Welcome to the Cutting Edge Health Podcast with Jane Rogers, where we discuss science to help prevent cognitive decline.

[00:00:00] Jane Rogers: I'm Jane Rogers. Welcome back to the *Cutting Edge Health Preventing Cognitive Decline Podcast*. Venki Ramakrishnan is our guest. You may recognize that name. He's a Nobel Prize winner from 2009. He and his team uncovered the structure of the ribosome. He has also written a book, *Why We Die*, because he's a molecular biologist.

He's not in the anti-aging field, but he's very close to it. From his perspective, because he doesn't have skin in the game, he doesn't have an anti-aging company, he's a really good person to talk to about all the money that's pouring into that field and whether or not the time is right for us to benefit from all of that research today. Dr. Ramakrishnan, thank you for joining us.

[00:00:49] Venki Ramakrishnan: Thank you. It's a pleasure to be here.

[00:00:51] Jane: Oh, it's a pleasure to have you on. First of all, I want to offer you my condolences at the passing of your father just three days ago, and you still kept this interview appointment. How are you doing? How's your family?

[00:01:04] Venki: I'm doing okay. I mentioned my father in my book because at the age of 97, he was still doing all his own cooking and laundry, even did a lot of shopping. He used to go on fairly long walks. When he was 93, he actually used to go on 8- to 10-mile walks a day. Three days before he died, he was making quite an elaborate meal for some guests who were coming, whom he knew from a long time ago in India. Three days before he sort of declined and then started dying.

In my book, I talk about compression of morbidity, which is the idea that you try and be as healthy as possible and have a very rapid decline. In a way, I would say he exemplified this idea of compression of morbidity. You couldn't have a more active life right till the end and then a sudden decline, which is what I think the aging research community really would like to achieve for most of us.

[00:02:14] Jane: I am so glad it happened for your dad because that's what this community is trying to achieve too. We're trying to postpone the diseases of aging: cognitive decline, cancer, heart disease. I wanted to talk with you because as a molecular biologist, you are not an anti-aging scientist. You don't have skin in the game when it comes to making a whole bunch of money, which is now flowing into the anti-aging field.

[00:02:41] Venki: That's right. I just want to say one thing and that is that I'm not very far removed from the anti-aging research field because my own field, which is about how the body makes proteins using information encoded in our genes and how that whole process is regulated and how the cell maintains quality control of that process, those are all quite central to aging.

In other words, when those processes break down, that's one of the major hallmarks of aging. There are people in my field who directly work on aging. I work on one aspect that has indirect effects, indirect influence on aging. You could think of me as somebody very, very close to the field, but not, as you say, with skin in the game. It's not like somebody who's a complete outsider coming in to survey the field.

[00:03:35] Jane: You're close. Yes. You watched your dad being able to really increase his health span and then have a very rapid decline. Is this possible today for more people than just your father, in your opinion? Is this a goal we should strive for?

[00:03:50] Venki: I think it's a goal we should strive for. My father was almost 99 when he died. The question I have is, if you improve healthspan, will you also increase lifespan? In other words, okay, in my father's case, he did decline rapidly. Even over the last 10 years, he had a number of morbidities. He had lots of aches and pains, and he was not what he was, say, when he was 92 or 93. At 93, he wasn't what he was when he was 80. There is a gradual decline, even so, even though he remained independent. The question is, how much of that can we maintain? How much of health can we maintain?

With death, it's very easy to define because you die, and that's a definition. Morbidity is less easy to define. For example, I have high blood pressure, I have high cholesterol, I'm on medication for these. I might be developing diabetes, and I might have to go on medication for that. These could be considered morbidities. I bicycle, and last year I hiked in the Grand Canyon. Is that a real morbidity, or is it something that's controlled and I'm fundamentally healthy? That's really a sort of gray area.

[00:05:13] Jane: You are taking measures, trying to be healthy as long as possible.

[00:05:19] Venki: That's right. Just to get back to your question…I'm sorry if I rambled a bit. Is it possible for everyone? The answer is I don't know. Some of it could be down to genetics. There are certainly a lot of things that we can do that will keep us healthier in old age. The thing that I'm not certain about is whether that simply postpones the inevitable decline. You still have a long period of decline, and possibly with disabilities of old age, or whether you can remain very independent and active and productive right up to the end, and then you have a very rapid decline.

