

Welcome to the Huberman Lab Podcast, where we discuss science and science-based tools for everyday life.

I'm Andrew Huberman, and I'm a professor of neurobiology and ophthalmology at Stanford School of Medicine.

Today we are discussing ways to improve your fitness.

In particular, we are going to discuss tools that you can incorporate into your existing fitness routine that will allow you to make significant improvement without having to invest a lot of extra time.

Most all of the tools we are going to discuss today were gleaned from the six episodes that we did with Dr. Andy Galpin.

We provide a link to those full episodes in the show note captions, of course.

Now those episodes included a very large number of protocols, everything from how to build a fitness routine, how to enhance recovery, nutrition and supplementation, exercises and routines aimed specifically at strength or hypertrophy or endurance or building anaerobic capacity.

What I've done is to select key protocols from those episodes that I myself have started to incorporate into my existing fitness routine and that I think will be especially beneficial and frankly fun for you to incorporate into your fitness routine.

Now a little bit later in this episode, I review the key components of any fitness program.

That is the number and type of cardiovascular training sessions and resistance training sessions that are essential for everyone to include as a template or a foundation for their overall fitness program.

Now a little bit later in the episode, I will be sure to review what are the essential components of any fitness program.

So the number and type of resistance training sessions, the number and type of cardiovascular training sessions, as well as some of the elements of how those are arranged to ensure proper and adequate recovery between sessions so that you can continue to make ongoing progress. However, the bulk of today's discussion is going to focus on tools that you can use again very easily, very quickly.

In some cases, even saving you time during your fitness regimen in order to improve all aspects of your fitness, your endurance, your muscular endurance, your anaerobic capacity, your recovery, your strength, your hypertrophy, and then describing these tools to improve your fitness.

It also provides an opportunity for each and all of us to step back from our existing fitness routine and ask whether or not it's really checking off all the boxes that are necessary as well as where we can be more economical with our time and our efforts in order to reach our specific goals related to exercise and performance.

So by the end of today's episode, you can be sure that you have at least one and as many as 12 tools that you can incorporate into your existing fitness routine, again, without adding much additional time or effort that are sure to accelerate your progress.

Before we begin, I'd like to emphasize that this podcast is separate from my teaching and research roles at Stanford.

It is, however, part of my desire and effort to bring zero cost to consumer information about science and science related tools to the general public.

In keeping with that theme, I'd like to thank the sponsors of today's podcast.

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Again, that's [drinkelement.lmnt.com slash Huberman](https://drinkelement.lmnt.com/Huberman) to claim a free sample pack.

Today's episode is also brought to us by Helix Sleep.

Helix Sleep makes mattresses and pillows that are the absolute highest quality.

I've talked many times before on this podcast about the fact that sleep is the foundation of mental health, physical health, and performance.

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Again, if you're interested, you can go to [helixsleep.com slash huberman](https://helixsleep.com/Huberman) for up to \$350 off and two free pillows.

Let's talk about tools to improve your fitness.

Before we do that, however, I just want to briefly remind everybody what constitutes a core or a foundational fitness program.

Now what I'm about to describe is not for the athlete that's trying to just improve one aspect of fitness or sports performance.

For instance, if you are a powerlifter and your main goal is to move more weight on the

core powerlifting movements or if you are somebody training for a marathon, it's likely that your core fitness program will differ substantially from what I'm about to describe. However, the vast majority of you are almost certainly trying to have some level of cardiovascular fitness.

The ability perhaps to run a mile or more, certainly to be able to walk up a flight of stairs without getting winded.

You almost certainly want some degree of strength.

The ability to perhaps pick up a heavy load of groceries and carry it in one arm as you carry something else in the other arm.

You want the ability to help move furniture.

You want the ability certainly to not injure yourself when performing daily tasks.

And perhaps you also want to be able to go out and play a pickup game of basketball or soccer or to go out on a long hike with the family without feeling so sore that you have to rest in bed the next day.

An optimal fitness program of the sort that was covered in the optimal fitness protocols episode that I did is therefore one that checks off the major boxes that science tells us are important for health span and for lifespan and that can also help us improve various aspects of performance and improve various aspects of aesthetics, whether it's fat loss or muscle growth, if we choose.

So without going into that program in a lot of detail, the core elements of it are that it include at least 150 minutes and ideally more like 200 minutes per week of so-called zone two cardio.

I'll talk a little bit more about zone two cardio a little bit later in the episode.

But zone two cardio is for those of you that don't know the type of cardiovascular exercise that you can do while maintaining a conversation without getting winded, but that if you were to push a little bit harder, that you would find it hard to complete your sentences.

In general, zone two cardio is the sort that you can do while purely nasal breathing, unless you need to talk of course, it's perfectly fine to talk while doing zone two cardio.

And again, the scientific research tells us that we should all be getting at least 150 minutes and probably more like 200 minutes of zone two cardio per week.

Now, in addition to that, a foundational or optimal fitness program for most people is going to include anywhere from two to four cardiovascular training sessions that are separate.

From the zone two cardio as well as two to four resistance or strength training, sometimes also aimed at hypertrophy or muscle growth training sessions.

Now, we have to acknowledge that most people are probably not going to hit the upper threshold of all of those three things.

Most people simply do not have the time and or discipline to get 200 minutes of zone two cardio per week plus four resistance training sessions plus four cardiovascular training sessions that are separate from the zone two cardio.

As a consequence, the optimal fitness program that I described in that episode, and by the way, it's the program that I've essentially followed for the last 30 years or more includes three cardiovascular training sessions.

So one longer duration, sort of typical endurance type training.

This would be a long slow jog or a long hike one day per week, as well as a shorter cardiovascular

training session of about 25 to 30 minutes, moving a bit faster, getting the heart rate up a bit more, breathing a little bit harder, as well as one very short cardiovascular training session that would fall under the category of high intensity interval training, things like sprints, which don't necessarily have to be done running, could be done on a rower, could be done on a bike, et cetera.

So three cardiovascular training sessions, as well as three resistance training sessions.

I want to acknowledge that resistance training can be done with body weight, can be done with weights, with machines.

I talked about the differing virtues of one approach versus another.

But nonetheless, three resistance training sessions.

One focusing specifically on leg training.

One focused specifically on torso training.

That's right, chest, shoulders, and back all together, as well as some neck training for important reasons that were mentioned in that episode.

And then a third session that was aimed at somewhat smaller body parts, biceps, triceps, calves, and some other small body parts that tend to be neglected and that are important to train if one wants to encourage muscular balance, both aesthetically and structurally to avoid injury and have excellent posture.

So those were the core elements of that foundational fitness program.

And I mentioned then, and I'll mention again now, that that program is not a mandate.

It is not an absolute requirement for anyone to follow.

It was simply meant as a template from which people could evaluate their own existing fitness program, perhaps modify it somewhat or a lot.

Or if you're interested in trying that specific fitness program that you could do that.

And we have provided a link both to that episode in the show note captions, but we've also provided a link to a table or chart that describes that foundational fitness program.

It provides examples of different cardiovascular training and resistance type training sessions.

And it describes some potential exercises and the rationale for those exercises and the rationale for selecting particular repetition ranges and rest between sets.

All that information is available completely zero cost.

You don't even need to sign up for anything.

You simply go to the link that we provided in the show note captions and there's a downloadable PDF there for you to explore.

Now in addition to the solo episode that I did about optimal fitness protocols, we did a six episode guest series with Dr. Andy Galpin, who is a professor of physiology at Cal State Fullerton and a world expert in all aspects of exercise and muscle physiology.

That episode described a lot of the science and in particular science back tools for improving everything from long distance endurance to anaerobic capacity, strength, hypertrophy, speed, power, recovery, nutrition, supplementation and ways to develop a year long program that will ensure you ongoing progress in that series.

Dr. Andy Galpin provided an enormous amount of valuable information such that anyone and everyone, meaning the person who's just interested in starting a fitness program or improving their existing fitness program or the elite athlete who's interested in improving their sprint times or their jump height or their powerlifting or their marathon time could

clearly benefit from some or all of the protocols that he described.

Now because that series is so extensive in terms of its depth and breadth, again, providing so much value at zero cost, thanks to Dr. Andy Galpin's expertise, but at the same time because it might be a little bit intimidating for many people out there to try and figure out which protocols to incorporate into their existing fitness regimen.

I thought it would be fun and very beneficial to talk about some of the key tools that were described throughout that series that one could consider incorporating into their existing fitness routine now.

So that's what this episode is really about.

It's about the tools that I personally glean from those discussions and that I found to be of tremendous value in improving both my cardiovascular fitness, my strength and hypertrophy training, my recovery and other aspects of my overall fitness protocols.

And when I say beneficial, I mean in terms of improving my cardiovascular fitness, improving my strength and hypertrophy training and that have improved the various metrics of fitness, lifespan and health span, which include things like heart rate variability, resting heart rate, blood pressure, VO2 max, as well as some of the fitness metrics that were described during that episode series with Dr. Andy Galpin, such as performance metrics, the ability to jump a certain distance, the ability to run a certain speed or to run a certain distance at a given speed, the ability to move weights in good form for a certain number of repetitions. Again, all of the metrics of performance and health are going to vary tremendously from person to person, depending on where you're starting, how long you've been training and other aspects of your health.

The tools described in today's episode are designed for everybody.

Again, these are simple tools that you can put into your existing routine that should really move the needle forward in terms of improving your overall levels of fitness and health.

Okay, let's talk about the tools to improve your fitness.

The first tool is to mesh your zone to cardio with your daily activities.

