Macronutrients: Carbohydrate Clinical Applications

Transcript

Hello and welcome to the Institute of Nutritional Endocrinology presentation on *Macronutrients: Carbohydrates and Their Clinical Applications*. Up to this point we have looked at carbohydrates, their structure, their function, the biochemistry, and now we are going to take a look at what happens when you cook them. How do the carbohydrates become more or less bioavailable in terms of the way that they are prepared? How do you determine whether the person you are working with needs higher carbohydrate diet, a lower carbohydrate diet or a medium carbohydrate diet? We will take a look at all of these factors.

Before we begin I do want to remind you that this presentation is not intended to replace a one-on-one consultation with a qualified healthcare professional. It is certainly not medical advice. When you are working with your own clients be sure to let them know that what you are offering them is an overall evaluation of where they are at nutritionally along with education about how they can improve their overall health and their diet but by no means is it medical advice, and if they are under the care of a doctor for being on medication or other diagnosed health condition, make sure that they know to consult with their doctor and make sure whatever educational resources you are making available are okay in light of the current treatment protocol they have with their doctor.

Let's take a look at how various cooking methodologies will affect the availability of carbohydrates. Cooked carbohydrates are not the same as the same food raw because of the way it is handled in the body. So what does cooking due to carbohydrates? There is some evidence that it facilitates the conversion of starch molecules into sugar. It makes me sugar more bioavailable by breaking down the cellulose and the other fiber in the food. It also increases the glycemic index of the food. The glycemic index is the rating of how much of that food is purported to raise blood sugar. It is not an exact science. It is not an index that I really pay a lot of mind to and we will go into way more detail into the glycemic index in our *Blood Sugar Balancing* module.

It actually increases the available calories because when you heat the starch and it breaks down the fiber it releases a lot of the calories from the food that were trapped and bound with the fiber out to be available to you to be absorbed.

This might be good in terms of someone who is thin and needs to facilitate all of the calories that they can from a food without so much extra bulk, but for people who are attempting to let go of some weight, which quite frankly is the majority of people that you are going to see, that is not such a good deal. It decreases what is called the resistant starch content. Resistant starch content is starch that is actually, I guess you could say it's more asked like fiber than it does starch because it resists breakdown from digestive enzymes and fuels its way through the intestinal tract. It also creates, when you heat things at high heat, especially dry high heat, example baking in the oven, it produces a chemical called acrylamide. Acrylamide is a known carcinogen.

This is pretty important because most people are not aware of it. They are not aware of their baked corn chips or baked potato chips, while not having the high contents of oxidized fats, are actually not good for them either because of the existence of acrylamide. The same thing happens with fried potatoes and baked potatoes, etc. We have a chart that will show you where the top 20 foods by average of acrylamide exists.

French fries made in restaurants, because they are very hot and very, the ovens tend to be hotter and drier and french fries that are oven baked, potato chips, potato chips are very crispy and he did at higher pictures. Breakfast cereals, cookies, even coffee, brewed coffee, toast, pies and cakes, chili con carne, corn snacks, popcorn, pretzels, pizzas, crackers, soft bread, coffee, which is very interesting that coffee would be a problem but it is definitely in the articles that I have found.

Burritos and tostadas, peanut butter, breaded chicken, bagels and soup mix, these are the things that have been measured to have the highest acrylamide. In general think about if you are going to heat a starch you want it to be at a moist, low temperature, for example steaming. Steamed potatoes are much different in their acrylamide content that are french fries or baked potatoes.

Given that carbs are one of the major food groups and there is a need for carbs, it is not that they are the bad guys, really, it is just that they get to be excessive and we get to take in the wrong kinds of carbs, which we looked at before when we looked at the top likes versus the simple carbs.

In our society, in the general diet, especially the standard American diet, we have a preponderance of calories from carbs in the simple form, from sugars, the baked goods, the chips, the cookies, candies, etc. Then there is a shift here to go to a much lower carb diet like the paleo movement is big. Paleo is pushing very low carbs as well as a ketogenic diet which is extreme low carbs.

