

Your Adrenal Hormones

The adrenals, small glands located above each kidney, produce a number of important hormones. The adrenals' inner medulla produces epinephrine and norepinephrine (adrenaline). Tumors of the adrenal medulla which produce excess epinephrine and norepinephrine are called pheochromocytomas. Deficiencies of the adrenal medulla that reduce the levels of these hormones do not give rise to clinical problems.

Adrenals also contain an outer cortex, which produces hormones such as cortisol, aldosterone, testosterone, DHEA, DHEAS, androstenedione and estrogens. Cortisol and aldosterone are two of the most important hormones the body makes. Excesses or deficiencies of these hormones result in important clinical problems. Cortisol, a glucocorticoid, is the stress hormone and is involved in weight control, infection fighting, quality of skin and bones, and heart function. Its levels are the highest in the morning, and are increased by stress and severe illness. Too much cortisol from any cause leads to Cushing's syndrome; the symptoms and signs of which include weight gain, stretch marks, bruising, extra hair growth, irregular periods in women, loss of muscle, trouble sleeping and emotional problems, such as depression. Too little cortisol is part of the syndrome called Addison's disease, often marked by low energy, joint and abdominal pain, weight loss, diarrhea, fever, and electrolyte disturbances. If the adrenals are making too little cortisol, the pituitary compensates and makes more of the hormone, ACTH. If the pituitary is not working, both ACTH and cortisol levels may be low.

Aldosterone is the salt-retaining hormone and is a mineralocorticoid. Excess of aldosterone leads to high blood pressure and low potassium. Deficiencies of aldosterone are much less appreciated than deficiencies of cortisol, and lead to low blood pressure and high pulse, especially on standing, the desire to eat salt (salt-craving), dizziness or lightheadedness on standing, and palpitations. Severe cases may lead to high potassium and low sodium in blood tests. When the adrenal is not making aldosterone, renin, a kidney hormone, increases. Excesses of cortisol and aldosterone may occur independently, that is a patient may have only excess aldosterone, only excess cortisol, or excesses of both. Similarly, deficiencies of cortisol and aldosterone deficiencies may be independent.

Many patients coming to see Dr. Friedman lately with symptom of fatigue and often symptoms of salt-craving, "cognitive fuzziness", dizziness or lightheadedness on standing, or palpitations have low blood levels of aldosterone. He explains the connection between low aldosterone levels and fatigue as follows: with low aldosterone, the kidney loses salt, leading to low blood volume. This coupled with the idea that the leg veins don't constrict properly, leads to lower blood volume to the brain and fatigue and other symptoms. These patients often have a drop in their blood pressure and an increase in their pulse when standing. They may also have decreased blood flow to the brain when measured by SPECT scan. Aldosterone deficiency may be made worse if patients restrict their salt intake.

Soon-to-be-published research by Dr. Friedman shows a few patterns of abnormalities in the renin-aldosterone axis. A little more than half the patients with fatigue had low blood levels of both renin and aldosterone. This is called hyporeninemic hypoaldosteronism and is probably due

to dysfunction of what is called the autonomic nervous system, which sends messages from the brain to the kidneys. Other aspects of the autonomic nervous system have been found to be deficient in chronic fatigue syndrome. About one-third of the patients were found to have low aldosterone and high renin. This indicates a deficiency in the aldosterone production in the adrenals themselves, with a compensatory rise in the renin coming from the kidney. The aldosterone defect can either be an isolated problem, or part of Addison's disease (often early Addison's disease), in which both cortisol and aldosterone production are diminished. The remaining patients (about one-sixth) had both high renin and high aldosterone. This is likely to be a compensatory rise in both of these hormones as a reaction to a low blood volume, most likely due to an inability of the kidney to retain salt.

Dr. Friedman recommends treating patients with an individualized combination of increased salt consumption, a synthetic form of aldosterone called Florinef (fludrocortisone), or Midodrine (proamantine), a drug used to raise blood pressure. Salt is the most benign of the treatments. Salt tablets can be purchased in a drug store or a patient can add an extra teaspoon of salt to their food per day. Florinef comes in 0.1 mg pills and Dr. Friedman usually starts with 1/2 pill in the morning for a week or two and then goes up to 1 pill in the morning if no side effects occur. The main side effects are headache and swelling in legs (edema). Midodrine comes in 5 mg pills and Dr. Friedman usually starts with 5 mg pills in the morning and noon. He may go up to 2 pills three times a day and sometimes needs to use both Florinef and Midodrine, as well as extra salt. The side effects of Midodrine include high blood pressure, itching, goosebumps, numbness and the feeling of writing on your skin or scalp. Many of these side effects go away with use and both drugs are unlikely to cause long term damage. Most patients taking Florinef and Midodrine, as well as extra salt report an improvement in their symptoms of palpitations and dizziness/lightheadedness on standing, while many report an improvement in fatigue and cognitive dysfunction. Licorice, available as a tea from Alvita, may help with mild cases.

Dr. Friedman is doing further research on the renin-aldosterone axis and chronic fatigue syndrome (CFS) in a study generously funded by the CFIDS (Chronic Fatigue and Immune Dysfunction Syndrome) Association of America. He is also studying the effect of Viagra on symptoms of CFS, with the idea that Viagra may improve blood flow to the brain. For more information on these studies, please email Dr. Friedman at mail@goodhormonehealth.com; or to set up an appointment with Dr. Friedman, please email Kimberly at appointments@goodhormonehealth.com.