Expanding Your Health Span with Dr. Benjamin Miller

Air Date: June 29, 2025

Guest: Benjamin Miller

Resources: Miller, Benjamin Oklahoma Medical Research Foundastion

Dr. Benjamin Miller: 0:29
So think about later in life, you get a higher incidence of diabetes, heart disease, stroke, cancer. Age is actually the number one risk factor for all of those things more than smoking what you eat, whatever. How old you are is the risk factor for all those diseases. We've prolonged the period that we can live with those things. What we're trying to do in the field now is extend the period spent in good health rather than periods spent with disease that we're managing.

Don Drew: 0:58
Welcome all to Peaceful Life Radio. That was Dr. Benjamin Miller, and today we're exploring current research on increasing your health span. I'm Don Drew and my co-host, David Lowry, is taking the week off to enjoy sunny Florida. So let's jump right in. Dr. Benjamin Miller received his PhD in integrative biology from the University of California Berkeley and is currently the GT Blankenship Chair in Aging Research and Program Chair of the Aging and Metabolism Research Program at the Oklahoma Medical Research Foundation. Dr. Miller's dedication to research allows us to get a better understanding of the changes that occur in our bodies as we age. Particularly the role that protein plays in these changes. By advancing our understanding of aging, he is contributing to the broader goal of improving our health span, the period of life spent in good health. Through his research, Dr. Miller is helping to pave the way for a future where we can all enjoy prolonged periods of vitality and wellbeing. Dr. Miller, welcome to Peaceful Life Radio.

Dr. Benjamin Miller: 1:56
Thank you for having me.

Don Drew: 1:57
Dr. Miller, can you give us some ideas about what got you interested in aging in the first place? I mean, we all have to face it at some point in our lives if we live long enough. But why did you pick that as an area to investigate?

Dr. Benjamin Miller: 2:10
Good question. My research originally started in muscle, specifically how to make muscle grow. But I found the preventing of muscle shrinking, which is the opposite of growth,

and they're not just the reverse of each other, really interesting problem. How do we maintain what we have with age? That led to other questions of aging, not directly related to muscle, what is basically happening within a cell that causes this breakdown over time. And I find aging a fascinating question because like you said, it happens to everybody. We don't know how to prevent it from happening yet. So it's an unanswered question, which is always a more interesting question to me. And it's just become a fascinating area. I think we're also on the cusp right now, the aging field of doing some truly fantastic things. Aging used to be this sort of cultish fringe type science with fountains of youth and potions and whatever that will reverse the aging process. And it's really emerged out of that to become a real hardcore science that we actually call gero-science now. So, the word gerontology is derive from age, so gero-science. And this extension of health span has become a really tangible goal that I think we're gonna make some really big differences in the upcoming years. And I'll go a little bit further on that and tell you why that's so important. So you've probably noticed that as people get older, the number of people with diabetes, cancer, Alzheimer's, heart disease, and so on, all the things that kill us, those things accumulate with age. Age is actually the number one risk factor for all of those things. By far more than smoking what you eat, whatever, it's how old you are is the risk factor for all those diseases, the most important risk factor. So if we could slow that aging process, we're simultaneously slowing the onset of all of those diseases. So that's why I think studying aging is super important and a super interesting question is to be able to not just whack-a-mole and treat one condition at a time, but to simultaneously prevent the onset or treat all of those diseases at the same time.

Don Drew: 4:32

Dr. Miller. I've been reading about your work and it involves mitochondria in cells, various proteins, and a better understanding of how central they are to the aging process. Can you provide an overview of the biological fundamentals of your work?

Dr. Benjamin Miller: 4:45

Sure. So we have two main areas in the lab. One is just the basic biology of aging what fundamentally causes us to age and deteriorate with age. It seems like we should have systems in place for keeping the cells and tissues from breaking down, but eventually that occurs and it occurs in everybody. So we study why that happens and how it happens. The second areas we focus particularly on muscle. We know that muscle's important to keep us mobile and independent, but it also is an important metabolic contributor to health and wellbeing because it uses a lot of energy. It's a sink for certain energy sources, by sync, I mean it uses them or it stores them. So it has a lot of important functions for keeping us independent. So those are the two main areas. But if I go a little more specific, we study mitochondria. As you mentioned, most people are taught in grade school or

high school, that these are the powerhouses of the cell. They're what produce energy. The way I like to provide an analogy here is that we're familiar with a car engine or internal combustion engine where you have oxygen. You have a fuel in the form of gasoline and the engine makes work out of that. And it generates work and it also dissipates some excess as heat. Okay. So that's an inefficient transfer. So I think cars are something like 30 to 40% efficient of harnessing all energy that is present in petroleum. But in our body, what we do is we take in foods and those foods have chemical bonds that have energy in them. And when we get to the point of the mitochondria, we essentially combust it. It's not exact perfect analogy, but we use those things derived from foods to make energy. And just like an engine, we lose some of that as waste, as heat. That's part of what keeps our body warm. But that energy we generate keeps all cells, keep all tissues, keep the whole body functioning in a normal way. And if you think about all the things that UV light or all these things that could cause damage to us during a day long process every day, we have to repair those things that all cost energy. We have to move things around our body that cost energy. And we don't have an infinite amount of energy. So we have to make decisions on where to use that energy and where not to use that energy. And we sort of study all of that to find out why there's a failure in the ability to repair over time. That might come from a lack of having enough energy.

