

## HORMONES AND WEIGHT LOSS

Dr. Friedman was taught in medical school that weight gain is due to taking in more calories than expending calories, although it is not so simple. Weight gain is a complex process that depends on hormones, other medical conditions, sleep, stress, mood and the motivation to stick to lifestyle changes. There are certain hormones that are specifically involved in weight control. The most important one is cortisol. Cortisol is elevated in stress, sleep deprivation, in people who have social jet lag which means their circadian rhythm is different from society's and the disease called Cushing's syndrome. Also, weight gain can be due to low thyroid hormone, low growth hormone (mediated by low IGF-1), high insulin, low leptin, low testosterone, low estrogen and possibly low oxytocin.

The first question is how does **cortisol** lead to weight gain. Cortisol especially leads to visceral or central obesity, which is the detrimental fat that is in your abdomen. Some studies have suggested that elevated nighttime cortisol may be more detrimental than daytime cortisol. Some studies have suggested that cortisol increases appetite, but I am not sure as my Cushing's patients really do not eat that much. It also may affect the type of food eaten in that people with high cortisol may prefer comfort foods, which are foods like your mother used to make such as macaroni and cheese and mashed potatoes. Cortisol stimulates enzymes that are involved in fat storage. These enzymes are in the visceral fat which is why cortisol leads to weight gain there. Cortisol leads to storage of triglycerides and decreased breakdown of fat. Cortisol also leads to larger fat cells (adipocytes). Growth hormone, testosterone and estradiol act oppositely to the combination of cortisol and insulin and they stimulate fat breakdown. Cortisol also inhibits other axes such as the thyroid, growth hormone and reproductive axis. All of these axes when they are turned off, lead to further weight gain. Cortisol stimulates glucose production which leads to more fat. Cortisol increases the hormone called NPY, which is a brain hormone that is involved in appetite. I am not really sure why nighttime cortisol leads to higher weight gain as people do not really eat that much at night, but I do know when I put my patients with Cushing's syndrome that have high cortisol at night on the medicine called ketoconazole, and I give it usually at night, they lose a lot of weight. Ketoconazole lowers cortisol for a few hours after its given.

How else does cortisol lead to weight gain? Cortisol decreases muscle strength which makes it harder to exercise. Cortisol leads to fatigue by unknown mechanisms. Cortisol leads to poor sleep which encourages people to eat more and especially more higher preference for a high fat and sugary foods. The poor sleep itself leads to high cortisol. Although it is hard to avoid stress and it is better to deal with it, stress reduction is one thing everybody can do to lower their cortisol.

**Insulin** is also involved in weight gain. Cortisol increases insulin. Insulin converts energy into fat and is a rainy day hormone that stores fat and leads to weight gain. When your insulin levels drop, your body starts to burn fat and weight loss occurs. In insulin resistance which occurs in obesity, your insulin does not bind to the insulin receptor properly and does not signal properly so you fail to sense you are full. Foods that are high in glycemic index, especially carbohydrates, lead to release of insulin. When you eat foods that raise your insulin, you also get more dopamine release in the reward centers of the brain, so you become addicted to food. Try to eat more high fiber foods and this will prevent release of insulin. The medicine metformin also reduces insulin levels and can lead to mild weight loss.

The hormone **leptin** is made in your fat cells and the more fat cells you have, the higher your leptin is. High leptin tells you not to eat anymore and low leptin tells you to eat more, so it sounds like it should be good that if you are obese that you should not eat that much. Unfortunately, most obese people are leptin resistant, so the leptin does not work properly and doesn't tell you to stop eating. It is like insulin resistance in that the insulin does not work properly, so you still eat even if though you are full. If you have leptin resistance, both the starvation and reward signals occur making it especially hard to lose weight.

So what do you do if you have high cortisol and are insulin and leptin resistance? Exercise is the first choice. Although exercise raises cortisol while you exercise, it lowers cortisol throughout the day. Exercise prevents insulin resistance and improves clearance of fat from the liver. It helps you deal with stress. You should also try to avoid the simple carbohydrates that stimulate insulin release.

