The Hormones That Dance in Your Sleep

By Dr. Ritamarie Loscalzo

The name of this article sounds like a nice, romantic title, and in fact I like to think of the interplay between our hormones as a dance – because it takes a lot of synchronization and a lot of smooth movements and rhythm to make it all work. When that dance is going smoothly, when the hormones partner up properly with each other, you get a lot of good rhythm, you get a lot of balance, and that's when you create the harmony in your body that produces the best health ever.

When your hormones are out of balance, bodily functions suffer.

So, let's begin the "The Hormone Dance."

We'll start by identifying the hormone family members that are important for energy, focus, fitness and a flat belly. I call them family members because they're like family members in that when they're all communicating well and in harmony, you have a really nice, comfortable, working family relationship.

But sometimes our family relationship gets dysfunctional, like when one member doesn't communicate well with another, or when one member does something that thwarts the progress of the other. The same thing can happen with your hormones. When you understand how this happens, you can take steps to prevent it.

Let's talk a little about the metabolic pathways that allow your hormone family members to cooperate and get your brain, belly and energy working properly.

The Hormone Family Members Involved With Sleep and Insulin Resistance

- **Insulin/Glucagon** – These hormones are secreted by your pancreas and responsible for keeping your blood sugar balanced.

- **Cortisol/DHEA** – These hormones are secreted by your adrenals and responsible for protecting you from danger and the effects of aging.

- **Growth Hormone** – These hormones are secreted by your pituitary gland and responsible for growth and repair and fat burning. There is an inhibitory hormone to growth hormone called somatostatin which is secreted by the pancreas, but we're not going to talk about it because it's not something that you can measurably control.

- **Leptin/Ghrelin** – These hormones are the appetite hormones, secreted by your fat cells and your stomach, respectively.

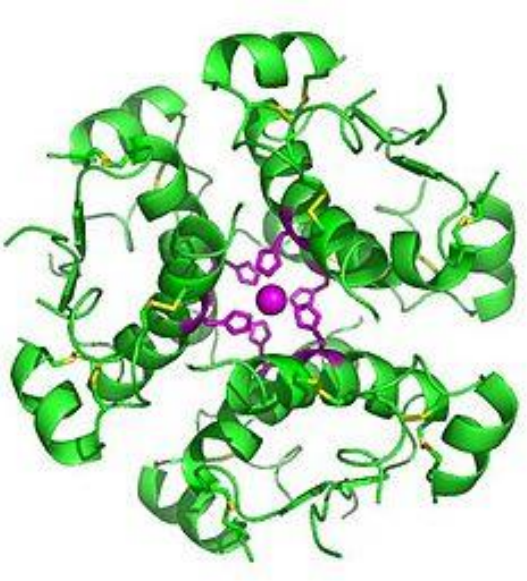
- **Melatonin** – This hormone is secreted by the pineal gland and is responsible for regulating deep sleep.

- **Estrogen/Progesterone** – These hormones are secreted by ovaries and adrenal glands and responsible for reproduction and related to sleep, insulin balance, and fat storage.

- **Testosterone** – This hormone is secreted by testes and adrenals and involved in producing lean muscle mass.

Insulin and Glucagon

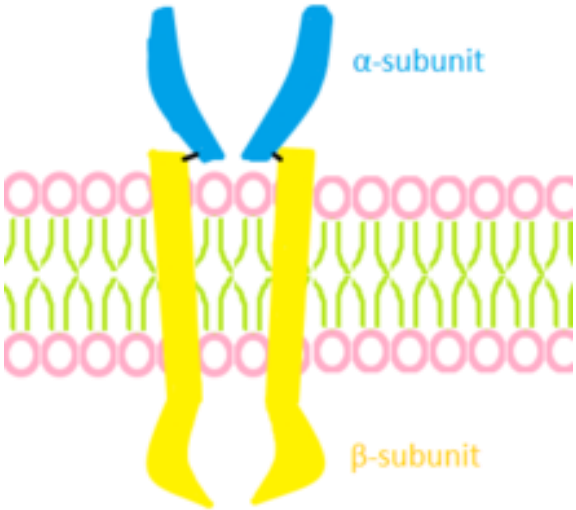
The picture below is a diagram of an **insulin molecule**. Isn't it kind of beautiful? The way that it's structured is very interesting. When you see what the insulin receptor looks like, you'll understand how they fit together.



When you eat, you get an increase in your blood glucose and your pancreas secretes insulin, which triggers the glucose receptors in the cell membrane to open up and allow the glucose, amino acids, and whatever nutrients are sitting in your blood to get transported into the cells. The glucose is cleared from the blood, the pancreas stops secreting insulin, you get energetic, and everybody's happy.

At least that's how it *should* be. However, the reality is that much of the time that's not what happens.

