

# Division of Diabetes Treatment and Prevention

## Advancements in Diabetes Seminar

### Update on Nutrition for People with Chronic Kidney Disease

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Theresa Kuracina:

Okay, thank you Jan. Good day to all of you. As you know, today's topic is an update about nutrition and chronic kidney disease. My name is Theresa Kuracina. I am a Registered Dietitian and a Certified Diabetes Educator. I have worked for IHS since 1991. I started out at the Zuni Service Unit and then I moved to the Albuquerque Service Unit and I've been there since 1992.

I have worked with Dr. Narva, when he was here in Albuquerque. We used to offer renal clinic to patients who came to the service unit. And our goal was always to have them understand about chronic kidney disease and hopefully slow the progression of chronic kidney disease. So with that being said, we are going to start. Oh the picture, that is at 10,000 feet, south of Taos, that's my dog, Rosie. Anyway, that's Rosie. She's here with us today. And thank you for letting her be here.

Now, let me start out by saying, great job to all who have worked so hard to identify and treat diabetic kidney disease across Indian Country. As many of you know, Dr. Bullock and others, including Dr. Narva from the National Kidney Disease Education Program, published results in the Center for Disease Control's Morbidity and Mortality Weekly Report in January 2017. These graphics are from the CDC Vital Signs monthly report for January showing their results graphically. On the left, you see a green line decreasing. This line shows that there has been a 54% decrease in the incidence of kidney failure due to diabetes in American Indians and Alaska Natives from 1996 through 2013. No other group has had such a decrease. And the graphic on the right shows the model used for diabetes care. And I think all of us play a role for caring for people with diabetes. And if they have kidney disease, caring for those people as well. Hopefully, today, you will learn something about CKD to share with your patients.

You've seen the objectives already. You should be able to identify chronic kidney disease using urine and blood tests. You should be able to talk about kidney functions and CKD complications with patients, review the dietary interventions to slow progression of kidney disease with them, and to discuss where the nutrients of concern are found within the food groups using My Native Plate. For the purposes of this presentation, these nutrients include sodium, protein, phosphorous and potassium. And I believe you all know how to access My Native Plate through DDTP. If not, email us at the end and we'll make sure you know how to do that. And as always, at the end of the presentation, you can identify a change you can make in your practice.

I believe many of you have seen or used this handout from the National Kidney Disease Education Program. How well are your kidneys working? You can see the link at the bottom. And urine albumin will be discussed first. In many people with diabetes, an abnormal level of albumin in the urine may be the first sign of damaged kidneys. The urine albumin-to-creatinine ratio or UACR is checked at diagnosis of diabetes and then at least, annually. A UACR below 30 is normal and above 30 may mean kidney disease. If the level is increased, providers obtain a second urine sample within a three to six-month period to confirm albuminuria. Just like we have to confirm a diagnosis of diabetes, we want to confirm that the person has an abnormal amount of albumin in the urine chronically.

Now, people with very high levels, those in the thousands are the ones at greatest risk for rapid decline in kidney function and progression to kidney failure. Many people with diabetes and albuminuria may be prescribed medications. They may be on an ACE, an angiotensin-converting enzyme inhibitor or an ARB, an angiotensin receptor blocker. Both classes lower blood pressure and lower urine albumin. Of importance today, both ACEs and ARBs reduce the amount of potassium that is excreted into the urine. Serum potassium may increase with their use. That's part of the reason why we are reviewing potassium in foods today. We want people to continue taking these medications and control their potassium levels.

As far as the diet is concerned for albuminuria, decrease in protein intake is thought to be beneficial. And in population studies, high sodium intake has been associated with it, particularly when the person is overweight. Smoking is also associated with abnormal urine albumin. Now, the testing of UACR and the use of these medications to protect the kidneys are some of the processes and outcomes cited in that CDC report I mentioned earlier. So keep checking the urines and treating the abnormal urine albumin.

