

OREGON HEALTH & SCIENCE UNIVERSITY ORAL HISTORY PROGRAM

a project of OHSU's Historical Collections & Archives

an interview with:

Thomas J. Fogarty, M.D.

interview conducted on: June 20, 2019

by: Richard Mullins, M.D.



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Interviewee: Thomas J. Fogarty, M.D.

Interviewer: Richard Mullins, M.D.

Date: June 20, 2019

Transcribed by: Teresa Bergen

Richard Mullins: My name is Richard Mullins and I'm interviewing Dr. Thomas J. Fogarty for the OHSU Oregon Health and Science University Oral History Program. Today's date is 20 June, 2019. We are in Dr. Fogarty's office in Mountain View, California. And thank you very much for giving us this opportunity to get your thoughts and remembrances, Dr. Fogarty.

I was wondering if we could start with your childhood. You were born and raised in Cincinnati. Can you tell us about your childhood?

Thomas Fogarty: Yeah. I had a great childhood. It's different path than a lot of people you may know. But I was brought up on food stamps. And it was just before the Second World War. And at that time, my father was in the First World War. And he came back brain damaged, essentially. It's PTSD, they call it now. But he had a platoon in the Battle of the Bulge in France. Half his platoon was wiped out. And when he came back, he was never whole again. He died when I was very early.

Mullins: Had he married your mother before the war?

Fogarty: Yes. No. No, after the war. Right after.

Mullins: After he returned.

Fogarty: Yeah. The First World War.

Mullins: Yes.

Fogarty: Yeah. Yeah. After he returned.

Mullins: Did you have brothers and sisters?

Fogarty: I had one brother, one sister. And I was the youngest.

Mullins: So, of course the terrible tragedy is, you lost your father when you were eight. So, it was a difficult challenge for your mother.

Fogarty: It was. But she was a very strong woman. And tough.

Mullins: Were there grandparents that helped?

Fogarty: Oh, my grandparents died, and I never knew. One of them I knew, barely. But just one.

Mullins: You've mentioned in other interviews you took up boxing.

Fogarty: Yes.

Mullins: Can you tell us about how you started your boxing career?

Fogarty: I started my boxing career very early. I was brought up one block on the right side of the tracks. But I spent most of my time on the other side of the tracks. Because I got along better over there. But it was a tough other side of the tracks. And so, I learned how to box pretty quick.

And then to keep me out of trouble, the parish used to send me off in the summertime to a camp, keep me out of trouble. And all we did was box. Not all we did, but one of the major recreational things was boxing.

Mullins: You boxed in Golden Gloves competition?

Fogarty: Not, I beat a Golden Gloves winner in what we call a backyard brawl. All the kids would get together, and they would box one another and they would classify us according to age and weight and experience. And the neighbors would bet on it. And the winner got a cut of the prize.

Mullins: So, that was kind of a stimulating neighborhood that you were in.

Fogarty: It was.

Mullins: Boxing taught you to think as well as move, right?

Fogarty: Absolutely. And thinking was a big part of it.

Mullins: Even though someone's throwing punches at you.

Fogarty: Yeah. But you know, I learned very quickly if you watched your opponent very quickly, you can anticipate what he's going to do.

Mullins: Did you follow the career of Mohammed Ali?

Fogarty: Sure. Yeah.

Mullins: Because it seems like boxing was a venue for him in which he demonstrated his intelligence.

Fogarty: Yes. Yeah. Yeah. Now I think good boxers are really pretty smart. They learn how to figure out their opponent and the weak spots. And if you anticipate properly, you can get something done before he knows it.

Mullins: Is there an element of coming back from a punch as well?

Fogarty: Yes. You know, but it's not cognitive coming back. It's almost a reflex. In some. And for me, it was almost a reflex. If you come back from a real good punch, and you come back quickly, you surprise them. Because they're looking at you, and you're going to fall down. You don't fall down, you just smack them.

Mullins: Now you got a job, they say, at age fourteen, in a casting shop. Is that right?

Fogarty: No, no, no, I don't think I was fourteen. I was probably, that was a machine shop. And I got a job cleaning up shavings after the machinists were finished. So, I cleaned it up.

Mullins: But that gave you the opportunity to manufacture the first clutch. Is that right?

Fogarty: Yeah. It was a centrifugal clutch, or a prototype of it. I was in the eighth grade. So, how old are you when you're in the eighth grade? Twelve, thirteen, about that? Yeah. And so, anyway, I developed that in conjunction with a kid in the neighborhood who was very, very smart. And his family was wealthy. He was the only dentist in the neighborhood. I got to be friends with him. He was kind of an outcast because he was more of a pinhead. That would be an egghead in today's terminology. But he was very, very smart and he was fun to be around.

And he had a Cushman motor scooter. And it was two gears, high and low. So, I'd be on the rear and he'd be going up a hill, you know, in high, and he'd have to shift into low. But when you shift into low, the thing would jerk ahead. And you would find your rear end on the street. But on the way to the street, there was a big backup light about this round, and it was sloped down. So, on the way down, guess what you would hit? Before you got to the street. Something that you didn't want to hit.

Mullins: So, you're saying there was an incentive to develop an alternative gearshift.

Fogarty: Yeah.

Mullins: But there's this element of you made that first protocol—

Fogarty: Prototype.

Mullins: Prototype, thank you. And that was one of your earliest experiences with that building something?

Fogarty: I always built stuff. I used to build model airplanes and sell them to the neighborhood kids, because you'd buy a kit for five cents. And depending on who the customer was, you'd get a multiple of what you paid. And I paid five cents for a kit and I never sold it for less than a dollar. Pretty good margin.

Mullins: So, were you interested, and did you read about inventors when you were young? Do you remember— Thomas Alva Edison. There was a movie with Andy Rooney in it.

Fogarty: Yeah.

Mullins: Did you read about inventors or—

Fogarty: No, I don't think I read about inventors. By working in a machine shop, I looked at guys building stuff. And they said gee, can you teach me how to do something on that machine? So, I started doing that. And what happened is I used that machine shop to make components of the centrifugal clutch. Of course I didn't know, but essentially when you do that, there's such a thing as called shop rights. They own it. So, that was my first lesson in intellectual property.

Mullins: Oh, very good.

Fogarty: Yeah. So, I learned not to do that. But that centrifugal clutch is still in use. Particularly in small motors.

Mullins: Wow.

Fogarty: Yeah.

Mullins: Well your next job, as I understand it, was at Good Samaritan Hospital.

Fogarty: Yes.

Mullins: In the supply room?

Fogarty: Central supply. But I ended up doing all different kinds of things. I was first in the supply room. They taught me how to run the autoclave and then they sent me up to the operating room to clean the instruments and run the autoclave in the operating room. And then they made me become a circulating nurse, and I did that. And then they said, when senior year in high school, yeah, senior year in high school, they said, "You should be a scrub technician." So, I learned to be a scrub technician. So, I saw an awful lot of surgery.

Mullins: And that's, of course, where you met Dr. Cranley.

Fogarty: Yeah, I met Dr. Cranley.

Mullins: And you met other surgeons?

Fogarty: I met them all. Most of them. All different.

Mullins: How big was Good Sam?

Fogarty: It was pretty big. It was probably just short of 300 beds.

Mullins: So, a lot of surgery, a lot of—

Fogarty: A lot of surgery. Yeah.

Mullins: Did you have to take call, do nights and weekends?

Fogarty: Yeah, I did. And I, yeah, like I was an emergency room attendant. It was a small emergency room, but it was open throughout the night. And they gave me a sleeping room. I'd sleep in there. And when somebody would ring the bell, I'd get up and let the ambulance people in and set up the emergency room for whatever had to be done. So, I got to know a lot of different doctors.

Mullins: You got exposed to serious medicine at a very, relatively young age.

Fogarty: Yes. I think it was good.

Mullins: Prior to that, had you thought of being a doctor?

Fogarty: No. My career path was to be a professional boxer. And Dr. Cranley convinced me I had enough brains, and I shouldn't get them knocked out. So.

Mullins: Tell us about Dr. Cranley. He was a vascular surgeon.

Fogarty: He was a vascular surgeon. He saw me in central supply, he saw me delivering oxygen tanks to the bedside, oxygen tents to the bedside. And he said, "What are you doing here?"

And I said, "Well, I'm working." You know, it was that simple. But he took an interest in me. He had nine kids. And I became his tenth, really. He really—because my dad was gone. So, he just treated me like one of his kids. And he essentially became my father.