I think that issue is not really solved yet. That's the goal. The goal is we're assuming that lifespan won't extend indefinitely. There are some natural limits to our biology. If we extend health, then we will compress that period. I'm not entirely sure that's true. We may actually extend our lives as well.

[00:06:23] Jane: By extending our lives, we may be extending the time when we're in a care home and needing a lot of assistance.

[00:06:29] Venki: Exactly. Because, for example, the past few decades have not resulted in shortage of this morbid period. In fact, the fraction of our lives that we spend in poor health has remained the same or even increased. People are spending more years in poor health and needing care than they did in the past. In the past, of course, you wouldn't want that compression where the moment they got sick, they would just die. You don't want that either. The question is, how can you keep somebody healthy and then have a rapid decline? That's a trickier problem.

[00:07:05] Jane: Anytime a family member passes, you look at yourself and say, "What am I doing? Am I doing enough?" You're just coming off of this period for you and your family. Are you doing any introspection and saying, "Oh, my gosh. I've been thinking about taking rapamycin. Now I think I'm going to start taking it." Is there anything that you're doing that may change?

[00:07:25] Venki: No, no. I think very little will change. I try to eat reasonably well and I get regular exercise. In fact, just before talking to you, I just came back from the gym. It's the first time I've exercised in a week because my sister and I were dealing with end-of-life care for my father last week. I try to get sleep. Then there are other things that people recommend, which is getting regular early tests for high blood pressure, diabetes, and cholesterol because those are detectable and treatable and can keep you healthy as you age. There are some other things that people can do.

They can get tests for certain kinds of cancer, which, when detected early, dramatically improve your odds. For example, skin cancer, or in the case of women, breast cancer, or prostate cancer for men, or colon cancer for both men and women. Those are all things that, if detected early, dramatically improve the odds of curing them and living on. Those are the practical things that we can do to stay healthy. Curiously, people have found that social isolation is not a good thing. It actually increases mortality and poor health. Possibly it leads to depression, which also affects our immune system.

Another interesting thing is having a sense of purpose really helps you with maintaining good health and living longer. You might think it's odd, but there's some complicated interaction between the brain and the rest of our body. I don't like to say mind-body as if the mind is something separate from the body because it's basically the brain which is part of the body. That connection between the brain and the rest of the body is quite complex. This is why suggestion we have a placebo effect for medicines. There are many ways in which that interacts, and that has consequences for our health in old age.

I should say, since you brought up my father, one thing he did was he always had a project. He would be either setting up a program in India for educating people in the life sciences or educating physicians assistants. Most recently, he started a program with one of the bigger educational missions in India where they take extremely poor children. These are really the poorest of the poor and make sure they're educated through college. These sorts of things gave him a purpose in life long after he'd retired. I think it is important for people, no matter what their age, to try to have a sense of purpose in life.

[00:10:09] Jane: I read that your father gave all of his life savings to help these young, poor people in India at this mission. This is impressive.

[00:10:16] Venki: Yes. That's true. Let's be fair, he could afford that because his daughter was willing to take care of him. [laughs]

[00:10:25] Jane: Bless her. That helps. When I think of Alzheimer's, when I think of dementia, I think of a two-pronged way of attacking this beast. Tell me if I'm right or wrong, please. I think of what you've mentioned in the lifestyle factors, making sure your blood sugar is okay, and your cholesterol, and your sex hormones, and your inflammation markers, and your Vitamin D, things like that.

If you've done that, and if you've tried to optimize most of those markers, there's just a lot of hype out there right now that says that maybe there are some other things you can do too that anti-aging scientists are very excited about. One of those is Matt Kaeberlein. He used to be with the University of Washington, and his dog aging project.

[00:11:11] Venki: Oh, yes. I actually spoke to him–

[00:11:13] Jane: Did you?

[00:11:13] Venki: –in connection with this book. He's a very interesting guy. I was actually very interested in his dog project to see if this compound rapamycin has beneficial effects on dogs because the problem with lab animals is, first of all, they're identical, often identical strains. Genetically, they might be identical. Secondly, they're in sterile environments. They're in these sterile cages. They're not exposed to the variety and all of the real-world environment that dogs are. Dogs' environments are as varied as their owners. This would be a very good experiment. I heard that there was some issue about whether it was going ahead, but I do hope it is.