Now, we also need to check kidney function. Check the serum creatinine to get an estimation of kidney function. The creatinine result is used in a formula that provides an estimation of the glomerular filtration rate or GFR. This result gives us an idea of how many nephrons are still functioning. This is how I explain the GFR to folks. Most of us start out with about two million nephrons. Those are the working units of the kidneys. Each nephron has a glomerulus or filter. An eGFR above 60 is considered normal. The person has a normal number of working nephrons. An eGFR between 15 and 60 may mean kidney disease. There are fewer functioning nephrons. And an eGFR below 15 may mean kidney failure. Too few nephrons remain. As the kidney function declines, you're going to see their lab work change. There will be highs and lows, and CKD complications may arise as well.

There are a lot of information on this slide, so bear with me. Most people know that the kidneys produce urine. I have my patients say, "But I still use the bathroom. I still use the restroom." And that is true. Most people will still make urine until the GFR is low. We know that they have kidney disease based on the abnormal urine albumin results and a low GFR, not the volume of urine they produced.

Now, most people don't know that they maintain the composition of the blood, and what we're going to see as the GFR goes down, is what is excreted into the urine changes. Fewer functioning nephrons mean fewer toxins are excreted into the urine. For example, the blood urea nitrogen or BUN level increases since there are fewer nephrons to remove nitrogen. Serum potassium may increase. This may be from the ACE or the ARB I mentioned before or just too few nephrons remaining to remove potassium.

The serum bicarbonate level may decrease. Bicarb is the base of the acid-base balance. So as the bicarb decreases, it's just telling us there are too few nephrons remaining to remove acid from the blood. The kidneys also make rennin for blood pressure control, so our patients may not know that they need to take multiple medications to control their blood pressure. The kidneys make erythropoietin, the hormone we need to make red blood cells. So people with CKD may have low hemoglobin levels and develop anemia. The kidneys are the sites where Vitamin D is activated. We need active Vitamin D to absorb calcium and to maintain healthy bones. As a result of too little Vitamin D, they may develop abnormal mineral metabolism.

This complication also involves phosphorus in the parathyroid gland. The imbalances within these systems can impact their bones and blood vessels and soft tissues may become calcified. People with CKD are increased risk for cardiovascular disease due to this particular complication. And of course, medications may be prescribed for many of these complications. They may include sodium bicarbonate to replace bicarbonate in the blood, iron to treat anemia, Vitamin D and phosphate binders for the abnormal mineral metabolism. It is really important for people to understand why they have

been prescribed these medications. Sometimes, I have spent an entire visit talking why they need to take these medications and how the medications may be beneficial.

And finally, as we all know, many medications are metabolized and broken down by the kidneys. People on insulin may start having more frequent low sugars because there are too few working nephrons to metabolize and eliminate it. Remind your patients to let you know if they start having low sugars more often. Now, some people may think that their diabetes has gone away when all the diabetes medications have been discontinued. We know that the diabetes has not gone away. The low sugars are the issue. Now, we -- this talk is about CKD, but I want you to know that these complications continue to be an issue for people who are on dialysis.

And, I do know that this is a lot of information to consider. So, the next slide will show you a handout that you may find useful. If nothing else, it will remind you of the information I just discussed. This handout includes the labs and why the labs are important. The first time I used it with someone and if you haven't seen it before, I'm going to tell you, this is to introduce the language of kidney disease. These are the results the doctor tracks the person's progress with. You can also use it when you're talking about medications.

Here, you can see a few of Charlie's results listed. His GFR is stable. You can see that at the top. He takes lisinopril, which is an ACE inhibitor for blood pressure control and to lower urine albumin. His urine albumin is lower which is good. Now, his potassium is a little high in November due to an increased dose of lisinopril and his use of light salt. Salt substitutes have potassium chloride. Now, his nurse told him to cut out the salt, and he did. However, his wife bought him light salt. Once he stopped using the salt substitute, his potassium level came down. Just to let you know, salt substitutes are the only thing that I cannot fit into the diet for someone with CKD.

