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 for the Gartner Pediatric History Center of the American Academy of Pediatrics. The 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.
ABOUT THE INTERVIEWER

Clement Ren, MD

Clement L. Ren, MD, MBA is Professor of Clinical Pediatrics at the Indiana University School of Medicine and Cystic Fibrosis Center Director at Riley Hospital for Children. He also serves as the Associate Chief of the Division of Pediatric Pulmonology, Allergy, and Sleep Medicine and Director of the Pulmonary Function Laboratory at Riley. Dr. Ren earned an AB in Biophysics from the University of California at Berkeley and an MD from the University of Chicago. He then completed a pediatric residency and allergy/immunology fellowship at Boston Children's Hospital, followed by a fellowship in pediatric pulmonology at St. Christopher's Hospital for Children. He also received an MBA (Medical Management) from the University of Rochester.

Dr. Ren’s research has focused on the use of infant/preschool pulmonary function testing to study outcomes of pediatric respiratory diseases such as cystic fibrosis (CF) and bronchopulmonary dysplasia. His other area of scholarly activity has been CF epidemiology. In addition to advancing knowledge through research, he has helped advance care through leadership and service in the CF Foundation and American Thoracic Society, where he has served on and chaired committees, led the development of clinical practice guidelines, and headed quality improvement networks. He also is an Associate Editor for Pediatric Pulmonology and a member of the American Board of Pediatrics Sub-Board for Pediatric Pulmonology. Dr. Farrell has had a profound impact on Dr. Ren’s career through his work on CF newborn screening and a collaboration on a longitudinal cohort study of CF nutrition in infancy and early childhood, and his career has served as an inspiration for Dr. Ren.
DR REN:  This is Dr. Clement Ren from the Indiana University and Riley Hospital for Children, taking the Oral History of Dr. Phillip Farrell of the University of Wisconsin for the American Academy of Pediatrics Oral History Project.

Thanks, Phil for taking the time to speak with me. So, let's start with your family background. Where did you grow up and how were you influenced to go into medicine? Did you actually ever consider any other professions?

DR FARRELL:  Very good question. Well, I was born in St. Louis on November 26, 1943. My father was a very busy general practitioner at the time. He had an increasingly large practice because it was World War II. And the majority of the physicians had been called up to the Army or the Navy, but he had by that point, he and his wife, my mother had two children and another on the way. And he worked during the war doing physical exams on inductees. And as a result, by the time I was a few years old I was exposed to the practice of medicine. My father Robert Farrell did not actually encourage me, but he did not discourage me either to become a physician. Rather he, being Irish, focused on the first born son, my older brother, and put a large amount of pressure on my older brother, named for my father Robert, to become a medical doctor.

I was in an environment in which medicine was often discussed. My mother met my dad in the Emergency Department of St Louis City Hospital, which my dad directed during the 1930s during the depression, what was called the Receiving Room, the triage center of St Louis City Hospital, which was like Cook County hospitals at the time - huge hospital which took all-comers and handled injuries in particular and catastrophic events like heart attacks, strokes, et cetera. Anyway they both were very intelligent. My mother, as a matter of fact, while she was working at St. Louis City Hospital was offered a four year scholarship to the university of Missouri to work on a bachelor's degree, which was very unusual for women at the time. And she actually did go to the campus and started that program before my dad traveled there and proposed, and then they got married.

But my mother used to discuss the practice of medicine as well. Now what was really very influential for me, in retrospect, is my father provided healthcare for all six of his children, as well as his nephews and nieces who sometimes would come to our house. And my dad was a talkative guy and he would generally, while he was making a diagnosis or giving a treatment would explain what was going on — what was the underlying disease and what was the treatment. The other thing is he used to make house calls, as many doctors did in the 1930s and in the 1940s. And he would take me along on those house calls. I would just wait
in the car. And also he made rounds on his patients on Sunday and typically
would take me, and often my brother, or maybe one of my sisters along, and we
didn't always wait in the car.

Sometimes he brought us into the staff room. And so there was an environment
of medical practice that I grew up in. Now, if that wasn't enough, I had a uncle I
was fairly close to named Joseph Lucido, who was a very good general surgeon
in World War II. He came out of the Army and did a thoracic surgery residency at
Washington University under a pioneer thoracic surgeon, Evarts Graham. He
would talk about what chest medicine was like. He would talk about resection
of lobes for tuberculosis, etc. He became very well known - they called him
"Jumping Joe" because he was without a doubt, the fastest thoracic surgeon in
St. Louis. He could go from the incision to the lesion in less than 15 minutes.

DR REN: Wow

DR FARRELL: That was remarkable in those days, you know, because he had to tie off the
bleeders etc. And so he kind of encouraged me as well because I could talk with
him about becoming a doctor, and it was very hard for me to talk to my dad
about it because my dad was so focused on my older brother. But when I was
finishing up high school in 1961, as I was 17 years-old, Dr. Lucido somehow got
me a position with - along with other high school graduates - at St. Louis State
Hospital as an orderly— actually a nursing assistant. Now, this was perhaps the
most significant influence for me. St. Louis State Hospital was a 3,300 bed
insane asylum.

DR REN: Did you say 3,300 - three thousand, three hundred beds!?

DR FARRELL: Yes, 3,300 patients. It was multiple buildings, but this was not unusual for what
would be called an insane asylum at the time. These were people with
schizophrenia, for example, or neurosyphilis. These were in the pre-Thorazine
days, so those people could not be out on the street. And there were many that
had congenital brain damage, intellectual dysfunction, etc. But this position
was fabulous. The LPNs and the RNs kind of took me under their wings. I was
working more as a nursing assistant than anything else. I did everything from
emptying the bedpans to making the beds to irrigating urinary bladders,
because many of the patients had indwelling urinary catheters. I also took care
of a decubitus ulcers. They gradually increased my responsibilities. They told
me how to use the stethoscope to take and record the vital signs, draw blood,
start IVs. I mean, that's a lot for a 17 year old to do. And I really did benefit
greatly from that.

Now you asked me what else was I interested in? I was interested in pharmacy. I
liked aspects of it— kind of appealed to my quantitative biochemical nature,
but the pharmacist who was located in the building where my dad had his office
- and this was not a common either - that there'd be a pharmacy on the first floor, selling drugs and a doctor's office. And my dad would have a direct line to the pharmacist. So he just would call prescriptions down after he saw a patient. And by the time the patient came down the stairs and went to the pharmacy, they'd have them ready and it was a very efficient set up. And the pharmacist, I think, paid the lease cost for my dad's office. That was not an uncommon thing at the time. But the pharmacist said to me, - his name was Richard Cutter. I'll never forget this. He said, "Phil, you'd be making a terrible mistake. Why should you become a pharmacist when you can become a doctor? You can be the person that gives me the orders rather than the person who's taking the orders." So that's basically how it happened, and I didn't have any interest in anything else after my senior year of medical school.

I have to tell you one other thing Clement, because I know you have children. My younger brother, John was treated the same way as me. You know, the attention was on the oldest brother, but neither John or I were really jealous about this. We kind of went our own way. In retrospect, we were fortunate not to have our father all over us putting all this pressure on. We know now that fathers who pressure their children are making a terrible mistake. But my brother, John, he was always a little bit like me considered kind of a screw up. You know, the two of us always were involved in mischief various kinds, you know, boys will be boys and that's the way we were. We were involved in all kinds of sports and dating and stuff like that. But out of the blue, my brother, John, who I'd become very close to, decided he wanted to do pre-med. He absolutely, like I did, aced his courses and went into med school after three years. And did a GI fellowship at University of Michigan and became a very prominent gastroenterologist and colonoscopist in St. Louis. I bring John up because he actually helped me with my research on vitamin E deficient chickens and those with hereditary muscular dystrophy.

