

## HPA-D Diet - Part 2

Hey, everyone. In this section, we're going to talk about dietary considerations for treating HPA axis dysfunction.

Glycemic dysregulation and inflammation are two of the four key drivers of HPA-D, as you know, so it follows that diet should be anti-inflammatory and one that regulates blood sugar.

The Paleo template is a great starting place in both cases. It removes most of the foods that would tend to be inflammatory. It emphasizes nutrient-dense foods and plenty of bioavailable protein, but general guidelines for tweaking of a Paleo-type diet for HPA-D include a higher protein intake overall but especially in the morning, and then eating carbohydrates later in the day tends to work better for most patients. However, do keep in mind, as with all of the other things we've discussed in the HPA axis unit, that you have to consider each patient individually and tailor the treatment protocol to their particular circumstances.

If the patient is overweight or insulin and leptin resistant, has high blood sugar or high blood pressure, for example, a high-protein, lower-carb approach may be the best starting place. It could be helpful in those cases, but it depends on the background level of stress, and the higher the stress is and the higher the HPA axis dysregulation, the less appropriate, in my experience, a really low-carb diet is. The caveat is that if a patient has already been on a low-carb diet, and it wasn't effective, or their weight loss is already stalled, or they had a lot of symptoms of HPA-D on a low-carb diet such as insomnia and fatigue, then I would actually suggest adding some carbohydrates back in, enough to at least mitigate those symptoms without aggravating their blood sugar. What I've found is that, in many cases, although patients with dysglycemia are not able to tolerate really processed and refined carbohydrates such as bread, crackers, muffins, and things like that or even some whole-food carbohydrates such as potatoes, the Paleo-friendly starchy plants such as sweet potatoes, taro, lotus fruit, and things like that, plantains and particularly green plantains, can be well tolerated even in these individuals.

Another tweak for people who have this presentation, overweight, insulin and leptin resistant, would be not snacking between meals because that tends to improve blood sugar in people who have high blood sugar.

If the patient is normal weight, however, and has normal glucose and insulin sensitivity or even a tendency more toward low blood sugar and low blood pressure, a high-protein intake is still a good idea because it has a stabilizing effect throughout the day, but I would definitely suggest a moderate-carbohydrate, moderate-fat approach in that case. It's also generally better in these patients to eat every two to three hours, so that could mean three regular meals but snacks in between meals and perhaps before bed, or it could mean five to six smaller meals throughout the day. One of the reasons for this is that if they actually do have low cortisol, then between meals

sometimes their blood sugar can drop, and they can experience symptoms of hypoglycemia, which are alleviated by eating.

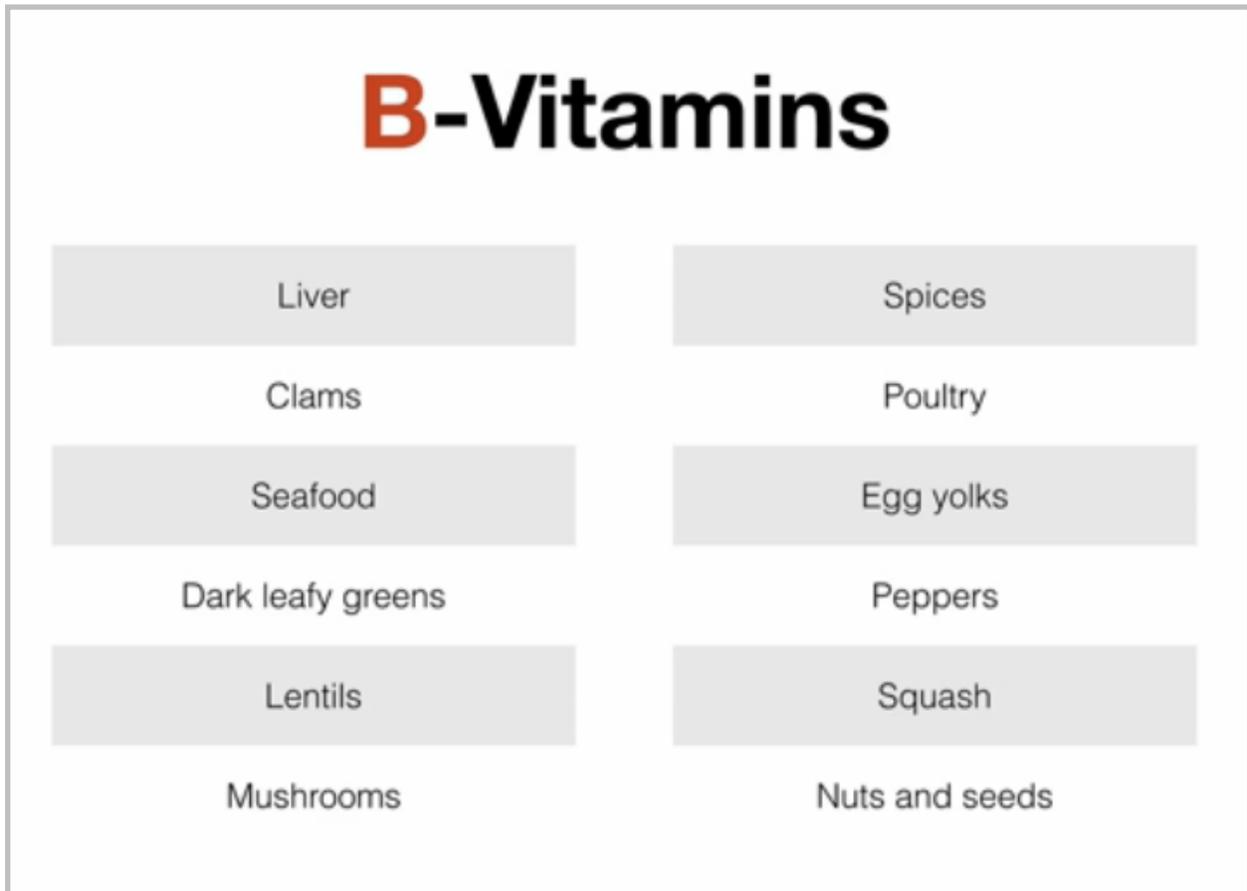
Sometimes a patient, of course, will present with symptoms of both. They could be overweight and insulin resistant, but they could also be having hypoglycemic crashes throughout the day and may even have low blood pressure rather than hypertension. So in that case, you really just have to experiment with both of these approaches to see what works best for that patient, and that's what I was referring to before about individualizing the treatment.

