

# Sports Pharmacy

DECODING THE SCIENCE OF ELITE HUMAN PERFORMANCE

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**Longevity & Human Performance:**  
The Science & Strategies for  
a Healthier, Longer Life

**Redefining Aging in Sport:**  
Lifestyle, Training, and  
Emerging Strategies for Athletic  
Longevity

**What Athletes  
Need to Know about  
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DECODING THE SCIENCE OF ELITE HUMAN PERFORMANCE



# MESSAGE FROM THE EDITOR

As conversations around performance continue to evolve, one word keeps rising to the surface, **longevity**.

It's become a trending topic across sport, medicine, and wellness spaces. But what does longevity actually mean? It's not simply extending years in competition. It's about sustaining quality of movement, protecting cognitive and metabolic health, preserving hormonal balance, and supporting athletes across an entire lifespan.

True longevity requires thoughtful training, intentional recovery, and responsible pharmacologic stewardship. It challenges us to think beyond short-term gains and toward long-term health. In this issue we examine the rapid growth of wellness and anti-aging clinics, helping clinicians and athletes navigate emerging therapies with a critical, evidence-based lens. We redefine aging in sport, highlighting lifestyle, training, and recovery strategies that support sustained performance across the lifespan.

This mindset is shaping the future of sports pharmacy, and we're excited to continue that conversation in person at the upcoming **Sports Pharmacy Summit**. With an expanding lineup of international and interdisciplinary speakers and attendees, this year's Summit reflects the global momentum behind our field. We look forward to bringing together pharmacists, physicians, athletic trainers, researchers, and performance professionals to collaborate, learn, and lead.

We hope to see you there as we continue advancing the field of sports pharmacy and collaborating with other members of the athlete care team.

**Kristal Potter, PharmD**  
Editor-in-Chief, Sports Pharmacy Magazine  
*Assistant Professor, Larkin University*



# Meet the Team



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# Longevity & Human Performance: The Science & Strategies for a Healthier, Longer Life

Highlights from The Sports Pharmacy Network Podcast

Hosted by **Brandon Welch, PharmD**



**GUEST: DR. MICHAEL DAY**

Dr. Michael Day is a physician whose practice focuses on longevity, healthspan, and sports performance. Dr. Day completed his undergraduate studies in Classical Languages at Georgetown University, where he graduated summa cum laude. He holds a master's degree in Greek and Latin Languages and Literature from Oxford University. He attended Weill Cornell Medical College. He completed a residency in orthopedic surgery at the NYU Hospital for Joint Diseases. He then completed a fellowship in orthopedic sports medicine at the Lenox Hill Hospital in New York, NY, where he worked with the team physicians for the New York Jets and the New York Islanders. Dr. Day is board-certified in orthopaedic surgery and sports medicine. He is the author of numerous research publications in orthopaedic surgery and sports medicine.

## Introduction

**Dr. Brandon Welch:** Once a niche area of medicine, longevity has quickly become a buzzword in the health and wellness space. From billionaires investing in anti-aging research to groundbreaking advancements in science, the pursuit of a longer, healthier life is no longer just the stuff of science fiction. It's a booming field of medicine and innovation. The statistics speak for themselves. A recent survey revealed that the global longevity economy, which includes advancements in healthcare, Biotechnology and preventative medicine is projected to exceed 27 trillion by 2026. More health care professionals are shifting their focus to longevity medicine with a growing number of clinics and practices, tailoring their services to extend not just lifespan, but health span, which is the years of life spent in optimal health. But what does this mean for the average person?

Is longevity medicine accessible to everyone, or is it reserved for a select few? And how can we separate the science from the hype? In today's episode, we'll explore these questions and more, shedding light on why longevity has become one of the most exciting frontiers of medicine.

So let's just dive right into it with Dr. Michael Day. You've been doing a lot of amazing work in the longevity medicine space, and I know you've been getting great results with a lot of patients you've

been seeing. But just for our readers here, how would you define longevity medicine and how does it differ from traditional medicine?

**Dr. Michael Day:** Well, I think there can be different ways of defining it. And so it'll depend on who you ask. And I think the way that I define it, for me, it's not about living to 120 or 200 or, you know, these things that we've not seen before on earth. For me, it's about, as you mentioned, health span, extending our disease-free period of life. And at the core of that is a proactive and preventative approach. And that is, you know, as I was, you know, in my sports medicine practice, you know, I thought we would do a lot of things great in traditional medicine. And it's, you know, the trauma care, acute care, advanced technology.

That's where our system really shines. And in my own corner of that world, you know, take for example, ACL reconstruction. It's great that somebody tears their ACL and we can, we can reconstruct it and get them back to doing the thing they love. And that's great. But then, you know, the next kid tears their ACL and the next kid tears their ACL. And it's the same story. They've got, you know, weak, weak core, weak glutes. they have poor mechanics.

They're putting themselves at risk for an injury that sometimes is unavoidable, but many times, you know, a lot of these are non-contact injuries. are people that

“

From prioritizing sleep and movement, to managing stress, building strong social connections, and finding purpose, the message is clear: longevity is built through consistency, not perfection.

have poor biomechanics that could have been prevented with known prevention programs that, you know, that's kind of the, you know, the story of modern medicine. Like, have great ways to treat the disease, but people are still getting the diseases. Still getting the cardiovascular disease and if you have a heart attack, we can, you know, bring you back from death's door and open up your arteries, but those arteries are still getting narrowed. And, you know, people are coming into the system and getting treated. But how do we keep people from having to come into the system? And that's where traditional medicine is really disease care. And there's some prevention, but it's just not set up to allow the economics of it or the way that the providers, spend their time, to be spent on prevention and being proactive and trying to delay the onset of chronic disease. And so that's for me, how I define longevity medicine is that it sits a little bit outside or layered on top of the traditional medicine. And we need, we need that, because of all the great things that traditional healthcare can do, but I think we can enhance that by being more proactive and preventative and that's where longevity medicine has its definition for me.

