. I was single for a long time. In 1962 or 1961, I met Beth [Sunshine]. She had come west to sort of explore California, Hawaii. She and a classmate of hers came out to California. They didn't like San Francisco too much, so they came out to Palo Alto. Beth applied for a job at Stanford. Norm Kretchmer loves to tell the story that he hired her to be my wife. She was the secretary to the chief resident. So, we had a very quick courtship and we married and have a wonderful married life, considering everything.

We have 5 great kids and only 2 grandchildren. Out of 5 kids, we thought

**we'd have lots of grandchildren, but just 2. [Subsequently, we now have 6 grandchildren in 2018.]**

**DR. GARTNER:** [Laughs] Tell me about your children.

**DR. SUNSHINE:** My oldest daughter [Rebecca Sunshine] is head of human resources at a company called Connectics, which is developing medications for various types of connective tissue disease. She set the standard for the family because at Stanford, one of the fringe benefits is that we get tuition benefits for your children. Stanford will pay up half of Stanford's tuition at any approved school for 4 years. So, she went through in 4 years. She has her master's in healthcare policy. She's just doing terrifically.

My next child is a physician [Samuel Sunshine] who's practicing down in Aliso Viejo [California]. He's a family practitioner with a fellowship in sports medicine. So, he's about getting his practice started and, hopefully, he'll be very successful. If he can fit in the practice of medicine around surfing and skiing and things like that, I guess he will be.

**DR. GARTNER:** [Laughs] How far is that from here?

**DR. SUNSHINE:** You know where Dana Point is?

**DR. GARTNER:** Yes.

**DR. SUNSHINE:** It's very close to Dana Point.

**DR. GARTNER:** Near that, okay.

**DR. SUNSHINE:** There's a whole new community there. They're building a new hospital and a medical center, so he's involved in that. The offices which they had anticipated being open in September probably will open in February.

Our next son [Michael Sunshine] is a graduate student at Thunderbird University. You know what they call it now? Now it's called Thunderbird School of Global Management. He is now finishing his first year, doing really well. He spent 5 or 6 years in Japan working and studying, so he's fluent in Japanese.

**DR. GARTNER:** Okay.

**DR. SUNSHINE:** He can read, write and speak it. He has the equivalent of any high school graduate in Japan, so he's very, very good at it.

**My next child [Diana Sunshine] is the director of marketing for the San Francisco Opera. She lives just a mile from us, so we see her frequently. She's been married now for, oh, about a year and a half, almost 2 years. And she's hoping to start a family. Her husband is involved in some internet business that I never understood.**

DR. GARTNER: [Laughs] Have you any stock in it?

**DR. SUNSHINE: You're joking. I'm certainly not going to buy stock in the San Francisco Opera company. I mean, it's been successful, but they live on donations.**

DR. GARTNER: Right.

**DR. SUNSHINE: And then my youngest [Stephanie Sunshine] is a massage therapist in Whitefish, Montana. She says she has the best life of anybody. She lives in a town that has somewhere between 10,000 and 15,000 people. It's about 20 minutes from a big mountain and about a 45-minute drive to the Glacier National Park.**

DR. GARTNER: Right. Nice country.

**DR. SUNSHINE: She's very happy there. She's skis, kayaks, hikes, paraglides. But we don't know, we don't want to know.**

DR. GARTNER: [Laughs] Let's see, does that take care of all of them?

**DR. SUNSHINE: Then we have 2 grandchildren. My oldest daughter. Beth provided daycare for them for the first, let's see, 2 ½ years.**

DR. GARTNER: Oh really?

**DR. SUNSHINE: The little girl till she was 2 ½, and the little boy till he was almost a year. And they love their nana.**

DR. GARTNER: That's fine. I see there are a lot of toys here, so they obviously come and visit also.

Who influenced you the most from a career perspective? You mentioned some people. What about other people who influenced you, including family, Beth, kids. And are these influences on you professionally or personally?

**DR. SUNSHINE: Going back into high school, in the back of my dad's drugstore was an office for a general practitioner. He influenced me a lot. His name was Dr. Shmugar. He had practiced for years at a small town in Colorado, and then moved to Denver. I thought he was just a terrific guy. Of**

course, his practice grew and he needed more space, he moved out.

Then in high school, I had a great biology teacher. Her name was Olga Nelson and she was a big influence.

Nobody at the college level. I mean I had to take all the courses and things like that.

Then in medical school I had some. I knew I was going to be a physician, so that was easy. In medical school I had several people who had a profound influence on me. One was a gentleman by name of Fred Kern [Jr.], who was a gastroenterologist. He was a wonderful, wonderful teacher and a great clinician. At that time, the University of Colorado started a new program where as a senior student, instead of going through all the subspecialties like cardiology, hematology and the like, you would pick up a family, and you'd follow these families through a general medical clinic. Well, most of our classmates didn't like it, but I picked up some wonderful families that I established great rapport with them. Working with him and with Jack [John H.] Githens, who was also a pediatric hematologist, I just learned a lot. Some of my classmates said they should really take their senior year over because they felt they didn't learn anything. But with these 2 guys, I just had a ball. I remember at the end of the year when we went through our final examinations, we were asked how we liked the course. I came out and Fred said, "How did you do?" I said, "I did great, but you didn't." [Laughs] We were really good friends until he passed away several years ago.

Then, of course, Harry [H.] Gordon who influenced me to come to Baltimore. And unfortunately, once we got to Baltimore, we had very little interaction with him. He was doing so many other things. He eventually went to [Albert] Einstein [College of Medicine] and took Hal [Harold N.] Nitowski with him.

DR. GARTNER: Yes.

DR. SUNSHINE: They were wonderful teachers. And then Bob Alway. And then Norman Kretchmer. Kretchmer was my "patron"; he was like a father. He was great with our family and he just gave me every opportunity that one could imagine.

DR. GARTNER: Did he have children and stepchildren? You were obviously one of his children.

DR. SUNSHINE: Norman had 2 sons and a daughter, but he treated me like I was one of his children. Of course, Bob [Robert] Greenberg, Irv Schafer, and Lou Gluck. Norman was an amazing, because once you became part of his faculty, he made sure that you were given every opportunity to succeed. There were people he just did not like. You can't like



everybody. But even those people whom he didn't like, he was always very fair to them and he always made sure that if they were to leave here, they went to a better position. He taught me how to write. [Laughter] He gave me the book *The Elements of Style*.

DR. GARTNER: Oh, yes. Who have you influenced? Who have you trained, your fellows?

DR. SUNSHINE: We've had a lot of fellows. I wish I could say that I influenced them, but I certainly made an environment conducive for them to succeed. Probably the person who has achieved the greatest status is David Stevenson. But I mean, you had a piece of gold to work with and unless you chipped away, you couldn't fail. He's just been extremely successful, and he now is the director of the nursery. He's my boss.

DR. GARTNER: But he was your fellow?

DR. SUNSHINE: He was my fellow. It was sort of interesting because when he applied for fellowship, we liked him. He came down, but there was another candidate who I thought was better. I was leaning to hire this other person, and then I got a call from Dr. [David B.] Shurtleff from the University of Washington who said, "David Stevenson's applying for a fellowship." I said, "Yes he is." And he said, "He's the best goddamn resident I've ever had and if you don't hire him, you're an asshole." [Laughter] That's quite a recommendation, so okay, we hired him. And certainly, I've never regretted it.

Besides him, John [D.] Johnson was not one of my trainees, but Johnny worked with me while he was still a medical student. When he came back after taking his residency at Hopkins, he immediately was put into a job as being associate director of nurseries.

Then Joe Daily. I can't take any credit for him. He just started off great. Let me just digress for a couple of minutes to tell you about him.

DR. GARTNER: Sure.

DR. SUNSHINE: He was a hard-working guy, very bright. He had a lot of insight into the care of babies. As I mentioned before, he was involved in putting the first baby on the ventilator. He started his fellowship before Marshall came. He spent a year with Petter Karlberg, a friend of Norm Kretchmer. When Joe was there, he picked up this whole idea of impedance pneumography, and that was the beginning of the development of the apnea monitor.

When he came back, Marshall and he started working on the impedance

idea. They were able to show that about 75% of the apneic episodes were not recorded by our nursing staff. He also published a really ingenious paper showing that if he kept the babies at the lower level of thermos-neutrality, you could cut the apneic episodes by 50%. Just by blowing a little cold air over their face, we could cut it down too. This was not new because Dr. [Allan R.] Dafoe knew this when he took care of the Dionne quintuplets. Joe published that paper and they developed the apnea monitor, with Frank Domingues. Domingues became a millionaire, and Joe got a trip to Mexico City to attend an International Pediatric Association and that was all.

DR. GARTNER: That's all he got out of it.

DR. SUNSHINE: But he was the one who developed it. We had the first 4 apnea monitors. Domingues immediately sold the company to Air Shields. They initially sold for \$300, but once Air Shields took them over, it was \$600.

Then Joe worked with a gentleman by the name of Ken [Kenneth L.] Kearns and they developed an even more sophisticated unit that could monitor heart rate, respiratory rate and you could plug in blood pressures as well. Joe did all the initial studies in our nursery and Ken Kearns gave us 4 of these apnea monitors.

The hospital would buy us nothing at that time, so all the equipment would come through the research center. When we would work with other companies, they would donate instruments. So, when you'd come into our nursery, you would find that there would be 7 or 8 different types of monitors. When new nurses came in, it would blow their minds. They would have to learn how to use every one of those monitors. Finally, when we started to work with Hewlett Packard, of course, all our monitors now are Hewlett Packard.

Joe was really involved in those studies, the apnea monitors, the ventilation. He and I working together were also convinced that the babies with patent ductus arteriosus were getting into trouble. We could not convince our cardiologists that this was a problem because their hearts didn't get bigger. They didn't go into heart failure. The only thing that we noticed is that when they tried to take them off the ventilator, their CO<sub>2</sub>s would rise. We kept seeing these kids have significant hypercapnia, and we could not wean them from the ventilators. Our cardiologists would not catheterize these kids. So, we would call Norm Shumway to tie off their ductuses. If we couldn't get a kid off the ventilator over a 2-week period of time, he'd take them to the operating room, find a nice large ductus and tie them off. He even operated on some in our nursery. We never had enough patients to write it up. But, when Joe left to go to Arizona, he collected about 30 patients in a short period of time and wrote it up.

DR. GARTNER: It was important.

**DR. SUNSHINE:** Joe was amazing. He still is an amazing guy. He would have stayed at Stanford, however when Norman stepped down as chairman, one of the first people they brought out to look at the job was Frederick Battaglia. He had ideas of what people should be doing. He said to Joe, "Well if I were to come, you'd be running the pulmonary clinic. You'd set up the pulmonary clinic." Joe said, "But I like to do newborn medicine." Fred said, "Well, you can do that a couple of months a year, but you would primarily do pulmonary." And meanwhile H. Belton Meyer had been calling Joe to come to Arizona, and then Joe said, "I'm coming." That was a big loss. But John Johnson stepped in. And he was wonderful to work with.

DR. GARTNER: Why don't we show the monitor over there. Can we get it on the tape?

**DR. SUNSHINE:** This is the apnea monitor. It's very simple. When the baby would stop breathing for 20 seconds the alarm would go off. You could set this for 15, 20 or 30 seconds; most of the babies were on 20 seconds. The nurses would run over and find the baby not breathing. It was a Godsend. After we started using all sorts of things as therapy, cooling the baby off, blowing cold air on its face, using water beds and then, of course, after a period of time, theophylline and now caffeine became available. But many would require ventilator support.

DR. GARTNER: Well, let's look at the development of neonatology. We've actually talked a lot about aspects of development of the field and a good deal about its early origins. What do you think were really the major research and/or clinical events? The things that changed? You've mentioned some of them, but which ones would you tick off as the major things that really have developed, if you will?

**DR. SUNSHINE:** I think the major one was ventilation. I don't think there's any question about that. We were able to keep babies alive that would not have survived. And now everybody just sort of takes this for granted. The technology in the field of ventilation has changed so much, that many of us really have a tough time keeping up in that field.

DR. GARTNER: Yes.

**DR. SUNSHINE:** So, when I go into our nursery, even though I still do 12 to 13 weeks of intensive care a year, I have to have the respiratory therapist by my side when I'm adjusting settings. If you look at another factor that's decreased mortality, certainly surfactant and the use of prenatal steroids. And as you know with the first surfactant, Exosurf, this made a great, great difference. Then the use of Surfactant and now Curosurf, that is made from

porcine lung. We said, “I’m not sure we’ll use Curosurf in our nursery, because we’re not sure it’s kosher.”

DR. GARTNER: [Laughs]

DR. SUNSHINE: So, I think those. I mentioned this before. I think the nursing care of these babies is really important. Certain aspects of nutrition, especially with the development of total parenteral nutrition (TPN). That was a major, major advent. Surgeons developed it, and the pediatricians refined it.

DR. GARTNER: Okay.

DR. SUNSHINE: And we did some early studies on TPN. I thought they would be helpful because the first parenteral solutions used protein hydrolysates. Johnny and I worked with one of our residents by the name of Bill [William L.] Albritton. We were able to show that these solutions had a very high ammonia levels, and these babies would get hyper-ammonemia. We pointed this out to the manufacturers. They tried to take out the ammonia, but eventually went to the amino acid preparations. Now with the newer solutions, we don’t even worry about hyper-ammonemia anymore.