The ketogenic diet is an extreme low-carb, high-fat diet that has been shown to be effective in things like multiple sclerosis and epileptic seizures. It has also been shown to be helpful in some cases of cancer.

Is it a good maintenance diet? Probably not except for someone who has become very ill and needs it to maintain a seizure-free environment, or to reverse their multiple sclerosis. Generally these extreme diets are used therapeutically for short periods of time. The thing about the paleo diet is that if you look at it from the way that is actually done versus the way that it ought to be done, it is a very different monster.

So people who are like, ‘yeah, yeah, paleo’, are eating big slabs of bacon, lots of meat, and butter, and very little in the way of vegetables. Remember on the complex carbohydrate side one of the biggies is vegetables. I am going to show you in a little bit how you can actually get plenty of carbs but have them be the low, slow carbs and that would be mainly from your non-starchy vegetables. Sometimes people do need higher carb intake, especially those who are very thin and need to gain weight. It is hard to gain a lot of extra weight on fat and protein calories. It just really is.

People who need to gain weight tend to need to have extra carbs. I am not saying needing extra carbs in the form of sugar or breads or things like that but extra carbs in the form of starchy vegetables, and some of the gluten-free grains. People who are competitive athletes, they are burning up like crazy and they need to have the carbs to fuel that exercise, to have available glucose in their bloodstream to fuel their exercise so they do not break down their protein. People who generally have a higher caloric need might need to have extra carbs, higher carbs. Growing children tend to do better with higher carbs.

Again I am talking good carbs, carbs from starchy vegetables from things like fruits and from non-gluten grains, and legumes to an extent as well. Pregnancy is another time when a higher carb may be needed, but diabetes in pregnancy is very common. It is called gestational diabetes. You really have to be watching somebody who is pregnant and discover what the best level of carbs would be for them to keep their blood sugar nice and steady. In general that is way you are going to work with people, is to really evaluate each person as an individual and not just have the, ‘well I put people on low-fat diets’ or ‘I put people on low carbohydrate diets’.

No, it is really very individual and you need to be looking at each individual person as a unique person with unique needs. What are the potential dangers of having too low a carbohydrate intake? Studies have shown that when the carbohydrates get too low, it increases the level of cortisol.

When there are not enough carbohydrates in the diet to supply the fuel that you need for your activity, naturally your body is going to try to raise that level of glucose. The first way to do that, the preferred way, it's use the hormone glucagon to break down the storage form of starch which, remember what that is? That is glycogen usually stored in the muscles and liver.

However if the person has been following a low carbohydrate diet for a while, they are not going to have much glycogen in their muscles so that is quickly going to run out, and then it becomes an "emergency" and the adrenals begin to come into play and begin secreting adrenaline and cortisol. Cortisol goes out to muscle and breaks it down to create new sugar, new glucose in the blood. It basically breaks down branch chain amino acids. I always tell people to not get stressed out because you turn your thigh muscles into belly fat. But in the case of tool low of a carbohydrate intake, you have a similar response which is actually a stress on the body because the adrenals are coming in trying to balance it.

The numbers, what are the numbers? The numbers I've seen mostly are when you go below 100 grams of carbohydrate per day. I will show you in a little bit that it is not really hard to stay above 100 when you include lots of non-starchy vegetables in your diet, and nuts and seeds. There are some studies that show that in concert with that increase of cortisol we also get a decrease in testosterone. Mainly I think that has to do with the *cortisol steal* effect. We have seen it before where testosterone and cortisol use the same precursor. So if we are increasing our cortisol it is naturally going to decrease testosterone as well as some of the other steroid hormones.

As a result of the increased cortisol, it disrupts the conversion of T4 to T3. So you get less T3 which means the metabolic rate goes down which means that fat burning slows down which means you can come up with a whole host of symptoms related to low thyroid function. Of course it can result in low energy because the body does not have readily available glucose to use. And also muscle wasting as a result of the increased cortisol.