So for those of you that don't know, zone to cardio is the type of movement that we typically call cardio exercise that elevates your heart rate somewhat, increases your breathing somewhat, but that still allows you to carry out a conversation without having to pause or to gasp in order to complete your sentences.

Okay, so that's a general rule of thumb for zone to cardio.

Now for those of you that use a fitness tracker, you can monitor whether or not you are in zone to cardio very precisely, but if you're like me and you don't use a fitness tracker, it's very easy to know if you're in zone to cardio because again, it's that level of output that puts you right below or somewhat below the threshold where if you were to exert yourself with any more intensity that you wouldn't be able to complete your sentences.

This could of course be evaluated by jogging with someone or walking with someone or hiking with someone and carrying out a conversation.

If somebody isn't available, you could of course do this by trying to speak out loud and have a conversation with yourself.

Or if you want another way to monitor whether or not you're in zone to cardio without having to use a fitness tracker, you could simply ask yourself whether or not you are maintaining

a level of output that increases your heart rate and your breathing, but that allows you to maintain purely nasal breathing the entire time.

Any of those approaches will tell you more or less whether or not you're in zone to cardio.

Now the scientific data tell us that we should all be getting anywhere from 150 minutes to 200 minutes per week minimum of zone to cardio for sake of cardiovascular health, cerebral vascular health, and a number of other aspects of health that are important essentially to everybody for health span and lifespan.

Now many people including myself schedule zone to cardio into their weekly fitness regimen.

So for me, I have one day a week.

For me, it falls on a Sunday where I go out for a jog that lasts anywhere from 60 minutes to 90 minutes.

It's a slow jog.

I can maintain nasal breathing the entire time or have a conversation with somebody else or myself the entire time if I like, or sometimes it consists of a hike by myself or with other people and sometimes those hikes extend anywhere from an hour to four hours depending on the circumstances, etc.

I will mention that whenever possible, I try and do that once a week zone to cardio session out of doors because I like being in nature and I like getting sunlight and I like getting fresh air.

Now during the discussion with Dr. Andy Galpin, I explained how I get my zone to cardio and I acknowledged that that once a week session doesn't always allow me to reach that 150 minute to 200 minute minimum threshold of zone to cardio per week.

Sometimes it does.

Sometimes it doesn't.

And his response to that was very reassuring.

What he said was, look, if you want to schedule zone to cardio and head out for a long Sunday jog or hike, terrific if you want to schedule zone to cardio as two or more sessions on the treadmill or on the bike, great, but that he doesn't actually think of zone to cardio as exercise at all.

And to that I gassed and then I was a little bit deflated.

I thought, oh, great.

I'm doing all this zone to cardio and you don't even consider that exercise.

And then when he said it was very reassuring and I think it's going to be very reassuring to all of you.

He said, first of all, zone to cardio is absolutely critical to our health for a number of reasons that I already mentioned.

But in addition to that, zone to cardio does not impede and in fact can enhance our other aspects of fitness.

So for example, our strength training, our hypertrophy training, or any type of speed work or other types of cardiovascular training one might do.

And that the best way to get zone to cardio is, okay, if you want to schedule it, schedule it as a session, but that to simply increase the amount of walking and in particular walking at a rapid pace that one does and to increase the total amount of movement that one's getting throughout the week.

So taking groceries in and out of the grocery store, running around with the kids, taking a walk with a coworker while having a work discussion, taking your calls for work while pacing in the office or going outside.

What he impressed on me is that zone to cardio can be meshed throughout the daily activities that I and everybody else generally have to do.

And this was of great relief to me because I as many of you are extremely busy.

I don't have time to schedule in more cardio per week, or at least I don't see the way I could do that without reducing the amount of sleep that I'm getting, or without reducing the amount of social connection that I'm getting with family and friends, both of which are extremely important to our mental health and physical health.

So the basic tool here is, yes, get 200 minutes per week minimum of zone to cardio.

You know, as I said, 200 minutes, not 150 minutes to 200 minutes, I'm going to set the higher threshold of 200 minutes per week minimum of zone to cardio, but that you don't need to schedule that as time on the treadmill.

If you want to, great.

But what was communicated to me from Dr. Andy Galpin is that zone to cardio is immensely beneficial.

It's not going to impede.

And in fact, it's going to improve other aspects of fitness and that it does not have to impede and it in fact can improve other aspects of our daily life, like our ability to engage socially, our ability to have a great output at work and whatever type of work you do.

So the message is very simple, get 200 minutes or more of zone to cardio per week.

And the message is also a very reassuring one, which is that that zone to cardio can be spread throughout your daily activities.

And that if you're doing enough of it, you probably don't even have to count the total amount of zone to cardio that you're getting.

If you simply make the effort to move around a lot more during your daily activities and to mesh that zone to cardio with your daily activities, you're going to hit that threshold of 200 minutes per week minimum.

Now that's a great message for me because I'm already doing the three resistance training workouts per week.

I'm doing what now I can just call the two other cardiovascular training workouts per week because now I don't even count that long Sunday jog or Sunday hike as exercise.

I just consider that movement out of doors on the weekend.

And in doing so, it's also allowed me to really enjoy that a lot more.

There's something about considering something, a fitness training program that shifts it from just recreation and enjoying life to training.

And I of course love training.

I love training in the gym and I love training out of doors.

I love running.

I love lifting weights.

I love all sorts of physical training.

I know many people do.

I know many people don't.

But if one looks at zone to cardio as just part of their daily life, you're far more likely to get that zone to cardio in and all the benefits that come with it.

And you're also opening up time for work for social engagements and to do and pay attention to other aspects of fitness, which is what we're going to talk about next.

The second tool that I've incorporated into my fitness regimen and that I believe can be of great benefit to, frankly, everybody is to start including low repetition, pure strength work.

Now, some of you may already be doing low repetition, pure strength work, but I believe that most people don't.

Most people who do resistance training are using either machines or free weights or some combination of those, or perhaps are using body weight and they tend to focus on repetition ranges from about five and usually more like six repetitions out to about 10 and perhaps 15 repetitions.

Now, of course, doing resistance training in repetition ranges of five to 15 reps per set provided it's done at sufficient intensity.

So either to failure or close to failure, of course, in good form is tremendously beneficial. It can help build strength.

It can enhance hypertrophy.

There is tremendous value to training in those repetition ranges.

But when I sat down with Dr. Andy Galpin to discuss resistance training specifically, he made it very clear that at least for some portion of one's yearly training cycle, so perhaps eight weeks or 10 weeks or in the case that I adopted 12 weeks, there is tremendous benefit to training in the three to five repetition range and maybe even lower.

So the second tool of training specifically for strength in this three to five repetition range is something that I started to incorporate after I sat down to record that series.

And I'll just tell you a few of the benefits that I've experienced and then I'll tell you the specific protocol that makes it very easy to do this.

The most obvious benefit to me was that I got much stronger and that that strength persisted such that when I went back to using higher repetition ranges.

So typically I train with weights or machines in the six to 10 repetition range, sometimes a little higher, sometimes a little lower, but never before had I specifically trained in the three to five repetition range exclusively for a period of 10 to 12 weeks.

And when I did that, I of course gained strength, but that strength stayed with me such that when I returned to higher repetition ranges, I could use more weight in good form and that of course enhanced strength and hypertrophy further.

In addition, there was another effect that was at least to me very unexpected, which was that my cardiovascular training improves significantly.

Now why would this be?

Because typically a three to five repetition set does not elevate the heart rate for long enough that you would consider cardiovascular training.

And of course the rest periods between those sets is pretty long as well.

So even if heart rate goes up during those heavy sets, it's going to go down during those long three to five minute rest periods between those sets.

But what I noticed was that my overall posture and my ability to maintain cardiovascular

output while using good running form or good rowing form was also vastly improved. And the logical interpretation of why that would be is simply that the muscles got stronger and those same muscles are being incorporated into the cardiovascular, let's call it endurance work that I'm doing on other days.

And therefore I can carry out those cardiovascular training sessions in better form for longer periods of time.

I actually felt much stronger during my cardiovascular training as I got much stronger moving these heavier weight loads for low repetition sets.

And then the third specific benefit that I noticed is that when training heavy for three to five repetitions per set, I didn't get sore.

And this to me was an incredible benefit because typically when I train in the six repetition to 15 repetition range and I take those sets to failure or near failure, I do experience some soreness the next day.

Ordinarily that soreness isn't so intense that it prevents me from doing any of the other sorts of workouts that I do.

And for those of you that have visited that foundational fitness protocol, you know that I hit each major and minor muscle group once per week directly as well as once per week indirectly.

That's the overall structure of that program in order to allow sufficient recovery between those resistance training workouts to be able to make continual progress.

Now by training in this three to five repetition range that Dr. Andy Galpin suggested, I was able to improve my strength, improve my cardiovascular output, reduce soreness, I also just felt better overall.

I had a lot more energy after those workouts than I typically do after my resistance training sessions when I use higher repetition ranges or just a number of different things that made me feel, wow, this is really a powerful protocol.

And of course, moving heavier weights in the gym feels good too.

It feels good to get stronger.

At least there's a positive feedback there for me and I think for most people.

And I should also mention that for those of you that are averse to doing heavier resistance training in this three to five repetition range, because you fear that it will make you too big or too bulky.

Training in the low repetition ranges is actually more geared towards increasing strength and is shifting away somewhat from increasing hypertrophy or muscle size.

So that's a great benefit for those of you that want to be strong and also want to maintain cardiovascular fitness, but you don't want to add muscular size.