So I was really focused in the healthcare field from the beginning. Anyway, I was so stimulated from the St Louis State Hospital experience that I just loved pre-med studies. Chemistry, my major, and I minored in biology and all these things I wondered about as a nurses aid and orderly during the summer were really questions in my mind that got answered through courses. So I'd kind of searched for the answer sometimes. So that's interesting, and it was very significant that I met my wife, Alice, my eventual wife, in chemistry class. She was a medical technology student, and we became very close early. We took our most difficult course together, the following summer, which in retrospect was really not a good idea,

DR REN: (chuckles)

DR FARRELL: Because organic chemistry is difficult enough if you take it during the year, but if you try to cram two semesters into a summer, especially a hot St Louis
summer, that could be a nightmare. Alice and I spent a lot of time together studying. And we both passed the course and - it was a struggle though. And once that was behind me, everything was downhill in pre-med and medical school at St. Louis University. That course was the one that weeded out medical students - probably still is.

But I realized that courses after that were relatively easy. So I decided that I wanted to - partly to boost my resume, but also out of interest - to apply for a research technician - laboratory technician job - at a neurology research Institute of St. Louis University that was at the medical school, just across the street from where we had our chemistry and biology labs as pre-meds. And the person who hired me, Dr. Louis Tureen became a scientific father figure. I got the work done very efficiently and Louie was willing to allow me to design my own research project looking at hereditary and nutritional muscular dystrophy in chickens. That was in the sphere of his research interest for sure and his talent, but he wasn't a biochemist. He did histopathology and this project turned out to be a breakthrough study that attracted national attention at a time when I was 21 years old - I got my own independent funding, three different grants along the way.

DR REN: Hmmm!

DR FARRELL: My brother, John helped me with taking care of those chickens, and Alice, who loved clinical chemistry and was actually working as a clinical chemist by then, helped me with the analysis of plasma creatine kinase. I had to do enormous numbers of these enzyme essays and she'd volunteer to come and we'd work some in the evening and then go out on a date. And so it was kind of a family affair at that point. Now, Clement, what was most important about it in retrospect was really two things. Number one is I got the thrill of discovery through research early and the gratification of national recognition for an original research project presented in New York with major scientists and leaders from around the world. It was an international conference. Lew Barness chaired the session where I presented, and he kind of pushed me as Lew does. He pushed me towards pediatrics. He said, Phil, "this project means you're going to be a pediatrician." And he said that to me on the stage of the hotel there in New York. And that's probably the first time I thought about "Hmmm, pediatrics? Maybe." But the other thing that was quite important about that is I really felt comfortable with this scientific method of research. I really liked that. I liked how organized it can be and the thrill of discovery, et cetera. So, I caught research fever then, and I still have it. It hasn't gone away. I still have, as one person told me, "fire in the belly" for research.

Now I entered medical school after three years, a few hours short of a degree. But all the major courses were done. I needed like one theology course and one
philosophy course or something like that. St. Louis University was a very good institution for me. You know, it's kind of a B-level university but the science education was very good. The science courses, particularly the labs, were taken in the medical school facilities and the Jesuits insisted on a liberal arts curriculum. So my degree is actually an AB degree, not a BS degree because they had to take a lot of liberal arts and a lot of history and maybe one of the reasons I've been sort of obsessed with history as well.

DR REN: Hey, let me ask a question about that. Did you actually study French at that point, because I took a lot of French in college myself, and I noticed that your French is quite good.

DR FARRELL: I'll explain how it happened. Terrific question Clement. In order to graduate with a PhD, I needed another course and my advisor/mentor, Bob Olson thought that taking another organic chemistry course would be a good idea. He said, "you know, you're studying vitamin E, you need to understand sterol metabolism, and organic chemistry would be very good or maybe statistics." But I had already had a couple, maybe even three statistics courses. And I said, "well, you know, I'm not sure I want to do organic chemistry again." I remembered it being a nightmare, and I didn't think it would be that useful, but I found out another alternative was a course, given to graduate students in the sciences entitled Scientific French and German. And I said, this is what I'd really like because as you know, some of the research that relates to my project was published in the French and in the German literature because in the 19th century and 18th century, France and Germany led the world. And so those publications in French and in German are extremely important. And so, he agreed. And fortunately, although Dr. Olson was an opinionated person, he was as flexible enough as Dr. Tureen was in letting me sort of find my own way in terms of research projects. So I took scientific French and German, absolutely loved the course. To pass, I had to translate a scientific article in French with just a little dictionary, tiny one and, and another one in German. And I did all right with it, but that's how it happened, Clement. And then I should tell you, as long as we're discussing France - or maybe we should come back to it when I tell you about my surfactant research, because I had a very strong connection there that also has become a strong connection for CF and CF newborn screening and genetics.

DR REN: So you told me how you got interested in pediatrics and research. But how did you choose what to do after medical school and in particular, how did you end up gravitating towards respiratory medicine?

DR FARRELL: Well, I think it happened because of my graduate program in biochemistry. Now I had to do instead of two pre-clinical years, and then the PhD, and then two clinical years, I had to do three years before graduate school—the first clinical year because of the risk of being drafted for service in Vietnam. It was a
very risky thing for me to do too. I had to resign from medical school to go into graduate school, you know, which is really a risky thing in retrospect. Now somebody in an MSTP is dual registered in med school and grad school, but I had to resign.

But I also felt that I had to accelerate my education in graduate school with biochemistry in case they reclassified me 1-A and I would then try to return into medical school. And at that time, Clement, the general attitude was, which has been a problem my entire career is people’s attitude, especially leaders, believe that you can only be one of these, or you can only be one of those. If you’re going to just be a PhD, well, that’s what you’re going to be. You’re not going to be an MD also. The MD-PhD concept was very new at the time, not proven. So I had to accelerate through courses as much as I could and with my research project. But in that third year, while on the pediatrics clerkship. As a junior medical student (I hadn’t gone into graduate school yet), I participated in the care of an eight year old girl with cystic fibrosis. I’ll never forget it. April of 1966. I got to know her well as she was being treated for her disease in the hospital. And I found this disease cystic fibrosis to be fascinating as a junior medical student, but the tragic thing was she died trying to cough up her thick respiratory secretions. She had upper airway obstruction, and that’s how she died - cyanotic, fear on her face. And I decided that day that no child should ever suffer such a death. And I’ve always remembered her. That, and a couple of other experiences are what I think led me into pediatrics.

But how about pediatric pulmonology? Well, as I moved along with my thesis project that focused on skeletal muscle, one of my five advisors, Bill Longmore, a lipid biochemist who developed an isolated perfused lung system to study surfactant biochemistry and physiology. This was novel at the time. I was using centrifuges in his laboratory and I’d be in there when he and a technician or a grad student were trying to set up the isolated perfused lung system. And Bill would ask me to help set up the system. We would perfuse the lungs with probably Krebs Ringer-Bicarbonate solution. I can’t remember. And I often discussed aspects of lung biochemistry with Bill Longmore while I was in his lab. And he convinced me that even though the liver and to a lesser extent the kidney were the usual target organs for studies of metabolism as related to function, the lung would reign supreme eventually. And it’d be more difficult to study since it was a complex organ with so many very interesting cells such as type II pneumocytes, et cetera.

And that really turned me on because it had a different dimension than skeletal muscle in terms of scientific interest and obviously such a vital role in gas exchange. So, it was probably the patient with CF and the experience with Bill Longmore and the isolated perfused lung that made a big difference, and I really liked lipid biochemistry a lot. While I was in graduate school, Alice had two baby boys, and she says that I got even more turned on to pediatrics helping
to care for our two children. And she's probably right, because my idea as I was finishing up in graduate school, ready to move on, was I'd go into laboratory medicine by doing a pathology residency. I had actually applied at several top quality places—the University of Wisconsin where Henry Pitot was the chair, the University of Minnesota, which was world renowned, and the Mayo Clinic. Going into November and December of 1969, my plan was a pathology residency.

Then I did a rotation at Cardinal Glennon Children’s Hospital in St. Louis. And it was like a thunderbolt hit me from the sky. One day I realized pediatrics is so exciting. I liked the respiratory aspect of it. And I was seeing children in an ambulatory care clinic; the ER, which is very busy and the neonatal service - it wasn't a NICU, but it was a neonatal service. And I made up my mind, I wanted to be a pediatrician.

