



## Victory Summit: Exercise

### The Latest Research in Exercise and Parkinson's

Davis Phinney Foundation

*Note: This is not a flawless, word-for-word transcript, but it's close.*

Polly Dawkins, MBA (Executive Director, Davis Phinney Foundation):

We are so happy you are here with us today. We have so many questions from the audience. We have so many questions that we've prepared for you, but I wonder, could you start off first, may I call you Daniel?

Daniel Corcos, Ph.D. (Professor of Physical Therapy and Human Movement Sciences):

Oh, absolutely.

Polly Dawkins:

Wonderful. Daniel, may I start off by asking you a similar question that Mel asked Bas is, how did you get into this work? Tell us a little bit about your journey towards exercise and Parkinson's.

Daniel Corcos:

Well, in that case, I base my story a little bit on Bas'. So, when I was young or younger I used to run, and I used to play rugby. So, I was an athlete and I loved sports and I loved athletics. I used to play rugby and run into immediate hurdles. I went out to the University of Oregon essentially because people ran in Oregon and I took a class in psychology there from a professor, Steve Keel, and loved it. And I ended up getting a Ph.D. I then moved on to Chicago for a postdoc, and I did relatively basic work in understanding patterns of muscle activation, and that is how people moved their limbs from point A to point B. And at some point, I started reading papers on muscle activation in people with Parkinson's disease. And fortunately for me at the time, just like Bas went to America to find an expert, I went to England to find an expert.

His name happened to be Professor CD Marsden. And so, I spent a year from 1994 to 1995 working primarily with Professor Rothwell, who's a well famous neurophysiologist. And we looked at whether people with Parkinson's disease are weak. And at the time, the conventional wisdom was they're not okay. But we showed quite clearly in a paper in 1995 in the Annals of Neurology that when you removed dopamine replacement therapy, lo and behold people become weak. And that led me into doing many studies on muscle activation and weakness. And then I did a clinical trial and have carried on in the area of Parkinson's disease ever since.

Polly Dawkins:

That's a great origin story. So, some of the questions we are getting today that stemmed from Bas' talk, and we get these questions every day is, what does the research say is the best exercise that has the greatest impact on the quality of life for people living with Parkinson's?

Daniel Corcos:

Yes, this is a really difficult question to answer and I'm going to give you a kind of complicated answer here. So, quality of life means different things to different people. So, on a Saturday morning, I'm happy on my bike, and that's good for my quality of life. That's not the way my wife likes to spend her Saturday morning. And so, the quality of life means different things to different people. So, the very first thing I want to stress is that activity, in general, is terrific for all of us, and activity in general will lead to an improved quality of life. I'm, I'm looking at a couple of notes here because I listen very closely to Davis Finney, and one of the things that Dr. Bloem and I both do is we listen closely to people with Parkinson's disease because they have the disease and they can talk in a way, which is, in my view, convincing.

And what he argued was that the pace should be sustainable and enjoyable. And so, for quality of life, you need to find activities which you enjoy, which you're going to do for the rest of your life. Later on, we are going to be looking at dance. Now for many people, dance is terrific, and dance does enhance their quality of life. Dance is not everybody's cup of tea. Now, my own view is if you happen to have Parkinson's disease, you should pay very serious attention to dance because it is very, very good for you. So, part of what quality of life is about what you enjoy, and what you are willing to do. Now, I can rephrase your question a little bit. Okay. And if we replace the quality of life, for example, with quality of health or quality of well-being, and this is slightly different, Okay?

Because the quality of life really is multi-dimensional. If we are just looking at this from a health and well-being perspective the evidence of what people should be doing is actually reasonably clear. So yes, exercise is a new field in many ways, but I think, and this is also the take-home message from Dr. Bloem. Endurance, and cardiorespiratory three times a week is clearly good for one. And if it's at a slightly higher intensity, the evidence is clear. Now, not, not everybody likes that. And so, I'm not saying one needs to do it, but for those of you who really want the best prescription from the current literature, okay, then there's no question. Three times a week, 30, 35 minutes of endurance exercise, getting your heart rate up reasonably high is important. The resistance training is very important from my point of view. I weigh them absolutely equally.

Weight training is very, very important. And then thirdly, the disease is relentlessly progressive posture, ga, balance, and flexibility is going to change over time. And so, any activity and dance does this. That addresses posture, gait, balance, and flexibility is important. And so that prescription if one's goal is to optimize one's health. And early on today, we heard that at any

stage in our life, covid can come along, flu can come along, and a lot of other things can come along. The more resilient our body is to deal with any health change, the better off we are.