The image below is a picture of the **insulin receptor**.



The insulin molecule binds to the receptor and the channel, highlighted in yellow, opens up and allows the sugar and nutrients to pass through the cell membrane to the inside of the cell. When the receptors get damaged - by hydrogenated fat, alcohol, toxins and too much insulin and glucose - and when they start to get resistant because of the excess of refined foods and sugars, then insulin doesn't bind properly there.

As a result, the nutrients aren't cleared from the blood. The pancreas continues to secrete more insulin, so you get high levels of insulin for a prolonged period of time and very little glucose enters the cells that are hungry for energy, like your muscles and your organs. Because they are not being fed, you can start to see dysfunction and signs of low energy throughout your body.

As your insulin levels rise, you have a prolonged depression of growth hormone. Growth hormone is your friend when you want to get rid of belly fat and put on lean muscle. Prolonged insulin elevation also leads to prolonged depression of thyroid hormone – which down-regulates your metabolism and as a result, you start to gain weight, even though you're eating the same amount of food.

When I first learned all this chemistry – way back over 20 years ago when I was in school – I was told that the brain does not need insulin. It can just pick up the glucose from the blood without insulin.

As I've been experimenting with my own blood glucose measurements, and in what I hear from my blood sugar balancing program members, I've noticed that when my blood sugar goes up too high, I feel a little bit off in my brain – just a little bit unfocused, and a little bit foggy. I found that interesting, because that doesn't happen because my blood sugar is low, like you would expect – but when my blood sugar is high. I've had quite a number of people tell me that they can tell even without testing when their blood sugar gets too high. They can tell because they're feeling a little loopy.

This observation set me to researching, and it turns out that just a few years ago researchers discovered that there are specific areas in the brain that have insulin receptors and these areas can become insulin resistant, just like your muscles and liver cells do.

Insulin is important after all for certain parts of the brain to get glucose. While you can get a lot of the glucose into the brain without insulin, you can't get it to all of the areas of the brain. One part of the brain that is particularly affected by insulin resistance is the hypothalamus, which is your self-regulating area.

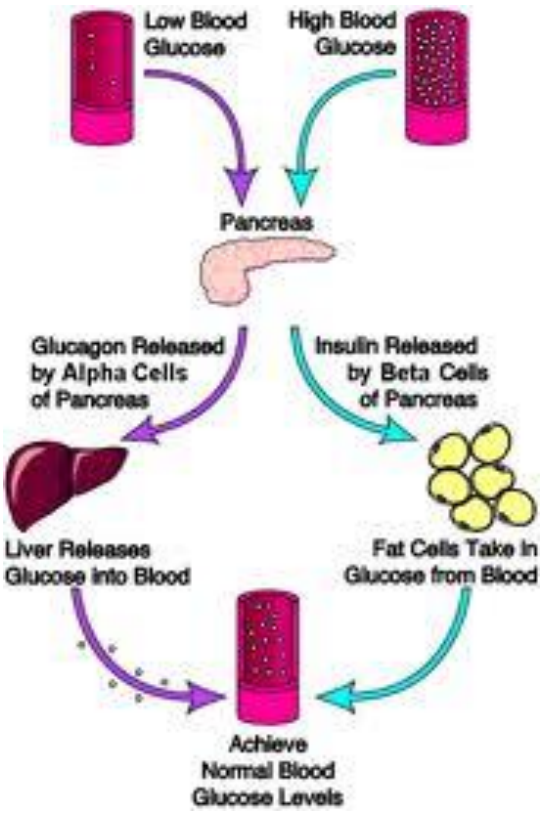
My theory is that insulin resistance in my hypothalamus is what makes me feel very hungry when my blood sugar goes up too high. It's a desire for food even though I've just eaten a full meal.

Not only does your hypothalamus become insulin resistant, it also becomes resistant to hormones like leptin as well.

The cerebellum, which is the balance area in the back part of your brain, can also become insulin resistant, which may explain why people say they just feel a little bit off and a little bit dizzy when their glucose level is high.

That pre-frontal cortex is the high-level functioning part of your brain (the front part) where you think more complex thoughts, and if you're short on glucose there, you'll be unable to think at full capacity, even if your muscles are working fine. Perhaps your motor cortex, which controls movement, is working fine, but some of the high-level functions are not, because the parts of the brain that control these functions have become insulin-resistant and they are not getting enough glucose. Thus, they can't make enough energy.

Let's look at **glucagon**, whose function is the opposite of insulin.



If you have a hormone that's responsible for lowering your blood sugar when it gets too high, namely insulin, then of course you're going to need to have a hormone that's responsible for raising your blood sugar if it gets too low; otherwise, there would be no checks and balances. The role of glucagon is to raise your blood glucose when it gets too low.