Now, many years ago when Dr. Narva was still working here in Albuquerque, his patients would ask me for this report card. We called it the report card. It looked a little different at the time, but the important thing I want you to know is that people wanted to know what their results were. They wanted to see the changes in their lab results when they started taking their bicarb medicine or their phosphate binding medicine. So this can really help you if you're working with someone and they're making changes. And I truly believe that learning about CKD is learning a new language. You can see that there's a link at the bottom if you're not familiar with where to get this handout.

Okay. The dietary interventions that will be discussed today include limiting sodium to lower blood pressure and decreasing protein intake if the intake is excessive. Limiting protein intake reduces phosphorus and potassium intakes and may impact sodium as well.

I won't spend much time on managing diabetes, as I believe many of you are skilled in this area already. Two things are important to remind you about. One, good control of diabetes early in the course of the disease may reduce the risk of developing kidney disease. So that person's urine albumin may remain normal. There's no damage to their kidneys due to uncontrolled diabetes. And two, once someone is approaching kidney failure and their GFR is lower, tight control of diabetes will not slow the progression of chronic kidney disease. And those folks may be at increased risk for low sugars as I mentioned before.

Now, these diet tips were designed in steps because there is an awful lot to consider. The first steps for eating right are to eat less sodium, to eat the right amount and type of protein and to choose heart healthy foods. The next steps are important when you see phosphorus and or potassium levels increase. Now obviously, if someone comes with a high potassium level, that needs to be discussed first. And of course, I'm going to suggest that you send your patients who are having issues with their diet to your local dietitian or nutritionist because they are the experts at tweaking the diets for those folks. And just to let you know, I will be talking a little bit about these steps and how they relate to people on dialysis, because I feel I wouldn't be doing my job if I didn't give you a little bit of information

about how the diet changes when someone goes onto dialysis. That may be the kind of question you get from someone. Now, this is another handout from the National Kidney Diseases Education Program that lists those steps to follow in more detail, okay?

Before we get in to the new trends in the food groups, let's look at what we eat. This graph is from the 2015 Dietary Guidelines. Notice the food groups or dietary components listed on the left side. Now, look at the X-axis along the bottom. You see the zero in the middle that shows the limit or goal. You see yellow and blue bars to the left and the right of that line. I marked sodium with an X to show you why we need to limit sodium as the very first step. That yellow bar to the right of the zero line shows most of us eat too much sodium. And now, find the fruits and the vegetables at the top. You can see those yellow bars to the left of the goal line show we do not eat enough vegetables and fruits.

Now, if we were together in the same room and I could ask you, "Which foods do we need to limit if someone's potassium level is too high?" I hope most of you would say salt substitute, but I bet others would be say fruits and vegetables such as bananas, and potatoes and oranges, and those do contribute to potassium intake. However today, by the end you will see how other food groups contribute to potassium as well.

All right! Now that you've seen data on the dietary intakes, let us review what is the healthy amount per day for those nutrients, the amounts we need for good health. We do not have data or recommendations specifically for CKD, but people with damaged kidneys or low kidney function will not need to eat more than the healthy amount of the nutrients. They may need to eat less since their kidneys cannot get rid of excess amounts as easily. The upper intake level for sodium is 2,300 milligrams per day, eating more than that may increase the risk of adverse health effects. I want you to think of high blood pressure for high sodium intake.

Protein intake recommendations are based on weight and vary by gender. The recommended intake is 0.8 grams protein per kilogram body weight. The reference woman needs 46 grams, and the reference man needs 56 grams per day. To frame this for you, if you're not a dietitian, one ounce of meat has about seven grams of protein. So that eight-ounce steak has about 56 grams of protein, more than the reference woman needs for the whole day and enough for the man for the day.

