Season 2 – Episode 7 – Dr. Ralph DaCosta

Transcript

CHRISTIAN COTÉ:
This is behind the breakthrough the podcast, all about groundbreaking medical research and the people behind it at Toronto's university health network, Canada's largest research and teaching hospital. I'm your host, Christian Coté. Joining us today, Dr. Ralph da costa, award winning scientist at UHN's Princess Margaret Cancer Center and Techna Institute. Doctor da costa invented a first of its kind handheld device that is revolutionizing how we image and treat cancer. Welcome, Dr.Da costa.

DR. RALPH DA COSTA:

Thank you, Christian. What a pleasure to be here andshare our story with you and the rest of your audience. I really look forward to this conversation.

CHRISTIAN COTÉ:

Well, thank you. And to that end, your story, what i find fascinating about this invention is it starts really with a serendipitousmoment right back in 2007. You're a grad student in the final stages of a PhD on cancer imaging. And what happens?

DR. RALPH DA COSTA:

Well, boy, that's a long time ago. But, but you're right. I was a graduate student in the department of medical biophysics in the University of Toronto. And my supervisor at the time, who remains a reallytrusted mentor and friend until today is Dr Brian Wilson, who was actually on staff at the Princess Margaret as a senior scientist. And around 2005 to 2007, we started to interact with a number of clinicians at the St. Michael's hospital in particular, what the clinicians in our imaging cancer imaging team were trying to develop were new technological waysor new imaging ways of identifying patients with early cancer.

And so, the researchers, including myself and the clinicians, started a really amazing collaboration, which still goes on till today. And what we were after in that time period was capitalizing or exploiting some of the robust technological capabilities using light, or light-based technologies.And loosely speaking, that box of optical tools is referred to as bio photonics.

CHRISTIAN COTÉ:

it's called which?

DR. RALPH DA COSTA:
it's called bio photonics. Biology and photonics orphotonics is.

CHRISTIAN COTÉ:

gotcha. All right. Thank you.

DR. RALPH DA COSTA:

so, the idea was, is there a way to help clinicians appreciate these subtle differences in these very dangerous and early cancers from surrounding tissues? And eventually the goal there was totry to make that part of the standard of care. So, we wanted to give the clinicians a better way of visualizing cancer. This was a fairly sophisticated enterprise. In other words, we weren't just in the bench using microscopes and endescopes at the research lab.

We were actually taking our original prototypes and moving them into first in human trials. And so, this was a very rapid time for me to learn notonly how to do research at the bench-side, but also interact with clinicians on a day to day basis. And, and i really think, looking back, that was a fundamental change that happened to me as a grad student, that a lot of the research that i was doing had a very direct connection not onlyto patients, but also to doctors and the medical system.

But anyway, getting back to what happened next, part of that work that i did back at the Princess Margaret involved some, i would say, fairly sophisticated animal models. And so, in order to understand what we wereseeing in our clinical trial with actual patients, but one of my main goals in my PhD thesis was to develop animal models and study how the fluorescence imaging. So, we were in particular looking at fluorescence asa way to enhance the differences between these early states of disease and normal tissue.

We developed a method where we would use fluorescence. It was essentially a way of illuminating the tissue inside the patient with a specific wavelength of light and then allowing the imaging sensor with anumber of different optical elements in front of it to filter out all of the you could maybe think of it as useless fluorescence information and really capture that very important diagnostic information that would help us appreciate the pre malignant from the healthy tissue.

And so, we were seeing some tremendous success in the first number of patients. But the questions really sort of circled back to the research lab.What was causing this sort of beneficial clinical outcome? Why were theseparticular wavelengths of light so useful and others not? And was there a way to better understand these things in an animal model system so that we could maybe fine tune what was happening on the instrumentation? Again, the goal here was really to help clinicians to see things that they were currently missing. So, what happened next? Around 2007 was together with some veterinary colleagues. We created an animal

Model. It was an animal model that allowed us to recapitulate what wasactually happening in patients.