Polly Dawkins:

Would you mind Daniel summarizing those three points again, just for our listeners, the three things that are ideal for overall well-being and Parkinson's?

Daniel Corcos:

And then, by the way, we have many people here who are loved ones, who are family members, who are health professionals. This applies to us all. We should all be doing endurance exercises three times a week for perhaps 30 minutes a session. Okay. Whether it's on a bike, whether it's on an elliptical, whether it's on a treadmill, it's really not that important. But the important thing is that one's heart rate is getting elevated. The point number one is endurance. Some people call it cardio; some people call it aerobic. It's all the same thing. You reach a point when your heart rate is elevated. Two, you should be doing weight training. And I can tell you save is Finn and his dumbbell is a no better example than weightlifting. and he will be acutely aware of this because elite athletes like him. So, when he was at his prime, you can be certain his heart and lungs were quite superior off the charts.

You can be equally super; you can be equally certain that, had his bone density been looked at, it would not have been great. So elite cyclists over time, you have a drop in bone density because you're not lifting weights because you're not walking because you have no load placed on the bone. And so, to see him lifting quite an impressive dumbbell. So, point number two, is weights. And point number three, any activity that's good for balance, be it dance, be it tai chi, be it yoga, they're all terrific. The important thing here is to realize they all are for slightly different purposes. In the chat, somebody asked a question, which of something is better? I don't look at it like that. It's a little bit like if you ask a dietician, Should I eat protein? Should I eat fat? Should I eat carbohydrates? They will tell you need the right balance of the three for your body at your stage in your life doing what you are doing. And so, it's a question of balance.

Polly Dawkins:

Yeah. You've made it so understandable. Thank you for that. And accessible folks are asking about ping pong and pickleball. Would you put those into the balance category along with yoga, tai chi, and dance?

Daniel Corcos:

Oh, absolutely. Ping-pong is terrific. Pickleball is terrific. Anything you can do for your eye hand coordination had his fingers up when he was talking about strength, manual dexterity, declines, anything that's good for eye-hand coordination. The Parkinson's brain does really well when it

has external stimuli coming in. Those of you have the disease, and those of you who freeze, your PCP will have given you a variety of treatment ideas that basically have stimuli coming in. So, both of those are terrific. Absolutely. Great.

Polly Dawkins:

All right. So, from the beginning of our webinar, we polled people about what they do and how much exercise they're doing today. So, we've got a group here, over 600 people watching right now, and more will watch this afterward, who are maybe not exercisers. Daniel, how do you recommend that folks who don't exercise have never really exercised, but have heard you now and have heard the science? What do you recommend about getting started getting over that, that hump of getting out of the lazy boy off the, off the couch and starting to exercise? Whoops, we can't hear you.

Daniel Corcos:

No, no. I'm just, I'm just make, I'm just working on my answer here. Okay. So, I think, you know, for somebody who's just getting, who's new to all of this an easy way to start is to tell yourself, I'm going to devote a certain amount of time a day to myself. So, the people who do well with the disease are those who've taken ownership of the disease. And you can see this coming in the chat, and you can see this when you listen to Dr. Bloem. And so, I've set aside a certain amount of time and then perhaps begin by walking, because walking is relatively easy. Those of you who have a dog, you have it kind of built in. The dog's going to take you out for a walk. Then once you start to assign time, because part of the problem is time management and you know, Bas talked about snacks, and snacking in terms of exercise.

And I agree if you're short on time a little here and a little there is good for you. But once you've found the time, as Dr. Bloem mentioned it's good to find experts to really help if you have access. Now, Holland has got a marvelous, marvelous health setup. We've got people coming in from all over the world. You're in different areas. All over America is different. But if you can find an expert to help you, a pt., an exercise scientist, then they can kind of move you in. But I think Mel made the point earlier, it has to become part of routine. So, I think the most important thing to do is to tell yourself, I, whoever you are, deserve for myself, 30 minutes, 45 minutes, 4, 5, 6, 7 times a week to look after myself. start with a little walking and then progress to a health club, a dance class, a yoga class, and then start to build it up to the point. And over the course of a week, you're doing cardio resistance, Postgate, and balance training.

Polly Dawkins:

Terrific. Thank you. One of the part attendees has mentioned that she's worried about falling and about balance while doing some of these activities, especially something like pickleball. What would you say that person should lean into when thinking about balance?