[00:11:58] Jane: We were lucky enough to have Dr. Kaeberlein here on the podcast. Fascinating interview. He has seen in his early dog aging project research that yes, indeed, rapamycin, which mimics caloric restriction as you know, has really had some efficacy with dogs and postponing some of the dogs' health issues that he feels would have come on without it.

[00:12:20] Venki: Yes, I agree that rapamycin is a promising compound. I want to point out that sometimes the enthusiasm runs a little bit ahead of the science.

[00:12:30] Jane: Yes, that's why I wanted to talk to you.

[00:12:32] Venki: Yes. Rapamycin was discovered originally as a compound that kills fungi like yeast. People thought it might be used as a fungicide. Then they found out that it might have some anti-tumor properties, and they looked into it further. Then, eventually, they found that it was an immunosuppressant and that it reduced our immune response, and therefore, it was FDA-approved

as a compound given to organ transplant recipients so that they don't reject the graft, the foreign organ. For an organ transplant recipient, there's absolutely no question that rapamycin is going to be very beneficial.

If you take a healthy person and then say, you should take rapamycin, rapamycin is an immunosuppressant. It's going to make you more prone to infections. There are actually studies that show that. It has other side effects. For example, because it reduces or inhibits overall protein synthesis, the same thing that causes suppression of the immune system also suppresses general protein synthesis. That means it affects wound healing. Now, if you're an old person, you really do need wound healing not to be affected, for example. Then it has a number of other side effects.

If you ask the people who are enthusiastic about rapamycin, and there are many, including Matt, I should say they will say the following. They will say, "Okay, if you give it at high doses, the high doses that you have to give to organ transplant recipients, then it has these problems. Maybe you can adjust the dose downward so that it has some of the anti-aging benefits without these side effects that are unhealthful." That's a possibility. The other thing that they might say is that "maybe rapamycin itself has these problems, but maybe they're analogs of rapamycin."

People call them rapalogs. These are chemicals that are similar to rapamycin, but slightly different. Some of them, they hope, will have the beneficial properties without the downside. There's a lot of work going on in the area, but I would say you need to wait–

[00:14:52] Jane: Jury's out.

[00:14:53] Venki: –for the clinical trials. I would say you should wait till the dog trial is done because that's a real-world experiment, and see, is it working well, do the dogs get infections, do they die of other things because of problems. The initial results may be promising, but remember, you're thinking of taking it for 10, 20 years, not for one year or two years, let alone months. It's not like an antibiotic where you're taking it for a couple of weeks. I think it's very promising. It's one of the things that, in my book, I say is a promising area, but it needs all of this careful study.

This leads me to two things about the anti-aging field. One is that people often feel they're in a hurry because they're aging, and they don't want to age. Very often, they're not willing to wait for clinical trials, which take a long time. The other problem is that if you're dying of cancer, you will take quite nasty compounds, compounds that normally would be very toxic because the alternative is you'll die.

If you're talking about anti-aging, something to keep you healthier for longer, you're not going to put up with lots of side effects and toxicity and so on, in the hope that 20 years later, maybe you'll be a little healthier or you'll live longer. I think the bar for anti-aging medicines is higher than something truly immediately life-threatening.

[00:16:29] Jane: It's hard to have in science a crystal ball. What do you think some of the things that the anti-aging community is excited about and pursuing now? When do you think those will really come of age and be, "Oh, my gosh, that is something that is helpful? We know that." Ten years, 20 years?

[00:16:45] Venki: I'm hopeful that it could be in the next 10 years. By which I mean some of the more promising ones, where there are already a lot of plausible mechanisms. There's a lot of data in animals. There are even some early data in humans. I think those, I would say, could happen in the next 10 years or so. If you're talking about prolonging life significantly, there are people who think we should all live to be 150, or even some people say, hundreds of years.

The hundreds of years, I think, is a bit of a pipe dream, in my opinion. Let's say 150, considering that the oldest person to have ever lived was 122, at least on record. I think that's a bit of a stretch, and it'll take real breakthroughs in anti-aging to do that. In terms of keeping us healthy for longer by attacking aging, that I think is more likely to happen sooner.