The recommended intake for phosphorous is 700 milligrams; the recommended intake for potassium is 4,700 milligrams. You can see the percent daily values listed to the far right. Those are the ones used on the current food label. If you find a percent daily value of 50% for phosphorous, for example on a label, that food has 500 milligrams of phosphorous in one serving. Now, phosphorous is not required to be listed in the nutrition facts in the current label or the new version that we will start using in 2018.

Here, you can see the current or the original and new versions of the nutrition facts label. When we check the nutrition facts label, it is always important to check the serving size first. Now, notice that the new label has a larger bolded font for serving size. They still have the percent daily values in the far right column. Now, for those of us who are not that good with numbers, here's a quick tip. A percent daily value of 5% or less is low and the percent daily value of 20% or more is high.

The new label will include potassium as you can see at the bottom. Now, I tell people to think of the percent daily value like a budget, based on one dollar or one hundred cents. Look at the percent daily value for potassium here. If someone needs two-thirds of a cup of this item, they get six percent or six cents of that dollar for potassium. Now, that is not a really high in potassium. Now for the dietitians who are listening, the percent daily value for potassium will be increased to 4,700 milligrams per day. In the current version, that percent daily value is based on 3,500 milligrams.

Now, let's start looking at the nutrients in the food groups. I used the food composition database from the USDA, and I have rounded sodium, phosphorous and potassium contents to make it easier to compare. Now, you remember that the first step was to choose and fix foods with less salt and sodium.

This entire meal has less than 200 milligrams of sodium provided that salt was not added during cooking or at the table. One teaspoon of salt has about 2,300 milligrams of sodium. So if we add salt, it adds sodium. Sometimes, I ask the person, how often do they have to buy a pound of salt? If someone tells me they have to buy a pound of salt once a year, that tells me they do not add a lot of salt to the cooking or at the table. I also have other patients who tell me they buy a pound of salt every two months. That is an awful lot a lot of salt, so we talk about that. As you can see, the fruits do not have sodium and the vegetables are pretty much sodium free. Starches and grains have no sodium unless we add salt like I mentioned. So rice, oatmeal, cornmeal mush, cream of wheat or pasta do not need salt to cook.

Now, when we start using those instant mixes and cups of noodles, those can have a lot of added salt. If there's a seasoning packet to add, use less and that will mean less sodium. As you can see, milk has sodium naturally, so any product made with milk such as cheese, cottage cheese, yogurt or ice cream has some sodium. The deer meat has sodium. Animal protein always has sodium and some have more than others, as you will see later. Now, protein foods such as crab and lobster that live in the salty seawater have more sodium than freshwater fish in general. Plant proteins such as beans, and peas and nuts do not have a lot of sodium in them unless we add it to them when we cook them. If we add salt or salt pork to the beans, they have added salt. Now, most canned beans do have added salt unless they are the no added salt-type. Commodity canned vegetables are lower in sodium than the store brand, so that's really good news.

As far as people on dialysis go, they do need to follow this step. They need to continue to limit their sodium intake. Salt usually make us all, any of us, thirsty. And people on hemodialysis have a fluid restriction, and most people on dialysis don't make much urine, so that changes. So people on dialysis, the salt and the fluid stays in the body, they may swell up. The person may have hard time breathing because the fluid is backing up into their lungs. Now, during dialysis, much of the extra salt and water are removed, but in between treatments those levels build up. So if someone is on hemodialysis, they are most likely on fluid restriction. Someone on peritoneal dialysis who does dialysis every day, they may need a fluid restriction if they are indiscrete with their sodium intake. But people on dialysis should be following this lower sodium recommendation.

Now the numbers shown here for protein are not rounded. The total protein for the meal is about 38 grams. I know you all remember that that reference woman needs 46 grams and the reference man needs 56 grams of protein. And again you can see that the food groups here from the animal sources, the meat and the dairy are rich in protein. And of course we want them to choose lean meat and low fat dairy. Fruits and non-starchy vegetables do not contribute much to protein intake. Grains and starches have a little protein. Dry beans, peas and nuts do contribute to protein intake.

