

THE ADRENAL GLANDS

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One adrenal gland sits atop each kidney. Working in concert, the adrenal glands steadily pump out hormones vital for a host of functions, including the following ones:

- Blood sugar balance
- Stress management
- Metabolism
- Immune system regulation
- Proper sleep patterns
- Mood stability
- Musculoskeletal tone

There are three classes of hormones secreted by the adrenal glands: the glucocorticoids, catecholamines, and mineralocorticoids. Any or all of these three classes of adrenal gland hormones can be out of balance when a functional illness is present.

The glucocorticoids – The adrenal glands produce these in response to stressors, such as emotional upheaval, exercise, surgery, illness, or fasting. The most recognizable of the glucocorticoids is cortisol, discussed later in detail.

The catecholamines – These serve as hormones or as neurotransmitters and include such compounds as epinephrine (adrenaline), norepinephrine, and dopamine. The medulla, the inner part of the adrenal gland, secretes epinephrine and norepinephrine, which are the main substances related to the fight-or-flight response.

Mineralocorticoids – These are hormones with specific tasks related to minerals. Aldosterone, for instance, directs the kidneys to retain sodium in times of dehydration.

Acting as the peacemakers of the hormonal family, the adrenal glands will exhaust all diplomatic options while attempting to maintain metabolic order. In the end, their ongoing sacrifice often initiates and then perpetuates vicious cycles that are destructive to the entire endocrine system, while leaving the glands themselves run-down and needing the most attention.

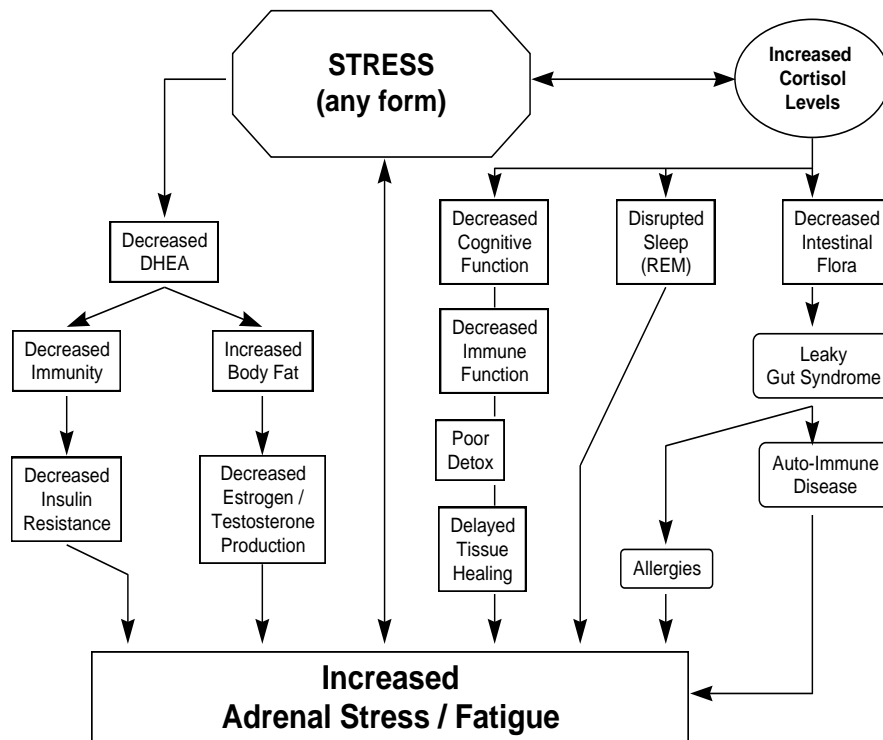


Figure 1: The Stress Effect

To measure the extent of the damage caused by the stresses of life, researchers have designed laboratory tests using saliva to detect and calculate specific adrenal hormones, with cortisol being the most important one.