Daniel Corcos:

So, when you start with Parkinson's disease and you first see a neurologist, and if you're diagnosed very early in the disease, your balance should be relatively normal. There's what it's called. And those of you have the disease, you've had it done, you have a poor test, and it's early on in the disease. You don't move very much. When a physician pulls you from behind. As the disease progresses, your posture gets worse. There's a scale, the hole in the area scale. And when you are classify three, you have a level of postural instability. It makes you more vulnerable to falling. And so, this becomes person dependent. If you are prone to falling, then everything needs to be done in a much more supervised way. If you have osteoporosis, the consequence of falling is worse if you really are a high risk for falling. There are places, for example, in Chicago where you can do gait training and you have a harness and there's something called partial body weight support training, where in fact the harness actually takes up a little bit of your weight and so you can't fall.

And so, what a person who's just been diagnosed, who is 40 should be doing as opposed to somebody who's, you know, in stage three, who's female, has mentioned that because osteoporosis tends to be more prevalent in their seventies and eighties. But I think it is very important people realize that one can be overprotective, and a lot of people do too little. And yes, we've done studies, we've had a site in Colorado, we got people out in the study, Dr. Bloem referred to. They went up into the mountains, they did more exercise and they fell occasionally. And so, this is a very, very fine line. We walk. and so, I think you have to know yourself. You have to know what levels of support and activities, you know, if you've had a fall, you need to really ask yourself why you fail. As an aside, 50% of the people on this call who have the disease will have orthostatic hypotension. So just going from sitting to standing can lead to a little bit of dizziness. So, I think one has to be, one just has to be careful, but one can be too careful, I think is my point. Because if you don't do activity, the consequences are also not good.

Polly Dawkins:

Such great points. Yeah. We're going to be doing a webinar this month on orthostatic hypertension. So, for those of you who are curious about that, we'll send you a link to sign up for that webinar. So, if we could shift a little bit and dig into some general information about exercise and the brain. Can you tell us a bit about what happens in the brain when we exercise and how exercise might slow the decline in brain structure and function, particularly in Parkinson's?

Daniel Corcos:

Yes. So, Dr. Bloem referred to his very, very recent article in Annals of Neurology. And so, there is clear compelling evidence that you have increased brain connectivity. And the second thing that is important to know, one of the reasons why high intense exercise is pushed to hear intensity referring to heart rate, is that the idea is that the vascularization of the brain improves

as the blood vessels in the brain become healthier. As you can take more oxygen to different parts of the brain, that certainly improves brain function. There's evidence that when you generate large forces, your basal ganglia, that's the five nuclei deep in the brain, which are in Parkinson's disease, get activated and this is good for them. So, the evidence that it is good for the brain in terms of connectivity, in terms of different parts of the brain being able to be activated more strongly in terms of improving oxygen flow is it's overwhelming and quite clear. And by the way, this goes across many diseases. So, you can look at Alzheimer's disease and there are benefits to exercise. You can look at aging and healthy aging. It's a kind of universal, it's kind of universally good at the level of the brain.

Polly Dawkins:

So, you mentioned aging. A person with Parkinson's has got two, two issues, right? They have Parkinson's and we're all aging. Can exercise, make the brain and body younger if you will?

Daniel Corcos:

So, I think it really depends where one starting point is. I think for somebody who's aging healthily, and I like to hope that I'm aging healthy the best we can do is to stay where we are. So, no change is the goal. I think we need to be kind of realistic. So right now, if I'm privileged enough to be asked to talk in 10 years, if I come back with no change from today, that would be spectacular. Now if one, it's not in great health, if one, and certainly when I turn 60, I wasn't in that the same health that I am now when one starts. So, for those of you who've been sedentary for a long time, yes, I think one can in fact make oneself younger, certainly in terms of performance metrics that one looks at. But really the goal, so I'll be out in Colorado, hope to see some of you.

I'm giving a talk on what happens when you age and yes, your cognition goes down, your muscle strength goes down, your inflammatory markers go up. There is one positive note here. I like to think wisdom goes up as you age. And so, as you've got all these negative slopes, cause most of its bad cognition, declining muscle mass strength, ability to stand on one leg. If we can just rotate that. And that's especially true in Parkinson's disease. Cuz in Parkinson's disease you have an aging component. And then you have where the disease starts, it gets a little steeper. So, you have a little bit of an acceleration. And what you're trying to do is to rotate that. And the people that I talk to who really look after themselves, their slope of decline is not very steep. I mean, they're doing well year in, year out. And all the physicians I talk to, they know which, which of their patients have the des are exercising regularly.