Mullins: And where was he trained as a vascular—in the 1950s, as you know, it was fairly new, vascular surgery.

Fogarty: It was brand new. And they had no training programs in it. He was one of the first. He trained at Mass General. Part of it. It was at Mass General. Part of it was there. Part was at Boston. But anyway, he was the first guy, at least in our community, to dedicate himself totally to vascular. Now he had colleagues, and there's six of them, he built a program. But all he did was vascular. And the other guys did both. Some of both. But mostly they did general surgery. So, I scrubbed for that whole team. So, I saw things more than just vascular.

Mullins: And of course that's when you saw the acute limb ischemia patient.

Fogarty: Yes.

Mullins: It was more common, it seems, in those days.

Fogarty: Well, it was very common, because a lot of rheumatic heart disease. And you know, rheumatic heart disease, you develop mitral disease, stenosis. And then you would have emboli, peripheral emboli.

Mullins: Young people.

Fogarty: Young people. Yeah, yeah.

Mullins: Tell us the procedure that was sort of the standard before the embolectomy catheter.

Fogarty: Well, there was three procedures, usually. There was the first procedure, try to get it out. And they used all different kinds of things that didn't work. Particularly if it was an embolus to the saddle, saddle embolus, they call them.

Mullins: Oh, yes. To the distal aorta.

Fogarty: Distal aorta. And they required usually, I don't know how many operations. The first one was try to get it out. And they make an abdominal incision. They couldn't get it all out. Then they'd have to make two incisions in the groin, try to get it out. They couldn't get it all out. But they'd try. And hopefully they got enough of it out. But half the time, they didn't get enough of it out, so they had to go back to the operating room. So, they had at least two operations, and sometimes more than that. As a result of that, because anesthesia wasn't as advanced as it is now, and they were long, dangerous anesthetics, and the patients would die.

Mullins: It must have been very frustrating.

Fogarty: Oh, it was horrible. But not only that, half would die, half would survive. But those half that survived, they would have an amputation.

Mullins: So, tell us about developing the idea of the embolectomy catheter.

Fogarty: Well, I was a scrub technician for Dr. Cranley who did all vascular. And I'd say, "This isn't working."

And he said, "I know it's not working. Why don't you make it work?" To me.

And I said, "Okay."

"Tell me what to do."

I said, "Well, I don't know what I want to do. But I'm going to do something." So, I thought about it a little bit and I said okay, I'll do something.

And he said, "What's it going to be?"

I said, "I'm going to put a balloon on a catheter."

He said, "What?!"

I said, "I'm going to put a balloon on a catheter." And I said, what are you going to do? "Once I get the balloon on the catheter, I'll thread it down the artery, or up the artery, I'll inflate the balloon and draw it back."

He says, "That may work."

I said, "Well, okay. How am I going to make it work?" I said, "Well, I can make it work. I can make the instrument. But I've got to test it."

And he says, "I'll show you how to test it." So, he made me do everything the FDA would make you do. He made me bench test it, he made me anal test it, he made me cadaver test it. And once I'd done all that, and sterility testing, you know, we used it. It took four weeks from the thought to the implementation in the first patient.

Mullins: So, you were at the first use of the embolectomy catheter?

Fogarty: Oh, yeah.

Mullins: Can you tell us what that was like, to see those big clots pulled out?

Fogarty: Well, I'll never forget, Dr. Krauss, I was a scrub technician handing the instruments. And Dr. Krauss was his assistant. And I was a scrub technician. Dr. Krauss was a German guy, very interesting person and a lovely man. A great technician. But it was a saddle embolus. And we put it up on one side, pulled it out, and this clot about that long comes out. And following that, a big spurt of blood. He says, "Holy shit!" That was his response. So, anyway. I'll never forget that response. But, anyway. So, it worked and it was a great experience. I mean, it felt very good.

Mullins: Now were you in college at that time?

Fogarty: No. What happened was, I actually came up with the idea in med school. I didn't have a chance to build one that would be for use until I'd finished my internship. And I was going to be drafted right out of my internship because in Ohio once you graduate from medical school you're a practicing physician. Only in Ohio. You didn't need an internship.

Mullins: Oh, army would take you.

Fogarty: What?

Mullins: The army would take you right away?

Fogarty: Yeah. And I got a notice for report for duty before I finished my internship. And so, I went to Dr. Dunphy, who was at the University of Oregon. And I told him what was going. He says, "Just cool it and I'll take care of it." He was commissioned in the reserves. So, he called and said, you know, "Let this kid finish his internship." So, I stayed in Oregon right after my internship. And I never heard from them again. Well, they'd lost me somewhere. So, I spent a year with Cranley, right out of my internship.

Mullins: This was '61, '62, after your internship.

Fogarty: Yeah, yeah. Right out of my internship. So, I essentially had a fellowship with Cranley right out of my internship.

Mullins: Yeah, yeah. But the first embolectomies were done when you were a medical student. And I believe you've told the story about Dr. Cranley presenting those—

Fogarty: Oh, gosh, yeah.

Mullins: --first nine cases, was it?

Fogarty: Yeah, yeah.

Mullins: At grand rounds?

Fogarty: Yeah. Grand rounds. Yeah.

Mullins: Would you want to tell us that story?

Fogarty: Yeah. It's very interesting. The University of Cincinnati, the chairman of the department of surgery was a guy by the name of Altemeier. German. And he was very rigid. And he was nasty. He was everything I knew I didn't want to be, okay. But anyway, Cranley presented these cases. And after they'd discuss it, you know, and he gets up and says, "Only one so uninformed and inexperienced would dare to think of such a dangerous thing to do."

Mullins: So, totally missed it.

Fogarty: Yeah.

Mullins: Dr. Altemeier totally missed, in fact, he denigrated it.

Fogarty: Yeah.

Mullins: So, this was when you were a senior medical student, and you were thinking—

Fogarty: No, I thought about it as a senior medical student. It wasn't until I finished my internship that I had a chance to build enough to use.

Mullins: Oh, I see. I mean, one of the papers, one of your earliest papers, as you know, in the *SG&O*.

Fogarty: Yeah.

Mullins: And that was a combination of cases that you had done and—

Fogarty: Cranley.

Mullins: And Cranley.

Fogarty: Yeah.

Mullins: And so, that must have been very exciting to be able to publish your results. Did you have any trouble publishing that first paper in surgery, gynecology and obstetrics?

Fogarty: Well, once we got the *SG&O*, no. But everybody else turned it down. All the journals, those prestigious journals. *SG&O* was just a new journal back then. *SG&O* became *Archives of Surgery*. The ACS bought that.

Mullins: Yes, yes.

Fogarty: But it was an independent journal. And it wasn't owned by anybody that I know.

Mullins: Well I wanted to talk, here is your *Annals of Surgery* papers, you and Cranley.

Fogarty: Yeah.

Mullins: And you presented it, it sounds like, because this was in 1965.

Fogarty: Yeah. That was well after the *SG&O* article.

Mullins: And people had begun to accept it, the vascular surgeons. The discussion highlights how the big names in vascular surgery got up and said this embolectomy catheter was a good idea.

Fogarty: Yeah.

Mullins: They didn't follow in the footsteps of Dr. Altemeier.

Fogarty: No, they didn't. Fortunately.

Mullins: How did you end up in Oregon as an intern?

Fogarty: It was Dr. Cranley, actually. He was back east with Dunphy. They were, I think it was, it was either the Brigham or Mass General, they were together. Okay, and I forget which one it was, but they were together as mates, either in a fellowship or, there were no fellowships then, but in training. So, they knew one another. And so, he called Dunphy and said, "This kid, you ought to take him in your internship."

Mullins: Because when you went out there, Dunphy was a big name in American surgery.

Fogarty: Oh, yeah.

Mullins: He had recently joined or become the chair.

Fogarty: Yeah.

Mullins: Had he transformed Oregon from kind of a—

Fogarty: I think he had a lot to do with it, yeah. I think he had a lot to do with it.

Mullins: Did you look at any of those big-name schools back east?

Fogarty: Yeah, actually. And I was accepted at Hopkins. But I didn't like it. It was a pyramid system. And I didn't want to wait around. It was a seven-year program, I think, back then. It was much like Cincinnati. It was pretty much like Cincinnati, the training program.

Mullins: And what was the—

Videographer: Sorry, I'm going to cut real fast here, I apologize—
And we are rolling again. So, whenever you guys are ready.

Mullins: So, we were interested in your recollections about the nature of the group that was at Oregon. There was Dr. Dunphy was the chair.

