DANIEL VON HOFF, M.D.

1947 -

Honored as 2023 Arizona Historymaker
Founding Physician-In-Chief of TGen
Leading Cancer Researcher

The following is an oral history interview with Historymaker Dr. Daniel Von Hoff **(DV)** conducted by Diane Spatz Smith **(DS)** for Historical League, Inc. and videographed by Leonardo Buono on August 3, 2023, at the Center for Positive Media in Phoenix, Arizona.

Original tapes are in the collection of the Arizona Historical Society Museum Library at Papago Park, Tempe, Arizona. The interview has been edited for clarity.

DS Welcome Dr. Von Hoff. Thank you for taking the time to talk to us.

DV Thank you very much. It's an honor to be here.

DS Can you tell us where you were born and about your growing-up years?

DV I was born in Oshkosh, Wisconsin, OshKosh B'gosh in those days. And I was trained in a one-room schoolhouse. I had two great parents, Stanley and Mary Anna Von Hoff, and I was the first born out of five of us. So, happy household. Mother read to me every night – to all of us every night. Dad was an incredible provider, a bricklayer and hard worker. Taught me how to work hard. I had multiple jobs growing up including tender for my bricklaying father, muskrat trapping, and work as a gandy dancer for the Green Bay & Western Railroad putting in and maintaining tracks.

DS You were educated in a one-room schoolhouse in Wisconsin. Can you tell us about that a little more?

DV I smile when people talk about walking two miles in the snow – I did that to get to school. I was happy. We were in Oshkosh, Wisconsin. We got a lot of snow, so we did walk two miles to school. One-room schoolhouse, all eight grades. I thought it was probably, as I look back, one of the greatest teaching experiences ever because we each had a role, first grade. No kindergarten in

those days. All the way up to eighth grade. And then everybody – the first grade would go up and eighth grade or whatever, go up in a circle and do their lessons. So, we got a chance to hear everyone's lessons. Which I think pulled us up every time. It was a very good model.

DS While we were talking earlier, you were talking about your teacher, Mrs. Morgan.

DV Yes, she was very memorable. Her name was Amber Morgan. She was a great teacher, very patient with us, but strict. All the lessons were usually up in front of the room, and then we had lessons over the radio. Our music lessons came in once a week and then we would kind of sing along. So she used all kinds of media in those days to teach us. We had good things like recess, that we loved. But she was a very serious teacher and made sure we made the marks. She also had drama classes for us to try to teach us speaking, I guess, would be the best way to put it, but also parts in plays. "I Saw Mommy Kissing Santa Claus" was a favorite. And of course, we had all the parents there. We got real nervous, all of us, yeah.

DS You were also talking earlier about your mother and how she worked two jobs.

DV She did, for some of our time in school she was an accountant and a bookkeeper at Pepsi-Cola, and she also worked in a hospital at night as a nurse's aide and she loved medicine. Her specialty, she loved old people. And when I would tell her when she was 90-something that she was also old, she never accepted that. She said, "There are people older than I am, Dan." *[Laughs].* She was right, as usual.

DS Were you the first in your family to go to college?

DV Yes. Yes, I was. But I never thought about it that way. I was just lucky enough to do that. In the old days, there wasn't very much money to go around. I did realize that my parents were very smart, and my dad eventually went to college and got his teaching degree. My mother, of course, was taking care of us kids most of the time. I thought as I look back on it – one thing that my mother did tremendously for us was read to us every night. She knew the value of education. Never pushed us. But all five of us went to college and some beyond.

DS What was it like when you got to Carroll University?

DV Scary. Carroll University in Waukesha, Wisconsin was and is a great school; went there for several reasons, mainly because the department of biology was so strong. Second of all, they gave me a scholarship, which I've never forgotten and we remember every day. The chairman of biology was very, very strong and if you got through the courses, then you had a better chance to get into medical school. Also he pushed me to go out of state, to go to Columbia College of

Physicians and Surgeons in New York, which was a big change. A great challenge. But got me to a little different atmosphere, very tough environment, very tough. He believed that if you had good training, you could go anywhere. And I did.

DS How did you become interested in medicine?

DV Two things, I think. One was we got the polio vaccine very early in its development because one of my classmates, who my dad took me to visit in the hospital, passed away from polio. So then we were all vaccinated very, very early. And I was very privileged later in my life to work at the Salk Institute and I spent a lot of time with Dr. Salk. You know, I realized what a gigantic contribution he had made, but I never thought that I'd come from a one-room schoolhouse that really got some of the first Salk vaccine, then actually got to work with him at times at the Salk Institute. So that taught me that the world was kind of small in medicine in a way. So that got my interest, no doubt about it--the early Salk vaccine.

And then the other was a special program that they had for small schools in Wisconsin to get the kids exposed to college very early. So they brought us down to the University of Wisconsin in Madison. They did all kinds of testing and then brought some of us down to the college and had us sit in on classes, one of which was anatomy and that kind of caught my attention as being very interesting. Because the medical students were taking it and some of the med students spent a little time with me. If you can believe it, as a real undergraduate. Real special.

DS That is special. I read that your first choice at Columbia was to study infectious disease. How did you end up in oncology?

