# E3 Nutrition™ Information for Energy, Exercise and Endurance

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## What is cortisol?

Cortisol, known as the regulator of immune response is a hormone controlled by the adrenal cortex. This powerful hormone is also known as an adrenalcorticol hormone, a glucocorticoid and hydrocortisone or simply cortisone. Playing many different roles in your body, cortisol can have a negative impact on sleep, mood, sex drive, bone health, ligament health, cardiovascular health and athletic performance, potentially causing fatigue and inflammation. Its primary functions are to increase protein breakdown, inhibit glucose uptake and increase lipolysis (the breakdown of fats).

## What does an increased cortisol level mean to me?

While cortisol in normal amounts is necessary for proper metabolic function, a chronic elevated cortisol level has adverse effects on your health, mood and performance. Here's the cycle: elevated cortisol secretion from physical or mental stress causes fat, protein and carbohydrates to be rapidly mobilized in order for you to take action against the stressor. This is sometimes referred to as the 'fight or flight' response. The mobilization of these nutrients in addition to epinephrine and a number of other endocrine hormones allows you to take quick action when presented with stress. During this mobilization, cortisol and adrenaline increase while DHEA (Dehydroepiandrosterone) and testosterone decrease. A chronic elevated cortisol level causes your body to enter a state of constant muscle breakdown and suppressed immune function, increasing your risk of injury.

## How do I know if my cortisol levels are high?

Mood swings, lack of motivation to train, loss of muscle and loss of appetite are all symptoms of an elevated cortisol level. Sound familiar? That's right, overtraining syndrome. If you are not taking steps to modulate your cortisol, you are breaking down your muscle, storing fat and getting sick, all of which don't make for a fast racing season. There is also strong evidence that athletes exercising in a carbohydrate-depleted state experience larger increases in cortisol.

## What affects cortisol secretion?

Stress, which includes trauma, infection, disease and exercise, is the primary factor that dramatically raises cortisol levels. Wait a minute, exercise is a stressor? High intensity exercise and prolonged exercise both increase cortisol levels, which remain elevated for about 2 hours following the exercise bout. Repeated exercise without appropriate rest results in chronic elevated cortisol

## How does cortisol affect my endurance performance?

It is only with chronic elevated cortisol levels that your performance will suffer, but the effect is dramatic. Excess cortisol suppresses your immune system, producing a greater risk of upper respiratory infections and depressed levels of testosterone. On top of that, your body will be

in a catabolic state- breaking down muscle and storing fat. In addition to reducing your muscle and getting sick, suppressed testosterone means suppressed recovery. Aerobic and anaerobic muscle fibers need time to repair and recover from hard workouts to improve their capacity to exercise. Elevated cortisol and suppressed testosterone do not allow you to maximize your recovery, leading to slower performance gains.

notes from the

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***Evidence that cortisol response to exercise can be modulated:***

Although true resting levels of cortisol do not differ between trained athletes and sedentary controls, exercise and recovery periods are associated with elevated cortisol release. Even 15 minutes of submaximal cycling exercise has been shown to elevate post-exercise cortisol levels in the saliva (O'Conner et al. 1996). A study of marathoners (Cook et al., 1987) found salivary cortisol levels to be elevated during the race, but were maximal at 30 minutes after race completion. Cortisol release in response to exercise appears to be altered depending on the time of day that exercise takes place (Kanaley et al). Cortisol levels were much higher during and after exercise at 7am than at 7pm or midnight. Double sessions for one hour and fifteen minute bouts at 75% of VO2 max were found to elicit higher cortisol response if only separated by 3 hrs of rest versus 6 hrs rest between bouts (Ronsen et al., 2002). Carbohydrates consumed during exercise have been shown to decrease the immune and cortisol response within 30 minutes after 6 x 15min maximal running bouts when compared to a non-caloric, sweetened placebo (Bishop et al., 2002). There is strong evidence that an athletes exercising in a carbohydrate-depleted state experience larger increases in circulating stress hormones (cortisol) and a greater suppression of immune function (Gleeson et al., 2001).

By Sally Warner MA, Ph.D.

## How can I modulate Cortisol?

Cortisol can be modulated through rest, nutrition and supplementation. First, since repeated bouts of exercise cause chronic elevated cortisol, it is key to get plenty of rest between workouts. Double workouts in one day are detrimental if there is not sufficient rest between the workouts (see side bar by Sally Warner Ph.D.). Next, as mentioned earlier, depleted carbohydrates mean higher levels of cortisol, so keep up your carb intake. Don't bonk! Finally, there are a number of supplements that are also capable of modulating cortisol. Adaptogens like ginseng, rhodiola and ashwaganda all help you adapt to 'stress' by helping regulate the body's 'fight or flight' response to stress.

**Recommendation:** Since the scope of this newsletter is nutrition, we will detail our nutrition recommendations and briefly list lifestyle changes which help modulate stress. The most important step is to reduce any unnecessary stress in your life. Although sometimes the most difficult thing to do, it is also the most effective, so make sure to manage the stress that you cannot eliminate. Time management, yoga, and hobbies are some effective techniques. Complimentary to managing stress, it is crucial to stick to a sensible diet. Poor nutrition including high fat or high protein diets can adversely affect cortisol control and in times of high stress, many of us crave meals, which we know are detrimental to our health. And it's not only what you eat but when. Make absolutely certain you have breakfast, which will help regulate your blood sugar and your cortisol prior to workouts. In a recent paper by Dr. Mark Davis and Dr. Adrienne Brown, it was clearly demonstrated that ingesting carbohydrates during exercise modulates many of the endocrine hormones, including cortisol.

For added cortisol control, consider some herbal applications. Adaptogens are some of the more popular supplements that help with cortisol control, which include ashwaganda, rhodiola and ginseng. By definition adaptogens help the body adapt to high levels of physical and mental stress. The result is a controlled 'fight or flight' response that helps modulate cortisol levels. Another class of herbs common in Traditional Chinese Medicine (TCM) directly and effectively modulate cortisol-magnolia bark, theanine (from green tea), epimedium and tyrosine have shown promise in regulating cortisol. Ironman triathlete, cyclist and Ph.D. Shawn Talbott's recently released book *The Cortisol Connection* goes into detail on these and other TCM herbs.

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