Fogarty: Yeah.

Mullins: He had people from Boston. Was it a friendly place to work?

Fogarty: Yeah, it was. Yeah. And Dunphy was a very benevolent guy. He was a nice person. Unlike Altemeier.

Mullins: Don Trunkey said Dunphy was a humanist.

Fogarty: Yeah.

Mullins: It's probably that Holy Cross college education?

Fogarty: I think probably he was contaminated, yes.

Mullins: Tell us about your own recollections of going to Xavier.

Fogarty: Xavier?

Mullins: Xavier, yes.

Fogarty: Well, first of all, I was a bad student.

Mullins: Oh, in high school?

Fogarty: In high school.

Mullins: Where did you go to, public high school?

Fogarty: Roger Bacon. No, a Franciscan school. Catholic. And you know, I was not, I was so bad I could not get the principal of the high school give me a recommendation to go to college. He called my mother and told her it would be a waste of time to send me to college. And a couple of

the priests felt differently. And they knew I wanted to become a doctor. And they felt that I could do it. And so, they went to the admissions group, one of them did, and said, “Look, this kid has bad grades, but he’s got a brain and he’ll do well. Just give him a chance.”

So, I actually entered Xavier University on probation. And I made it.

Mullins: But the Jesuits are interested in giving everybody a chance.

Fogarty: Yeah.

Mullins: It seems like their commitment to education in their universities has been to give every—did you live at home?

Fogarty: Oh, yeah.

Mullins: And commuted. Were you premed? What was your curriculum?

Fogarty: It was premed, yeah. So, I got into premed. And the problem was, I didn’t think anybody would accept me. So, I’d go anywhere.

Mullins: And did you have trouble getting into the University of Cincinnati Medical School from Xavier?

Fogarty: No, no. I ended up with good grades. So, I didn’t have a problem.

Mullins: Did other surgeons at Cincinnati have a favorable impact on you, besides Dr. Cranley? Were there other—

Fogarty: Yeah, there were some of the residents, the chief resident, that had a positive impact. But in general, the staff emulates the chief. You know, so they act like Altemeier.

Mullins: Yeah.

Fogarty: But in spite that, some of the residents were very good people.

Mullins: So, you went to Oregon in ’60 for one year as an intern.

Fogarty: Yeah.

Mullins: And then you came back and were a vascular fellow with Cranley.

Fogarty: Cranley.

Mullins: And that’s where you did a fair number of the embolectomies?

Fogarty: Yes.

Mullins: And at the end of that year, you wrote the first draft of that *SG&O* paper.

Fogarty: Yes, yes.

Mullins: And did you have difficulty, you said, getting it published?

Fogarty: Oh, before that, everybody turned it down. Cranley thought it was a great contribution and was very upset that nobody would accept it. But Lowell Davis was also, who was editor of the *SG&O* was a friend of Cranley's, so Cranley called him and finally got them to take it.

Mullins: Ah, ah.

Fogarty: It's a little section at work.

Mullins: Yeah, yeah.

Fogarty: "Surgeon at Work," they called them.

Mullins: More than a few great papers, the first one is short. So, then you came back to Oregon.

Fogarty: Yes.

Mullins: And were trained as a resident. Can you tell us about what it was like in Oregon when you were there?

Fogarty: Well, it was very exciting. First of all, the people were very nice. People were very different. And there are a fair number of mavericks there. One guy by the name of Charles Dotter. Do you know Charlie?

Mullins: Yes, yes.

Fogarty: Okay.

Mullins: Legendary Dr. Dotter, yeah.

Fogarty: Yeah. Crazy Charlie, they called him. That was his name. And he said, "I am crazy."

I said, "Why do they call you crazy?"

He says, "Because I am crazy." It was that blatant. But he was very different. That's for sure.

Mullins: So, January the seventeenth, 1963 or four, you did that first balloon angioplasty. Charlie Dotter.

Fogarty: Yeah. Did that. How did you know that?

Mullins: I was just looking at the plaque on the wall, actually, at OHSU. Did he use a Fogarty catheter?

Fogarty: Yes.

Mullins: Oh my gosh. So, tell us about that.

Fogarty: Well, I met him there at Oregon. And the first thing, he approached me and said, "You're that kid that made that balloon catheter. You've got to make one for me."

I said, "Well, okay." I said, "I'll do it with no elastomer."

He said, "Well, will it break?"

I said, "Yeah, if you overinflate it, it will."

And so, he, I don't know how many damn things he broke before I get him to quit breaking them. He finally said, "Okay, how much should I inflate it?"

And I said, "Well, just do this much." I forget how much it was. Because I tested it and told him to do that much. I got an assignment through Dunphy to the National Institutes of Health. And so, I went back there. It was for two years.

Mullins: To work for Glenn Morrow.

Fogarty: Yeah. Yeah. And so, I went back there and Dotter said, "Before you leave, you have to make me a balloon catheter that's strong enough to be able to dilate."

So, I said, "I'll try." And I knew that the elastomers had a breaking point. And so, I think I made four of them for him and told him not to overinflate it. I forget. There were different sizes. So, I left him with it. While I was gone, he used it. That's where that date came from. I wasn't there to see it.

The interesting thing, Dunphy was an interesting guy. When he found out I was making catheters for Crazy Charlie, he called me into the office and said, "You shouldn't be doing this."

And I said, "Why?"

He said, "Well, he's, something wrong with Dr. Dotter."

And I said, "What do you mean, something's wrong with?"

"He's not quite right."

And I said, "Oh."

"So, don't work with him anymore."

I said okay. But I lied. Charlie was so adamant. I made those catheters. Left them. And he used while I was gone in the NIH.

Mullins: Well I mean, he's widely recognized as having done one of the first angioplasties.

Fogarty: Yeah.

Mullins: Now another guy that worked with him was Dr. Judkins.

Fogarty: Oh, yeah.

Mullins: Do you remember Dr. Judkins?

Fogarty: Yeah, he was big and fat. Oversized, let's put it that way. No, he was a good guy. He was benevolent as hell. Very nice person.

Mullins: They were looking for ways to improve the endovascular use of instruments.

Fogarty: Oh, yeah. Yeah.

Mullins: You know, your Fogarty set the standard or introduced this endovascular treatments.

Fogarty: Yes.

Mullins: Now of course another individual there was Albert Starr.

Fogarty: Yeah, yeah.

Mullins: And I'd like to talk to you about Dr. Starr and Mr. Edwards.

Fogarty: Yes. Yeah.

Mullins: In previous interviews, you've said that Dr. Starr introduced you to Mr. Edwards.

Fogarty: That's right. Yeah.

Mullins: Can you tell us about that?

Fogarty: Yeah. I rotated through Dr. Al's—Dr. Al. Dr. Albert Starr's service.

Mullins: Oh, yeah. That was right when they were starting the valve.

Fogarty: Yeah. The valve stuff. And they saw a lot of emboli. And so, they wanted to do an embolectomy. They called me and say, "We need one of your catheters." So anyway, Starr started using those catheters. And along with a guy by the name of Jim Woods. And they were a team back then. So, they'd call and I'd help them do an embolectomy. And so, that's how I became familiar with Dr. Starr, on his service. He saw the catheter being used. Used it himself. And I couldn't get anybody to make them.

Mullins: You were still making them in the North OR?

Fogarty: No. I was making them in the sleeping room. You know, back then you slept in the hospital, Multnomah Hospital.

Mullins: Yes. It's an urban legend, or a legend about you, is that you lived in the county hospital on the fifth floor.

Fogarty: Yeah.

Mullins: So, you're confirming that's where you lived?

Fogarty: I sure did. It was a great place to live. You got free meals.

Mullins: You went down to the basement, to the cafeteria?

Fogarty: Yeah.

Mullins: They just closed that OR this spring.

Fogarty: Oh, did they really?

Mullins: Yeah. Had a big ceremony. A hundred years.

Fogarty: My lord. Yeah.

Mullins: And you would use, tell us about how you would manufacture, construct the prototypes and then the catheter.

Fogarty: Well first of all, I stole everything. I'd go get a urethral catheter, you know. I knew all about urethral catheters because I used to clean them and wrap them. Back then, you could sterilize them. So, I knew how to do all that. So, I'd go steal stuff from central supply, and go up to the room and make them.

Mullins: Were they stiff?

Fogarty: No. They're like a urethral catheter. They were pliable enough. No, they were just right.

Mullins: And so, you would cut off the finger cot?