So here it is around December 1969 and the interviews are done. And the University of Minnesota - I wanted to go back to the same places particularly University of Minnesota, which was generally considered the best pediatrics residency in the Midwest at the time. They wouldn’t interview me because I was too late. Wisconsin, it turns out, was on the upswing and the Chair there, Charles Lobeck, whose field was cystic fibrosis checked up on me by calling the Chair at St. Louis, Art McElfresh because Dr. Lobeck was concerned that somebody who would begin an MD, leave med school, go to grad school during the war in Vietnam might be as he put it later an “odd ball.” You know, why would somebody do this - leave medical school to get a PhD and run the risk of being drafted? I mean, the war in Vietnam was really an overriding issue at the time. And he wanted to make sure that I really was committed to pediatrics. So he called the Chair of Peds at St. Louis Art McElfresh, and Art told him I was the real deal. And so Charles Lobeck brought me on board as a resident. Now it turns out that Wisconsin needed more applicants. Minnesota did not. The other thing, my advisor Bob Olson for my PhD in biochemistry who was an opinionated person, strongly recommended Madison because there were some very successful MD PhDs there, like Harry Wasteman, who among other things was one of the pioneers in newborn screening for PKU.

DR REN: Hmmmm.

DR FARRELL: And so it was very desirable to go to Madison, and the pediatrics residency there was very good and definitely on the rise. But one of the most attractive features for me was they had started a neonatal ICU in 1968. And I was going there in 1970. 1968 was early for a NICU. You know, the first babies were mechanically ventilated in '65-'66 by Millie Stallman and Phil Sunshine. And I liked that because I was definitely interested in neonatology, and I definitely had gotten turned on to pulmonary surfactant. The other things that I really liked were Charles Lobeck and the CF Center director at that time, John Mangos— both
excellent mentors—and there was also a lot of elective time. You had to take night call on an elective, but there was a surprising amount of elective time, which most people would spend on cardiology or genetics or something, but Dr. Lobeck allowed me to devote that time to research.

So, I linked up with another MD-PhD Richard Zachman, who got his PhD under James Olson, studying vitamin A, and I got my PhD under his brother, Bob Olson, studying vitamin E. Zachman was studying the lung enzymes important in surfactant phospholipid production. I was a skilled enzymologist by then. I was also interested in induction of enzymes at the genetic level, and so I got into the project. It was published a couple of years later in Science and was an absolute breakthrough. So I was very fortunate, as I took advantage of the opportunity, under another excellent mentor, Dick Zachman, and very fortunate to have gone to Madison for my residency.

I want to stop there because next I should tell you about how I linked up with my fifth mentor, Paul di Sant'Agnese. It was in the spring of 1969, I had done some research in grad school at St. Louis University that was well-received nationally, and I was presenting it at the Federation meeting - FASEB - in Atlantic City. Before going out there, I heard about this NIH Clinical Associate Program. We had a leader there, an Associate Dean named Ted Cooper who had been the director of the National Heart Institute. He was kind of like Tony Fauci. Dr. Copper was at the NIH a long time, but he was a graduate of St. Louis University. And I think he told me directly, you should look into this Clinical Associate program. You know, I was the first one coming out with an MD and a PhD. Six different candidates came into the program on the NIH grant that supported me, and I’m the only one that graduated. It was challenging—four were med students, one was a dental student and then me. So anyway, I heard about this NIH program and decided to apply. I probably still have a copy of my application.

And what I really liked was the Pediatric Metabolism Branch. I didn’t know too much about Paul di Sant’Agnese, other than his focus on cystic fibrosis and a little about the sweat test. But I was going out to Atlantic City in April of 1969. I had been accepted at Wisconsin for general pediatrics residency and Paul invited me for an interview. Well, we hit it off immediately. Paul was a very warm father figure, kind of like Louis Tureen. And he really wanted someone to investigate vitamin E deficiency in CF. Leroy Matthews at the time was treating CF patients with everything. And one of the things he was treating them with was large doses of vitamin E that was kind of controversial at the time, although it shouldn’t have been. But Paul did not start his patients on vitamin E even though he suspected or even had evidence they were Vitamin E deficient. And he told me I never want to treat with something that I want to study. He then said, I want to study vitamin E deficiency in children with cystic fibrosis, and since you're an expert on vitamin E, I want you to join my program as a clinical
associate. That would be two years of fellowship at the NIH to do that project. So we hit it off well, and this appointment carried with it a deferral. You became a US Public Health Service officer so during my residency, the two years in Wisconsin, I was deferred from military service. Otherwise, almost every MD graduate would do a one-year internship, and then you’d be drafted and go to Vietnam.

DR REN: Hmmmm.

DR FARRELL: But if you got into US Public Health Service, you were deferred to a program called CORD. So I started my pediatrics residency during last week of June 1970, and in the first week of July while I was on the general pediatrics ward the unit clerk called me to the phone and said, there is a call from some doctor whose name I can’t pronounce, but he’s in Bethesda, Maryland. And I thought, oh, that might be Dr. Paul Di Sant’Agnese. He said, you know I’m happy I could reach you. I want to offer you the position in my program as clinical associate. Could you begin in July of 1972 and come for two years? And I said, yes, and I’d be very excited about the vitamin E study we discussed.

DR FARRELL: So what happened, Clement, was really fascinating. I got accepted into this wonderful position. Generally, it was medical students from elite institutions—Harvard, Hopkins, Duke, et cetera, but I got accepted and that’s where I think the PhD really helped a lot. And Bob Wood got accepted same time. We were the two fellows that were coming in. It was always two people like Lynn Taussig with John Kattwinkel and before them, Tom Boat. Anyway, when the word got to Charles Lobeck and John Mangos, they were ecstatic because, you know, Paul was very famous at the time. He wasn’t generally appreciated for being as great a clinician as he was. So those two mentors, Lobeck and Mangos, took me under their wings. Whenever a new patient came in to be diagnosed with CF, no matter what service I was on, Dr. Mangos would ask me if I’d want to join him. And so I learned a lot about establishing the diagnosis of CF and how to communicate with the family, and what the care plans would be. I really had tremendous CF and pulmonology training experiences as a resident. When I was on research electives, I generally would take call in the NICU. So I got a tremendous amount of experience with managing respiratory disease of infants and so, when I went to the NIH, I was really very well-prepared at that point in time. I’m going to stop there and see if you have any questions, because then I can get into what happened there, and how that moved me towards newborns.

DR REN: No, no, I think that’s what I, what I’d like to hear about. Definitely wanted to have time to talk about how you got involved in newborn screening and sort of the challenges. Maybe just before that, maybe you can just talk a little bit about sort of what happened after, when you were finishing up in the NIH, how you, how you decided to go back to Wisconsin and you have to tell the story. Because I
remember you telling me this story before, where I think you were resuscitating children, neonates, and some type of animal on the same day or something. We have to get to that story, but maybe you can just kind of say how you decided to go back to Wisconsin.

**DR FARRELL:** Well, normally you do two years as a clinical associate or fellow at the NIH, and then you would go somewhere and join the faculty. In my case, it was again, a lucky break—an opportunity that I capitalized on. Paul's long-term laboratory director, whose name was Charles Pallavicini, ran the sweat test lab and did the laboratory mentoring for his clinical fellows. Typically, Paul did not have fellows like me who came to the lab already fully trained, probably even more capable than Charles Pallavicini. But anyway, Charles decided to retire. He was like a Prince in Malta, and he decided to go back where he became a member of the Sovereign Military Order of Malta or Knights of Malta. Suddenly, the position was vacant, and Paul knew I had the capability to direct the sweat test lab and train the fellows in research techniques, et cetera. My earlier interest in clinical pathology or laboratory medicine led me to learn all there is to know about sweat tests from Dr. Pallavicini. So Paul appointed me to a permanent NIH position. This is like getting tenure out of your fellowship.

And so I stayed there. During that time, Paul knew that my fate was to become a neonatologist and a pulmonologist. This was very clear because I worked with Bob Wood, another MD-PhD when he was developing fiber-optic bronchoscopy. Bob and I were both pulmonology types early on and close colleagues—we really related to pulmonology. Of course there was no such thing as a sub-board of either neonatal perinatal medicine, or pediatric pulmonology - about the only significant sub-board was cardiology, at the time. Now, with those extra years in Bethesda and my interest in neonatology, I actually did some training with Gordon Avery at DC Children's Hospital in neonatology, and Paul made sure that all the CF patients who were infants referred to the NIH went to me. So I was getting a big practice of young infants and young children with CF. Paul and I would always discuss these cases and the importance of earlier diagnosis.

