Sleep: The Endocrinology of Sleep

Transcript

Hello, everyone and welcome to The Endocrinology of Sleep presentation. This part of our sleep core module and we are going to talk today about all the different hormones and how they interact during sleep. A lot of people think sleep is just well you sleep. It's nothing happening, right? Nothing is happening in your brain, nothing is happening in your body. Actually the activity of the brain is actually not much less during sleep than it is during the day because there's so much going on. We're going to go into the hormones and all that. It's going to be lots fun. Before we begin, this is not all medical advice, this is all simply education and really important for you to make sure when you're teaching your clients, patients.

If you're not in a situation where you're not licensed to diagnose or treat that person, that you let the know that here I'm going to be giving you advice and education about your lifestyle and your diet and all these other things and it's just education and you can work with your doctor if you're on any medications to help you make a decision about where to go with that. Hopefully that helps. Let's talk about the different hormones that can be playing around while we sleep. Sometimes I like to call it the dance that the hormones do during sleep. Some of them are beneficial and some of them are not so good during sleep. The hormones that can have a beneficial affect during sleep and actually enhance the sleep process and all the cleansing and rebuilding and repairing and all that that happens during sleep and don't forget fat burning which we'll talk about. Those are Growth hormone, Melatonin, Leptin, Estrogen, Progesterone and Testosterone. Those hormones that don't have such a hot effect during slumber are Cortisol and Insulin.

The ones that don't have such a great effect during slumber are the ones that during the day, having excesses of them can be problematic. We're going to just take each of these hormones, we're going to talk about the role they play during sleep. We're going to talk about interactions between them so that when you have people presenting, which our next presentation in this series will be one sleep disorders. When you have somebody who's presenting with particular sleep disorders or particular patterns of not being able to fall asleep or stay asleep or waking up at certain times that you can start to really understand what might be going on, on a hormonal level.

Let's talk about sleep and insulin resistance. This is something you've heard me speak about probably many times before but insulin resistance is something that can actually be hurt and be increased during sleep. There's a lot of studies that relate to this. The affective sleep deprivation on all of the hormones, the mental function, the blood sugar, metabolism, energy and weight. All of these happen during sleep. All of these get enhanced during sleep. When a person is sleep deprived, they tend to end up throwing their hormones off, having lower mental function the next day, having an imbalance in blood sugar energy and weight because they don't get to do the appropriate fat burning. We're going to talk about how to adopt a bedtime ritual that encourages sound sleep and including activities herbs and supplements that improve sleep.

Understand how the sleep cycles work, which we've done already in part one and how to chose bedtime routine that optimizes deep sleep. The reason for that, we went through that in a lot of detail in the first part of this presentation was that when you optimize the sleep pattern, you can actually improve insulin resistance. We're going to look at how the hormones interact during sleep so you can optimize those and help people to optimize those. Some studies on sleep deprivation and insulin resistance. Sleep debt causes an impairment in endocrine cardiovascular and immune systems, we talked about that already. Glucose clearance rate is depressed by 40% after four days of sleep deprivation. That's a lot and that's just sleep of four hours a night. It's comparable to he kind of changes we see in women with gestational diabetes.

40% decrease in the glucose clearance rate. After a four-day deprivation of sleep to four hours a night. A lot of people sleep four hours a night, all the time or barely above four hours asleep all the time. I know personally I sometimes go long stretches of sleeping just four hours a night. As a result, I developed insulin resistance, even though I eat a really clean diet and exercise and manage my stress. This is really critical in your go getters, your executives, your people that push and your insomniacs. They're going to have a hard time getting their glucose under control, getting their blood sugar under control. If they're already pre-diabetic and insulin resistant they're going to have a hard time getting those fast and glucose numbers down until you an help them get sleep.