DV Well I think that number one, infectious disease was super interesting because I had great teachers in it. They taught parasitology, for example, and we learned that some of the parasites were even found in the Egyptian mummies, in the pharaohs, and I remember my teacher always used to say, "Dan, there are even parasites in the seats of the mighty." Right? So that's like ringworm and stuff that comes out the wrong end, right? So, super interesting teachers. And then in infectious disease, it’s like we were microbe hunters. Somebody came in, we saw a lot of patients with leprosy, for example. And finally, it was figured out that leprosy could only grow in one place in an animal model and that's in the foot of an armadillo because it's the right temperature. And as you know, leprosy affects things like your nose and your fingertips first 'cause that's where the organism grows. And the footpad of the armadillo is the only animal model for leprosy.

DS Really?

DV Yeah, so you find out all these incredible things, you know, you got this naegleria that's in the

lakes. A young woman just passed away of that. It goes right into the nose. So, it's hard not to be fascinated by infectious disease. But one of the groups of people who get a lot of infections are people with cancer, right? And infectious disease – it was really important. But it's only one of the aspects of medicine. You know you have kidneys and heart and brain, neurology, liver, and one thing that affects all those organs is actually cancer. And I couldn't decide, you know, whether it was good to be a kidney cancer specialist or heart specialist or whatever. But oncology demanded very good internal medicine background and all of those specialties. It demanded that you learn them. You know, you're not going to be perfect at it, but you're going to learn all of those because you never know who's going to walk in with leukemia. So, you need to know hematology, right? Or liver cancer. You better know the function of the liver. So that's how I got interested in cancer because it kind of covered all aspects of medicine.

DS Interesting. So…

DV So, it was the right decision. *[Laughs]*

DS How did you end up coming to Arizona? What was your path to get to Arizona? .

DV Well I had known quite a few of the doctors, especially cancer specialists, in Arizona over the many years of my training at the National Cancer Institute in Bethesda, Maryland. And we were working at the National Cancer Institute on a special technique to take tumors directly from people and grow them in plates so we could test many different drugs or radiation or other things to see whether it would have an effect on those patients' cancer cells. So, we were working on it for about a year, and then I opened up *Science* magazine and there was Dr. Syd Salmon, M.D., Director of the Arizona Cancer and Anne Hamburger, his partner, Ph.D. scientist, who actually had been doing this and reported it right away. So, they beat us, right, on that technology. I called up Syd. I said, "Could I come out and learn with you?" And he graciously said, "Sure."

So I came out here for six weeks in the dead of summer and learned everything that they had learned. I was very grateful for that. Went back to the National Cancer Institute, carried on that work. But that's how I got to know Syd and many of their other folks, including Dave Alberts, who unfortunately just passed away. But David was a great investigator and oncologist in cancer medicine and, in particular, for women's cancers. Contributed a tremendous amount. So those were my teachers here in Arizona. Many years passed, about twenty. And then I got a call and my wife actually, Ann, got a call from Syd Salmon saying, "Ann, I'm passing away of pancreatic cancer. I want Dan to come out and be the new cancer center director." I got home. She told me that and she said, "We're going aren't we?" He was a great friend and a great mentor. So, we did. And then I became director of the Arizona Cancer Center. That's how we got to Arizona.

DS And from there, how did you come to TGen?

DV Well it didn't quite work out that way. In Tucson we were taking care of a wonderful lady by the name of Francie Mallery. And Francie had ovarian cancer. And her husband Dick Mallery said, "I know this – that Francie's not going to make it. So, what can we do? What's going to be the future to help other people?" I said, "I think it's genomics." And so he said, "Okay, you know, we'll do that." And so he came up here and got busy trying to raise awareness and support that genomics would be the future. And then we knew that Dr. Jeff Trent was a native son, and he was second in command at the National Human Genome Institute in Bethesda, Maryland. So, it would be fantastic to get him recruited here. Of course, the rest is history 'cause Jeff took it from there. But it was really Francie Mallery.

DS Wow. What a great tribute to her.

DV Very special. And to Dick who worked tirelessly to have the city come together to do this.

DS How would you describe TGen to a layman?

DV It's a place where basic research at the laboratory bench is translated to help patients. It's always been the emphasis - how do we get things to help people? So, bench to bedside.

DS What is that process? I mean, how do you get it from the pure research that's being done over here into your local doctor's office?

DV That's a good question. It's a long process usually--the process of discovery to application where the FDA approves is usually around 14 years.

DS Wow.

DV It's too long.

DS Mm-hm.

DV Right? So our job is trying to accelerate that. What's helped a lot now is the technology. You know, the ability to sequence DNA has been dramatic – and Jeff Trent, as you know, worked in that from the very, very beginning. And was a great pioneer in that. So being able to sequence the human genome was a huge step. And now you can literally do it for dollars, and a few dollars. Of course, that technology allows one to tell what's different in cancer versus in normal cells. It's been the holy grail to find that, but now we actually are able to sequence normal cells– the three billion base pairs. That's the number of heartbeats that all of us have in a lifetime. You

have to sequence every one of those base pairs. It's like cutting up the national library of medicine, Jeff will tell you. All the books, and then try to put them back together. It's dramatic, right? And that technology allowed us to say, okay, here's a normal cell from a skin cell, normal skin. And now here's the person's cancer. What's the difference? If you can find the difference, say, oh that gene is very high and driving the cancer, so then we try to look for something that knocks it down. And there's lots of new technologies to figure out ways to knock it down. So…

DS When you say knock it down, you mean find a – a medicine or treatment?