Don Drew: 7:22

Very good. So most of us have probably heard that Americans possess a life expectancy of around 78 years at birth, and your research aims to increase what you term the health span. Will your research allow me to live longer?

Dr. Benjamin Miller: 7:34

The term health span is this concept that people that are interested in the science of aging did not see a huge value in increasing lifespan without increasing the period of good health. Okay, so in the 20th century we were very good at extending the maximal expected lifespan. But what we've done is manage diseases better so that we are actually extending the period spent with disease. So think about later in life, you get a higher incidence of diabetes, heart disease, stroke, cancer. We've prolonged the period that we can live with those things. What we're trying to do in the field now is extend the period spent in good health rather than periods spent with disease that we're managing. So that term for that is health span. I would say that we've made significant progress in that area. But what you may note is that there's not a drug out there for health span yet. And that's something the field is working towards. We know of some things that do promote longer health span, things like exercise. But as we have found over and over getting a hundred percent of people to be physically active in exercises hasn't worked very well.

Don Drew: 8:47

Is it fair to say that this is a two-pronged approach that you're taking looking at both biology and the value of exercise?

Dr. Benjamin Miller: 8:55
Yeah. in the case of exercise, it's something that we know works and we don't completely understand how it works or why it works. So we study how it works but we also use exercise as a benchmark for other sort of therapeutics and drugs and stuff that we're trying to develop to increase health span. My catchphrase for this is that all the drugs that we're working with are trying to be as good as exercise. We know exercise works, but we don't exactly know how, so we can't just turn that into a pill. Anybody that tells you that they have exercise in a pill that's false advertising. It just, it's not possible yet. So we're trying to find multiple different ways to approach this question of health span and extending it.

Don Drew: 9:38
You're presently conducting an anti-aging study, if I can use that term. What is that about?

Dr. Benjamin Miller: 9:43
We have two studies and let me cover both of those real quickly. So the one that is wrapping up. We had 101 subjects come through this study and it was testing the effects of metformin. Many of your listeners will know metformin and a lot of'em may be on it'cause it's one of the most prescribed drugs in America for type two diabetes. So there was some evidence that metformin might actually trigger processes in the cells globally throughout your body that may slow that aging process. Okay? So there was some evidence for that. We had evidence that it might work for some people and it might not work for others. So that study was about testing what we say, the context specificity of metformin. Who is it good for and who is it not good for? Turns out we don't think it's the right thing for everybody. If you're metabolically unhealthy, I think it's a very good thing. But if you're already healthy, it's probably not the right treatment for you. So that's one study and we're in sort of the analysis phase of that study. The one we're starting up now is a funded study looking at exercise in a different way. So if you put a hundred people on an exercise training program, say 40 of'em will have really positive benefits for it and 40 might not have much of a benefit from the exercise and maybe 20 fall somewhere in the middle there. So not everybody responds to exercise the same, and some people don't seem to get much of a benefit at all. So we're testing in older subjects, what is it that causes that heterogeneity of response to exercise? Could we predict who's not gonna respond? And if we could predict who's not gonna respond, what could we do to make sure that they do respond? So there's two goals for that study. Be able to predict who's

gonna respond and who won't respond. And the second goal for those that don't respond, how can we make it or tailor things so that they do respond? And this is a very simplistic version of that study. I mean, we're getting into the cellular pathways, molecular pathways, and so on. But that's the general idea.

Don Drew: 11:51
Okay. Help us understand, a little better this link between exercise and improvement at the molecular level.

Dr. Benjamin Miller: 11:57
Yeah, so a simple analogy here would be if you had a house that you did regular maintenance on, kept it up, painted it every couple years, replaced gutters, do things as you go, that house 20 years from now is gonna look largely like it did when you built the house. If you ignore the house and don't put any maintenance into it, then it falls apart over time. And that's the same thing in our body. When you do things like exercise, you trigger pathways and cells that rebuild and break down proteins. Proteins just accumulate damage over time, just like something exposed to the elements is gonna accumulate damage over time. One of the main things in cells and we talk about mitochondria, are these things called reactive oxygen species. They're a natural byproduct or free radical, some people know'em as, that can cause damage and they're just a natural byproduct of our mitochondrial working. But by doing things like exercise we can trigger those repair processes that keep the cells looking young. It's triggers the cellular pathways that are like regular maintenance to a house. That's a very simplified version of these biochemical pathways.

