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The Importance of Exercise and Biological Youth for Longevity

Analysis by Dr. Joseph Mercola | November 15, 2026

STORY AT-A-GLANCE

- Maintaining "biological youth" is crucial for longevity. According to Siim Land, exercise — particularly moderate activity such as walking, plus resistance training in moderation — is likely the most powerful intervention for slowing biological aging. A 2023 review suggests about 40 to 60 minutes of strength training per week, ideally not exceeding 150 minutes
- Optimal protein intake is about 0.8 grams per pound of ideal body weight. Protein quality matters, with collagen and glycine being especially important but often overlooked nutrients
- Moderate carbohydrate intake (40% to 55% of calories) is associated with lowest mortality risk in observational studies. Long-term low-carb diets may impair insulin sensitivity and mitochondrial function
- Based on National Health and Nutrition Examination Survey (NHANES) data, more than 99% of the U.S. population may have some degree of insulin resistance. The HOMA-IR test is a simple way to assess metabolic health
- Regular sun exposure is critical for health and longevity. Other key factors include adequate sleep, stress management, minimizing environmental toxins, and maintaining gut health

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I spoke with Siim Land, author of the book "The Longevity Leap," discussing key factors for optimizing health and lifespan. According to him, maintaining "biological youth" is the single most important factor for longevity, but the question is how to achieve this as you get older.

Land's book is more than 500 pages, with 8,000 references, so it's a good resource to take a deep dive into the strategies that will help keep you biologically young. He's a leader in the longevity field and walks the walk — he implements the programs he talks

about and is a stellar example of taking good care of your biology. Chronologically, Land, who was living in Estonia at the time of the interview, was 29, but he reported that the biological ages of his organs were much lower — 17 years overall, with a 9-year-old liver.

These estimates are based on relatively new epigenetic and biological age tests, which are intriguing, but we don't yet know if the results translate to longer lifespans. I personally do not put much trust in them and believe they are flawed. Land explains:[1]

> *"What does it mean if you have a liver of a 9-year-old? Does it mean that you're going to live exponentially longer than someone else? We don't have that data yet … I wouldn't put a lot of emphasis on the tests themselves, much rather I would look at the traditional biomarkers, like glucose, inflammation … and those other things."*

Historically, many mistakes have been made in longevity research, particularly the focus on extreme calorie, carbohydrate, and protein restriction:[2]

> *"The practical outcome would be that you're eating very small amounts of food and you are becoming very frail and skinny. But in the actual world, we're starting to see right now that frailty is a huge risk factor for early death and mortality. And malnutrition itself also increases the risk of a lot of different diseases, all-cause mortality and neurodegeneration and heart disease events.*
>
> *Right now, I think the field has started to appreciate a lot more of these tangible, practical, functional outcomes, like muscle strength and body composition … other biomarkers that move more from the theoretical side of biological aging."*

Optimal Protein and Carbohydrate Intake for Longevity

Land and I agree that most adults need about 0.8 grams of protein per pound of ideal body weight (the weight you would ideally be, not necessarily the weight you are now), or for Europeans, approximately 1.76 grams of protein per kilogram, for appropriate muscle maintenance and growth. Land applies the same 0.8-gram figure to lean body mass rather than ideal body weight, which works out to be somewhat less protein for most people.

"If you eat too much, then that could be problematic from the perspective of kidney health and homocysteine levels. If you're eating too little, then that's the risk of the sarcopenia and frailty," Land notes. Regarding carbohydrates, we're also in agreement that low-carb diets are not typically optimal for longevity.

Land cites research showing that moderate carbohydrate intake is associated with the lowest mortality risk. "With carbohydrates as well, it's very commonly thought that eating too many carbs is going to be bad for your health. At least in observational studies, it's the opposite — 40% to 55% of calories as carbohydrates is linked to the lowest risk, usually," he says.[3]