Polly Dawkins:

Yeah. As, as Mel mentioned in her interview with, with boss, we see that in our community day after day, those who are doing better, doing well are those who are really following the, this

mantra of do something now and use it or, or lose it. And that, that seems to be pretty stark. The contrast in people,

Daniel Corcos:

The contrast is black and white. It's absolutely dramatic. I mean, so I think the clearest example that I can give you as to why of evidence, it is anecdotal, but it's quite compelling. So, during covid 19, many, many, many places were shut down for exercise. Lake Forest is a hospital in the northern suburbs of Chicago, which has a terrific exercise program for people with Parkinson's disease. And I'm sure wherever you are in the world, there'll be places which have programs like this. Well, they, when they were shut down, they noticed how quickly people were deteriorating with Parkinson's disease and they managed to get permission to stay open, which is really quiet, quite impressive. And the argument was made that it was a health medical necessity. So, for those of you who don't believe it spend three months getting yourself in better shape and then stop for three months and see what happens. And I have a zoom meeting every month with people with Parkinson's disease and the likelihood of me talking them into not exercising for three months to prove the point to zero, okay. It's just not going to happen. And you can imagine not taking those of you on Sinemet, not taking Sinemet for three months. I think most of you probably wouldn't do that. And exercise is exactly the same. And of course, there is this potential, you know Dr. Bloem talked about that his study in my study, which have hinted that there may be protective effect. And so, it's a long way yet for us to show that's true. But exercise has so many other benefits that even if it's not true, it's still worth doing. But if it has a protective effect, continuing to exercise is very good.

Polly Dawkins:

Yeah, I think, I think you're right. We find when we speak with people in our community about not exercising for a few days, that is hard to imagine. And

Daniel Corcos:

Yeah, it is. It absolutely is.

Polly Dawkins:

Yeah. I want to ask you a bit about research, current research. What do, what do you see out there, Daniel, that's most exciting or notable that's being done today in the field of exercise and Parkinson's?

Daniel Corcos:

I think the most overwhelming part, the most, the fact which overwhelms me is just the amount. There's 137 clinical trials and I got that number from another talk Dr. Bloem did, which

you can find on YouTube. So, so in terms of interesting, it's just the number is interesting to me and they're all showing benefits. So that point number one. Okay. And then I mentioned this earlier, but you talk to movement disorder specialists, and they all tell you my patients who exercise are doing Wow. And when I talk to people with Parkinson's disease, they say they are doing well. And then if we look at the literature, the evidence that high intensity may have a slightly increased advantage over lower intensity, I think is important. I recognize that it's not for everybody. Yeah. And I can later on, you know, take a question of how to help people transition from low and moderate to high intensity, but I'll stay very focused on the interesting findings where we need more research. And the really big question is adherence. So, I think we're at the point now that we just know exercise is good for you. They are very clever research questions to be asked and answered and they will be. But the really big question is how to get people to start and how to get them to adhere. And that can be a problem. Now, the kind of iTunes in for the biking session this morning.

Polly Dawkins:

Yeah, I know

Daniel Corcos:

And it was great. And so, one reason people adhere is there were 25 or so terrific people. So why would one adhere, what do you get a chance to meet 25 terrific people and you can chat and exercise and, but that's an important area. Now Bas has done very nice work, and I think we're five, 10 years away from this, but there are many articles coming out now about gamification. So, you, you can put people into a virtual environment and then we can make it more enjoyable. Now, in the cycling community, of course there is Swift and Strava, so a lot of people will get on Swift and they will get on with their friends. And so, the idea of these multi role player games of feedback being provided, of having an exciting virtual environment, I think that's going to make a big difference over time. I mean, if they can captivate adolescents and people in their twenties, it should be able to captivate people a little older. Yeah.

Polly Dawkins:

Is that, is that really, Oh, I'm sorry. Did, did I interrupt you?

Daniel Corcos:

No, no.

Polly Dawkins:

Kevin asks in the chat about dual task exercise. Do you have any comments on that or is that related to this virtual reality gamification that you're dual tasking while exercising?