And we did that through some sophisticated surgical procedures. And when we had this animal model, we essentially miniaturized the optics that we would be using in patients so that we replicated what we were doing in the clinic back home at the Princess Margaret optics lab. And thatwas really interesting because normally we take things from the bench to the bedside, but here's a good example where we were already at the bedside and we needed to understand we came back to the bench. So that was a very interesting experience. So as part of that exercise, this was, as you referred to it, the serendipitous moment. And I was looking through the binoculars at this animal that was sitting there under anesthesia trying to understand what was happening. And i saw the early signs of cancer that we were seeing in the clinic.

So, i was very excited, obviously, and i saw the same color that we were seeing in the clinic on this animal model. So that gave me some confidence that the animal model was actually working. That was a good first start. And as i probed under the microscope and there's lots of lasers and bells and whistles and it's fairly complicated to operate under lighting conditions, just sort of fumbling around with some dials. And I just moved my eyes away from the binoculars for a moment and came back and I guess I had shifted the animal. So, this is sort of true serendipity. So, what i saw unexpectedly was I was a very bright color of red through the binocularsof this very complicated microscope. And I think what had happened, as I mentioned, the animal may have shifted inadvertently and the microscope was pointing out a different area.

And while I saw what I had expected to see is the color of cancer. The fluorescent greenish colour of cancer was in stark contrast to this bright red color, which I was not expecting to see. So, I really wanted to understand what this strange red light was inside the animal. So, i investigated a little bit and I thought what we do normally when we're dealing with tissues is we will often take a sample of that tissue. And in this case, I took a small biopsy of the animal and I moved the animal aroundto see if another biopsy was needed. And i quickly noticed that there is another red spot and another red spot. And I turned on the lights and looked at what I would normally see just with the unaided eye. And I realized that those red spots were occurring in a very particular patternthat matched a surgical suturing that i had done in the animal.

So, the first thing I thought was, well, that's kind of bizarre. And they were just like little round circles around the suture sites, right? Just where I had done my surgical work earlier in the animal. And so, I thought,

Well, that's kind of bizarre, unexpected. So, i sent the biopsies off to a friend of mine who was at Mount Sinai in pathology, and he happened to beon call that night. And I said, because you run this through your panel andtell me, are there cancer cells? And he called me up and he said, you don't have any cancer there. And I said, well, what do you think it is? He said, well, i tested it for bacteria. And I said, what led you to think that? He says, well, you describe them as being around the suture sites and it is the gut. So, it's not surprising that you'd see bacteria and maybe they were congregating around the suture sites, just like you said. And sure enough, he, he confirmed that it was bacteria.

It struck me that, boy, that's something we've never seen before. And if that's also happening in patients where there's also a lot of gut bacteria, could that possibly interfere with the way our fluorescence endoscopes are working? Could it even be a way to optically differentiate bacteria which are not cancer from, from the cancer? And so, I thought, what does any grad student do when you know, faced with an interesting discovery? Well, you send it to your supervisor and say, look what I found. That wasn't very different from my thinking at the time. And I snapped a pictureand I looked at it and the screen wasn't so great. But I thought, oh, jeez, that's a pretty interesting picture. Put my camera away. I was pretty exhausted at 4:00 in the morning. I thought, well, I better get home. So, I started walking home and as I'm walking, it was about a 15 minute walk, and I thought, well, well, that's interesting.

We've just shown that fluorescence can identify bacteria, not just cancer.So, I sort of tucked that in the back of my mind. And then you know, just a few feet away from my front door, I thought, wait a second, I just took a picture of fluorescent bacteria and the image quality was magnificent, even though it was early technology. And I did it with a cell phone.

CHRISTIAN COTÉ:

With your blackberry.

DR. RALPH DA COSTA:
That's right. And I thought, well, I could maybe turn a cell phone into a microscope. So that's where it all happened. It sort of came out of cancer imaging a very strong clinical focus on improving earlydetection in our gi patients. And that night i realized it's interesting, but what do I do with it? What does it actually mean? Then I started to dig anddig, and you know while I was finishing up my Ph.D., I learned a lot, I learneda lot about wound care because I was asking myself obviously where with this kind of a finding, be useful in medicine.

CHRISTIAN COTÉ:

so, in terms of your investigation, what was the state ofimaging for wound care patients back in 2007?