Paul always felt that the sweat test was good, but not good enough. The weakness of the sweat test was that it required an astute primary care physician to order the test. So Paul was really in favor of newborn screening, and we discussed it a lot. Paul used to emphasize that patients with meconium ileus, if they're treated well, are sometimes better off than the patients that get severe protein energy malnutrition and the ones that die of a hyponatremic dehydration and shock. So I was building up this great interest in both neonatology and pediatric pulmonology while having thoughts about early diagnosis of CF. Also, I had about 49 publications and was presenting invited lectureships at conferences. So I started to get contacted about positions at
Johns Hopkins in neonatology, and the same at Harvard by Mary Ellen Avery, and by Charles Lobeck to come back to Wisconsin.

This was a real dilemma for me, Clement, because I had in hand a letter of offer from Harvard to work with Mary Ellen Avery, in neonatology, but I wanted to work with Harry Shwachman as well. And Mel Avery was adamantly opposed to doing both neonatology and cystic fibrosis. She really wasn’t keen on the scientific aspects of CF, whereas she was very keen on the scientific opportunities in neonatal-perinatal medicine. So I wound up having to turn that position down.

But before I could accept a faculty position at Wisconsin, the NICHD offered me a position to be Chief of their newly formed Neonatal and Pediatric Medicine Branch. This was a big Branch at the NIH. And at the time, a Branch Chief was like a department Chair -- they had a big budget. And you had administrative support, and I got to know Tony Fauci at the time - we were both Branch Chiefs together. And so I delayed negotiating with the University of Wisconsin where I decided I really wanted to go in order to get more experience and finish off projects at the NIH, and also to get some research grants— before I left NIH for Wisconsin, I already had three research grants. So I landed in Wisconsin with three research grants and was able to kind of hit the ground running. And I was able to work in both the NICU, the normal newborn nursery and the pediatric pulmonology service. Immediately, I was named the CF Center Director. And I was also asked to cover the pediatric intensive care unit. I was on call every other night and every other weekend.

At that point I probably had four research grants and a growing research team, and I was studying fetal lung development in the rhesus monkey. We were creating a diabetic rhesus monkey model with streptozotocin injection and studying lung development in the diabetic pregnancy, because infants of diabetic mothers were particularly susceptible to RDS. So the story you remember is that once I was on call for the NICU, the pulmonology service, the PICU and follow up care of the rhesus monkeys. Now all of this happened within about a mile and a half. So I could literally go from NICU to PICU, go through the wards to see the patients on the pediatric pulmonology service, and then go make rounds on a rhesus monkey who was susceptible to hypoglycemia. (laughs) So I was multitasking, which is something I learned as a pre-med and med student MD-PhD candidate.

But what happened is I got quite interested in neonatal screening for CF because I had noticed what Paul had pointed out - the kids that I took care of in the NICU that had meconium ileus would come back to my CF clinic and see me in better condition than the new referrals of patients who had a delayed diagnosis who could be, you know, four months, six months, eight months, one year of age. And it was a no-brainer to me that early diagnosis would be
valuable. So I started doing a bedside BMC meconium testing with a paper strip. In other words, take the baby's meconium and do paper chromatography. And the CF Center Director in Milwaukee, Ted Bruns, was doing the same thing as he was going from hospital to hospital. That to me could have provided the opportunity for a randomized clinical trial of CF newborn screening. However, the test wasn't good enough, and it wasn't until a report on IRT in 1979 from New Zealand, which I didn't see until about 1981, that I realized -- oh, this could be done with dried blood spot specimens. Ted Bruns was very interested in collaborating on that project, and the Madison CF Center Director by then, Elaine Mischler, was also eager and a terrific asset as a leader and collaborator.

And so I made the decision that we were going to do a CF newborn screening research project in Wisconsin, and hopefully Minnesota and possibly Iowa—a three-state study to investigate the benefits and the risks of early diagnosis through newborn screening. Unfortunately, we weren't able to work things out in Iowa and Minnesota, so it turned out to be an all-Wisconsin study.

Now the way it went in terms of the challenges, just to summarize - number one, I wanted some national support from colleagues. If you read Chapter 9 of Doershuk's book, it's described there. I happened to be doing a site visit in 1981 at Case Western Reserve, and took a walk with Tom Boat. Tom, who I was close to from our similar NIH experiences, encouraged me to stay with it, but told me that this is going to be a tremendous challenge to do this. And people are not going to be comfortable with it. But I did have his support. The second problem for me was I had a couple of big SCOR grants, like two and a half million dollar grants, and I had a NIH R01 grant, a JDF grant, and a French connection at the time with the Collège de France. The great biologist Alfred Jost had invited me to accept some of his post-doctoral fellows and train them in lung surfactant research. And he also invited me to come work in Paris. I had a lot on my plate, but nevertheless, I decided that research on CF newborn screening is such a good idea so let's try to move ahead with it.

The CF Foundation was not interested at that time because they were focused on care and research, not diagnosis. We had some significant logistical challenges because this had to be done statewide. And every hospital in Wisconsin that delivered babies had to be given the opportunity to have their IRB approve or reject the protocol. The University of Wisconsin IRB struggled with it because of two things. Number one, they wondered how could we have a control group and to deny early diagnosis to one group. We had to prove, well, that clinical diagnosis was the standard in this country at that time. And what we're changing is the screened group's care. We're not changing standard care. And then the second thing is: what if some of them die in the control group? So we set a limit that would not allow any of them to be older than four years of age. We did that by running the screening test on all
babies. And we blinded the results on those that were randomized to the control group—we avoided selection bias that way. The next thing came up at the IRB at Milwaukee Children's Hospital was this—well what if the parents don't want to be have their baby in this project? So we had to give them the opportunity to opt out. And then the next question was—what if the parents opt in, but they want the screening result: will you provide the result? And we agreed that we would. When some people who came out to Madison from CF Foundation to site visit us, including Bob Beall and Pam Davis said, "This will never work—the project will not be successful." I remember Pam saying to me, Phil, you have no chance for success with this project because all the parents are gonna want the results. It turns out only 0.03% of parents ever asked for the results, including many residents who had babies during what turned out to be nine years of the study.

Another problem, Clement is that the conventional wisdom was that CF occurred in one out of every 2000 newborns; of course that's wrong. But we realized early on that our screening test was either underdiagnosing due to false negatives or the incidence of CF wasn't as high as generally thought, which turned out to be the case. Anyway, we got an $865,000 grant from the CF Foundation with the provision that we would apply to the NIH. We did, and the NIH reviewers really liked our methods of avoiding selection bias. The four year old unblinding, letting the parents opt out, disclosing information to parents—they loved all of this. They love the design of this RCT and they gave us a $1.1 million grant. So I wound up sending back the $865,000 grant.

DR REN: Wait, so the CFF ended up funding it initially, even though Bob Beall wasn't initially supportive of newborn screening?

DR FARRELL: Correct. It got a fundable priority score. And in 1984, the CF Foundation awarded us an $865,000 grant. But with the requirement that we apply to the NIH, even before the award was made, it was a contingency for the CFF award. And maybe Bob was figuring, this will never fly at the NIH, but, you know, Bob was not adamantly opposed. He just didn't feel like it was the way to go. Of course, everything else Bob did was extremely valuable cutting-edge. Bob was really into treatment more than diagnosis. So, yes, once we got that grant and discovered the lower than expected incidence of CF, we realized we had our work cut out for us, that we were going to have to do more than five years of screening.

We wound up doing nine years of randomized screening. In the meantime, I became Chair of Pediatrics, which meant I had to stop doing laboratory research. My first love and deepest love with regard to research is working in the lab, handling test tubes, doing biochemistry. I couldn’t do that and be Chair of Peds, nor could I continue to do neonatal intensive care, which was in a hospital a couple of miles away. So I had to give those things up to become Chair
of Pediatrics, but believe it or not, the newborn screening project turned out to be the perfect project for a Chair of Peds and also for a Dean. It was just absolutely ideal and once the CFTR gene was discovered, we transformed this project from an RCT into a comprehensive epidemiologic study. And that’s how we learned about risk of person to person transmission of Pseudomonas. We learned a lot about the psychosocial aspects, the potential harm of newborn screening and false positives and communication misunderstandings. I was very fortunate that my son, Mike joined us. Mike’s interest and expertise was along the lines of communication quality assurance. He, along with Audrey Tluchek, who was our research nurse originally, but then became a PhD researcher herself in counseling psychology, were invaluable. And so our team stayed together when I was Chair of Peds and Dean, and I always set aside time to meet with the research team and to see patients in the clinic. Although I stopped doing inpatient coverage as Dean, I did inpatient pulmonology coverage as Chair.

