



STRESS, CORTISOL AND THE UNSEEN BARRIERS TO FAT LOSS

If you've ever been in that position where you are pretty sure you're doing everything by the book as far as your training and diet goes but just can't figure out why you only seem to be adding the 'smooth' layer and adding **nothing** in muscle and strength then maybe your biochemistry is letting you down, namely, **cortisol!**

Famed researcher Hans Selye's definition of stress was 'the nonspecific response of the body to any demand made upon it to adapt, whether that demand produces pleasure or pain.'

According to Selye's 'General Adaptation Syndrome', there are three phases of the stress response in humans that shows the disease-causing effect that chronic stress can have, specifically its long-term chemical changes in the body.

Phase 1 - The Alarm Stage

This phase is quite normal and healthy, in fact pertinent to your health, as it is simply the body recognising that there is an element of 'stress' be it danger, a threat, physical exertion etc and prepares the body to handle it. This is most commonly known as the Fight or Flight response, where the adrenal glands kick in to secrete adrenalin, breathing and heart rate increase, senses are peaked, blood flow is sent to the muscles in the limbs to combat the danger (fight) or for running away (flight). Along with adrenalin, noradrenalin and cortisol are produced to supply that instant burst of energy required.

According to Selye, if this energy is not used by physical activity it can become harmful.

So far, everything is normal and healthy, you have experienced a stressful event and the body has prepared you via hormonal changes to be fully equipped with adequate energy, focus and physical resources to handle it. Typically the body is wound-up for around 20-30 minutes after, as generally this is all that is needed, you've either escaped the danger by this time and realise you're safe and can calm down or you are still trying to escape in which you won't last long and you'll be dead soon anyway. The problems arise when the stress response endures.

Phase 2 -The Resistance stage

Once the stress has 'ideally' been resolved the body moves into this second phase where it graduates back into homeostasis, hormones levels return to normal and a recovery process can begin. Essentially, the problem here is that the body is slightly fatigued from the effort and requires a renewal/recovery to regain its strength in the adaptation response again. If the stress *has not* been resolved and the condition persists, as is the case with emotional stress, then the body adapts in a continued effort of resistance and stays in a state of 'arousal'. This places a large toll on the body.

Even when the stress *is* resolved, if further events of short term stress hit the body in its fatigued state you have reduced defenses and adaptive energy and repetition of this process with insufficient recovery/rest before you still ultimately move into the final stage.

Phase 3 – The Exhaustion Stage

By this time the stress is chronic, in that it has persisted for too long or repeated too frequently and the body is drained of its adaptation energy. Overload and burnout are the direct result. The fight or flight system is wiped (adrenal fatigue) and your **stress** levels are here to stay.

This stage impacts most negatively on your health, with potential damage to nerve cells and muscle tissue, cardiovascular conditions, stroke, gastric ulcers, anxiety and depressive tendencies, thinking and memory impairment, high blood pressure, heart disease and high blood glucose levels.

So what has this got to do with training, fat loss and muscle gain?

When we experience a prolonged or constant state of stress the primary hormone that is elevated is cortisol.

Cortisol is a natural steroid hormone produced by the adrenal glands and secreted during the stress response. It is primarily involved in producing the readily available glucose for energy and distributing it to the body's areas of greatest need like the muscles and brain, and it regulates how fats, carbohydrates and proteins are metabolised to best aid the stress response.

Again, in small and acute doses Cortisol is great, it:

- Gives us the quick burst of energy when we often need it.
- Improves memory function.
- Lowers sensitivity to pain.
- Helps burn fats and carbohydrates as energy.

Chronic effects of Cortisol on the other hand have a more devastating effect. Such as:

- Impaired cognitive performance.
- Suppressed thyroid function (bad for burning fat).
- Blood sugar imbalances such as hyperglycemia (bad for burning fat).
- Decreased bone density.
- Decrease in muscle tissue (atrophy) (bad for burning fat).
- Higher blood pressure.
- Lowered immunity and inflammatory responses in the body including slowed wound healing.
- Increased abdominal fat, which is associated with a greater amount of health problems than fat deposited in other areas of the body.

Now let's really get into the problem of cortisol.