DR. RALPH DA COSTA:

the more I read, the more people I spoke to, clinicians, nurses, people who worked in long term care facilities. I basically just started to call everybody, because it started to dawn on me that as I as I read more of the literature and had these conversations with frontline workers and wound care, the one thing I came away with back then I stillthink is true today is that chronic wounds and the care of patients with chronic wounds globally really can be considered a silent epidemic. And what really got me was the best people could do when it came to, understanding the role of bacteria, in how wounds go from a contaminated state to a truly clinically infected state.

Was that the standard of care and by the way, this is still true today. Andthis is really why i think the innovation the team has come up with reallyhas, has the potential to change the standard of care, because if you lookat chronic wound care, not just in Canada, not just in north America, but around the world, there are essentially two ways that doctors rely on, on a day to day basis.

And again, this is a very large population of patients who have these chronic wounds. They essentially rely on visualizing the patient, taking a history and then looking at very subjective signs and symptoms that they would use collectively to make essentially a guess. Is this wound infectedor not?

Now, there are some wounds that are very obvious. They smell they're verywarm to the touch. They look terrible, you can see the bone, etc. And so those, those are patients where an infection is almost likely to be there. And, and then the next decision that they have to make at the front line inreal time is do you prescribe antibiotics or do you clean or in the worst case, do you do you amputate, which is not good.

But the other way in terms of actually quantifying, the amount of bacteria in these wounds, I came to learn it was a simple swabbing technique. So, you swab the center of the wound and this becomes a challenge because the results from a culture lab you know, usually take several days to come back. And so if a clinician, a nurse, for example, is doing an assessment in real time and you know, there's a waiting room filled with other patients, you really have a very short amount of time tomake your diagnosis, determine your treatment plan and deliver the treatment. And so, waiting a few days for you know confirmation that you've got an infection vis a vis the culture test isn't really practical andit's very costly.

And so, I realized, boy, this is such a tremendous impact on patients around the world from a personal standpoint, a quality of life standpoint. I know

I spent years, my vacation days while i was finishing up my graduate work,trailing around nurses and doctors, just learning about the problem formyself. And I'll tell you one thing, and I say this very respectfully, these patients are dealing with such, such an enormous emotional burden. And that you know translates into a poor quality of life, higher risk of mortality, et cetera.

And just from a human perspective, it struck me that in the absence of innovation in wound care, these patients might continue to go down thatpath. Now, what's interesting is I think the field of technology has also realized what i realized in 2007 so a number of people, a number of companies really chasing this idea of helping clinicians improve the stateof modern wound care. But back in the day, there was no such thing as optical imaging, per say, fluorescence imaging and wound care. We've changed that now in 2020.

CHRISTIAN COTÉ:

So, you essentially had a better mousetrap that could identify wounds and confirm there was bacterial infection on the spot.

DR. RALPH DA COSTA:

That's right. And one thing that i sort of left out, my mistake is you'll appreciate that without any tools or without some sort of an imaging capability or some way of visualizing the bacteria. Remember,bacteria under the standard of care with the naked eye are invisible to the eye, right. You can see them when they grow in a culture dish just because they've multiplied from one to a billion. But in a complex wound where you have pus, blood, connective tissues, all sorts of things, they're sort of hidden and yet they are still wreaking havoc against the patient, the host's immune system.

And so you know one could think, well, ralph, what would be the benefit of having an imaging instrument, a device that could be used at the point of cure in real time to visualize these otherwise invisible bacteria when you've got culture tests that are based on swabbing? Well, you really can't tell where the bacteria are. And these wounds can be very deep. Theycan be very amorphous, if you will. They're not little circles you know that you can point to the center and know what's happening around.

So you know, in a nutshell, Christian, what we realized was the, the abilityto actually take an image in real time and do it within less than a second and show exactly where the bacteria are in terms of the spatial organization or presence, and also show you know, how does that bacterial population change as a function of a treatment, antibiotic or debridement or other such methods. So, being able to see the bacteria was a game changer.

CHRISTIAN COTÉ:

so, describe this for us ralph. What does this device look like that you're taking a picture with of a wound to determine you know,if it's actually infected in terms of bacteria?

DR. RALPH DA COSTA:

right, so that's a great question. So let me, before i answer that briefly tell you how we create a fluorescence picture. So, forfluorescence to occur, it needs to be in the dark because it's all about creating or exciting molecules that are present in a particular target in this case, the wound and being interested to differentiate between the different fluorescent colors. So, bacteria may appear red, connective tissue may appear green or yellow, and other components of this complicated wound could appear with different colors.