It's really critical that we learn to help these people sleep. Here's another study that showed that glucose tolerance is decreased during sleep debt. This was a study called The Roles of Time of Day and Sleep Quality in Modulating Glucose Regulation: Clinical Implications. When I read through these studies, it was shocking to me. I was like, "Yeah, sleep is just like one of the things. If everything else is good, you don't need as much sleep." When I started to look at the evidence that this was not true, it blew my mind. There's another study called the relationship between sleep quality and glucose regulation in normal humans.

Here's another study. Three days of 10 to 12 hours of sleep can normalize fasting glucose. There was a chart that was put together. This is the first study I read about this was just following one guy. They followed this guy who was pre-diabetic, fasting Glucose. I keep saying Insulin. Fasting glucose was about 119 and they put him on this sleep program and they had him sleep anywhere from ... I think for him it was nine to ten hours a night. They kept watching the glucose.

You saw this chart and it just goes down and down and down. His fasting glucose within four days of sleeping nine hours a day was down in the 90s. Not perfect yet but pretty darn good after four days. That foreman can't come to that kind of claim to fame. They kept watching him and then something happened where he couldn't get the full nine hours but he only got eight hours of sleep one night. His glucose creeped up a bit. Two nights in a row, maybe he went down to seven and a half hours, it kept creeping up. As soon as he got back to the nine hours, it started going down again. Really good evidence.

Everybody is going to be a little different because we're all about biochemical individuality and all that stuff but it's really critical that you emphasize how important it is for people to get their sleep. Specially if they are in that pre-diabetic, insulin resistant range where their blood glucose is between 100 and 120 an especially if they had that extra fat around the middle or they're brain fogged and that really want to solve these problems. Another one was sleep deprivation disrupts normal pattern of growth hormones surge during he first three hours of sleep. Growth hormone is one of our friendly hormones that helps us to decrease our fat mass and increase our lean body mass. It helps to do repair and there's particular spikes in growth hormone.

First spike happens during that first hour of sleep. We fall asleep and it's actually the biggest spike of the night, goes down. At the beginning of each sleep cycle, we get a growth hormone surge. The biggest one is at the beginning. Typically, when people are sleep deprived, their sleep deprived in the early hours of sleep. They generally can sleep at the end of the night or into the early morning but they are deprived at the beginning. Not all, some people fall asleep easily and then wake up at 4:00 and can't get back to sleep.

Especially those people who are having difficulties falling asleep and don't fall asleep till after midnight, 1:00, 2:00 or stay up late because they're busy, they're night owls, etc, they're party animals. Then those people are going to miss one of that very first growth hormones surge which is going to lower their overall growth hormone and that's going to interfere with all the repair and muscle building and fat burning.

Even if they have the other end of it they fall asleep easily, they go to bed early but they wake up and they can't get back to sleep in the middle of the night they're still going to miss out on those last couple of cycles of sleep and that's going to help keep their growth hormone down. This study was done in Journal of Physiologic Regulation of Integrated Comprehensive Physiology back in 2000. It was all about adaptation of 24 hours growth hormone profile to the stat of sleep debt. I think I've been convincing enough so far to say that sleep is super important for growth hormone and for insulin resistance. Now we're leading into for growth hormone. Sleep and growth hormone.

Growth hormone increases protein synthesis in every cell in the body. It promotes the release of fat from cells. Growth hormone and insulin are considered almost antagonistic. It's between meals that the growth hormone elevates and after exercise and once the insulin starts to rise after a meal, right after a meal, within that two hours, the growth hormone drops. In that time when we're not eating, when there's no food coming in and the insulin levels are low, growth hormone helps us to use the fat we have as fuel. It shifts the cell fuel from glycogen in glucose to fat. It basically signals the cell, "Okay, you no longer have to burn the glycogen or the glucose in the blood, let's burn some fat." It promotes insulin sensitivity. The more growth hormone we have, the more insulin sensitivity we have.