[00:17:49] Jane: Speaking of that 122-year-old from France…

[00:17:52] Venki: Yes.

[00:17:53] Jane: I understand that after lunch, she would have a glass of port. She would smoke–

[00:17:57] Venki: A cigarette.

[00:17:57] Jane: –one cigarette. Then every week, she had 2.2 pounds of chocolate.

[00:18:02] Venki: About a kilo of chocolate a week.

[00:18:04] Jane: That's a lot of chocolate. That's a lot.

[00:18:07] Venki: As a chocoholic, that's one of my weaknesses. I can relate to that. [laughs]

[00:18:11] Jane: Me too. I can relate. When I read that, I went, "Oh, yes. Yes."

[00:18:15] Venki: Considering that the other things were really terrible, and probably, who knows, she might have lived even longer if she hadn't smoked, or had a glass of port or whiskey every day. I have no idea.

[00:18:29] Jane: It's just a funny story.

[00:18:30] Venki: Yes, it's a funny story.

[00:18:32] Jane: We're trying so hard with our lifestyle, and then she's doing the port and the cigarettes.

[00:18:36] Venki: Yes. I think what it shows is we can learn quite a bit from centenarians, but we shouldn't completely take it as gospel because a lot of centenarians have simply survived by luck. They were lucky in that they didn't get cancer, or an accident, or a life-threatening infection. The unlucky ones died, so we don't know about them, who had exactly the same genetics and lifestyle, but under normal circumstances, they just died. Whereas these are the ones who were lucky enough to survive. That's also a possibility. We shouldn't take their lifestyle as gospel, or even their genetics, I would say.

[00:19:16] Jane: Smart. Very smart. Now you said there are a lot of things that are promising, that are on the horizon within the anti-aging scientific community. We know about the hallmarks of aging, and that has been updated to include a few more of them. When you look out there, what are some of the promising therapies, like senolytics, or…?

[00:19:34] Venki: Yes. Let's start with the caloric restriction drugs. You mentioned rapamycin, that's one of them. There are others that affect the other pathways affected in some way by caloric restriction. Those are ones that I think might be useful. There's some idea that metformin falls into this class, but whether metformin actually extends life or not is somewhat debated. There's evidence both for and against it. Again, it's one of these things where if you're diabetic, there's no question, you should take metformin. If you're a healthy person, whether you should take it or not is completely an open question and people need more data.

[00:20:16] Jane: The TAME study is going to help to find that for us when that comes out in a couple years.

[00:20:20] Venki: It is. Yes. I don't know the status of it. I tried to find out but I haven't been able to find out its current status.

[00:20:27] Jane: I think a couple years out before we know anything.

[00:20:30] Venki: Yes. That's one thing. The other is the senolytics which you mentioned, which is when cells undergo stress, for example, DNA damage or viral infection or other kinds of stress, they can often do one of two things. They can kill themselves in a sort of suicide of the cell or they can send the cell into a state called senescence. In this senescence, what happens is the cells don't divide. They're not really functional in the normal sense but they also secrete a lot of inflammatory compounds. Now why would the body do that? In the case of DNA damage, DNA damage is a cancer risk.

It's in the body's interest to get rid of it or if a cell is infected by viruses, it's a risk to the body. This is the way for the body to say, "Look, there's a problem at this site. Come here and get rid of this cell and repair the tissue around it." They have a real purpose early in life. As we get older, more and more things happen that cause more and more senescent cells to build up. At the same time, our ability to get rid of the senescent cells also declines with age. Our immune system doesn't work as well and all of these responders don't work as well.

You get this buildup of senescent cells which cause inflammation. Inflammation then causes more aging and more stress and more senescence. It's almost…you get this vicious feedback loop in a way. That's why inflammation is considered one of the real problems with aging. Many anti-aging therapies are aimed at reducing inflammation. One idea is that if we can somehow target senescent cells and kill them as we age, then maybe we'll improve some of the aspects of aging.

That has been shown in mice successfully. The question though is, how do you then do it in humans in a safe way? Because you want to give drugs that don't affect our normal cells. They only target senescent cells. They have no toxic side effects. There are a lot of things that have to be worked out before it's ready for people to take as a routine medicine. I consider that a rather promising area.