So, the goal here is to make those bacteria and their fluorescent signal stand out amongst everything else. So, to do that, you can appreciate that if you're doing that in sunlight where you have a whole range of differentoptical wavelengths contaminating your background, it makes that very challenging. So, we start off by having a dark environment, and that's not challenging clinically. You can always turn off the clinic room lights to take this fluorescent picture. The next thing you need is the light that causes the fluorescence to be excited. In this case, we use a narrow wavelength of light in the violet range. So, this is not ultraviolet light. This is four hundred and five nanometer light and we block that light from being detected by the imaging sensor.

So, the light hits, the wound illuminates everything. And we have a sensor which is built into your cell phone, just the regular one. You take a pictureof you know, your daughter or son at a birthday party. That same sensor is sensitive to those emission wavelengths, but we don't want to see all the different colors. So, we've selected green and red bands using an optical filter that sits in front of the sensor. And all of this is constructed in a way that fits onto or essentially attaches to what would otherwise be aninteractive cell phone communication device. So, you've got…

CHRISTIAN COTÉ:

A light source as well that will light up the red or green.All built-in.

DR. RALPH DA COSTA:

You've got it all built in and it fits in the palm of your hands and you can control it with the software that we've developed. Andso, you can turn on the blue light and instantly without any need for any kind of a spray or a contrast agent or an injected contrast agent, you get the results immediately. And so, what you end up seeing on the color screen of this device is a real time fluorescence image that identifies the presence and distribution of the bacteria against the, the rest of the wound. And what the clinician then instantly appreciates is the relative

Abundance of the bacteria and where is the bacteria and if they prod or you know, surgically remove some dead tissue, we found that it's very helpful in identifying underlying infections, which would not normally beseen.

And these are just a few examples. But in a nutshell, what this translated to in the early days and of course, we've come a long way since 2009 in those first health Canada trials, is that if you can have a device that can fit in either the palm of the hand or the pocket of a lab or clinical apron, lab coat, as they say, you have something that's portable, you can use it just like it would use a stethoscope. So, you know, today we sort of refer to the moleculight device, the company's device, which is now sold all overthe world as the sort of stethoscope of wound care. You can carry it anywhere. You can pull it out when you need it. And you get more information that when it's combined with the standard of care, you know all of those other signs and symptoms, the physician has a higher confidence of knowing about the presence or absence of an infection.

CHRISTIAN COTÉ:

This sounds like a device that could be creating a paradigmshift in wound care, treatment, diagnosis, etc.

DR. RALPH DA COSTA:

The device, I think, is a paradigm shift, mainly because ithas so profoundly, over the last number of years addressed a very important unmet need. And that's the need to have real time information about bacterial burden, because as we've appreciated over the years, clinicians have been guessing a lot about whether you know, what's happening with the bacterial part of the host bacterial tug of war, as it were.

You know, when a patient has a wound, if we're healthy and we have no underlying conditions, it's our immune system that protects us from thatinfection once those bacteria contaminate the wound. But as you know, many patients have underlying comorbidities. Their immune systems are compromised. And so that initial exposure to these dangerous pathogens can go unchecked, and all of a sudden the bacteria, end up more or less winning the war against the patient. And that's when you know, you run into a lot of trouble.

The other thing to think about in terms of the unmet need is to think thatthe scope of the problem, not only the human cost of chronic wounds, but the other area that we really have to look at not only as scientists and clinicians, but as policy makers and governments, is the massive cost of treating for this chronic condition across say North America. As i recall from recent medicare and medicaid statistics, it's about 80 billion dollars U.s. to treat patients who have chronic wounds. And patients who have

Diabetes have the last time i looked at this was maybe several months ago,a twenty five percent chance of developing an infection resulting in a diabetic foot ulcer that remains chronic. It doesn't heal.

And you know, with the increasing sorry, aging population, i should say, we're you know, even if you're conservative Christian and you're estimating a 10 percent increase in diabetic foot ulcers, knowing that diabetic foot ulcers are not the only type of chronic wound, you're looking at, increases that are, as i said, in the billions of dollars per year.And you know, that's just in the United States so extrapolate that across the world.

