

Excessive Endurance Exercise Causes Hyper-Cortisol State

Analysis by [Dr. Joseph Mercola](#)

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STORY AT-A-GLANCE

- › Cortisol, known as a stress hormone, plays a vital role in our health but can lead to severe health issues like muscle breakdown, inflammation, and impaired immune function when chronically elevated. Understanding cortisol's dual feedback mechanisms in the brain and body is essential
- › Long-duration, high-intensity exercises like long-distance running can inadvertently increase the body's cortisol levels, pushing the body into a chronic stress state
- › An enzyme called 11 β -HSD1, present in most body tissues, is central to producing cortisol and becomes the focus for understanding and potentially treating elevated cortisol levels linked to metabolic diseases
- › While drug companies explore inhibitors of the 11 β -HSD1 enzyme to manage conditions caused by high cortisol, alternatives like aspirin, emodin, and progesterone offer potential natural solutions, as all three inhibit the activity of 11 β -HSD1
- › To address elevated tissue cortisol, consider reducing the amount of endurance exercise you do, make sure you're getting enough healthy carbs, and supplement with progesterone

Despite what blood tests show, your body might be experiencing high stress levels internally that can fuel health problems. Research is ongoing to find ways to manage this issue, including possible medical treatments and understanding the effects of lifestyle changes like exercise.

In a recent blog post, bioenergetic researcher Georgi Dinkov highlighted research¹ showing that endurance exercises cause a hyper-cortisol state. In other words, exercises like long-distance running may be ruining your health by putting your body in a chronic stress state.

Chronically Elevated Cortisol Takes a Toll on Health

As you probably know, cortisol is a stress hormone, and while it has a crucial role in keeping you alive, it exacts a high price when chronically elevated. One of the functions of cortisol is to raise low blood sugar, but it does this by breaking down your muscles, bones and brain.

It sacrifices your lean muscle mass to release amino acids that your liver converts to glucose in a process called gluconeogenesis. So, ultimately, chronically elevated cortisol will increase inflammation and impair your immune function.

Cortisol is also the primary aging hormone. If it is chronically elevated, you simply will die prematurely as it is highly catabolic, meaning it breaks down tissues. To stay healthy as you age you need to be anabolic and build healthy tissues like muscle and mitochondria, and high cortisol will seriously impair those efforts.

Cortisol Feedback Mechanisms

Importantly, cortisol can behave differently in various parts of the body due to different feedback mechanisms.² There's a central mechanism in your brain that usually tells your body to slow down cortisol production when there's enough (negative feedback).

However, outside the brain, in other parts of the body (peripheral feedback), the mechanism actually works the opposite way (positive feedback). This means that in these areas, elevated cortisol can actually lead to even more cortisol being produced.

There's also a difference between the cortisol level in your blood versus that in your tissues. Even if blood tests show normal or low levels of cortisol, it's possible to have

high levels of cortisol in your tissues.

This can happen because of an enzyme called 11 β -HSD1, which helps make cortisol and is found in most parts of the body. It's the rate-limiting step in synthesizing cortisol, and as noted by Dinkov, evidence suggests the activity of the 11 β -HSD1 enzyme in the tissues (not just the cortisol level in the blood) is a good indicator of whether someone might develop Type 2 diabetes. He writes:³

“This discrepancy between the peripheral and central feedback mechanism of cortisol is probably a major reason why most endocrinologists still do not want to admit the primary causative role cortisol plays in conditions such as diabetes II – i.e. the blood levels of cortisol in such people are often normal, or even low.

However, multiple studies have demonstrated that tissue expressions of 11 β -HSD1 are not only predictive of developing obesity/diabetes in the future, but are also predictive of the course of already established diabetes.”

When you're stressed or change your diet (like fasting or going on a low-carb diet), you can produce more cortisol, which in turn increases this enzyme, leading to even more cortisol. At that point, you're in a vicious cycle.

Long-Term Keto Can Also Induce Chronically Elevated Cortisol

This is also part of why I no longer recommend chronic keto or extended fasting for most people, especially once you're metabolically flexible. When you don't have enough glucose to fuel your mitochondria, when you deplete your glycogen level, then stress hormones – adrenaline and cortisol – are released to trigger endogenous production of glycogen.

“Adrenaline and cortisol are pathologic, and if they're continuously released at high levels to compensate for insufficient glucose due to a lack of

healthy carbs, it will accelerate disease and premature death.”

Both of these stress hormones are pathologic, and if they're continuously released at high levels to compensate for insufficient glucose due to a lack of healthy carbs, it will accelerate disease and premature death.

To learn more, listen to my interview with Dinkov above. This interview was previously featured in my June 2023 article, "[Important Information About Low Carb, Cortisol and Glucose.](#)"

Exercise and Cortisol

Drug companies are now exploring drugs that can block 11 β -HSD1 as potential treatments for health issues linked to high cortisol in the tissues, like obesity and diabetes. However, evidence suggests certain types of exercise can also increase the level of 11 β -HSD1 in tissues, subsequently leading to elevated tissue cortisol levels. As reported by Dinkov:

“As a result of this tacit admission that elevated cortisol is pathological for health (especially for metabolic conditions), a number of pharma companies are running clinical trials with 11 β -HSD1 inhibitors as treatments for obesity, diabetes, dementia, sarcopenia, and even Cushing syndrome/disease.

