



Cortisol

The evidence is overwhelming regarding the relationship between cortisol, poor health and life-threatening diseases

An Important Hormone

When we experience or feel stress, our bodies respond by stimulating the hormonal (endocrine) glands throughout our body to release hormones, including adrenaline and norepinephrine that trigger the fight or flight response, as well as cortisol.

Cortisol is an important hormone in the body responsible for regulating the manner in which our bodies use our fuel resources. It is secreted by the adrenal glands and involved in the proper glucose metabolism, regulation of blood pressure, insulin release for blood sugar maintenance and rapid fat and carbohydrate metabolism. Cortisol also provides for immune system balance and inflammatory response.

Known as a glucocorticoid, Cortisol is secreted by the adrenal cortex (corticoid) and because it increases levels of blood sugar, or glucose (thus glucocorticoid).

Glucocorticoids are essential to life. They enable the body to adapt to external changes and stress. They also maintain fairly consistent plasma glucose levels even when we go for long periods without ingesting food. Cortisol is the major corticosteroid. It is responsible for about 95% of all glucocorticoid activity in the body.

Fighting Stress

Cortisol is the body's chief stress fighting hormone produced by the adrenal gland and is high during periods of stress and low when relaxing. When levels of serotonin and dopamine are low, mood may dip, leaving us ill equipped to cope with stress. It is important to balance blood sugar levels because when these are low, serotonin and dopamine fall. Unnaturally high levels of cortisol can result in blood sugar irregularities creating fatigue, immune system deficiencies, anxiety, panic attacks, depression and increased risk of associated diseases. Even if the original stressor disappears, the body may remain in continuous or "hyper" state of anxiety.

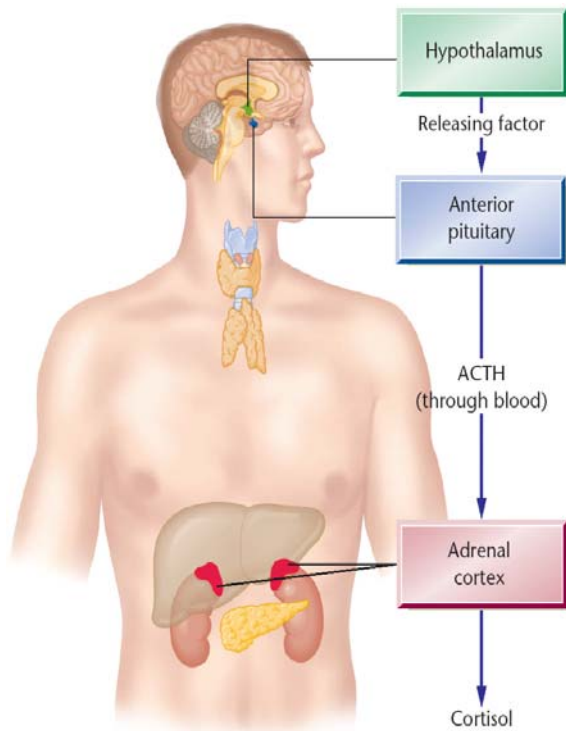
During periods of ongoing stress, the overproduction of adrenaline and cortisol interferes with the delicate balance of hormones in the body. Cortisol appears to interfere with how much serotonin and dopamine are produced. These are neurotransmitters, which affect mood and our sense of well-being.

Adapting to Stress

The father of stress research, Dr. Hans Selye, provided what we now know as the classic model for adaptation to stress. In summary, if stress puts the body out of balance, then our bodies will go through a series of actions (stress response) to help the body regain its balance. He termed the struggle to maintain this balance as the general adaptation syndrome. It is the body's way of reacting to a stress and to bring the body's system back in balance.



Phase one of the response is termed the alarm phase, characterized by an immediate activation of the nervous system and adrenal glands. Next comes the phase of resistance, which is characterized by activation of the hypothalamic-pituitary-adrenal (HPA) axis. The HPA axis is the coordinated system of the three primary endocrine tissues (glands) that manages our response to stress.



The HPA axis is a major part of the neuroendocrine system that controls reactions to stress and has important functions in regulating various body processes such as digestion, the immune system and energy usage. Species from humans to the most ancient organisms share components of the HPA axis. It is the mechanism for a set of interactions among glands, hormones and parts of the mid-brain that mediate a general adaptation syndrome, which will be discussed later.

Small increases of cortisol have some positive effects including bursts of energy for survival reasons, heightened memory functions, bursts of increased immunity and lower sensitivity to pain.