# Vitamin C

Fruits	Vegetables
Papaya	Bell peppers
Strawberries	Broccoli
Pineapple	Brussels sprouts
Oranges	Cauliflower
Kiwi	Kale
Cantaloupe	Cabbage
Raspberries	Bok choy
Blueberries	
Cranberries	

There are specific nutrients that play an important role in supporting the HPA axis, so you want to ensure adequate dietary intake of these nutrients, perhaps in addition to supplementation. Let's start with vitamin C. The adrenal glands have one of the highest tissue concentrations and greatest active uptake of ascorbic acid of any tissue in the body. It protects against oxidative damage and nitric oxide-induced catecholamine secretion. It also protects the morphology and function of the adrenal glands. Studies have shown that supplementing with vitamin C reduces inflammatory cytokines and cortisol, blunts adaptive mobilization of ascorbic acid out of the adrenal gland, and lowers subjective stress and blood pressure. Top food sources of vitamin C are listed here on this slide. They are primarily fruits and vegetables, so in the fruit category, we have papaya, strawberries, pineapple, oranges, kiwi, cantaloupe, and berries such as raspberries, blueberries, and

cranberries. In the vegetable category, we have bell peppers, broccoli, Brussels sprouts, cauliflower, kale, cabbage, and bok choy.



B vitamins are also important for adrenal function. Biochemical pathways for producing steroid hormones have B vitamin-dependent enzymes. Suboptimal B vitamin status can lead to poor stress-related metabolic function, and these include B2, B3, B5, B6, folate, B12, biotin, inositol, and choline, so pretty much the whole range. Top food sources of B vitamins include liver, clams, seafood, dark leafy greens, lentils, mushrooms, spices, poultry, egg yolks, peppers, squash, nuts, and seeds, as the table on this slide here indicates.

Minerals also play an important role in the function of the HPA axis. Sodium and potassium are the most obvious, but also calcium, magnesium, and zinc. So let's start with sodium.

# Sodium

## Signs of **Low Sodium**

1/2-1 tsp of sea salt  
in glass of water  
upon rising

Add salt and kelp  
flakes to food

Sodium deficiency is rare in the U.S. and in the developed world with a normal diet, but you will find patients who were told to severely restrict their sodium intake out of concern for hypertension, heart disease, or just so-called heart-healthy diet, and they may have a very low intake, less than 1,500 mg per day. The problem with that is that studies have shown that, again, as is the case with so many nutrients, there is a U-shaped curve for sodium. Too much can be problematic, but too little can also be problematic.

I wrote a series on this called “Shaking Up the Salt Myth,” and we’ll put a link to this in the resources section. In that series, I presented research indicating that a low-sodium intake leads to higher levels of renin, cholesterol, and triglycerides; higher all cause in cardiovascular mortality; and that low sodium can also cause symptoms such as nausea, lethargy, and low blood pressure. These patients will often have strong salt cravings, and they may need additional salt in their diet. They may need to maybe reduce their potassium intake if they’re eating a lot of potassium or supplementing with potassium because it opposes the fact of sodium. If their blood pressure is low and their intake of salt is low, consider advising them to consume one-half to one teaspoon of sea salt mixed in room-temperature or warm water upon rising. This can provide 1,200 to 2,400 mg per day of additional sodium, and they can also use seaweed such as kelp flakes and salt liberally on food.

Now let's talk about potassium. In patients with high blood sugar or hypertension or patients who are overweight with features of metabolic syndrome, potassium levels are typically low. High dietary intake of potassium is associated with low blood pressure, and, in fact, many researchers believe that the protective effects of potassium are one of the major reasons why hunter-gatherer populations such as the Kalahari bushmen and traditional pygmies of sub-Saharan Africa have such a low incidence of hypertension.