Glucagon is secreted by your pancreas, just like insulin. Whereas insulin is secreted by the beta cells, glucagon is secreted by the alpha cells.

When your pancreas gets the signal that the blood sugar is too low, it triggers glucagon to be released. When it gets the signal that the blood sugar is high, it releases insulin. When insulin and glucagon are dancing together – when they're in harmony, when one is not overpowering the other – we have this wonderfully nice balance and your blood sugar stays nice and steady.

Glucagon and insulin work together to keep your blood sugar nice and steady. After you eat a meal, insulin is secreted to reduce your blood sugar. If you wait too long for your next meal, or if you over secrete insulin, your blood sugar begins to drop and glucagon comes to the rescue.

What causes you to secrete more glucagon is a sudden decrease in glucose. Maybe you've eaten a meal, and it's triggered a high insulin response and your cells are resistant, so your pancreas just keeps secreting the insulin, until it gets to a level where the cells say, "Ah, I can hear you." Or the insulin signals the storage of the glucose as fat since the fat cells are not insulin resistant like the muscle and organ cells.

When you over secrete insulin, you can get a sudden and rapid decrease in your blood sugar. Some people will experience a feeling of hypoglycemia when blood sugar goes down too low. That's because the glucagon isn't getting in there quickly enough to raise the sugar. Glucagon is responsible for keeping your blood sugar at a comfortable fasting level in the 70's to 89's; otherwise, your sugar would just keep plummeting when you're not eating anything.

Glucagon works by burning some of the liver's stores of glycogen, which is the storage form of glucose. It's a kind of starch that your body creates from glucose. There's a limited amount of glycogen stored by your liver. Once it's used up, glucagon triggers lipolysis, which is the release of fat from fat cells. Glycogen is more for a quick response and the fat is a little bit slower.

Lipolysis just means the breakdown of fat. 'Lysis' means "tearing down" and 'lipo' means "fat". And gluconeogenesis can be broken down and understood as 'gluco' for "glucose," 'neo' for "new" and 'genesis' for "to create" – so it's a way of creating new glucose. Gluconeogenesis is the burning of protein.

The interaction between insulin and glucagon is an example of how your hormones dance. Low blood glucose triggers your pancreas to secrete glucagon. If the blood sugar drops too rapidly because of too much insulin, then an emergency signal is sent out and cortisol and adrenalin come to the rescue. Cortisol raises blood sugar as an emergency measure and prefers breaking down muscle to fat. Adrenalin signals fat release. However, the fat cells can become adrenalin resistant from overuse.

When glucagon does not bring your blood sugar level back up in a timely manner, adrenalin and cortisol come into play. As a result, you may be awakened from sleep or experience rapid heartbeat and palpitations due to this response to low blood sugar.

This is a good segue into the balance between cortisol and DHEA, which are produced by adrenal glands.

Cortisol and DHEA

Cortisol is produced when your body goes into fight-flight sympathetic mode. Its job is to release sugars into the blood, and, among other things, to get your heart beating faster and increase blood supply to your muscles.

Cortisol increases blood sugar – and here's the interesting thing. The main path is what's called gluconeogenesis, rather than lipolysis, so when cortisol is flowing – when you're sitting there at your desk and your body thinks there's a hungry tiger going after you and it's raising your blood sugar, it's mostly not breaking down your fat, it's breaking down liver glycogen and muscles. That's because cortisol reduces the rate of lipolysis, or fat burning.

Cortisol decreases the rate of fat burning. It preferentially uses gluconeogenesis, which is to take amino acids and other protein constituents and turn them into glucose. It converts protein and muscles and connective tissue into glucose. Cortisol also suppresses your immune system and decreases bone formation.

So all those times you sit at your desk and you stew over the news, or you worry that you might get hit by a car on the way home, or if you going to get out in time, you're producing cortisol – which not only adds to your waistline, but it suppresses your immune system and weakens your bones. So that's why I've included in this program a huge emphasis on managing stress.

That's why I've included 30 days of recordings taking you through stress transforming activities. If you are not already doing the "mini-vacations" five times a day and working at decreasing the effects of cortisol, that could be a major reason why your waistline may not be going down as quickly or as much as you'd like.
A lot of people underestimate the importance of stress. They think it's just the food and the exercise that are really important for weight reduction.

We've had people within the program find out first-hand what happens to their glucose level when they get stressed. I measured it on a friend of mine and saw her sugar go up to 197 and then to 400, and then settle back down at 167. It was huge. And she hadn't eaten in four hours. The stress resulted from her freaking out because she thought she lost her credit card. (She later found it in her wallet!) By the way, she eats a very healthy diet; yet, in spite of that, her blood sugar went into diabetic arrange even though she hadn't eaten for hours – all because she was worried.

How many times do you get "freak out mode" because of something? Changing this response will take you time and practice. It's not something that's going to change overnight, but it's really worthwhile to practice, practice, practice, practice, practice.