And of course, for all of you that want to add muscular size, it's well established that increasing your strength will allow you then to return to patterns of hypertrophy training that will allow you to use heavier weights and therefore induce greater hypertrophy.

So there are so many reasons to incorporate these strength training protocols.

So the way that Dr. Andy Galpin suggested, one do it and was the way that I did it is to use this three by five protocol, the three by five protocol is very straightforward.

It involves doing three to five exercises per workout.

So if it's a workout for legs, it's three to five exercises.

If it's a workout for some upper body muscle, it's three to five exercises.

Three to five exercises for three to five sets per exercise, three to five repetitions per set and three to five minutes of rest between each set.

In addition, he emphasized that one can do those workouts three to five times per week, although I'm going to put in asterisks next to that last statement because I found that I couldn't do the three by five protocol say for legs specifically three to five times per week.

I realize that might be possible for some people, but I'm somebody who like many of you out there either doesn't have the time or doesn't have the recovery capacity to train my legs three to five times per week.

Even though I acknowledge that there are probably ways to do that, that would still allow me to recover.

It just simply starts to impede into other areas of training.

It starts to impede other areas of life like work and family and sleep and all the rest.

So what I did and what I'm suggesting you try is for any existing resistance training that you're doing to take a period of eight or 10 or ideally 12 weeks and do the vast majority, if not all of that resistance training in the lower repetition range that's designed specifically to induce strength adaptations and to not pay attention to whether or not you're hitting that same muscle group three to five times per week.

Rather if you train your legs once or twice per week to simply do all of the work for your legs in that three to five repetition range.

If you train an upper body muscle or muscle groups, chest, shoulders, back once per week or twice per week to just stay within that three to five repetition range for those work sets, right?

Warmups can include a few more reps.

And then to adhere to this three to five exercises, three to five sets per exercise, three to five repetitions per set and three to five minutes between sets.

Now the one exception to this that I incorporated was that for very small muscle groups. So for instance, the rear deltoids or for neck work or for calf work to not rely purely on three to five repetitions, but maybe to work in a range of anywhere from five to eight repetitions.

So still fairly low repetitions, but not so low that it restricts you to three to five repetitions.

The reason for that is that I and I think a lot of people out there find it hard to fatigue those smaller muscle groups adequately with good form when restricting oneself to those low repetitions.

However, for big compound movements like presses and squats and deadlifts and glute ham raises and things of that sort, maybe even leg extensions and leg curls, which are isolation exercises, of course, to really restrict oneself to those three to five repetition ranges that take you to failure or near failure.

I listed off the benefits of doing that that I experienced and I'm confident that you will also experience a lot of benefits.

So just to remind you what some of those benefits are, you get stronger, which feels great.

That occurs within your weight workouts, but it also carries over to your endurance training

sessions.

I also noticed that when we're returning to higher repetitions for resistance training, so after 12 weeks shifting away from three to five repetition ranges and going back to training in the six to 10 repetition ranges, mainly occasionally up to 12 or 15, but really mainly restricting to six to 10 repetitions that you can move much heavier weights in good form and thereby induce more hypertrophy while still also continuing to gain some strength. And another benefit was again, reduced soreness compared to when training with higher repetition ranges and more mental freshness is I guess the only way to describe it when training in those lower repetition ranges.

I don't know about you, but when I finish a really hard hour long resistance training session done in the six to 12 repetition range, there's a certain type of mental fatigue that even if I eat properly afterwards, even if I hydrate properly, that it tends to sap a bit of my mental energy later in the day, but that the training at the three to five repetition range did just the opposite.

It actually enhanced my focus and my cognition, my overall levels of physical energy, which is great because it allows you to do all the other things that were required to do throughout the day.

And by the way, it'll also allow you to get more of that zone to cardio.

So if you want more details on the three by five protocol, again, that's time stamped in the relevant episode on strength and hypertrophy that we did with Dr. Andy Galpin.

I'll also provide a link to that specific time stamp in the show note caption to this episode.

I do want to point out that you don't just jump right into heavy sets of three to five repetitions.

You need to warm up adequately for some people that warm up will be higher repetition sets.

So say 10 to 12 repetitions with just the empty bar or a lightweight and then adding a little bit of weight and doing eight repetitions and maybe six repetitions.

And then your work sets as they're called of three to five repetitions, or perhaps you're like me and you prefer to do low repetition warmups.

So this was also something that I discussed with Dr. Andy Galpin and that for me has made a tremendous positive impact on all my resistance training, regardless of whether or not it is low repetition or higher repetition.

And that's to do a brief warmup set that is somewhere in the range of six to eight repetitions, very light, just to get familiar with the movement, then to do a second warmup set that includes some load on the bar or the free weight or the machine.

And then a second warmup set, again, this could be free weights or machines that incorporates a bit more load, but still keeps the repetitions low.

So in the four to six repetition range, and then maybe, especially if it's at the beginning of the workout and my core body temperature isn't elevated yet, I'll do a third warmup.

But that third warmup, which of course is going to be progressively a little bit heavier than the first or second warmup is still going to fall within the low repetition range.

So just two to four repetitions for me, including a few more warmup sets with progressively heavier weight on each warmup, but still keeping the total repetition count low.

So somewhere in the range of two to six repetitions has been very beneficial for improving my

work output during the so-called work sets, regardless of whether or not I'm training in the three to five repetition range or whether or not I'm training in the six to 15 repetition range.

I know for some people, this might be kind of surprising.

How is it that my work sets are actually higher repetition than my warmup sets or put differently?

How and why is it that my warmup sets are lower repetition than my work sets?

And that's because I fall into this category of people that tends to fatigue pretty quickly when doing resistance training.

So for me, keeping the repetition count on any individual warmup set pretty low has allowed me to really improve my strength output and really improve my strength and hypertrophy training when I shift to the so-called work sets.

So I already listed off a number of important documented benefits and benefits that I've certainly experienced by incorporating low repetition, pure strength work into my yearly training cycle for periods of eight to 12 weeks.

In addition to that, during my conversation with Dr. Andy Galpin, he said something very important for everyone to hear and understand.

He said, when you look at the data on aging and performance, in particular, muscular performance, you see some very interesting patterns within the data.

He said, for instance, that for every year after age 40, there's a 1% drop in muscle size that can be offset by resistance training, but that if you don't do resistance training, that you won't offset.

And during that series, we also talked about the minimum requirement for six and probably more like 10 working sets per muscle group per week in order to at least maintain muscle size, not just age 40 and beyond, but even at younger ages.

Okay.

So that's muscle size, 1% decrease per year, unless you do the right thing.

And the right thing is get six to 10 working sets per week in order to offset that decrease.

And if you train properly for hypertrophy, yes, you can still increase muscle size past age 40.

In addition, he said that there is a three to 5% reduction per year for every year past age 40 in strength and power.

Now that's a very important metric because what it's telling us is that the drop off in strength and power is significantly greater per each year after age 40 than is the decrease in muscle size, telling us that we have to do something to offset that decrease in strength and power.

In addition, he mentioned that for every year past age 40, there is an eight to 10% decrease in speed and in explosiveness.

And so if one is interested in maintaining speed of muscular movement and explosiveness of muscular movement, something that's perhaps important to a number of you.

One also asked to incorporate training specifically geared toward maintaining or improving speed and explosiveness.

Now, I, like many people, am not so interested in speed and explosiveness.

I know they have their utility, but I am interested in maintaining muscle size over the course of my life, perhaps even adding some muscle to particular muscle groups.

I'm also very interested in at least maintaining and ideally even gaining some strength in certain muscle groups throughout my entire lifespan.

And that's not just for performance reasons.

That's also because we know that maintaining or improving strength of our muscles is very important across the entire lifespan, but especially in the years spanning from 40 until death, which I think for most people will fall somewhere between 50, 60, 70, or ideally out into the 80s, 90s, or hundreds, right?

That's what we're all seeking is to die later in better health.

And in order to do that, we have to dedicate some very specific training protocols in order to maintain or build strength.

So to summarize, in addition to all the positive reasons to do dedicated strength training that I mentioned before, it's highly recommended that you do some dedicated strength training for the purposes of offsetting the age related decline in strength that occurs again, three to 5% per year past age 40, which is a pretty significant decline.

But the good news is if you do the three to five protocol for say 12 weeks per year, and then you continue to resistance train using other repetition ranges geared towards hypertrophy and strength, or perhaps even muscular endurance, the good news is you'll maintain your strength and perhaps even build your strength offsetting that natural decrease that would otherwise occur.

I'd like to take a quick break and acknowledge one of our sponsors, athletic greens.

Now called AG one is a vitamin mineral probiotic drink that covers all of your foundational nutritional needs.

I've been taking athletic greens since 2012.

So I'm delighted that they're sponsoring the podcast.

The reason I started taking athletic greens and the reason I still take athletic greens once or usually twice a day is that it gets to be the probiotics that I need for gut health.

Our gut is very important.

It's populated by gut microbiota that communicate with the brain, the immune system and basically all the biological systems of our body to strongly impact our immediate and long-term health.

And those probiotics and athletic greens are optimal and vital for microbiotic health.

In addition, athletic greens contains a number of adaptogens, vitamins and minerals that make sure that all of my foundational nutritional needs are met.

And it tastes great.

If you'd like to try athletic greens, you can go to [athleticgreens.com slash Huberman](https://athleticgreens.com/slash/Huberman), and they'll give you five free travel packs that make it really easy to mix up athletic greens while you're on the road and the car on the plane, et cetera.

And they'll give you a year supply of vitamin D three K two.