In Paleolithic diets, the average daily intake of potassium was about 10,500 mg per day. In comparison, the average American consumes about 2,800 mg, so that's nearly four times greater in Paleolithic cultures. Studies have shown that in the U.S. increasing potassium intake alone would decrease the number of adults with high blood pressure by 17 percent and increase life expectancy by five years for over 12 million Americans. Now that's a pretty simple change with a pretty profound effect. An increase of dietary potassium of only 80 to 120 mg per day results in a drop of systolic blood pressure of 2 to 3 mmHg, so this is something you definitely want to keep in mind with your overweight patients, your patients with hypertension and dysglycemia.

## Dietary sources of Potassium

Potato	Sockeye salmon
Halibut	Parsnips
Plantains	Pumpkins
Rockfish	Kohlrabi
Sweet Potato	Duck
Beet greens	Mushrooms
Bananas	

In terms of dietary sources of potassium, many of them are in starchy plants, which is one of the many reasons I don't endorse a low-carb diet across the board for all patients, so potato, plantains, sweet potato, pumpkin, and parsnip are really good sources of potassium. Fish is another good source, so halibut, rockfish, and sockeye salmon. Then we have other foods such as duck, mushrooms, kohlrabi, beet greens, and bananas that are good sources of potassium.

## Calcium, Zinc & Magnesium

Calcium	Zinc	Magnesium
Sesame seeds	Oysters	Dark leafy greens
Sardines (with bones)	Liver	Nuts and seeds
Yogurt	Crab	Fish (mackerel)
Collard greens	Lobster	Avocados
Spinach	Beef	Dairy products (if tolerated)
Cheese	Lamb	Bananas
Turnip greens	Endive	Figs
Sockeye salmon (with bones)	Pork	Dark chocolate
Molasses	Crimini mushrooms	
Mustard greens		

Let's move on to calcium, zinc, and magnesium. When these are deficient, the deficiency can lead to a number of alterations in neurotransmitter and HPA axis dysfunction. Calcium, zinc, and magnesium, when they are included in multivitamin formulations, show some stress-lowering effect in clinical studies. Magnesium is especially important. It's been shown to improve sleep, metabolic function, fatigue, and energy. As we talked about in the exposome section of this course, about 60 percent of Americans fall below the adequate dietary intake of magnesium, and it's the most common mineral deficiency in the U.S. So we'll talk more about other specific nutrients that can benefit the HPA axis later in this unit, including blood sugar-regulating, anti-inflammatory nutrients and nutrients that help with sleep.

Top sources of calcium in the diet include sesame seeds, sardines with bones, yogurt and other dairy products, collard greens, spinach, turnip greens, sockeye salmon with bones, molasses, and mustard greens. So if the patient is on a strict Paleo diet, one of the easiest ways to get more calcium in their diet is for them to consume canned fish that has the bones still in it, such as salmon from Vital Choice. The bones are soft and easy to eat, and they are really rich in calcium.

Top sources of zinc include oysters, liver, crab, lobster, beef, lamb, endive, pork, and cremini mushrooms, so pretty much mostly animal sources. Zinc is much more bioavailable in animal sources than it is in plant sources. It's in a similar fashion to iron.

For magnesium, we have things such as dark leafy greens; nuts and seeds, although they should be soaked and dried before consuming because they contain phytic acid, which inhibits magnesium absorption; fish such as mackerel; avocados; dairy products if they're tolerated; bananas; figs; and dark chocolate.

What about caffeine? That's always on patients' minds and clinicians when we talk about HPA axis dysfunction. The research on caffeine is somewhat mixed, and that's likely because of individual differences in caffeine metabolism and HPA axis status. I've written a lot about the effects of caffeine and coffee on my blog, so we'll share links to those posts, so you can get some important background, but in terms of HPA axis dysfunction, there's an important paradox to be aware of, which is that the more someone needs caffeine to function, the more likely it is that it is not good for them. Most patients with significant HPA axis dysfunction should restrict or avoid caffeine until they have fully recovered from their condition.

What about alcohol? That's also a popular question, and the answer is similar to caffeine. There are individual differences in how each person processes alcohol that are determined by genetics, nutrient status, detoxification capacity, etc. People who are under a lot of stress are at higher risk for abusing alcohol, so that's something to keep in mind. I'm sure you know if you've been in clinical practice for any length of time that there's a tendency for people to underreport their alcohol intake. I've had some patients who were patients for a couple of years before they came clean and admitted that they had an alcohol problem, even though I had suspected it based on their lab results. So even in the context of a functional medicine practice, you're going to get patients who abuse alcohol, and it's something you need to be aware of. Alcohol, of course, puts stress on the liver, and the liver is already often under-functioning in HPA axis dysfunction. If a patient can get by and completely eliminate alcohol, that's probably going to facilitate their healing process, but we permit, in most cases, two to three drinks a week with meals in a social situation during the treatment phase unless the patient is pretty far down the track of HPA-D, and we feel like they can't even tolerate that amount.

Okay, so next time we'll go further into HPA axis dysfunction treatment, and I'll see you then.