[00:22:59] Jane: Right now, even though you read about you should take Dasatinib and Quercetin or–I don't say this right usually–Fisetin, those specifically target senescent cells, zombie cells, but they may be targeting other things and we shouldn't be taking those quite yet. Science is not quite there is what you believe.

[00:23:20] Venki: I'm a big believer in control trials where you have a control group and an experimental group. Then you see over a period of time, first of all, is it harming in any way, is it toxic, are there side effects? Then, is it helping? Is it actually helping with the condition? The third is, are there any long-term side effects? You will also have to do some long-term studies. I think that those are things that need to be done. One problem with the anti-aging field is clinical trials can take very long if you use the normal procedure which is you have to wait until they age, and actually the ultimate measure is how long do they actually live.

You have to wait till they die and that could take 20 years. That's very expensive. No company really can afford 20-year clinical trials for a product that may or may not work out. There's an idea that maybe we can use markers of aging instead of actually waiting for the end. We can actually look at things like DNA methylation or glycosylation, which is the adding sugar groups to proteins. All these things increase with age. There are these biological markers of age.

You could ask, does your treatment slow down or even possibly reverse some of these markers? That you could probably measure in a shorter time. The community then has to agree on what is a good set of markers. Currently, people using different markers, each one of them advocates their own–

[00:24:59] Jane: Mine is best. Yes.

[00:25:01] Venki: –particular biological clock and they'll charge you $600 or so to tell you your biological age. I would say all our organs age at different rates. A single number for biological age is almost meaningless. Also, if you know your biological age, what does it mean? What are you going to do with it? I'm a bit of a skeptic about these tests. I think, as a research tool, these markers are very useful and quite interesting. That's the thing about senolytic drugs. There's one other area

which is, as we get older, we lose the ability to make many of the compounds that we need in the body, which facilitate many of the reactions.

When I say lose the ability, we don't lose them completely, but it declines. There's a lot of interest around one particular molecule called NAD, which is involved in energy metabolism, but it's involved in lots of other things. The levels of NAD decline by about 40% as we age compared to when we were younger. The idea is that can we supplement our diet with NAD, but NAD has problems just taking it as it is. What seems to have worked best are some of precursors of NAD-

[00:26:18] Jane: Like NMN and–

[00:26:19] Venki: –like NMN and NR. Each of the advocates claim that theirs is the best, but again, I'm not sure what the data are about them. These compounds have shown some benefits in animals. For example, they slow down the loss of stem cells, which are cells involved in regenerating all our tissues, including our immune system. They're extremely important. Apparently, they slow down the loss of stem cells. They also slow down the loss of muscle. They have a number of beneficial effects as judged in animals. What I don't think they do is extend life very much, which may be okay because that's what we want. We want healthy life, not necessarily to extend life.

[00:27:02] Jane: Ideally.

[00:27:03] Venki: Again, I would say we need to understand what is the dose we need, what are long-term side effects, what is optimal. I think all those things need some careful studies, but it hasn't prevented these two compounds from being that $300 million a year market, soon expected to be over a billion in just a few years. Again, as I told you, that's the rush that people have with aging. One thing about these compounds is many of these are found in food, so they're not regulated by the FDA.

They don't need FDA approval or clinical trials, and people simply go ahead. Many of the trials are done by the companies themselves, which is okay because that's how many drugs are also done by the companies that are going to market them. I would say they need something more of the trials that we use for medicines, which is properly registered trials that people can look at.

[00:28:01] Jane: Does it sometimes bother you? I think you're 71, right?

[00:28:04] Venki: 72.

[00:28:05] Jane: Oh, you just had a birthday. This is all coming quickly. We see it out ahead of us. We need the trials. We see it maybe 10 years out, or we'll have the clinical, the research evidence. You're 72, and so you're wanting to get on with it because this is the time in your life that it's important. Is it hard to wait? Do you just wish you were 62?

[00:28:26] Venki: Oh, I can see the psychology. I completely see the psychology. Let's just say I haven't reached that mental state where I'm desperate enough to want to take it yet. I don't blame people for wanting to try things. I just think that if we're going to help humans as a whole, then we do need proper trials. Just these random things of people just popping it without any control, it's not going to help science along.