DHEA and cortisol use the same cofactors. When you have a cortisol surge, DHEA is inhibited. It takes about a half an hour for cortisol to go back down to baseline levels.

Meanwhile, the production of DHEA is inhibited. DHEA has been shown to significantly decrease the fat around your organs and the subcutaneous fat that's right below the surface. It significantly increases insulin sensitivity. This comes from a study that was published in JAMA (*JAMA*. 2004; 292: 2243-2248).

This is important; it's another reason to really focus on those stress management techniques and really find that place of centering within you and letting everything go, because it's not worth destroying your insides just because you lost your credit card. An alternate response could be to breathe, let it go, and call the credit card company. Yes, it will be inconvenient.

And so what? Having a heart attack's a lot more inconvenient. Having belly fat's a lot more inconvenient. Being foggy in your brain and having no energy is a lot more inconvenient than having to call a credit card company and report your credit card that's been lost.

Granted, I don't mean at all to make light of some of your day-to-day stresses and situations, because they are real. I know that. I know there are some big stresses, and some of you aren't freaking out about lost credit cards. You're freaking out about maybe a family member who's ill or having lost your job.

Just know that stressing about any painful situation isn't going to change the situation. In fact, learning to maintain your inner calm is going to help you to be able to access the part of your brain that's the most helpful for helping yourself or others around you.

It takes practice. It's not something that changes overnight. It's something you practice, and then you suddenly find that you can handle it with grace and ease.

What I've just described is how stress affects insulin resistance and how cortisol and insulin interact with each other. Stress increases your cortisol and adrenaline. The preferred fuel during stress is glucose. Stress eats your muscle, because it's a source of glucose through the process of gluconeogenesis. Stress suppresses fat-burning.

Burn that into your brain. Every time you get stressed, you're decreasing your ability to burn fat. Plus you're raising your blood sugar as much as if you'd just eaten a candy bar.

By raising blood sugar, the stress hormones stimulate excess insulin. The insulin then tries to store fat. So there are two mechanisms here at work. The cortisol itself suppresses fat burning. The insulin that it triggers promotes fat storing. These are important things to understand.

During periods of stress, insulin and cortisol are constantly at war.

Insulin's job is to decrease your blood sugar; cortisol's job is to increase it to provide fuel so you can run away or fight. Insulin blocks the release of the fuel from the fat cells, so cortisol looks to ready sources of protein that it can easily convert to glucose. It breaks down the glycogen in your liver and your muscles.

This war causes a gnawing craving for carbohydrates, especially two hours after a meal.

When you're relaxed, cool, and calm, you may not think about food for hours. You may not even realize you're hungry until you're very hungry.

When we talk about leptin and ghrelin, you're going to understand why it's important to be hungry and feel hunger, as long as you don't allow it to get to the point of feeling jittery, irritable, or out of balance. Feeling hunger and not eating right away can actually be very beneficial, as long as you don't let it go too far.

Growth Hormone

Growth hormone is produced by your pituitary gland. Its job is to increase protein synthesis in every cell of your body. It also promotes the release of fat from your cells. It shifts the primary fuel from glycogen and glucose to fat. It promotes insulin sensitivity.

After hearing this, wouldn't you like to get as much growth hormone as you can?

In fact, growth hormone shots are popular for stimulating weight loss. I am not a proponent of taking growth hormone as a shot. I am a proponent of giving yourself your own shot of growth hormone and learning how to increase and optimize your level of growth hormone by modifying eating and exercising habits.

Because growth hormone is your friend, and you need growth hormone, you need to be having surges of growth hormone throughout the day.

So, when is growth hormone secreted?

1. **Growth hormone is secreted when you have an empty or emptying stomach**, via the hormone called ghrelin. Ghrelin stimulates growth hormone. If you just constantly are afraid to have an empty belly – you're constantly eating to fill that gap – you're not going to be getting an opportunity to create growth hormone. If you eat again right away every time your stomach is empty or has just emptied, you'll stimulate insulin and go back into a state of inhibited fat burning.

   Instead, if you make friends with hunger and wait to eat until you are completely hungry, you'll promote the release of growth hormone and promote fat burning and lean muscle growth and repair.