Daniel Corcos:

Well, this is very, very interesting. So, there are kind of two schools of thought here. And it goes back to the attending's question on falls earlier on. So, on one extreme, you can simply tell people with Parkinson's disease don't do a task because it increases the possibility or probability of falling. So, if you're walking and talking the likelihood of you falling possibly goes up a little bit. I don't subscribe to that, but I understand it. I think people should be, or I think, let me put it a different way, I think there are clear benefits to dual task training. So, people learn how to dual task, they basically walk in chew gum. But there are also times when if you are out with a partner and they have Parkinson's disease, there are times when it's probably not a good idea to do a task. So, for example, if one is walking outside, it's poorly lit, and if there's any curvature going on, you've now made the walking as hard as you can make it. And then if you now start to have a complicated conversation about what the Joneses have just done today, then that's not a good idea.

Polly Dawkins:

No stress level goes way up.

Daniel Corcos:

What a stress level goes up. And that gets really, really complicated. So, your tasking studies are very important. Teaching everybody actually how to do multiple tasks at the same time is important. But it is very important to know that if one has the disease aspects of dual tasking become harder. And one, it's really a question of playing within one's knowledge about oneself. And so, I believe in dual-task training, and I believe in helping people to come to terms with their disease and the environment.

Polly Dawkins:

Right. A few questions are coming in about folks who no longer can walk and what type of exercise might be available or might be recommended when walking is, is not a possibility. We have a comment from the folks at power for Parkinson's that they have many videos for chair-based workouts. Do you have any other suggestions for those who are not mobile?

Daniel Corcos:

Oh, absolutely. So, the benefits of exercise remain with one till pretty much the end of life. And people will reach a point that they may be in a wheelchair, they may be in a chair. I think I looked at the dance programs, which were shown on the website, and much of that is done seated. You've just spoken about the PWP. I want to make sure I get this correct. Who had the-

Polly Dawkins:

Oh, there's a person who said Bob has said that he's restricted to a wheelchair.

Daniel Corcos:

Yeah, so there are, there are lots of exercises that can be done in a wheelchair. Thebans can be very useful. You actually looked at David Finnie morning. He could have done that. He could have done that wonderful overhead lift with the, with a dumbbell in a wheelchair. So, there's lots that can be done from a wheelchair. It just requires a little bit of creativity. This is not available everywhere but in many physical therapy departments. Many rehab centers have what is called hand dynamometers. So, a year and a half ago I wasn't very clever. I managed to rupture my Achilles tendon. And so, for many months, anything with my legs was not possible. But I got on a device, and I just got the same cardiac workout using my arms as I normally would if I was on a treadmill, a cycle, or elliptical.

Daniel Corcos:

And so, there are ways one can have because if you look at people in wheelchairs, and if you look at people with spinal cord injury, for example, and those who had stroke and are confined to wheelchairs, their cardio health suffers, and it suffers dramatically. And so, you know, one can use Thebans, one can dance, and this is all terrific, but they're not getting the heart rate up. And so, if you are in a wheelchair and if you can find access to what is basically a hand dynamometer, you can then do your endurance workout using your arm muscles instead of your leg muscles. And I did that because I didn't want to have a reduction of too much in my cardiorespiratory fitness over the four to five months that it took to rehab.

Polly Dawkins:

Great. Thank you for those suggestions. I'm going to take a few questions from the chat now if that's okay with you. We've got

Daniel Corcos:

Sure. Yes, no, absolutely. Whatever's most helpful to people.

Polly Dawkins:

Great. You had at the very beginning of our conversation, we talked about the ideal prescription and some comments are asking about the resistance training or the strength training. How many days a week you had said endurance training, three days a week, 30 minutes? What about strength training or resistance training? How many days a week would you recommend based on what's, what's being studied?

Daniel Corcos:

I would recommend two days a week, I would recommend exercises which cut across muscle, multiple muscle groups. I would say the same thing that badge did and confirm that. I think it's good to start off with a PT or an exercise physiologist who can really help you. One way one does this is they would take what is called a one-rep maximum. So, we can go back to Davis when he was putting up the dumbbell, we'd find the largest dumbbell that he could push, and then we would say to him, Okay, we are now going to take 70% of that dumbbell weight and we are going to do that eight to 10 times. And you would then exercise all the other major muscle groups. So, one reason why the weight training is very good is the likelihood of having Parkinson's. Well, I think the likelihood of people on this zoom not having had an episode of back pain is really quite low.

You may find two or three out of six hundred's, much more likely that people have had episodes of back pain. And so, if one is doing resistance training, working all the major muscle groups, it's very good for not just Parkinson's disease. It should also tell you that the best evidence for improved cognition actually comes out of weight training studies. Not endurance exercise studies, but to stick with the question you would maybe take I mean my, my workout is I do eight to 12, I do eight different exercises and I repeat the exercise three times. So, if I'm going to do bench press, I'll do bench press once a set of eight to 10 to 12 a second, set the third set, and I go onto my next exercise. It's good to have help and somebody who can walk you through that, to begin with. Because if you have, if you do it badly, you can cause damage to yourself.