You see it is not really about high carbohydrate diet or low carbohydrate diet. It is really about figuring out what the best level of carbohydrate is for each individual person. It takes some experimentation sometimes. Sometimes you try to find a spot and move in either direction. Meanwhile you can assess how well it is working for someone based on their symptoms, their energy level, their muscle tone, you can also use a glucose meter. We go way more into detail on using the glucose meter. We will touch on it now in this presentation and then we go into more into detail when we do *Blood Sugar Balancing*.

What types of carbs should you be offering people? I believe there is never a case for giving someone pure sugar or simple carbs or refined flour products. Never. You can get plenty of carbohydrates in a healthy form that come in a healthy package with other nutrients, fiber, vitamins, and with minerals. The grains, as we talk about whole versus processed: processed grains are devoid of fiber, they are devoid of B vitamins, they are devoid of germ, they are devoid of a lot. So whole grains, preferably non-gluten grains, and the things that I feel are really good healthy carbs are actually the grains that are more considered seeds like buckwheat, quinoa, teff, millet, sometimes amaranth, too.

Legumes. Some people handle legumes really well and some people don't. Some people get gas from the fermentable sugars in legumes and some people handle them well. Some people handle different legumes differently. I had a client who could eat black beans but she could not eat garbanzo beans because the garbanzo beans shot her blood sugar up. It is going to be different from person to person and that is why you do your best in assessing where the person is at, assessing their needs, and of course you've got to look at their taste buds in their habits too because you've got to get compliance, right? So you look at that and then you determined what you should have this person try.

Fruits. Some people do phenomenally with fruits and some people don't. There is a tendency to use fruits in ways that are not healthy: fruit juices which is pure sugar water or fruit purées like smoothies, or smoothies without greens in them. It is really a matter of finding what their tolerance is. Low glycemic fruits like berries tend to work like better than high glycemic fruits like mangoes. But there are ways that you can figure out how to balance it by including the low glycemic of high nutrient dense chlorophyll rich greens. We go way more into that in our Blood Sugar Balancing module.

Vegetables. Personally I am going to show my bias here. I think that non-starchy vegetables are your best form of carbs because in the quantities that most people eat them, i.e., a little tiny bit on a plate with the whole rest of the plate being other stuff like carbs and starchy vegetables and grains and pasta and meat and all of that, I think that we need to be eating a large percentage of the meals as vegetables. When you do you can get a significant amount of carbs that are slow release carbs, as well as tons of minerals and vitamins and chlorophyll. So my bias is a lot of vegetables for the carbs. I am going to show you in a little bit a day in the life of. It was just a general estimation but to show you that without any concentrated "protein sources” or “carb sources" we had quite a substantial amount of both in the diet. So vegetables are key. They are the best source, I mean the non-starchy vegetables.

Some of these foods contain soluble versus insoluble fiber. Soluble fiber, like I said earlier, is the fiber that will dissolve in water. Soluble fiber is found in certain fruits.

It is fruits that contain pectin. It is also found in legumes. It is found to an extent in vegetables. Vegetables also contain insoluble fiber, i.e. cellulose, which we see is a very long chain of glucose molecules strung together but we don't have the enzyme machinery to efficiently break that down so it basically goes through. Grains are typically very high in insoluble fiber altough some of them have a little more of the soluble. Things like Chia seeds, flax seeds and the mucilaginous foods tend to have more of the soluble fibers in them.

Of course sugar: we don't ever want people to take sugar unless they are about to go into a diabetic coma, and you need to stick sugar under their tongue to bring them out of it. Really no need for sugar and sugar alcohols. We will go through sugar and sugar alcohols in a lot more detail in the sugar presentation video.

How do you know if people are tolerating the carbs and what the deal is with them? There are a number of ways to test the blood sugar and how the blood sugars are reacting both on a short-term basis and a long-term basis, how it is reacting to the diet. So fasting blood glucose is not the best. It is first thing in the morning before you get up, before anybody eats anything, you take their blood sugar. That is typically what the traditional medicine will look at but more so than they will look at some of these others.