Again, that's [athleticgreens.com slash Huberman](https://athleticgreens.com/slash/Huberman) to get the five free travel packs and the year supply of vitamin D three K two.

The next tool I'm about to describe relates to your cardiovascular training.

And it's a tool that can greatly improve your cardiovascular fitness with a limited amount of time commitment.

But that is not to say it is easy.

What I'm referring to is the so-called sugar cane.

If you listen to the series with Dr. Andy Galpin, you may recall our discussion about the sugar cane, which is so named after our friend and expert trainer, Kenny Cain.

And it is a very efficient yet somewhat brutal way to increase your cardiovascular output.

So the sugar cane is the type of protocol that you would incorporate once in the period of a week, but certainly not every week.

It's the kind of thing that you might throw in once every two weeks or once every four weeks as a replacement for your other high intensity interval training.

The sugar cane involves selecting some form of exercise that you can do at high intensity safely.

And of course, it will differ between individuals.

For some of you, it will be a stationary bike.

For others of you, it will be a road bike.

For others of you, it will be running and for others of you, it will be rowing.

The exact form of exercise is not important.

What is important is that you can generate a lot of intensity.

So you're going to be doing some sprint-like work, although not all out sprints, except on the final round.

I'll explain where all this is going in a moment.

But again, you need to select a movement that you can do without injuring yourself while still performing a movement at high intensity.

So for me, that would be running.

For you, it might be something else.

The sugar cane is pretty straightforward in structure.

It involves three rounds after a brief warm up, of course, so you're going to do three to five minutes of jogging or jumping jacks or skipping rope, something to get your core body temperature up so that you're prepared to do the high intensity work.

And then there are only three rounds of high intensity work, and they go as the following.

In round one, you're going to take two minutes, so you'll need to set a timer for two minutes, and you're going to go the maximum distance that you can in that two minutes.

So run the maximum distance that you can for two minutes or cycle the maximum distance that you can for two minutes, or verse a climber the maximum distance that you can for two minutes.

Whatever you select, you're going to do that as far and as fast as you can for the duration of two minutes.

So depending on the movement and depending on your level of fitness, that distance might be 400 meters, 600 meters, 800 meters, et cetera.

Whatever distance you travel in that two minutes, you are going to mark that distance down in your mind or in your phone or on a piece of paper.

And then you're going to rest two minutes.

So two minutes of work, then rest two minutes.

Then in round two, you're going to go the same distance that you did in round one, and you're going to take as much time as you need to do that distance as fast as you can.

So if you went 600 meters in two minutes for round one, in round two, you're going to go

600 meters, and it's going to take you however long it takes you.

Chances are, if you really did the best you could in round one, you were at maximum output for the first two minutes, that in round two, it's going to take you longer than two minutes to travel that equivalent distance.

However, there is the possibility that it will take you less time.

But for most people, it's going to take you more time.

So staying with this example of 600 meters in two minutes on round one, in round two, you're going to go 600 meters.

Let's say it takes you two minutes and 30 seconds.

You then are going to mark down how long round two took you.

So in this case, the example is two minutes and 30 seconds.

Then you're going to rest another two minutes.

And then in round three, you're going to go all out again as fast and as safely as you can for the same duration that you did in round two.

And your goal is to go at least as far as you went in round one.

And if there's still time left, you're going to continue to go all out again as fast as you safely can until the entire duration is completed.

So it's really just three rounds with two rest periods in between round one and round three.

And then I highly recommend that after round three, that you do some sort of dedicated cool down.

So instead of just flopping onto the bench or the floor or the lawn, that you walk around slowly until you recover your breathing.

The reason I like the sugarcane as a tool that one implements once every, say, two to four weeks as a replacement for one's typical high-intensity interval training is several fold.

First of all, if you provide the right intensity in round one and round two and round three, it is sure to elevate your heart rate substantially.

And in doing so, improve your VO2 max, which is correlated with all sorts of important metrics related to health span performance and lifespan.

One of all, it gamifies things a little bit.

It pits you against yourself in the sense that if you go out at maximum speed, again, performing a movement that you can safely perform at maximum speed in round one, well, then you have something to compete against in round two and round three.

And that makes the high-intensity interval training, first of all, very intense, but also it makes it kind of fun in a way that lets you forget just how painful the whole thing is.

The next tool to improve your fitness is called exercise snacks.

And as the name suggests, this is a fun one.

And was suggested by Dr. Andy Galpin as a way to either enhance or maintain your fitness depending on how your core or foundational fitness program is going.

So when I say core, I don't mean your abs.

I mean, whether or not you're getting your regular cardio and your regular resistance training, if you were to add one or several of these exercise snacks per week, it can

further improve things like VO2 max, muscular endurance, et cetera.

I'll talk about the specific snacks that you will be doing in a moment.

However, as Dr. Andy Galpin also pointed out, there are times in which we happen to not be following our foundational fitness program, either because work demands or family demands or we're traveling, we're simply not keeping up with our basic routine.

And under those conditions, exercise snacks are a terrific way to maintain the fitness that you've already built and developed.

And you don't lose any ground in a week, say where you get particularly busy.

Now exercise snacks can take on a variety of different forms, but for sake of simplicity and clarity, today we're going to divide them into two major categories.

The first category are exercise snacks that are going to improve or maintain your cardiovascular fitness or your ability to run or cycle or row some distance, say, you know, 12 minutes or longer.

Okay.

But keep in mind, these exercise snacks are very, very brief.

They don't require that you do them for 12 minutes or longer.

What they are going to do is either maintain or enhance the type of endurance that allows you to continue in an activity for 12 minutes or longer.

The second category of exercise snack relates to muscular endurance.

Muscular endurance is a very important aspect of fitness.

And even though some people are already training for muscular endurance, it's something that most people are not doing enough training for.

Muscular endurance is your ability, say, to maintain a wall sit or to maintain a plank or to do the maximum number of pushups that you can do in one session, the sort of, you know, drop to the floor and give me as many pushups as you possibly can type of thing or as many sit ups as you can type of thing.

Muscular endurance translates to a number of other aspects of fitness and it's something that we should all be working on.

And again, many people just don't make space for it in their regular routine.

So now we have these two categories of exercise snacks.

One geared toward enhancing or maintaining your cardiovascular fitness as it translates to longer duration endurance activity.

So 12 minutes or longer.

And then the other category is purely muscular endurance, which is essentially some bout of exercise that's going to be fairly brief anywhere from a minute to two minutes, but certainly less than 12 minutes.

Okay.

So let me give you an example of an exercise snack for enhancing your long duration endurance, 12 minutes or longer.

This is the sort of thing that if you were going to incorporate into your routine and I highly recommend that you do can essentially be done anytime with no warm up.

A good example of an exercise snack of this type would be to suddenly stand up from your desk and to do a hundred jumping jacks.

Now depending on how fit you are and how fast you do those jumping jacks and how wide and

you know, tall you do those jumping jacks, meaning, you know, are you doing these kind of little things where your hands don't actually meet and your hand like parting your legs just a little bit, or you're doing full jumping jacks or really jumping and, you know, setting your feet out as wide as you comfortably and safely can and then bring your hands together. It could take you anywhere from 30 seconds to 90 seconds.

Okay.

So in the case of jumping jacks, you may end up doing this for 90 seconds, but the point is to simply do a hundred jumping jacks.

Or if that takes too long, you can even do just 25 or 50 jumping jacks.

The point is that it's going to get you moving your muscles.

It's going to get your heart rate up.

Even if you're very, very fit, if you're doing these fast enough and you're doing them with proper form, it's going to get your heart rate up and then you're done.

You can sit back down to your desk or you can continue to walk through the airport.

Yes.

I've done these in the airport typically not while walking toward my gate, but at the gate.

But occasionally I'm feeling lethargic or I haven't had the opportunity to train that day and perhaps I won't get the opportunity to train.

So I'll do something like a hundred jumping jacks while, you know, facing the window.

So it feels a little less awkward facing people while you're doing them.

And of course you don't have to do jumping jacks and equally effective type of exercise snack is to find a stairwell and to simply go up that stairwell as fast as you safely can for 20 to 30 seconds.

So perhaps just find the bottom of a stairwell and go up that stairwell as quickly as you can and perhaps go down as quickly as you can and just keep doing that for about 20 to 40 seconds and then you're essentially done.

You could also opt to pick some distance away from your car in the parking lot.

You know, assuming you're not carrying any heavy bags or anything and simply run to your car.

So 20 to 30 seconds of not necessarily all out sprinting.

You don't want to injure yourself because again, this is done without a warm up.

These exercise snacks are designed to be inserted into your day and into your week, essentially at random.

You could plan them if you want, but anytime you feel inspired or perhaps anytime you're feeling like you don't want to do one, you could simply do one of these exercise snacks.

And of course, doing jumping jacks or running to your car or taking the stairs very quickly up and down or just up and then walking down, for instance, and doing a few jumping jacks.

Things of that sort, of course, can take on a near infinite number of different variations.

So if you don't like any of the variations that I just presented, you can easily come up with something else.

Again, the purpose of these exercise snacks is to get your heart rate up.

It's of course to do this while not getting injured and it is entirely compatible with an existing exercise program.

It in no way is going to impede your performance in strength or hypertrophy or other forms of long form endurance or high intensity interval training.

Quite to the contrary, everything we know about these exercise snacks is that they enhance various aspects of your physiology in ways that promote both recovery and performance in your other types of exercise and your other types of athletic endeavors.

So no reason to think that they are going to be problematic for your training.

But of course, don't trip, don't fall, don't undertake a movement that puts you into a range of motion that has you hurting your back, your knee or any other part of your body, you know, start off slowly and find something that really works for you.