This is not something that you can do, going out for a walk is one thing. If you look at what Davis Finney did, and you get your body in a very slightly wrong posture and you end up with a back problem it could happen. He obviously knows what he's doing. But I fully encourage resistance training. Just to let you know how important it is. If you look up my name and maybe the paper can be sent to you in 2015, my resistance paper in the Journal of Movement Disorders, which is the specialty journal for movement disorder specialists, it was voted paper of the year because it showed quite clearly that resistance training had significant benefits on three measures of cognition. So, if any of you need any motivation, I know people find resistance training hard, I ask my students, they don't all do resistance training. It's much easier to do various forms of cardio. There are all these options available to you, but if you really want to do what is best for you, it's important to do resistance training.

Polly Dawkins:

Wow. So not only does it help with balance and strength, but it also helps with cognition. And what are the other benefits of resistance training?

Daniel Corcos:

Well, I think there, there are so many benefits. Okay. I can I mean I think, you know, do I ask if I answered a general question? What are the benefits of exercise? Math gave a lot of them.

Right. But for resistance training, it's the bone strength, the cognition, and the tone. So, an easy way to think about why you should be doing resistance exercise is when you look at people who are frail, and elderly, and you look at how they get out of a chair, they use their arms as much as their legs.

And that's simply because they've lost the strength and coordination in their lower limb muscles. So anytime you need any prodding to work on your leg muscles, just think that at some point in life, sitting to stand is going to become potentially hard for you. And the stronger your leg muscles are, the stronger your back muscles are. And it turns out that if you need your arm muscles, the stronger you can make them. Because, you know, one way to look at Parkinson's disease is that it's a major mobility disorder. And what all of our work is designed to do the work that Bas does, the work that I do, the work that many other people do, we are all trying to help maintain mobility in a disease, which is a movement disorder, and strength training. Does that,

Polly Dawkins:

Thank you. Is there a thing as too much exercise for a person with Parkinson's?

Daniel Corcos:

The quick answer is yes. Okay. So, but now let me give you a longer answer. The single most important thing is to know one's body and no one's disease state.

I try to persuade the zoom group that I meet with every month that a day of rest is good. And one of the people on the phone said, not for me. I need my exercise in the morning, my stretching, my, my mobility routine, et cetera to get me up and going. And so, seven days a week is quite possible for many people with Parkinson's disease. My own view is it depends on what else you're doing. If you talk to Davis Finney, I am quite sure he'll tell you all about really hard days, easy days. and recovery days on the bicycle. So, as you get more and more into exercise, you have to think more and more like an athlete. So, where fans, and I agree, maybe it's because we both started off in athletics, is you need to think like an athlete and that means you can overdo it.

Okay. I would never, never recommend high-intensity endurance when that is defined as 30 minutes with your heart rate of at 80% or higher. I would not recommend that more than four days a week. And some people may find that one day too much. the other thing is that exercise does lead to aches and pains. One can have problems with the Achilles tendon. One can have problems with the knees. So, one, certainly over-exercise, it's a little bit like pills. It's a little bit like alcohol. You know, perhaps one glass of wine may be quite nice and there's probably some evidence that it could be potentially quite helpful. But there's a point at which when you go too far when it's clearly bad and some people get so into exercise that they forget Dr. Bloem's kind of six points. And it's very much an integrated part.

And so, for those of you who, and again, you can think of this like the coach of an athlete, some athletes need to be pushed, some athletes are just fine, and some athletes need to be held back. And I think for those of you who are pushing yourself too much, you should certainly look at your weight. You don't want to drop too much weight. There comes a point when comes a point in life with one gets older with a possible frailty looming on that. An extra pound or two is no bad thing. Some people get so driven by the exercise. So, one can, one can definitely over exercise, and listen to your body. The other day, last Sunday, I just couldn't exercise. I was just wiped out. Not sure why did a great session the next day. I didn't lose anything over time. But listen to your body.

Polly Dawkins:

That's such a key takeaway. Listen to your body.

Daniel Corcos:

I know. Absolutely.

Polly Dawkins:

Yeah. People are asking about Pilates and that type of exercise. Where would you categorize Pilates in the overall spectrum of exercise?