### What Longevity Medicine Really Means

**Brandon:** Now, I think that's a phenomenal definition and how you define it is because one of the things that you nailed on, which I think is so important for people to understand is that we're not trying to debunk any of the principles of modern or traditional medicine is because there is good evidence and resources behind that. But essentially, how do we enhance or innovate that approach to help optimize the care of our patients, right? It's because, like you said it, with traditional medicine, there are these time constraints that put barriers with the high level of care that you can deliver to a lot of these patients. And I think the key here is really being proactive and preventative, understanding, okay, what are some of those lifestyle modifications that we need to do to stay ahead of any disease states that we may have. And I

always like to say, as I think about longevity medicine and how to be preventative and proactive, it's always important for us to understand what our family history is.

So we are also aware of what are those predisposing risk factors that we may have and how do we tailor a lifestyle approach to help be ahead of that curve so that we don't put ourselves at a greater risk of some of those disease states that may be embedded inside of our family history. And so I like where longevity medicine is going. It's very innovative and proactive. But also a key thing here too, and I'm sure you're aware of this too, Mike, is that we need to stay evidence-based as much as possible. I know sometimes longevity medicine can go a little bit outside of the guard rails and we can be too exploratory, which has drawbacks, but as much evidence that we can pull with some of the clinical decisions that we're making for a lot of our patients, the better we'll be able to help optimize their care.

**Michael:** Yeah, the two things that you hit on there, the family history and the evidence base, the genetics are huge and we shouldn't deny them. You know, there's so much that we can do that our genes don't define us and that's 100% we should not limit ourselves in terms of achievement or how healthy we can be. But there is the reality of like they, you know, that's where we're starting with it's main, what we do with it is, you know, up to us. But you know, if you had parents that died in their 50s or 60s, like, that's something you need to be aware of and active against.

And if you had people in your family live into 100, that's you know, a vote in your favor and you see all the time, you know, people live in past 100 and they're like, what's this? What's your secret? And it's like, I have brandy every morning. And it's like, okay, that's like, that will, that's a testament to the power of genetics. You know, lot of, a lot of that is, is genetics. But we want to take both in mind and say, well, this is what I'm dealt and how can I make the best of that? And, when choosing what to do, I think we should be, I'm constantly going back and forth between. What is the evidence

base and what is more just evidence informed and what then what is more individualized because our evidence is based on the scientific method and we test the hypothesis and we refine it and we find out but the nature of that is it will tell us what we can conclude for a large population of people. So we say, you know, if there's a thousand of you, you know, the quote unquote you know, best thing to do for a thousand individuals is this, but that, that may, you know, that thousand people is going to include, you know, a thousand individuals that it may not be the best thing for that one person. So we've, we've got this constant back and forth and almost tension between like, what's the evidence at large, but what's, what's works for the individual. And that is where we get a little outside of it and experimental and the main thing is if we are going to go outside of the evidence is we're going to do it safely and, you know, it's always a constant discussion of risks and benefits. And if there's a wide safety margin and, and, and low enough risk, then we can experiment a little bit and see what, what works for the individual.

**Brandon:** Definitely risk versus benefit here. You have to be able to do that analysis, right? When we have our oath, right? You see this in pharmacy when you graduate pharmacy school and you see this in medicine when you graduate medical school. The very few words that I remember out of that lengthy oath that we have to say. It's important for us to use good clinical judgment. And the way we use good clinical judgment is being able to assess safety versus what are the risks. And so if we're gonna go outside of those confines, right, it's important to assess risk versus benefit. So literally you nailed it right on the head with that.

### **The Five Pillars That Most Influence Longevity**

**Brandon:** Now, moving on into like what are some key factors that you would say influence longevity medicine if it had to be five things. So in other words, what are the things we can do to live healthier and longer if it had to be those five things that you had to say?

**Michael:** Okay. Well, what we can do refers to our activities, like the choices that we're making. But I think you can think about this in two ways. You can think about risk, which we touched on a little bit, or we can talk about what activities you're doing. And so I think maybe it helps, first of all, to think about risk and at its most basic level, what's most likely to kill you. And in the United States, that's cardiovascular disease, metabolic disease, neurodegenerative disease, cancer, or accidental injury and falls. So for the older individuals, more of the falls for younger individuals, accidental death, which you know, you could also put overdose in that, unfortunately. Um, but,

but for someone that's not using, you know, the, for me, for example, the most dangerous thing I do, I tell my kids when, when we're in the car, I'm trying to get them to like quiet down. They're like, this is the most dangerous thing that we do. We're driving, driving in a car. This is the most likely thing to, that's the most likely thing to kill me statistically speaking, uh, at the age that I'm at. So we think about those are the five things that I would say from a risk standpoint.

And you bring in your family history and your occupational exposure and whatever else active issues that you have and then you think about well what are the five things that are going to affect my longevity and here I think I would think about sleep, exercise, social connection, purpose in life, and stress and stress management.

Sleep is foundational, affects every aspect of our health. And, um, and so that's gotta be a priority. Um, probably like neck and neck with that is a movement practice and exercise. And I say movement because it's not just about exercise. It's not just that whatever you dedicate to going to the gym, but you know, it's, how much are you moving in a non-exercise fashion as like the larger portion of that Venn diagram. And what's your movement practice.

Social connection, I think we see very strong ties to the strength of social connection being tied to longevity. then purpose, what are you doing here? What are you living for? If you live a long time and you're miserable, there's no point in that. And so I think finding something, a reason to, to be healthy is key. And then, you know, I think stress, stress really, really kills us. So, you know, it's like, it's hard to measure that, like how much stress I'm under, quote unquote, but you know, it's clear that we've got to find ways to to manage stress and have the right amount so that we're having good stress that spurs us to achieve and to get our bodies to adapt, but that we're also not overloading it.

**Brandon:** Those are a great five. And I really want to get into the minutia of some of the ones that you mentioned. So when we talk about, for example, sleep as one of the foundational things we can do to help influence longevity medicine, live longer, healthier, and happier. How many hours a night are we talking about? What about the quality of sleep? Is there any sleep hygiene recommendations, wearable devices? What's your thoughts on that?

### **Sleep as a Foundation**

**Michael:** Well, with my patients who always try and start with the basics, and you know, as some people may come into an interaction thinking What supplements do I need to take or "What medications and that's really the last thing that we talk about. I try not to assume that anyone has good sleep hygiene.