The more insulin we have the less growth hormones we have and then of course the less sensitivity we have to it. It's this vicious cycle and when we can maximize and optimize the levels of both it's really awesome. When does growth hormone get secreted? Well, it actually get secreted in response to the stomach emptying via the hormone called ghrelin. Ghrelin is a hormone that secretes by the stomach to say, "Hey we're getting empty." When growth hormone senses the ghrelin, it says, "Well, food supply is getting low, let's just burn some fat." That's really cool. That's one of the advantages of being hungry, at least for a little while. Some people say as soon as I get hungry, I have to eat because otherwise it's going to stress the adrenals.

In reality, you're only going to go into that distress state if the hunger perceives for a really long time. Usually only when the person has a dis-regulation of insulin and glucagon. The emptying of the stomach will trigger growth hormones. One of the things I like to tell my patients is, "When you start to feel hungry, embrace it, welcome it, enjoy it. Know that that's triggering fat burning." Don't let it go on too long because you'll get famished and weak and it's going be counter-productive and metabolism may go down. Really embrace that and enjoy that half hour or so of enjoying the hunger. It's also secreted in response to amino acids. If we have amino acids in the blood stream, it's like, "Let's take some growth hormone to turn these amino acids into protein, into muscle.

It also is secreted in response to exercise and increases with exercise intensity. Studies have shown that most intense increase in growth hormone occurs when we do burst training. short burst. 30 second burst, very intense during the day. Causes a rise in growth hormone for up to 90 minutes. Similar to the way that 30 minutes of aerobic exercise does. That's why we teach you to show your clients how to do burst training in between other things throughout the day makes it easy to do exercise because they're just doing 30 seconds at a time. It's very easy to fit into a busy schedule and it's so effective. It doesn't mean that cardio vascular exercise is not needed etcetera but it's a lot easier to get somebody to do a 30-minute burst of exercise and spread then put throughout the day four to eight times, the it is to go out and get them to go out and do a half an hour of aerobics at a time.

That's where it is. The more intense the exercise, the more growth hormone is secreted and then of course deep sleep. You get into there and boom, you start to go into that cycle and an hour after you fall asleep, that's when you start to get the growth hormone spikes. This is really cool. The thing about growth hormone is that, like I said, it's antagonistic with insulin. If the growth hormone goes up and it senses insulin, it causes the growth hormone to come back down. This gives us a couple of different opportunities for behavioral modification. One is, if a person eats right before they go to sleep and there's insulin in their system, what's going to happen to that growth hormone spike that's supposed to happen? It's not going to happen. It's going to interfere with repair and lean muscle lay down and fat burning. It's really important to know that.

The other thing, if they do some intense exercise and during the exercise, they're sucking down on one of those gel packs or goo pack or Gatorade because they think they need it, that's going to interfere with that growth hormone surge because it's going to cause a surge of insulin during the exercise which is going to interrupt the growth hormone. If they decide, okay they don't need it during but they're going to do it after and they do it within that 90m minutes after, especially during that first half hour to an hour after, it's going to disrupt that growth hormone surge that could have bee doing some repair and muscle lay down and lean body mass. Now, it's not absolute, it's to the best amount of time after exercising to when they should eat something. It’s based on person to person physiology to physiology and then it also depends on what they are eating.

I always tell people wait at least half an hour to an hour after you finish your exercise before you put any food in your stomach just to make sure that you maximize your growth hormone. Some people do really well with going the full 90 minutes. Some people do really well with having breakfast before exercising just going out and exercising so it’s really a matter of hoping to find the right rhythm for your client and their particular case and their particular stage but it’s really important to keep these things in mind.

Sleep is critical. Going back to sleep if someone is having a difficulty falling asleep obviously they are not going to get as much growth hormone. If they are watching TV or being on the computer too close to bedtime that's going to cause them to have a longer prolonged falling asleep time because it decreases the amount of melatonin secreted. All these hormones interact with each other. How does cortisol growth hormone interact? Well if you have a cortisol surge before bed it's going to inhibit growth hormone. Here's the deal. Why would you have a cortisol surge before bed?