Don Drew: 13:10
So you're recruiting people now for this study, correct?

Dr. Benjamin Miller: 13:13
We are. So, this is a two site study funded by the National Institutes on Aging, which is in the National Institutes of Health, NIH. We have two sites, one here, and one at a Research institute in Florida. We are seeking to recruit 70 people here at OMRF. And these people undergo 15 weeks of supervised exercise training. So it's like having a personal trainer.'cause we have controlled exercise programs that people will go through. And then at the end of that 16 weeks, if we find that people are fall into this category of that they respond to exercise, or they don't respond to exercise will determine what happens then for a second phase of the study. If they don't respond, then we do some things that hopefully will make them respond.

Don Drew: 13:59

The participants have to meet certain qualifications, correct?

Dr. Benjamin Miller: 14:02
Yeah, we're looking for people over 60 and we're looking for people that don't have major health conditions currently ongoing. There's some people that may have treated a health condition in the past and would still qualify. There are certain drugs that we exclude, such as Metformin, the one I mentioned before. And we watch out for things like dosing of statins. Some people on statins will qualify, some will not. If we didn't allow anybody in with statins, then we might not have anybody in our study. So we have to be practical, but also screen out some things that could cause major differences by themselves.

Don Drew: 14:39
So if somebody's on Metformin, then they would not qualify.

Dr. Benjamin Miller: 14:43
Correct. Yeah.

Don Drew: 14:43
If our listeners was interested in participating in this study, what specifically would they need to do? Where do they go to connect?

Dr. Benjamin Miller: 14:51
They would go to the OMRF webpage, Oklahoma Medical Research Foundation, and there's a link on the page for participants interested in studies or they can directly contact me if you're able to leave some information in the notes for the show, but we could leave some contact information there for any listener interested in being involved in the study. And it starts with a simple online screening. And then maybe half our people will screen out just from that. But then you go to the next step of screening, which is, in person. And then we walk you through this process.

Don Drew: 15:24
Many of our listeners may be outside Oklahoma area and may not meet the criteria for your particular study, but are interested in participating in aging studies like yours. How might they go about finding medically overseen research studies in their area of the country?

Dr. Benjamin Miller: 15:38
So there's a central database called clinical trials.gov. That's clinical trials, one word.gov. And for any sort of research study that you might be interested in, you can do search

terms, area terms whatever else, and it'll bring up all funded clinical trials on that topic in your area where you live. For example, my father had pancreatic cancer or has a pancreatic cancer. So I immediately went to that website to see what ongoing clinical trials there were for treatments for pancreatic cancer. It's a nice resource.

Don Drew: 16:09
It's a resource anybody could use really to look up clinical trials no matter what medical condition you're looking at.

Dr. Benjamin Miller: 16:16
Absolutely. But also I encourage people to be active and seek out what their local communities have. As far as information about, my area of interest aging. There's a lot of aging resource centers within most cities as well. But the research, the actual research you wanna seek out through these, clinical trials.gov.

Don Drew: 16:35
We've talked about the science here and about exercise and a number of issues related to your studies. But what are some of the things that people can do right now that could help expand their own health span? Okay, that could help us live healthier during our life besides do more exercise, eat better, and that sort of thing, is there anything that you can think of that would be useful?

Dr. Benjamin Miller: 16:57
So that's, that's funny. Because what we've narrowed on are things that are kind of obvious. Okay. So there's exercise, nutrition, and we're not, when we say nutrition, we're not saying like a fancy diet of some sort. It's just the absence of eating a bad diet. Eating a whole nutritionist foods and things like that. Sleep has emerged as another key factor. That's not my area ex expertise, but it's an important one. And social engagement has emerged as an important factor too. These are the basics. What we're doing as scientists for the people that cannot exercise, is there something that we can substitute that has some of those same effects? And this is where we get into therapeutics or drugs and we talked a little already about Metformin. Everybody knows someone that's on a GLP one agonist right now, so that's getting some traction in the aging space. There's a drug called rapamycin, and for anybody in your audience who really pays attention to aging research, this one will be top on their list. This is a drug that was originally used as if someone was getting a liver transplant or something, they would get this drug because it suppresses the immune system so you don't reject that organ. But it's turned out to be a very powerful reproducible treatment to slow the aging process. In mice, for example, we can make'em live 30% longer in better health. Rapamycin is one that's starting to be taken