The problem occurs when we ask our body to react too often or with excessive resistance – both of which can lead to elevated cortisol levels. When stress is repeated, or constant, cortisol levels increase and stay elevated – causing a third phase of the general adaptation syndrome that is appropriately referred to as overload. In the overload stage, body systems start to break down and the risk of chronic disease increases significantly.

Elevated Levels Cause Problems

It is known that in normal people the level of cortisol in the bloodstream peaks in the morning and decreases as the day progresses. In depressed people, however, cortisol peaks earlier in the morning and does not level off or decrease in the afternoon or evening. Although the exact mechanism that causes depression is uncertain, clinical studies suggest that chronically elevated cortisol may induce clinical depression.

Cortisol secretion varies among individuals. People are biologically 'wired' to react differently to stress. One person may secrete higher levels of cortisol than another in the same situation. Studies have also shown that people who secrete higher levels of cortisol in response to stress also tend to eat more food, and food that is higher in carbohydrates than people who secrete less cortisol.

A 2006 Carnegie Mellon University Study found that lower social economic status was associated with higher levels of cortisol, independent of race and consistent with mediation by health practices and social factors. Interestingly, lower social economic status was associated with a greater likelihood of smoking, of not eating breakfast and with less diverse social networks. There was sufficient evidence to support the hypothesis that behavioral and social variables mediated the relationship between lower social economic status and higher levels of cortisol.

Comfort Foods

Stress also inhibits the release of serotonin, a neurotransmitter that affects appetite, mood, learning, and memory. Carbohydrates help increase serotonin levels, producing a calming affect. It is little wonder that high-carbohydrate foods like breads, pastas, and sweets are sometimes called "comfort foods."

Research published in Proceedings of the National Academy of Sciences by Mary Dallman, professor of physiology at the University of California at San Francisco, suggested that there is a biological link between stress and the drive to eat. Comfort foods -- high in sugar, fat, and calories -- seem to calm the body's response to chronic stress. In addition, hormones, such as cortisol, produced when one is under stress encourage the formation of fat cells. In developed countries, life tends to be competitive, fast paced, demanding, and stressful. There may be a link between so-called modern life and increasing rates of overeating, overweight, and obesity.

Risk of Disease

As stated, we do know that stress can alter the levels of hormones in the body and affect the immune system. The body reacts to stress by releasing hormones, such as adrenaline which prepares the body to respond to a challenge. Unfortunately, during times of stress, the body also releases the "killer" stress hormone – cortisol which is designed to help our body utilize proteins, carbohydrates and fats to produce energy to respond to whatever is causing stress. Unnaturally high levels of cortisol can result in blood sugar irregularities and increase the risk of fatigue, immune system deficiencies, suppressed thyroid, high blood pressure, higher "bad" cholesterol, lower "good" cholesterol, obesity, diabetes, ulcers, heart disease, cancer, and for many people, anxiety and depression.

Cushing's Syndrome

Excessive levels of cortisol in the blood result in Cushing's Syndrome. Symptoms include rapid weight gain, particularly of the trunk and face with sparing of the limbs (central obesity), "moon face", excess sweating, telangiectasia (dilation of capillaries), atrophy of the skin (which gets thin and bruises easily) and other mucous membranes, purple or red markings on the trunk, buttocks, arms, legs or breasts, proximal muscle weakness (hips, shoulders), and facial male-pattern hair growth. The excess cortisol may also affect other endocrine systems and cause, for example, reduced libido, impotence, amenorrhoea and infertility. Patients frequently suffer various psychological disturbances, ranging from euphoria to frank psychosis. Depression and anxiety, including panic attacks, are common. Other signs include persistent hypertension, and insulin resistance, leading to hyperglycemia (high blood sugars) which can lead to diabetes mellitus. Untreated Cushing's syndrome can lead to heart disease and increased mortality.

Anxiety and Depression

When you are constantly reacting to stressful situations without making adjustments to counter the effects, you will feel stress which can threaten your health and well-being. Too much stress can cause relatively minor illnesses like insomnia, backaches, or headaches, and as noted, can contribute to potentially life-threatening diseases.

The paradox of stress causing the release of cortisol is that anxiety produces cortisol, which produces anxiety which produces more cortisol, which causes the sufferer to feel more anxious. Soon the sufferer from anxiety and depression finds themselves in a never ending cycle of anxiety and depression.

A recent Emory University Study showed increased elevations of cortisol was associated with people undergoing magnetic resonance imaging (MRI). The results were consistent with the theory that the scanning environment can induce cortisol elevations and supported the well-established effects of acute stressors and their relationship to secretion of the killer hormone, cortisol.

