

The Ins and Outs of Glucocorticoid Replacement

Patients with adrenal insufficiency, either due to a pituitary problem or an adrenal problem, need glucocorticoid replacement. Patients with adrenal causes of adrenal insufficiency, such as those who have had a bilateral adrenalectomy for Cushing's disease, need both glucocorticoid and mineralocorticoid replacement. Glucocorticoid replacement is usually given in the form of hydrocortisone, of which the brand name is Cortef. Other possibilities include prednisone or dexamethasone, but hydrocortisone, because it has a relatively short half-life is more physiological, and is usually recommended. The body makes most of its cortisol in the morning and the proper way to replace cortisol is to give most of it in the morning in the form of hydrocortisone, which is a relatively short-acting glucocorticoid. Many physicians used to give too much glucocorticoid to a patient with adrenal insufficiency; however, more recently it is recognized that the body makes about 10-12 mg of hydrocortisone. Because not all of the hydrocortisone is absorbed, doses around 15 mg to 20 mg of hydrocortisone are needed, with a higher dose in patients who are heavier and a lower dose in patients who are more petite. In general, patients with pituitary causes of adrenal insufficiency need less replacement than those with adrenal causes. In most of the hydrocortisone given in the morning, the common replacement might be 12.5 mg in the morning and 2.5 mg in the afternoon. Brand Cortef is often preferable to generic hydrocortisone.

Dr. Friedman, when he was a fellow at the NIH in the 1990s, published a paper in the *Journal of Clinical Endocrinology and Metabolism* on the timing of giving glucocorticoids to patients with Addison disease. This paper involved sleep studies, and Dr. Friedman found that a small dose of hydrocortisone given at bedtime helped the patients with Addison disease go into REM sleep while if the glucocorticoids were withheld for 1-1/2 days, the patient did not go into REM sleep. It is commonly known that excess glucocorticoids give trouble sleeping, but this paper showed that glucocorticoid insufficiency is also associated with poor sleep and that it might be beneficial to give a small amount of glucocorticoids at bedtime.

Another question that Dr. Friedman is often asked is, "When do I increase my hydrocortisone?". Patients who have permanent glucocorticoid insufficiency and need lifelong hydrocortisone should be on the lowest dose possible and should find a stable dose. Patients who are weaning off glucocorticoids who had Cushing disease and are cured, may be able to decrease their dose progressively to get off the glucocorticoids. For those on a chronic dose, again, the lowest dose is desirable; however, if the patient has a fever greater than 100.5 or is nauseous and vomiting, I recommend the patient double their hydrocortisone dose. If they still cannot take down hydrocortisone (such as if they have a stomach flu) it could be an emergency and they should go to the emergency room and/or give themselves an IM injection of Solu-Cortef at 100 mg. I do provide patients with a letter to take to the emergency room. If patients are doing strenuous exercise or are under rather severe stress, they can add an extra

2.5 mg to 5 mg of hydrocortisone, but this should only be done for a short period of time. In general, the principle is to take the least amount of glucocorticoids over a long period of time, although for a short period of time, extra can be taken.

The next question that comes up is, "What about for surgery?". There was a landmark study from the NIH in the 1990s that used monkeys to show that replacement glucocorticoid dose is needed in monkeys who had an adrenalectomy to handle the stress of having their gallbladder removed. However, 10 times the amount of glucocorticoids was not needed. This shows that our common practice of giving extra glucocorticoids at the time of surgery is probably an overkill. However, doctors do not want patients to get sick when they have surgery so most doctors recommend giving extra glucocorticoids. In general, prior to general anesthesia, Dr. Friedman would recommend 100 mg of IV hydrocortisone before the surgery and 50 mg after; this would be for an extensive surgery like a gallbladder removal. In patients who are having minor surgery, 100 mg before the general anesthesia could suffice with regular dosing afterward. A patient going for a colonoscopy may also benefit from 50 mg of IV hydrocortisone before their colonoscopy. It is also important before going for surgery to drink a lot of fluids.

In addition to glucocorticoid replacement, patients with adrenal insufficiency need mineralocorticoid replacement. This is done using a medicine called fludrocortisone (Florinef). Florinef is no longer available as a brand, and the generic name is fludrocortisone. The dose of Florinef is very easily monitored in patients with adrenal insufficiency by use of a blood test called renin. When the renin is high, it means the patient needs more Florinef and when the renin is low, the patient needs less. Patients who are going for procedures such as a colonoscopy when they have to have their bowels cleaned out should double their Florinef dose the day before the colonoscopy.

Glucocorticoid replacement can be difficult, and I recommend you contact your doctor or Dr. Friedman with specifics regarding glucocorticoid replacement.

If you have any questions about Dr. Friedman's practice or want to make an appointment, please to go his website www.goodhormonehealth.com.