into humans in some forms of dosing trials. Some might have heard of Senolytics. Senescent cells are what we, people refer to as zombie cells. They're a somewhat dead, somewhat alive cell that functions like a rotten apple and spoils everything around it. And then there's a class of drugs that will go in and selectively kill those cells to keep them from spoiling the runs around them. So there's clinical trials for Senolytics right now, too. The important thing with all these drugs is that right now we're getting closer to this, but as of right now, if you go to the FDA to try to get a drug approved. So if I brought a drug to the FDA to say, treat blood pressure, we measure blood pressure and we know if it brings blood pressure down, it's working. We don't have a measurement of slowing the aging process. That's something that's really hard. I mean, you have a calendar to show someone's age, but that's not necessarily their biological age. So what do we measure for that? So if we go to the FDA to propose a drug for aging, right now, we don't have the framework to be able to say, yes, this drug is working for slowing the aging process. And that's a main hindrance for bringing a drug to market for aging. But many in the field are in the process of changing that, and I don't think we're that far off from bringing clinical trials of different drug treatments to slow the aging process.

Don Drew: 19:54
Dr. Miller, I happen to know that you're a cyclist. You love to exercise in that way and I'm sure you probably do other things as well. I've been reading a lot about the importance of strength training lately, and totally anecdotal, but in my own case, I've been doing more strength training lately and it's improved balance and it's helped me in a lot of positive ways. When we use the term exercise, are there some exercises that you suspect might be really excellent exercises for people that are in the second half of life?

Dr. Benjamin Miller: 20:23
So I'll start with a lot less exciting answer probably than you're hoping for. The thing is, the majority of benefits from exercise comes from not doing anything to just doing something. Okay. To get people physically active. We don't even have to call it exercise. Just physically active can have a lot of the major benefits of so-called exercise. And as you have people that exercise frequently or regularly, adding more exercise on top of that has diminishing benefits. It's just going from doing nothing to doing something. And that's not glamorous, but it's effective. Okay. Then once you get to that point, you do wanna have a mix of what we call both strength training and aerobic exercise training. So the cycling and running and walking are all aerobic exercises they're endurance type exercises. But it's a nice to have a balance of both strength and endurance training'cause they have different benefits. So strength obviously is gonna work on things like muscle size and balance and other things where endurance actually targets the mitochondria that I'm so interested in. Either one of them can be beneficial. Doing both of'em is

recommended to have well-balanced benefits. I don't wanna go too long on this, but if you do strength training or you do aerobic exercise training, it's not just about what it's doing, say to that particular muscle. When your muscle gets stimulated by exercise, it releases all kinds of things into the blood. And those things that it releases into the blood travel to other places in your body. One of the places that travels is the brain. So exercise is not really directly stimulating your brain in a way like solving a puzzle would, but it has benefits there. It's no mystery that physical activity leads to brain health'cause these things are all connected. So it's not just the direct benefit it has, it has all kinds of peripheral tangential benefits when you do exercise, no matter what kind of exercise you're doing.

Don Drew: 22:27
What else are you working on and what's the next big thing for you?

Dr. Benjamin Miller: 22:31
Another area of the lab that I think it might be interesting to some people is that, if you've ever watched someone go into the hospital and they're in a bed for five, seven days, young people come out of the hospital and rebound pretty quickly from that. But the older person comes out of that never quite the same again. Okay. Never quite back to full strength. And that's something that we study'cause it's a significant health problem. How to recover from this period of disuse like hospitalization to regain strength and function to what you were before you went in. That's a significant health concern. And we get funding from the VA, the Veterans Association, to study that'cause it's a problem for veterans too. And that's an area that's taken up a lot of focus in our lab right now. So this isn't a question of health span directly, but it's a question of muscular health after a period of insult of some sort.

Don Drew: 23:25
I know you're the immediate past president of the American Association on Aging. So I'm sure you've heard about a lot of really interesting studies that are happening. So is there anything that just really like tickles your own imagination?

Dr. Benjamin Miller: 23:36
Well. There's so much going on in the aging area right now, and it was nice to be president of the society for a year and we just got done with our annual meeting and you see what's going on in the area and, you see all the young scientists with their new ideas. I guess the one thing, about science that's so important right now, including the work we do, is how do we continue to do this work in a productive way? Science in the United

States is under threat right now. It's threatened. There's large scale cuts to the ability to do this kind of science. I actually worry most about the young scientists coming up.

Don Drew: 24:13

Dr. Benjamin Miller, Chair of the Aging and Metabolism Research Program at the Oklahoma Medical Research Foundation, past President of the American Association on Aging and so much more. Dr. Miller, thank you for educating us on your work and for providing our listeners with hope that they can achieve a longer health span for their lives. Thank you for being on Peaceful Life Radio.

Dr. Benjamin Miller: 24:32

Thank you. I enjoyed it.