Daniel Corcos:

Well, I think I'm a big fan of Pilates and I think it is very, very beneficial. I earlier mentioned back problems. I think if one does Pilates then it is very, very good for the core and everything goes around the core. I'm sure David Finney will tell you that if you're going to be a great cyclist, you need an absolutely phenomenal core because it's through the core that the power goes to the legs, which drives the pedals. So, I think Pilates is great. It is very good for the range of motion. It's very good for balance. I saw a Pilates class the other day where they were doing amazing, amazing moves. For me, it probably comes down in the third category. So, it's not a substitute for endurance exercise, high-intensity endurance. And it's not a substitute for whole-body resistance training. But it is a wonderful exercise, and I would absolutely encourage it. In fact, there is no exercise I wouldn't encourage. And so, if Pilates is what you love doing, it is absolutely terrific. You know, it's two thumbs up. I've done it. And I love,

Polly Dawkins:

It's super, super. Somebody asks about how to protect her knees while doing intense or forced intensity exercise. Is there anything that you've seen recommended for the protection of maybe joints in particular?

Daniel Corcos:

Not really. I want to talk a little bit at length cuz I saw one of these questions in the chat and there's a misunderstanding about the term force exercise. Right. So, you should all understand I'm a huge fan of Jay Alberts. We're very good friends. I know his work very, very well. And in the literature, his argument is that when you are on a bicycle, especially on a tandem, his early work came out of a tandem. He's now got devices which control cadence that when a person is forced to rotate their legs at a high rate, that is good for them. So, imagine you are on a tandem and the person in front of you is going 90 repetitions. Forced means you on the back are going at 90 repetitions. Two. And so, increasing the rate at which you pedal is very, very good forced is

It's, and Jay and I have discussed this at length. It may be an unfortunate use of the term, but really what it really means is you are being constrained to move at a rate faster than you normally would. Now in terms of knees, you should go and see an orthopedic specialist pt. You should also avoid activities that put stress on the knees. So, a minute ago I told you weight training is great for you and it is, you should not be doing a full squat if you've got knee problems under any circumstances. So, you need to work with a specialist who can guide you. I'm not sure if it was in the chat or whether it was earlier on today about somebody having to get fit for surgery. When I did my progressive resistance exercise program, many people probably three, went in for joint replacement surgery.

And the orthopedic surgeons were stunned by how quickly they recovered because they were all part of a very, very vigorous resistance program. The muscles around their joints were very strong. And if you've got any problems, it is good to strengthen the muscles. You can rest assured if you go in for any kind of knee surgery, the better condition your joints and muscles are the better condition you will come out. And so, the idea of preconditioning is very important, but for, it's very hard for me to give specific advice because it's all person dependent. For the person who asked about knees, find a really good orthopedic PT, and find out why you've got knee problems.

Polly Dawkins:

Got it. Thank you. Many folks are recommending or saying they do water aerobics and swimming. Any, have any thoughts on those as exercise modalities?

Daniel Corcos:

Well, I can tell you now, you'll buy you already know what I'm going to say, but I will, I will, I will tell you. Okay. They're great. They're absolutely great. Okay. and again, it's finding what works for you. So, we had the question half an hour ago, you know, about falls. Well, when I'm at the health club and I see the water aerobics class, the very worst you're going to get when you fall is wet hair. Okay. And so, it has to be great. So, if you've got a propensity to fall now if you're a little bit overweight, the water deals with that very, very nicely. You don't feel quite the same way. And so, it's very helpful if you've got joint problems. It's a little bit like earlier on I talked to

you about partial body weight support training. The idea that you have a harness that's really what the water is doing. It's giving you a safe environment. So, I'm very much in favor of it. If you actually swim now you're getting very close to cardio. So, you can get your heart rate up to 75, or 80%. And I can tell you that when I go out and run, it's really hard. Now with my ruptured Achilles tendon, I feel much closer to my age than when I dive into a swimming pool. And when I'm swimming I absolutely don't feel my age. So, I'm a big fan.

Polly Dawkins:

Yeah. It's also water aerobics. Whenever I go to a pool and there's a water aerobics class going on, it's a hugely social activity.

Daniel Corcos:

Oh, absolutely. I mean I actually sometimes watch the class. So, I've done my workout and I may be going to kind of soak in a tub to make sure my back isn't too bad. And I watch and it just looks to me like an immense amount of fun. And I think this is what is really, really important for

My first main clinical trial was over two years because I wanted to show that people could do it for two years. And they did. I happened to be the principal investigator of Sparks three, which is a phase three clinical trial designed to test two different doses. And that study is over two years because we want to see if people will stay in the study. So, if you look at what is probably most popular, so when I give talks, my favorite slide bar none that I show is the Rock Steady Boxing slide. And in it you have, I've got 20 people totally engaged, totally smiling. And as I learned this morning, one big advantage of rocks of rock steady boxing, and this wasn't my comment the punch bag doesn't punch back. So, you're getting a great workout, you're working out with lots of friends, and one should not underestimate the social side of exercise.