Now, I need to sit and ask you a question or ask you a question. How many of our patients are only eating three ounces of meat at one meal? Lots of people that I see are eating higher protein diets -- diabetes or no diabetes, many people are adding protein powders to smoothies or they're eating protein bars for snacks. All this protein adds up. If someone has kidney disease, if someone has abnormal urine albumin, talk to them about the amount of protein that they eat.

As far as people on dialysis are concerned, they do need to eat the right amount and type of protein. However, they need to eat more protein. They need to replace the protein, actually the amino acids that are removed or lost during dialysis treatments. So this message is different for them. They need to eat more protein. And this may be the biggest difference in the diet for them. Once they start dialysis they will be instructed to eat more protein. So now you know if someone is approaching kidney failure and thinking about dialysis, tell them that they will hear from their dialysis staff that they need to eat more, and that's because they lose it during treatments.

Now let's look at the phosphorus in food and see how much phosphorus there is in foods rich in protein. Now these numbers are rounded to make it easier to compare. Notice the dairy and the protein are the

groups with the most phosphorus. If we eat a larger portion in one serving we get more phosphorus. Plant proteins have phosphorus, one half cup of cooked pinto beans has about a 125 milligrams.

Now, the thing about dietary phosphorus is the amount that is absorbed differs based on the source. So phosphorus found naturally in foods like these is not all absorbed into the bloodstream. Maybe 60% to 70% of the phosphorus in this whole meal is absorbed into the blood. Now the difference is that phosphorus that is added to food is absorbed much more readily, 90% to 100%. The absorption may vary but overall, reducing protein intake still reduces phosphorus intake. And I will talk a little bit more about added phosphorus later and how to find it.

For the people on dialysis, phosphorus is still an issue. I mentioned that they need to eat more protein that means they get more phosphorus from the protein. And most people on dialysis need to take phosphate binders with each meal. These pills bind with the phosphorus in the gut and both are eliminated in the bowel movements. That means it's not getting into the blood. Phosphorus is a part of that abnormal mineral metabolism complication I mentioned. The bones may get soft. And the thing is for people who have this abnormal mineral metabolism; the phosphorus and the calcium may start depositing in the medial layer of the blood vessels, and within soft tissues, making them hard and stiff. So that's the reason that they have an increased risk for cardiovascular disease. There's precipitation of calcium and phosphorus in one of the layers of their blood vessels. It's not a good thing.

All right, now we're going to move on to potassium. And remember once the serum potassium level is elevated, they will need to limit foods rich in potassium. I have already told you about avoiding salt substitutes that contain potassium chloride. And when you look at the foods here, I bet you're noticing that the foods that are rich in protein are rich in potassium. The three ounces of deer meat have more potassium than the peaches, the veggies and the rice combined. Vegetable proteins like those in dry beans and peas are very rich in potassium. And a half-cup of cooked pinto beans has about the same amount as the cup of milk.

And people who go to hemodialysis, who go to the dialysis unit three times a week usually need to limit potassium, because potassium will build up between treatments depending on what they eat. And remember, they're supposed to eat more protein, so they will get more potassium from those protein foods. Those folks will need to eat low potassium fruits and vegetables, and of course still avoid salt substitutes. Limiting dairy and dry beans also limits potassium, so those are commonly suggested by the dialysis unit to decrease, beans and dairy.

For those of you who are wondering about the potassium. What's the big deal about potassium? This is what I tell people, if the potassium level gets too high in the blood, the person may develop cardiac arrhythmia. And what I tell them that means in English is that the heart may just stop beating. So that's an issue and the cardiac arrhythmias are when the person is very hyperkalemic. Their serum potassium might be 7 or 8. That's an incredibly dangerous level. We start getting worried when their potassium level might get to 5 or 5.2, just a little bit above the normal range for people with CKD. Now people who do peritoneal dialysis generally do not need to limit potassium. They dialyze every day and that removes the potassium every day, so it doesn't build up in the blood.