So not only is there a patient cost of human cost, but the cost to the health care system, especially at a time when resources have to be really managed and a lot better. This also helps to address that. The evidence wehave from a large number of multinational multicenter trials, FDA trials,have really demonstrated that it's an effective technology for what it's intended for. And we've had very, very positive reviews across all of the different doctors using it around the world. So, we're very encouraged and enthusiastic of where we are today.

CHRISTIAN COTÉ:

And you don't stop there. You go back to your primary research, which is cancer imaging. How have you been able to apply themoleculight invention to cancer imaging or adapt it?

DR. RALPH DA COSTA:

Right. Well, you know, you're right. And an area that became very interesting to me, partly related to you know, my member ofmy family, my grandmother, Martha, had developed breast cancer. And i thought, well, boy, if we can you know, do what we did way back with Dr. Marcon's team at st. Mike's and look at endoscopy, is there a way to take the same kind of technique and adapt it so that we could address a very important problem that affects a lot of patients at Princess Margaret?

So, patients with invasive cancer, in this case breast cancer, will often undergo what's referred to as a breast conserving surgery. In breast conserving surgery, we have to appreciate that a certain percentage of time, despite the best surgical practice and guidance documents, patientswill often have cancer remaining after that index procedure. That first procedure and you know, sadly, around twenty to twenty five percent ofthe time on average in North America, a patient has to come back for another operation.

So, early on, i made a decision in the lab that we should really pick one cancer and really adapt the technology Christian and we sat down and wesort of said, hey, is it possible to take this fluorescence technology and

Make it so that it works in the operating room in real time? And we coulduse it, at least theoretically, to identify the sort of missed cancer, right.And i can tell you, we finished a 75 patient trial. In fact, we recently finished recruiting the last patient. And we've just submitted our phase two clinical trial results to a journal and we're just waiting for it to undergo final reviews.

And the results were absolutely positive and dramatic. And what we found in women who are undergoing breast conserving surgery, that ifyou administered the safe, we refer to it as ala a-linolenic acid.

CHRISTIAN COTÉ:

is the contrast agent.

DR. RALPH DA COSTA:
that's right. And just for you know, the completeness ofthe story, the agent actually doesn't fluoresce, which is really great, because if you drink it and it goes everywhere, you don't want to see the agent, you want to see the tumor cells. And so, it's the tumor cells that convert this non- fluorescent ala into a molecule, in this case porphyrin, that does produce this bright red signal. And so, this is how the fluorescence contrast is achieved. And what we found just in the first patient was the primary excision has been completed and we're seeing tiny spots of fluorescence, which then on pathology. This was work led by Dr. Susan done, one of our great collaborators at Princess Margaret.

The evidence started to build that, gosh, what we're seeing are actually tumor cells. And so, what made us very enthusiastic in this phase two trial,which was health canada approved, it gave us a foundation by which we could write more grants. And so, we're very successful with writing some very large peer reviewed research grants. I remember cihr was a very large funder of what now has become a multicenter, multinational FDA pivotal phase three trial, which is now currently underway.

CHRISTIAN COTÉ:

so, a phase three trial now underway in terms of testing the imaging device with the agent to be able to pinpoint where cancer maystill exist in terms of breast cancer, what's your sense of what's, what's coming after that trial?

DR. RALPH DA COSTA:

in a nutshell, you know, not to be coy about this, but ireally have always dreamt about using this kind of fluorescence technology to take that twenty to twenty five percent re-excision rateand squash it down to zero eventually. In terms of what's coming next, i would say that the breast cancer FDA phase three trial was probably going to last us about two years in order for us to complete this very large number of patients, and we've been working very intimately with

Health Canada and the FDA to make sure that it's a success in terms of ourpipeline.

We've got first in human studies planned with our head and neck surgeons.We've got a very strong interest in developing another application in gynaecological cancers, another one in looking at lung cancer. And so, we're very excited. These are very expensive trials, as you can appreciate. Alot of the funding support we've received has come up to this point from funding organizations like cihr and the breast cancer foundation.