Well getting upset, watching the news, having an argument with someone, doing some intense exercise, doing some intense mental activity right before bed. That can cause a surge of cortisol. It's really important to help your clients to transition to bedtime into their parasympathetic nervous system. Do some heart math, do some tapping, do some meditations, some yoga. To make that transition so that you don't go to bed with the cortisol up which will then inhibit the growth hormone. Cortisol reduces the rate of fat burning so which do we want during sleep? Do we reduce the rate of fat burning or increase? Now some of you may argue that him underweight or have clients who are underweight.

Some of the rules that were put together you may actually want to know this rules so you can say okay if I want help this person to put on weight temporarily in a healthy way how can I do it? Well raising their cortisol before bed isn't a good way but it might be okay to then eat a little snack before bed as long as it's a fat protein kid of a snack as opposed a carbohydrate snack. When you add growth hormone to the mix with cortisol it can actually increase the rate of fat burning. They've done that in the lab where they'll take somebody. They'll throw some cortisol in their growth hormone in but naturally occurring in the body that is hard to do because the cortisol does inhibit the growth hormone surge.

What other hormones have an effect on sleep? Leptin. We talk about this in our appetite and a chronology section. Leptin is secreted by the fat cells, the white adipose tissue. It signals the hypothalamus in the pancreas "We are full". The response is then to turn off appetite which is good. We don't want to be hungry right before we go to bed. The pancreas responses to stop producing insulin which is awesome, we want the leptin to be going on so we don't produce insulin during sleep. Leptin in addition to responding to that "We are full" signal. It has a 24-hour circadian rhythm in addition to be controlled by eating.

Some of the things that affected are the timing of meals and the timing in particular of carbohydrates in meals. It's found that people who have a higher carbohydrate snack in the morning are going to ... Or breakfast in the morning are going to peak their leptin sooner. Their circadian rhythm of leptin is going to peak sooner.

It's going to start to be on the decline after dinner instead of being on the rise after dinner and at a peak during sleep and I'll show you a chart about that. It's really a good idea. You have people that are having difficulty with sleeping. There are some really cool things that you can do during the early part of the day as opposed to just at the bedtime in order to help that. One is to have no carbohydrate breakfast or low of high fiber breakfast with some fat and protein. I'm not talking bacon and eggs, ham and cheese and all that and it can still be a plan powered breakfast that's high in protein and low in carbs so it would be the low glycemic type, veggie type things and green powders with cheer seeds and hemp seeds and various things like that. They are higher in protein, higher in fat but very low in the glycemic load. That's leptin. Let's look at leptin in the normal leptin function.

If leptin is perceived properly and produced properly, both. It can be produced properly but not perceived properly and that has to do with leptin resistance. If you look at this, the leptin is on the rise starting at dinner and peaks usually two hours into sleep. If the leptin is on the rise after dinner generally you're not going to feel hungry. You're not going to feel that urge and that need to snack but I'm sure many of your clients and patients have that problem of, "Well I just get hungry after dinner. About ten o'clock I'm feeling like well I really need to eat something and have a snack before going to bed." It's a hard habit to break. One of the reasons is because the leptin will peak earlier and I'll show you that in the next slide. Here's what happens during sleep, two hours after sleep when leptin is at its max the fat burning begins. It's okay we got plenty of leptin here. Let's start fat burning so the fat burning starts to go plus you've got a good surge of growth hormone going on.

Between midnight and 8:00 am is your prime fat burning. You're just increasing it. That's when you really want to do it. The leptin starts to go down but it's now to its baseline level until 8:00 am. If we look at what happens in leptin resistance or when you have food you eaten early in the day this precipitates it. Well in leptin resistance you're actually going to see that leptin peeking too early. It's peaking here and it starts to go down. When leptin is on its way down is when we start to get hungry. It's like 9:00, 10:00 it's a few hours after eating and someone is super hungry. We get that craving. My son used to note that if he went to bed before 10:00 it was fine he didn't get a craving for food but if he went to bed after 10:00 he did. I thought that was interesting. Leptin starts to go down. We get intense food cravings because it's perceived, the leptin is going down. We got to start eating again.