I'll give you a real example from the COVID pandemic. In some ways, Britain of course invented randomized clinical trials, so they're very fond of the idea. There was an idea whether dexamethasone, a steroid, would actually help COVID patients. The initial indications were that it would, but they very deliberately did a trial where half the people did not get dexamethasone and half the people did. Now you might think this is a bit cruel because what about the poor people who didn't get it?

[00:29:30] Jane: Was beneficial.

[00:29:31] Venki: It was the only way to establish that it actually had a benefit. That in turn benefited lots of people afterwards because they knew then that it did work. Otherwise, you just wouldn't know.

[00:29:44] Jane: Yes. One of the other promising things on the horizon that I've heard you talk about are stem cells.

[00:29:50] Venki: Yes. That's a very interesting and also extremely challenging area. When we start off, we start off with a fertilized egg. A fertilized egg has in it the ability to develop into any kind of cell in the body. As it develops in the early stages, any one of those cells in the early embryo can develop into anything–skin, hair, nervous system, blood, anything. As it develops further, the stem cells themselves start to specialize. The early cells are called pluripotent stem cells. The pluripotent means they can do anything. The later stem cells are specialized.

Some stem cells will only form cells of the blood system, but that’s a lot of different types of cells, like all of the cells of the immune system, our red blood cells, and so on. Other stem cells will form only skin and hair, but they won't form the nervous system. Others will form all cells of the nervous system. There's more specialization of these stem cells. Now, all our tissues are being replaced constantly. That's why when you get a bruise, your skin heals over. You can replace your blood. You can donate blood and your body replaces it. Your immune system is constantly producing new cells.

For all of that, you need stem cells because that's what's doing the regeneration. Now, as we get older, the stem cells also suffer from senescence and you get a depletion of stem cells. That has a double whammy because not only are they being depleted, but then we're losing the ability to regenerate tissues, our immune system, and even some tissues which are very slowly replaced, like heart tissue or the nervous system, very slowly replaced.

Even there, it is an issue. The question is, could we regenerate stem cells as we get older and how would you do that? Because this means you're trying to move the arrow of time backwards. This idea came about because a scientist named Yamanaka showed that you could take fully developed cells, like skin cells or muscle cells, and with the help of these factors, push them backwards in development so they could become like stem cells. In fact, you could push them all the way back to pluripotent stem cells.

[00:32:11] Jane: Then there are cancer risks.

[00:32:13] Venki: Then there are cancer risks. If you take induced pluripotent stem cells and try to regenerate tissue, you can do it. People are still working out how to make it safe because in many of the early trials, you would get tumors and so on. The idea is maybe you can take these fully differentiated cells and push them backwards just a little bit in development. Not all the way back, but just a little bit. Enough to generate specialized stem cells or even just reverse this effective biological age of these cells. People have done that in mice. Initially, they did it in mice which are genetically predisposed to age prematurely.

[00:32:52] Jane: Quickly.

[00:32:54] Venki: They're called progeric mice. Then they also did it in normal mice. I have to say I was fairly astonished to read these papers to see the effect. They actually were able to improve a number of measures of health in these older mice by this so-called reprogramming. I think that's a very exciting area. Again, you would have to ask how would they deliver it to people. For example, with mice, they either use genetically modified mice. These are mice into which these genes for these factors have been introduced. You wouldn't want to do that to humans and also the cost of that would be enormous.

The other way of introducing it is through these viral vectors. These are viruses that have been essentially disabled, but they can carry whatever genes you want to introduce into cells. Doing this in a way that's really effective in humans and sustainable over the long term, I think, will require a lot of work. I would put this in the area of very exciting and promising technology, but perhaps not quite so immediate as say something like a rapamycin analog or possibly compounds that will kill senescent cells. That's my opinion, and of course, the future is the one thing, as Yogi Berra said, the future is always hard to predict. I have no idea which of these will pan out first. I'm just giving you my own guess.

[00:34:21] Jane: I appreciate that very much. Before we close, personally, what are you most proud of in your long career?

[00:34:28] Venki: I think what I'm most proud of is when things didn't work out, I kept giving myself second, third, fourth chances. I started off life as a physics student and that didn't work out, so I changed to biology, but I was using a technique that wasn't that useful so I went off and learned

new techniques. The idea that you can fail, but then you can try and recover, I think that's probably what I'm most proud of.