I think the other important advents were the studies which haven’t gotten the recognition they deserve. [Karen] Hammarlund and [Gunnar] Sedin were able to show in these really tiny babies the extent of their trans-epidermal water loss. If you try to restrict their water intake, to prevent lung disease, you dry them out. Once we recognized that I think the incidence of intraventricular and pulmonary hemorrhages dropped precipitously.

Then, of course, the use of monitoring. We have ultra sound, CT [computed tomography], MRI [magnetic resonance imaging]. And now the new technology of using “Flight of Light.” [Britton] Chance initially developed it, and David Benaron one of our young faculty members is studying it on premature babies.

DR. GARTNER: Why don’t you explain what that technology is? What it’s measuring.

DR. SUNSHINE: [Laughs] Actually, what it is, is just putting headband around that has different light sources. Then by assaying and modifying these, you can actually see structure just by using light.

DR. GARTNER: Like if you shine a light through your fingers you can see in them?

DR. SUNSHINE: Yes.

DR. GARTNER: Babies' brains, you can go through.

**DR. SUNSHINE:** That's right. As you know, when nerve cells die, for instance, they go through this process called apoptosis. By injecting the material that will be picked up by these dying cells, you can then see the nuclear-enhancement and visualize a brain that has suffered death of cells. You can document that long before MRI or a CAT [computerized axial tomography] scan or anything else would show that. A young man at Stanford in radiology who's working on this has done, I think, their third or fourth patient. The MRI looks normal, but with this new technology, you see a lot of damage.

DR. GARTNER: I remember years ago there was molecular spectroscopy being done in the MRI.

**DR. SUNSHINE:** Still is.

DR. GARTNER: Is that still going on?

**DR. SUNSHINE:** Yes, but very few centers are doing it.

DR. GARTNER: Right.

**DR. SUNSHINE:** Probably the person who's done most of that of anybody has been Maria Delivoria-Papadopoulos.

DR. GARTNER: She's published extensively in that area.

**DR. SUNSHINE:** They're still trying to figure out what's normal, what's abnormal. But you know in the future, it may be very, very efficient.

DR. GARTNER: May help. How do you feel about the advances that have been made that now are resulting in significant survivals of the very immature infants?

**DR. SUNSHINE:** That's a great question, and I wish I had answers for that. We've been debating this since the day we put that first baby on the ventilator, about how these are babies who were not supposed to survive are doing.

DR. GARTNER: Right.

**DR. SUNSHINE:** And we thought that if they ended up surviving, they'd be damaged. Well, we've now lowered that threshold, and every couple of years we come up with a new dilemma. How low do you go? And if you look

at the outcome, we're getting down to 23-24 weeks. Right now, that's the threshold, but not of keeping them alive because you can keep babies 22, 23 weeks alive as well. At 24 weeks, where lots of multiple gestation babies are born, there are all sorts of problems. Although the survival rate of those babies is going up, the morbidity is still pretty close to 50%.

Now many of those problems still include respiratory disease, but there's still a significant number who have hearing loss and vision loss and who have severe neurological impairment. There are some centers, that have decided that if the baby — and they know the dates, they discuss it with the parents — is 24 weeks or less, they really don't want the neonatologist in the delivery room. Between 24 and 25 weeks, they'll let them in, but they don't really want them to do very much. Once the baby's completed 25 weeks, then it's aggressive therapy.

DR. GARTNER: How do you feel about this?

DR. SUNSHINE: It all depends what kind of day it is. After I've taken care of a set of triplets who are 24 weeks and all doing poorly, I think that's a very good idea. When they're not, when they're doing great, I think it's a pretty bad idea. But it's something that we have not resolved, so we have never developed a policy.

But what we have changed is our approach to families, so that when we come in and speak to them, we tell them what our outcome data have been, what the problems they're going to encounter are, and we try to get them to give us as carefully thought out consent or agreement as we think is possible. That's the only thing that's really improved, I think, over the last 4 or 5 years.

DR. GARTNER: Yes. Do your parents play an active role in the decision making?

DR. SUNSHINE: Yes, they do, and they're brought up to date and they're given every opportunity to give their input. There are times we disagree. And most of the times that we disagree are when we think the baby is damaged, and they want us to continue. We then will meet with them as often as necessary to re-discuss the baby's issues. We started this a long time ago. This was after, I think, Marshall. He may have planted the seed, but it was after he left that we felt that if the baby has been damaged terribly, we didn't want to continue therapy. We all have to agree, all the caretakers from the nursing student on up. We then present it to the parents. But we won't present that to the parents until everybody agrees. Then we'll work with the parents. Most of the time our prophecy is fulfilled that the baby's not going to make it. But every year we have our premie graduate program which I attend. It's a picnic and one of the mothers will come up and say, "This is Dr.

**Sunshine who told us that we should stop treatment.”**

DR. GARTNER: [laughs]

**DR. SUNSHINE: And the baby or child is a “winner”.**

DR. GARTNER: Is the baby doing alright or not doing alright?

**DR. SUNSHINE: But parents do have a voice, and we do try to give them the best information we can. But the group of us, the faculty in neonatology, cannot agree on a date, on a time. I guess if you say 20 weeks, we’d probably agree.**

DR. GARTNER: Yes. Do you think the threshold can continue to go down?

**DR. SUNSHINE: Well, I said this at 28 weeks, I didn’t think so.**

DR. GARTNER: [laughs]

**DR. SUNSHINE: Now, I don’t think it’s going to do it at 22-23 weeks, but who knows?**

DR. GARTNER: I think it’s an interesting question. What do you think about the attitude that so many neonatologists have that we should push no matter what. We should try everything. We should be heroic, no matter how bad it looks?

**DR. SUNSHINE: I don’t agree with that. I think we as the physicians have a finite period of time of caring for the baby for whom we’re responsible. Once that baby goes home, we’re out of the picture. Now, many neonatologists who are involved in follow-up programs, really do get involved. Maureen Hack is a classic example. We have a young gentleman by the name of Barry Fleisher, very committed to these families. But when they leave the nursery, it’s the family’s problem, and one of the things that families always tell us is that they feel that once they leave the hospital they’re abandoned by the medical profession. The person who really pointed this out to me many years ago was Bill Silverman. He talked about how the babies with severe retinopathy, at that time called retrolental fibroplasia. The thing that really bothered them was that they were abandoned by the medical profession once they found out the baby was blind. So, that’s a big concern I have and that’s why I think 24 weeks is the threshold. Come back in 10 years and ask again.**

DR. GARTNER: Do you have a follow-up, an intensive follow-up program for your graduates?

**DR. SUNSHINE: Yes, and we started this when we first opened our**

nursery and we had a wonderful social worker who made sure this worked. Her name was Rose Grobstein. And she was the social worker with whom everybody could identify, and she just helped us get our patients back for follow-up evaluation and care.

We had a woman by the name of Natalie Malachowski, who was actually an abstractor. But she got involved in the follow-up with the first babies we had who had been on ventilators. We had a 90% follow up on those. She followed them all over the country, all over the world, and brought them back.

We had funding for follow-up for these babies up to 3 years of age. But we always sneak them in with some other money, so we could follow some until they are 5 years of age. Nothing like Bill Tooley had. Tooley followed these babies with hyaline membrane disease until they were 18, 19 years old. If you were a state approved agency, approved by CCS [California Children's Services] to have an intensive care nursery, you have to have a follow-up clinic. They will pay till the baby is about 3 years of age, which is not very long. But David Stevenson has been able to get money through a center that he's created called the Johnson Center [Charles B. and Ann L. Johnson Center for Pregnancy and Newborn Services]. We're now able to follow these patients until they're 8 years of age. Because there's no state or federal money for this, you have to come up with other funding.

DR. GARTNER:        You have to have grants.

DR. SUNSHINE:       So, we do have pretty good follow up of what happens to these kids.

DR. GARTNER:        With careful data collection.

DR. SUNSHINE:       Data collection and very good evaluation. So, besides the hearing, vision, occupational and physical therapy, they have psychometric studies.

DR. GARTNER:        Have you evaluated the families' and the parents' reactions to caring for such children?

DR. SUNSHINE:       That's part of the ongoing study.

DR. GARTNER:        It is.

DR. SUNSHINE:       I think they have data on this. I don't know whether they're going to publish it or not. But involved in all of this more recently has been these infant development studies. Heidi Als and her group, using minimal intervention for babies in the nursery, you know, cut down the lighting, cut down the sound, cover the crib with a blanket.



DR. GARTNER: I know this, yes. Right.

**DR. SUNSHINE:** And evaluating their outcome by keeping them sort of bundled. There are a lot of differences of opinion of how valid that is.

So, we're now getting data. The first group of patients are now somewhere between 4 and 5 years of age. Certainly, they've been able to show that you decrease the length of hospitalization. Decrease the length of time the baby's in oxygen, and probably show a better weight gain. But what happens to them 3 to 6 years down the road? It's going to be interesting.

DR. GARTNER: Is that a controlled trial?

**DR. SUNSHINE:** It's compared to kids who were not in it.

DR. GARTNER: At the same time, concurrent?

**DR. SUNSHINE:** Well, they're different parts of the nursery, right.

DR. GARTNER: Alright. Have you been using Kangaroo care in your nursery?

**DR. SUNSHINE:** No. I mean, the parents have the opportunity of skin to skin and things like that that, if that's what you mean.

DR. GARTNER: Yes.

**DR. SUNSHINE:** They have that opportunity.

DR. GARTNER: Right.

**DR. SUNSHINE:** A lot of them take advantage of that. I just had a wonderful family who had twin boys. They were really pushing this, and one of the babies just was really very fragile. He had all sorts of apneas and tachycardia. And as soon as we are put in that situation, I sat down with the parents and said, "You have a fragile baby. He's not a term baby. You have got to leave him alone," and they did. The babies have done well, but they never let me forget that.

DR. GARTNER: Yes. Some of the small preemies do better that way.

**DR. SUNSHINE:** The nursery staff really is a great asset. It bothers me though, that when I first came back from LA and I was making rounds, I'd walk by and there would be a baby on a ventilator with the top of the incubator covered. You had no access to the baby and you were taking care

**of baby with a monitor.**

DR. GARTNER: Yes, I would say, “You can’t do this.”

**DR. SUNSHINE:** Well, it took about 8 months, and we finally worked out a system for the baby on the CPAP, nasal CPAP, or on a ventilator that you have to only have part of it covered up so you could see the baby.

DR. GARTNER: I get very upset when I go into nurseries and see this. You can’t see the babies.

**DR. SUNSHINE:** That’s right.

DR. GARTNER: I agree with you.

Economics, finances of health have become a really major issue in medicine in recent years. What about the economics of newborn care, neonatology, neonatal intensive care? How do you feel about that?

**DR. SUNSHINE:** I don’t think it’s out of control yet. It’s up there. I mean it’s very expensive, honestly.

DR. GARTNER: Yes.

**DR. SUNSHINE:** But I’ll tell you, I’d much rather have it with that sense than what it was when we first started. When we first started there were no funds for the care of these babies. Insurance companies would not cover the cost of the care of the babies until they were either 2 weeks of age or a month of age. They would have to leave the hospital and be readmitted. So, for most of the babies cared for in the preemie center, there was no funding for these babies. A physician by the name of Leo Bell, who practiced in San Mateo was able to get the governor’s ear — [Ronald] Reagan was the governor — and also influence a woman by the name of Yvonne Braithwaite Burke who was an assembly member to introduce legislation to cover the cost the care of a baby.

DR. GARTNER: From birth?

**DR. SUNSHINE:** From birth and through intensive care. Leo sort of dropped out of the picture when he saw the neonatologists jumping on the bandwagon. People forgot how influential he was, including myself, and it took about 2 years to get the bill introduced. Initially the bill was defeated, mostly because of the insurance companies. Braithwaite Burke got the insurance companies together. She said, “You write the legislation and close the loopholes, and everybody’s in it together.” So, it passed, and California was one of the first states, along with Arizona and Tennessee, to cover the

newborn. The rest of the states covered it after that. Up until then, there was no reimbursement. Unless you had grants or something like our preemie center where we could bring the baby in, these parents could be devastated.

Now of course, the cost is great because we have all of these wonderful technologies. We have MRIs that cost a fortune, CT scans, we get x-rays frequently, we do all sorts of laboratory studies. We try to control cost as best we can.

We did an interesting study that Bill Benitz devised, only using the surfactant when it's really indicated. We cut down its use. Routinely, a baby will get 4 doses of surfactant. Now they may get 1, they may make it 2. Very few babies get 3 and 4. So we cut the use in half. We cut down the number of head ultrasounds we do because we're able to get maximum interpretation if we do it at certain times. Same thing with other diagnostic studies. But when you got a critically ill baby, you have to be on top of everything.

DR. GARTNER: Absolutely. Are you getting a lot of pressure from the insurance companies or from Medi-Cal to reduce costs of care for sick newborns, or are you doing this on your own?

DR. SUNSHINE: We started to do this before I even went to LA. When I went to LA, it had become so blatant that something had to be done. I came back here and have instituted several different studies, or several different programs. Instead of getting daily electrolytes, things like that, the way we monitor babies on TPN, and cut back on the labs. We don't use TPN, once the baby's taking, say, 60% of his feed, we stop the TPN. Little things like that I think have cut back the prices. Medi-Cal just doesn't reimburse well. They haven't changed the reimbursement to physicians since I think 1972 or 1974. Recently we've finally have gotten a small increase.

DR. GARTNER: So, is the hospital losing money on running the neonatal intensive care unit or are they making money on it?