DV That's right. So we're born with two copies of each gene. So, if a cancer cell has nine copies, you say, is there a way to, as you said, knock it back to normal two, or complex a drug with those copies to make them inactive, so they don't drive that cancer. So we've discovered these targets and drivers. That's where TGen has been really a big contributor. Everybody looks to see how do you knock down that driver? You can you make what we call an anti-sense that actually gets those copies and locks them so they can't do their damage. And then you hope that that'd be a small drug, maybe an antibody that knocks down that bad target. And take it from there. Then you have to do human trials, which is what we try to hand off to someone like me who is also a clinical investigator, so we'll try that for people whose tumors have progressed on all other therapies. They volunteer to try it. They're wonderful people. Brave. Hopefully they'll help themselves, but their heart's in it for others, too. And it's a longer process to do the big clinical trials. You know, usually it involves hundreds to thousands of people to make sure of safety and efficacy. And then it's approved by the FDA and then docs can use it.

DS Do you see any way to take that whole process from 14 years down to a…

DV That's a great question. How fast can it be done? The quickest it's ever been done is about 3 to 5 years. So, it's getting better. And I'll tell you why it's better. If you can detect the target, right, then you can only treat those patients whose tumors have the target. Before, we took a new agent and tried it in people with breast cancer. Now we know that only people with breast cancer where the cancer cells are estrogen receptor positive, you should try it for them. So the trials are smaller. And you can tell earlier whether or not this is going to work. Instead of a shotgun approach, it really is a rifle shot.

DS More targeted.

DV Exactly.

DS Well this leads me to my next question. What is precision medicine, individualized medicine, there seem to be many terms that are used to describe this. What term do you use to describe this and how does that work?

DV I like to call it personalized medicine. I think some people call it that, but I'd like to think that most docs practice personalized medicine. I mean, people who've been following people for many years, taking care of them, they know that person. They know what the person's goal – the patient's goal is. So, I like to call it personalized medicine. Precision medicine should be part of that, which precision medicine in oncology or in infectious disease, is you take the tumor out or you try to culture the microorganism. You find out what it's sensitive to, either by putting antibiotics on a plate, right, for infections, or here, seeing what target is in that person's cancer. Then you take a drug that hits that target. So, that's precision medicine. Only treat the patient with something that hits a target that's in that person's tumor, right? And cancer is a difficult disease because one person can have pancreas cancer and have a gene called RAS being abnormal and another person has exactly the same type of cancer under the microscope and RAS is normal. Some other gene might be abnormal. So the great challenge in cancer is that each person's tumor is really quite different, even though we say breast cancer or colon cancer. Each person's tumor is different. That's why you have to practice precision medicine under personalized medicine. We're just learning how to find out what that problem is, you know, what the target is in people's tumor. That's where the technology has come. Some people's tumor, we can't find one yet. That's what's frustrating.

DS In addition to looking for a specific medicine that reacts with a specific gene, is there some thought that you could take out that gene and replace it with a normal gene?

DV Oh yes, gene therapy. Gene therapy where for instance, there's a mutation called P53. It's usually mutated or gone in many cancers. We call it P53 – it's the guardian of the genome. So if you have both copies, you're good. There are some people that are born without any copies. It's called Li-Fraumeni syndrome. A hundred percent of those people get cancer. If you have one copy of the gene, well then you're okay. But remember, as a cancer grows that cancer might delete P53 too, it just throws out that guardian of the genome, right?

DS And you only have one to fall back on?

DV That's right. That's right. It's kind of an interesting situation because there are some animals – there is one that doesn't get cancer very often, even though it lives a long time. That's an elephant, right? And an elephant has two hundred normal copies of P53.

DS Wow.

DV Right. And elephants, people don't realize it, but elephants actually die of foot infections. They stand on their toes all the time. You'll have to ask the Phoenix Zoo team that, but that's the way they die is toe infections. But they don't get cancer. Not that anybody really knows, so what a lot

of people are thinking is that if your cancer is caused by missing one copy of P53, if it's caused by that, could we put a new one in? Just like you said. And the answer is, you can, with difficulty. Right? It's called gene therapy, and the question is, how do you get it into the right place? We have three billion of these things. How do you get it to the right place?

DS To the right place. That's pretty hard, huh?

DV It's hard, but not impossible. A Nobel Prize was won by somebody who's discovered a way to do that, to actually bring it to a gene right next to it. And I just have to tell you that I don't think we're very far away from being able to do that. I would guess within the next year.

DS Wow.

DV Yeah, trying to replace that gene. Yep. It has to be member compatible with the person's other DNA and their cell type and their blood type and everything else. So it's – it's complicated, but I do believe that that will happen very soon.

DS That's very important news.

DV Right. And we know that there are 200 at least different genes that, if they're gone or there are increased copies, they can cause the cancer. But that would help a lot of people.

DS You are regarded as one of the most important pancreatic cancer researchers in the world. You've been involved in the development of many drugs that have extended the lives of pancreatic cancer patients working or leading more than 200 clinical trials. What do you count as a success in a trial? And what do you learn from the failures in the trials?