Amount is individual, so some people need more than others. Seven to nine hours is kind of the catch is most people. And it is important to note that that is seven to nine hours of sleep, not necessarily time in bed. So sleep efficiency is ideally would be around 85, 90%. So encourage people to think about that. Sleep trackers can give that number to you, but if you don't need a tracker, if you say I'm spending this much time in bed, figuring I'm getting 85%, then that's going to give me X hours.

Same time to go to bed and go to wake up. So regularity is, is huge for getting your body into that rhythm and giving you that quality of sleep that's going to be repeatable. then bedroom practices, absence of light, absence of noise or white noise, the right temperature, usually like 65 to 68 degrees Fahrenheit.

Alcoholic drinks within three hours of bed. Are you avoiding, you know, really strenuous exercise within four hours bed? Are you You know doing things to cause your body temperature to drop whether it's taking a hot shower before bed or even just You know splashing water on your face and hands can help with that and then on the morning side Are you getting sunlight exposure in the early morning? That's gonna tell your circadian rhythm like this is morning and set you up for sleeping at night. So those are kind of the basics of sleep hygiene. then once somebody is doing all that, know, if there's a lot of times there's something that's like glaring like, oh, you're having two alcoholic drinks after dinner, right before bed every night, that's probably destroying your sleep quality.

**Brandon:** Now, for people who've exhausted all of those different sleep hygiene tips and all of that, what supplements would you say are out there for people to consider that could potentially help them give them that extra boost to go to sleep?

**Michael:** Yeah, probably the first one that we do is magnesium because again, a wide margin of safety in terms of whether it's going to help sleep? I think the evidence mostly shows that if you're magnesium-deficient, correcting that can help with sleep. It's a little less convincing that magnesium is likely to do something for a magnesium-replete individual. But we do use Magnesium L-threonate just because that crosses the blood-brain barrier, that formulation. And, you know, it's an easy one to, you know, just add on and unlikely to have adverse effects unless they're using like magnesium oxide, may, you know, get the bowels moving. But magnesium is one. Don't use melatonin except for jet lag situations. Although perhaps in the elderly, I think there's more evidence that they may have a harder time with endogenous melatonin. So try and keep melatonin to jet lag situations.

**Brandon:** Quite a few questions around what some good sleep supplements are, especially for the jet lag piece. So it's great that you touched on that. Typically, when I think of some of these tips that we're talking about to enhance longevity medicine, I usually like to carry over some of the wellness and high-performing tips that athletes are using. How do we carry that over into the general population, right? And I'm sure you may be familiar with this, Mike, working with lot of athletes yourself. And the reason why I bring this up is that I always love the story of Roger Federer, a world-renowned tennis player who had multiple injuries, and people thought that his career was done.

And why do I bring this up is because one of the ways that helped him get back to being competitive that he talked about was the restorative sleep that he was getting in his younger years when he was competing at a high level in tennis. He was getting a lot of different injuries; now, his knee and lower back were bothering him, and he took a long hiatus from the game to try to help with his recovery.

And a huge part of that was him talking about sleep and the restorative benefits that it provided him. And it's funny because analysts who were thinking that his best days were behind them. were like, man, did this guy find the fountain of youth, because for him to come back after, you know, multiple injuries and perform at such a high level, remember this guy was winning titles back to back.

And it was just very eye-opening to see the power and importance of sleep, because people were walking around overworked and under-rested, and they were wearing poor sleep as if it were a badge of honor.

You know, don't get sleep. "It's all about the grind. I'll sleep when I'm dead." No, it's not because, you know, each day you contribute to what I call sleep debt is detrimental to your body. It's important to optimize our sleep.

**Michael:** Yeah, that's our time to repair and recover, and yeah, I think I'd better as routine involved like more than 12 hours per night of sleeping, and I can't even stay asleep that long, I'm not performing at his level.

**Brandon:** It's like they say, success leaves clues. Look at the greats, LeBron James, Optimized Sleep, Tom Brady, the TB12 Method, he talks about sleep. And so these guys who are performing at a high level for long periods of time just tell you a lot about what they're doing.

**Michael:** Yes, and I think the, the overall cultural pendulum has swung a little bit away, from the "always grinding, sleep when I'm dead" culture. I think there's more awareness of that now, and it's still easy to fall into that for people who are seeking high achievement. But there's more awareness now, which I think is good, that

sleep is something that will help you perform rather than something to be minimized.

### Practicing What You Preach

**Brandon:** So I know one of the things we pride ourselves on is that we like to practice what we preach. And I love one of the recent phenomena you started, which was the 100 days of health. And I believe that before we got on this call, you mentioned you're on day 24. So you've got 76 days left, but can you speak to our audience a little bit about what this phenomenon of 100 days of health is that you're doing?

**Michael:** Yeah, so, you know, New Year, we often think about habits and practices, and I love James Clear's book *Atomic Habits*. I'm in a book club where we had recently read a book called *Good Habits, Bad Habits*, which was, you know, along similar lines. And one of the things from that book is talking about how long it takes to establish a habit. And, you know, it's really not what you may hear, like you need 30 days to establish a habit. Like, you could establish a habit very quickly. Or you could just say that it could take like 100 days, or I think for exercise habits. I don't remember the statistics in the book, but it was more like, in that 50 to 90 range, for establishing exercise.

I wanted to start the new year with the notion of healthy habits. But there's a downside of resolutions, good intentions that kind of fall by the wayside. I didn't want it to be in the context of like New Year's resolution. And 100 days for health: the idea is that it is not limited to 100 days. This is just how I want to live my life. As you know, I want to always be promoting health. And then the idea of sharing is about being the example and showing people that this is what I tell my patients, but the reason I tell my patients is that it's good enough for me as well. I'm sharing my workouts, posting the actual workouts, people can follow me on Strava if they want. And I'm not doing these with an injury. I'm not lifting amazing amounts of weight or running at these incredible speeds. It's more about consistency than intensity and just showing up. We talk about longevity and that's ultimately what we're being active for, as long as possible. I may look at my times or my weight and be like, man, just one year ago

I was doing so much better. And it's like, well that's fine. I'm showing up here today.