It is my view that it will be part of the future. And what happens is you may not be having a great day, Anxiety may be a little bit up, you may have that little apathy that Dr. Bloem was talking about, but your friend at the health club is waiting for you or your friend on the bike is waiting for you. And it may give you just that little bit of motivation to get over the hump to go out and do it. Yeah. And so, the social aspect of swimming, I think, is great. The social aspect of the six-days-a-week Davis Phinney rides that you can do, I think is great. And I can tell you something else, and I know I'm being recorded, but you know, I've been now working with people for Parkinson's disease for a long time and they, you, you all seem universally nice.

Now sometimes somebody says, Well Daniel, the urologist has only referred to you as somebody who's nice, but I've met lots of people. And for those of you who are undecided or struggling, you know, find a social group. Now not everybody is social, and you know, some people just like to do it themselves, in which case you can get on a lift and tune everybody else out. But the key thing here is the known self. The literature is clear. Okay? The literature is so

clear you've got this message by now but let me put it to you in a very blunt way. If you look at any disease, any disease out there, and you ask where the biggest difference is, is going to be nothing versus something. And then once we get above the something, then everything else after that is progressively refining it.

And I've worked with enough people to know that what they really want is to refine it for themselves, to do the absolute best for themselves based on the current literature. But if you're, if you find it hard, you know, find a social group, find a walking group, find a dog walking group all kinds of ways. I happen to have suggested to my friends in the past that they use an app. I'm not advertising any apps. I'm absolutely not. It's not my job to, and I won't I'm mentioning one because Strava is a way that you can connect with people. So, if you go on and you do your 30 minutes and you suddenly find that now seven other people tell you good job, you find that motivating other people doesn't resonate with that. They just want to be left alone and do it.

Polly Dawkins:

Yeah. Yeah. We have just a few minutes left, and I'd love to ask you a question about some current literature that's just come out in September I believe about I think it's called irisin, the hormone that's secreted into the blood during high-intensity endurance and aerobic exercise. Do you know anything about that study and what that has to do with Parkinson's or what it could potentially have to do with Parkinson's?

Daniel Corcos:

I haven't read that particular study, but Dr. Bloem and he was actually referring to some of the work that I'm doing now. Certainly, mentioned hormones, and the one thing which we haven't really talked about, but it is where my research is going to go over the next 10 years is that what I'm hoping to do with my colleagues is to develop a Parkinson's specific blood panel. So, you know, if one, if one goes and sees one's PCP, you'll have a standard blood panel run and that's great. Now the hormone you refer to and several other hormones I think are going to come to the forefront. So, in my work, we are working closely on cortisol vitamin D, and a hormone called Klotho, which is an aging, anti-aging hormone. So, in Parkinson's disease, cortisol, which is a stress hormone, is elevated, and when you exercise it gets reduced.

CRO, though, in Parkinson's disease is reduced, and when you exercise it is increased. So, the idea will be over the next many years that we hope to develop a kind of a panel of markers, which will motivate people to try to get their markers within a healthy range. So just to give you one example, in the video group that I meet with, we have one person who takes this all very, very seriously and he asked me about brain inflammation and what was known. And I mentioned to him that there's a blood measure which is routinely taken on people as an index of inflammation. It's CRE reactive protein. And I asked him, Well Michael, what's your c reactive



protein level? And he said it was very, very low, which means his inflammation is very low. And when you look at what he does, you understand why it is very low.

So, the marker you mentioned will be studied in Sparks three, which is my phase three clinical trial. We are drawing we are drawing blood and we are measuring at least 40 different markers, including neurotrophic factors like brain-derived neurotrophic factor, which exercise may increase. It is lower in Parkinson's disease. And so, we are very, very interested in inflammatory trophic hormonal factors. And the evidence is clear that exercise benefits them all. So, if you really want, so you can look at the brain work, which Bas talked about, you can look at function, the ability to walk, the ability to move, the ability to have less tremor. But you can also ask the question if there is a preferred blood chemistry you want, and you can be certain that exercise improves your blood chemistry that you can take to the bank.

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