DV Well we count as a success against pancreas cancer, something that improves survival. Those are the agents that the FDA will approve, but also give a person a longer better quality of life. I'm not sure I would put them in a category of success because we haven't cured patients with stage 4 disease, although some are starting to live 10, 15 years.

DS That's remarkable.

DV It is remarkable. It's just too small a number yet. But if you now say, well, it used to be zero. Right? But if you say you have a one in nine chance or one in six chance of making it out past five years, that's the truth, number one. But we know the key to this disease is early diagnosis. That's the key. Many people will tell you with breast cancer when it's advanced, you don't really cure, you do get an incredible increase in life. I mean, the five-year survival for patients with any

stage breast cancer is 85% now. And that's because of the awareness and activism of the ladies who really took it and said, we're not going to die from this thing. Pancreas cancer hasn't had as much attention. It's not as common, but still, we know that some people with the current therapies we have with stage 4 disease, can have a long survival. But it's such a small percentage. So, I think our best work is trying to get earlier detection because those things that work a little bit for people with stage 4 disease, they work a lot for stage 1, 2 and 3. Clear cut, dramatic improvement in survival. So, our attention at TGen and many other places is keep working on things for patients with stage 4 disease but keep working a lot on early diagnosis. That's the key.

DS I've read that you're working on trying to find a blood or a urine screening test for pancreatic cancer, that pancreatic cancer cells can grow for 20 years before the cancer is detected. Is that…

DV It's probably true for all cancers.

DS Really?

DV Yes. And remember I talked about this P53 gene called Li-Fraumeni. You're born with that. But the people – children or – they don't start getting cancer until they're 16 or 18 or in their 20s. It takes around 20 years, we think, for a cancer to grow to the size to be detectable. We know in the last years, it grows faster. It gets a blood supply, so it actually gets nutrients. But it does take a long time to go from one cell, right? And a cancer you can detect is about a billion cells. It grows slowly and then – 'cause your immune system is probably trying to keep it at bay and then you have an acceleration of the curve.

DS Reaches sort of critical mass or something?

DV That's exactly right. Critical mass seems to be driven by – it has a blood supply. If it has nutrients. If it starts out as a cell, it's just sitting there. But once it gets a blood supply, that's when it accelerates. Exactly right. So, we know it's – it's good and bad. You'd say, well, it takes a long time to grow, I guess that's good. But it does give a period of time where detection, early detection, is possible. And let's face it, we know it. I've just watched over my career, one big question was polyps. Now, I had a colonoscopy yesterday, it's probably too much information, but I did. Just want to show that we do follow our own guidelines, right? And in the old days, meaning when I was in medical school and very early in the career, the question was, if you saw a polyp in the colon, was that really turning malignant? I mean, we didn't have the ability to keep looking serially. Now we know. Now we know that 10% of the people sitting in this room, 10% of us, are going to have a polyp, right? And 10% of those 10% are going to have colon cancer, if you let it go. But if you get that polyp and snare it out, no cancer. So that took a long time to recognize the pre-malignant condition. And it was polyps, right? It was polyps. We also know

ulcerative colitis, lot of inflammation of the bowel is a bad risk factor. But we're starting to recognize those risk factors. And what we try to do first is look. We don't use the word screening because screening is hard to get people to have colonoscopies, you know, two hundred – three hundred and twenty million people. First thing you do is try to find people who are at high risk.

So, we're learning with AI and genetic testing what gives Dan and the rest of his family high risk. Did your mother and father have cancer? That's about 16% of the time, right? Did you smoke? Do you have diabetes? Are you overweight? Do you use chewing tobacco? Right? Do you have low Vitamin D? There are all kinds of factors. Not everybody tries to pin it on one – but smoking is for sure. Right? But there's a lot of things that conspire with your genetic background. You may have genes called bad luck genes. You're just born with them. And they cause mutations along the way, but all those things conspire to give us cancer. So, we know if we can detect it early, though, you can cure it for sure.

DS How far away do you think you are from a blood or urine test to detect the cancer at year two instead of year twenty?

DV Year two will be pretty early, but remember, it's not until the last two or three years that the cancer kind of gets out of control.

DS Mm-hm.

DV So if we were able to detect it, you know, three years, any year, but mostly three years or earlier. And the answer is, there's about eleven different companies and lots of other investigators out there who actually have stuff (blood tests) that looks really promising. I believe they'll probably be approved by the FDA within the next two years.

DS Wow.

DV And they're being tested. You can actually get them now. They're not perfect. But everybody, especially if you have those risk factors--identifying people with high risk. For instance, right now I'm a little bit worried about a person if because your mother died at less than 55 years of age of pancreas cancer. Or she had breast cancer, right? And we probably ought to have you tested for the BRCA gene of breast cancer, right? If at less than 55, you get cancer, that means that you have to watch out for the kids and your brothers and sisters. You have to. And so that's the kind of thing you're telling your internist. You know, I'm a little bit worried and you can actually have that test today. It's not perfect. FDA hasn't approved it yet. But it's only a matter of time and getting more patients and people on the trials. They're testing it intensely in the United Kingdom because there people get a very late diagnosis. You know, the national health system has to parse who gets scans and things like that. So, they're actually doing a prospective trial of

that. Many trials ongoing in the United States. That's a pan cancer test.

DS So when you say pan, that means for all cancers?

DV Yes, most cancers.