Not going to see pictures of me squatting 500 pounds. I ran like three miles today. Is that going to impress anybody? I don't think so, but it's not meant to, it's meant to show that every day I'm going to do something that's health-promoting and also recognize that life gets in the way. Maybe you're not gonna have an hour or two hours to spend in the gym every day. But maybe the thing that you do to promote your health that day is make sure you get a really good meal. Maybe your day was totally shot with other obligations. Maybe I spent two minutes of restorative breathing and meditation. I went for a walk around the block for 15 minutes. Just to show people that none of us are living in an idealized environment and most of us are not earning our living by being a professional athlete. So the reality is, you've got a family, you've got a job, and I want you to prioritize your movement practice, your health, and your nutrition. But again, it's consistency over intensity. 100 days is something that I can demonstrate on a sustained basis. But again, it's not about going back to anything else after that. It's just how I want to live my life.

### Wrapping Up

This conversation highlights what longevity medicine is all about, not chasing extremes, but focusing on sustainable, evidence-informed habits that help us live better for longer. From prioritizing sleep and movement, to managing stress, building strong social connections, and finding purpose, the message is clear: longevity is built through consistency, not perfection.

Michael's perspective reminds us that practicing what we preach matters, whether that's showing up for a workout, prioritizing rest, or making small daily choices that compound over time. Longevity isn't reserved for elite athletes or biohackers. It's accessible to anyone willing to be intentional about their health.

If you enjoyed today's discussion and want to hear the full conversation, you can find the complete episode on the Sports Pharmacy Podcast, available on your favorite podcast platform. Be sure to subscribe, leave a review, and share this episode with colleagues who are interested in the future of proactive, preventative healthcare.



This transcript is based on a podcast episode and has been edited for length and readability. While we have made every effort to accurately capture the essence of the conversation, certain sections have been modified or condensed to enhance clarity and flow. Some filler words, pauses, and non-verbal cues have been omitted. The views and opinions expressed in this interview are those of the speakers and do not necessarily reflect the official policy or position of the Sports Pharmacy podcast producers or the Sports Pharmacy Magazine. Please visit <https://sportsrxnetwork.com/sports-pharmacy-podcast/> to listen to the full episode.



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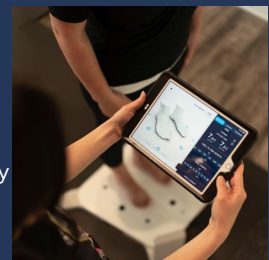
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# Longevity in Sport:

## A Nervous System–Centered Approach Integrating Chiropractic Care, Performance Medicine, and Pharmacologic Stewardship

By Seth Garza, D.C



### AUTHOR BIO:

Dr. Seth Garza, D.C., is a Doctor of Chiropractic and integrative health practitioner specializing in sports performance, injury resilience, and longevity-focused care. He is the founder and clinical director of Relief Point Chiropractic in Bakersfield, California, where he provides evidence-informed, movement-centered chiropractic care for active individuals and athletes. Dr. Garza's clinical interests focus on optimizing neuromusculoskeletal function, reducing injury risk, and supporting long-term performance while minimizing reliance on symptom-based pharmaceutical interventions. He integrates principles from chiropractic, sports medicine, and lifestyle-based longevity science to promote durable, sustainable health outcomes. Dr. Garza is also the author of *Mindset and Muscle: Mastering the Art of Personal Transformation* and the creator of *The Vibrant Health Reset*, a structured program addressing chronic pain, burnout, and performance decline.

### Introduction: Redefining Longevity in Athletic Performance

Longevity in sport is often misunderstood as the simple extension of an athlete's career. In practice, true longevity reflects the ability to sustain high-level performance while preserving movement quality, recovery capacity, and neuromuscular resilience over time. For both elite and recreational athletes, longevity is closely tied to how effectively the body adapts to repeated mechanical stress, training loads, and recovery demands.

Modern sport places unprecedented stress on the musculoskeletal system, often manifesting as familiar clinical patterns: the young distance runner with insidious anterior knee pain; the tennis or golf athlete with repetitive rotational stress and knee overload; the football player presenting with recurrent cervical and shoulder strain; and the soccer player with chronic ankle instability following repeated sprains. Early specialization, dense competition schedules, and limited off-seasons increase cumulative load and elevate injury risk.<sup>17,18</sup> In response, many

athletes enter cycles of recurrent pain, missed training time, and escalating pharmacologic intervention. While medications such as nonsteroidal anti-inflammatory drugs (NSAIDs), muscle relaxants, and other analgesics play an important role in acute injury management, long-term reliance may obscure underlying dysfunction and interfere with normal tissue remodeling and load tolerance.<sup>5,6</sup>

Longevity, therefore, should be reframed as a systems-based outcome. It reflects the integration of nervous system function, mechanical efficiency, the balance of training and recovery, and judicious medication use. Within this framework, chiropractic care offers a unique contribution by addressing neuromuscular and biomechanical factors that influence load distribution, motor control, and movement efficiency.<sup>3,4</sup>

### A Framework for Longevity in Sport

Athletic longevity can be conceptualized through a three-part framework:

1. Nervous system integrity and biomechanical efficiency





# Longevity in sport is not achieved by a single intervention but by integrating multiple systems that support adaptation over time.

2. Load management and recovery capacity
3. Pharmacologic stewardship

These components are interdependent. Disruption in one domain often increases strain on the others. For example, impaired joint motion or altered neuromuscular control may increase tissue stress, leading to pain, reduced performance, and greater reliance on medication.<sup>3,4</sup> Conversely, restoring efficient movement and neural coordination can reduce unnecessary tissue loading and improve training tolerance.