DR. SUNSHINE: They'll make money. Mostly because of the reimbursement for the feeders and growers. We have an intermediate intensive care nursery, for the babies who are no longer requiring ventilatory support. The number of labs is less. They may have a weekly lab to evaluate hemoglobin and reticulocytes, and a nutrition panel. The reimbursement for intermediate care is good, so it helps the hospital a lot. For the hospital, if you look at if they were given a charge or cost per day for care of these babies, they'll probably do well; even on MediCal.

DR. GARTNER: You make it up on the back end.

DR. SUNSHINE: When you deal with HMOs, they want us to transfer the

**baby to a much lower care cost area, and we'll do that. We'll get the babies back to their community. There are some insurance companies that haven't realized the benefit of that. They don't want to pay the transport fee. So, we say, "Look, it's going to cost you extra dollars to transport the baby back, but you'll make that up in 3 or 4 days."**

**DR. GARTNER:** Do you encourage moving the babies back to their community hospital?

**DR. SUNSHINE:** Always, if their community has a nursery there. We know almost all the nurseries, because we visit them. We know that a baby's going get good care there, depending upon the stage of their illness, and how severe it is, and things like that. But it's always easier to get babies back to their community.

**DR. GARTNER:** And the parents want the babies closer presumably.

**DR. SUNSHINE:** Although you will find some parents who live far away, but because of Ronald McDonald House they love it. They say, "Please don't send us back. We love it here."

**DR. GARTNER:** They'd rather stay. [Laughs] Can't get rid of them.

Okay. Let's see how our time is. Well, a little bit longer, and then we probably ought to take a break.

What do you think the contributions of neonatology as a field have been for society — positive, negative?

**DR. SUNSHINE:** Oh, I think positive, I think that in conjunction with the field of fetal maternal medicine, it's been extremely positive. Women who could never get pregnant, or who could never carry a baby now are able to do that. We've made lot of mistakes along the way by delivering "litters" instead of singletons. But you know, a woman who has not been able to conceive and then suddenly has 4 fetuses, I mean, she's on cloud 9. They don't realize the problems. But now, I think, with the ability to really implant one or 2 embryos, I just think it's changed a lot. Especially now where there are very few babies up for adoption. The abortion issue has really changed the availability of babies. I think it's been very, very positive. That's given a lot of gainful employment to the physician.

**DR. GARTNER:** [Laughs]

**DR. SUNSHINE:** Probably gave a lot of money to the departments.

**DR. GARTNER:** Yes.

**DR. SUNSHINE:** Also for the hospitals.

**DR. GARTNER:** How about negative? Has this been a burden on neonatologists? And have the things we've done as neonatologists burdened society?

**DR. SUNSHINE:** Well, if you look at the incidence of cerebral palsy and mental retardation, it really hasn't changed much since 1950, or whenever they started monitoring it.

**DR. GARTNER:** That's right.

**DR. SUNSHINE:** It's still 2 to 2.5 babies per thousand who have cerebral palsy, and all the advances haven't made much difference. I think if we could in some way educate every pregnant woman to avoid alcohol, to avoid smoking, to avoid drug abuse, and to take her folate, and be monitored carefully for diabetes and other things, we'd probably do a lot better.

**DR. GARTNER:** Do you think the social problem are having their impact on the babies? I think you're right.

**DR. SUNSHINE:** Absolutely. I think, also, that we haven't reduced the incidence of prematurity. In fact, the incidence of low-birth weight is creeping up in the United States.

**DR. GARTNER:** Why do you think that is?

**DR. SUNSHINE:** I think there are a lot more multiple births. Three percent of all births in the country are now multiple births, and we deliver, about 4 million newborns a year.

**DR. GARTNER:** Right.

**DR. SUNSHINE:** And 13% are delivered in this state. So, we just don't have good prenatal care for a lot of these families. Everyone worries about the immigrants coming in. Turns out the outcome of the offspring of immigrants, especially Hispanic, is as good as, if not better than, the Caucasians living here. However, if the immigrants, especially Hispanics, have been here for one or 2 generations, they start to get all these other problems. It's been very interesting to see that. So, for a woman coming in from Tijuana to have her baby, that baby's going to have a good outcome, unless of course there's major problems that we don't understand. And of course, the Hispanic population in this state is going up, growing so that the white population will no longer be a majority. For every white baby that's born in the state of California now, 1.4 Hispanic babies are born. We took

**the land away from the Mexicans, but they're getting it back now. It's re-homesteading.**

DR. GARTNER: What about the Asian populations and their neonatal issues? You have a large number of Asians, I'm sure.

**DR. SUNSHINE: They are a highly intelligent race, I guess. We don't see that many where we are. Up in San Francisco, they see a lot more Asians. Initially, we had a large influx of Vietnamese. It was very interesting dealing with them because they're very shy and very wary of the medical community. They thought we were like a government coming in. Once they recognized the value of medical care, they became the most compliant of all patients. In a very short period of time, they were all speaking English. They were very compliant. You'd tell them, "Be here Tuesday morning, 10 o'clock," and they were there on Tuesday morning at 10 o'clock. The only group that I think we've had some problems with has been Cambodians. We don't have very many of those.**

DR. GARTNER: Do the Asian groups have lower prematurity rates in the US?

**DR. SUNSHINE: I don't know the answer for that.**

DR. GARTNER: Well, they do in Asia.

**DR. SUNSHINE: Well, after they've been here for a while, it's different.**

DR. GARTNER: I don't know.

**DR. SUNSHINE: There is still a higher rate of prematurity in the Mexican, Hispanic, and the Asian population even when they're here in the country. I don't know what's happening in different regions. I just don't know the answer for that.**

DR. GARTNER: Let's talk a little bit more generally about fellowships and training of neonatologists. How many fellows have you trained altogether? Do you know?

**DR. SUNSHINE: Altogether about 50.**

DR. GARTNER: How do you feel about the state of fellowship training in neonatology? One, are we training too few, too many? Are we training the right way or the wrong way?

**DR. SUNSHINE: I thought I knew all the answers to this, you know, 10 years ago, but —**

DR. GARTNER: Okay. We need to change tapes.

We talked about fellowship training, yes.

**DR. SUNSHINE:** When we first started our fellowship training program, I was heavily influenced by Norman, so that our fellows spent 2 years primarily in research projects. They had very little clinical hands-on care. They would get maybe 6 months out of the 2 years. And the attending did all of the newborn care. We wanted them to be able to continue to do research and set up their own programs. About the early 1980s, I began working with Merton Bernfield. Merton was a pediatrician, who was interested in morphology, said, "How about if I moved into your division?", and I thought that was a great idea. Merton's not a neonatologist, but what he set up a terrific fellowship program. We started getting unbelievably gifted fellows. They would spend, during their first year, 2 months on in an intensive care nursery. The other 10 months they'd be in a lab. We would put them in a lab, any place in the university. It was all laboratory research, very little clinical research. Most of them worked with Mert. He had like a mill going. He had studies of development of the eye, of the lung, of the gut, of everything. So, these people then, during their second year, would take a little bit more clinical experience, and during their third year would take a little bit more. Just the opposite of what most people would do.

DR. GARTNER: Right.

**DR. SUNSHINE:** And what also would happen was that at the end of their first year of fellowship they'd start writing a grant that would be submitted by October. They would, hopefully, get funded by the following July. So, their senior year, their third year of fellowship, would be supported by a grant. It usually was those K01s [National Institutes of Health Research Scientist Development Award - Research & Training grant] at that time. They would get a 5-year grant, 3 years with a 2-year renewable. Most of them would continue to take another year of fellowship, so it'd be 4 years of training. Then they'd become a very attractive faculty member because they had their own money. I think we had 9 fellows in a very short period of time. Eight of them were able to get the support. That program just flourished until Mert left. He left the same time I did in 1989. He went to Harvard to direct the joint program in neonatology.

DR. GARTNER: Right.

**DR. SUNSHINE:** Although we continued getting the same group of fellows, the intensity of the investigative endeavors dropped.

DR. GARTNER: Yes.

**DR. SUNSHINE:** For a period of time, very few of our fellows were getting support. David Stevenson reinstituted this type of thinking, and I think now we're attracting fellows who are more research-oriented and who will be able to get their own support. At least we hope so.

**DR. GARTNER:** Is it harder to get support for fellows in general now as young people than it was in the past, or is it easier?

**DR. SUNSHINE:** Our first training grant was funded in the late 1970s that continued through the mid 80's, but then we lost it.

**DR. GARTNER:** Right.

**DR. SUNSHINE:** Then when Merton came we, we were able to get it again. When he joined us, we combined it with an undergrad pre-doctorate fellowship, a post-doctorate in basic sciences, and a post-doctorate in neonatology, and there's interaction at all levels. That's been successful, except for neonatologists who haven't received support. So now we're starting to do that again and I think if you can educate fellows to investigation, they're going to continue this throughout their career. For a period of time, we had about 90% of our people going into academics, then it went down to about 40%. Now it is coming back up again.

**DR. GARTNER:** How do you feel about training people as clinical neonatologists?

**DR. SUNSHINE:** I always had a problem with that.

**DR. GARTNER:** Yes. Why do you have a problem with it?

**DR. SUNSHINE:** I just feel that their contributions are tough to evaluate. They become good physicians, but the impetus becomes different, and it becomes mostly monetary. That's what bothers me. I mean, it's a great field to make money.

**DR. GARTNER:** Yes.

**DR. SUNSHINE:** And too many people go in because they can make a very good living.

**DR. GARTNER:** Are they needed in the community, do community hospitals need clinical neonatologists?

**DR. SUNSHINE:** I think there are some that do and most of them don't. They want to have a neonatology program so they can compete in the



**marketplace. But suddenly you have this proliferation of community intensive care nurseries that have 4 and 5 beds. They have 2 or 3 neonatologists. They keep babies they shouldn't.**

**DR. GARTNER:** Right.

**DR. SUNSHINE:** And you know Rod Phibbs' son, Ciaran Phibbs has done some studies showing outcomes in these community hospitals that are nowhere near as good as they could be, especially in the state of California. I've been on the subcommittee of the California medical services, to certify programs. Say this program meets all the certifications of a tertiary care center, a community intensive care, or a community intermediate. There's just this proliferation of community ICNs [intensive care nurseries], and they may have 4 beds. We finally rewrote the regulations and the standards.

**DR. GARTNER:** Right.

**DR. SUNSHINE:** In order to have a unit, you have to have at least 8 beds. And if you're a tertiary, you have to have 16 beds. Or, you could say, "I have 8 beds, but 2 of them aren't going to be full." [Laughs]

**DR. GARTNER:** I was going to say, would you look at the actual use? Because that's really what matters.

**DR. SUNSHINE:** Yes. And we've been able to defer or reject centers because they just don't have the need; there's not a community need. But it's not that easy, because immediately there's litigation.

**DR. GARTNER:** Right.

**DR. SUNSHINE:** And the head of CCS [California Children's Services] is inundated with lawyers calling and saying, "What happened to our approval? Why wasn't it approved?"

**DR. GARTNER:** Big money.

**DR. SUNSHINE:** I think there are way too many centers. In order to have centers, you have to have neonatologists, and there probably are more neonatologists than we really need. But when we started in this business. I thought that the half-life of a neonatologist was about 5 years. After that, there's burn out.

**DR. GARTNER:** Right. I remember you saying that at a meeting. You got up at a meeting and said that.

**DR. SUNSHINE:** And I still believe it. Except what's happened is that you

**then hire more people. So now if you look at the half-life of this person it's longer because of more support.**

DR. GARTNER: Yes. But they aren't burning out, many of them now, but some are.

**DR. SUNSHINE: Oh, I think they do after a while.**

DR. GARTNER: Yes, some are, but some continue on, actually.

**DR. SUNSHINE: Yes, but they don't have to put in the time and the effort.**

DR. GARTNER: You're still doing it.

**DR. SUNSHINE: Nothing like I did.**

DR. GARTNER: That's true.

**DR. SUNSHINE: Nothing. I mean, this is Disneyland, you know?**

DR. GARTNER: [Laughs] Because you have fellows.

**DR. SUNSHINE: Yes, fellows.**

DR. GARTNER: You have nurses that are more —

**DR. SUNSHINE: But even then, I'm on the intensive care nurseries, say, 12 weeks a year.**

DR. GARTNER: Yes.

**DR. SUNSHINE: Okay. During that 12 weeks we have 2 teams, so I'm on call at night half the time. It used to be that when we were on call, we were on call 6 weeks in a row and you got called every night. And most of the time, you were in the hospital because we didn't have good fellows, good house staff. Now I get called, but I don't have to go in very often. And if I do go in, it's really a lot of fun. But it's nowhere near the intensity of what is was.**

DR. GARTNER: Yes. Interesting. So, you don't think neonatologists are burning out now?

**DR. SUNSHINE: Oh, I think if they have 2 people covering a unit, and they do it for 3, 4 or 5 years, I think they're in trouble. I think they're going to burn out. But in the university setting, where there are 10 people, or 12 people in the division, and they all have the interest, research. Some of them**

**do follow-ups, some of them do outreach. They're going to stay in that business a long time.**

DR. GARTNER: Right. Interesting point. Has anyone done any studies of neonatologists and their burnout?

**DR. SUNSHINE: If they have, I haven't seen the results.**

DR. GARTNER: You ought to do it. You're the one who ought to do it.

What about the role of women in neonatology? Women physicians are now about half of the entering young physicians. Are they coming into neonatology? Are they playing a more major role?