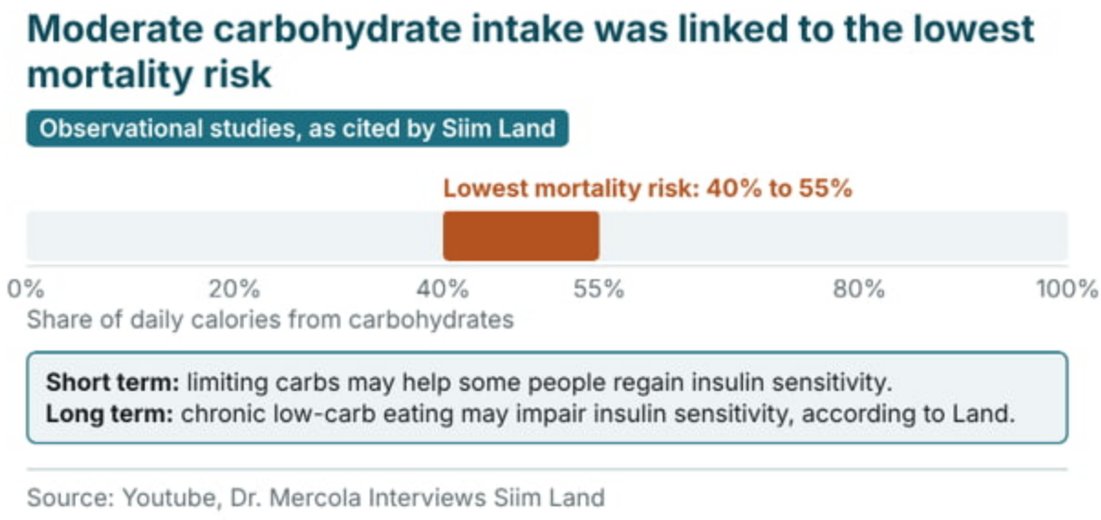


Figure 1. In observational studies cited by Siim Land, getting 40% to 55% of calories from carbohydrates was linked to the lowest mortality risk.

Land argues that while low-carb diets can be beneficial in the short term for certain individuals, long-term carbohydrate restriction may impair insulin sensitivity:[4]

> *"In the short-term, someone might have pre-diabetes or insulin resistance, then in the short-term, it makes sense for them to maybe control the carbohydrate intake slightly to regain some of that insulin sensitivity. But chronic ketosis, chronic low-carb does impair long-term insulin sensitivity as well."*

In my view, adequate carbohydrate intake is vital for optimal mitochondrial function and overall health. Glucose is the preferred fuel for the mitochondria in most of your cells, but most people don't consume enough healthy carbohydrates. If you're metabolically healthy, most adults need about 250 grams of carbohydrates daily, while active individuals need far more — closer to 400 grams. Chronically restricting carbohydrates can lead to increased stress hormone production and muscle breakdown.

Many people experience initial health improvements on low-carb diets, but these benefits are typically not sustainable long-term. I believe the short-term benefits occur because you're no longer feeding harmful bacteria in your gut, which decreases the production of endotoxins that can damage your overall health. In the long-term, however, if you don't consume enough healthy carbohydrates, your mitochondrial health is likely to suffer.

While low-carb diets may temporarily ease symptoms by starving harmful bacteria, they don't resolve the underlying mitochondrial and gut health issues. A more sustainable approach involves addressing what I consider the root causes: improving mitochondrial function, reducing exposure to environmental toxins, including **seed oils**, endocrine-disrupting chemicals in plastics, and electromagnetic fields (EMFs), and supporting a healthy gut microbiome balance.

The Most Powerful Intervention to Maintain Biological Youth

When asked how to maintain biological youth, Land states that exercise is likely the most powerful intervention:[5]

> *"Probably the single most powerful thing for biological aging is moderate exercise. Just maintaining physical activity, it just targets all the hallmarks of aging in a positive way. It improves all the organ function and it also improves the risk of all these chronic diseases as well. It targets everything that you need to do when it comes to slowing down biological aging."*

Land's summary is a broad one. Much of the research linking exercise to slower biological aging and lower chronic disease risk is observational, so it shows strong associations rather than proof of cause and effect — though those associations are remarkably consistent.[6,7]

As highlighted in a 2023 systematic review by Dr. James O'Keefe and colleagues, **too much vigorous exercise** may be counterproductive, so finding the right balance is key. The featured review, which examined studies published from 2011 to 2022, reported that the mortality benefits of vigorous exercise were maximized at about 150 minutes per week, with no further all-cause mortality benefit beyond that.

For strength training, the benefit curve was J-shaped: about 30 to 60 minutes per week was linked to lower mortality, but the benefit was lost at roughly 130 to 140 minutes per week. That said, the authors suggest about 40 to 60 minutes of strength training per week, ideally not exceeding 150 minutes.[8]



Figure 2. In the O'Keefe review, strength training of about 30 to 60 minutes a week was linked to lower mortality, the benefit was lost at roughly 130 to 140 minutes, and vigorous exercise benefit peaked at about 150 minutes.