**Thyroid hormones** also play a crucial role in metabolism. Patients who have an underactive thyroid have slower metabolism and are more tired. They have fluid retention, have a harder time exercising and the liver does not metabolize glucose properly. Patients that are hypothyroid can gain weight, but it is usually modest. Patients who have an overactive thyroid often have an increased appetite, so I usually do not recommend thyroid hormone for weight loss in someone with normal thyroid tests.

Another crucial hormone is **growth hormone** which tells the liver to release a hormone called IGF-1. Growth hormone itself can lead to diabetes and insulin resistance. IGF-1, however, is the active hormone that increases metabolism and often improves diabetes and insulin resistance. IGF-1 decreases fat stores and leads to increased muscle mass. In patients with normal IGF-1 levels who are not growth hormone deficient, growth hormone has minimal effects on weight and increases the risk of cancer. However, in patients who are growth hormone deficient determined by a growth hormone stimulation test, growth hormone treatments lead to increased energy, increased muscle mass, better sleep, decreased abdominal fat and weight loss. There is a supplement called Serovital, which is a blend of amino acids that does stimulate growth hormone and may be a good choice in people who have a low IGF-1 but are not found to be growth hormone deficient.

**Testosterone** is also helpful for weight loss in both men and women with low testosterone. Testosterone replacement increases muscle mass, decreases abdomen fat and blocks some of the detrimental effects of cortisol in fat, but it is not recommended in patients with normal testosterone levels.

**Estrogen** plays a crucial role in weight regulation. Weight gain is common in perimenopausal and menopausal women, and it may be related to the worsening mood and poor sleep that menopausal women have. Low estrogen may lead to fat storage. Estrogen replacement is often beneficial for weight control in perimenopausal and menopausal women.

Another very interesting hormone that has not been well studied is **oxytocin**, which is made by the posterior pituitary like arginine vasopressin. It is the only pituitary hormone that we do not test for and that we do not replace, and it may have a role in bonding, intimacy, orgasm, GI issues, trust, generosity, pain and energy. A 2015 Endocrine Society abstract showed that oxytocin given to men caused weight loss. It needs to be studied more, but I think oxytocin may be helpful to facilitate weight loss.

So why it is hard to lose weight? It is because most people gain weight as they age and because of something called the thrifty gene hypothesis. Humans lived for millions of years in times of scarcity, therefore, their hormones, such leptin, insulin and cortisol, have evolved to prevent starvation. Also, the thyroid, reproductive and growth hormone axes are programmed to shut down in times of starvation. Now food is abundant, but we still have the hormones designed to prevent starvation. There is an abundance of high caloric and unhealthy foods, healthy foods are more expensive, people have less time to exercise, they live sedentary lifestyles, they have a lot of stress and are sleep deprived. For all of these reasons, it makes it very hard to lose weight.

For patients to try to lose weight, I recommend a low or no carbohydrate diet, with mostly vegetables and lean protein, and avoid processed foods. Get an app on your phone and track your food intake. You should eat about 1200 or 1400 calories a day for women and 1400 to 1600 calories a day for men. Avoid eating at night, avoid stress eating and avoid eating out at fast food restaurants. You should try and exercise 30 to 60 minutes a day or longer if you can. Eat a high fiber low glycemic diet, get at least 7 to 8 hours of sleep at night and avoid and learn to deal with stress.

So who should come see me for weight gain and hormonal testing? Somebody who has unexplained weight gain after being on the same diet and exercise pattern. If you have a dramatic weight gain over a short period of time and if you have other symptoms including fatigue, irregular periods in premenopausal women or hair loss. I will test patients for hormonal causes of weight gain by testing for Cushing's syndrome, growth hormone deficiency, hypothyroidism, testosterone and estrogen deficiency, hypopituitarism, polycystic ovarian syndrome which is marked by high testosterone and insulin resistance making it hard to lose weight, insulin resistance in general, vitamin D deficiency and iron deficiency.

For more information about Dr. Friedman's practice or to schedule an appointment, go to [www.goodhormonehealth.com](http://www.goodhormonehealth.com) or email us at [mail@goodhormonehealth.com](mailto:mail@goodhormonehealth.com).