Then the digestion of food happens during sleep because if you'd eaten ... Instead of all the cleansing and clearing and liver and gall bladder and everything else then what happens is, it doesn't happen. Your digesting food instead. That cause more sluggish liver. More sluggish liver can create decrease conversion of T4 to T3. It can create hormonal clearance problems. It can create detoxification problems. There's all kinds of things.

What happens is you're getting minimal fat burning during sleep. People go, "I'm not eating that much, why I'm I not losing weight?" Leptin resistance is key.

We find that with eating carbs in the morning you actually see this peak a little bit earlier but somewhere in that range. Around dinner time you start having this peak and then after dinner it's coming down. You just can't get enough. These are people who are ravished and can't get enough food. That's that.

When we look at these hormones we want to start to manage them appropriately. We'll go into a lot more managing techniques in a later presentation. For now, there's always these specific things that you want to do to manage the leptin and the insulin so that you have optimal fat burning and minimum fat storage. Don't eat after dinner. It's a hard one to break if they are on this cycle and they have insulin resistance and leptin resistance and they are eating carbs early in the day. I find that when you can get them to stop eating so early in the day and not snacking between meals it keeps the insulin levels, allows the insulin levels to go up and down, up and down, up and down. Whereas someone's eating that five to six meals a day like a lot of folks are recommending, the insulin levels are going to be up and then they stay up. They start to go down and then we eat again, up, up.

You're basically in fact storage mode all day. You're interfering with leptin; you're interfering with growth hormone. It's causing a major disruption in the cycle. Only three meals a day. I like five or six hours between meals. Many people say I can't do it so you start with wherever they are and you just start gradually increasing the spacing between meals. There's other advantages to that. We talk about that another parts of the program but for example migrating motor complex which helps keep the things moving along, a peristalsis of the small intestine if you will, keeps things moving along the intestinal tract. That really comes and starts to really maximizes effects about three and half hours after eating. Allowing the spacing between meals allows us to have ... Really enjoy the insulin going down, the growth hormones staying up. It helps us allows us to be able to have the proper movement in the guide and optimize so it's optimizing blood sugar, it's optimizing digestion. It's also going to optimize how the person feels and their weight. It's really important.

Overly large meals now, people say how could I eat only three meals a day or two meals a day and not eat large meals. Well it's not that hard but you just want to eat filling and satisfying meals yes but you don't want to eat meals that are going to make you feel like you are overly stuffed and that's what people tend to do. You eat a good proportion lots of fiber and lots of fat. Maybe not lots of fat for everybody but fiber. Lots of fiber and fat in the meal will help someone feel satiated. Eating slowly helps a lot for managing these hormones.

Having a breakfast containing protein and avoiding the starchy carbohydrates or even fruit or juice at breakfast so that you don't get that carbohydrate surge which then causes an early leptin surge. These are just some of the things. Overall all of these is going to help them with sleep.

Let's look at ghrelin and sleep. Ghrelin is secreted by the cells in the stomach wall. Eating suppresses ghrelin and having an empty stomach stimulates it. Ghrelin then suppresses appetite but like we said before, ghrelin also helps to increase the level of growth hormone at least temporarily. Sleep deprivation increases ghrelin and it increase hunger. Sleep deprivation has an impact on ghrelin and leptin. What that does is that the next day after sleep deprivation, I know this is true for me I'm ravenous. I just can't get enough food. I am hungry all day. I can't keep my appetite under control. What happens is during those periods of sleep deprivation I can't keep my appetite under control. What happens is during those periods of sleep deprivation, you are going to burn fat less effectively. You may have people say, "Well I'm just barely eating. I'm not eating a high level of calories, why am I getting weight?"