DS So this would be one test that would check for cancer period.

DV Right, right. It's not been extensively tested in pancreas cancer. That's what we're working on. See if there's a way to do better than that. But for other cancers that are real common ones, breast, colon, lung, yes. And again, early detection is the key to for sure cure the disease. For sure. Right, so we have to really emphasize that in our research.

DS Do you see a day when pancreatic cancer could be cured?

DV Oh without a doubt, because I already see people that are cured.

DS Right?

DV It's just that the people who are cured, the best chance they have is early detection. So, the answer is absolutely yes. Absolutely yes.

DS That sounds like we should all be very optimistic about where research is today.

DV You know, it takes almost 50 years – and being an older man, that, you say, well, I – I laugh when a young clinician says, "Well, in my experience…". Right? *[laughs]*. But. I've got experience now. In the past, every young man with testicular cancer died. Every young man died with it. Maybe if it was caught early. And then a new drug came along called cisplatin. And a man by the name of Lance Armstrong won the Tour de France. And he had testicular cancer. Bad testicular cancer. So almost all men now are cured with that. So, you say, okay. that's interesting, right? It turned out to be really important because young men got it and it killed productivity in the United States a lot, right? Now, testicular cancer is curable, productivity goes up and that is happening with a lot of different cancers. But we still want to do the same for the very elderly and not give up.

DS People say, “He's had a good life.”.

DV But we don’t feel that way, you know? When you're 76 you feel that, hey, maybe I could make it to next year, right? Take leukemia, children, 90% are cured. Children cured with leukemia.

Then, the new drug, a targeted drug came along for a thing call GI stromal tumor, lethal as all get out. Take the pill, you're good. Chronic myeloid leukemia, take the pill. There's 2 million people alive with that. I mean, it's unbelievable. See – so if you see enough of that, when somebody asks you that question, first of all we haven't done a very good job of telling our supporters and the American people, hey, you know, research pays off. There's a lot in the room here who have cancer? Oh yeah, you know, 'cause one in two people – men get it, one in three women. Some people, as you remember in obituaries, used to say died after a long illness. Instead, it was nobody wanted to use the "C" word. Thank God that's over pretty much. And then AIDs came along. He died after a long illness, okay. We got something for that. But yeah, there are plenty of cancers. That's why I tell people, don't give up. We got a lot of things that are going to work for you right away. And, of course, early detection is still our best weapon.

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DS Where do you see the next medical frontier? Is it genetic? Is it the genome? Is it something else that's out there? What's the next frontier?

DV The next frontier is earlier detection of diseases. For instance, Parkinson's Disease. You know, the central nervous system – let me back up. So, when I was in medical school, I was able to work with a great neurologist and his name was Houston Merritt. A tiny guy. He's the first person who worked on and gave patients the new antiseizure medicine Dilantin. These are, you know, seizures, terrible seizures. People didn't know what to do. He developed the drug Dilantin. He was a great neurologist. Great neurologist. But he was also great at the bedside, as I said. So, he asked me, "What are you going to do, Dan?" Cause I got a chance to spend time with him. And I said, "Well, I'm thinking about neurology or oncology." And he said, "You know, Dan, there'll be quicker advances in oncology right now than there will be neurology." He said, "Neurology will follow in terms of treatment, but oncology is going to change the world."

And at that time, it was at the time that people found out that doing an orchiectomy helped men with prostate, terrible pain. Orchiectomy was not the greatest thing to have as a man, but orchiectomy, taking a person's testicles away, they got comforted from their terrible bone pain instantaneously. Pain went away just like that. Then we knew that testosterone was the driver. Of course, Huggins won the Nobel Prize for that, and because then we learned that testosterone was the driver of prostate cancer and caused terrible bone pain [due to tumor in the marrow]. So, he was at that era that it was just changing.

We had another drug called fluorouracil, so Houston Merritt was starting to see that these things were benefitting people with cancer. And he said, "I got something for seizures. But for multiple sclerosis, we don't have anything." Well look, we got a lot of stuff now, right? We don't have anything for Parkinson's. That was just at the time that L-dopa came, and it helped some. So, I think it's going to be early diagnosis and use the tools that we have earlier in the disease, and it'll have better effects. So, I'll give you a quick example, the new technology you're going to hear

about is that in Parkinson's disease there is actually loss of sense of smell. That's the first thing that's lost.

DS Really?

DV Yeah, and you watch. That's the new test for Parkinson's disease. You'll be able to get it early. You'll use the meds or any other methodologies earlier. And that's really going to help.

DS It seems – just in my personal experience with people that I know that more and more people seem to have Parkinson's, and that may be because other diseases have been partially taken care of.

DV That's true. We used to die of other things like infectious disease, cancer, and you're living to get something else. That is true. Cardiovascular disease, look at the tremendous advances. Lowering cholesterol, other things. That's true. We're living longer to get other things. But we want that quality of life to be super and if you catch these things earlier, there is going to be a lot more you can do. Early diagnosis is the new frontier of not only cancer, but it's a new frontier for medicine.

DS Can you tell me about some of your mentors? I know you've mentioned a few. Are there any others that have been impactful in your life?