**DR. SUNSHINE: I think so. Some of our best people are women. It's interesting that for medical students at Stanford now, I think, the entering class is 56% women. So, it's going up. And, of course, the number of people wanting pediatrics has gone up exponentially. The number of women going into academic medicine is not as great; but that is changing. We've selected more and more women for fellowship training, and they have been terrific.**

DR. GARTNER: What percentage of your last 2 or 3 years of fellows have been women?

**DR. SUNSHINE: I think it's been half and half.**

DR. GARTNER: Half and half.

**DR. SUNSHINE: And the people who've stayed on, our faculty.**

DR. GARTNER: That's good.

**DR. SUNSHINE: So, we're very pleased. The last 2 were people who worked with David, one of them worked at David's lab ever since she was a sophomore in high school. She was vacillating whether she should go into neonatology or not. We had some long chats. Of course, she's just been terrific. Then the other is committed to follow-up evaluations.**

**When I left Stanford back in 1989, we had no women faculty in neonatology, only 4 males. David Stevenson joined the faculty when Johnny left. We had Ron [Ronald L.] Ariagno, myself, and then we kept a position open because Bill Benitz was coming along. We knew that when he was a senior resident, we wanted him in our program. We were given permission to have more backup, but we kept that position open. We went through a search, but we knew he'd be the guy. Then when I came back, the number of faculty went from 4 to 11, and women were involved.**

DR. GARTNER: How many do you have now?

**DR. SUNSHINE:** We have 3 women faculty now, at Stanford. We have 2 at El Camino [El Camino Hospital Neonatal Intensive Care Unit in Mountain View], soon to be 3. Then we have one woman at Washington Township Hospital, 2 women at Sequoia [Hospital in Redwood City], and 2 out of 4 women at Good Samaritan Hospital. So, the number of women on our faculty has gone way up.

DR. GARTNER: The people who are out at your peripheral hospitals or the outreach hospitals, do they also come back to do some attending work in the Stanford academic?

**DR. SUNSHINE:** About 20% of them do.

DR. GARTNER: Twenty percent of the women, or 20% at a time?

**DR. SUNSHINE:** Twenty percent of the people who actually do it.

DR. GARTNER: But not everybody comes back to do it.

**DR. SUNSHINE:** Not everybody. We fight for time at the intensive care nursery.

DR. GARTNER: Well, I think for the outreach people, that's also an issue. Keeping up their skills and so on and keeping in touch. What about the role of the general pediatrician? You've sort of excluded them from the neonatal intensive care unit and from neonatology in general. What's their role?

**DR. SUNSHINE:** No, we don't.

DR. GARTNER: Do they come back in?

**DR. SUNSHINE:** No, it's changed. Funny what happened. Our nursery was always open so that community physicians could come in and care for babies in our nursery. Initially, they all wanted to be involved in every aspect of care. Then it became obvious to them that they didn't have the skills. They still had admitting privileges for the nursery if they're on the medical staff.

DR. GARTNER: Right.

**DR. SUNSHINE:** But when they came in, they would talk to the parents, and they say, "We'll take over the care of the baby when the baby comes off the ventilator or when the baby goes down to the intermediate nursery." So, we keep them involved. Some of them don't even want to do that because it's

not cost effective to them. Most will say, “Look, you take care of the baby. When the baby’s ready to go home, let me know.”

DR. GARTNER: Oh.

DR. SUNSHINE: We keep them very much informed of everything that’s going on, so they’ve been our allies all these years. Stanford, even though it’s a university hospital, is really a community-oriented university hospital. At [Lucile] Packard Children’s Hospital [Stanford], the community physician is very much involved in teaching and care. We’ve had a great relationship and because of that, they have not developed subspecialists in pediatrics in the community. They use the university subspecialists, so that we’re not in competition with them. And we’ve avoided competition for general pediatric care as well.

DR. GARTNER: Good. Well, maybe this is a good time to break and we’ll come back.

DR. SUNSHINE: Okay.

[INTERVIEW BREAK]

DR. GARTNER: Okay. Well, why don’t we continue the interview. You wanted to talk about the research. These are clinical research studies?

DR. SUNSHINE: Yes. These are mostly studies that were carried out in the Prematurity Research Center. As I mentioned before, that was a center that was originally set up by Norman Kretchmer, to which we all contributed. It was a very active part of our clinical investigation, especially during the early times that we were at Stanford. Subsequently the neonatal network has taken over a lot of these studies.

One of the important ones was Anne [S.] Yeager who joined our faculty in the early 1970s. She was a remarkable woman, very dedicated. She was convinced that most of the babies who develop CMV [cytomegalovirus] got this through either the breast milk, but primarily through blood transfusions. Because of her work, we were able to document that the infants who received blood that was CMV-positive had a much higher incidence of CMV illness than those where the blood was CMV-negative.

DR. GARTNER: These were low birth weight babies.

DR. SUNSHINE: Low birth weight. All babies who require transfusions.

DR. GARTNER: Right.

**DR. SUNSHINE:** But if they required more than, say, I think, it was 50 ml per kilo of blood over a period of time; they became CMV-positive and became CMV excretors. About 20% of those babies really got sick. They developed CMV-pneumonia and problems like that. Because of her work, through the blood bank, we only used CMV-negative blood, even if their moms were CMV-positive, and none of the infants developed CMV. And the side benefit was that when HIV became a problem, especially through blood transfusions, none of our babies ever got HIV because if you were CMV-negative, you almost are surely HIV-negative as well. So, we never had any of those issues come up.

She worked initially with Ann [M.] Arvin, and then Ann Arvin worked with Charles [C.] Prober. They did all the seminal work, I think, on transmission of herpes viruses, noting how many women were positive, how often their babies got infected, and pointed out that at any particular time in our delivery room, a third of the women were excreting herpes. So that was another side benefit of that nursery.

One other interesting thing; I just have gotten a follow-up on this. About 25 years ago, a woman who was just finishing her undergraduate work at Stanford wanted to do some studies in our nursery about how babies learn language. She worked at our nursery. We gave her space. I just heard from her about 3 months ago that she and her husband now have all these research grants at the University of Louisville and are doing unbelievable work lateralizing areas of the brain that children use to develop their learning processes. And she said that all of this work started in that little nursery. So, I feel pretty happy about that.

Those are the main things I wanted to bring in.

**DR. GARTNER:** The idea of making a neonatal intensive care unit a clinical research center, you said it was Norman Kretchmer's idea?

**DR. SUNSHINE:** Norman Kretchmer's idea, and it's just carried on.

**DR. GARTNER:** Was that the first time there was such a unit?

**DR. SUNSHINE:** No, because if you look back at some of the work that Harry Gordon and [Samuel Zachary] Levine did, they did their studies in the preemie nurseries.

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

**DR. SUNSHINE:** Those were remarkable studies considering the technology they had. They did an unbelievable job looking at the RQs [respiratory quotients] and being able to study the metabolism of premature

**infants.**

**DR. GARTNER:** Right.

**DR. SUNSHINE:** And then pointing out that these premature babies excreted large amounts of various types of organic and amino acids and if you give them a little bit of vitamin C you can obviate that.

**DR. GARTNER:** Right.

**DR. SUNSHINE:** And then, of course, Kretchmer, who was the leader of developmental biochemistry, felt that the premature nursery should be a laboratory, and you have a captive audience. And that's been our whole attitude over the years since then. It's a great research center, and they might as well take advantage of that.

**DR. GARTNER:** I agree with you. Considering how we ran ours as well, though we probably got the idea because Henry [L.] Barnett probably got it from Norman.

**DR. SUNSHINE:** [laughs] Who got it from Sam Levine. Yes.

**DR. GARTNER:** Well, any other issues about the research that you wanted to cover?

**DR. SUNSHINE:** The other areas were clinical things I mentioned. Al [Alvin] Hackel developed a wonderful transport incubator with the help of people in mechanical engineering. It's a radiant warmer that could be used to transport babies even at high altitudes or very cold temperatures, and they can still keep warm. It never really developed into common use as we had envisioned, because it was too costly.

Then we had one graduate student develop an air curtain incubator. Now that worked very, very well, but again it was too expensive. Air Shields had control of the market, but they didn't think it would be cost effective, so it died.

**DR. GARTNER:** Did anyone in the neonatal unit work with the engineering school? Stanford has a school of engineering

**DR. SUNSHINE:** Yes. We did.

**DR. GARTNER:** Do you have collaboration with them?

**DR. SUNSHINE:** We collaborated with them on the development of the incubators, transport incubators. We also worked with them on fluid losses

and the studies that we were carrying on with insensible water loss. We just started about the time that Sedin and Hammarlund did their studies, so we quit.

But Dr. Adams had a really nice technique of measuring and insensible water loss by identifying a small area on the skin, and then by mathematical computation, calculated how much fluid they lost. This was done by several students in engineering getting their PhDs on studies.

You know, John Johnson, and then David Stevenson were able to work out the technology of measuring bilirubin production by seeing how much carbon monoxide is excreted by the lungs. All that material, all that technology was developed at Stanford. One of the engineers helped develop this, then went off and started his own business. It's called "trace gas analysis." He just sold his business for multimillions and has been very, very successful. In fact, one of the physicists several years ago who won a Nobel Prize is a gentleman from Germany who used this technology to do all these measurements.

DR. GARTNER: Are you using the expired CO monitor routinely? In the nursery?

DR. SUNSHINE: Unfortunately, not, but one of these days we will.

DR. GARTNER: Because people are beginning to use it to predict which baby is to be followed closely after discharge.

DR. SUNSHINE: I think it's a wonderful tool. I just wish that we could use it.

DR. GARTNER: Well, we're using it. University of Chicago is.

What about other people in neonatology that you think were significant important contributors to the field, either through their research or clinical applications of new technology and new concepts?

DR. SUNSHINE: Well, probably one of the most important was Bill [William A.] Silverman. I always thought that he not only was a wonderful investigator, but I also felt he was a wonderful teacher. He stimulated people to try to come out with answers, think problems through, so his controlled studies led the field. I think he probably had about as much influence on the field as anybody else.

We mentioned Lou Gluck, who I felt also made significant contributions. Bill Tooley and his group of co-workers. Rod Phibbs and George Gregory, Joe [Joseph] Kitterman and others up at UC, understanding pulmonary



**physiology and working with John Clements who developed the first surfactant that was available.**

**The person who has never really been given the credit that he deserves is Nick [Nicholas M.] Nelson. He really was the first to do pulmonary mechanics. We've nominated him several times for the [Virginia] Apgar Award. Unfortunately, he has not received it, but he certainly is deserving. And I think he's made a lot of contributions.**

**Millie Stahlman. Over the years, she's just been a dynamo and she's still very active. I was a visiting professor at Nashville several years ago, and she still came in every Wednesday and had Stahlman rounds, Millie rounds. If she calls on you, it can be frightening.**

**DR. GARTNER** [Laughs] Did she call on you?

**DR. SUNSHINE** No I told her, "I'm not coming if you call on me."

**DR. GARTNER** [Laughs]

**DR. SUNSHINE:** What teaching sessions! They can start off with a little thing like anemia, but end up talking about hookworm infestation. They were just amazing. She really did a great job. In fact, when I took over the nursery and Joe Daily was coming in to be my co-worker, I sent him on a trip. We saved up enough money, and I said, "I want you to visit these other nurseries and come away with some ideas. The places that I want you to visit are Bill Silverman, the other is Millie's unit, and the third is Bob [Robert H.] Usher." He came back with great ideas on how to run a nursery. And again, Bob Usher, who I think is a great doctor with great ideas, has never been given the credit I think he deserves. I think he had a lot of influence on the field.

**DR. GARTNER** Any others? How about outside the US or outside North America, Europe?

**DR. SUNSHINE** I'm sure there are people and, of course, the granddaddy of them all, Dr. [Arvo Henrik] Ylppo who was a great Finn. He just died at 104 years old. He was the head of pediatrics at the University of Helsinki. This guy was amazing. Every time I wanted to do a study, I would look up what he had published. He had published so much material and so many different studies with ideas of things that I thought were important information. Often, I found out that he had already done it. But he was one of the first really to describe rickets and calcium-phosphorus metabolism in infants.

**There was a gentleman from South Africa, H de V Heese. He also ventilated**

**babies very early, especially infants who had neonatal tetanus. He never got the recognition that he should have. He was able to sedate them and almost put them in a paralytic state and then ventilate them until they got over the disease. Amazingly, many of these babies did really well. He was in charge of the department of pediatrics at the Red Cross [War Memorial] Children's Hospital in Cape Town. So, he certainly made a lot of contributions.**

**The other person who's made lot of contributions has been Jerry [Jerold F.] Lucey. Not only in the area of bilirubin metabolism, but in his educational endeavors. He has Hot Topics now. They get over 1,000 neonatologists to attend those meetings, and they have great meetings.**

DR. GARTNER        They're very popular.

**DR. SUNSHINE        And he seems to have hot topics.**

**People in New Zealand have made remarkable contributions. [Peter D.] Gluckman and his coworkers, especially in understanding asphyxia and neuronal damage. They were working right on the cutting edge of that particular field. They were the ones who were promulgating the use of the ice cap, the differential cooling of the brain after an asphyxic episode.**

**A gentleman by the name of Malcolm Levene in England has done a lot of interesting work on asphyxia, problems of central nervous system development, and also on various forms of therapy. So, I think he's made a lot of contributions.**

**I'm leaving out a whole legion of people.**

DR. GARTNER        You know a number of names that I know, but you also mentioned some that haven't had the recognition and that's important.