But we can't do that alone. You know, it's just not sustainable. And so, i findthat working together with industry and commercializing these technologies, which uhn is very good at, really helps accelerate the movement of these concepts closer to trials and therefore into adoption. So, what I'll tell you, it's been a roller coaster ride.

CHRISTIAN COTÉ:

It sounds like it. What advice would you give people in terms of the notion of raising financing or commercialization? I mean, youtook all this on your own.

DR. RALPH DA COSTA:

there was an urgency to it, because you know, if we really wanted to get this technology out into the marketplace, we had toact quickly. And so there really you know, wasn't time for Ralph to go and get an MBA at U of T Rotman. So, it was really learning on the fly. As I reflect back, it was probably the most important lesson or lessons that i learned above and beyond what I was doing in my regular career in research.

And what I mean by that was i had literally zero experience on what it meant to be an entrepreneur. I'd seen other success stories, many of whom came out of UHN. But really what I struggled with in the early days was, ohmy god, what am I taking on? And I must say that one of the most important decisions i had to make early on, once I knew that the evidence supported this as a real technology that could have some commercial implications. And this is really something that i often highlight to my colleagues who come to me. It's the following. It's when you're in a research institute and you make a discovery, big or small, you have to really ask yourself what are the implications for the discovery?

And it could be a discovery based on an on a new drug or a new therapy or a new device or a new method or something like that. First of all, can you patent it? Can the institution patent it? Can you actually protect it?
That's very important. And it's important for, for several reasons. One of which is if you can't protect it, someone will copy it. And so the value and ihate to say the word value, but the financial value is, is diminutized. The Other thing you have to think about is what's the best that you can do toget this discovery into society in the future?

And often we struggle, including myself in the early days. You struggle with this question. Let's assume you've got a patent around it. Is this something that we should license out to, to a company that's bigger and iswell-funded and can hit the ground running? Or is it something that is so new that who would be that company to take it over? Right. And in which case, what do you do? You have an invention. It's protected. You've worked very closely with the tech transfer office. And you know, obviously there's lots of guidance that I

received from that office. And then i started to talk to people who had been there and done that, some of whom are remain mentors to me today.

And the decision i made was to create a company. And that really was the pivot point for me in my life, because licensing it is a fairly straightforward procedure. You take the technology, you know, you put itout there and a company, olympus, UHN deals with lots of companies in the imaging device space. They could have easily taken it on. But what we thought in consultation with Mark Taylor and his office was it probably made a lot more sense to create a company. And of course, the commercialization process at uhn has evolved since 2000 and say 10, 11 when I was first starting, thinking about this.

So to me, that was the big question i had to ask myself in order to know what I wanted to do. And by agreeing that I wanted number one to learn what it meant to be an entrepreneur. I also wanted to largely be involvedin the translation. There was, i hate to say it, selfishness. I spent all this time thinking about it. I know so much about the area. If we hand it off to, to another company, you know, I was a bit afraid that it might sit there and languish. And at the time people kept telling you, ralph, you're still motivated. You're so inspired by this, you know, why don't you take the risk.

So what I would say to people who might be listening, who find themselvesin the same kind of situation as I did in those early years, it's one of the most important decisions you can make alongside with UHN's tech transferand others is are you willing to commit to participating in a commercialization pathway that is about spinning off a company? And I chose to do that.

CHRISTIAN COTÉ:

You're listening to behind the breakthrough the podcast, all about groundbreaking medical research and the people behind it at Toronto's university health network, Canada's largest research and teaching hospital. I'm your host, Christian Coté, and we're speaking with dr. Ralph da costa, award winning scientist at the Princess Margaret Cancer

Center and a pioneer in cancer imaging. Dr. Da costa's work is supported inpart by the Princess Margaret Cancer Foundation.

We like to explore with each of our researchers their origin story, what turned them on to science? And I, I understand for you it involves actuallywatching the terry fox marathon back in in 1980. Talk to us about that.

DR. RALPH DA COSTA:

yeah. You know it takes me way back to 1980, I could see him with this entourage of these very old police cars. Right. And the spinning single red lights. They don't look like that anymore today. And i was about to flip the channel and I thought, what's this all about? And it was the marathon of hope. And I could see him in these vignettes. Over the course of the year, news coverage would be in Nova Scotia and Prince Edward Island, he'd be in Toronto. He'd be in Sudbury. And, and as he made his way through the country, i would tune in to watch these. You know and my parents were like, what you just saw him what do you want to see itfor?