Land's interpretation is more generous. He suggests that for vigorous exercise, including resistance training, the sweet spot appears to be around 140 to 200 minutes per week, noting that it's unclear how rest periods between sets were counted in the underlying studies.

Land has adjusted his own routine based on this data. "I'm doing about 180, maybe 150 to 180 minutes, of resistance training, and I'm training three times a week … cycling between upper body, lower body or push-pull leg split," he says.[9]

I've also reduced my resistance training to three days per week based on potential risks of excessive training, but most people need to exercise more, not less. Note that both of our routines sit above the range the O'Keefe review associates with the greatest benefit from strength training. Moderate-intensity exercise like walking is an ideal form of physical activity, as it's very hard to overdo it. So, aim for about an hour of walking a day.

The Importance of Protein Quality and Collagen

It's not only protein quantity that's important but also its quality and amino acid balance. Glycine and collagen, which are often overlooked, are among the most important. Land explains:[10]

> *"Glycine is conditionally essential, not essential, but that's because your body makes 3 grams of glycine per day. But those 3 grams would be used for things, like glutathione and creatine synthesis. But then you have 12 grams of glycine for collagen turnover, like optimal collagen turnover."*

By my review of the statistics, most people consume only 0 to 1 gram of collagen protein daily (Land estimates 2 to 3 grams of glycine on a typical diet) — far short of what collagen turnover requires. About one-third of total body protein is collagen, so it's crucial to consume adequate collagen, from foods like bone broth or grass fed ground beef, which contains connective tissue, or glycine to support connective tissue health.



Figure 3. According to Siim Land, your body makes about 3 grams of glycine a day and a typical diet supplies 2 to 3 grams, while collagen turnover needs about 12 grams.

The Prevalence of Insulin Resistance and Metabolic Dysfunction

The homeostasis model assessment of insulin resistance (HOMA-IR) is a simple calculation developed in 1985 and validated against the gold standard for measuring insulin resistance — a laborious, hours-long IV clamp test that few people will ever have. In my view, HOMA-IR is the best practical measure of insulin resistance.

Through the course of my own research, I learned that Dr. Cate Shanahan has looked at the most recent National Health and Nutrition Examination Survey (NHANES) data, and when HOMA-IR is applied, more than 99% of the U.S. population may have some degree of insulin resistance. Using this test is a simple way to assess your metabolic health.

You can figure out your HOMA-IR using two simple tests — your fasting blood glucose, which you can do at home, and then a fasting insulin level, which is an inexpensive test. Multiply those two numbers, and if you're in the U.S., you divide by 405, and if you're in

Europe you have different units than the U.S. and need to divide by 22.5. I consider a result below 1 to mean you're not insulin resistant. The lucky less than 1% of the population does not have insulin resistance.*