Cortisol, which is manufactured in the outer part, or cortex, of the adrenal gland, is a multi-purpose steroid hormone that has anti-viral, anti-bacterial, and anti-inflammatory properties.^{i ii} It is also a critical agent involved in blood sugar stabilization, mood balance, and restful sleep.ⁱⁱⁱ However, chronic elevations of cortisol, like what occurs with ongoing stress, eventually suppresses the action of the immune system, thereby increasing one's chances for infection. High cortisol will also lead to weight gain by promoting fat storage and muscle tissue breakdown, a process called catabolism.^{iv} Two diseases relate specifically to cortisol. Cushing's syndrome is the chronic over-production of cortisol, where Addison's disease is just the opposite. Both diseases are rare when compared to the functional imbalances altered cortisol levels create, which are epidemic.

The Circadian Cortisol Profile is a saliva test measuring the normal rhythm of cortisol through a 24-hour period. A normal profile is shown below.

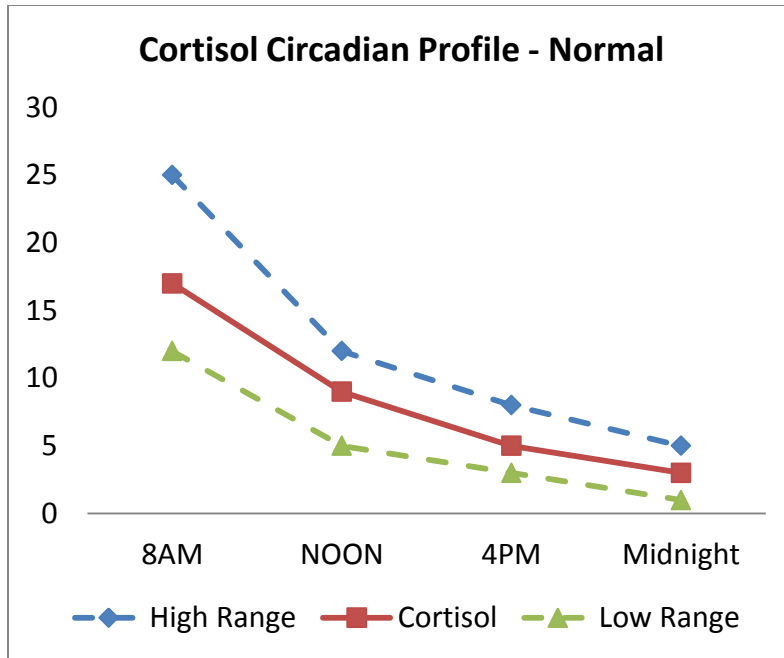


Figure 23: Normal Adrenal Function

The normal rhythm for cortisol begins with high levels in the morning, followed by decreasing levels throughout the day, and ends with the lowest level at night. In the early stages, functional imbalances generated via diet, lifestyle, or other stressful circumstances, begin to alter the flow of cortisol. Eventually, the normal rhythm gets flipped on its head.

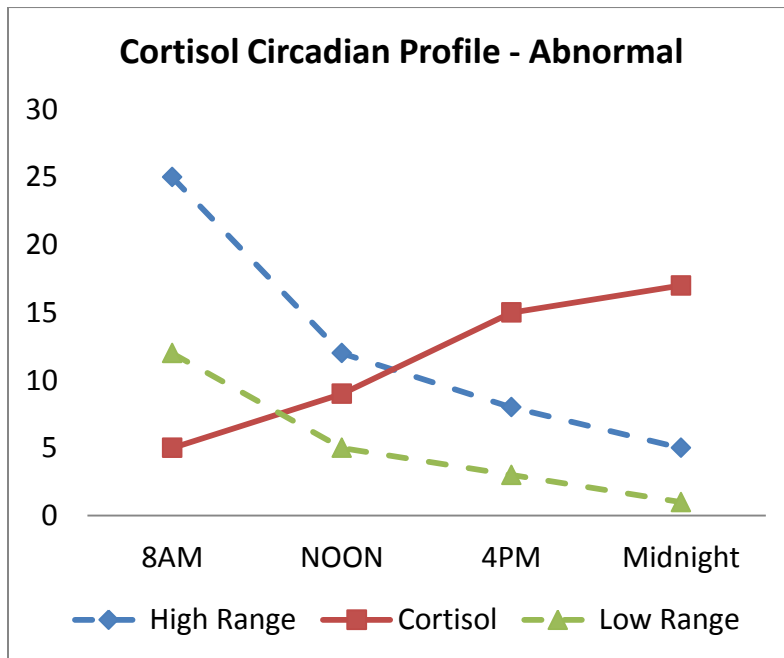


Figure 24: Overworked Adrenal Glands

Elevated cortisol levels at night begin to disrupt sleep and make “popping out of bed” in the morning more difficult. In addition, those with the profile above will likely experience sugar cravings and, if they are female, hormonal swings during their menstrual cycle.