DV A fellow by the name of Roy Christoph. Roy Christoph was in my college at Carroll University. He demanded excellence. He was a very thoughtful man and he talked to me about aiming high, aiming high. You know, go to the best place you can. Stretch yourself and be a really honest, straightforward investigator. Report it as it is so in the writing, it was a very important skill to write, to know in medicine. And you hated to turn in a paper to him. *[Laughs].* It's redder than anything else.

DS It sounds like you've had a lot of people in your life who believed in you and demanded excellence from you.

DV Well, my mother believed in me. She never pushed me, but she believed in me. And so did my father. But they knew that giving me the life skills was the most important thing, so you're right. Those were two great mentors.

DS You've always been known for your caring and your kind focus on patients. What have your patients taught you?

DV That's a very difficult question. They've taught me so much. I don't really have an answer to that. It taught me to be humble for sure. It taught me a lot about life. They're amazing. Everybody I've taken care of – amazing in so many different ways. I think they've taught me to make sure whatever I receive from them, that I make sure I would tell others. You know, maybe an early symptom that they had that I put back here and then you hear it again. I think that's one of the bad things about getting older as a clinician is that you've learned these things, and you just want to make sure you transfer that knowledge that patient has given you to others. There are so many clues.

The number one thing a patient taught me is to listen. That's what they've taught me. And you have to catch yourself sometimes. You may have been in a hurry and stuff. But a very old doctor told me once, "The most important tool you have, Dan, is to listen. And your second tool is attention. So, listen." I believe that's probably what patients have taught me the most. But that's important in all aspects of life. But that's the one thing. And whatever you hear, make sure you apply that in another situation.

DS In oncology in all the years you've been in practice, how do you protect yourself emotionally? You're obviously a very compassionate person. How do you deal with losing patients, and – and just deal with all of that?

DV How do you know that I do? *[Laughs]* No, it's – I think you think of that person that you've lost, how special they were and you better honor what they've contributed. You know? And you better pass it on. How they've been so wonderful to deal with the bad cards they've been dealt, how strong they were. And how they were able to pass away peacefully. I've really never had anybody say don't let me go, you know, at the end. Never that. I've been able to hold people's hands at the end and it gives you a lot of comfort that they have comfort in Christ, and their beliefs. Also reflecting that they've done a darn good job of living. So, there's a lot of positive 'cause we all have to go through this, right? You get – in a funny – funny way a lot of strength, from people saying, "Hey, you know, such and such, yeah. And they did it. Right?" So, it's not a defeat in that way 'cause we're all going to have to go through it. And there's a lot of lessons I've had there, but the answer to your question is, is that you don't. You – you don't get over it. There's a lot of times that people will pop up in your mind – sometimes, by the way, it's when you're seeing a person with exactly the same disease, and you say, hey, maybe such and such is talking to me, that you better listen here, Dan, because you learned something there when you were taking care of me. See? I mean, it keeps coming back. So, that's the other thing that's a contribution. I know that sounds kinda funny, but it is. That somebody taught you something. And sometimes people come back that way, meaning that you see a similar situation and say, oh, I know what direction that's going to go. Let's try to push this direction, so this person can do better. I believe it's all of a learning experience. My only worry is that we pass that information on to the next generation of nurses and docs as best we can. All that wisdom that's been built up by a person that we lose, all their family, you know, all the things they did in their life. You want

to just make sure you honor that and you say, "Boy I learned a lot there and I better be as good."

DS That was very – that was very instructive and very profound.

DV It's from the heart.

DS I'll change the subject. You're known for your workaholic ways.

DV *[Laughs]*

DS And sleeping only three or four hours a night. Can you describe a typical day and how you get by on so little sleep? And also, do you ever take weekends off?

DV I really smiled at that. No doctor takes weekends off. *[Laughs]*. Well, I think I inherited the ability to not sleep very much from my mother because she did work two jobs and she was incredible to me. I don't know how she kept the family going at those times, so there is a science now that describes people that are able to get a lot of refreshment in short sleep. So, I usually get up at 5:02, always the same exactly, the same time. You can ask Ann. It's exactly. I don't know why. That's why I don't travel very well, but yeah, I get up in the morning really early and try to get into the office or the clinic by 6:30 or so. I divide my time now, in laboratory work and writing grants to get the support, etc., etc. And then clinically to be a consultant now because I'm 76 years old and you do step back from the patient care. Patient care wise, we've been on call every other night here in the past, so I've paid my dues long time there, but the answer is work all day long, so I get up at 5:02, get to work, work all day long, try to make a difference against the disease where there's an early diagnosis, which we're working on a lot now.

And usually, I'll get home about 7:00 or so. Ann will fix me a little something to make it through until when she goes to bed, but then I'm ashamed to say that she usually has to get up at 1:00 o'clock or so and make me dinner. Yeah, I know. *[Laughs]*. It's bad. But I'm able to work at the desk then and mostly writing. We have tremendous amounts of correspondence, emails, and things. I'm really, really blessed. I've got a fantastic group of people that I work with. My clinical colleagues are just really, really special. They're wonderful. They can take care of me any time, that's the best compliment a doc can give. You can take care of me any time. And my administrative team, as you've met, are super. And the laboratory group, again, very, very best. Jeff Trent has given us a great place to work. TGen, you can exercise creativity, work on a clinical problem, always emphasis on the patient. That's one thing Jeff has always said. So, we're very blessed. Also blessed to be able to work at HonorHealth Research. Great team there, and wonderful organization. Totally devoted to good care.