Clement, I just want to mention one other thing. In Europe, there was much greater interest in the Wisconsin RCT of newborn screening than in the United States. It was a surprise to me, but I kept getting invitations to make presentations at the European CF conferences. It was very hard to get on the program of the NACFC with a newborn screening abstract. This puzzled me. It bothered me to some extent, but you know c’est la vie, I decided. But I met numerous Europeans as a result of this. And one of them was Claude Ferec the great geneticist based in Brest. He was quite impressed that I could speak some French and that I had worked at the very prestigious Collège de France. Incidentally, this is the most prestigious research institute in the country, and it goes back to 1530. And when Claude heard that I had worked there, with the famous Alfred Jost, he was impressed, and Claude had been watching our progress through our publications as his region of Brittany was starting to do newborn screening with IRT-DNA. As a result, I was very fortunate to make this second French connection with those great geneticists in Brest, and then with Anne Munck later. When I was predominantly a surfactant researcher at the Collège de France, I didn’t have an opportunity to make any CF connections but later with Anne and Isabel (Sermet) and others it’s turned out to be very fruitful and enabled me to pursue what’s my current - maybe my last - obsession in research to determine why the F508del CF allele is so frequent? What is the selective advantage for the CF heterozygote carrier? So I’ve been working on that project with Claude and others.

I should also tell you something about the HuiChuan Lai connection. I’ll just take a minute. As you know, I’ve always been interested in and nutritional metabolic aspects of lung disease. HuiChuan was a student in Nutritional Sciences who—because we had a Pediatric Pulmonary Center Grant—wanted to train in clinical nutrition and get an RD. She asked me if she could work on our CF neonatal screening research project, the RCT. And I said certainly, and
along the way she wanted to get a masters degree in statistics and train in epidemiology. I encouraged that plan. By that point, I had trained in epidemiology at the University of Michigan and the London school of Hygiene and Tropical Medicine. So I took a lot of epidemiology courses in the early nineties. HuiChuan came on board and was supported off my grants for several years. When my NIH R01 grant ran out in 2011, I told her that I’m not going to renew the R01 again for newborn screening research (the RCT and the epidemiology studies). But I did encourage her because we had some leftover questions from the RCT such as impact of breastfeeding, so I encouraged her to seek NIH funding, and that’s how she got the first grant. So we kind of flip-flopped, she used to be on my R01 grants and now I’m on her R01 grants, et cetera. That’s turned out to be, for me, a wonderful collaboration.

So I’ve been extremely fortunate throughout my career. And you can see there’s some continuity to it, even though people always wondered why did I do this if I was doing that? I’ve never escaped the fact that people always felt like you can’t do this if you’re doing that— like I’m Chair of Peds, you can’t be doing research, Or, if you’re Dean, you can’t do research and you can’t see patients. I’ve gone through this skepticism during my entire career.

DR REN: Hmm. Well, you know, just getting back to newborn screening for a minute again, I think many people—well, maybe many younger people, may not really remember how it was prior to newborn screening and how severely malnourished or how much lung disease these infants and children could have at the time of diagnosis. How did you end up in these last few years, maybe the last 10-15 years also just actually working with the Foundation to kind of facilitate newborn screening in the United States?

DR FARRELL: Oh, that’s a great question. I was planning to do 10 years as Dean. I started as an interim Dean in 1994. Then, I went through the search process, beat out the other three candidates and became Dean in 1995. But, I had planned to do no more than 10 years and saw the deanship as an interlude although for most people being a Dean is like the peak of your career. I wanted to get back to research and my target was 2005-2006. What happened, Clement, is that Bob Beall was influenced around 1999-2000 by Preston Campbell. Bob was going the CFTR modulator route— a great decision. And Preston convinced Bob that CFTR modulators will not be as effective if patients are diagnosed after they’ve developed irreversible lung disease, malnutrition, et cetera; this was Preston’s clinical perspective, whereas Bob was not a clinician, so he didn’t have that perspective. Bob did not seem to want to get the CF Foundation involved in newborn screening. Preston persuaded him to bring CDC on board to review the evidence. CDC has responsibilities for quality assurance of the tests that are done, the screening tests. But CDC had never reviewed evidence before, pro or con, for a newborn screening test— never happened before and hasn’t happened since, but Bob and Preston persuaded CDC to do this.
As part of that process, two workshops were held; the second one in November of 2003 was extremely important. We had outstanding CF clinical leaders there. There were people coming from around the world too. At that time, the challenges associated with the screening test, per se, IRT, and then DNA CFTR panels were discussed a great length. It was clear that there were differences of opinion between Colorado and Wisconsin. And so, Preston realized that this was going to require some quality improvement at some point. What happened then is CDC in October of 2004 published an MMWR in which they endorsed CF newborn screening on a universal basis, but pointed out the hazards - the risks - including with the tests. When that came out, the CF Foundation published a Journal of Pediatrics Supplement in which Preston wrote a lead article with Terry White endorsing newborn screening. At that point, Preston was very concerned because certain states, New York for example, were struggling with newborn screening. And so, as I was finishing up as Dean, he asked me if I would take the responsibility to facilitate nationwide implementation of CF newborn screening by the end of the decade. He put it this way: “the goal is all states screening by the end of the decade.” And then he said, and Phil, your other important job is to “fix New York.” And I said, okay.

DR REN: (chuckles)

DR FARRELL: And so, I became available as soon as I finished as Dean after the 2005-2006 academic year. My successor committed in January, 2006. That month I got a five-year renewal on my R01 grant. I finished as Dean on June 30, 2006. And I started working as a National Facilitator of CF Newborn Screening and implementation. Then, I got the idea that to “fix New York,” we needed a consortium of CF centers. So that’s how why I brought the New York center directors together and recommended that there be a statewide leader. You guys decided you wanted to elect the statewide leader. That’s how you got elected. You asked me what’s my position description going to be. I put it together. It turned out all of this was the right model for every other state and every, almost every state with the exception of Ohio and maybe Texas, has operated with the New York model that we came up with.

We got all the states and DC screening by December 2009. Texas was the last. And then it was clear that many of these states were struggling. And so Preston thought that I should, and Bruce Marshall, who’s CFF the QI leader, thought that I should expand my role to state-by-state quality improvement efforts, which also extended me abroad. I helped eight countries abroad, and now I’m helping India begin CF newborn screening. So that’s how it happened, Clement. They recognized that it had to be done. The CFF didn’t want to hire somebody—how they hired Drucy Borowitz or JP Clancy. They didn’t want to hire somebody for newborn screening, which was kind of a good thing for me. They just wanted me to be the “point person,” as Preston Campbell put it. So they pay me honoraria to do this, and I’m literally on standby 24/7 to deal with newborn
screening issues. For me, this has been a real privilege and a great opportunity. So that’s it.

DR REN: Well, I know that you’ve got to go soon. So, you know, there’s this show on NPR called “How I Built This”. And they interview entrepreneurs, but the thing is, the last question that the moderator always asks -- which is, I think the question I’d like to ask you is -- obviously you’ve been highly successful. You’ve accomplished a lot. How much of that do you ascribe to your own skills and abilities, and how much do you ascribe to luck and good fortune?