Well this is why, it's because these hormones are out of balance and you're not able ... Your sleep is deprived, which causes more ghrelin and less leptin or increases leptin resistance in some cases. They are hungry and they are slowing down and they are slowing down fats burning, increasing fat storage. You may be able to go on much less calories. As people start to increase their sleep without increasing the amount they eat, they may naturally see a drop in the weight. Ghrelin is a protein stimulator of growth hormone. We talked about that. If you wait to eat until you are very hungry and your stomach is empty you are going to stimulate fat burning and muscle sparing. Like I said earlier I don't mean that you get to the point where you're like passed out, "I have to eat. Got to eat. Going to kill somebody." In the state of adrenal stress. No, but it's that, "I'm a little hungry. I'm getting a little more hungry. I'm a lot hungry. Maybe I'll eat now." Right? As opposed to, "I'm got an itch I got to scratch it right now."

No. You don't eat immediately upon sensing that there is some emptiness you wait till you are healthfully hungry and that's a good thing to teach people. Let's talk about sleep deprivation and hunger I've all ready alluded to this. Sleep deprivation decreases leptin, increases ghrelin and stimulates hunger, obviously. A reduction of sleep duration to four hours for two consecutive nights only has recently been shown to decrease circulating leptin and increase ghrelin as well as self-reported hunger. Just two days! It's not like you have to be going weeks of this before this happens and this is the study in the PubMed. We've looked at the hormones. A lot of them related to food and appetite and now in growth hormone, let's take a step looking at a hormone whose primary role is sleep.

Melatonin is produced by the pineal gland and it's stimulated by low light conditions. The pineal gland when there's light coming in through the eyes, then it stimulates melatonin to shut down. Darkness is what stimulates melatonin. I believe we have a lot of our sleep issues in our society is because we don't really follow the natural rhythms of the earth and of life. We are basically in these boxes with electricity and we can have light any time. We can have bright day light at 3:00 am and many of us do.

We also have devices and those devices are shooting light into our eyes at a very close range. It's turns on by low light conditions, it's turned off by bright light. If you are sitting and you have somebody who is saying, "I can't fall asleep and I keep waking up in the middle of the night." Their sleep deprived and they are gaining weight and you start to ask them questions like what do you do right before you go to bed? Most people are on their cell phone or on their computer or on their iPad.

Either watching a movie or on their TV watching something, responding to email they are doing things that are not only stimulating which is turning on the sympathetic nervous system which isn't conducive to sleep but they are doing things that are causing light to go in to the eyes at close range and that turns off the melatonin. Days and then years of this can be creating a problem with melatonin and a problem with sleep. Whenever we are looking at people with sleep issues, we've really have to look at it as a multifactorial event and we'll go through all the details of that in the fourth part of this content. Promotes deep sleep, it also protects from tumor growth. There've been studies that have found that women with breast cancer have been found to have lower levels of melatonin. A lot of us say we just stay up late it's no big deal but really by decreasing the amount of melatonin that's circulating in our system we are actually putting ourselves at risk.

At risk and in particular breast cancer studies that I've seen. It's reduced by computer and TV at night, yes. It's also inhibited by eating too close to bed time. Melatonin comes from serotonin so it's produced from tryptophan, required B6 for synthesis. We have tryptophan B6, they get converted to 5-hydroxytryptophan to serotonin and then to melatonin. You can have a deficiency of melatonin as a result of their activities. They're eating too close to bed time, bright light too close to bed time but also you can have a deficiency because of a deficiency of B6, vitamin B6 which come from people eating too refined a diet and also from not having the right metabolism or not having their receptors or not having enzymes. There's so many reasons for not having enough B6 and also amino acids, why would they not have enough tryptophan? Well they can be not eating enough tryptophan. It is an essential amino acid but they can also be that they are ... It's not that they are not eating enough that they are not digesting enough. That goes back to looking at stomach acid and the digestion.

It's really important that we look at this. A lot of people want to say well let's just give a person melatonin which is fine. It's a really safe thing to do and at sometimes I at that let's get them sleeping no matter what it takes. Sometimes pharmaceuticals are required. We try to get people away from that because they became so addictive and they don't necessarily work. We got to get them sleeping, they cannot get well unless they sleep. What you might be doing is saying let's take melatonin which is great but just taking melatonin is a Band-Aid. We don't want to go for just Band-Aid.