Chiropractic care fits naturally within this model as a non-pharmacologic intervention that targets movement quality and neuromuscular function. Pharmacologic care, when used strategically and time-limited, supports acute recovery while preserving long-term adaptive capacity.<sup>12</sup>

## Chiropractic Care and Nervous System Integrity in Athletic Longevity

Long-term athletic health is rarely compromised by a single traumatic event. More commonly, it erodes through cumulative microtrauma, inefficient movement patterns, and compensatory strategies that go unaddressed over time. From a sports chiropractic perspective, this underscores the importance of preventive care to identify and restore movement deficits before they manifest as recurrent pain or injury.<sup>11</sup>

Longevity begins with the relationship between joint motion, neuromuscular control, and load distribution. Athletic movement depends on coordinated input from the central and peripheral nervous systems, with joints serving as key sensory organs. Restrictions in joint motion or altered afferent input may disrupt motor control, leading to compensatory movement strategies that increase tissue stress over time.<sup>3,4</sup>

Research suggests that spinal and extremity joint dysfunction can influence neuromuscular activation patterns, coordination, and force production.<sup>9,10</sup> While chiropractic interventions are not a replacement for strength or conditioning, evidence indicates that spinal manipulation and mobilization can influence neuromuscular function and movement performance in select athletic populations.<sup>9,10</sup> These effects may be particularly relevant for athletes managing chronic training loads or recovering from repetitive stress injuries.

Importantly, chiropractic care should not be viewed as a passive or standalone solution. Its greatest value emerges when it is integrated within a comprehensive performance and recovery strategy. By addressing joint motion, neuromuscular coordination, and mechanical efficiency, chiropractic interventions may improve an athlete's capacity to tolerate training loads over time. This capacity is essential for the athlete's longevity.

## Physiologic Modalities as a Bridge Between Pain Control and Performance

In addition to chiropractic care, physiologic modalities play a meaningful role in supporting athletic longevity. Modalities such as superficial heat, electrical stimulation (e-stim), transcutaneous electrical nerve stimulation (TENS), therapeutic ultrasound, and myofascial decompression (e.g., cupping) are commonly utilized in sports medicine settings to modulate pain, circulation, tissue extensibility, and neuromuscular tone.<sup>16</sup> In this article, tissue extensibility refers to how easily muscles and connective tissues can lengthen and move, which affects stiffness, comfort, and readiness for movement.

Superficial heat therapy has been shown to increase local blood flow and tissue extensibility, which may reduce muscle stiffness and improve readiness for movement

or manual intervention.<sup>17</sup> When combined with other conservative treatments, heat may positively influence pressure pain thresholds and soft-tissue circulation.<sup>18</sup> Electrical stimulation and TENS may modulate nociceptive signaling through peripheral and central mechanisms, providing short-term analgesia that allows athletes to continue active rehabilitation without immediate reliance on pharmacologic pain control.<sup>19,20</sup> Neuromuscular e-stim has also demonstrated potential benefits in reducing perceived exertion and fatigue indices when applied strategically, suggesting a role in neuromuscular modulation during high training demands.<sup>20</sup>

Therapeutic ultrasound, while demonstrating mixed evidence across sport-specific outcomes, has shown benefit in controlled musculoskeletal pain contexts, potentially enhancing tissue perfusion and soft-tissue healing when appropriately dosed.<sup>21</sup> Myofascial decompression techniques, including cupping, have been associated with increased localized blood flow, altered fascial mobility, and short-term reductions in pain and stiffness in athletic and physically active populations.<sup>22</sup>

When applied strategically, these modalities should function as adjunctive tools rather than standalone treatments. When integrated with chiropractic care and active rehabilitation, physiologic modalities may help regulate the tissue environment during periods of high training load or acute pain flare-ups. In doing so, they create physiologic windows, or short periods during which pain is reduced, and tissues are more receptive to movement and loading, supporting continued adaptation and recovery for the athlete. This may also reduce dependence on chronic pharmacologic intervention, which is an important consideration in long-term athletic health and performance longevity.

### **Load Management, Recovery, and Athletic Healthspan**

Longevity is ultimately determined by an athlete's ability to continue training. Resistance training and physical activity are strongly associated with reduced mortality, improved metabolic health, and preserved musculoskeletal function across the lifespan.<sup>15</sup>

In this article, load management refers to the strategic application, progression, and distribution of mechanical and physiological stress to stimulate adaptation within the athlete's capacity to recover. Progressive overload is not simply an increase in training volume or intensity, but the alignment of stress exposure with recovery and adaptive capacity over time.

However, the benefits of training depend on the body's capacity to recover and adapt. Recovery is influenced

by sleep quality, nutritional status, training volume, and neuromuscular efficiency. When movement inefficiencies or joint restrictions persist, recovery demands increase, and adaptive capacity declines. Over time, athletes may experience plateaus, recurrent injuries, or chronic pain syndromes that limit training continuity.

By improving movement quality and neuromuscular coordination, chiropractic care may indirectly support recovery efficiency. When athletes move more efficiently, mechanical stress is distributed more evenly across tissues, reducing localized overload and facilitating adaptation.<sup>3,11</sup> This may allow athletes to train consistently—a cornerstone of longevity.

Longevity is not achieved by eliminating stress. It is achieved by improving the system's ability to manage it. Chiropractic care, strength training, recovery strategies, physiologic modalities, and pharmacologic restraint collectively contribute to this adaptive capacity.

### **Pharmacology in Sport: Acute Support Versus Chronic Dependence**

Pharmacologic agents remain essential tools in sports medicine. NSAIDs, corticosteroids, and muscle relaxants are frequently used to manage acute inflammation, pain, and post-injury recovery. When used appropriately, these medications can facilitate early return to function and protect against excessive inflammation during acute injury phases.

However, longevity in sport requires careful consideration of how medications are used over time. Chronic NSAID use has been associated with altered muscle adaptation and impaired satellite cell activity in some experimental and clinical models.<sup>5,6</sup> In this context, adaptation refers to the cellular processes responsible for muscle repair, remodeling, and hypertrophic response following mechanical loading. Disruption of these processes may blunt training-induced improvements in strength and tissue resilience over time.

For example, in an athlete with ongoing back or leg pain, prolonged anti-inflammatory use may reduce symptoms without restoring normal movement or loading. In contrast, interventions that improve joint motion, muscle activation, and gradual return to loading can help reintroduce the mechanical signals needed for normal tissue repair and remodeling.

While these effects may not be clinically significant in short-term use, prolonged reliance without addressing underlying mechanical or training-related contributors may compromise long-term tissue health.