DR FARRELL: It’s probably half and half, that’s why I said in the beginning that essentially chance favors the prepared mind. It’s kinda like with a football player -- if you’ve got a great quarterback, like Aaron Rogers, you have to have the skills and the talent, but you also have to have the opportunities to execute and you have to recognize the opportunities. And to some extent, I’ve kind of weaved my way down a football field, taking what the defense would give me, but always having on my mind an idea of where I wanted to go, why I wanted to do something, where it would take me and what would be the next extension of it. So I, in my entire career — believe it or not Clement— I’ve never been without a stimulating research project. And, I’ve never been without a paper that needs to be written. If you asked me, well, how many papers do you have in the hopper right now? Three or four. I’ve never, since I went into the MD-PhD program, I’ve never been in a situation where I didn’t have an interesting paper to write. So I think it’s the opportunity that is the luck. But to some extent, you make your own luck. I had some, you know, great supporters. My wife, my son, our team in Wisconsin. You can’t imagine how invaluable it is to work with somebody like HuiChuan Lai for I guess, 20-25 years. And I was lucky to connect with the CF Foundation early on when it was still named the NCFRF— Paul di Sant’Agnese connected me early through Doris Tulcin. And so I’ve always felt like the CFF has been my favorite organization— I call it my go-to opportunity, so to speak.

DR REN: MMM. Right.

DR FARRELL: And I do think getting the PhD was essential because no one has ever doubted whether I understand what’s written in these papers in terms of the biochemistry and the microbiology. You know, I think that made a big difference for me. I may not know pulmonology as well as I should. You know, I never became an accomplished bronchoscopist, but I’ve always been able to get by all right. I did feel limited when I practiced pediatric critical care medicine, but never felt limited practicing neonatal intensive care; but working in the PICU is the most challenging thing I ever did in my whole career.

DR REN: Wow. Well I want to thank you again. It’s been really a great hearing your story.
CURRICULUM VITAE

PERSONAL DATA:

Name: Philip Marshall Farrell
Email: pmfarrell@wisc.edu

EDUCATION:

1967 A.B. Chemistry, Minor in Biology
St. Louis University, St. Louis, Missouri

1970 M.D. (Medicine); Ph.D. in Biochemistry and Minor in Physiology
St. Louis University, St. Louis, Missouri
Professor/Advisor: Robert E. Olson, M.D., Ph.D.
Thesis: Properties of Creatine Kinase in Hereditary Muscular Dystrophy and Vitamin E Deficiency of the Chicken

POSTGRADUATE EDUCATION:

1970-1971 Internship, Department of Pediatrics
University of Wisconsin Hospitals; Madison, Wisconsin

1971-1972 Residency, Department of Pediatrics
University of Wisconsin Hospitals; Madison, Wisconsin

1972-1974 Fellowship, Pediatric Metabolism Branch, NIAMDD
National Institutes of Health, Bethesda, Maryland
(Clinical Associate of Paul A. di Sant'Agnese, M.D.)

CONTINUING EDUCATION:

1985 Fellowship in Developmental Biology; College de France

1991 "Introduction to Clinical Epidemiology" Course, University of Michigan, School of Public Health

1992 "Program for Chiefs of Clinical Services" Course, Harvard University School of Public Health

1993 "Epidemiology for Health Practitioners, Nutrition Assessment Epidemiology, Nutrition Intervention in Clinical Trials, Epidemiology and Health Policy" Courses, University of Michigan School of Public Health

1993 "Advanced Epidemiological Methods" Course, London School of Hygiene and Tropical Medicine

1994 "Genetic Epidemiology" Course, University of Michigan School of Public Health
RESEARCH FELLOWSHIPS:

1964-1965 NIH Medical Science Fellowship
1965 National Viets Traineeship
1966 National Multiple Sclerosis Society Fellowship
1967-1970 USPHS Traineeship in Biochemistry
1971-1972 American Academy of Pediatrics, Gerber Fellowship

HONORS AND AWARDS:

1965-1967 Avalon Foundation Scholarship
1966-1970 Thurston Memorial Scholarship
1970 Phi Beta Kappa
1970 Alpha Omega Alpha
1970 Borden Undergraduate Research Award
1970 Graduated Cum Laude
1985 Fogarty Senior International Fellowship Award
1995 Wisconsin Pediatrician of the Year, WI Chapter of the American Academy of Pediatrics
2001 Joseph B. Goldberger Award in Clinical Nutrition, American Medical Association
2005 Paul di Sant’ Agnese Distinguished Scientific Achievement Award, U.S. Cystic Fibrosis Foundation
2007 Marshfield Clinic Heritage Foundation Award
2008 Edwin L. Kendig Award, American Academy of Pediatrics and American College of Chest Physicians
2010 Presidential Citation Award, Wisconsin Medical Society
2011  CDC Award of Excellence in recognition of leadership and outstanding efforts in newborn screening quality assurance for cystic fibrosis

2013  George Cunningham Visionary Award, in Newborn Screening, Association of Public Health Laboratories

2019  Docteur Honoris Causa honorary doctoral degree in genetics, Université de Bretagne Occidentale, Brest FRANCE

SOCIETY MEMBERSHIPS (PRESENT AND PAST):


CERTIFICATIONS AND LICENSURE:

1971  National Board of Medical Examiners
1971  Medical Licensure, State of Wisconsin
1972  AEC Certification for Radionuclide Use in Patients
1977  American Board of Pediatrics
1979  Sub-Board of Neonatal-Perinatal Medicine
1986  Sub-Board of Pediatric Pulmonology
1995  Recertified in Pediatric Pulmonology

PROFESSIONAL APPOINTMENTS:

1974-1975  Senior Investigator
           Pediatric Metabolism Branch
           National Institute of Arthritis, Metabolism and Digestive Diseases
           National Institutes of Health
           Bethesda, Maryland

1975  Chief, Section on Developmental Biology and Clinical Nutrition
Chief, Neonatal and Pediatric Medicine Branch
National Institute of Child Health and Human
Development
National Institutes of Health
Bethesda, Maryland

1975  Assistant Professor
Department of Child Health
School of Medicine and Health Sciences
George Washington University
Washington, D.C.

1977  Assistant Professor
Department of Pediatrics
Center for Health Sciences
University of Wisconsin-Madison
Madison, Wisconsin

1977-85  Attending Neonatologist
Meriter Hospital
Madison, Wisconsin

1977-81  Director, Cystic Fibrosis Center
University of Wisconsin-Madison
Madison, Wisconsin

1978  Associate Professor
Department of Pediatrics
Center for Health Sciences
University of Wisconsin-Madison
Madison, Wisconsin

1978  Affiliate Scientist
Wisconsin Regional Primate Research Center
University of Wisconsin-Madison
Madison, Wisconsin

1981  Affiliate Faculty
Department of Nutritional Sciences
University of Wisconsin-Madison
Madison, Wisconsin

1981-1987  Director, Pediatric Pulmonary Specialized Center of
Research ("Nutrition and Metabolism in Infant Lung Disease")
University of Wisconsin-Madison
Madison, Wisconsin

1982  Professor
Department of Pediatrics
1983  Co-Director, Cystic Fibrosis Center  
University of Wisconsin-Madison  
Madison, Wisconsin  

1985-1995  Chairman  
Department of Pediatrics  
University of Wisconsin-Madison  
Madison, Wisconsin  

1988-1995  Medical Director  
University of Wisconsin Children's Hospital  
Madison, Wisconsin  

1990-2006  Alfred Dorrance Daniels Professor on Diseases of Children  
University of Wisconsin-Madison  
Madison, Wisconsin  

1992-1997  Director, Pulmonary Specialized Center of Research on Lung Biology and Diseases in Infants and Children ("Pathobiology of Bronchopulmonary Dyplasia")  
University of Wisconsin-Madison  
Madison, Wisconsin  

1994  Interim Dean, Medical School  
University of Wisconsin-Madison  
Madison, Wisconsin  

1995-2005  Dean, Medical School  
University of Wisconsin-Madison  
Madison, Wisconsin  

2006  Dean, School of Medicine and Public Health  
University of Wisconsin-Madison  
Madison, Wisconsin  

2001-2006  Vice Chancellor for Medical Affairs  
University of Wisconsin-Madison  
Madison, Wisconsin  

2005-2009  Robert Turell Professor in Medical Leadership  
University of Wisconsin-Madison  
Madison, Wisconsin  

2006  Affiliate Faculty  
Department of Population Health Sciences  
University of Wisconsin-Madison
2007- Clinical Professor
Department of Pediatrics
University of South Florida
Tampa, Florida

2008- Special Advisor to Professor Gilles Bousquet
Dean of International Studies & Vice Provost for Globalization
University of Wisconsin-Madison
Madison, Wisconsin