It is just one point in time. Actually when we are assessing for things like diabetes, it's the last thing to change. Somebody could be having ranging blood sugar imbalances for many years before the fasting blood glucose goes awry. We've got home testing. You could buy one of these little units. They could run anywhere from $10-$40 depending on which one you get. The one I usually recommend is a very inexpensive one, between $10 and $15. It is called the *True To Go* Meter and the *True Results* test strips. You can test before meal and before exercise and see what the glucose is. Then you can test it after the meal and after the exercise. There is a very specific regime that I have to offer you in terms of that. We will include the glucose testing page, the tracking sheet, on this page, so you can have access to it. We will go into more detail about it when we do the Blood Sugar Balancing module.

[19:00] Then there is hemoglobin A1C. Hemoglobin A1C is the measure of the average glucose in the blood over a period of time. Usually it is a measure of how it has been over the last three months. So it is an accurate assessment of how well the person has been maintaining but it does not change very rapidly when you are making changes to someone's diet. You have to wait a whole three months. What hemoglobin A1C is, is how glycosylated or sugarcoated the hemoglobin is.

The hemoglobin is a carrier protein that takes iron around the blood. It's basically how you measure if a person is iron deficient or anemic, among other things.

Hemoglobin A1C is how glycosylated, how much sugar coating does that hemoglobin have in the system. It should be below 5%. If it gets too low it means you are probably maintaining too low blood glucose but below five is really good. Glucosamine is actually measuring the amount of sugar coating on a particular amino acid. It forms a thing called fructosamine which more of a short-term measure. It can measure over a course of a month.

I often do a combination of all of these including insulin which is the last thing listed because it is important to get the big picture. How much insulin are they producing? Are they insulin resistant? Are they having hyper, meaning high insulin surges? How well are they maintaining their blood glucose? Do they have higher than usual amounts of fructosamine or hemoglobin A1C?

How are they doing after meals? And of course the fasting [blood glucose] which is usually the last to go. Let's take a quick look at a label and I know you know how to read labels. You have read them before but just to reiterate, when you are teaching someone how to read labels you are looking for carbohydrates. You are looking for total carbohydrates. So in this particular case total carbohydrate is 15. But we don't know if that is a good carbohydrate or is that mostly sugar carbohydrate?

The next thing I skipped down to is looking at sugars. It is 4 grams of sugar. Okay, so what else is making up that total carbohydrate? Well, 4 grams of sugar I don't think it's very good for a food. I think it is a little bit too much. But 4 grams of sugar it is. So we have 4 grams of sugar and 4 grams of dietary fiber. Then we have three grams of sugar alcohol. So if you add 4+4 is eight, 8+3 is 11, that is 11. What happened to the other 4 grams of carbohydrate? That would be in the form of starch, longer chain polysaccharides.

This particular food has 2 grams of protein. When we look down, the other thing you want to teach our people when they are reading, the first ingredient is this is wheat flour. Obviously that is not a very good thing. First of all it is not whole-wheat. Wheat is gluten and we will have a whole thing on gluten and how that can affect people's energy and their hormones. So wheat flour, unsweetened chocolate, **erythritol**, inulin, **erythritol** is one of the sugar alcohols, inulin is that longer chain of fructooligosaccharides. It is kind of an insoluble starch, and insoluble fiber. Oat flour, cocoa powder, evaporated cane juice; that is going to drive the sugar up.

Whey protein. Whey protein is actually a mixed bag because as you learn in the blood sugar balancing program, people are really pushing ‘whey, whey, whey’, ‘whey is great’ but whey actually drives up insulin levels.

That might be good in somebody has low insulin levels like a type I diabetic, but generally that leads to increased fat storage and all of the damage that it does to blood vessels and blood pressure, etc.

Cornstarch. It says low glycemic. I do not understand how that could be low glycemic. Natural flavors, salt, wheat, gluten, they have added extra gluten. This is not a good food as you probably know by reading, it but you look at this label and that is how you tell if a food is high in starches or not.