Opioid exposure presents an even greater concern. Clinical guidelines increasingly emphasize non-opioid and non-pharmacologic approaches as first-line strategies for chronic musculoskeletal pain.<sup>12</sup> Observational data

suggest that patients receiving chiropractic care for musculoskeletal conditions may demonstrate lower rates of opioid use, highlighting the potential role of conservative care in reducing pharmacologic exposure.<sup>13,14</sup>

A longevity-focused approach does not reject pharmacology. Instead, medication is viewed as strategic, time-limited support rather than a default solution. Chiropractic care may complement this approach by addressing mechanical and neuromuscular contributors to pain, thereby reducing the perceived need for ongoing medication use.

## Practical Clinical Implications for Sports Medicine Teams

For sports medicine professionals, integrating longevity principles into practice requires coordinated decision-making across disciplines. Chiropractic care may be particularly valuable when athletes present with recurrent pain, movement asymmetries, or declining training tolerance without clear structural pathology.

Indicators for chiropractic referral may include persistent joint stiffness, altered movement patterns, or repeated injury flare-ups despite appropriate conditioning. Pharmacologic review and collaboration with a sports pharmacist becomes essential when athletes rely on frequent NSAID use, sleep aids, or analgesics to maintain training participation.<sup>12</sup>

Effective longevity care emphasizes communication and shared goals. Medications should be prescribed with clear indications and durations. Conservative care should be integrated proactively rather than reactively, addressing dysfunction before it escalates into chronic pathology.

By aligning chiropractic care, performance training, physiologic modalities, and pharmacologic decision-making, sports medicine teams can shift from symptom management toward long-term performance preservation.

## Conclusion

Longevity in sport is not achieved by a single intervention but by integrating multiple systems that support adaptation over time. Chiropractic care offers a unique contribution by addressing nervous system integrity, joint motion, and movement efficiency. These factors directly influence load tolerance and recovery capacity.<sup>3,4,11</sup> When combined with intelligent training strategies, physiologic modalities, and pharmacologic stewardship, chiropractic care may help athletes sustain performance while minimizing injury recurrence and medication dependence.

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**AUTHOR BIO:**

Lauren Ha is a pharmacist beginning her journey in healthcare, with a vision to bridge the gap between pharmacy and athletic performance. Lauren is currently working within USC's Fellowship Program and is pursuing a career in the pharmaceutical industry to influence patient care at a larger scale. Before her PharmD journey, she was deeply rooted in the world of sports. At California State University, Monterey Bay, she worked as a Game Operations Supervisor surrounded by athletes from all sports, including baseball, golf, water polo, and more. She developed a deep appreciation for the unique physical and mental demands that come with athletic performance. With her clinical training and athletic background, Lauren is passionate about shifting the focus in sports medicine from treatment to prevention. Her goal is to optimize athlete care by promoting injury prevention strategies, performance enhancement, and overall wellness. By working closely with healthcare providers, trainers, and athletes, she hopes to create a more proactive, collaborative approach to athlete health.



Elizabeth is a recent graduate of the USC Mann School of Pharmacy, where she earned her Doctor of Pharmacy (PharmD). She is currently completing her PGY1 pharmacy residency at Henry Mayo Newhall Hospital. Prior to residency, Elizabeth spent four years as a pharmacy intern at Cedars-Sinai, an experience that deepened her passion for patient-centered care. Before entering the world of pharmacy, Elizabeth was a dedicated competitive swimmer. Her years in the pool, training and competing in numerous swim meets, instilled in her a deep appreciation for discipline, resilience, and the importance of whole-body wellness. This lifelong connection to sports continues to influence her professional journey today. Elizabeth is passionate about bridging her pharmacy expertise with her personal understanding of the athletic experience. She is particularly interested in athlete health, including injury prevention, recovery, and performance optimization. She believes pharmacists have a vital role in supporting athletes' well-being and is excited to contribute her unique perspective to the conversation around athlete wellness.

# Redefining Aging in Sport:

## Lifestyle, Training, and Emerging Strategies for Athletic Longevity

By Lauren Ha, Elizabeth Gusenov

### Introduction

Longevity has been the upcoming trend to the public, alongside growing emphasis on lifestyle factors such as nutrition optimization through supplementation, physical activity, sleep hygiene, stress management, and preventive care. But what is the true meaning of longevity? At its core, it reflects the interplay between physical activity, nutrition, and the choices made everyday. For instance, participation in professional sports such as the NFL has a reputation for early retirement, burnout, and overall decline. The assumption of NFL players that retiring around age 30 was part of the package of becoming a successful athlete.<sup>1</sup> Fortunately, longevity-focused practices have the potential to challenge this mindset and meaningfully influence lifespan. Athletes are more prone nowadays to believe that they shouldn't give up to aging but to take care of their bodies.<sup>1</sup> They want to preserve their career by taking care of themselves as best as they can. Aging isn't optional (as much as we'd like it to be), and with it comes slower recovery, reduced muscle mass, joint wear and tear, hormonal shifts, and increased injury risk.<sup>2</sup> Modern athletes are redefining what aging in sport looks like. The best athletes today aren't trying to avoid aging; they're learning how to slow it, adapt to it, and outperform younger competitors through efficiency and effective preparation.

### Lifestyle Interventions and Supplementation Foundation of Athletic Performance

Sleep is one of the most important drivers of athletic longevity. Adequate sleep supports hormonal balance, muscle repair, cognitive function, immune health, and injury prevention. Chronic sleep deprivation has been linked to increased inflammation, impaired glucose metabolism, slower reaction times, and higher injury risk in athletes. It is important that professional athletes use structured sleep schedules, controlled light

exposure, and travel strategies to protect their sleep cycles.<sup>3</sup> Improved sleep quality enhances performance and may slow biological aging processes by reducing systemic stress and oxidative damage.

Resistance training and muscle strength exercises are increasingly recognized as one of the most effective anti-aging interventions available to athletes as it has shown mortality benefits. Age-related declines in muscle mass, strength, and power are major contributors to reduced performance and injury risk. Regular resistance training preserves lean mass, improves bone density, enhances insulin sensitivity, and maintains neuromuscular function.<sup>4</sup> Resistance training allows athletes to remain competitive while reducing physical decline.