**DR. SUNSHINE: Dr. [Rolf] Zetterstrom is wonderful, and we met him at a conference and when Beth and I were in Ankara [Turkey]. He was there with his daughter who was this young beautiful lady. He's just done a tremendous amount of work.**

DR. GARTNER        Yes, he's an amazing guy. I like him.

Let's turn for a moment to something that has gotten a lot of attention over the years and that's ethical issues in neonatology and ethical questions. We touched a bit on the issue of very low birth weight babies and parental decisions, but what other ethical issues do you see as being major concerns over the years in the development of neonatology?

**DR. SUNSHINE        I think the ethical issues of prolonging life in a patient**

whom the caretakers feel has significant damage. As I mentioned, Marshall started this program of nurse-doctor interaction. From that evolved sessions we called ethical issues in our nursery. Initially Rose Grobstein ran these. She was our social worker. She was able to really get people to talk about issues that bothered them. Then we were fortunate enough to have a gentleman join our faculty in the School of Theology. He was the hospital chaplain and joined the university His name was Ernle Young. He came about the same time that the that Bill Tooley and Al [Albert R.] Jonsen up at UCSF were talking about this.

DR. GARTNER      Right, right.

DR. SUNSHINE      They wrote significantly in this field. Well, Ernle Young was wonderful and he brought us together to discuss various ethical issues in the nursery. I went to these meetings. We held them every 2 weeks. We met for about 8 months. Community physicians were involved, nursing staff, social workers and the like. At the end of these 8 months, the only thing we agreed upon is that we would not actively end the life of a patient by strangling him or doing something like that. I said to Ernle, “You know, we’ve been working for 8 months and we haven’t really come up with any answers.” And he said, “Phil, that’s not the issue. The issue most importantly is to keep talking about them and discussing them.” I realized then that I’m dealing with a Talmudic scholar.

I’m never going to be able to keep up in this field, so one of the community physicians took over. Then Ron Ariagno took over the running of that program, and I think much discussion has taken place, but not many real answers have come out other than to keep everybody informed and to try to get the best information you can.

We talked about this before, about the area that we have the most difficulty is when you should stop treatment on a baby when the parents want to continue the treatment. Now what happens when you want to treat a baby and the parents don’t want to? The famous Messenger case was when the dad came in and disconnected his son’s ventilator.

DR. GARTNER      Right.

DR. SUNSHINE      And he based that on not very good data because a 700 gram or 750 gram nowadays has got a wonderful chance of surviving.

DR. GARTNER      Right.

DR. SUNSHINE      However, we’ve run into situations where we have parents who are educated. We see are a lot of these people in our practice who want a child who is going to be bright and who is going to make

contributions. They're young enough that if this child looks like he's not going to end up that way, they'd just as soon stop treatment and start all over again. We had a situation like that with a family who had twins. What we agreed upon was that we would provide intensive care, but no heroic therapy. Now that's a very difficult definition.

DR. GARTNER      Right.

**DR. SUNSHINE:**      One of the babies was just dwindling all night, nobody called me. They agreed that they would probably not do anything heroic to this baby. I came in the next morning, it was about 7:00 o'clock, it was a Sunday morning, I looked at this baby, the baby's white as a sheet, so I put my stethoscope on and he's got pneumothorax, so I immediately put a chest tube in to evacuate the pneumothorax, and the kid pinks up, and becomes responsive. About 2 hours later, his father called me, irate, furious, he said, "We agreed no heroic therapy. The baby was on its way to bowing out and you came in now and you resuscitate a baby who has suffered an unbelievable amount of problems." He was very, very angry, and I didn't know what to do.

I remembered I had a family that I'd taken care of about 2 years before. The mom, a wonderful woman, bright, enthusiastic, had twins. The little girls were very, very sick. This was before surfactant. I told the mom that the babies are sick and they are not doing well. Then I came back about 4 hours later and said they were still not doing well. When I came back for the third time, she looked at me and said, "Doctor Sunshine, if you're going to hang crepe about my girls, don't come and talk to me. They're going to do fine." Well they did. One of the girls ended being slightly handicapped, she had hearing loss; but they're both really great. So, I called her and I said, "I've got a problem." I told her what the situation was, and she said, "Tell me their names and their phone number." She called them that same day and she said, "I understand you have twins, boys in the nursery. I want you to come over to my house for dinner." She sat down with them and she brought out her daughters and told them what happened. She went through everything with them. She completely turned them around. We had contact with that family for a little bit, but then we lost contact.

When I came back from LA, we were having dinner one night at one of the local restaurants, and I looked over and there's this woman who helped me. I went over and talked to her. Her husband had died, she remarried and happened to remarry a very good friend of mine, a former football coach. I told him, "You won't believe what this woman did for me." And she says, "You know, I saw that family about 2 months ago." These kids were about 17 or 18 years old. She said, "They're great kids. They're so happy that they didn't stop treatment because now they have 2 wonderful sons." Good things happen to good people, I guess, but those are ethical issues.

**At least that had a good ending, but I'm sure there are many others that don't.**

DR. GARTNER        Have you used or what do you think about the use of ethics committees?

**DR. SUNSHINE        We have them. That's part of our hospital. We very seldom use them. We've been able to resolve almost every issue in our nursery, but I think it's mostly because people do communicate well, and we keep everybody involved. It's very, very seldom that we would have to use them.**

DR. GARTNER        Go to the committee. We had a committee with a good teaching experience.

**DR. SUNSHINE        That's what we used them for, but as far as resolving issues, we very seldom have had to use them. Of course, we deal with the problem of Jehovah's Witnesses all the time. If it becomes necessary for us, when we think giving blood, if it's a matter of life and death, not just to give good care. Then we will get a court order, and that's worked out really well in almost every situation.**

DR. GARTNER        Have you ever had to give blood in such an emergency situation that you did it before you got a court order?

**DR. SUNSHINE        That has not occurred, at least as far as my experience. Now whether the other neonatologists have, I don't know. I had a difficult experience because of one judge. We usually deal with judges of the juvenile court. I'd have to call every day to get permission. She would not give me approval for more than one day and she never would talk to me. I had to deal with one of her clerks or social workers. It would take me 20 or 30 minutes every day to go through and bring this person up to date. They would talk to the judge, and then would call me and say, "Yes, you can continue." But most of the other ones have been so easy to deal with. One judge's car broke down on the freeway; so, he hailed a motorist and made him drive up to Stanford to hold court in the mother's room. That's a dedicated judge.**

DR. GARTNER        How about the issue of dealing with death in the nursery? Death is an ever-present reality in the neonatal intensive care unit. How have you dealt with that? How do you think physicians, neonatologists should deal with issues of death and dying?

**DR. SUNSHINE        Well, we used to deal with it a lot more than we do now because so many babies died. Nowadays, it's uncommon for a baby to die in the nursery. Everyone is pretty much in tune with these issues, so there's a**

lot of time spent preparing the parents for this, parents and other immediate family, if we can. The social worker is very much involved. If, say, we decide to take a baby off a ventilator there's a whole process of having a parent room that is very quiet, with the immediate family there depending upon what we feel the family's needs are. We spend as much time or as little time as possible with them and guide them through this. We've had a few families where they said they don't want to see the baby. We've talked to them about the importance of holding the baby and seeing it, and by doing that we're able to get them to go through the mourning process. This is never easy, and the worst situations for me are when I don't speak the family's language. I'm not very good at Spanish, certainly not good at the Asian languages, and that's the most difficult; when you just can't talk to them and tell them what you want to and be able to hear what they're saying, rather than going through an interpreter. I never got used to this. You can go through this 100 times and every time it's very, very painful and there's no way you can avoid it. But if you could, you'd probably not like to be there.

DR. GARTNER But it is a reality.

DR. SUNSHINE It is a reality. We have Mr. Jones who runs a mortuary in East Palo Alto who has helped us out so many times. When families don't have enough money for funeral services or burial services, he'll do it at a very reduced cost. He's just been wonderful to deal with. We honored him with a dinner several years ago for all the work that he's done for us.

DR. GARTNER That is very nice. Over the years, neonatology has been marked by a number of inadvertent errors: chloramphenicol, misuse of oxygen, things of that sort. What others are there? Which errors have we fallen into over the years, and how can we in the future prevent those? Any thoughts about that issue?

DR. SUNSHINE We're going through one right now. I mean you mentioned 2 of the major ones. Chloramphenicol is a very interesting issue because the dosage recommendation was 50-100 mg per kilo per day, and by just doing a few levels you could see that the preemies would not conjugate the drug. Initial studies that were carried out at LA County/USC Medical Center [LAC+USC Medical Center] would use a 150 mg. per kilo and they studied 4 groups of babies and the groups that received chloramphenicol, alone or in combination, were dying. But they continued the study until it was completed; and that was a big bone of contention when Senator [Edward M.] Kennedy investigated the issue. That paper was published in the *New England Journal of Medicine*. I give a copy to people who are setting up clinical studies to see if there's any way that this could be avoided. I think sometimes it's extremely difficult, you set your standards. I think nowadays there are many built in facets that prevent this from happening, but not always.

**Retinopathy [of prematurity] is a major issue still. We thought we had it licked, but by restricting oxygen we probably caused more deaths than we should have. Careful monitoring of the baby's pO<sub>2</sub> has not obviated this problem.**

**We're going through a problem now with the use of steroids, trying to wean babies from ventilators. There have been some papers now showing that kids who receive steroids have a higher incidence of cerebral palsy [CP] than those kids who didn't. So now, I mean, that has to be evaluated.**

DR. GARTNER      Yes.

**DR. SUNSHINE      I've been a big proponent of the use of steroids for preemies to get them off a ventilator to prevent further lung damage, but if they're going to have increased incidence of CP, is it worth it? So, hopefully once studies are set up, there will be these built-in safeguards. None were more diligently evaluated, I think, than the surfactant study.**

DR. GARTNER      There are those who feel very strongly that every change in intervention should be evaluated as a controlled trial.

**DR. SUNSHINE      It's ideal; I think that this has been a field of innovation. If a baby is dying, then you try something to keep the baby alive, and you find sometimes it works. Then it becomes, unfortunately, a hypothesis. And maybe after the next child, you prove the hypothesis, you don't have to do a study. That's, I think, our shortcoming, and I think we'll continue to have those shortcomings.**

DR. GARTNER      I think you're right. Where do you see neonatology going? What does the future hold? There are going to be major changes in neonatology in the next 10, 20, 30 years. Do you think we just make continued small increments? What's your view of where neonatology will go?

**DR. SUNSHINE      Well, I'm 100% correct in my predictions about 10% of the time.**

DR. GARTNER      Just speculate. Think about it.

**DR. SUNSHINE      Well, I think there are some exciting things that are coming along. I think we mentioned flight of light being one area that we can monitor babies using techniques where we can identify tissue death or damage early. There's a technique that's being worked on by a gentleman and his wife in our department now called luminescence where you can, by using this technology, see where bacteria are invading in laboratory animals. You can see the spread of bacteria through them. It's just a very exciting**

field, and I think you can do this to evaluate effectiveness of drug therapy in the future in babies with infection, especially in the central nervous system. We certainly made tremendous strides in decreasing incidence of death due to sepsis. Once a baby has meningitis, we can cure them, but the damage is just horrendous. I think if we could come up with techniques of evaluating therapy in meningitis, it may be helpful, such as this.

When we dedicated the premature infant research center, Sam Levine was our featured speaker. At the end of his presentation, he said he hoped in the next generation we would close all the preemie nurseries because they would do away with prematurity and change these into geriatric units.

DR. GARTNER [Laughs]

DR. SUNSHINE We haven't made a dent in decreasing prematurity, but we have made an improvement in outcome. One of the areas where I think changes have really helped is the very aggressive resuscitation of babies. Fred Battaglia and I talked about this many years ago. I talked about the commitment of a neonatologist to a program and he said, "Phil we have the same residents. They're all bright people. You don't have to be in the nursery every day and every minute. You let them run the nursery."

When Mike [Michael] Simmons and Rod [Rodney L.] Levine were at Colorado, they wanted to see if they could make a difference in outcome. One was a faculty member, one was a senior resident or fellow. One or both of them was present at every delivery where the infant was less than 1500 grams or at risk, and their survival rate went way up. And then Fred went around the country telling everybody how great the intensive care really was, and I think that's made a big difference.

One of the areas one of our faculty members is working on is called simulation. Just like you train airplane pilots to fly, you do the same thing with people in resuscitation. You give them, in a simulated area, different physiological parameters, and see how they respond to it. It's really exciting; I'm afraid to take the course.

DR. GARTNER [Laughs] This is a neonatal resuscitation course?

DR. SUNSHINE That's one thing. This is in a simulated situation like you would be in if you were a pilot in an airplane. You're going to be flying alone, and all of a sudden you see your altitude dropping, this happens, this happens, what do you do? And the same thing happens here. You intubate, and you resuscitate, suddenly you see the heart rate is dropping. What do you do next? Then, the heart rate comes down, then what do you do here when it starts to fall again? It is a fantastic technique. Lou [Louis P.] Halamek is the gentleman who is doing this. It started in the department of



**anesthesia, and he's expanded it. So, he's going around the country now, talking about this, and it's really exciting.**

**DR. GARTNER** I haven't heard about that. That is exciting. So, education is an area that you think will make a major amount of difference, staff education.