So these are very easy.

They take very little time.

They're fun, to be honest.

And as was discussed in the conversation with Dr. Andy Galpin, they're also very effective.

The second category of exercise snack are the exercise snacks that enhance muscular endurance.

So muscular endurance is the type of endurance that allows you to maintain a fixed position for some period of time, usually somewhere between one and three minutes.

But these endurance bouts are never going to last 12 or more minutes unless you are exceptionally evolved in terms of your muscular endurance abilities.

What I'm talking about here are things like planks, wall sits, maximum number of push-ups, things of that sort.

And this is an aspect of fitness that translates to other aspects of fitness in a very important way.

And again, this was covered in the exercise series with Dr. Andy Galpin.

I don't want to go into any of the details now because it was all covered there.

It's very easy to look up because it's time-stamped.

But just in brief, muscular endurance allows the buildup of more microvascular supply to muscles and connective tissue in a way that allows delivery and removal of more nutrients and waste products.

Now, I realize to the physios, things like nutrients and waste products as far too broad a category.

But what we're talking about here is the ability to deliver more fuel and oxygen and to remove waste products of muscular effort or to be more specific, neuromuscular effort.

This is a great thing because it can help you enhance your strength training, enhance your hypertrophy training, enhance your long distance endurance and your middle distance and even your short distance endurance.

And these exercise snacks for building muscular endurance are exceedingly easy to do.

And you can even do them while talking on the phone, especially if you're using headphones or if you have your phone on speaker.

A good example of an exercise snack for muscular endurance would be a 30 to 60 second or perhaps longer wall sit.

So remember wall sits.

Wall sits are, as the name suggests, where you put your feet out some distance from a wall, you squat down into a seated position, but there's no chair there.

And then you maintain that seated position.

And that is harder to do over time.

Okay.

You could lean back against the wall a little bit harder if you wanted to gain some extra support and continue.

But the idea here is that you're going to go not necessarily to muscular failure, but to the point where you can't continue to sit in that wall sit position.

You could also simply do this as an air squat down to the bottom position where you're comfortable. And then you don't want to rest down there.

I mean, you want to maintain some tension in your quadriceps and other muscles of your lower body so that you're actively trying to support yourself in the seated position, but without a seat below you.

That can be done again while on a speaker phone conversation that can be done at random throughout the day.

You can just decide, okay, I'm going to do a wall sit now and I'm going to time myself.

I'm going to see how long I can do this for.

Or you could decide to do a plank.

I've done this while on a phone call.

Sorry if it was you that I was talking to, but I put the phone on speaker and just gotten into a plank position and then I'll just have the conversation in the plank position.

I don't fight to maintain that plank position past the point where I could continue to have a conversation.

So again, this is a type of exercise that one is trying to incorporate into their daily routine.

If you wanted to dedicate a specific amount of time just to doing these exercise snacks, you could, but it's far more reasonable to assume that people will incorporate these into their daily routine more regularly.

If you can incorporate it truly into the other aspects of your routine like work, you do this while watching TV or listening to a podcast.

One form of muscular endurance exercise snack that's really terrific and is a bit of a challenge that's fun is to just simply see how many pushups you can do.

And we talked about proper pushup form during the episode series with Dr. Andy Galpin.

But here what we're talking about is chest all the way to the ground.

So it touches the ground, then pushing up till your arms are completely straight.

That's one pushup.

And then continuing in piston like fashion, meaning you're not pausing at the top and taking a bunch of breaths, you're not going to a plank position in other words, but continuing to do as many pushups as you can to see whether or not you can enhance that number over time.

And in any case, just to simply get your body working to engage the muscles of your chest, your shoulders, your triceps and your core, et cetera.

And to do that every once in a while.

So instead of needing somebody to say, drop and give me 20, just see whether or not some point, any point throughout the day and get into a pushup position to your maximum number of pushups and just mentally note that number to yourself.

Again, these exercise snacks serve multiple roles.

They're designed to get you moving, to get your heart rate going, to maintain or enhance your fitness and other domains of fitness.

And this is very important to not take too much time out of your schedule.

In fact, like zone two cardio, right?

Being the type of movement that you're just going to do a lot throughout the week, carrying groceries, et cetera.

As we discussed earlier, these exercise snacks are designed to be incorporated into your daily life.

And I must say that having started doing these after recording the series with Dr.

Andy Galpin, I've noticed two things.

First of all, including these exercise snacks, at least once a week and more like three to five times a week for me.

So that's one exercise snack done three to five times per week has definitely correlated with improvements in my fitness in other domains of fitness, strength, hypertrophy, long distance, endurance, et cetera.

Now I've changed a number of other things as well as a consequence of that series with Dr. Andy Galpin.

So I can't say for sure that it's the exercise snacks per se that are causing all those positive shifts.

I have to imagine that it's not just the exercise snacks, but they've become an important part of my routine.

And that relates to the second point, which is that the exercise snacks are designed to be fun and easy.

And so I really enjoy doing them so much so that if I don't do one for a couple of days, I start to crave them a little bit, kind of like the other kind of snack.

The next category of tool to improve your fitness relates to breathing or respiration.

Now, breathing and respiration is an enormous topic in and of itself.

And in fact, I did an entire episode on breathing and respiration.

And this is a topic that my laboratory works on extensively as it relates to anxiety control and some other aspects of mental health, as well as to physical performance.

For today's discussion, I want to just review a few tools that one can incorporate both into workouts and around workouts that can greatly enhance fitness and recovery.

The first one is the type of respiration tool that you use between sets of exercise.

And again, here we're talking about resistance training, but we could just as easily be talking about rest between rounds of say high intensity interval training.

So for instance, between bouts of sprinting on the track or the bike or the treadmill or the rower, a great pattern of breathing to incorporate during rest between sets is something that I've talked about before in other contexts, which is the physiological side.

The physiological side is a deep inhale through the nose to maximally or near maximally inflate your lungs. And then a second very brief inhale, and it's necessarily brief because your lungs are already pretty full, to maximally inflate your lungs and to make sure that any of the little sacs, the little aviolabial lungs that have collapsed during the exercise exertion will reinflate and then a long exhale until lungs empty.

So I'll demonstrate it right now as I've done many times before, but if you haven't seen it or heard it before, it's two inhales followed by an extended exhale and it goes like this.

You'll notice that the inhales were through the nose and the exhale was through the mouth.

That's the ideal way to do it for a number of reasons.

Check out the episode that I did on respiration physiology, aka breathing, if you want more details on why that is, but two inhales through the nose and a long extended exhale through the mouth, the so-called physiological side, not named by me, but rather named by physiologists in the 1930s is as far as we know, the fastest way to shift your nervous system from so-called sympathetic drive to more parasympathetic drive from a state of greater alertness to a state of greater calm. Now, the reason to do this between sets of resistance training is that the more that you can shift yourself from sympathetic drive to parasympathetic drive, that is from alert to calm in between sets, the more energy and focus you can devote to exertion during your work sets.

And so one way to do this that's very convenient and very effective is to consider the last repetition of your set, a physiological side, which is not to say, okay, I want to be very clear, which is not to say that you should do the physiological side during your set. In fact, I recommend you do not do that, but rather, if you're doing six repetitions of a given exercise, and you, let's say fail on the sixth, or you do that six repetition, and you're just close to failure, because again, your work set should be too failure or close to it most of the time, then set down the weight, and then you're going to do the next repetition as the physiological side, meaning you're not going to do the movement, you're going to think of doing a physiological side as the last repetition of every set, not during the last repetition of the resistance training movement. Okay. So the physiological side is something you do at the beginning of the rest period immediately following a set. If you'd rather think about it that way, because it's more convenient than thinking about it as the last rep of a set, be my guest, whatever works for you. But what you'll quickly find is that if you do a physiological side right after completing your last repetition, you'll calm down much more quickly, your heart rate will come down more quickly, and you'll recover more completely in whatever designated rest period you've allowed yourself, whether or not it's 30 seconds, which would be very short, frankly, or it's a five minute period of rest between sets. If you do one truly just one physiological side at the beginning of the rest period, you are going to effectively shift your nervous system in the direction you want it to go during those rest periods. And of course, if you're training hard during your work sets, you run zero risk whatsoever of feeling so calm that you don't feel motivated to do your next set. I promise you that it will allow you to relax more at the beginning of the rest period than you ordinarily would to shift into a state of rest. You know, they're differing opinions about whether or not you should walk around or stay still during your rest periods. I like to walk around a bit and stay standing. I'm not one of these people that kind of collapses into a C shape on the bench in between sets. I like to stand up and, you know, breathe normally walk around during a little water, etc. In any case, doing a physiological side at the beginning of each rest interval between work sets of resistance training is a very effective way to enhance your focus and your output during your work sets. Now, the last respiration tool to improve your fitness is again, a tool gleaned from the discussion with Dr. Andy Galpin. And that's to include a three to five minute period at the end of every single workout. So it doesn't matter if it's high intensity interval training or it's resistance