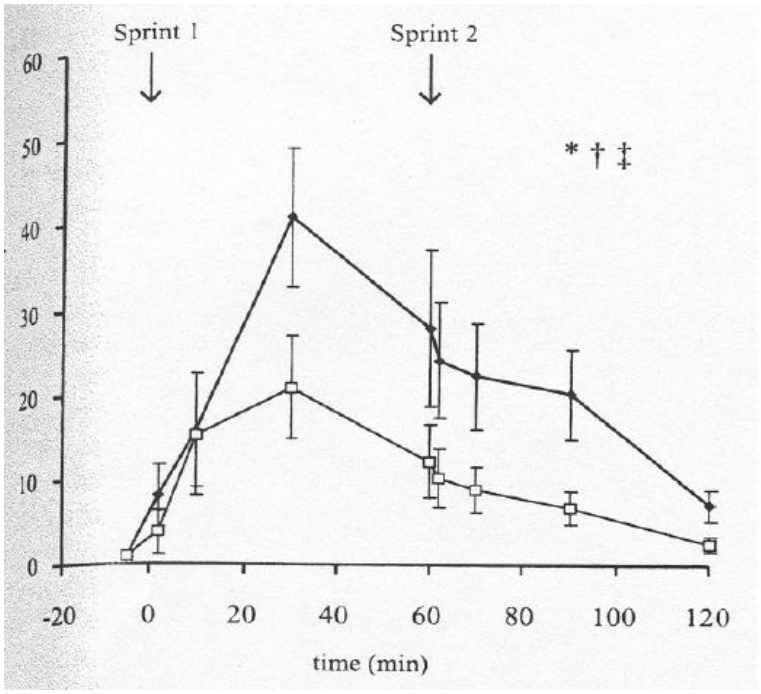
   Sit with that hunger…not for hours, because that can be counterproductive, but for as long as you can. Half an hour to an hour would be ideal, unless you've reached the point of becoming irritable, off-center, and feeling woozy. But if you're just a little hungry, like you have an itch, just deal with the hunger.

   Make friends with the hunger and say, "Oh, hunger thank you so much. You're helping me produce more growth hormone to burn off some of my excess fat and increase my muscle-making. Thank you, thank you, thank you!" You should be thanking your hunger – you should be looking forward to the time when your stomach is empty, because that's the time when you're making growth hormone.

2. **Protein at breakfast** stimulates growth hormone. That's why I recommend you start your day with protein instead of a lot of carbohydrates. That's why in *The Sweet Spot Solution* we have you start with greens, which are very high in protein, usually around 40-50% percent protein. They have a lot of water, so they don't have a lot of calories in them, but they don't have very much in the way of carbohydrates or fat. They're mostly fiber and protein and they can stimulate a nice increase in growth hormone.

   Having greens and perhaps extra protein in the form of protein powder within the first hour of the morning helps to optimize your growth hormone levels. It also affects leptin levels, which we'll talk about in a bit. So now you understand the reason behind having greens and protein within an hour or so of getting up.

3. **Exercise**, especially intense exercise that raises your heart rate really high (as in the intense bursts recommended in *The Sweet Spot Solution*), increases your growth hormone dramatically. In fact, 30 seconds of all-out, high intensity exercise gives you as much increase in growth hormones as exercising aerobically at a comfortable pace for 30 minutes. The growth hormone stays high for 90 minutes.



The graph to the left illustrates the relationship between exercise and growth hormone.

The upper curve is a 30-second all-out burst (sprint). The lower curve is 30 minutes of aerobics.

Notice the amount of growth hormone secreted is higher with the 30-second sprint. The growth hormone peaks at about 30 minutes, and then it starts to come back down, and it stays elevated much higher than the baseline, all the way up to 90 minutes. A second sprint at 60 minutes does nothing to level of growth hormone, but it extended the elevation out to past the two hour mark. From this data, it appears that the optimal spacing of sprints (bursts) is about 120 minutes apart. If every two hours throughout the day you do a burst, you're optimizing your growth hormone and maximizing fat burning.

Trained muscle takes up glucose more rapidly than untrained muscle and short duration, high intensity bursts of exercise increase growth hormone best of all.

Aerobics are awesome and you need it for your cardiovascular strength and your circulation, but if you want to maximize your fat burning, the bursts are what are going to achieve that result. Thirty minutes of aerobics doesn't bring growth hormone up anywhere near as high as the burst. Of course there are other reasons for doing moderate intensity aerobics, like cardiovascular benefits, so the best exercise program combines aerobics with burst training.

4. **Deep sleep** is another activity that increases growth hormone. It's during the deep stage of sleep that growth hormone comes out to play. It's really important to have those deep states. The sleep materials in *The Sweet Spot Solution* program provide more detail more about sleep stages. Sometimes you can shorten the length of time you're in bed, as long as you're getting adequately into the deep sleep stages.

   That said, studies are showing that long nights of sleep are best for keeping blood sugar and hormones balances and fat burning optimal. Since the early 20th century, the average amount of sleep we get has gone down dramatically. Nine hours of sleep a night used to be the average. Now it's down to 7.5 hours and we're seeing the negative effects. Approximately 1/3 of the population sleeps 6 hours or less and many shift workers sleep less than 5 hours per work day.