**DR. SUNSHINE** Oh, yes. I just think that as people identify more and more problems, recognizing more and more metabolic diseases where kids used to die sudden deaths, the acyl-CoA dehydrogenase deficiencies, we're recognizing those babies more. I think we're monitoring kids more closely, too. I just gave a talk not too long ago about where we still have a lot of work to do, and these were the major, major areas where the baseline is prevention of prematurity.

**DR. GARTNER** Why haven't we been able to dent that one at all?

**DR. SUNSHINE** If you believe [Robert L.] Goldenberg, and I think he's done a tremendous amount of work in this, it's because these women are chronically infected. And you deal with the poor socioeconomic group, and I think if you have a woman who goes into premature labor at, say, 24-26 weeks or below, it's almost always due to infection, chorioamnionitis. And they're difficult to identify, so if we could work out a way of identifying this high-risk group of patients, monitor them carefully using techniques such as transabdominal thoracentesis, you know, amniocentesis looking for various organisms and then treating aggressively. Just routine treatment is not going to make a difference.

**DR. GARTNER** And certainly it's amazing to me that this hasn't changed at all. In fact, it's gone up a little bit.

Anything else about the future, in terms of training, technology? You mentioned some areas of technology. Do you think that we'll have more advanced computer techniques for imaging, or other measurements of physiology in preemies?

**DR. SUNSHINE** I'm sure. Now they're working on a technique of connecting the baby to catheters in place so that every hour or so you press a button, a little bit of blood comes out and measures the pH, pCO<sub>2</sub>, pO<sub>2</sub> and goes right back into the baby so you don't have as much blood loss, but you're able to get instantaneous measurements.

I think there'll be more rapid techniques developed such as polymerase chain reaction to identify various infectious agents. That's really been a big help in the management of babies with herpes. Identifying them very early, that's still a devastating problem. I think those techniques will become more readily available.

**Genetic markers will become much more readily available. This affects a small segment of population, but if you're the parent of that baby, it becomes extremely important.**

DR. GARTNER      We know more about the genetic composition, but it's not as limited, you know, in number.

**DR. SUNSHINE:    I think they'll improve. This is a little bit further on, but I think they'll develop better ways of altering abnormal genetic situations by bone marrow transplantation and the like. And probably doing this in utero.**

DR. GARTNER      If you were talking to a senior officer in government or a hospital and you were to tell that person what the needs are in neonatology, what does neonatology need to really do its best or are we doing our best? I mean, you know, you can't buy anything more than that.

**DR. SUNSHINE      Well, I'm not sure that's where I'd put my money.**

DR. GARTNER      Okay.

**DR. SUNSHINE      I'd put my money in just developing good health care programs for children in general. That's, I think, extremely important so that they have access to healthcare. I didn't realize it until I went to LA [Los Angeles] where there are numerous children that have no health insurance or access to health care. I think, that's the first step.**

**I think the second step is just getting healthcare for everybody. Once we start doing that, and you start giving good healthcare to people when they're young, and then they turn into adults and have babies, I think they will have better outcomes there. That's what I think the money should be spent.**

**As far as neonatology, the area has to be improvement in access of prenatal care.**

DR. GARTNER      Would you make any major changes in personnel or kind of personnel that you need for newborn care?

**DR. SUNSHINE      Well, things are already evolving. I'm very unhappy with the way the residency training program is going. Now, I have been vociferous about this for it seems like the last 10 years and nothing seems to change. Our house staff used to spend 6 months in the intensive care nursery during their 3-year period. When senior residents left our program, I thought that they could run an intensive care nursery and do a really good job 80% of the time. Now, when a senior resident leaves, I'm not sure they can handle even kids in the feeder grower areas. I'm very concerned about that, and these are very bright people. When they come through as PL1s**

**they're interested, they're dedicated, they do a terrific job. By the time we see them as senior residents, I don't know what's happened, but they just don't seem to be as committed or interested in newborn care. Maybe 20% of them are. I have the impression that they've developed an "on-call mentality", so when they're on, they just have to get through the night.**

**DR. GARTNER** That's all that counts.

**DR. SUNSHINE** That's all that counts.

**And the amount of time that they spend in a nursery is limited today. It's between 3 months, possibly 4 months at most. We have an intensive care nursery at the Santa Clara Valley Medical Center, but I would like to see them spend more time in our intensive care setting. They may not be doing intensive care when they complete their training, but at least they'll recognize basic physiology, and recognize how to take care of sick patients. I just think that we've just left this whole area of education dangling. And unless we do something to change that, I think we're going to be turning out people who know how to take care of babies only in a well-baby clinic.**

**DR. GARTNER** I don't know where that's going to go. What about relationships in the future with other disciplines such as obstetrics, infectious disease people, cardiology? Do you see any of that changing or would you see ways in which to better utilize neonatologists working with other disciplines? Have we isolated ourselves too much; could we be more interactive?

**DR. SUNSHINE** This is such an individual situation when I look at my colleagues. Many colleagues often do not call for consultations. I love to call for a consultation. Mostly it gives you a chance to interact with other faculty members, and I always think that they have something to offer to the house staff and students that we don't. I don't call them on simple things, but certainly in infectious disease, if I have a baby with a serious illness, I want their input, mostly because they facilitate the diagnostic techniques much more readily.

**DR. GARTNER** Right.

**DR. SUNSHINE** I also deal with cardiology in our nursery all the time, and we co-manage so many patients. The interaction with the various pediatric surgeons has been a real godsend. For a long period of time, we've had a general surgeon doing pediatric surgery. We then had a pediatric surgeon who wanted to manage the patient himself. The baby came in with terrible lung disease, and the infant was still his patient. Now we have 3 pediatric surgeons who are wonderful to work with because we share the care and interact. We use the best person to take care of that patient. I feel the same about the pediatric subspecialists. Certainly neurology, genetics, all

of these are very, very helpful. I think it improves the care of the patients and I just feel badly about the poor — not monetarily — neonatologist in a community hospital who doesn't have access to all these people, or is afraid to call them, or it's a pain to call them. Whereas in a tertiary center such as ours, these people are readily available. Although it may increase the cost of care somewhat, it really is so much better for the babies and their families.

DR. GARTNER        I agree.

DR. GARTNER        What advice would you give to a young resident in the second year, trying to think about his future career, who comes to you and says, "Dr. Sunshine, should I go into neonatology?"

DR. SUNSHINE       I'm very excited about it. I'd try to point out all the pluses. I think it's a great field. I've had a great life. My wife may not agree, because there were many times when she could have had some companionship rather than having somebody in a nursery and still not on-call. With my hearing going the way it is, I may not hear the phone call in the night. And also, I feel the foot in my back saying, "Phone."

DR. GARTNER:       [Laughs]

DR. SUNSHINE       Get up to answer the phone -- and at least now we have portable phones, so we can leave the bedroom. Not too many years ago, one new fellow was calling me every 20 minutes, and Beth said to me, "I'm going to get his phone number and wake up his wife tomorrow night every 20 minutes and see how she likes it."

But I think it's a great field, and I think you see so much going on. It's exciting. Sometimes it's routine, but it's amazing when an unusual problem occurs. We make rounds at least twice a day on our patients. You can teach on every patient, -- you usually have time to do it -- and make it interesting. We're using a lot more nurse practitioners now, and they bring in a whole new discipline. It's very different from working with residents.

DR. GARTNER        Right.

DR. SUNSHINE       You don't have to go through all the training, but when it comes to really difficult problems, they have a lot of pluses, benefits, but some minuses compared with the house staff. But in order to get a good coverage, you have to use them, you have to work and appreciate them.

I think the relationship with OB is only going to get better. David Stevenson has been a genius in getting funds from the Johnson family. He's created the Johnson Center [for Pregnancy and Newborn Services], which includes well baby nursery, intensive care nursery, OB, delivery room, postpartum, follow-

**up. He's gotten an endowed chair for the head of fetal-maternal medicine. He's getting an endowed chair, hopefully, for somebody in follow-up. So, this whole program has its own finance center. OB was always felt to be a money loser, but it is not a money loser, and people worked very well together.**

**DR. GARTNER** That's very nice.

**DR. SUNSHINE** That's really been very exciting to do a lot of outreach education together. And just learning a lot from each other.

**DR. GARTNER** Good. I gather you would make the decision to go into neonatology again.

**DR. SUNSHINE** Yes. I'd probably be more enthusiastic than the first time because the first time I didn't know what I was getting into. [Laughter]

**DR. GARTNER** Didn't know you were going to be a neonatologist.

Is there anything that you'd like to add that we didn't cover, any particular experiences, stories? You were always a good storyteller. Anything that we left out?

**DR. SUNSHINE** Just that there's a couple of other people who I did not mention.

**DR. GARTNER** Okay.

**DR. SUNSHINE** I think Fred Battaglia and his group in Colorado have made many, many important contributions in understanding of fetal physiology and newborn physiology.

Abe [Abraham M.] Rudolph and his group at the UCSF at the CVRI [Cardiovascular Research Institute] as far as physiology of the fetus. Dick [Richard E.] Behrman when he was at the University of Illinois carried out great physiological studies with the baboon.

**DR. GARTNER** Right.

**DR. SUNSHINE** So many people made important contributions. I know I left out a bunch of other people.

I must tell you that except for the time I was in LA trying to be an administrator, every morning I woke up, I just really looked forward to the day. I looked forward to going to work because I knew something good was going to happen. When I started in LA and I would get up in the morning, I really didn't want to go to work. I said, "This has got to stop," because my

**father always told me, “Find something you like to do, and you’ll never work again as long as you live.” Good advice.**

DR. GARTNER        Very good advice. Are there any things you have in-house that relate to your professional life, that you’d like to share with us so that we could put it on video?

**DR. SUNSHINE        I have a bunch of slides of early days, I’m not sure you can use those.**

DR. GARTNER        Those you could give me, we could add to the archive, but do you have any collections of things that you’d like to share with us?

**DR. SUNSHINE        No, only pictures of friends, children and grandchildren.**

DR. GARTNER        Well, those are nice, too.

**DR. SUNSHINE        I’ve been very fortunate. I’ve gotten some awards. I’ve gotten the Ross Research Award [Ross Award in Research by a Young Investigator] from the WSPR [Western Society for Pediatric Research] and the Educational Award [Joseph W. St. Geme, Jr. Education Award]. Those are very important to me. The California Cranial Association which is now defunct, I was the awardee of the year. I even wore a tux.**

DR. GARTNER        [Laughs] Well, congratulations.

**DR. SUNSHINE:        I remember there was one other guy with a tux, so I asked him, “What did you do?” He said, “I play violin.”**

DR. GARTNER        [Laughs] Well, on that note, I do want to thank you very much for a wonderful interview. And for really some very, very important insights into the history. You helped me understand a lot of it, and I’m sure many others. Carol, do you have any questions or anything that you like to add?

CAROL GARTNER: No, I don’t, thank you.

DR. GARTNER        Okay, well, thank you again.

**DR. SUNSHINE        My pleasure, my pleasure.**

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## CURRICULUM VITAE

### PHILIP SUNSHINE, M.D.

Born: June 16, 1930  
Denver, Colorado

Married: Wife (Sara Elizabeth) 5 children: Rebecca Michele, Samuel  
Everette, Michael Barter, Diana Carolyn and Stephanie Lynn

#### Education

1952 B.A. University of Colorado  
1955 M.D. University of Colorado

#### Clinical Training

1955-56	Intern	Sinai Hospital of Baltimore Baltimore, MD
1956-57	Resident in Pediatrics	Stanford University Hospital, San Francisco, CA
1959-60	Resident in Pediatrics	Stanford University Medical Center, Stanford, CA
1960-61	Chief Resident, Pediatrics	Stanford University Medical Center, Stanford, CA
1961-63	Postdoctoral Fellowship Pediatric Metabolism	Stanford University Medical Center Stanford, CA

#### Military Service

1957-59	U.S. Naval Medical Corps	Taipei, Taiwan and U.S. Naval Hospital, San Diego, CA
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#### Boards

1963	American Board of Pediatrics
1986, 1993	Recertified
1975	American Board of Pediatrics, SubBoard in Neonatology/ Perinatology
1986, 1993	Recertified

## **Academic Appointments**

- 1963-65 Instructor in Pediatrics, Stanford University School of Medicine  
Stanford, CA
- 1965-68 Assistant Professor of Pediatrics, Stanford University School of Medicine,  
Stanford, CA
- 1968-73 Associate Professor of Pediatrics, Stanford University School of Medicine,  
Stanford, CA
- 1973-89 Professor of Pediatrics, Stanford University School of Medicine, Stanford,  
CA
- 1980-89 Harold K. Faber Professor of Pediatrics, Stanford University School of  
Medicine, Stanford, CA
- 1989-93 Professor of Pediatrics, University of Southern California School of  
Medicine, Los Angeles, CA, 1989-93
- 1989-93 Vice Chair, Department of Pediatrics, University of Southern California  
School of Medicine, Los Angeles, CA, 1989-93
- 1993-94 Acting Professor of Pediatrics, Stanford University School of Medicine  
Stanford, CA, (3/1/93 - 2/28/94)
- 1994- Professor of Pediatrics, Stanford University School of Medicine Stanford,  
CA, 3/1/94 -