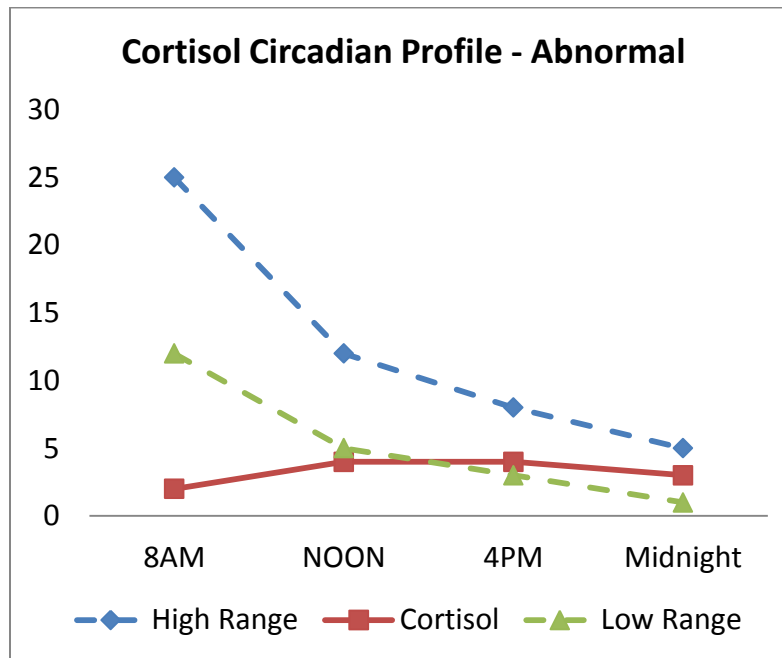


Figure 25: Exhausted Adrenal Glands

The final profile above is adrenal gland exhaustion. It shows cortisol at very low levels, lacking the ability to spike at all. Restoring health in this individual would take time and precision. An all-in-one adrenal gland supplement would not do and might, in fact, further overwork the gland and exaggerate the fight-or-flight response. When the adrenal gland is exhausted, gentle rehabilitation is called for. This often means supplying a supplement that re-establishes proper cortisol levels first, while making sure not to encourage adrenaline production. With Functional Bio-Analysis (see: www.FBAHealth.com), practitioners can discover the ideal hormetic nutrient and supply it in a non-stressful dosage.

Adrenal Gland Hormetic Nutrients

Many hormetic nutrients may help restore adrenal function because of their multi-purpose nature and because different degrees of adrenal fatigue are possible. Common nutrients include phosphatidyl serine; vitamins B5, B1, and B2; glandular tissues or extracts; the amino acid L-tyrosine; and calcium or magnesium. In more severe cases, patients may need to supplement adrenal hormones. Bovine adrenal tissue or their extracts can be helpful, as well as hormones such as DHEA or progesterone. Modulating herbs like ashwagandha, rhodiola, and panax ginseng can also be of great value.

ⁱ Buford TW, Willoughby DS. Impact of DHEA(S) and Cortisol on Immune Function in Aging: A Brief Review. *Appl Physiol Nutr Metab*. 2008 Jun;33(3):429-33.

ⁱⁱ Fontana L. Neuroendocrine Factors in the Regulation of Inflammation: Excessive Adiposity and Calorie Restriction. *Exp Gerontol.* 2009 Jan-Feb;44(1-2):41-5.

ⁱⁱⁱ Van Santen A, Vreeburg SA, et al. Psychological Traits and the Cortisol Awakening Response: Results from the Netherlands Study of Depression and Anxiety. *Psychoneuroendocrinology.* 2010 Aug 17.

^{iv} Mujica-Parodi LR, Renelique R, Taylor MK. Higher Body Fat Percentage is Associated with Increased Cortisol Reactivity and Impaired Cognitive Resilience in Response to Acute Emotional Stress. *Int J Obes (Lond).* 2009 Jan;33(1):157-65.