Over-the-Counter (OTC) medications like omega-3 fatty acids play a critical role in regulating inflammation, cardiovascular health, and joint function. Chronic inflammation from stress and physical wear and tear contributes to tissue degeneration, slower recovery, and increased injury risk. Omega-3s, particularly EPA and DHA, have been shown to reduce inflammatory markers, support muscle protein synthesis, and may improve joint health. They also have potential neuroprotective effects that make them of interest in sports like boxing, where brain health is a growing concern.<sup>5</sup>

Most professional athletes have heard the saying "you are what you eat." The gut microbiome has emerged as a key player in athletic longevity due to its influence on immune function, nutrient absorption, inflammation, and metabolic health. Athletes and the general public with more diverse gut microbiota may experience enhanced endurance, greater resilience, and improve recovery. It is important that professional athletes consult with a dietitian to optimize their gut microbiome to induce a healthier lifestyle and also improvement in performance. With the collaboration with dietitian, it will allow athletes to have a more stable gut microbiome while reducing the risks of gastrointestinal problems.<sup>6</sup>

## The Power of Wellness Adaptation

One of the most critical shifts in athletic mentality is training smarter rather than simply training harder. As athletes age, levels of the enzyme nicotinamide phosphoribosyltransferase (NAMPT) decline in skeletal muscle. NAMPT plays a key role in producing NAD<sup>+</sup>, a molecule essential for cellular energy production and the activation of longevity-related proteins such as sirtuins. Reduced NAD<sup>+</sup> in the body has been associated with decreased muscle function and impaired recovery. Research shows that both aerobic and resistance training can increase NAMPT levels in skeletal muscle, which helps counteract age-related declines.<sup>7</sup> By preserving NAD<sup>+</sup> production, athletes may maintain muscle performance, metabolic efficiency, and physical function.

Some pharmacologic interventions have also been considered in the context of longevity. Metformin, a medication commonly used to treat type 2 diabetes, has gained attention for its effects on metabolic regulation, cellular stress responses, and aging-related pathways. It is also prescribed for individuals with polycystic ovary syndrome (PCOS) to improve insulin sensitivity and restore ovulation in select populations. While metformin may offer benefits for individuals with diabetes or PCOS, it is not a universal longevity solution, and lifestyle interventions remain the foundation of healthy aging.<sup>8</sup> For patients who have diabetes, this may be a great option as an adjunct therapy with lifestyle interventions.

Cold plunges and saunas share similar effects in athletes by affecting circulation and the potential to increase lifespan, yet they are fundamentally opposite concepts. Cold plunges often include practices such as cold showers, ice baths, cold-water immersion, and, sometimes, outdoor winter swimming. Cold modalities like this have many benefits to the athlete's health after training, such as maintaining cardiometabolic, kidney, and cognitive health, as well as preventing neurodegenerative disease, improving immune function, and treating inflammation. Although some benefits still need further study, many sources indicate that the benefits outweigh the strain on athletes. With regular cold plunge exposure, the extent of frequency and exposure may promote a longer healthspan. It also promotes cellular aging through several cellular pathways that may activate autophagy, improve

mitochondrial function, and trigger adaptive responses to oxidative stress.<sup>9</sup> Autophagy occurs when the body consumes its own body tissues during starvation or certain disease states.

So, how is a sauna different from a cold plunge? Traditional saunas use dry heat, typically ranging from 80°C (176°F) to 100°C (212°F), and have been associated with improvements in cardiovascular health, blood pressure regulation, mental well-being, and reduced inflammation.<sup>10</sup> Athletes frequently incorporate sauna sessions for post-exercise recovery and endurance adaptations. Heat exposure stimulates cellular stress responses that enhance antioxidant activity, reduce inflammatory markers, and promote cardiovascular conditioning.

## Challenges in Implementing Longevity Interventions

Despite their potential benefits, longevity-focused interventions do pose certain risks. NAD<sup>+</sup> supplements work well in moderation, but more isn't always better. Taking excessive amounts can actually mess with your cells' ability to repair themselves, throw your metabolism out of balance, and may even alter gene regulation through a process called methylation. NAD<sup>+</sup> supplementation still needs more studies regarding its positive and negative effects on individuals to promote longevity.<sup>11</sup> Studies have identified limitations with metformin, and further research is required to clarify how it affects the aging process. Common side effects to closely monitor with metformin include nausea, diarrhea, and electrolyte imbalances with long-term usage.<sup>12</sup> Cold water therapy carries potential adverse effects influenced by factors such as age, body size, water temperature, and duration of exposure. Prolonged or excessive cold exposure can lead to hypothermia, cardiovascular strain due to vasoconstriction, and cold shock responses, which affect respiration.<sup>9</sup> Similarly, sauna use can cause dehydration, hypotension, accidental injury, and cardiac complications in susceptible individuals. Those with underlying cardiovascular conditions must approach heat exposure cautiously and under medical guidance.<sup>10</sup> As longevity strategies continue to gain popularity, proper screening, moderation, and individualized planning are essential.

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# What Athletes Need to Know about Wellness and Anti-Aging Clinics

By USADA



The U.S. Anti-Doping Agency (USADA) is recognized by the United States Congress as the official anti-doping organization for all Olympic, Paralympic, Pan American, and Parapan American sports in the United States. USADA began operations on October 1, 2000, as an independent, non-profit organization governed by a Board of Directors. USADA was given full authority to execute a comprehensive national anti-doping program encompassing testing, results management, education, and research while also developing programs, policies, and procedures in each area.

There are an increasing number of health clinics that advertise to be anti-aging or wellness clinics, many of which provide compounded pharmaceuticals, herbal medicines, steroid hormones, unconventional treatment methods, and dietary supplements to treat various maladies.

While these therapies may seem routine or safe, it's important for athletes competing in sanctioned events, even those at the non-national or recreational level, to recognize that some of these treatments may be prohibited under anti-doping rules. Moreover, the various healthcare providers who work in these clinics may not be aware that their treatments are prohibited in sport.

Keep reading to learn more about wellness therapies in relation to anti-doping rules, and as always, make sure to check [GlobalDRO.com](http://GlobalDRO.com) or email [drugreference@usada.org](mailto:drugreference@usada.org) before using any medication.

## Hormone Replacement Therapies

Many anti-aging or wellness clinics offer hormone replacement therapy (HRT) or bioidentical hormone replacement therapy (BHRT) as a method to treat natural changes that occur with aging, such as menopause in women or decreasing testosterone levels in men. Hormones, including prohibited steroid hormones, may also be prescribed to address lack of stamina, improve bone density, and treat general fatigue or a number of other issues.