Fogarty: Yeah. Just a baby finger, number five glove. And cut the tip of it off, and then tie it onto the urethral catheter with fly-tying techniques. Because I knew how to tie flies. As a kid I learned how to tie them and sell them to the neighborhood kids.

Mullins: So, this is why sometimes they would rupture if they overinflated.

Fogarty: Yeah.

Mullins: They weren't that—

Fogarty: No. Particularly, you could never use an autoclaved glove. Because they used to autoclave at very low temperatures, but it really did damage to the elastomer.

Mullins: So, say 1963 or four, you were trying to get them manufactured?

Fogarty: Yes. And Albert Starr introduced me to Lowell Edwards.

Mullins: So, what was Mr. Edwards like?

Fogarty: He was an aeronautical engineer. That's what caused the ball valve. So, he helped Dr. Starr and essentially manufactured the valves for him.

Mullins: So, he was an inventor.

Fogarty: Yeah. Lowell Edwards, yeah.

Mullins: A very successful, lifelong inventor.

Fogarty: Yes.

Mullins: There's one picture of him, it's the only one I know of that shows him smiling. And he's in his—

Fogarty: The shop.

Mullins: His shop. You talk about, do you still have a shop?

Fogarty: Yeah, I do. I started Institute for Innovation. It's in the hospital. El Camino.

Mullins: Ah. And so, you have, he had presses? I think he could press metal.

Fogarty: Oh, yeah, yeah. I worked in the shop.

Mullins: Oh, you did?

Fogarty: Yeah.

Mullins: On the way to Mount Hood.

Fogarty: Yeah. What's the name of that community?

Mullins: Yeah, I can't—

Fogarty: I'll think of that community. But he had a shop there. And that's where I used to go. He wanted me to help him with an oxygenator he was developing.

Morgen Young: Is that Sandy or Rhododendron?

Videographer: Zigzag? Rhododendron?

Young: Sandy?

Fogarty: No. Hood?

Young: On the way to Mount Hood?

Fogarty: Yeah. It's on the way to Mount Hood.

Young: We'll think of it later.

Mullins: But he had a summer home.

Fogarty: Yeah, he did.

Mullins: And this was a shop. His wife said that he would wake up in the middle of the night with an idea and go out in the shop and work on it.

Fogarty: Yeah.

Mullins: Would you have a similar experience in your life as an inventor? Suddenly get an idea?

Fogarty: Yeah.

Mullins: It just come out of nowhere?

Fogarty: Yeah.

Mullins: Were you thinking about, so I'm interested in how people invent. Does it sort of percolate, do you feel?

Fogarty: Well, honestly, there's a lightbulb experience that you can have. I've had a couple of those. The balloon catheter was a lightbulb experience. There were a couple of other things I've done were lightbulb. But the other ones really are not lightbulb experiences. You think of something and you make a prototype. You try it out and it doesn't work. Then you try something else. It may or may not work. It may work a little bit better, but not perfectly. Then you make another one. So, it's really prototype, prototype, prototype, bench test, bench test, animal test, animal test. So, most of all, you go through a series of failures. That's part of the process before you succeed. Unfortunately, what most people do if they don't succeed the first time, they forget about it. The problem, however, still exists. So, if you keep thinking about it, eventually you'll come up with something that will maybe work. That's the process of innovation.

Mullins: Dr. Starr says that Edwards was a very skilled and intelligent engineer.

Fogarty: Yes. Absolutely.

Mullins: In other words, he didn't just sort of put a ball in a cage.

Fogarty: No. No.

Mullins: He knew exactly the dimensions and, he must have been a genius.

Fogarty: He was. He was very eccentric, too. Did you talk to his son?

Mullins: Miles?

Fogarty: Miles, yeah.

Mullins: Yes, I knew Miles.

Fogarty: Yeah. Is he still with us?

Mullins: No. No.

Fogarty: Really?

Mullins: No. Tragic, no. Miles' daughter is now sort of the family leader. And Edwards Laboratory just had a celebration. And she went down there and spoke about her grandfather.

Fogarty: Yeah. I think I was at that celebration.

Mullins: Edwards Laboratory?

Fogarty: Edwards, yeah.

Mullins: You know, one of the parts about him was he was a businessman as well.

Fogarty: Yes.

Mullins: There are a lot of inventors who aren't necessarily businessmen. Can you comment on your own experience learning to be a businessman?

Fogarty: I learned very early. I learned about shop rights.

Mullins: Shop rights. And the need to get a patent.

Fogarty: Yes.

Mullins: I had the first patent, I think it's your first one. Filed in 1962. Of course, you know this patent. Can you tell us how it came about that you patented your catheter?

Fogarty: Well, my mentor, Dr. Cranley, told me to patent it. I didn't know what a patent was. But he identified an intellectual property attorney and I went and talked to him. His name was Shenk,

S-h-e-n-k. And I didn't have any money. And I said, "I've got this idea. And how much it will cost?"

And he said, "This is what it will cost." And gave me a number, an approximate number. He said, "But I know you don't have any money. Just when you get this thing finished, if you have any revenue from it, pay me then." Can you imagine any attorney doing that in this day and age?

Mullins: Well, I don't know, yeah. That's—

Fogarty: It would be hard to find one. I'm sure some do. But back then, no. So, anyway, he did. And I paid him off, plus.

Mullins: Yeah. So, what was the business agreement, may I ask, that you had with Edwards? Mr. Edwards?

Fogarty: A business agreement was essentially patterned after the agreement that Al Starr had with him.

Mullins: The first patent for a mitral valve has as the inventor Mr. Edwards.

Fogarty: Yeah.

Mullins: No other inventors are listed.

Fogarty: And that's absolutely right.

Mullins: The second patent for the aortic valve has both Mr. Edwards and Dr. Starr.

Fogarty: And that's probably absolutely right.

Mullins: What was your own experience getting into the business of, it must have been very exciting. I mean, you had an effective catheter. Mr. Edwards agreed to manufacture it. Did he make you pay him?

Fogarty: No. He paid me. Mr. Edwards and Albert Starr, relative to one another, were exact opposites.

Mullins: Is that part of why they were successful?

Fogarty: I don't know if it helped or hindered. I don't know. I mean, I wasn't part of that. I just know that Dr. Starr was a wonderful person. I also know he was very, very interested in money.

Mullins: Well I mean, it's one of those situations where their success, by definition, produced a lot of money.

Fogarty: Yeah. Yeah.

Mullins: And somebody had to get it.

Fogarty: Well, Lowell Edwards got a bunch. And I'm sure Starr got something in the way of a royalty.

Mullins: Dr. Starr said an interesting thing about Mr. Edwards, I thought. After they reported the mitral valve series, in early '61, I said, "Mr. Edwards must have been elated."

And he said, "Oh, no. Oh, no, you don't understand. Mr. Edwards suddenly realized he was going to have to manufacture high-quality prosthetic heart valves. He couldn't make them in his shop anymore."

Fogarty: Yeah.

Mullins: It was like he had this obligation, this duty.

Fogarty: Yeah.

Mullins: He needed to go forward.

Fogarty: Yeah.

Mullins: And so, he founded Edwards Lab and worked very hard for several years to get high-quality valves produced.

Fogarty: Yes.

Mullins: Because he wouldn't release them for use until he got high-quality valves.

Fogarty: Yeah. That's the kind of guy he was.

Mullins: A real legend in American surgery. So—

Fogarty: He was a perfectionist.

Mullins: Mr. Edwards.

Fogarty: Yeah. Absolutely. Yeah, he used to have me up to his place in Oregon, his shop, near Mount Hood. I forget, was it Hood River?

Young: Could be.

Fogarty: Could be. But anyway, he was trying to develop a membrane oxygenator. Which finally somebody did it. There was a big debate whether to do a bubbler or a membrane. And Lowell wanted to do a membrane, and a guy by the name of Bentley wanted to do a bubbler. They

parted ways over that. But anyway, so Lowell wanted me to help with the membrane. But Starr wanted to do a bubbler. So, they parted ways at that point in time.

Videographer: Hold on for one second here.

Fogarty: Yeah, it does.

Mullins: Are we doing okay?

Fogarty: Yeah, we're fine.

Videographer: Ready?

Mullins: So, you had a very exciting time as a resident presenting some papers. And at the end of the residency, what did you decide you were going to do after you finished in Oregon? You said Dunphy got you into the National Health Service?

Fogarty: Yeah. Yeah.

Mullins: So, you were commissioned?

Fogarty: Yeah.

Mullins: So, that was an alternative to Vietnam, I guess.