That's the day. It's a long day. Believe it or not, I never get tired. It's hard to get to sleep. Lot of, you know, problem solving. I think a lot of docs are that way. That's why we don't make good airplane pilots. I guess we're okay drivers, I hope, but it's not constant problem solving. And so, I don't really feel sleepy. I'm blessed because I get up at five, maybe go to bed at two. Yeah. And 5:02. And I feel rested. So, I think it came from my mother. Good gene to have.

DS Yeah, obviously.

DV Ann is the opposite, by the way. *[Laughs]*

DS Well that leads me to my next question. Tell me about your family. About Ann and your children.

DV Well, Ann and I have been married 50 plus years now. So, everybody who knows us, knows that she's the angel and the saint in the family, very forgiving. We got married three days after we graduated from medical school and on the way out to my internship. I'd be on call every other night as an intern. In those days, we didn't have microwaves. She would put the casserole there and then I'd have to chip it off the hot plate or add water first and chip it off. So that was in San Francisco. So, we got married in Wisconsin in a church that her father helped start. She is a great Christian lady. She tries to help others. She's been a great mother. She's a geographer by trade and she worked in the field of geography, environmental impact studies to try to make sure we could eat during my internship because the salary was terrible, and that was in San Francisco, by the way.

So, she's been a great mother. We had three children, a boy and two girls. We have nine grandchildren, three in Chicago area. And my son's a professional musician and a teacher there, too, so Paul is really terrific on the trombone and special instruments. And he has three children. And then my two daughters live in Texas. They say that when girls are born in Texas, they put a chip in their head 'cause they don't move. So, both of them are teachers. And we're real proud of all of them. One has a girl and two boys, and the other one has three boys. So, we're really blessed. Great, nine grandchildren. Our first one just graduated from high school and she's gonna go to nursing school. So, we're real proud of Lauren. Yep. They go all the way down to age five.

DS Sounds like you have a great family.

DV We're lucky and very fortunate to have them and they're all healthy, most important thing. And all look like they have different talents, including playing cards. I'm kinda worried about that one.

DS *[Laughs]* Well, it takes math to do that.

DV I think he counts cards, yes. *[Laughs]*. He's five years old. Yeah.

DS What would you say to young people today? What advice would you give to young people today?

DV Read, read, read. And if you're going to be a young mother or father, read. It's the one skill I think that … boy, I'll tell you was so important in so many ways. But I do believe that that's it. You know, you'll read about people who have done great things, but also people who've gone awry and you just need to read – you can learn so many things. It was an emphasis for us without question. And I'm sure for you. You know, it was Aesop's Fables, were kind of my favorite. You just think of how many things you learn with those. My mother would go over and over and over those. But I think reading in – in every country, the people that I run into, you look at really what their history's been, who have really done some great things, they read like crazy, right? I hope we never lose that skill. But I'm worried.

DS You've been honored by so many distinguished medical groups over the years. Which awards are the most important to you?

DV I have to say none. We haven't cured a disease yet. I'm really grateful for them. I'm grateful for this. But still feel inadequate with where we are in medicine, and we've got a long ways to go. Again, I'm very grateful. I'm hoping that it can show as an example that people care that you've done that, but, but truthfully, I don't feel that that's what I'm ever about, ever. I'm grateful for them, also, by the way, if it's named after someone, is really an honor because I might have known them or known what they've done. So, it means a lot, but it still--I always worry of being unworthy of it. It's a worry because I realize that we have got a long ways to go in these diseases. So, it tells me we're on the right path, I guess, but still, I realize what can be done and I've seen change in medicine. And I haven't done that yet.

DS Do you ever think about retiring?

DV Oh yes. I do. And, only because, just remember now in medicine, we have to take exams to keep practicing. Right? So, I guess I'm okay as long as I pass the exams, right? But there is a time. But most importantly, we've recruited some super people to Phoenix, and, in this area, both in TGen, HonorHealth, many of the great institutions. And my boss who I learned a lot from, Chuck Coltman, at one time in San Antonio, he said, "You know, Dan, the view never changes if you're not the lead dog." Right? So, as we're recruiting good people, I need to get out of the way and realize that we recruited them, we recruit them 'cause they're smarter than we are, and we need to get out of the way. Hard to do sometimes.

DS Yeah.

DV But the view never changes if you're not the lead dog. So, I hope to live by that.

DS What do you hope your legacy will be?

DV I wish my legacy would've been someone who served in the United States armed forces because I think that's one thing that I missed, duty to country. So, I'm not looking at it as a legacy. I'm looking about what I could've done and maybe should've done. You know, I probably could've been a better father, and certainly a better husband over the years. I'm just glad my family tolerates me.

DS Well…

DV That's a good legacy. *[Laughs]* I was – I was smart enough to pick the right people, *[laughs]* for wife and kids. Sorry about that, but that's the best I can do.

DS You have done so much with your work, and you've brought it along so far.