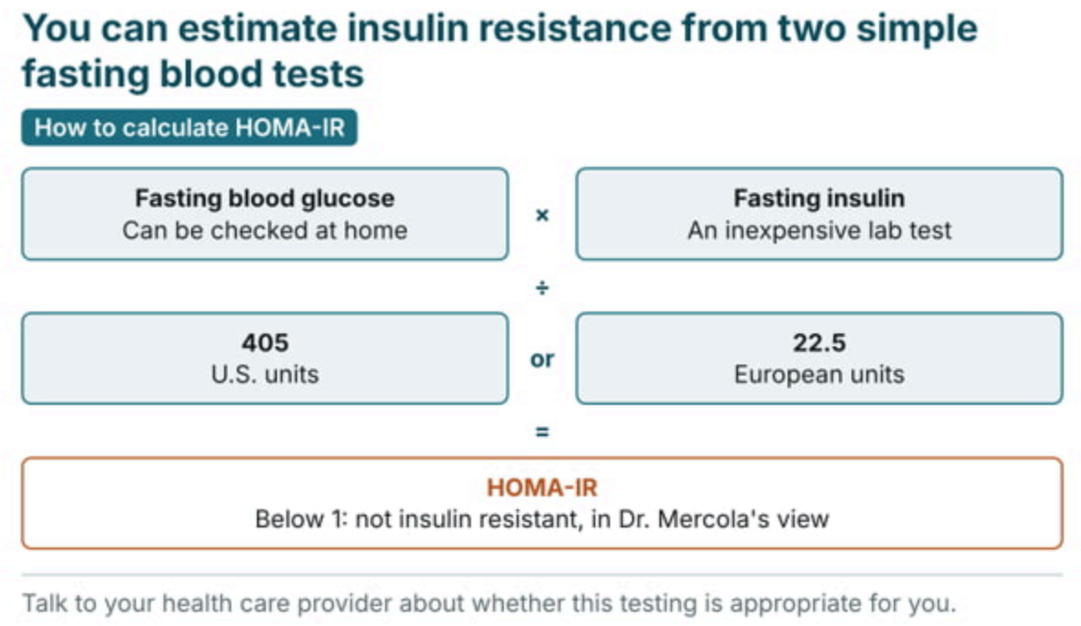


Figure 4. HOMA-IR is fasting glucose times fasting insulin, divided by 405 in U.S. units or 22.5 in European units. In my view, a result below 1 not insulin-resistant.

Land agrees this is a useful marker, while also emphasizing the importance of looking at multiple biomarkers, such as hemoglobin A1c, to assess metabolic health.

**Talk to your health care provider about whether this testing is appropriate for you.*

The Importance of Sunlight and Vitamin D

We also discussed the critical importance of sunlight exposure and maintaining optimal vitamin D levels. Land, who was living in Estonia at a high latitude, maintained his vitamin D levels through a combination of sun exposure when possible, diet, and supplementation when needed.

Sun is one of the most important factors for longevity, probably comparable to exercise. I think it's almost biologically impossible to be healthy if you don't have enough sun exposure. One way to help compensate, if you live in an area where year-round sunlight exposure isn't practical, is using topical lanolin.

Lanolin is the raw material used commercially to make vitamin D3, and I believe that putting it on your skin before going in the sun may enhance vitamin D production from sunlight. It also helps reduce skin drying, cracks, wrinkles, and fissures, so it's especially useful if you're concerned about photoaging.

However, if your diet is rich in seed oils (often sold as “vegetable oils”), you need to exercise extra caution with sun exposure. These oils contain high levels of linoleic acid (LA), an omega-6 fatty acid that easily oxidizes when exposed to ultraviolet (UV) light. When sunlight interacts with skin laden with these oils, it can trigger their breakdown, which may contribute to inflammation, sunburn, and DNA damage.

Therefore, if you’ve been consuming these oils, it’s advisable to limit sun exposure to earlier in the A.M. or later in the P.M. and avoid high-intensity midday sun exposure until you’ve eliminated them for four to six months. After that, you can gradually start going out closer to solar noon, which is the optimal time for sun exposure.

Practical Recommendations for Longevity

By focusing on foundational aspects of health — from mitochondrial function and gut health to exercise and nutrient balance — you may be able to significantly improve your long-term health outcomes. Several key strategies to optimize your health and longevity covered in the interview include:

- Exercise regularly, including moderate-intensity activity like walking (about an hour a day) and moderate amounts of resistance training. The O’Keefe review suggests about 40 to 60 minutes per week, ideally not exceeding 150 minutes
- Consume adequate carbohydrates (about 250 g daily for most adults, and far more if you’re active) from whole food sources to support metabolic health
- Prioritize protein quality, aiming for about 0.8 g per pound of ideal body weight, with roughly one-third coming from collagen sources
- Get regular sun exposure and maintain a vitamin D level of 60 to 80 nanograms per milliliter (ng/mL)
- Focus on gut health through diet, lifestyle, and possibly targeted interventions
- Minimize exposure to environmental toxins, including seed oils (keep linoleic acid intake between 2 and 5 grams a day), endocrine disruptors, and EMFs
- Use simple tests like HOMA-IR to assess metabolic health regularly
- Prioritize sleep, stress management, and overall lifestyle balance

You can find more details in Land's book, "**The Longevity Leap**," which provides a comprehensive overview of these topics and more, backed by extensive scientific references. As he describes:[11]

> *"I covered a lot of specific chronic diseases. I have a full chapter on kidney disease, metabolic syndrome, heart disease, three chapters on heart disease, actually, neurodegeneration and inflammation. I'm going into a lot of deep dives with a lot of these conditions."*

As research in longevity science continues to evolve, it seems that a proactive, comprehensive approach to health is crucial. Rather than seeking a single magic bullet, the path to longevity appears to lie in the consistent application of evidence-based health practices, regular self-monitoring, and a willingness to adapt as new information emerges.

This article is for informational purposes only and does not constitute medical advice. Consult a qualified health care provider before making changes to your health regimen.

Sources and References

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