Yes, we love our Band-Aids, yes we give banded freely when needed to solve the acute situation but we always have to be looking deeper, why is there not enough melatonin? Is it because there is a deficiency of tryptophan and B6? Is there an impairment of that mechanism? Is there impairment in serotonin maybe due to some digestive issues and is it because of their activities during the day and night? All those things play in.

Let's look at progesterone. Progesterone actually promotes deep sleep, when we look at bio-identical hormone supplementation, generally taking them orally has been shown to be a problematic except progesterone can be taken orally and it's actually used a lot to help people get deep sleep. I'm not saying just give them a Band-Aid of progesterone if they are having a problem but that could be an issue. Looking at what's going on in their cycles, what's going on with the estrogen dominant, progesterone deficient there's a lot of things to look at. Progesterone can be very helpful for people who are having sleeping difficulties. Progesterone helps prevent lipid peroxidation, which is really awesome because it blocks the atherogenic effects of cortisol. Cortisol in excess can cause atherosclerosis by hardening and thinning of the arteries.

Progesterone, most people don't know, also has anti-inflammatory and antioxidant effects. It reduces natural killer cells, TNF-alpha and Th1, T helper one, cytokines. This is really important to know in cases of chronic information. In fact, there's a lot of studies recently and you go look this up online there's a lot of studies on it that are using progesterone for traumatic brain injury. To help reduce some of the swelling, in traumatic brain injury help the person to naturally sleep and have really positive effects. It also stimulates the production of interleukin 4 and 10 and increases the levels of reduced glutathione and superoxide dismutase. Those are two very important antioxidants and interleukins that are anti-inflammatory and help combat the more inflammatory into interleukin 6s and some of the other in 13s and 16s. Progesterone also suppresses excess estrogen which is really good and with people who are estrogen dominant.

Even people who go into menopause or sometimes estrogen dominant so it's really important if you are looking at estrogen and progesterone.

It suppresses excess estrogen and can help sometime people have difficulty falling asleep because of the estrogen dominance. It activates GABA receptors. Well what are GABA receptors? GABA is a neurotransmitter that's calming and so if it's going to activate those receptor sites, it's going to have a calming effect on the brain. Also there have been some studies that show it's involved in regulating the blood sugars. Cool stuff all this stuff that we don't really think about these, we think about this in terms of sex not so much to sleep. Let's look at estrogen. Estrogen significantly increases the amount of time people had in REM sleep, when these studies were done. It reduces the time spent awake from 20 to 12 minutes during the first two sleep cycle of the night.

It has a deep sleep promoting effect not just the hot flash control. A lot of people think the estrogen in the perimenopausal or postmenopausal on women that estrogen supplementation helps them to sleep because of reducing the hot flashes but in fact it has some effects on the cycle in it of itself by increasing REM time and decreasing the shorter parts. Finally let's look at testosterone. Diminished testosterone is linked with snoring and sleep apnea. I gave you a couple of studies there for you to have a look at.

Sleep can increase testosterone, sleep deprivation decreases testosterone. The guy laying there snoring may have some decreased testosterone. If you have people who are complaining that they snore, their partner tells them that they snore, or their partner snores, you may want to have them start to look at the testosterone levels. A sleep deprivation decreases testosterone. A few extra hours of sleep ... This is a cool self statistic in the study, an extra few hours of sleep can double testosterone.

If you've got some male patients or even female patients with low testosterone who are complaining about this andropause type stuff and you can just explain to them that they just need a few extra hours of sleep and get them to do a sleep vacation which we will talk about more in our forth section. Get them to do a sleep vacation that can dramatically improve their testosterone levels and make them have a happy partner either way. That's the end of our hormones related to sleep, our endocrinology of sleep. You can see the lot of the interconnections, and we are going to pull it all together in a later part of this presentation when we look at what do we do, and what are the various approaches we can take to help people to get better sleep.