## **Specific Administrative Responsibilities**

- 1963-67 Assistant Director, Clinical Research Center for Premature Infants,  
Stanford University School of Medicine, Stanford, CA
- 1964-80 Director, Pediatric Gastroenterology, Stanford University School of  
Medicine, Stanford, CA
- 1967-89 Program Director, Clinical Research Center for Premature Infants,  
Stanford University School of Medicine, Stanford, CA
- 1967-89 Director, Neonatology, Stanford University School of Medicine,  
Stanford, CA
- 1989-93 Chief, Department of Pediatrics, Children's Hospital of Los Angeles, Los  
Angeles, CA
- 1993 - Co-director Mid California Coastal Perinatal Outreach Program  
(MCCPOP)

## **Society Membership**

### **National:**

- Western Society for Pediatric Research (Council Member 1968-72)
- Society for Pediatric Research (Emeritus)
- American Pediatric Society
- Perinatal Research Society (Secretary-Treasurer, 1979-1984) (Senior Member)
- American Academy of Pediatrics
- North American Society for Pediatric Gastroenterology & Nutrition

National Perinatal Association  
American Association of University Professors  
American Institute of Nutrition (Clinical Nutrition)  
American Federation for Clinical Research

**State:**

California Perinatal Association (Founding Member)

**International Committees:**

International Pediatric Association Advisory, 1980-present  
Expert Panel on Pediatric Gastroenterology and Nutrition 1980-present

**National Committees:**

Steering Committee, Gastroenterology Research Group 1967-1971  
Scientific Advisory Board, National Rye's Syndrome Foundation, 1978-1982  
Editor, Examination Committee of Sub-Board of Neonatal-Perinatal  
Medicine, 1981-  
Member, Sub-Board of Neonatal-Perinatal Medicine, 1975-79  
Member, Committee of the Fetus and Newborn, National American  
Academy of Pediatrics (1978-1984)  
Member, Committee of Maternal and Child Health, NICHD, 1979-1984  
Member, Association of Program Directors, GCRC 1979-89

**State & Local Committees:**

Member, Committee of Fetus & Newborn, Northern California Chapter of the  
American Academy of Pediatrics, 1968  
Member of the Council, California Perinatal Association, 1972  
Medical Director, Mother's Milk Bank, San Jose, 1979-89  
Member, Technical Advisory Committee on Neonatology, California  
Children's Services, 1984-

**Consultant:**

Scientific Referee:      *Pediatrics*  
                                 *Journal of Pediatrics*  
                                 *American Journal of Diseases in Children*  
                                 *Journal of Perinatology*  
                                 *Journal of Pediatric Gastroenterology & Nutrition*  
                                 *Pediatric Research*  
                                 *American Journal of Obstetrics and Gynecology*

Editorial Boards              *Gastroenterology, 1970-79*  
                                 *Neonatology-Perinatology 1979-1984*

*Journal of Perinatology* 1980 - 1998  
*Journal of Pediatric Gastroenterology & Nutrition*  
1973 - 1993  
*American Journal of Clinical Nutrition* 1991-1997

### **Honors and Awards**

Alpha Omega Alpha elected 1955  
Charter Member Waring Society University of Colorado 1955  
Ross Award in Research, Western Society for Pediatric Research 1970  
Henry J. Kaiser Education Award Stanford University School of Medicine  
1988  
California Perinatal Association Awardee of the Year 1988  
Joseph W. St.Geme, Jr. Education Award WSPR 1997

### **Grants**

RR - 81	Associate Program Director	1964-1967
	Program Director	1967-1989
	Thrasher Foundation	1979-1981
HO-16131	Developmental Gastroenterology	1984-1989

## PUBLICATIONS

1. Sunshine P, Yaffe SJ: Amitriptyline poisoning. *Amer J Dis Child* 106:501, 1963.
2. Sunshine P, Kretchmer N: Studies of small intestine during development. III. Infantile diarrhea associated with intolerance to disaccharides. *Pediatrics* 34:38, 1964.
3. Sunshine P, Kretchmer N: Intestinal disaccharidases. Absence in two species of sea lions. *Science* 144:850, 1964.
4. Sunshine P, Kusumoto H, Kriss J: Survival time of circulating long-acting thyroid stimulator in neonatal thyrotoxicosis: Implications for diagnosis and treatment of the disorder. *Pediatrics* 36:869, 1965.
5. Thomas DV, Fletcher G, Sunshine P, Klaus M, Schafer IA: Prolonged respirator treatment of pulmonary insufficiency in the newborn period. *JAMA* 193:183, 1965.
6. Koldovsky O, Sunshine P, Kretchmer N: Cellular migrations of intestinal epithelia in suckling and weaned rats. *Nature (London)* 212:1389, 1966.
7. Koldovsky O, Sunshine P, Kretchmer N: The digestion of carbohydrates during postnatal development. *Gastroenterology* 50:596, 1966.
8. Sunshine P, Kretchmer N: Intestinal disaccharides deficiency in the sea lion. *Gastroenterology* 53:123, 1967.
9. Dallman PR, Sunshine P, Leonard YI: Intestinal cytochrome response with repair of iron deficiency. *Pediatrics* 39:863, 1967.
10. Cohn RB, Sunshine P: Gastrostomy in the premature and newborn infant. *Arch Surg* 96:933, 1968.
11. Herbst JJ, Sunshine P: Postnatal development of the small intestine of the rat. *Pediatr Res* 3:27, 1969.
12. Benjamins D, Sunshine P: Active chronic hepatitis in infancy: Possible presence of the disease in siblings. *J Pediatr* 75:294, 1969.

13. Miller MJ, Sunshine P, Remington JS: Quantitation of cord serum IgM and IgA as a screening procedure to detect congenital infection: Results in 5006 infants. *J Pediatr* 5:1287, 1969.
14. Herbst JJ, Hurwitz R, Sunshine P, Kretchmer N: Effect of colchicine on intestinal disaccharidases: Correlation with biochemical aspects of cellular renewal. *J Clin Invest* 49:530, 1970.
15. Herbst JJ, Fortin-Magana R, Sunshine P: Relationship of pyrimidine biosynthetic enzymes to cellular proliferation in rat intestine during development. *Gastroenterology* 59:250, 1970.
16. Koldovsky O, Sunshine P: Effect of cortisone on the developmental pattern of acid and neutral b-galactosidases in the small intestine of the rat. *Biochem J* 117:467, 1970.
17. Koldovsky O, Herbst JJ, Burke J, Sunshine P: RNA and DNA in intestinal mucosa during development of normal and cortisone-treated rats. *Growth* 34:359, 1970.
18. Daily WJ, Meyer JB, Sunshine P: Mechanical ventilation of newborn infants. III. Historical comments and development of a scoring system for selection of infants. *Anesthesiology* 34:119, 1971.
19. Daily WJ, Sunshine P, Smith PC: Mechanical ventilation of newborn infants. V. Five years experience. *Anesthesiology* 34:132, 1971.
20. Hackel A, Sunshine P: A radiant heat unit for transportation of neonates. *Anesthesia and Analgesia* 50:548, 1971.
21. Musch B, Adams JL, Sunshine P: An air curtain incubator for use in intensive care nursery. *J Pediatr* 79:1024, 1971.
22. Lebanthal E, Sunshine P, Kretchmer N: Effect of carbohydrate and corticosteroids on activity on alpha-glucosidases in intestine of the infant rat. *J Clin Invest* 51:1244, 1971.
23. Johnson JD, Albritton WL, Sunshine P: Hyperammonemia accompanying parenteral nutrition in newborn infants. *J Pediatr* 81:154, 1972.
24. Sunshine P, Lindenbaum JE, Levy HL, Freeman JM: Hyperammonemia due to a defect in ornithine transcarbamylase. *Pediatrics* 50:100, 1972.

25. Cohn R, Sunshine P, DeVries P: Necrotizing enterocolitis in the newborn infant. *Amer J Surg* 124:166, 1972.
26. Lebenthal E, Sunshine P, Kretchmer N: Effect of prolonged nursing on the activity of intestinal lactase in rats. *Gastroenterology* 64:1136, 1973.
27. Johnson JD, Malachowski N, Grobstein R, Welch D, Daily W, Sunshine P: Prognosis of children surviving with the aid of mechanical ventilation in the newborn period. *J Pediatr* 84:272, 1974.
28. Goldstein AS, Hoogenraad NJ, Johnson JD, Fukunaga K, Swierczewski E, Cann H, Sunshine P: Metabolic and genetic studies of a family with ornithine transcarbamylase deficiency. *Pediatr Res* 8:5, 1974.
29. Hansen RC, Wasnich RD, DeVries PA, Sunshine P: Bile ascites in infancy: diagnosis with <sup>131</sup>I-rose bengal. *J Pediatr* 84:719, 1974.
30. Leake RD, Gunther R, Sunshine P: Perinatal aspiration syndrome. Its association with intrapartum events and anesthesia. *Am J Obst Gyn* 118:271, 1974.
31. Friedland GW, Dodds WJ, Sunshine P, Zboralske FF: The apparent disparity in incidence of hiatal herniae in infants and children in Britain and the United States. *Am J Roent Radium Ther Nucl Med* 120:305, 1974.
32. Friedland GW, Sunshine P, Zboralske FF: Hiatal hernia in infants and young children: A 2-3 year follow-up study. *J Pediatr* 87:7, 1975.
33. Sinatra FR, Yoshida T, Applebaum M, Mason W, Hoogenraad NJ, Sunshine P: Abnormalities of carbamyl phosphate synthetase and ornithine transcarbamylase in liver of patients with Reye's syndrome. *Pediatr Res* 9:829, 1975.
34. Sinatra FR, Suntain WL, Mitchell C, Sunshine P: Cholestyramine treatment of pseudomembranous colitis. *J Pediatr* 88:304, 1976.
35. Johnson JD, Malachowski N, Vosti KL, Sunshine P: A sequential study of various modes of skin and umbilical care on the incidence of staphylococcal colonization and infection in the neonate. *Pediatrics* 58:354, 1976.

36. Pass MA, Johnson JD, Schulman IA, Grumet CF, Hafleigh EB, Malachowski N, Sunshine P: Evaluation of a walking-donor blood transfusion program in an intensive care nursery. *J Pediatr* 89:646, 1976.
37. Goetzman BW, Sunshine P, Johnson JD, Wennberg RP, Hackel A, Merten DF, Bartoletti AL, Silverman NH: Neonatal hypoxia and pulmonary vasospasm: Response to tolazoline. *J Pediatr* 89:617, 1976.
38. Mitchell CH, Sinatra FR, Crest FW, Griffin R, Sunshine P: Intractable watery diarrhea, ganglioneuroblastoma, and vasoactive intestinal peptide. *J Pediatr* 89:593, 1976.
39. Liebhaver M, Lewiston NJ, Asquith MT, Olds-Arroyo L, Sunshine P: Alterations of lymphocytes and of antibody content of human milk after processing. *J Pediatr* 91:897, 1977.
40. Johnson JD, Simoons FJ, Hurwitz R, Grange A, Mitchell CH, Sinatra FR, Sunshine P, Robertson WV, Bennett PH, Kretchmer N: Lactose malabsorption among the Pima Indians of Arizona. *Gastroenterology* 73:1229, 1977.
41. Liebhaver M, Lewiston NJ, Asquith MT, Sunshine P: Bacterial contamination comparing two methods of human milk collection. *J Pediatr* 92:236, 1978.
42. Johnson JD, Simoons FJ, Hurwitz R, Grange A, Sinatra FR, Sunshine P, Robertson WV, Bennett PH, Kretchmer N: Lactose malabsorption among adult Indians of the Great Basin and American Southwest. *Amer J Clin Nutr* 31:381, 1978.
43. Tsuboi KK, Schwarz SM, Burrill PH, Kwong LK, Sunshine P: Sugar hydrolases of the infant rat intestine and their arrangement on the brush border membrane. *Biochim Biophys Acta* 554:234, 1979.
44. Tsuboi KK, Kwong LK, Burrill PH, Sunshine P: Sugar hydrolases and their arrangement on the rat intestinal microvillus membrane. *Membr Biol* 50:101, 1979.
45. Stevenson DK, Kasting DS, Darnall RA, Ariagno RL, Johnson JD, Malachowski N, Beets CL, Sunshine P: Refractory hypoxemia associated with neonatal pulmonary disease: The use and limitations of tolazoline. *Pediatrics* 95:595, 1979.



46. Cohen RS, Stevenson DK, Malachowski N, Ariagno RL, Johnson JD, Sunshine P: Late morbidity among survivors of respiratory failure treated with tolazoline. *J Pediatr* 97:644, 1980.
47. Stevenson DK, Kerner JA, Malachowski N, Sunshine P: Late morbidity among survivors of necrotizing enterocolitis. *Pediatrics* 66:925, 1980.
48. Johnson JD, Malachowski N, Sunshine P, Hafleigh EB, Grumet C: New transfusion program for an intensive care nursery. *J Pediatr* 97:806, 1980.
49. Tsuboi KK, Kwong LK, Ford WDA, Colby F, Sunshine P: Delayed ontogenic development in the bypassed ileum of the infant rat. *Gastroenterology* 80:1550, 1981.
50. Neu J, Masi M, Stevenson DK, Kwong LK, Hurwitz R, Sunshine P: Effects of asphyxia and oral gentamycin on intestinal lactase in the suckling rat. *Pediatr Pharmacol* 1:215, 1981.
51. Neu J, Ariagno RL, Johnson JD, Pitlick PT, Cohen RS, Beets CL, Sunshine P: A double blind study of the effects of oral indomethacin in preterm infants with patent ductus arteriosus who failed medical management. *Pediatr Pharmacol* 1:245, 1981.
52. Tsuboi KK, Kwong LK, Neu J, Sunshine P: A proposed mechanism of normal intestinal lactase decline in the postweaned mammal. *Biochem Biophys Res Commun* 101:645, 1981.
53. Cohen RS, Stevenson DK, Malachowski N, Ariagno RL, Kimble KJ, Hopper AO, Johnson JD, Ueland K, Sunshine P: Favorable results of neonatal intensive care for very low birth weight infants. *Pediatrics* 69:621, 1982.
54. Kimble KJ, Ariagno RL, Stevenson DK, Sunshine P: Growth to age three years among very low birth weight sequelae-free survivors of modern neonatal intensive care. *J Pediatr* 100:622, 1982.
55. Molfese V, Sunshine P, Bennett A: Reactions of women in intrapartum fetal monitoring. *Obstet Gynecol* 59:705, 1982.
56. Berserth CL, Malachowski N, Cohn RB, Sunshine P: Longitudinal growth and late morbidity of survivors of gastroschisis and omphalocele. *J Pediatr Gastroenterol & Nutr* 1:375, 1982.