It's because I started to understand the real cost of cancer for the first time as a young person. And I didn't really understand anything about cancer. This was about the time when I was thinking about university and what did i want to do. And I would think, although I can't say definitively,it really helped me think through my future career. And i really started to understand that i wanted to do something to help him. Here's the really interesting thing.

The terry fox foundation was so invaluable to my own lab. It was still very early in my career as a scientist at Princess Margaret. And i remember getting a letter in the mail and I found out that I received the terry fox research foundation's new innovator grant half a million dollars you know. And I like immediately went back to 1980 and watching terry fox andto sort of come full circle with that terry fox story is a very personal and meaningful experience and we've done a tremendous amount with that money.

CHRISTIAN COTÉ:

It's terrific. You're born in dar es salaam, Tanzania, and your parents emigrated to canada when you're just six resettling in Toronto and they essentially just start over, which must have taken youknow, great courage on their part. How does that experience shape you today?

DR. RALPH DA COSTA:

Coming to Canada represented for my parents a reallybig shift and as you put it, a big risk. And it did take a tremendous amount of courage. I learned that it's really important to be focused and it's really important to remember that, as they say, no person is an island. My

Parents really sort of taught my siblings and i to really work together. And so that was not new to me. They also shared with us some of the trialsand tribulations as parents coming to a new country with us.

They didn't make it sort of you know, a tiresome complaint story. I mean, it was more like, gosh, you remember when we had to leave all our furniturebehind? And, and look, i think it was Ikea furniture way back. The you know,it's these lessons where you work together as a family to better yourselves as new Canadians. And my mom got a job really quickly and my dad also got a job very quickly and became contributing numbers to Canadian society. And we saw that work ethic, that idea of, well, there's no time to complain about it. Let's just get out there and start working onimproving the lives of our family.

CHRISTIAN COTÉ:

How do you inspire possibility in your lab with your people?

DR. RALPH DA COSTA:
There's no one answer to this, I must say, Christian, butin my experience, I think a good leader helps to create better leaders. Right. And I don't know. I think I read that somewhere a long time ago, I sort of stuck with me. Helping people learn from my mistakes. I hope you and your audience can tell I'm a very open person about these kinds of things. I try to say, look, this is my experience and here's where I did well and here's where I think I could have done better. And can you learn fromthat?

I don't see myself as their lab boss. I see myself as just one person in the team that does research. Obviously, the buck stops at my door for institutional reasons. I do enjoy being a leader of a lab and contributing to science and particularly in cancer imaging. But I think to answer your question in one way, even though it is a one phrase, that response is the following, that I want to be the leader who helps to make better futureleaders and i think that's it.

CHRISTIAN COTÉ:

what's your approach to mentorship today?

DR. RALPH DA COSTA:
In terms of mentorship. I don't always look at myself asthe only mentor to my team because I'm not the panacea of how to do things right. My experience is, i would say fairly narrow, to be quite blunt about it. It's a fairly narrow experience. And there are others in and around who i encourage my own lab mates, my trainees to really interact with. What we try to do in at least in my lab is share experiences and i can only share mine and then encourage people to look beyond. Right. And if you want to be a, academics professor, don't just take my word for it. Go and talk to Brian Wilson, a name that we spoke about earlier. Go and talk to Brad Wouters, or go and talk to Marianne Koritzinsky or others.

I mean, there's, there's an entire team of people whose experience, either individually or in concert, could really help my trainees. But in terms of mentorship, I have another area that I find very passionate, which is to encourage young people to really get excited about science. We started aprogram many years ago called the summer discovery of science program.So that grew and grew and grew. And then eventually the model we developed over years Christian, then helped to inform a more formal model that the clinician side of Princess Margaret started inside the Princess Margaret Cancer Center.

So now we became a node. I think you know, they learned from what we have done and the mistakes we made. And today it's running as a fully functional student volunteer program. The effort is to bring kids into cancer research early as young as high school. The more we do, the higher chance we have for that long-term goal of research being successful, because at some point many of us are going to retire or change careers. Butthis next generation of these cancer fighters is very important.