When cortisol levels are chronically raised they have an impairing effect on glucose, insulin and lipid metabolism, such that insulin resistance builds up causing higher levels of blood glucose. This makes fat burning next to impossible when blood sugar is high. Also, studies have shown that cortisol stimulates neuropeptide Y (NPY) which is an appetite stimulant and has been associated with increased caloric intake, not just through 'stress eating' but through hunger signals as well. Furthermore, there is a growing body of evidence showing that cortisol not only effects increased fat storage and muscle loss, but it effects *where* the extra fat is deposited – right in the *belly!*

See the following findings from research into the relationship between stress and stress hormones on fat deposition:

“...Women who had larger cytokine (stress hormones) responses to stress were more **abdominally** obese than women with smaller cytokine stress responses. (1)

“The rise of morning cortisol values was positively associated with waist/hip ratio, abdominal sagittal diameter and triglycerides (fat). (2)

“When genetic factors are identical, visceral (intra-abdominal area) fat accumulation... is associated with increased psychosocial stress and concomitant hormonal changes.” (3)

“... chronic stress, whether psychological and/or physical, exerts an intense effect upon body composition, which, in turn, significantly affects the longevity and survival of the organism.” (4)

To top it all off, there is also a close correlation between cortisol and testosterone, whereby the testosterone/cortisol ratio, which is a depicter of anabolism and muscle recovery, is significantly lowered, thereby blunting your very efforts to gain muscle and recover adequately.

So what other things increase cortisol levels?

Apart from stress, there are other things that can cause increased levels of cortisol within the body. Sleep deprivation is a trigger and it often goes hand in hand with stressful situations causing a sustained hyper-arousal of the body's stress response system. Current research not only indicates that sleep deprivation can lead to an elevation in cortisol levels, it can be harmful to carbohydrate metabolism; changes which increase the chance of obesity. According to Michael Thorpy, Ph.D., and director of the Sleep Wake Disorders Center at Montefiore Medical Center in New York, "Sleep loss is associated with striking alterations in hormone levels that regulate appetite and may be a contributing factor to obesity.

That morning cup of coffee is full of caffeine and just 200mg of this stimulant can increase blood cortisol levels by 30% over the course of an hour and can remain elevated for up to 18 hours.

Surprisingly, exercise can affect your cortisol levels as well. Because cortisol is released in response to stress and exercise forces the body to temporarily deviate from homeostasis, this is perceived as stress on the body, thus causing a cortisol release. What is good to know though, is exercise training will increase the threshold of cortisol release. For example, if you begin jogging at a 9 minutes per km pace, cortisol will be released at that intensity. However, as your training progresses and you begin jogging at a 6 minutes per km rate, the body will not perceive the 9 minutes per km pace to be as stressful and will not release as much cortisol. Additionally, the time and intensity of exercise will dictate the level of cortisol release. If you exercise for more than 60 minutes, even at a low intensity, the body's glycogen stores (fuel) will decrease significantly and the increased stress will cause more cortisol release. The more training you do, the better your body will become at dealing with physical stresses and decrease the need to release cortisol. This effect is not limited to exercise; people who are regularly active show a decreased cortisol response to an emotional crisis when compared to sedentary controls.

So how can we improve the body's cortisol production?

Sex can be a great stress reliever. Research has found that sex and physical intimacy reduces stress levels and puts us in a better mood. One particular study looked at women's heart rate and cortisol levels as a measure of stress response, and found that women exhibited less of a stress response after 'positive physical contact' with a partner. Emotional support alone didn't have the same effect.

A good night's sleep is vital to feeling your best. Anyone making a commitment to losing weight should consider a parallel commitment to get more sleep. See the Conan Fitness Sleep article for tips on how to improve your sleep patterns.

Tips to reduce your cortisol levels

- Magnesium supplementation can decrease cortisol levels after aerobic exercise but not after resistance training.
- Omega 3 fatty acids have a dose-dependent effect in slightly reducing the cortisol release influenced by mental stress. Omega 6 fatty acids, on the other hand, have an inverse effect.
- Music therapy has been known to reduce cortisol levels in certain situations.
- Massage therapy has also been known to reduce cortisol levels.
- Laughing, and the experience of humour, can also lower cortisol levels.
- Crying can reduce cortisol levels by making you feel better by releasing emotion.
- Vitamin C can reduce cortisol release in response to mental and physical stressors.
- Black tea may hasten recovery from a high-cortisol condition.

Conclusion

Stress is a natural part of our daily lives but with stress comes increased cortisol production and we now know that this has a negative effect on weight loss efforts.

Although cortisol is a necessary hormone for fuel regulation, exercising, eating, awakening, and coping with dangerous situations, if there is too much cortisol in circulation, excess abdominal fat storage can develop. This type of central obesity is linked to developing cardiovascular disease, type II diabetes, and cerebrovascular disease. Adopting an effective and regular exercise and stress management program aimed at reducing sustained stress, will have a positive effect on weight loss and muscle gains.

References:

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