2011- Emeritus Dean and Professor
Departments of Pediatrics and Population Health Sciences
University of Wisconsin-Madison
Madison, Wisconsin

2011- Clinical Professor
Department of Pediatrics
Medical College of Wisconsin
Milwaukee, Wisconsin

PROFESSIONAL ACTIVITIES:

1974-1977 Member, Clinical Research Committee National Institute of Child Health and Human Development

1974-1976 Lecturer, Foundation for Advanced Education in the Sciences National Institutes of Health

1974-1977 Member, Conference Committee, National Cystic Fibrosis Research Foundation

1975-1977 Member, International Research Review Panel Fogarty International Center

1975- Reviewer of grant and contract applications for the following agencies: NIAMDD, NICHD, NHLI (NHLBI), American Lung Association, National Foundation-March of Dimes

1975 Member, Nutrition Task Force National Institute of Child Health and Human Development

1975-1977 Medical Staff, Pediatrics Section Children's Hospital, National Medical Center
1976  Co-Chairman, Cystic Fibrosis Foundation
       Conference on Exocrine Gland Function and
       Development

1976  Member, Clinical Trials Review Panel National
       Heart and Lung Institute

1976-1977  Co-Chairman, Steering Committee, Clinical Trial on
          Antenatal Steroid Therapy for the Prevention of
          RDS, National Heart and Lung Institute

1976-1977  Member, Advisory Committee, Lung Cell Resource
          Facility, American Type Culture Collection

1977  Co-Chairman, NIAMDD/NHLBI/CFF Conference on
       Tissue Culture Approaches to the Study of Cystic
       Fibrosis

1977-1980  Chairman, Conferences Committee, Cystic Fibrosis
          Foundation

1977-1979  Member, Nutrition Committee, Cystic Fibrosis
          Foundation

1977-1980  Director, Core Week Lecture Program in
          Neonatology, University of Wisconsin School of
          Medicine (III Year course)

1977-1989  Lecturer, Respiratory Pathophysiology Course,
          University of Wisconsin School of Medicine (II Year
          course)

1977-  Member, Pediatric and Neonatology Section
       Madison General Hospital

1978-1979  Member, South-central Wisconsin Perinatal Center
          Planning Committee

1978-1980  Member, Research Committee Cystic Fibrosis
          Foundation

1978  Member, National Workshop on Bronchopulmonary
       Dysplasia, Sponsored by the NHLBI, National
       Institutes of Health

1979-1984  Director, University of Wisconsin Pediatric
          Pulmonary Lab

1979-1982  Chairman, University of Wisconsin Perinatal
          Research Committee
1979 Reviewer, SERCA Ad Hoc Committee
NICHD/NIAMDD, National Institutes of Health

1979 Member, Program Committee for the Pediatric Scientific Assembly, American Thoracic Society

1979-1981 Extramural Advisor, Case Western Reserve Cystic Fibrosis Research Center

1980 Chairman, Planning Committee for the National Symposium on the Diabetic Pregnancy in the Infant of the Diabetic Mother, University of Wisconsin

1980 Chairman, Nutrition Committee, Cystic Fibrosis Foundation

1980-1985 Member, Recommended Dietary Allowances Committee, Food and Nutrition Board National Academy of Sciences

1980 Chairman, Pregnancy and Fetal Development Task Group of the NIH Task Force on Animal Models Appropriate for Research on Diabetes Mellitus

1982 Member, American Academy of Pediatrics Infant Nutrition Task Force

1982-1984 Member, University of Wisconsin Institutional Research Grant Committee American Cancer Society

1983 Member, Wisconsin Infant Apnea Task Force

1984-1990 Member, Medical Advisory Council Cystic Fibrosis Foundation

1984-1986 Vice-Chairman, Cystic Fibrosis Foundation Research Committee

1984 Visiting Professor, Laboratoire de Physiologie du Developpement, College de France

1984-1989 Member, Editorial Board of Pediatric Pulmonology and Section Editor for Symposia

1985 Fogarty Senior International Fellowship Award Laboratoire de Physiologie du Developpement College de France (with Professeur Alfred Jost)

1985- Member, Executive Committee, Wisconsin Chapter of the American Academy of Pediatrics
1985- Member, Association of Medical School Pediatric Department Chairmen

1986-1990 Chairman, Cystic Fibrosis Foundation Research and Research Training Committee

1986-1989 American Academy of Pediatrics Mead-Johnson Award Committee

1988 Chairman, American Academy of Pediatrics Mead-Johnson Award Committee

1989-1993 Member, Editorial Board of Annual Review of Nutrition


1990 Member, Borden Award Jury, American Institute of Nutrition

1991- Member, Nominating Committee, Association of Medical School Pediatric Department Chairmen

1994 Chairman, Nominating Committee, Association of Medical School Pediatrics Department Chairman

1998- Member, ELAM Advisory Committee, (Executive Leadership in Academic Medicine Program for Woman)

1999- Member, Veterans Administration/Council of Deans Liaison Committee

2003 Lecturer on “Chronic Pediatric Malnutrition” in the Clinical Nutrition Course, University of Wisconsin Medical School (II Year course)

2005-2006 Course Director for “Cystic Fibrosis Newborn Screening—An Opportunity to Improve the Health of Children Through Early Diagnosis and Treatment” (CME presentation in 32 US cities)

2006 National Facilitator for Implementation of Cystic Fibrosis Newborn Screening, U.S. Cystic Fibrosis Foundation

2006-2009 Member, Subcommittee on Newborn Screening Guidelines for Premature and/or Sick Newborns, Clinical and Laboratory Standards Institute
2007-2009  Member, Subcommittee on Sweat Testing: Sample Collection and Quantitative Chloride Analysis, Third Edition Clinical and Laboratory Standards Institute

2007-2008  Course Director for “A New Era in Cystic Fibrosis: Newborn Screening and Preventive Management” (CME Webcast program presented nationwide in 10 interactive sessions)

2007-2009  Advisor to the Florida Department of Health Newborn Screening Program for Cystic Fibrosis

2008-2011  Chairholder, Subcommittee on Newborn Screening for Cystic Fibrosis, Clinical and Laboratory Standards Institute

2008-2013  Chairman, Healthy Birth Initiative Steering Committee, Wisconsin Partnership Program, University of Wisconsin School of Medicine and Public Health

2012-2013  Consultant for the Division of Children’s Medical Services Florida Department of Health

2016-   Member, Clinical and Laboratory Standards Institute NBS05 Document Development Committee
TRAINEES (STUDENTS AND FELLOWS):

1. Graduate Students

Susan M. Langan, MS (article #81)
Dorothy M Ainsworth, PhD (article #86)
Kathleen E.McMahon, MS (articles #71, #82 and #90)
Mary S. Marcus, MS (article #113)
Julie Mares-Perelman, MS (article #87)
Molly Kloosterboer Groose, MS (articles #226 and #240)
Janelle M. Wells, MD, MPH (article #255)
Adam J. Grieve, PhD (articles #247 and #251)
Katelyn Parker-McGill, MPH, MD (article #275)

2. Medical Students

James Bruno, MD (article #77)
Amy Simantal, MD (articles #136)
Christopher E. Colby, MD (articles #138 and #145)
Charles Kwon, MD (article #158)
Amy Haavisto, MD (article #163)
Raymond J. Kotwicki, MD, MPH (article #159)
Laura Certain, MD, PhD (article #162)
David J. Ciske, MD (article #163)
Joseph L. Bobadilla, MD (articles #167 and #171)
Don S. Lee, MD, MPH (article #180)
Andrew Peterson, MD (article #180)
Andrew T. Braun, MD (article #207)
Simona Joffe, MD (article #217)
Malika Siker, MD (articles #214 and #223)
Aimee Cunningham Walsh, MD (article #233)
Adam Fritz, MD (article # 256)

3. Postdoctoral and Clinical Fellows in Neonatology and Pulmonology

T. Alan Merritt, MD (article #19)
Michael F. Epstein, MD (articles #14, #18, #24, #25, #31 and #41)
Lawrence F. Cohen, MD (articles #23, #28, and #29)
Sharon L. Levine, MD (articles #30 and #35)
Robert L. Manniello, MD (articles #30, #35, #38, and #39)
Dorothy B. Gail, PhD (articles #40 and #43)
Van S. Hubbard, MD, PhD (article #47)
Michael J. Engle, PhD (articles #70, #71, and #106)
Suzanne S. Toce, MD (article #68)
Steven Blythe, MD (article #73)
Jacques R. Bourbon, PhD (articles #58, #93, #95, and #105)
Robert E. Schumacher, MD (articles #78 and #96)
Jerry J. Zimmerman, MD, PhD (articles #89, #117, and #124)
Jeffrey Lobas, MD (article #86)
Michael J. Rock, MD (articles #101 and #107)
ARTICLES:


118. Tluczek A, Mischler EH, Farrell PM, Fost N, Peterson NM, Carey P, Bruns WT, McCarthy C. Parents' knowledge of neonatal screening and


185. Farrell PM. Excellent progress has been made but significant challenges remain. WMJ. 2004;103(5):91-2. PubMed PMID: 15553574.