5. **Having your last meal 3 hours or more before bedtime** optimizes growth hormone production. The first surge of growth hormone happens during the first three hours of sleep. If you've eaten a meal and then gone to bed, you're not going to get that surge during that first three hours, because growth hormone doesn't come out while insulin's out. Instead it is at its peak on an empty stomach.

   The best thing to do is to go to bed a little bit hungry; you'll optimize your growth hormone output if you go to bed a little bit hungry. If you delay the first surge of growth hormone to the second deep sleep cycle, the peak will not be as high as it would have been during the first. That's why I've been recommending that you have your last meal at least 3 hours before bedtime and go to bed slightly hungry.

Growth hormone has the ability to counteract the inhibitory effect of cortisol on fat burning. There was a study in which a group of animals were fed cortisol, and it reduced their rate of fat burning. When growth hormone was added to the mix, the rate of fat burning increased.

In summary, here's how to maximize your growth hormone secretion:

- Start your day with two to three minutes of burst-type exercise. You may have to practice to determine what intensity you need to do to sustain for 3 minutes and feel really winded at the end.
- Have a low-carb breakfast (this is the approach all *Sweet Spot Solution* members are encouraged to take)
- Do 30 minutes of walking throughout the day. It doesn't have to be all at the same time – you could do 5 minutes here, 10 minutes there, 15 minutes there – you can spread it out. Researchers found either approach to be just as effective.
- Add sprints to your normal jogging, swimming and cycling routines to get into that burst mode pattern that we just saw on the graph. When you look at the Phase 3 Fitness Guidelines, I talked about adding sprints to your normal jogging. That's more for people who are advanced and are used to it. So when you're ready for that, if you've got your normal walking routine, just try adding a burst somewhere in the middle of that. And then add two. The burst can be running instead of walking, or walking really fast instead of walking a little bit slower. It can be walking up a hill. So, whatever you're doing, just add that little moment of intensity, the sprint, to your normal routine.
- Do a two-minute burst-type exercise two hours after your evening meal to reliably lower your post-meal glucose by 20-40 points. If you're finding that at two hours past your evening meal your glucose is still elevated, try a two-minute burst and see if you get it down.
- Get a good night's sleep.
- Space your meals far enough apart to experience true hunger in between them.

Leptin and Ghrelin

Leptin is secreted by your fat cells, in particular the white adipose tissue (a source of readily storable, easily retrievable fat most prominent around your abdomen). Normally, leptin is secreted as the fat cells fill with fat to signal that the "ready-fuel" tank is full. Leptin is also secreted in response to insulin, signaling that nutrients are being stored away, and that starvation is not immanent.

Rising leptin tells your hypothalamus that your ready-reserve of fat is adequate and your hypothalamus responds by reducing your appetite and increasing fat burning from your white adipose tissue (belly fat) via adrenalin.

Leptin sends a feedback signal to your pancreas, which responds by reducing insulin secretion.

Normally, there is a daily cycle of leptin production. Leptin is supposed to peak in the late evening and be at its lowest point upon awakening. As a result, under normal circumstances, appetite is at its lowest before bed and fat burning is at its highest during sleep.

High-glycemic carbohydrates early in the day cause leptin to peak earlier in the day and then decline in the evening, causing you to have a larger appetite for dinner and then food cravings after dinner and at bedtime.

Upon learning about leptin, you may wonder why you're always hungry when you have so much leptin to be released by your fat cells. Unfortunately, the more fat you have stored, the more likely you are to develop leptin resistance.

In response to a high-glycemic diet, high insulin surges, and stored fat from overeating, leptin levels become greatly elevated. Your hypothalamus and pancreas develop leptin resistance by shutting down receptors, similar to how your cells develop insulin resistance.

Your fat tank may be full, but your hypothalamus reads it as empty. Your hypothalamus, thinking you are starving, increases your appetite and decreases your metabolism.

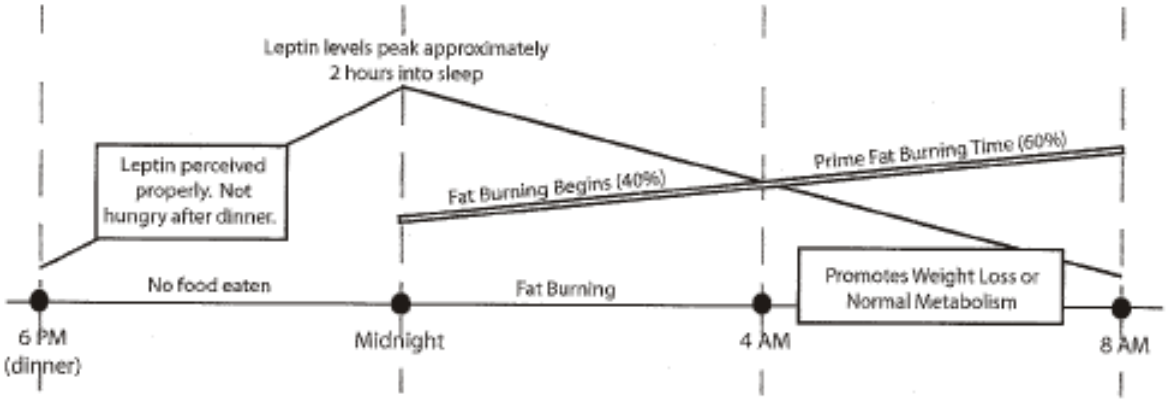
Your pancreas, which normally reduces its insulin secretion in response to rising leptin, also develops leptin resistance, and it continues to secrete insulin when it would normally stop. This leads to excess insulin and insulin resistance. To make matters worse, your belly fat, aka white adipose tissue, develops adrenalin resistance and does not burn fat despite plenty of adrenalin being around.