You subtract the dietary fiber and the sugar and the sugar alcohols from the total carbohydrate and that will give you the amount of starch in there. That is just another example of a nutrition label. The thing is there is a variety of different fruits that can be good for people. What is good for one person might be bad for another. Red apples tend to be higher in sugar than the green apples so go for the green apples when people are having apples. Apples contain pectin, which is a soluble fiber and will slow down the absorption of that food.

Here is a list of carbohydrate content in food. On the website we will have three PDF documents that we will share with you in more detail on this. This is just the starchy stuff. You can see that most of these foods have anywhere from 30 up to 60 some grams of carbohydrate. If you look at it, a low carbohydrate diet is considered under 100. A very low carbohydrate diet is considered under 50. A moderate carbohydrate diet is anywhere from 100 to 250. So you can see that's just one serving of baked potato is going to give you 64 gram. If you are going for a lower carbohydrate diet you need to be aware of where the carbohydrate is coming from.

[25:00] This is a log that I did on FitDay.com. I used play with it before and it was much easier to use but now it is just crammed with advertisements. It took me a while to get this in. I was trying to put in, what if I had a chia porridge and a smoothie for breakfast, a salad with some dip or dressing for lunch, and then some steamed vegetables with maybe flax oil on it for dinner. I gave up after a while so this is not complete. Actually the hemp seeds are missing because they did not have it in the database but hemp seeds had about 5 grams of protein and another 5 grams of carbohydrates to this plus some really good omega-3 fat. So as you can see, given this, it's really not bad.

It's not a very low carbohydrate diet but it is more of a moderate carbohydrate diet but all of the carbohydrates are, look, from the veggies, nuts, and seeds. What I am saying is we do not have to get people into eating a lot of starches and legumes if we don't want to, if they don't tolerate them, if there a reason for them not to do it, but you can still keep the carbohydrates at a level that is not going to cause an excess of cortisol.

I have seen people on my *B4BeGone* program and they go real extreme the first couple of days. They end up with palpitations and other signs of high cortisol and adrenaline. It is really a matter of working with people and figuring out what the best is for them.

Let's lastly look at carbohydrate intolerance and the special diets. There are a lot of different carbohydrate related special diets. Of course first of all there's lactose intolerance. People who do not digest milk sugar need to be on a dairy free diet. Personally I think everybody should be on a dairy free diet because dairy is generally the milk of another species, which is intended for the young of that species.

Yes, there are therapeutic cases where some fermented goat Kefir, might be helpful where colostrum or even sometimes whey protein, as long it is clean and cold processed. It might be useful. That is more of a medicine, food as medicine. But when we are looking at food as food I think most people should be off of dairy. I have seen it cause far too many problems. Lactose intolerance is the inability to break down the bond between glucose and galactose in the lactose sugar. That enzyme that is missing is lactase. Some people will cheat and just drink the milk and take the lactase enzyme.

That is okay but they are really not addressing the problems with casein, which we talked about in protein. I think that another diet that is common is low glycemic. What does that mean, a low glycemic diet? It depends on whether you are looking at the glycemic index or the glycemic load. That would be to eat foods that are under a certain level of rating. I consider what I do low glycemic eating because they are completely devoid of any kind of heavy-duty processed starches and sugars. Again, it is a matter of finding for that person, does that low sugar, low glycemic diet, is it below 100 grams? Do they need a ketogenic diet for a while to get in balance because of a neurologic issue? You have to figure that out and play with it.

Gluten-free and grain free. Gluten free, gluten has shown to be detrimental in all sorts of problems. It contributes to depression, it continues to thyroid conditions, problematic with autoimmune. A lot of people don't tolerate great very well because it causes spikes in their blood sugars and again you will have to see how it works. Some people might do really well with quinoa and not with rice.