training, or it's a long run of some sort at the end of every workout to take three to five minutes. So you'll want to set a timer and to do some form of parasympathetic that is calming, promoting breathing in order to shift your nervous system from a state of heightened alertness and output into a state of recovery. Because as you all well know by now, you get fitter not during your workouts, but rather after your workouts in between workouts. So you stimulate the adaptation during a workout, but you get the adaptation, you get the actual improvement in between workouts. And a common mistake that many people make, and I made this mistake for years, was to finish a great workout. And then, you know, you're texting on your phone or you're talking on the phone, you're driving home, it's certainly not as intense as the workout that you just did. Maybe you're even feeling really calm from a nice long jog, or you had a particularly good workout that day, and you're feeling really happy. So you're enjoying the high, so to speak. Well, when you do three to five minutes of what's often called down regulation breathing, after a workout, it allows you to recover and to induce the adaptation that you've been after the one that you actually train for much more quickly. I can't tell you how many people I know who start to incorporate this into their workouts, find that they recover far better from their workouts, which might seem a little bit surprising. You know, why would it be that just three to five minutes of some activity would enhance recovery to such a great degree? And that's because typically people don't bookend their workouts. They finish their workouts. And of course, they're not continuing to lift weights or run, but they move about their day in their life, even if it's preparing a meal in a way that the level of stress and therefore stress hormones, things like cortisol, adrenaline, things that, by the way, are excellent to elevate during a workout, things like inflammatory markers, which, by the way, are great to enhance during a workout. That actually happens during a workout. You have a massive increase in inflammatory markers, which might seem bad, but all of those things are enhancing the adaptation that you're seeking. But as soon as those workouts end, you want to shift into recovery mode. And this three to five minutes of down regulation breathing is a terrific way to do that. There are a couple of different patterns of breathing that will work best, but all of them emphasize exhales. Okay, I want to repeat that. All of them emphasize exhale. So for instance, you could just choose slow, deliberate breathing. How does that emphasize exhales? Well, ordinarily, when we breathe, we inhale actively and we exhale passively. Whenever we deliberately breathe more slowly, we are actively exhaling. Okay, so active exhales really promote the calming response in brain and body. The other thing you could do, which many people are now doing is to do a repeated round of physiological size. So the double inhale through the nose, long exhale through the mouth, but repeated for say three minutes. That's another version. The other thing you could do is simply to notice your exhales and to emphasize your exhales make them longer and more vigorous than your inhales. Now you don't want to turn this into a breathwork session where you're, you know, you're doing, you know, Pranayama or Kundalini breathing or something of that sort. The idea is to calm down. So anytime you're extending your exhales, you're actively exhaling, you're trying to slow your breathing down overall, you're going to shift yourself in the right direction. So rather than complicate this type of tool, the best thing you can do is just focus on those exhales, slow your breathing overall, use physiological size if you want, or simply sit in your vehicle or if you have to drive home while doing this extended exhale type of down regulation.

Ideally, you would take a couple of minutes and just shift your whole system by not driving, you know, closing your eyes and just sitting in your car stationary, of course, don't drive with your eyes closed or bike with your eyes closed. Just simply calm down, extend your exhales and shift from the workout to the recovery mode, which is where the progress is going to arrive. I'd like to take a quick break and acknowledge our sponsor, Inside Tracker. Inside Tracker is a personalized nutrition platform that analyzes data from your blood and DNA to help you better understand your body and help you meet your health goals. I'm a big believer in getting regular blood work done for the simple reason that many of the factors that impact your immediate and long term health can only be analyzed from a quality blood test. However, with a lot of blood tests out there, you get information back about blood lipids, about hormones and so on, but you don't know what to do with that information. With Inside Tracker, they have a personalized platform that makes it very easy to understand your data, that is, to understand what those lipids, what those hormone levels, et cetera mean, and behavioral supplement nutrition and other protocols to adjust those numbers to bring them into the ranges that are ideal for your immediate and long term health. Inside Tracker's ultimate plan now includes measures of both ApoB and of insulin, which are key indicators of cardiovascular health and energy regulation. If you'd like to try Inside Tracker, you can visit [inside.tracker.com slash Huberman](https://inside.tracker.com/Huberman) to get 20% off any of Inside Tracker's plans. Again, that's [inside.tracker.com slash Huberman](https://inside.tracker.com/Huberman) to get 20% off. The next tools to improve your fitness are psychological tools, and they're really geared toward enhancing your focus during your workout and separating or segmenting your workouts from the other parts of your day. Now, of course, workouts are naturally segmented from the other parts of your day unless you're running around all day long or you're lifting weights or other heavy objects all day long. But one of the more attractive tools that was presented during the series with Dr. Galpin that I adopted and found to be really effective is this concept of the line. The line is this concept that you have a physical location, say at the entrance to a gym or at the start of your run or your bike or maybe it's around the stationary exercise device that you use for which once you cross that line, you are all about business. Okay, you're not socializing or at least not too much. You don't want to be rude to people, but you're really focused on your workout. So this is especially effective on days when you're a little bit distracted or you didn't sleep that well the night before, or maybe you know, you got something going on in mind or you're in an argument or you're excited about something else. But if you care about your fitness, which I hope everyone does, and your goal during any workout is to stimulate a particular type of physiological adaptation, strength, hypertrophy, long distance endurance, etc. And you also don't want to get injured so that you can continue to train for your entire life as regularly as possible. The concept of the line is fantastic because what it does is it forces you to compartmentalize the portion of your life that comes before the workout and after the workout and also to really enjoy your workouts. This is something that's not often discussed, but nowadays with the advent of smartphones, there's a lot of infiltration of other types of communication and information while one is supposed to be exercising. And so our life has become far less compartmentalized than it used to be before the advent of smartphones. Now, of course, smartphones are wonderful. They provide all sorts of wonderful tools and benefits. And of course, I use one and I'll talk about how

to incorporate the smartphone in a very specific way to enhance your workouts in just a moment. But the idea of a line is you pick a location, it can change each workout, but ideally it would be at the threshold of where the physical location to the workout begins. And once you cross that line, you are all business. You are taking care of business, which is not to say that you can't enjoy your workouts. In fact, you absolutely should. One of the best pieces of advice that I ever got about fitness was given to me when I was a teenager and I started lifting weights. And the person who was teaching me how to do that said one of the best things that you can do and you absolutely should do for your fitness now and forever is to learn to enjoy training hard. And that really stuck with me. I really do enjoy training hard, but that was something that I learned how to do over time. I took on the mentality that I'm here by choice. I'm here for my own good and my own fitness to enhance my life. So I'm going to enjoy training hard. I'm going to enjoy training effectively. And of course there are days when I train a little less hard, where I back off quite a bit. I even take rest periods of a week every once in a while, every, you know, say 12 to 16 weeks, I'll take a week off and just do some activities like hiking and things of that sort. I talked to all about extended layoffs, meaning a layoff of more than two days during the episode that I did by myself, which is the optimal fitness protocols episode. But in any case, learning to train hard and enjoy training hard and really making the workout something that is separate from the rest of your life is one of the most gratifying things that you can do to enhance your overall fitness, because it really teaches you how to designate your mind and your body toward this one specific set of goals while you are there and to really enjoy the process because fitness can be a truly enjoyable process, even when you were exerting yourself especially hard. And for you, masochists out there, it can be especially because you're training hard that it feels so good in any event. The key is to set some sort of boundary and know that when you cross into that boundary, you're training and when you cross out of that boundary, you're done training, which also lends itself to more adequate recovery and the decompression type breathing exercises that we talked about before. I'm not going to tell you whether or not you need to do the down regulation breathing at the end of your workout within the line or after you cross the line, that's up to you. I don't think one needs to get that specific. Now, another tool that's wonderfully effective, not just for your workouts, but for all areas of your life is if you are going to bring a smartphone to your workouts to set some boundaries around what you're going to listen to and do with that smartphone during your workouts. I see people texting, I see people doing selfies, I see people having phone calls, I see people, I presume listening to music or podcasts. Look, I am not the smartphone police, nor are you. And everyone has a right to use their smartphone in the way that they choose is best for them in order to distract themselves or focus themselves or enrich their life. Look, it's a free world, of course, or for some than for others, but you can do what you want with your smartphone. However, if your goal is to improve your fitness, one of the more powerful things you can do with your smartphone is to decide before you cross the line into your workout, what you're going to listen to or do with that phone or not. So for me, I like to designate a playlist of music for that particular workout. And then I just stick to that playlist. I might repeat songs that I like a lot or someone talks to me while the music's playing. I might go back and restart a song if they distracted me, that sort of thing. Although I do my best

to not get into too much social chit chat during workouts, but I'm friendly and you know, it's nice when people come over and say, hello, I sometimes work out with other people in which case I don't use headphones. I don't use a smartphone, but setting a playlist or to designating a podcast or to designating an audiobook or to whatever it is that you're going to listen to, to really decide what that's going to be before you do your workout. The reason I say this is that I observe a lot of people and frankly, I've observed myself under conditions where I'm suddenly in a text communication or I'm bouncing between albums or between podcasts or between whatever it is on the phone to the point where rest intervals aren't being controlled well to the point where focus during sets becomes harder to achieve at the beginning of a set because in between sets, I was focused on a conversation not on training. I'm a big believer in making your exercise fun, making it accessible, meaning not so expensive or geographically difficult to achieve that you don't do it or that it starts to interfere with other areas of life. This is really important. We want fitness to be blended with the rest of your life, but you don't want it so blended with the rest of your life that the rest of your life starts to impede your efforts or and this happens quite often for a lot of people that workout start to take an hour and a half, two hours when they could easily be completed in 45 minutes to an hour if you were just more efficient with your time. And of course you don't need me to tell you this, but smartphones can be one of the major bleeds on our focus and efficiency. In fact, it can cause you to hemorrhage focus and efficiency. So what I'm suggesting here is not throwing away your smartphone, although some people do benefit from just leaving it in the car or at home when they're training, but rather to designate podcasts, books, music, playlists for that particular workout and to just stick to those for the duration of your workout. And once you cross into the line, that's what you're listening to and only that or nothing. And of course, once you cross back over the line as you finish your workout, you can decide to continue to listen to the podcast or continue to listen to the audio book or to the music. That's up to you. Although I highly recommend that you do incorporate that down regulation period of three to five minutes minimum. The last category of tools to improve your fitness come from the discussions about nutrition and supplementation and recovery in the series with Dr. Andy Galpin. Now the list of tools I'm about to describe is not exhaustive, meaning it doesn't even begin to come close to the total number of tools that one could glean from the discussion about nutrition and supplementation that I had with Dr. Andy Galpin on this podcast, but they are the major ones that are definitely worth knowing. And those include supplementing with omega three fatty acids. Now, omega three fatty acids are found, of course, in foods, things like fatty fish and krill of all things, certain forms of algae, et cetera. But most people do not get enough of so-called EPA form of omega threes. And for that reason, I and many other people choose to supplement with a minimum of one gram per day and in some cases as high as two grams per day of omega threes in supplement form. So typically one would get to one to two grams of EPA by supplementing their nutrition, their diet, that is, with fish oil capsules or liquid fish oil. There are many different sources of these that was discussed in an episode that I did with Dr. Ron Patrick. I find that it's most cost efficient to get that one to two grams of EPAs from liquid fish oil. Despite what you might see on the internet, I don't have any relationship whatsoever to a liquid fish oil company. You just want to make sure that you go