248. Earley MC, Laxova A, Farrell PM, Driscoll-Dunn R, Cordovado S, Mogayzel PJ Jr, Konstan MW, Hannon WH. Implementation of the first


257. Sanders DB, Lai HJ, Rock MJ, Farrell PM. Comparing age of cystic fibrosis diagnosis and treatment initiation after newborn screening with


292. Scott SR, Shafer MM, Smith KE, Overdier JT, Barry Cunliffe B, Stafford TW Jr., and Farrell PM. Elevated lead exposure in Roman occupants of


CHAPTERS:


BOOKS AND JOURNALS:


OTHER PUBLICATIONS:


INVITED EDITORIALS/COMMENTARIES:


RESEARCH GRANTS as PI, unless otherwise noted; (agency and total direct costs award):

- 1973-1975 Cystic Fibrosis Foundation ($49,050): "Effects of Vitamin E Deficiency in Man"
- 1977-1979 Cystic Fibrosis Foundation ($57,960): "Essential Fatty Acids in Cystic Fibrosis As Related to Vitamin E Deficiency"
- 1977-1981 Cystic Fibrosis Foundation ($46,369): "Care, Teaching, and Research Center Grant"
- 1979-1981 Juvenile Diabetes Foundation ($73,749): "Mechanisms of abnormal Fetal and Neonatal Lung Metabolism in Pregnancies Complicated by Diabetes" (with Dr. Michael J. Engle)
- 1979 Organon Pharmaceuticals, Inc. ($20,000): "Assessment of Digestants in Cystic Fibrosis"
- 1979-1982 Cystic Fibrosis Foundation ($59,141): "Correction of Linoleic Acid Deficiency in Cystic Fibrosis" (with Dr. Elaine H. Mischler)
1982-1985 American Lung Association ($48,000): "Pediatric Pulmonary Fellowships- Institutional Training Grant"

1984 Mead Johnson, Inc. ($3,500): "Choline Nutrition in Low Birthweight Infants"


1985 National Institutes of Health (Fogarty Center) (F06 TW00881) ($10,000): “Fogarty Senior International Fellowship” for Research at College de France on Fetal Lung Development in the Diabetic Pregnancy

1985-1987 Mead Johnson Nutritional Group ($18,000): "Nutritional Benefits of Cystic Fibrosis Screening"

1985-1990 National Institutes of Health (1R01 AM34108)($1,056,082): "Pulmonary Benefits of Cystic Fibrosis Neonatal Screening"

1987-1988 National Institutes of Health (IROI HL 38149) ($783,513): "Risk Factors in Bronchopulmonary Dysplasia" (Co-Principal Investigator with Dr. Mari Palta)


1991-1996 National Institutes of Health (1P50 HL 46478) ($2,628,944) "SCOR: Lung Biology and Diseases in Infants and Children - Pathology of Bronchopulmonary Dysplasia"

1994-1999 National Institutes of Health (2 MO1 RR03186) ($12,036,474): "General Clinical Research Center - University of Wisconsin"

1996-2000 Howard Hughes Medical Institute; ($2,800,000): “UW/HHMI Carrier Development Program in Molecular Mechanisms of Disease”


1998-2001 National Institutes of Health (2RO1 DK 34108) ($1,027,212): “Pulmonary Benefits of Cystic Fibrosis Neonatal Screening”

1999-2004 National Institutes of Health (2 MO1 RR03186) ($15,839,890): “General Clinical Research Center - University of Wisconsin”

2000-2003 Howard Hughes Medical Institute; ($1,600,000) “UW/HHMI Career Development Program in Molecular Mechanisms of Disease”

2001-2006 National Institutes of Health (2RO1 DK 34108) ($2,472,753): “Pulmonary Benefits of Cystic Fibrosis Neonatal Screening”

2003-2008 National Institutes of Health (K01 HL072530) ($584,125): “Quality of Communication after Newborn Genetic Screening” (Advisor to PI, Dr. Michael Farrell)

2004 National Institutes of Health (1 C06 RR020102) ($7,000,000 as 5 awards of $1,400,000 each): “Extramural Facilities Improvement Program” (for Intradisciplinary Research Complex construction—cancer research laboratories)

2006-2011 Cystic Fibrosis Foundation (FARREL06A0) ($796,139): “Pulmonary Benefits of Cystic Fibrosis Neonatal Screening: Psychosocial Outcomes”

2006-2011 National Institutes of Health (5R01 DK072126) ($185,000): “Malnutrition and Lung Disease in Cystic Fibrosis” (Co-investigator with PI, Dr. HuiChuan Lai)


2007-2013 National Institutes of Health (2RO1 DK 34108) ($2,030,842): “Pulmonary Benefits of Cystic Fibrosis Neonatal Screening”
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<th>Funding Body</th>
<th>Grant Number</th>
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<td>2008-2011</td>
<td>National Institutes</td>
<td>R21 HG004252 ($356,913)</td>
<td>Developing a Family-Centered Approach for Genetic Counseling: A New</td>
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<td>R01 HL086691 ($1,051,250)</td>
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<td>1RC1HL100819 ($499,940)</td>
<td>A Rapid-Throughput Feedback Intervention for Population-Scale</td>
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<td>2010-2015</td>
<td>National Institutes</td>
<td>DP2OD007031 ($1,500,000)</td>
<td>Integration of Genomics with Genetics – Molecular Phenotypes for CF</td>
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<td>R01 DK 072126 ($2,110,407)</td>
<td>Newborn Screening, Malnutrition and Lung Disease in Cystic Fibrosis</td>
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“Fibrosis to Reduce False Positives by a New Molecular Strategy” (Co-investigator with PI, Dr. Mei Baker)

2015 National Institutes of Health (1R56DK109692-01) ($150,456): “Early Childhood Diet, Growth, Gut Microbiome and Lung Health in Cystic Fibrosis” (Co-investigator with PI, Dr. HuiChuan Lai)

2016 Cystic Fibrosis Foundation (LAI15AO) ($334,443): “Early Childhood Diet, Growth, Gut Microbiome and Lung Health in Cystic Fibrosis” (Co-investigator with PI, Dr. HuiChuan Lai)

2016-2021 National Institutes of Health (R01 DK109692A) ($3,435,587): “Early Childhood Diet Growth, Gut Microbiome and Lung Health in Cystic Fibrosis” (Co-investigator with PI, Dr. HuiChuan Lai)

2017-2010 Cystic Fibrosis Foundation (LAI17A0) ($1,092,063): “Impact of Early Malnutrition on Lung Disease Development in Cystic Fibrosis” (Co-investigator with PI, Dr. HuiChuan Lai)

2017-2021 Legacy of Angels Foundation ($717,045): “Assessing the Added Value of Whole Genome Sequencing in Cystic Fibrosis Newborn Screening” (PI)

2019-2022 Cystic Fibrosis Foundation (WORTH19A0) ($1,092,300): “Finding and Integrating Pharma and Nutrition Linked Genomic Variation in CF” (Co-PI with PI, Dr. Elizabeth Worthey, UAB)

2019-2022 Cystic Fibrosis Foundation (MCCOLL19Q10) ($1,369,784): “A Ten-year of Newborn Screening for Cystic Fibrosis” (Consultant and Associate Investigator with PI, Dr. Susanna McColley)