The thing you have to keep in mind and we will talk more when we do immune system, is that there are certain cross-reactivities that happen when somebody's gluten intolerant and they do not tolerate some of the other grains like corn and rice and quinoa.

Another diet, which you may hear about and probably have some familiarity with, is the specific carbohydrate diet (SCD). Another name for it is the GAP diet.

They are actually very similar. There is very little difference between them. One is based on the other. It eliminates all sugars except for monosaccharides. All starches as well. So monosaccharides are the only ones they will allow. So glucose or fructose or galactose would be allowed but none of the others. I think that there is merit to some of this because people may not have the ability to break down the disaccharides and it causes a lot of bloating and gas. There have been some good studies that show that specific carbohydrate diets can work well with people with Crohn's and other inflammatory bowel diseases.

In our *Digestion* module you'll see modified specific carbohydrate diet that I have put together and also a modified diet that takes out the FODMAP and the specific carbohydrate things that they tell you to avoid and leaves you with a fairly good and wide range of veggies that you can eat. It is just a matter of seeing. I generally don't go to these types of diets unless the typical stuff does not work. The obvious is you get people off the refined carbs. You get them off the gluten, off the dairy, off any other food intolerance that they have and then address the specific needs as you see fit if those first line of defense things are not working well.

FODMAPs. What is that? That is one of the latest in these carbohydrate specific special diets. The FODMAP stands for Fermentable Oligosaccharides, Disaccharides, Monosaccharides And Polyols. So if you look back at the GAPs diet, which only looks at monosaccharides, this further takes the monosaccharides out as well. So anything, oligosaccharides, which are the medium chains, disaccharides, monosaccharides, and polyols, and it allows for the polysaccharides. Polyols are the sugar alcohols. So again, some people do really well with this. A lot of it has to do with the gut flora.

Oftentimes you can restrict the foods on the FODMAP list and then you can address the gut, address the bacteria in the gut by adding some good probiotic foods, get things cleaned up, and then you can broaden the spectrum. I believe that a lot of these intolerances come from poor digestion, not having the right bacteria, and just years and years of abuse. These are these in a nutshell and we will go through more details about some of these and give you specifics about what is included and what is not in our *Food Religions* module.

Let's do a review. Good carbs-bad carbs. A good carb to one person might be a bad card to the other so it is very important that you take a good history, get a good diet diary, a good symptom diary, and personalize a recommendation to the individual. In general, processed carbs are bad for everyone. It is just the way it is. Gut health may temporarily restrict some intake of carbohydrate. For example if you are working with someone who has an inflamed gut and they have either a diagnosed or kind of a generic inflamed gut so maybe they have Crohn's disease or a colitis or just an inflammatory disease. They are not going to feel comfortable if you feed them a lot of cellulose-containing foods.

For example raw, green leafy vegetables, very high in cellulose, can be very aggravating because it acts like a broom. Think about running a broom over an inflamed raw surface. So that might be it. Other gut health. You have bad bacteria, dysbiosis in the gut, you may not be able to take some of those carbohydrates and you may have to follow a FODMAP or an SCD diet for a while. Glucose tolerance does play a major role and I think a lot of this is overlooked by most folks who recommend the special diets.

That is that you really need to look at how is the person responding on a glucose level? What happens to their glucose after they eat a specific meal? Learn to play around and alter the composition of those meals so that you could help them to achieve balance, glucose balance. Again, way more detail in our *Blood Sugar Balancing* module.

Restriction of good carbs is generally temporary when healing. For example on the FODMAPs you may be eliminating things like kale, broccoli and cauliflower for a while. It is generally got to be temporary because if you follow some of these diets long-term you are going to create nutrient imbalances. Same thing is true if you have someone with inflammatory bowel disease. Yes, temporarily take them off of the raw vegetables because they can be irritating. Put them on raw vegetable juices, which are non-irritating. All in all what we need to do is really treat each person as an individual. Listen to what they have to say. They will be able to help pinpoint what is going on if you listen and ask the right questions. Enjoy working with your clients on these carbohydrate issues. Thanks.