Fogarty: It was. I didn't know what it was an alternative to. Because I got the NIH by mistake. Because you had a chance to take a year or two out to do some research. And I wanted to go study cardiovascular physiology. And a guy by the name of Rushmer wrote a book on cardiovascular physiology. And he was at the University of Washington. So, I told Dunphy I wanted to go to Washington to study cardiovascular physiology. He thought I meant the NIH Washington.

So, he called me one day and he said, "You're in."

And I said, "When do I leave?"

He says, "Well, you're going to have to leave right away."

So, what I had to do was drop out of my residency and go back to Washington for two years.

Mullins: Washington, DC.

Fogarty: DC.

Mullins: And that's when you worked at the NIH.

Fogarty: NIH.

Mullins: And tell us about Glenn Morrow. He was a cardiac surgeon there.

Fogarty: Yeah. He was more of a physiologist than he was a surgeon. But he was a surgeon. He was certified. But he really loved physiology and Dunphy knew that, so he said to go there instead. I had no idea that I was joining the navy. Because you get commissioned into the navy and then assigned the NIH Public Health Service.

Mullins: And so, were you doing open heart surgery?

Fogarty: Back at the NIH? Yes. Yeah. Yeah.

Mullins: How would that compare to the surgery you saw being done in Oregon by Starr's team?

Fogarty: Very different. The NIH, they were slow and plodding. Very, very careful. Starr was quick and precise.

Mullins: Here's a picture of Starr with his team. You may remember—

Fogarty: Oh, yeah, yeah.

Mullins: There's Jim Wood.

Fogarty: Jim Woods. This guy is—

Mullins: Rod Herr.

Fogarty: Rod Herr. What became of Rod?

Mullins: He moved to Idaho and was the, did the first open heart surgery in Boise and practiced for, some people have said he's the best technician they've ever seen.

Fogarty: He was great. Yeah. He was really good. He had some good technicians back there.

Mullins: It was a difficult time in some ways, developing the valve surgery.

Fogarty: Oh, yeah.

Mullins: Because there was complications and deaths.

Fogarty: Sure. I mean, no matter what you did, there are complications and deaths. Because all of it was new. The oxygenators were new. People to run them, had to learn how to run them. I mean, it was—

Mullins: And actually to do the procedure, was there, was it important to do it exactly right?

Fogarty: Oh, yeah. Yeah. Absolutely.

Mullins: Each step had its own instruments. That's what I remember.

Fogarty: Yeah, yeah, yeah, yeah. They did.

Mullins: You open the sternum this way, the pericardium—

Fogarty: Yeah, yeah, yeah, yeah.

Mullins: And you didn't want to vary, Dr. Starr didn't want any variation.

Fogarty: That's true. Until he saw it. If he saw something work, he'd pick it up quickly. But like most surgeons of that age, most of them didn't like to change. Because surgeons are taught to do it the way they were taught. And if you deviate, you'll get in trouble and be sued for malpractice. So, it's kind of self-repeating mistakes.

Mullins: You were a heart surgeon. What were the stresses of heart surgery in those days? Compared to the end of your career.

Fogarty: Well, no, I mean, you're always concerned somebody's going to die. Because everything was so new and everybody was on a learning curve. But I was fortunate enough to be part of that learning curve and also see that we converted people from a mortality rate for open heart surgery 25 percent down to 1 percent.

Mullins: Yes, yeah.

Fogarty: So, to see that evolution was very rewarding. Let's see, Jim Wood—

Mullins: This was in Los Angeles. The young guy's representing one of the papers, I think it was the multiple valve paper.

Fogarty: That's Rod.

Mullins: Yes. And this is McCord, someone named—

Fogarty: McCord, yeah. Yeah. He was on the faculty with Albert. Who's this?

Mullins: That's Jim Wood.

Fogarty: Jim Wood. I don't remember him in glasses.

Mullins: So, after—

Fogarty: He was a tough guy, Jim Wood.

Mullins: Yeah, he was. His whole career, he was a tough guy. Marine Corps.

Fogarty: Yeah. That's right.

Mullins: He might have been a Golden Gloves boxer.

Fogarty: Yeah. He was a rodeo guy, too, as I recall. He loved to rodeo horses.

Mullins: They had a big string of ponies over in eastern Oregon.

Fogarty: Yes. It was around Bend.

Mullins: Did you cross paths when you were at NIH with Nina Braunwald?

Fogarty: Yeah.

Mullins: Can you tell us about Nina Braunwald, probably the first woman cardiac surgeon.

Fogarty: Yeah. Yeah. Whenever she was going to do surgery, she made me scrub in with her. She was really good at getting into trouble.

Mullins: You have seen both the entrepreneurial side and you've seen the NIH for two years.

Fogarty: Yeah.

Mullins: And I would be interested to hear your thoughts about in terms of developing a career. If you're a young surgeon and you're just finishing at the NIH, should you stay there? Or should you go back to the private sector kind of thing? I hope that question's clear.

Fogarty: Well, yeah, no, I've been part of the government NIH. I've been part of private practice. I've been part of academia. And my preference is private practice. There's too much structure in government stuff. There's too much structure in academia. And if you're a maverick like most inventors, you don't fit well into highly structured environments. I've been in and out of Stanford three different times. I had to leave because they had a dean. And all the academics at that time felt that if you related to industry, you were evil. You can't get anything commercialized unless you relate to industry. The whole point of inventing something is to get it into clinical use. You have to relate to industry to do that.

Mullins: Yeah.

Fogarty: So, I'd been recruited back to Stanford two times. Each time I was recruited I did go back. The dean says, "No, we're not going to do what we used to do." In other words, deter relationships with industry. We're not going to do that." Well, a new dean would come in and they'd do it. So, I didn't have to stay more than a couple of months to figure out this guy's different. I'm not going to survive, I'm not going to punish myself. So, I left.

Mullins: One of the things that's interesting is that you were very young and Albert Starr was very young—

Fogarty: Yeah.

Mullins: --when you developed your new ideas.

Fogarty: Yeah.

Mullins: Has it been your experience that young people come up with—

Fogarty: Yes.

Mullins: And is that why you have FII, Fogarty Institute—

Fogarty: Absolute, yes, absolutely.

Mullins: --to encourage young people.

Fogarty: Yes.

Mullins: They're the ones with the new ideas.

Fogarty: Yeah. Young physicians, young engineers, everybody young.

Mullins: What kind of guidance do they need?

Fogarty: They need guidance from people who've been in the industry. So, if you look at the Fogarty Institute, our mentors, which are full time, they've all been successful. They've all been involved in technology that was really significantly causing change in a way we do things. And part of that process of displacing the old. Then you have a different mindset. People that come from large companies don't fit into this institute. Because they'll bring the old concepts with them. They all come from early stage start-ups.

Mullins: Yes. So, maybe an exception was your work to develop an endo-luminal aortic aneurism stent graft.

Fogarty: Yeah.

Mullins: In later years of your academic career. So, you worked on that project when you were older.

Fogarty: Yeah.

Mullins: Tell us about how going through it when you're older, that is, inventing something, was different than you were younger.

Fogarty: I don't think it was any different. I just surrounded myself with a bunch of young people. That's what was different.

Mullins: There were some major differences, of course. The embolectomy accomplished a holy shit.

Fogarty: Yeah.

Mullins: Whereas a graft, you're sort of replacing an established procedure with a new one.

Fogarty: Yes.

Mullins: What are the stresses of doing that? Human experimentation.

Fogarty: Well, to be—well, no. That's a bad word. We don't experiment on humans. We experiment on rats. I used to experiment on dogs, but I can't do it anymore. I'm ashamed of how many dogs I've killed. But anyway, we investigate. That's what we do. We investigate based on we know what doesn't work. We're trying to figure out by investigating what will work. But we do that with a reference points that tell us if we do this, it could work. And we do that after doing all the bench testing, all the cadaver testing, all the every testing. And that it's got a good chance to work. We explain to the patient. I do, and everybody else does now, hopefully, that this is the first time we'll be using this technology. And here's what could happen. They either accept it or reject it.

Mullins: Yeah. So, it's linked to solving a problem for patients.

Fogarty: Absolutely. They understand that. You know, sometimes, I mean, if we just listen to patients as physicians, sometimes we don't. But if you really listen to them, and you have something that's a very, very bad disease and they're suffering, you tell them what the options are, a new technology or an established technology. Tell them what the downsides are on both. A lot of them will say, "Cure me or kill me." You've got to accept that premise. And the FDA kept us from doing that for years and years. But if you're a patient, and you're really suffering, you've got...