with a reputable brand. I like the ones that are flavored with lemon so that it offsets the taste of fish oil. And I'll take a tablespoon or two of that per day. And if I'm traveling, and even if I'm not, I will often use fish oil capsules. And there are a variety of different sources of those as well. Getting sufficient amounts of omega three has been shown to be important for mood. Okay, so as a way to offset depression, but also for enhancing overall mood, that probably relates to the omega threes effect on neurotransmission, not just for neuromodulators like serotonin and dopamine, but for all neurotransmission. And neurotransmission, of course, is essential for neuromuscular performance. And the omega threes have been implicated in reducing the inflammation

response, cardiovascular health, etc. I realize that there is some debate about omega threes. But when I look at the bulk of literature about the omega threes, it's very clear to me that getting one to two grams of EPA form of omega three per day is the right thing for me to do. And many others find that as well. The second tool to enhance your fitness under this category of nutrition and supplementation is creatine. Now again, creatine is not just found in supplement form, it's also found of course in foods in particular red meat. However, the amount of red meat that one would have to eat in order to get the amount of creatine that one would start to see a real performance enhancing effect is just far too high, you'd be ingesting far too much of other things in red meat that you wouldn't want that much of. And for that reason, I and many other people will take creatine daily. We now know there's no need to so called load creatine in the old days as it were. So old days, by the way, meaning mid nineties and 2000s, we were all told that we had to load creatine, we had to take high dose creatine for four or five days. And then you could back off to a maintenance dose. Now it's very clear you can just take a daily dose of creatine and that it really doesn't matter when you take that creatine, you could take it post workout as many people do, you could take it pre workout, it really doesn't seem to matter. I happen to take it post workout just as a matter of habit. But again, you could take it any time of day. Now the point I want to make about creatine is one that's a bit different than the other discussions out there. I have no issue with the majority of what's discussed about creatine out there. For instance, that creatine monohydrate is the most effective form. Fortunately, creatine monohydrate is also the least expensive form of creatine that sold out there. I see no evidence whatsoever that the other forms of creatine are superior to creatine monohydrate. But what you'll usually hear is that taking five grams of creatine monohydrate per day is ideal for everybody. And that advice is simply not well informed by the scientific literature. If you are a larger person, so for instance, I weigh 100 kilograms, so that's about 220 pounds. Well, it turns out if you look at the literature on creatine and athletic performance, and if you look at the literature on creatine and cognitive performance, because as some of you already know, creatine is a fuel, or the phospho creatine system is a fuel system for the brain as well. And if you look at the studies on creatine, they almost always gauge the amount of creatine to give an individual based on their body weight. So you don't have to get really specific about this. But if you weigh, say 185 pounds to 250 pounds, you can get away with and probably should be taking 10 grams or so of creatine per day, which is what I do. Whereas if you weigh less than that, five grams or maybe even three grams is sufficient. Now I discussed this with Dr. Andy Galpin during that series. And one of the things that I've started to do since the closure of that series is to take more creatine per day. So now I'm taking 10, sometimes even as much as 15 grams per day of creatine. Again, this is powdered creatine monohydrate. My stomach tolerates it very well. But frankly,

I don't tend to get stomach aches or gastric distress from pretty much anything unless it's, you know, some form of food poisoning, which is exceedingly rare for me. So some people out there find that creatine really disrupts their gut and they need to take it with food or they really need to slowly increase the amount of creatine that they're taking each day. I find that I can put 10, even 15 grams of creatine into a, you know, a whey protein shake or into some water with a little bit of lemon juice just to make it taste a little less chalky drink that. And I don't have any gastric distress from that. So you'll need to find what works for you. But the point here is if you're going to take creatine, you don't just want to quote unquote take creatine, you know, one scoop per day, you really want to adjust the amount of creatine that you're ingesting according to your body weight. And I would give you a very specific formula of X grams of creatine per kilogram or pound of body weight. But believe it or not, no such specific recommendation has ever been published in the scientific literature. At least I couldn't find it in a way that's consistent with all the other papers, meaning you see a lot of variation. So what I'm talking about here is if you weigh 185 pounds or so, okay, plus or minus five pounds out to about 250 pounds, 10 to 15 grams of creatine per day is probably more appropriate for you than is five grams, meaning it's going to be more effective for enhancing physical performance. And perhaps again, perhaps even cognitive performance as well. And if you're somebody who weighs, you know, 180 pounds down to say 130 pounds, five grams of creatine per day is probably sufficient. The point here is if you are taking creatine, again, not everyone has to take creatine. There's no law that says that you have to take creatine. Some people don't like it. I know some people fear it's going to make their hair fall out. We already talked about that in previous episodes and the lack of data to support that idea. But I realized some people steer away from creatine for whatever reason. But if you decide that taking creatine is right for you, adjust the total amount of creatine that you take according to your body weight. The next supplementation based tool for enhancing your fitness is a rhodiola rosea. Now this very esoteric sounding supplement is one that I learned about both from Dr. Lane Norton when he was a guest on this podcast, expert in nutrition and frankly training as it relates to resistance training. And from Dr. Andy Galpin, rhodiola rosea is a supplement that's gaining increasing attention because it is what's called a cortisol modulator. It does not necessarily suppress cortisol. It does not increase cortisol. It's a cortisol modulator. And frankly, the mechanism by which rhodiola rosea modulates cortisol is still under investigation. I hope to do an episode about it in the future, at least make it part of an episode because the hypothesized mechanism that's starting to emerge is really interesting as it relates to neurons in the brain that control the stress response and glands in the body like the adrenals that control the stress response and that secrete cortisol. Regardless, there's a growing body of research that has explored rhodiola rosea supplementation and one's subjective perception of fatigue or output during high intensity training of various kinds, both resistance training as well as running and endurance type training. So I started taking rhodiola rosea about six months ago in response to conversations that I had again with Dr. Lee Norton and with Dr. Andy Galpin. And it's a supplement that I take before high intensity workouts. So I don't take it before a run because frankly, my runs either are very long and slow or they're very brief, like a high intensity interval training session. And I find those to be pretty easy to recover from even though they are very intense. I might take a rhodiola rosea supplement before doing a 30 minute hill run that's very intense, but typically I only take it about 10 to 15 minutes before any sort of high intensity resistance training

session in particular my leg day, which falls on day two of my exercise protocol or the torso day or the small body parts day. Again, here I'm referencing the way that I train across the week and you can find that training protocol as a downloadable completely zero cost PDF if you like. But I realize other people are using different body parts splits and different combinations of resistance training and endurance training. The reason I mentioned rhodiola rosea in this episode is that I realized that while some people might not yet be supplementing omega threes, they might not be supplementing creatine. There are many of you who are already doing those things

and you're looking for additional tools to give you an edge. So again, the rhodiola rosea would not fall into the category of foundational supplements. Certainly get your nutrition, right? Get your sleep, right? Get your sunlight, all the basics first, please before even thinking about any supplements. However, once you get into the category of supplements that can enhance fitness,

rhodiola rosea does seem to have some good research to support it in the context of lots of different forms of high intensity exercise. Now I can't tell you whether or not it's purely subjective or whether or not it's objective and subjective, but my experience has been that when I take rhodiola rosea, I definitely noticed that I can exert myself harder without feeling like I'm bringing myself to the brink of fatigue either during the exertion or afterwards. In other words, I feel like I can do more work without feeling so exhausted and I feel as if I'm recovering from my workouts more quickly in particular across the day after my workouts. In fact, if I had to cite one specific subjective effect that I've experienced from taking rhodiola rosea before very high intensity workouts is that prior to taking it, I would often find that three or four hours after the workout, having eaten a good meal, taken a shower, etc. And I was tired. I have a real dip in energy. But now I notice I have a lot of energy throughout the day, even after these very high intensity sessions in the early part of the day. And frankly, I haven't changed anything else about my supplementation or my nutrition, at least nothing major. So I personally am going to continue to take rhodiola rosea before these high intensity workouts. So for me, that's about two or three times per week. However, if I forgot to take rhodiola rosea before a workout, I have no reason to think that that workout would go much worse. This is a supplement that's designed

to sort of give you an edge to be able to exert more focus and intensity during your workouts with less perceived exertion and to enhance your recovery. The typical dosage of rhodiola rosea that you'll find in most supplements is 100 to 200 milligrams. And of course, anytime you're going to take a new supplement, you would be wise to figure out the lowest effective dose from that supplement. That's just logic, right? Why spend more money taking more of something that you don't need more of if you could get away with taking less of it. And it's just as effective, maybe even more effective. So I typically will take 100 to 200 milligrams of rhodiola rosea about 10 to 20 minutes before a workout. However, I've taken as little as 100 milligrams on a consistent basis. And frankly, I don't really experience much difference.