The other, I suppose, is that I've not been afraid to ask for help. Lots of people have helped me at very key points, even with scientific ideas, with reagents. You can't be too proud or arrogant to ask for help. I think those are two things that really helped me. Other than that, I would say I also had quite a lot of luck in my career, but I think many people do and then many of them forget the luck part when they rewrite their history. I try not to forget. Yes.

[00:35:29] Jane: You remember it. What was it like for you to win the Nobel Prize in 2009 in chemistry?

[00:35:35] Venki: It was quite a surprise, not because the ribosome structure was unimportant. Many people felt that it was a Nobel-worthy field and that there might be a prize for it one day. There were a number of players in the field, and I didn't think I would make it to the three that get chosen because there's a limit of three people. It's when the music stops, do you have one of the three chairs to sit on? It's a bit like that. I'd also gotten into a very vigorous scientific disagreement with a Swedish scientist who later on became a member of the Nobel Committee for Chemistry.

[00:36:12] Jane: Oops.

[00:36:12] Venki: As soon as I heard that, I just immediately felt that I didn't have a shot at it at all. Actually, it was a big relief because then you don't worry about it. You just know you're not going to get it and so you just move on with life and do experiments and keep moving science forward instead of fretting about whether you're going to be one of the people chosen and so on. I thought it was a blessing in disguise. It also shows this guy had tremendous integrity–

[00:36:38] Jane: I was thinking that.

[00:36:39] Venki: –because he wouldn't even have to say anything terrible. He could just say, "Oh, yes, this Ramakrishnan guy is pretty good but he's not quite up to the mark with these other people." That's all he would have to say and it would have sunk me. It just shows you some people put aside their personal differences and look at the bigger picture. I do admire him for that.

[00:37:00] Jane: Have you been surprised at how people treat you after you won the award?

[00:37:04] Venki: Yes. It has a real risk. In my book *Gene Machine*, which is a memoir about the race for the structure of the ribosome, I described two diseases. One is called pre-nobelitis. It's when you think or you delude yourself that you've done something that could get a Nobel Prize and then you start campaigning and fretting about it and every October you have this fever and then disappointment and then the cycle starts again. That's pre-nobelitis. Post-nobelitis is a disease where once you've won the Nobel Prize, the public doesn't realize it's done for doing an important piece of work.

That could have happened by luck. It could have happened because you had great resources and were persistent or it could have happened because you were really smart. There are all three. Shakespeare said some are born great, some achieve greatness, and some have greatness thrust upon them. The same thing could apply to Nobel Prizes. It doesn't mean that because you have a Nobel Prize you're very smart. You may be, you may not be.

[00:38:06] Jane: You may just be really lucky.

[00:38:08] Venki: You may be very lucky. All you know is that you'd contributed some important advance to science. The public though doesn't realize that because people like Einstein and Linus Pauling and all these guys won the Nobel Prize that somehow you get associated with that. They suddenly start asking for your views on all kinds of things and inviting you to all sorts of meetings and you have to be very disciplined really to not let that affect you and pick and choose what you want to do.

You can also do a lot of good. As a Nobel Laureate, you have credibility so you can do a lot of good for science. In my case, for example, I was president of the Royal Society which is the voice of science in Britain so it affects public policy for science. I think there's a lot you can do to benefit science. You can also do public engagement. One way I do that is by writing books about topics I think are important. There's an opportunity there as well.

[00:39:07] Jane: Thank you. Is there anything else you would like to add?

[00:39:10] Venki: No. It's been a pleasure. Thank you for having me.

[00:39:12] Jane: It really has been a pleasure. Thank you for your time.

[00:39:15] Venki: Thank you.

[00:39:18] Jane: You've been listening to the *Cutting Edge Health Preventing Cognitive Decline Podcast*. Any information shared here is for educational purposes only. Guest opinions are their own. This podcast is not responsible for the veracity of their statements. Do not use any of this information without first talking to your doctor. Cutting Edge Health LLC is not responsible for what may happen to you if you use their information in place of official advice from a medical professional. Thanks for listening. Be well.

[00:39:57] [END OF AUDIO]

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