DV I think that's why I – that's why we hope we can use that. That's a legacy to recruit the next generation to keep it going. When you look at a legacy, you say, well, if you've built enough of a program, you know, that people want to be the next to take it to the next level, as I think about it, that's really the important thing, right? It's almost like if you're President of the United States, you want to make sure you've left it in the best way, so the next President has a little better chance. Maybe that's not happening all over the world, right now, right? But it is the legacy. You know, take it from here. Nobody lasts forever. So, take it from here. I kind of liked Harry Truman. He stepped away. He had a good person come in. He knew it. Didn't agree with everything, but then, you know, Eisenhower steps in and away we went. We got all the superhighways and many, many other things. So, I think the legacy is leave it in the best possible shape because you know if somebody behind you is smarter, take it to the next level.

DS Sort of like the old Boy Scout motto, leave the campground cleaner than when you found it.

DV Exactly. I never made it to honor scout – I never made it to Eagle Scout 'cause I couldn't swim worth a darn.

DS *[Laughs]*

DV I was a 120 pounds. They threw me in the lakes up in Wisconsin. It was 62 degrees. And I'd make it about halfway, right? And I'd turn so blue I just gave up. And I was going under and then somebody would pull me up. I never made it, so I couldn't be an Eagle Scout.

DS Oh, well, most people never make Eagle Scout. *[Laughs]*

DV *[Laughs]* I was a failure there.

DS I'd like to end our conversation by talking to you about your 2011 commencement address to your alma mater, Carroll University, entitled "The Ginkgo, Lessons Learned Here and Beyond." It was such a beautiful and thoughtful summation of your personal philosophy. Can you give us some highlights from your ginkgo rules of life?

DV Sure, you bet. Well, I had a great professor, his name was Roy Christoph, at Carroll University. It was Carroll College in those days. So, his first test was practical. He said, I want you to go to all the trees here in campus and I'm going to give you a test – I'll give you the leaves, right? So, sure enough we went around, you know, I was bright-eyed, bushy-tailed, wanted to go to medical school. First test, God I really studied. I went to every tree in the place, I thought, and got it down. Hickory, oak, c'mon, this was freshman biology, should have been easy. Got to be easy, kind of? So, I went around, and he only had one leaf on the test, which I had no idea what it was, right? No idea. And there was a tree there on campus, it was a small tree which turned out to be the oldest tree ever in history, the only one we got from the time of the dinosaurs. It was called a ginkgo. Right? And the ginkgo has been around, and it has just two parts to the leaf, which is the beginning of all leaves. So, of course, of course, I flunked. I mean, you either got an A or an F. It was easy. Yes or no. And, of course, nobody got it because we didn't go to every tree. Right, it was lesson number one. Make sure you go to every tree, no matter how big it is, right? You know, look at all the data. Lesson number two, he expected that even when you got that leaf, you could tell since it only had two lobes, that it had to be a precursor for other trees. He expected not to, you know, show what you know in the big trees. No, no, no. You need to reason that. That was a hard lesson. I actually thought that night that I was done. When I got that F, I was done. No chance in medicine. I didn't go home, but I was really under the weather, right? I realized that it was an important lesson and then we took it from there.

The next time I saw it – so, you know, that was imprinted, that leaf. I'm not going to get that wrong again. Right? Next time I saw it was there was a little girl, she was three years old, and this is at Columbia Presbyterian Medical Center in New York City. And she was sitting there seizing and she had a drip going and she had neuroblastoma growing outside her head. Terrible situation- mother and father are there. Terrible grief. Three-year-old. We had anti-seizure meds they're dripping, etc., but I was working with a guy by the name of Dr. Wolf. He was one of the fathers of chemotherapy. And – Jim Wolf – he was tottering along, and he goes over there, and

he talked to the parents. We could try something. It's called doxorubicin and – and he says it has some side effects, but we could try it. “Oh, if we could only see her again and she would be able to be normal for a while. We want to try,” the parents said. And Jim Wolf walks out there with me tottering behind, right? And, he says, "I think we're going to treat Melinda here with doxorubicin…," – anyway, we pulled the curtain and I saw the ginkgo again. It was imprinted on the curtain, right? That was the pattern. Hmm, interesting. So I thought, well nothing's impossible, right? I came from an F *[laughs],* and I got into medical school at Columbia. And the nurses said, "Over our dead body. You will not treat that child. That child is dying. You will not treat her." Jim said, "We are going to try because the parents want us to and we think it will help.” He said, "Well, Dan and I here will go ahead."

So, we took her to the treatment room, gave her the doxorubicin– at that time between you and I, it was called the red death because it had a lot of side effects, you know? But we knew it worked against that disease. He did; he knew. So, and literally two days later, when we drew back that ginkgo-imprinted curtain, she's on a tricycle, riding around the ward. And the nurses said, "That was a good idea to treat her." *[Laughs]* It was – there's the ginkgo again. So that got me really interested in chemotherapy, as you can imagine. We don't know how long she went. But her mother and father had a little bit more time with her. Right? So that stuck with me forever. And, more recently, when we opened up the new chemotherapy unit at HonorHealth, Scottsdale Healthcare, when it opened, guess what? They had curtains and they all had ginkgoes on them.

DS Wow.

DV Yep. So, the ginkgo was kind of important to me. But also, for the kids if you read about ginkgo trees. They were there at the time of dinosaurs and kids love dinosaurs now. So, I tell my grandchildren that, hoping they'll get interested in medicine somehow. Yeah.

DS Wonderful. Thank you for taking the time to spend with us. Your story is so important. We're so privileged to have you as one of our Historymakers.

DV You're welcome.

[END OF RECORDING]