The bottom line is excess leptin leads to leptin, adrenalin, and insulin resistance. The opposite can also happen. Excess insulin (hyperinsulinemia) can trigger excess leptin, leading to leptin resistance in your pancreas which further aggravates hyperinsulinemia and insulin resistance.

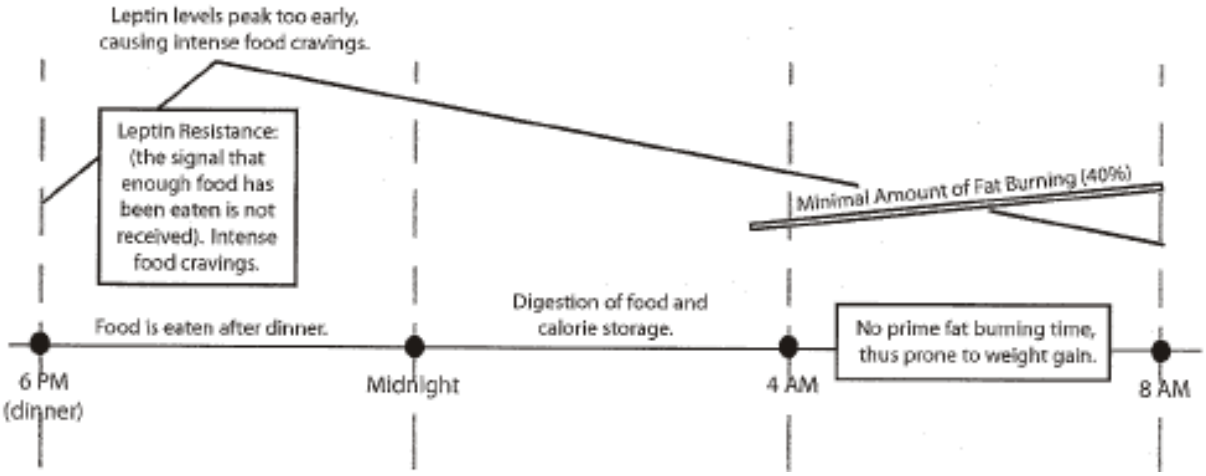
Ghrelin, on the other hand, is secreted by your stomach wall.

When you eat, ghrelin production is turned off. When you have an empty stomach, you produce lots of ghrelin and it stimulates your appetite. In addition to increasing your appetite, ghrelin is a potent stimulator of growth hormone. Therefore if you wait to eat until you're really hungry, and your stomach is completely empty you'll stimulate fat burning and muscle sparing.

Normal Leptin Rhythm



Leptin Resistance



How do you know if you're leptin resistant? According to Dr. Jack Kruse, a neurosurgeon turned nutrition enthusiast, the easiest way to do this is to look in the mirror.

If you're overweight, you definitely are leptin resistant. If you have a large appetite or crave carbohydrates, especially at night, you are likely leptin resistant. If you are fit or in decent shape, get a blood test and check for elevated reverse T3. You can also check your salivary cortisol. It will likely be elevated later in the day if you're developing leptin resistance.

How to balance leptin and reverse leptin resistance:

1. Make dinner (supper) your last food of the day. After eating, wait at least 3 hours before going to bed. Allow eleven to twelve hours between dinner and breakfast.

2. In order to keep leptin managed, it's really important to space your meals. The research is clear: you need to be eating three discrete meals a day and no snacking. If you get uncomfortably hungry between meals as you're first transitioning, drink *Chia Gel* with a little bit of peppermint to fill you a little bit and without raising your insulin levels.

3. If you eat large meals, you have to eat them very slowly and make sure that your body can handle it; you really shouldn't be eating to the point of being overly stuffed.

4. To manage leptin and heal from leptin resistance, it's important to reduce your intake of sugar and starchy carbohydrates. Now you know that avoiding processed carbohydrate foods has a double positive impact; it helps balance your leptin as well as your insulin.