Whether I take 100 milligrams or I take 200 milligrams before a workout. So lately, I've just defaulted to taking 100 milligrams of rhodiola rosea before any high intensity workout. Now, the final tool that I want to review for improving your fitness comes from the category of nutrition. I've done lots of episodes about nutrition already on this podcast. We've done episodes about intermittent fasting. I did a long interview episode with Dr. Lane Norton,

where we discussed all the ins and outs of nutrition as it relates to fat loss, muscle gain, fitness in general, lifestyle in general. So check out that episode where you will learn his philosophy on nutrition, which frankly is the one that I largely subscribe to and of course, obeys the laws of thermodynamics, calories in calories out being fundamentally important, but also gets into all sorts of details about which sources of protein are most effective and bioavailable, how much protein you can incorporate into your muscles after training, etc. All of that is included in that episode. With that said, the series on exercise with Dr. Andy Galpin also included an episode on nutrition. And while having the discussion for that episode and then listening to that episode again, I realized that while certainly I've gotten a number of things right about my nutrition across the years, there are a few areas where I could probably do better without much effort in ways that could really enhance my fitness. And the thing that I'm referring to is that for me, my first meal of the day lands somewhere around 11 a.m., maybe 12 noon. Sometimes I'll eat an earlier breakfast, but most typically I hydrate and caffeinate and train in the morning and then I eat sometime around 11 or 12. And then I eat my last meal of the day sometime around 8.30 or 9. And as some of you already know, I tend to organize my meals such that meals during the early part of the day tend to lean more toward protein and fibrous carbohydrates. So things like meat and salad or chicken and salad, fish and salad, and maybe a little bit of starch. And the meals that I eat later in the day tend to be more starch focused and more vegetable focus of things like pasta, rice, etc. Later in the day because it helps me sleep. And the architecture of all that is really about energy and focus. I find I can focus a bit better and I have more energy throughout the day. When I have my first meal at around 11 or 12, and I keep the total amount of carbohydrates that I ingest during the day, moderate, not low, but moderate. Now there is an exception to that, which is if I do a high intensity resistance training session early in the morning, say train legs or train torso or even small body parts early in the morning, then I make sure to incorporate more starchy carbohydrates and some fruit, some simple sugars as well into the first meal of the day so that I can replenish the glycogen that I depleted during those high intensity resistance training sessions. However, after talking to Dr. Andy Galpin, I realized that I really shouldn't worry about or be afraid of eating something before training if I'm really hungry in the morning. So what I'm referring to here are the times in which I wake up and I want to train, but I personally like to train fasted and caffeinated. Yes, I do recommend that people delay their caffeine intake 90 to 120 minutes after waking if and only if you have trouble with an afternoon crash, you know, real fatigue in the afternoon, then it makes sense to delay your caffeine 90 to 120 minutes after waking. However, the exception to that is that if I'm going to train early in the day, I do ingest water to hydrate as well as electrolytes and caffeine prior to training. And sometimes that means I'm drinking caffeine within 30 minutes or 60 minutes of waking. I've tried to be clear about this in previous episodes, but I think a number of people have come to think that I always delay my caffeine intake 90 to 120 minutes after waking. And that's simply not the case. If I'm going to train in particular, if I'm going to do high intensity resistance training or a long run, I will ingest caffeine sooner than 90 to 120 minutes after waking. And in addition to that, yes, I tend to eat my first meal around 11am, maybe 12 noon. But if I wake up and I'm very hungry, I will eat a small meal that includes typically some protein and some fat. So some Brazil nuts, maybe a couple scoops of whey protein would be typical for me, or maybe even a little bit of oatmeal, some whey protein, not a lot of food in my gut.

But after talking to Dr. Andy Galpin, what I learned was for some people training fast, it feels best. I would consider myself one of those people. You may be somebody in that category as well, or you might be somebody who really feels as if you run best, you resistance train best when you've eaten, say 90 minutes or a couple hours before you do that.

There are basically no specific rules as it relates to whether or not you train fasted or train fed, except what you can handle in terms of gastric distress. So you'll want to make food choices according to that and try and avoid, of course, gastric distress. But basically the change that I've made is if I wake up and I'm hungry, I'll eat a small meal. Or if I want to work out in the afternoon or I have to work out in the afternoon and I have lunch at say 12 or 12 30 or 11 a.m. And the only opportunity that I have to train is 1pm or even 12 30, I will go ahead and train. And that's a new thing for me. Typically I try to keep my meals at least three to four hours prior to any training bout. And of course, if you're sleeping all night, you're not eating. And then if you wake up and you don't eat and you train in the morning, that's certainly longer than three or four hours unless you're sleeping very, very little, frankly. So essentially what I'm saying is figure out what works best for you. Do you prefer to train fasted or fed?

For some of you, you might prefer fasted before cardio and fed before resistance training. For some of you, it might be fasted is always best. Again, I put myself in that category. For some of you, it might be fed is always best. Again, this is highly individual. And that's another point that I'm trying to make here, which is Dr. Galpin really impressed upon me that there is no hard and fast rule about training fasted or fed. And this is the second point that having some flexibility in whether or not you can train fasted or fed allows you to incorporate your fitness training sessions more readily into a shifting schedule. And that's a really overarching theme of everything we've been discussing today, which is, yes, it's wonderful and important to have a core fitness program, something that you're really striving to do each and every week. And for me, that's three sessions of cardio, three resistance training sessions, and a day where I'm doing thermal stress training, which is just fancy language for deliberate cold and deliberate heat exposure. However, real life happens, travel, work, illness, family, all the sorts of things that can impinge on an exercise schedule and make it less likely that one would complete their workouts. So today, we've been discussing tools to improve your fitness, which are brief, easy to incorporate, scientifically supported, and that are shown to improve the various sorts of exercise adaptations and recovery that will allow you to get the most progress from your schedule. So while the tools that we discussed today relate to breathing, they relate to nutrition, they relate to supplementation, they relate to specific set and rep patterns and cadences and rest periods, etc. All of those specific recommendations are within a larger container that I hope has become clear, which is the best tools to improve your fitness are the tools that of course are going to be effective in improving your cardiovascular and strength and hypertrophy training, etc., whatever it is that your goals are, but also tools that are going to make it easier and more likely that you are going to engage in your fitness program with enthusiasm, with effort, and with focus. And as with any episode of this podcast, I covered a lot of information and there are a lot of different tools that one could incorporate. By no means do you need to incorporate them all, although if you choose to, that's wonderful. Just even incorporating one or two of them, say incorporating this notion of the line and the exercise snacks, or adjusting your level of flexibility as to whether or not you train fast or fed and the line, or trying a 12 week cycle of purely training for strength when you do your resistance training. But whether or not you pick one tool or all the

tools or somewhere in between, the key thing is to actually implement them. And I like to think that during today's discussion provided a number of tools, again, largely gleaned from the episode series with Dr. Andy Galpins. And again, if you haven't seen that series, that's linked in the show note captions. Those episodes are long, there are six of them, but they are a wealth of information

of every aspect of fitness. During today's episode, we're really just talking about the things that you can and I do believe should bring to your existing fitness program that can really make a positive difference without a lot of effort. Thank you for joining me for today's discussion all about tools to improve your fitness. If you're learning from and or enjoying this podcast, please subscribe to our YouTube channel. That's a terrific zero cost way to support us. In addition, please subscribe to the podcast on Spotify and Apple. And on both Spotify and Apple, you can leave us up to a five star review. If you have questions for me or comments about the podcast or guests that you'd like me to include on the Huberman Lab podcast, please put those in the comment section on YouTube. I do read all the comments. Please also check out the sponsors mentioned at the beginning and throughout today's episode. That's the best way to support this podcast. During today's episode and on many previous episodes of the Huberman Lab podcast, we discuss supplements. While supplements aren't necessary for everybody, many people derive tremendous benefit from them for things like enhancing sleep, hormone support and focus. The Huberman Lab podcast is partnered with Momentus supplements. If you'd like to see the supplements discussed on the Huberman Lab podcast, please go to live momentous spelled OUS, so live momentous.com slash Huberman. If you're not already following me on social media, it is Huberman Lab on all social media platforms. So that's Instagram, Facebook, Twitter and LinkedIn. And on all of those platforms, I cover science and science-based tools, some of which overlaps with the content of the Huberman Lab podcast, but much of which is distinct from the content on the Huberman Lab podcast. So again, it's Huberman Lab on all social media platforms. If you haven't already subscribed to the Huberman Lab podcast neural network newsletter, this is a completely zero cost newsletter. It comes out about once a month and it includes podcast summaries and toolkits. Toolkits are short PDFs that for instance, describe a toolkit for sleep, a toolkit for learning and neuroplasticity, toolkit for fitness and on and on. To sign up for the neural network newsletter, you simply go to Huberman Lab.com, go to the menu, scroll down to newsletter and provide your email. We do not share your email with anybody. And again, the neural network newsletter is completely zero cost. Thank you once again for joining me for today's discussion all about tools to improve your fitness. And last but certainly not least, thank you for your interest in science.