One of the criticisms I have heard from endocrinologists in regards to the positive feedback mechanism of cortisol peripherally is that most of the evidence so far is from in-vitro experiments.

The in-vivo study⁴ [published in the Journal of Applied Physiology in October 2017] may be able to address that criticism by demonstrating that running daily for a few weeks doubled 11 β -HSD1 expression in tissues, confirming once again that even 'beneficial' stress such as 'endurance' exercise is sufficient to cause peripheral state of high cortisol, which probably persists even after the

stress/exercise stops since the increased expression of 11 β -HSD1 is not known to downregulate on its own.”

While a specific drug called RU486 can help reduce these high tissue cortisol levels, it's almost impossible to get. The good news is that other substances, such as aspirin, emodin and progesterone, inhibit the activity of 11 β -HSD1 as well, hence lowering tissue cortisol. These three also increase the activity of a related enzyme called 11 β -HSD2, which deactivates cortisol. So, they lower cortisol in two ways.

Many Can Benefit From Progesterone

Of those three, progesterone may be one of the most beneficial, as it has many other health benefits as well. It's one of only four hormones I believe many adults can benefit from. (The other three are thyroid hormone T3, DHEA and pregnenolone.) As a general recommendation, I recommend taking 30 to 50 mg of bioidentical progesterone per a day, taken in the evening before bed, as it can also promote sleep.

For optimal bioavailability, progesterone needs to be mixed into natural vitamin E. The difference in bioavailability between taking progesterone orally without vitamin E and taking it with vitamin E is 45 minutes versus 48 hours. Another good reason for taking progesterone with vitamin E is because it binds to red blood cells, which allows the progesterone to be carried throughout your body and be distributed to where it's needed the most.

Simply Progesterone by Health Natura is premixed with vitamin E and MCT oil. You can also make your own by dissolving pure USP progesterone powder into one capsule of a high-quality vitamin E, and then rub the mixture on your gums. Fifty milligrams of powdered progesterone is about 1/32 teaspoons.

Do not use synthetic vitamin E (alpha tocopherol acetate – the acetate indicates that it's synthetic). Natural vitamin E will be labeled “d alpha tocopherol.” This is the pure D isomer, which is what your body can use. There are also other vitamin E isomers, and

you want the complete spectrum of tocopherols and tocotrienols, specifically the beta, gamma, and delta types, in the effective D isomer.

I do not recommend transdermal progesterone, as your skin expresses high levels of 5-alpha reductase enzyme, which causes a significant portion of the progesterone you're taking to be irreversibly converted primarily into allopregnanolone and cannot be converted back into progesterone.

If you're taking it orally with vitamin E as the solvent, a significant portion will be non-metabolized, and the non-metabolized progesterone has potent pro-thyroid effects. It's also a thermogenic steroid. It induces uncoupling, so you'll be producing more heat, which is one of the effects of taking T3.

While not as potent as taking T3, it can raise your metabolic rate by about 10%. In addition to blocking cortisol, progesterone also helps deactivate adrenaline, another potent stress hormone. As noted by Dinkov in a previous [interview about hormone replacement](#):

“There are human studies demonstrating that when you administer progesterone, even in its nonoptimal form – such as just the powder without the long-chain fatty acids and definitely without the tocopherols – even in that form, a single dose [100 to 200 mg] is sufficient to drop cortisol and adrenaline by about 60%.”

Key Take-Home

The key take-home from all of this is that endurance-type exercises can seriously backfire, causing chronically elevated cortisol, which will prematurely age you. Other research has also shown that engaging in endurance training, such as full-distance triathlons, when you're in your 40s and 50s increases your risk of atrial fibrillation by 500% to 800%.

I reviewed this research in [“Nailing the Sweet Spots for Exercise Volume.”](#) One of the many findings in that study was that, once you get into your mid-40s and 50s, exercise

should be fun and stress-reducing, not competitive.

Another take-home is that your cortisol may be elevated even if it looks normal in blood tests, thanks to the presence of 11 β -HSD1, which helps make cortisol, in most of your body's tissues. To counteract chronically elevated cortisol, you may consider:

- Reducing the amount of endurance exercise you engage in
- Making sure you're [getting enough healthy carbs in your diet](#), and not getting too much fat (ideally, keep your fat intake below 35% to avoid inhibiting glucose metabolism in the electron transport chain of your mitochondria)
- Supplement with progesterone, mixed with high-quality natural vitamin E

Sources and References

- [1, 2, 3 Haidut.me February 26, 2024 \(Archived\)](#)
- [4 Journal of Applied Physiology October 1, 2017; 123\(4\): 717-727](#)