5. Be sure to eat a low carb breakfast with moderate protein and fat within an hour of getting up in the morning. This gives the signal to your body to start digesting food, which increases the calories you burn and starts to "activate" your muscle fibers. Eating protein at the breakfast meal causes a surge in growth hormone, increases metabolism by up to 30% for as long as 12 hours, keeps leptin levels steady throughout the day, and keeps insulin levels balanced.

I recently ran across the recommendation to eat 30 grams of protein within the first 30 minutes of waking up. Tim Ferris, author of *The 4-Hour Workweek* and *The 4-Hour Body* did extensive experiments on himself and his father. He claims that his dad lost a significant amount of weight simply by following this guideline. As he put into place other lifestyle changes, he went on to drop 100 pounds.

Does it work? I haven't tested it yet, but it certainly seems worth a try and is founded in reasonable science. The easiest way to take in 30 grams of protein seems to be protein powder with spirulina or other concentrated green. Juicing a pound or two of leafy greens could contribute significantly. A pound of kale contains about 13 grams of protein.

You'll notice there's an overlap of the activities that balance glucose levels and restore insulin sensitivity and those that keep leptin balanced. Following these guidelines are key practices to keep you fit, trim, energetic and focused.

Estrogen and Progesterone

Estrogen and progesterone are "female" hormones that play a small but significant role in insulin and blood sugar metabolism and have a definite influence on belly fat. Males produce small but significant amounts of estrogen and progesterone, just as females produce the male hormone testosterone.

Estrogen and progesterone balance affect your brain as well as your belly fat. When estrogen levels go down, you can get cranky and irritable, and when it's too high you can store fat around your waist. When estrogen and progesterone are fluctuating, as in early menopause, you tend to be more prone to being irritable and storing fat around your waist.

Progesterone promotes deep sleep; prevents lipid peroxidation; and thus protects cells from damage, blocks the negative effects of cortisol on blood vessels, and has anti-inflammatory and anti-oxidant effects. The anti-inflammatory effects of progesterone are due to its ability to reduce such potent inflammatory chemicals as NK cells, TNF-alpha, and Th1 cytokines and its stimulatory effect on the production of IL-4 and IL-10 reduced glutathione and superoxide dismutase. Progesterone also processes the harmful estrogen metabolites and thus protects from the risks associated with excess estrogen.

Progesterone can also have a calming effect because it activates receptors for GABA, an inhibitory neurotransmitter. Studies suggest that progesterone also has a role in blood sugar regulation, in particular with preventing hypoglycemia, but a specific mechanism has not yet been identified.

Estrogen significantly increases REM sleep time. Sleep lab studies also indicate estrogen reduces the number of times a patient awakens. In males, excess estrogen can induce insulin resistance. In females on oral contraceptives containing estrogen, there's a greater incidence of insulin resistance. During pregnancy, there is an increase in insulin resistance due to estrogen and cortisol.

Both estrogen and progesterone are negatively impacted by stress. They share the same precursor molecules as cortisol, and when you're stressed, cortisol steals the precursors, leaving you without a sex drive and with uncomfortable symptoms of imbalanced female hormones like PMS, hot flashes, menstrual irregularities, irritability and weight gain around the middle.

Testosterone

Testosterone, the "male hormone", has a significant effect on lean muscle mass; it's more akin to growth hormone in that it helps you produce lean muscle mass. Estrogen is more akin to insulin, which stores fat.

Diminished testosterone is linked with snoring and sleep apnea. Excess testosterone in women is associated with insulin resistance. Sleep deprivation decreases testosterone while quality sleep can increase testosterone.

Links between testosterone and blood sugar have been documented. Diabetics tend to have lower levels of testosterone than non-diabetics, establishing a link. In men with low testosterone levels, there tends to be an overall increase in fat percentage, and in particular, an increase in belly fat. Testosterone levels appear to decrease with age, explaining the characteristic belly fat increase as men approach midlife. It's unclear as to whether the decline in testosterone is "normal" or is a result of unhealthy lifestyle habits.

Summary

As you can see, the hormone dance is quite complex. The hormone family members need to be living in harmony for you to achieve the fit body, focused mind, and high energy you desire.

The Sweet Spot Solution is designed to give you the tools to get your hormones in balance and achieve your health goals.

This detailed paper was created to give you an understanding about how this system works under the covers so you're even more inspired to follow through with the lifestyle recommendations outlined throughout *The Sweet Spot Solution* program, even when it gets hard. It will get easier and easier as time goes on, and the results will be worth it.

It's clear from clinical trials and lifestyle experiments that the people that are the most successful in making long-term lifestyle changes and creating a fit and healthy body are ***those that understand rather than follow*** a prescription and also track their bodily functions and measurements.