Many of the steroid hormones used in these therapies, such as testosterone and dehydroepiandrosterone (DHEA), are prohibited at all times under the World Anti-Doping Agency (WADA) Prohibited List and for all competitive athletes, including non-national, junior, recreational, and masters level athletes. The prohibited

status of testosterone and DHEA does not depend on whether the substance is natural, bioidentical, or synthetic. They are still prohibited regardless of how they are manufactured, marketed, or used.

Your health provider might tell you that testosterone or DHEA are not considered performance-enhancing drugs if they are only bringing your hormones back to their normal level. However, the use of testosterone or DHEA in any amount and regardless of the route of administration is prohibited under anti-doping rules unless you have an approved Therapeutic Use Exemption (TUE).

In most cases, hormone replacement therapies involve taking tablets, using creams or patches, getting injections, or having pellets (pellet therapy) or other slow-release devices implanted under the skin. If you are prescribed a hormone replacement therapy, it is essential that you understand exactly what is in your medicine.

## Medical Weight Loss

To assist with weight loss, some wellness clinics prescribe the stimulant phentermine, which is prohibited in-competition.

Another commonly used medication for weight loss is human chorionic gonadotropin (hCG), a hormone prohibited at all times in males. Even though hCG is not prohibited in women, female athletes should still be cautious. According to the Food and Drug Administration (FDA), hCG is approved as a prescription drug for the treatment of female infertility, but it is not approved for weight loss. In fact, the prescription drug label notes there "is no substantial evidence that it increases weight loss beyond that resulting from caloric restriction, that it causes a more attractive or 'normal' distribution of fat, or



that it decreases the hunger and discomfort associated with calorie-restricted diets.”

Even though it is not approved for weight loss, some doctors choose to prescribe hCG for that purpose anyway. Keep in mind that hCG is not approved for over-the-counter sale for any purpose and it is illegal to sell hCG as a dietary supplement or homeopathic medication.

### **Intravenous (IV) Infusions of Vitamins or Saline**

Some wellness clinics offer intravenous infusions of vitamins (sometimes called Meyers cocktails) that might be advertised as “boutique,” “concierge,” or “hang-over cure” IV infusions. They might even offer mobile or “ambulatory” IV infusion units that will come to your hotel, home, or other location. All intravenous injections of more than 100 mL in a 12-hour period are prohibited at all times, regardless of what is in the IV bag.

The only exception is if an IV is legitimately received in the course of hospital treatment, surgical procedures, or clinical diagnostic investigations. For the purpose of anti-doping rules, wellness or anti-aging clinics are not considered a hospital setting.

### **Ozone Therapy**

Ozone therapy, a treatment that introduces ozone into the blood stream, can be conducted in a number of ways. With

one type of ozone therapy, blood is removed from a vein, infused with ozone, and then reinjected back into the body. This method of ozone therapy, called autohemotherapy, is prohibited at all times. While ozone itself is not prohibited as a substance, all treatments that remove and reintroduce blood into the circulatory system are prohibited.

Ozone therapy can also be performed through rectal insufflation, where ozone molecules are generated and passed into the colon through a catheter. Ozone therapy by rectal insufflation is permitted.

### **Compounded Medications**

Wellness and anti-aging clinics often prescribe or custom-make individualized medications for each patient, which requires that a compounding pharmacy mix the product.

Athletes who have a prescription for a compounded medication or a compounded supplement should be aware that compounding pharmacies have additional risks for athletes. Compounded products are more likely than prepackaged prescription products to be contaminated because they are mixed by hand on workbenches where prohibited substances are often mixed as well. With compounded products, there is limited regulatory enforcement.

### **Adrenal Fatigue Therapies**

In recent years, wellness clinics have started diagnosing



# There are no FDA-approved homeopathic remedies and such products reach the market without any FDA evaluation of safety or effectiveness.

a condition dubbed “adrenal fatigue,” which they treat by prescribing oral cortisone that is prohibited in-competition.

## Dietary Supplements

Dietary supplements are regulated in a post-market fashion, which means that no regulatory body approves the accuracy of the label or safety of the contents before they are sold to consumers. As such, no dietary supplement can be guaranteed to be 100 percent risk-free. If athletes choose to use supplements despite the risks, USADA has always recommended that athletes use only dietary supplements that have been certified by a third-party program that tests for substances prohibited in sport. USADA currently recognizes NSF Certified for Sport® as the third-party certification program best suited for athletes to reduce the risk from supplements. Visit USADA’s [NSF Athlete Advisory](#) for more information on how to reduce your risk from supplements.

## Stem Cell Therapies and Orthobiologics

Anti-aging or wellness centers may also offer a variety of stem cell or other orthobiologic treatments. Most commonly associated with sports injuries, orthobiologics are biological substances used to speed the healing process for musculoskeletal injuries.

According to the WADA Prohibited List, “stem cell injections may or may not be prohibited, depending on how the cellular material is manipulated or modified for use.” In most cases, stem cell therapy is permitted if no prohibited substances are added to the material and the stem cells are locally applied only to the injury with no intent to enhance performance. Stem cell injections are prohibited if the product is modified in a way that can offer performance-enhancing benefits. Click [here](#) for more information.



## Homeopathic Remedies

There are no FDA-approved homeopathic remedies and such products reach the market without any FDA evaluation of safety or effectiveness. Through testing, the FDA has later identified some homeopathic products that contain active pharmaceutical ingredients, as well as products that are unsterile or otherwise unsafe. Please see the [FDA consumer advisory](#) for more information.

Because homeopathic medications are manufactured and sold without strict pre-market review, USADA is not able to guarantee that the labels are accurate and therefore cannot provide an anti-doping status for homeopathic medications. Homeopathic remedies, like supplements, are used at the athlete’s own risk.

Even when a treatment is prescribed, athletes should check on the anti-doping status of any procedure or medication and determine if they need an approved TUE. For questions about specific products, substances, and methods, contact USADA’s Drug Reference Line at [drugreference@usada.org](mailto:drugreference@usada.org) or call (719) 785-2000, option 2.

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