Mullins: I don't know if you knew that.

Fogarty: Albert.

Mullins: No, Charles Dotter.

Fogarty: Oh, Charles. Oh, yeah, yeah.

Mullins: Did you know that Cook used to do--

Fogarty: Yeah, no, he related very well to Cook.

Mullins: Did you know Mr. Cook?

Fogarty: Yes. Yeah.

Mullins: You know a lot of those entrepreneurs.

Fogarty: Yeah. The son is running Cook now.

Mullins: And another one was Don Shiley.

Fogarty: Oh, yeah. How do you know Don?

Mullins: Well, I know that he was an early employee of Edwards.

Fogarty: Edwards, yeah.

Mullins: In the early '50s, when Edwards had that company that was testing the centrifugal pumps.

Fogarty: Yes. Yeah.

Mullins: And when he founded Edwards Lifesciences, Shiley went with him.

Fogarty: Yeah.

Mullins: And then I think he left over the bubble versus the membrane oxygenator.

Fogarty: That's right. Yeah.

Mullins: You worked with an inventor named Hancock.

Fogarty: Warren Hancock.

Mullins: Can you tell us, you developed—

Fogarty: Tissue valve.

Mullins: Yeah, aortic arches. I remember seeing one put in.

Fogarty: Yeah, yeah.

Mullins: How was that?

Fogarty: It was very interesting. Hancock left Edwards. And it was over essentially a tissue valve that I helped Hancock develop and did the first clinicals in the first animals. I did the first animals with tissue valve when I was at the NIH.

Mullins: Oh. Wow.

Fogarty: Way back when. And then we changed the formulation of glutaraldehyde. And I was part of that, and tested that at the NIH. I did the first tissue valves implants at Stanford.

Mullins: These were human valves glutaraldehyde-treated or pig valves?

Fogarty: Pigs. First we did cow valves and then we did pigs.

Mullins: How did Carpentier get up in front of this whole thing?

Fogarty: Through Edwards. Yeah.

Mullins: So, they went back to tissue valves.

Fogarty: Yes. And Albert Starr was very upset about that.

Mullins: Well, they're competitive people, aren't they?

Fogarty: Oh, yeah.

Mullins: I mean, it's part, you want to win, but you want to beat the other guy, to a certain extent.

Fogarty: Yeah. Yeah. It's very competitive. But anyway, I have an attitude, whatever works. Independent of who invented it or who came up with it. It's what works.

Mullins: So, when you went back to Oregon after the NIH, I think it was about '68.

Fogarty: Yeah.

Mullins: Were you on the faculty there then?

Fogarty: I think I was an instructor.

Mullins: And so, what were you doing?

Fogarty: When I went back to Oregon?

Mullins: Oregon, yeah. Before you came to Stanford.

Fogarty: Oh, before I came to, I essentially was, you know, vascular surgery was just in its beginnings. I already had a fellowship. So, I used to help them do vascular procedures. Even the faculty.

Mullins: Dr. Krippaehne was interested in it.

Fogarty: Krippaehne, yeah. He was a great guy.

Mullins: Yes, many people say that.

Fogarty: Yeah, he was a fine person.

Mullins: He seemed committed to the institution.

Fogarty: Yes. He absolutely was. He was one of my favorites back there.

Mullins: Tell us about the development, the modification of the embolectomy to pull common duct stones out.

Fogarty: There wasn't much of a modification. It was the same thing. It was just shorter.

Mullins: But you and Krippaehne wrote that paper.

Fogarty: Yes. Yeah.

Mullins: Nothing more satisfying than pulling a stone out of the common duct.

Fogarty: I'll tell you what's more satisfying. A big clot out of the aorta.

Mullins: Yeah, yeah. So, you decided to move to Stanford in what, '69.

Fogarty: Yeah, I think that was it, '69.

Mullins: So, that was one year after Dr. Shumway had done that first heart transplant. And you worked for Shumway.

Fogarty: Yeah, I did. Yeah.

Mullins: What did you do for Dr. Shumway?

Fogarty: I did whatever he told me to do. No. Yeah, no. I went through, I was one year a resident and then the next year I was on the faculty.

Mullins: So, you helped in the OR, basically. Spent the year operating?

Fogarty: Yes. Yeah.

Mullins: He did a lot of heart surgery, didn't he?

Fogarty: Yes.

Mullins: Didn't just do the transplants.

Fogarty: Oh, no. He did a lot of surgery. Yeah.

Mullins: How would you compare him to the other heart surgeons you've seen?

Fogarty: Well, he was a nice person. He was very interested in making sure you learned things. He helped you any way he could. He was very humorous. You think somebody like that wouldn't have, but he really was funnier than hell. That's why people liked to be around him. He was a good person. We got in a little bit of a tiff with one another. But that resolved. And we ended up great friends. And he helped me in different ways even after the tiff. Yeah.

Mullins: He was under some criticism for doing cadaver. Do you remember that?

Fogarty: Doing cadaver?

Mullins: Not cadaver, brain dead donor hearts. People thought that was, in the late '60s, unethical.

Fogarty: Yeah. Yeah.

Mullins: How did he respond to that? Was that worrisome for him?

Fogarty: He didn't really talk about it much. He says it will go away. And it did. But no, they were going to put him in jail—

Mullins: Oh my gosh.

Fogarty: --for killing people.

Mullins: Oh my gosh. I didn't know that.

Fogarty: Oh, yeah. There was a threatened lawsuit.

Mullins: Well that would be a disincentive to continue to—

Fogarty: Yeah. No. It obviously was.

Mullins: Some people have said he was a very methodical program developer.

Fogarty: Yes.

Mullins: With the heart transplant.

Fogarty: Oh, yeah. No, no.

Mullins: He kept working at it.

Fogarty: Yeah. No, no, he knew what the issue was and he knew that he did not have the expertise to solve rejection. But he worked on it with the right people. So, he brought people in to help him with that. No, he's essentially, when I look about people who really—I had so many people help me get to where I am. It's very rewarding for me to repeat what they did for me. Yeah.

Mullins: Some cases, they inspired you?

Fogarty: Yeah.

Mullins: Encouraged you?

Fogarty: Yeah. And, you know, I look at even you learn from people what you want to do. You also learn from people what you don't want to do. And I think that's very valuable to recognize that. You may say he's a shitty person, but he taught me what I don't want to be. That's important.

Mullins: One thing that's important in vascular and heart surgery is technique.

Fogarty: Yes.

Mullins? Can you talk about being trained as a surgeon by some of these people, and what you value?

Fogarty: Well, what I learned, it's not so much what people say they do. It's seeing what they really do. Surgeons don't want to know sometimes what they really are doing. They won't accept their own inadequacies. But if you don't do that, you'll never improve. Why would you improve if you're great already?

Mullins: As we were talking about earlier, cardiac surgery is about being in control.

Fogarty: Yes. I think not only cardiac, but I think any surgery is.

Mullins: So, you along the way have invented some instruments and things.

Fogarty: Yeah.

Mullins: Can you talk about inventing instruments to help in the operating room?

Fogarty: Well, you just see what doesn't work when you're using it. And you think, how can I make this work better? And then just don't think about it, you've got to do something about it. Well, to do something about it, you have to engage others. You can't do this stuff alone anymore. You have to engage everybody that's part of the ecosystem. Regulatory, that's part of

the ecosystem. You've got to know about regulatory. You've got to know about all things that we aren't trained to do.

Mullins: That's very true. Surgeons aren't trained well, and very few know about the litigation—

Fogarty: Oh, no, no, no. Yeah. You've got to learn all that, you know.

Mullins: And informed consent. Very important.

Fogarty: Yes. Yeah. Yeah. I think they're beginning to recognize some of these things, how important they are. You've got to understand about reimbursement. If you don't, you can get in real big trouble.

Mullins: Have you seen many major disputes about intellectual property and the development of new ideas? Just in general terms. Is that something you have to be careful about if—

Fogarty: Absolutely. Yeah. You do. You can't be too careful. But you have to know, freedom to operate. You know what that is?

Mullins: No.

Fogarty: Well, you have a patent. Okay. It's issued patent. You've got an issued patent, but does that mean you can utilize that patent? Maybe. Maybe not. But freedom to operate means you have to identify there's nobody else doing what you have done. And you have to study that, because you have got an issued patent, but find out that you don't have freedom to operate.

Mullins: Oh. That would be a disappointment.