57. Kimble KJ, Ariagno RL, Stevenson DK, and Sunshine P: Predictive survival among ventilator-dependent very low birth weight infants. *Critical Care Medicine* 11:812, 1983.
58. Asquith MT, Pedrotti PW, Harrod JR, Stevenson DK, and Sunshine P: The bacterial content of breast milk after the early initiation of expression using a standard technique. *J Pediatr Gastroenterol & Nutr* 3:104, 1984.
59. Stiehm ER, De Vivo DC, Brann Jr AW, Fisher DA, Hodson WA , New MJ, Shearer WT, Sokol RJ, Sunshine P, Taeusch HW: Advances in perinatology from the Clinical Research Centers. *Pediatr Res* 18:197, 1984.
60. Cohen RS, Stevenson DK, Ariagno RL, Sunshine P: The survival and morbidity of our smallest babies: Is there a limit to neonatal care? *Pediatrics* 73:415, 1984.
61. Benitz WE, Malachowski N, Cohen RS, Stevenson DK, Ariagno RL, Sunshine P: Use of sodium nitroprusside in neonates: Efficacy and safety. *J Pediatr* 106:102, 1985.
62. Enzmann D, Murphy-Irwin K, Barton J, Stevenson DK, Ariagno RL, Sunshine P: The natural history of subependymal germinal matrix hemorrhage. *Amer J Perinatol* 2:123, 1985.
63. Kerner JA, Hartman G, Sunshine P: The medical and surgical management of infants with the short bowel syndrome. *J Perinatol* 5:13, 1985.
64. Tsuboi KK, Kwong LK, D'Harlingue AE, Stevenson DK, Kerner JA, Sunshine P: The nature of maturational decline of intestinal lactase activity. *Biochim Biophys Acta* 840:69, 1985.
65. Tsuboi KK, Kwong LK, Sunshine P, Koldovsky O: The nature of elevated intestinal carbohydrase activities following high carbohydrate feeding. *Amer J Physiol* 249:G510, 1985.
66. Tsuboi KK, Kwong LK, Fan Q, Thompson DJ, D'Harlingue E, Sunshine P: Effects of hydrocortisone on carbohydrase concentrations, de novo synthesis and turnover patterns in immature rat intestine. *Cell Biochem Functions* 4:131, 1986.

67. D'Harlingue AE, Kwong LK, Morrill JS, Sunshine P, Tsuboi KK: Growth and differentiative maturation of the rat enterocyte. *J Pediatr Gastroenterol Nutr* 5:956, 1986.
68. Stevenson DK, Sunshine P: Home phototherapy: Risks versus benefits. *Clin Pediatr* 25:300, 1986.
69. Kerner JA, Poole RL, Sunshine P, Stevenson DK: High serum vitamin E levels in premature infants receiving MVI-Pediatric. *J Pediatr & Perinat Nutr* 1:75, 1987.
70. Hartman CG, Castillo RO, Kwang LK, Sunshine P, Tsuboi KK: Maturational patterns of carbohydrases in the ileal remnant of rats after jejunectomy at infancy. *Am J Clin Nutr* 47:868-874, 1988.
71. Morrill JS, Kwong LK, Sunshine P, Briggs GM, Castillo RO, Tsuboi KK: Dietary CHO and stimulation of carbohydrases along villus column of fasted rat jejunum. *Am J Physiol* G158:G165, 1989.
72. Quan R, Yang C, Rubinstein S, Lewiston NJ, Sunshine P, Stevenson DK, Kerner, Jr. JA: Effects of microwave therapy on anti-infective factors in human milk. *Pediatrics* 89:667-669, 1992.
73. Tsuboi KK, Kwong LK, Sunshine P, Castillo RO: Mechanism of maturational decline of rat intestinal lactose-phlorizin hydrolase. *Biochem J* 282:107-113, 1992.
74. Gaynon, M.W., Stevenson, D.K., Sunshine P., Fleisher, B.E., Landers, M.B.: Supplemental oxygen may decrease progression of prethreshold ROP. *J. Perinatol* 17:434-8, 1997

**Publications: Non Peer Reviewed:**

1. Herbst JJ, Sunshine P, Kretchmer N: Intestinal malabsorption in infancy and childhood. *Adv Pediatr* 16:11, 1969.
2. Sunshine P, Herbst JJ, Koldovsky O, Kretchmer N: Adaptation of the gastrointestinal tract to extrauterine life. *Ann N Y Acad Sci* 176:16, 1971.
3. Sunshine P, Sinatra FR, Mitchell CH: Intractable diarrhea of infancy. *Clinics in Gastroenterology* 6:445, 1977.

4. Kerner JA, Sunshine P: Parenteral alimentation. *Seminars in Perinatology* 3:417, 1979.
5. Sunshine P: Short bowel syndrome of infancy. *J Calif Perinatal Assoc* 1:15, 1981.
6. Fischer AF, Sunshine P: The thick blood syndrome. *Perinatology-Neonatology* 8:39, 1984.
7. Asquith MT, Pedrotti PW, Stevenson DK, Sunshine P: Clinical uses, collection, and banking of human milk. *Clin Perinatol* 14:173, 1987.

## **CHAPTERS, BOOKS & MONOGRAPHS**

### **BOOKS:**

1. Stevenson DK, Sunshine P (eds): *Fetal and Neonatal Brain Injury: Mechanisms, Management and Risks of Practice*. B.C. Decker, Inc., Toronto, 1989.
2. Stevenson DK, Sunshine P (eds): *Fetal and Neonatal Brain Injury: Mechanics, Management and Risks of Practice*, 2nd Edition. Oxford University Press, Oxford 1997

### **BOOK CHAPTERS:**

1. Sunshine P: Carbohydrate intolerance and carbohydrate malabsorption, In *Current Pediatrics Therapy*, 3rd Edition, Gellis. S.S. and Kagan, B.M. (Eds.), W.B. Saunders Company, Philadelphia, 1968.
2. What pediatricians should know about malabsorption, but are afraid to ask. In *Current Problems in Pediatrics*, Volume II, Number 8, Gluck, L., Cone, T.E., Jr., Dodge, P., Falkner, F. and Green, M. (Eds.), Year Book Medical Publishers, Inc., Chicago, 1972.
3. Diarrhea, In *Pediatrics*, Barnett, H.L., and Einhorn, A.H. (Eds.), Appleton Century Crofts, New York, 1972 & 1977.
4. Vomiting, In *Current Pediatrics Therapy*, Gellis, S.S. and Kagan, B.M. (Eds.), W.B. Saunders Company, Philadelphia, 1973 & 1976.

5. Diseases of Infants, In *Anesthesia and Uncommon Diseases: Pathologic and Clinical Correlations*, Katz, J. and Kadis, L. (Eds.), W.B. Saunders Company, Philadelphia, 1973.
6. Diseases of the gastrointestinal tract, In *Neonatology*, Behrman, R.E. (Ed.), C.B. Mosby Company, 1978.
7. Nutrition of the low birth weight infant. In *Fetal and Maternal Medicine*, Quilligan, E.G. and Kretchmer, N. (Eds.), John Wiley & Sons, Inc., New York, 1980.
8. Treating the tiniest patients. In *Medical Update 1983*, World Book, Inc., Chicago, p. 106.
9. Sunshine P, Kerner JA Jr: The management of infants with short-gut syndrome. Proceedings of the International Pediatric Association Symposium of Infant and Young Child Feeding, Ankara, Turkey, November, 1982.
10. Sunshine P, Kerner JA Jr: The use of intravenous fat emulsions in preterm infants. In *Nutritional Adaptation of the Gastrointestinal Tract of the Newborn*, (eds. Kretchmer N, Minkowski A), Raven Press, New York, Nestle Nutrition Workshop Series, vol. 3, p. 163, 1983.
11. The gastrointestinal system. In *Behrman's Neonatal-Perinatal Medicine*, Fanaroff AA and Martin RJ (Eds.), The C.V. Mosby Co., pp. 477,
12. Sunshine P and Benitz WE: Neonatal Resuscitation. In *Current Therapy in Neonatal-Perinatal Medicine*, NM Nelson (ed.), B.C. Decker, Inc., publisher, pp. 360-369, 1985.
13. Stevenson DK, Sunshine P: Handicaps of prematurity. In *Prenatal and Perinatal Biology and Medicine*, Vol. 2, Quilligan EJ, Johnson JD, Kretchmer N (eds.), Harwood Academic Publishers, p. 155, 1987.

Philip Sunshine, M.D.  
Post-doctoral Fellows

<b>Name</b>	<b>Year</b>	<b>Current Position</b>
<b><u>Peds G.I.</u></b>		
John J. Herbst	1966-69	Professor of Pediatrics LSU - Shreveport, LA
Emanuel Lebenthal	1970-72	Professor & Chairman Pediatrics Hadassah Hospital Jerusalem, Israel
Frank R. Sinatra	1974-76	Professor Pediatrics USC, Los Angeles, CA
Charles Mitchell	1974-76	Emeritus Chief of Pediatrics Madigan General Hospital Tacoma, WA
Obiodun Johnson	1977-79	Assoc. Professor Pediatrics Texas Tech University Amarillo, TX
John A. Kerner, Jr.	1977-79	Professor of Pediatrics, Stanford Stanford, CA
Steven M. Schwarz	1977-78	Chairman, Pediatrics Long Island College Hospital Brooklyn, NY

**Neonatology**

W.J.R. Daily	1964-67	Chief, Neonatology Associates Phoenix, AZ
Rosemary Leare	1967-69	Emeritus Chairman, Pediatrics Harbor/UCLA, Torrance CA
Thomas Harris	1968-70	Neonatology Associates Phoenix, AZ

Carol A. Browning	1968-71	Neonatologist, Sinai Samaritan Medical Center, Milwaukee, WI
Arnold S. Goldstein	1969-71	Private Practice, Pediatrics Highland Park, IL
Nancy Edwards Dow	1970-71	Assoc. Professor of Pediatrics USC, Los Angeles, CA
Boyd Goetzman	1971-73	Professor Pediatrics, UC Davis Davis, CA
Steven Fernbach	1972-73	Chief, Neonatology, Kaiser Hospital Santa Clara, CA
Richard Topel	1971-73	Neonatologist/Pediatrician, Kaiser Hospital, San Francisco, CA
Robert A. Darnell	1975-77	Assoc. Professor, Pediatrics, U.of Dartmouth, Vermont Medical Center Lebanon, NH
Albert Bartoletti	1976-78	Chief, Neonatology St. Peter's Hospital, Albany NY
David S. Kasting	1976-78	Chief, Neonatology, Ventura County Medical Center, Venture, CA
David K. Stevenson	1977-79	Professor, Pediatrics, Stanford Stanford, CA
Carolyn L. Berseth	1978-80	Professor, Pediatrics, Baylor Univ. Houston, Texas
Josef Neu	1978-80	Professor, Pediatrics U. of Florida Gainesville, FL
Ronald S. Cohen	1979-81	Chief, Neonatology, SCVMC San Jose, CA
Keith J. Kimble	1979-81	Director, PICU & Chief, Pediatric Anesthesiology, Cedars-Sinai Hosp Los Angeles, CA
Andrew O. Hopper	1980-82	Assoc. Professor Pediatrics, Loma

Linda University, Loma Linda, CA

David Smith	1981-83	Chief, PICU, Sutter Medical Center Sacramento, CA
Arthur E. D'Harlingue	1981-83	Neonatologist, Children's Hospital Oakland, CA
William G. Benitz	1982-85	Assoc. Professor Pediatrics Stanford, Stanford CA
William L. Salomon	1982-84	Chief, Neonatology, Central Maine Medical Center, Lewiston, ME
Terrance J. Sweeney	1983-85	Neonatologist, Swedish Hospital Seattle, WA
Michael Trautman	1983-86	Assoc. Professor Pediatrics, U. of Utah, Salt Lake City, UT
Philip M. James	1984-87	Neonatologist Tucson, AZ
Lawrence Mathers	1985-87	Assoc. Professor Pediatrics, Stanford, Stanford, CA
Allen F. Fischer	1985-88	Chief, Neonatology, Kaiser Hospital Walnut Creek, CA
Ralph D. Aarons	1986-89	Asst. Professor, Tufts University Boston, MA
Richard F. Fulroth	1987-89	Neonatology Associates Phoenix, AZ
Diane N. Lorant	1988-90	Clinical Asst. Professor, U. of Utah Salt Lake City, UT
William D. Rhine	1987-89	Assoc. Professor of Pediatrics Stanford, Stanford, CA