A 2003 Stanford University study confirmed that Cortisol can be strongly activated by exposure to and anticipation of a phobic situation as did A University of Zurich study in 2006 that conversely showed lower levels of cortisol reduced social and spider phobias.

A Masstricht University (Netherlands) study reported in 2004 that panic attacks in normally healthy individuals, showed no increase in the level of cortisol after a panic attack, however, those patients who had been previously diagnosed with panic disorders, men in particular, showed higher levels of cortisol after a laboratory induced panic attack.

It has long been known that many seriously depressed patients have high blood levels of cortisol, caused by chronic stress. There is robust evidence that shows raised cortisol levels in mood disorders.

Answers are also coming from scientists like those at Dalhousie University in Nova Scotia, who reported in the journal, Behavioral Neuroscience that rats repeatedly exposed to a cortisol-like stress hormone show more depression-like behavior and greater signs of anxiety. Their study also indicates that the hormone affects males more than females. For example, patients with Cushing's disease have high levels of cortisol and are often depressed.

After the researchers injected rats with high levels of stress hormone for three weeks, they found that compared with controls, the animals showed significantly more behaviors that could be considered anxious and depressed. After chronic stress response with repeated cortisol injections, the rats demonstrated stress-like behavior.

Depression may make it harder to take the medications needed and to carry out the treatment for heart disease. Depression also may result in chronically elevated levels of stress hormones, such as cortisol and adrenaline, and the activation of the sympathetic nervous system (part of the "fight or flight" response), which can have deleterious effects on the heart.

Overweight and Obesity

To add insult to injury, research has found that high cortisol levels are linked to a tendency to store excess fat in the abdomen (rather than in the hips, thighs, and buttocks). Abdominal fat is particularly dangerous as it places a greater strain on the heart and is also associated with increased risk of cancer and diabetes. Even healthy-weight individuals who are "high-stress responders" have been found to store extra abdominal fat.

A 2004 University of Newcastle study reported that there is overwhelming evidence that during periods of acute stress, cortisol promotes survival by mobilizing energy reserves. In addition to these short-term adaptive changes, cortisol is also involved in other longer-term, stress-related adaptive changes such as shaping and regulating a number of physiological processes, including immune responsiveness and activation of the sympathetic nervous system. Although cortisol production is essential for survival, overproduction is associated with a significant disruption of cellular functioning, which, in turn, leads to widespread physiological dysfunction.

Sleeplessness

It is fairly obvious that stress can affect proper sleep, but a recent study by researchers at Pennsylvania State University found another reason why people may be losing sleep. It's not just because of what they worry about. According to the sleep study, it is about an increased risk of sleep deprivation caused by stress hormones.

The Penn State study of middle-aged men showed they become more sensitive to the stimulating effects of cortisol. When both young and middle-aged men were administered cortisol, the older men remained awake longer and slept less deeply.

Vgontzas and his colleagues suggested that an increased prevalence of insomnia in middle-age may, in fact, be the result of deteriorating sleep patterns associated with increased sensitivity to arousal-producing stress hormones, such as cortisol.

In another study, the Penn State researchers compared patients with insomnia to those without sleep disturbances. They found that insomniacs with the highest degree of sleep disturbance secreted the highest amount of cortisol. This suggested that chronic insomnia is a disorder associated with a sustained hyper arousal of the body's stress response system.

A 1989 study reported in the Journal of Clinical Endocrinology and Metabolism showed that increased levels of cortisol significantly reduced the time spent in rapid eye movement (REM) sleep (deep sleep) and significantly enhanced the time spent in lighter sleep patterns suggesting that cortisol influences sleep effectiveness.

A 2000 European Psychiatry and Clinical Neuroscience study reported that in the event of sleep deprivation and recovery sleep, normal or unusually high cortisol levels are not effected, reinforcing the notion that sleep, in of itself does not lead to a reduction of stress which would lead to a more normal level of cortisol.

Natural Remedies

All people feel stress, but they feel it in different amounts and react to it in different ways. Today, everyone experience the cortisol surge that accompanies chronic stressful situations that builds up and has a damaging effect on the body. The evidence is overwhelming regarding the relationship between cortisol, poor health and life-threatening diseases. Unfortunately, medical science seems to only be able to treat the symptoms of health problems derived from elevated levels of cortisol.

Fortunately, natural stress relief remedies, such as adaptogens, have been shown to help the body eliminate the damaging effects of stress and elevated levels of cortisol.