Fogarty: Oh, yeah. Well, most guys don't even think about that. But if you're going to sell anything to anybody, you have to really review what is out there and make sure it doesn't impede you from operating. So, if you identify something, you can change it so you do have freedom to operate. Well, that's something surgeons never think about.

Mullins: Mm hmm. Can you patent a procedure?

Fogarty: It's very difficult.

Mullins: In your patent, though, you describe in great detail how to do the embolectomy, I noticed.

Fogarty: Yeah.

Mullins: Did you write the whole—

Fogarty: Yeah.

Mullins: It looks like it took quite a while, you know, because you just are so precise and detailed. Were you a natural patent writer?

Fogarty: No, no, no. I'm not a natural patent writer. I learned from having other people do it and reading it, what they did. That's how I learned it.

Mullins: Well what do you see as the future of inventors and surgery?

Fogarty: Well I think the future's positive. I think academia has finally realized that innovation is a way to improve healthcare. And however you do that improvement, you have to accommodate a lot of other people with different perspectives. That means you've got to relate to regulatory, you've got to relate to reimbursement, you've got to relate to everybody involved in any technology that may relate to what you're doing. And different disciplines. And it's very different than what it used to be. You know, it used to be that you didn't relate to these, even competitive people. You've got to relate to those who you compete with.

Mullins: So, communication—

Fogarty: Yeah, communication. Yeah. It's very important.

Mullins: And collaboration. Working with somebody who knows something you don't know.

Fogarty: Absolutely. If you don't do that, you won't get very far in this day and age. There's too much technology moving way too quickly to think that you know it all. You do not know it all.

Mullins: Have you seen examples where technology really did more damage than good, you thought?

Fogarty: Yeah.

Mullins: What are your thoughts about recommendations to young people to stay out of trouble regarding making bad choices in that regard?

Fogarty: A basic premise is patients come first. Period. End of conversations. And so, you don't do anything that could damage a patient. If there's a potential that you're going to damage a patient, you've got to make sure the patient understands they may be damaged. Or they may not make it. You've just got to be upfront. Tell them in the kindest way you can what the issues could be. And they'll often ask questions in response to that. All you do is answer them. Sometimes that answer will be, "I don't know."

Mullins: Well one of the things interesting about AneuRx, the endoluminal stent, is you and your team did a randomized control trial.

Fogarty: Yeah.

Mullins: Tell us about what you learned about doing randomized control trials.

Fogarty: Sometimes they're needed because academia wants it to be that. And sometimes it's because the FDA wants it to be that. You talk to patients. Sometimes they don't want that. They want to be part of the arm that's not randomized. Randomized control trials can be dangerous. You know why?

Mullins: No.

Fogarty: They're controlled. That means you pick what you want to make it work.

Mullins: So, as a surgeon, you're doing a case and you adjust—

Fogarty: Absolutely.

Mullins: And if for some reason you can't use that judgment, it's not like giving an aspirin.

Fogarty: No.

Mullins: You did a lot of heart surgery in your career, didn't you?

Fogarty: Yeah. A lot. More heart surgery than vascular.

Mullins: Did you enjoy it?

Fogarty: Yeah. I enjoyed both.

Mullins: Spent a lot of time, though.

Fogarty: Yeah.

Mullins: Some people find near the end of their career, they're getting tired.

Fogarty: Yes.

Mullins: They just aren't that sharp young guy they were at the beginning.

Fogarty: You're not. I retired from doing surgery, but I haven't retired from innovating.

Mullins: Yes. Well, that's good. That's good.

Fogarty: Yeah.

Mullins: What do you think is the future of artificial intelligence and application to medicine?

Fogarty: I think there's going to be a huge application. I really do. It's going to be bigger than most people think. I think at some levels, it's really going to help. Now which levels where it

won't help, there's probably too many to mention. Because it ain't going to be the cure for everything, that's for doggone sure. But it's certainly going to be able to move some things forward quicker than we're doing it now.

Mullins: It seems like cardiac physiology is, you know, the numbers and the flows and the resistance and the balances of the physiology would be an ideal area.

Fogarty: It would.

Mullins: As a heart surgeon, you're doing a case. And don't you get the sense that this is better? That's the one thing about valve replacement is it took a diseased heart and made it better. And you could see it.

Fogarty: Yeah. Yeah, no, right away.

Mullins: Did you do much pediatric congenital heart?

Fogarty: Not a lot. I did some at the NIH and a little bit at Oregon. Starr liked kids.

Mullins: Yes. I think he took it as the super challenge.

Fogarty: Yes. Yeah.

Mullins: And again, you need a certain—

Fogarty: Mindset.

Mullins: Yes. To do that. Did you ever think you maybe could have gone a different path, say if you'd stayed at the NIH?

Fogarty: Well, I had a chance to go back, but I turned it down.

Mullins: Well was that? Like when you were at Stanford?

Fogarty: At Stanford.

Mullins: Poor Glenn Morrow died of his own disease, right? IHSS?

Fogarty: Yeah, he did. Yeah. Yeah. He had another problem that not many people knew about. Alcohol. Yeah. But anyway, he was able to handle it. But you never called him after six at night.

Mullins: Yeah, I've met a few surgeons through the years like that.

Fogarty: Yeah. Yeah.

Mullins: Well, tell us about getting into vineyards and becoming a vintner.

Fogarty: It was a mistake. No. No, it was okay. My son runs the winery now. He's making a living at it. So, anyway. But you know—

Mullins: So, something, excuse me, altogether different from what you were doing?

Fogarty: No, it's actually a combination of art and technique, hard work, long hours. It's a lot like surgery, you know.

Mullins: Except if you have a bad outcome, you just have next year to try again.

Fogarty: That's right.

Mullins: Surgery, that's—

Fogarty: Well, if you have a bad outcome, you lose a lot of money very quickly. People don't like to drink bad wine. So, anyway, it's a difficult path. And a lot of people just drop out because it's not as glamorous as one would think. It's farming.

Mullins: Well I'm interested in this idea how surgeons entertain themselves.

Fogarty: Yeah, yeah, yeah, yeah.

Mullins: It's a stressful, hard life. And what do they do? And some of them never find anything else to do.

Fogarty: Well a lot of them find out they want to be a pilot and then they die.

Mullins: Yeah? I've heard that you can't buy death insurance.

Fogarty: Yeah, you can't.

Mullins: If you're a doctor.

Fogarty: No. But a lot of very prominent physicians have died acting like they know how to fly. Gruentzig is one.

Mullins: Were you active in academic societies throughout your career?

Fogarty: Not really. I don't, I was president of a couple. But did I enjoy it? No. I think academics often have their head up their ass. Is that too blunt?

Mullins: No. No. It's a whole different, it's like you're playing a game.

Fogarty: Yeah.

Mullins: You're part of a group. And guys like Dunphy were very influential.

Fogarty: No, he was.

Mullins: And I think he enjoyed it.

Fogarty: He did.

Mullins: And he's certainly remembered more as a leader than as a surgeon skilled at operations.

Fogarty: Oh, yeah, yeah. No.

Mullins: But for some, it becomes what they want to do their whole life is play this game.

Fogarty: Oh, yeah. No, they do. That's right. Yeah. I'll tell you what the problem is. They think that, they don't really understand that their shit also stinks. And they treat everybody as somebody less than they.

Mullins: Yeah. And in my career, I've heard countless talks about the importance of getting NIH funding in order to do research. Where I think you are an example of somebody who made a major breakthrough repeatedly in surgery through inventing, kind of using your own resources.

Fogarty: Yes.

Mullins: So, what should we advise young people today?

Fogarty: Well, first of all, what do they really want to be? Do they want to be a surgeon? Do they want to be a surgeon who invents things? Some will say, "I want to be a surgeon. I'm not interested in inventing anything." But the importance of innovation and invention in the field of medicine, you multiply your contribution. Because other surgeons will learn to do and pick up what is better for the patient. So, you kind of multiply your success. When we as a surgeon do a patient, we do them one at a time. If you invent something that other surgeons can use, you multiply that experience.

Mullins: Yes. Yeah, yeah.

Young: Yeah, it's really great. I hope you're enjoying it.

Fogarty: Yeah. I'm fine.

Videographer: Ready whenever you are.

Mullins: So, we were talking about training surgeons.

Fogarty: Yes.

Mullins: Now they say Shumway was very good, as you mentioned.

Fogarty: Yes. Yeah.

Mullins: And one particular thing was he assigned responsibility to the residents and the fellows.

Fogarty: Yes.

Mullins: He himself would be involved—

Fogarty: Yeah.