CHRISTIAN COTÉ:

What's your advice then to these young students whoaspire to enter the field?

DR. RALPH DA COSTA:

My message to them would be it's really ok to dream bigand it's really important that you dream big and it's also okay to make a decision to try something and change in the future. I mean, that's the benefit of time, is that you know, you have time in the future to try a different career. And one of the things I always emphasize to my students, I'm sure a lot of scientists do, a lot of mentors do this as well. Is, you know, I'm 51 years old and it's taken me a long time to get to where I am. And I've made a heck of a lot of mistakes. But you know that old saying, Christian, that if I only knew back then what I knew now, that's never been lost on me.

And these days, as part of my mentorship, at least insofar as i can do it, I try to remind students that one of the things that they have on their side when they start looking at their careers as they have time on their side and that there is time to change and evolve. And, you know, it's rare when you find someone with one idea as a young person for a career and they endup becoming that only thing in the future. Society today and the way the internet is and the exposure young people get to a diversity of different careers, I think there's a shift. Young people are understanding that there is a lot of different roles that are complementary, that they can fulfil and really help society become better.

And the earlier we teach young people, at least in my humble opinion, that it's a compound interest. Right. You start really early and the benefits and

The long term, even if you switch careers, may have profound effects insociety globally.
CHRISTIAN COTÉ:

I'm just wondering, does this ever turn off? I mean, is this24/7 this work for you?

DR. RALPH DA COSTA:

I want to help society. I found a great place to try to you know, use my skills, if you can call them that, to towards a bigger end, which is to conquer cancer. And you know, Princess Margaret in particular.It's in my dna it's in all of our dna. I really believe it.
CHRISTIAN COTÉ:

there's a saying from an author named Simon Sinek that goes, people don't buy what you do, they buy why you do it. Why do you dowhat you do ralph?

DR. RALPH DA COSTA:

It sort of goes back to that question you asked me earlier about my family and what things happened to me at an early time that shaped who i am today. I mean, if you look at, the career I've chosen Christian, you know, it's obviously a career where I'm passionate about science and technology and all of that. But I think you know, before I meetmy maker, as they say, i really want to use the life that I was given to help people. It's just that's the simplest way to put it, that want to help people who are suffering has come from my mom, my dad, my sisters, who are very passionate and compassionate people.

I mean, it's such a fulfilling thing. And I can look back in my career and I've still got many years to go hopefully I can say that I've been able to help people improve their lives, not only in cancer, but here in wound care andin other medical areas. So, it's one of those pay it forward kind of things.
CHRISTIAN COTÉ:

And finally, what's, what's next, what's on the nearhorizon for you?

DR. RALPH DA COSTA:

It's a busy time. It's going to be busy for a number of years to come. I want to see these things through to fruition on the cancer research side. I think, you know, having industry support is, is obviously very helpful to accelerate these longer-term goals and maybe pulling them up closer to near time.

So what's next?

DR. RALPH DA COSTA:
look, with my skills in research and learning the lessons I've learned and trying to make myself a better scientist overall,trying to make future leaders in canada what I think is I've settled on what I want to be when I grow up. I want to be a scientist who focuses on medical problems and cancer that I see can be translated to society and

Are scalable, will help as many people as possible and at the same time leave the world in a better place. And yeah, I think that's the t-shirt I'm wearing today.

CHRISTIAN COTÉ:

Well, Dr. Ralph da costa, award winning scientist at UHN's Princess Margaret Cancer center and Techna Institute, thank you for sharing your breakthrough with us and continued success.

DR. RALPH DA COSTA:

Christian, thank you for the opportunity to share this story with you and your listeners. I really appreciate it.

CHRISTIAN COTÉ:

Dr. Da costa's research is made possible in part thanks to generous donor support. If you'd like to contribute to this groundbreaking medical research, please go to www.thepmcf that's the pmcf.ca and click on the donate now button. For more on the podcast, go to our website www.behindthebreakthrough.ca and let us know what youthink. We'd love to hear from you. That's a wrap for this edition of behind the breakthrough, the podcast all about groundbreaking medical research and the people behind it at the university health network in Toronto, Canada's largest research and teaching hospital. I'm your host, Christian Coté. Thanks for listening.