Mullins: --but he expected them—

Fogarty: Yeah.

Mullins: --to take a lead.

Fogarty: Yes.

Mullins: See, I don't think that happens nearly as much anymore in the training of surgeons.

Fogarty: It doesn't. I remember when coronary artery bypass grafting came around. Obviously, it was new. And he said, "You're in charge." Me. I was a first-year faculty member.

Mullins: Yeah.

Fogarty: There aren't many times you'll see somebody do that. He had other interests. And he wasn't very good at fine things. And he understood it.

Mullins: Yeah. There are some surgeons who claimed victory, or credit, for what their protégées or young people accomplished in their career. But you seem to have worked with some people who aren't that way.

Fogarty: Yeah.

Mullins: Cranley--

Fogarty: Cranley, yeah.

Mullins: --wanted you to succeed.

Fogarty: He did. He wanted my name on a paper first.

Mullins: You know, that *Annals of Surgery* paper—

Fogarty: Yeah.

Mullins: Why isn't Dunphy's name on that paper? Other chairs would have said, "I want my name on that paper. It's out of my department."

Fogarty: I don't think Dunphy was that kind of guy.

Mullins: It's the same thing Albert Starr said. He wanted you to do well.

Fogarty: Yeah. Yeah.

Mullins: And I would assume Shumway was the same way.

Fogarty: He was. Yeah. No, he was absolutely the same way.

Mullins: I think it's one of the traps in academics is people get manipulated and they achieve things, but their boss takes credit.

Fogarty: Yeah, absolutely. Their shit doesn't stink. I'm important.

Mullins: So, you're credited with having founded the biomedical engineering atmosphere here in this part of California. You were one of the first.

Fogarty: Yes. Yeah.

Mullins: Have you seen a lot of changes?

Fogarty: Yeah, I have. I think, you know, when I first came to Stanford, there was no biomedical things going on. There were some. But they came out of the engineering school. Not out of the medical school. There were a few things that did, but not many. That's changed now. The medical school, particularly Stanford, is realizing the importance of commercialization. You're not going to help anybody unless you get it commercialized. It's that simple.

Mullins: Yeah. High-quality product.

Fogarty: Yes. High quality. Yeah. And Stanford now wants to join with the institute because they really now do understand that they have to continue to contribute beyond the level of science. Science is critical, it's important, it's a foundation of a lot of things. But it ain't the end of the game. Commercialization is the end.

Mullins: So, that involves investment.

Fogarty: Yes.

Mullins: Convincing somebody to give you the venture capital.

Fogarty: Yes. Now reference to the venture capital, what's happened in the medical device area, because it was so expensive to get things into the marketplace that the venture capital people quit investing. So, the sources that used to be there was primarily venture capital. That is pretty much gone. So, there's alternative ways, and we're using those now. But I think so much has changed. The FDA has gotten to understand that if they don't allow technology to progress, they're not going to see any. That's why everybody was going offshore. The patients were going offshore, industry was going offshore. That's huge loss. Not only financially, but think about the number of patients that were going offshore to get therapies that could not be delivered here in the United States. That's now dissipating. But the venture capital guys got to see it. They got to see, is it really changed, or are they just acting like they're changing?

Mullins: What kind of timeline are they expecting these days between when they invest and when they get their money back?

Fogarty: I think it all depends on what the product is. There's different categories. But we just sold a company that I'd been working on for twenty years. Why so long? It was because of the FDA. Now if I started that company ten years later, I would have been a lot better off. But at that time, what we were doing, everybody thought was impossible to do, and it was dangerous. Well that was, they were referencing an old technology, not something new, and they couldn't understand the newness and the benefit that newness would bring to patients.

Mullins: Is there also an element in this innovation of surgeon skill?

Fogarty: Yes.

Mullins: That some of these things are difficult to do. Certainly as a heart surgeon, you've encountered difficult—

Fogarty: Sure. Yeah.

Mullins: The minimally invasive revolution that occurred seems to take away from the skill of the operator.

Fogarty: Yes.

Mullins: I don't know where I'm going with this.

Fogarty: You're talking about the robots.

Mullins: Yes. I think that the young surgeons coming up didn't see the broad spectrum of cases that you saw.

Fogarty: No. No.

Mullins: Acquired the confidence in their ability to use their hands to solve a problem. They want CAT scans, they want x-rays, they want drugs.

Fogarty: Oh, yeah, yeah, yeah, yeah, yeah, yeah. Yeah.

Mullins: They don't want to take them to the OR and operate on them.

Fogarty: Well, that's good. But it's never going to go away. You're still going to need to—but you're going to operate with what? It used to be we used the knife and the scalpel. Hemostats and all that kind of, but now we're using different technology to get to the same point. Some of that technology eliminates manual dexterity.

Mullins: Yes. Yeah.

Fogarty: But that's the way it's going to be.

Mullins: Yeah. Well I mean, I certainly saw laparoscopic surgery. Academic surgery gets very little credit for lap cholecs revolutionizing the management of cholecystitis. It was the private sector.

Fogarty: Sure. The private sector, they look more often at patient benefit. Sometimes they look at money. That's okay. But to sacrifice patient benefit for money is not okay. And we've got to take care of that issue, because it's still around.

Mullins: One of the achievements with the Fogarty catheter, embolectomy, was small incision to accomplish a big end.

Fogarty: Yes. Yeah.

Mullins: But you were trained by a surgeon who said, "Big surgeon, big incision."

Fogarty: That's right. No. I used to hear that from the likes of Dr. Altemeier. The bigger the incision, the bigger the surgeon.

Mullins: Well, just to wrap it up, here's a picture of you with the president. What a tremendous day that must have been.

Fogarty: Oh.

Mullins: Was your family there?

Fogarty: Yeah, they were, actually, yeah, yeah. There it is up there.

Mullins: So, just comment on success and awards, and how it encourages you?

Fogarty: You know, it does encourage me. But the fact is, I compare awards to hemorrhoids. You hang around long enough, every asshole gets one.

Mullins: Well, that's a little harsh.

Fogarty: But no, it's true. It may be harsh, but it's actually true. Look at the Academy Awards.

Mullins: Yeah, yeah. But I think the problem may be that you get them later in life than when you're actually doing the work.

Fogarty: Yeah.

Mullins: Nobel Prizes, most people get it for work they did when they were in their twenties.

Fogarty: Yeah. I guess that's right.

Mullins: You weren't even thirty when you developed, not even twenty-five, when you developed the embolectomy catheter.

Fogarty: That's right. Yeah. Yeah.

Mullins: Well, do you have any regrets or—

Fogarty: No. Yeah, I sure have regrets.

Mullins: I shouldn't ask like that. Things that you'd do a little differently, maybe.

Fogarty: Oh, yeah. There's so many, I can't tell you about them all. But, no. If you're going to create something, you're going to make a lot of mistakes.

Mullins: Should you have gone east rather than west? That's maybe, you were right in the middle of the country.

Fogarty: I think I'm doing fine where I am.

Mullins: You did pretty darn well. Moved here to the frontier.

Fogarty: Yeah. I actually kind of miss Oregon. Yeah, I enjoyed Oregon.

Mullins: You used to go fishing with Jack Campbell.

Fogarty: Oh, yeah, yeah.

Mullins: Did you go fishing with Dr. Krippaehne?

Fogarty: No, he didn't like to fish. No.

Mullins: Yeah, Oregon's nice. Very nice.

Fogarty: It's a great place. Yeah.

Mullins: Well, any other—

Fogarty: I think their political attitudes have changed.

Mullins: Yeah, yeah. It's evolving. It's evolving.

Fogarty: Evolving.

Mullins: Yeah.

Fogarty: The wrong way, I think.

Mullins: Maybe.

Fogarty: Yeah.

Mullins: Well, any final comments, sir?

Fogarty: No. No. I'm glad you're doing this.

Mullins: Well, thank you.

Fogarty: It may be meaningful for somebody.

Mullins: You know, I think that it's important for young people who aspire to be influential. A lot of young academic surgeons set out, what they want to do is make a difference. So, they hear well I'll go in the lab and understand this and that. And then they do that, and not much comes out of it.

Fogarty: Yeah.

Mullins: And it's important to understand that there's an alternative. Inventing.

Fogarty: Yeah.

Mullins: Innovation. Development.

Fogarty: Yeah.

Mullins: It takes a different set of skills. Any final questions?

Young: No, this is perfect.

Mullins: Well, thank you.

Fogarty: Good. Thank you.

Mullins: God bless you.