All right, now that you've seen the basic information about the food groups and perhaps heard more about dialysis than you want to know. Let's spend a little time on each nutrient. You've already heard that reducing sodium intake is one of the key dietary interventions for people with kidney disease. Decreasing sodium intake lowers blood pressure. Currently for most people with diabetes, the target blood pressure is less than 140 over 90, as I believe most of you know.

I've already told you that most of us eat more sodium than the recommended 2300 milligrams per day. Here are more graphs and data from the 2015 dietary guidelines. Those blue boxes show the recommended maximum limit for sodium. And notice those yellowish circles above the boxes, those show the average intake. All of the circles are above those boxes. You can see the graph on the left

shows the males, looks like lots of salt and the one on the right shows the females. Now what really shocked me was the children. Look at the children ages one to three years, they need no more than 1500 milligrams of sodium per day and on average they are having 2000 milligrams per day. So it looks like most of us over the age of one eat more than the recommended amount of sodium. So my public health message to you today is to know that most of us need to consider lowering our sodium intake.

Now, the more often we cook from scratch, the more likely we are eating less salt and sodium. When someone makes tortillas, they can add less salt to the dough. The baking powder in the tortillas has some sodium and that ingredient is not quite as easy to cut back on. So if we buy them from the store, there's more sodium than the ones that we may make at home. We do get some sodium from fresh cooked eggs; they do add a little sodium to the egg substitutes as a preservative. And that ready-to-eat salsa can be a major source. Now, if we make the salsa ourselves from fresh veggies, it is basically sodium free. Now I do admit I picked the ready-to-eat salsa with a lot of sodium just to show you the difference. And I don't make my own salsa from fresh veggies, so I have to read the nutrition facts label and make sure that the one that I buy is a little bit lower in sodium. And of course I want you to dip fresh veggies, instead of salted chips, in that salsa, although maybe not at breakfast.

Now some people tell me that they have to have meat at breakfast with their eggs. Here you can see examples in the table. Now any processed meat, not just the examples listed, have added salt. Processed meat includes deli meat, all the different sausages, ham, baloney, chopped ham, hot dogs, and many people have changed from pork bacon to turkey bacon. I don't care what kind of bacon it is. It has salt. And I believe it is a good idea to make any processed meat a special occasion food, meaning once in a while in small quantities. Now that luncheon meat at the bottom of that table, is the lunchmeat in a blue can that many people eat. I'm not supposed to say brand names here but you know that blue can that everybody eats. One can has over 4,700 milligrams of sodium and most people in my office laugh when they read the label from that blue can, because they may split one can for breakfast. That means they've reached their sodium limit for the day with just that one item.

Now onto some other breakfast foods, ones most of us don't think about is contributing to sodium intake. We need to check the nutrition fact labels on the cold cereal for serving size and sodium. And most cold cereals do have some salt added to them. The exceptions are the shredded wheat shown on the far left and puffed wheat and popped rice which are not shown. Many brand cereals do tend to be higher in sodium, and in reality, most people don't measure how much cereal they pour into their bowl. But most of the time people show me that they have more than three quarters of a cup or a cup of cereal. So just like having more carbs, having a bigger portion of cereal may mean having more sodium, depending on the type of cereal. And I know that hot cereal is not shown here. But if we make hot cereal, oatmeal or cream of wheat or cornmeal, we don't add salt, those are sodium free. We do have to check the instant oatmeals and other convenience-type instant hot cereals because they may have some added sodium. So make sure you check those label.

You've already heard, homemade usually means lower sodium. The lunch on the left is not high in sodium the total is less than 300 milligrams. The ground meat, that animal food has sodium in it naturally. You can see they add salt to yeast buns, yeast bread, whatever kind of yeast product that they make. Now notice there's no pickle or ketchup, or mustard or, special sauces on that burger. Those do add sodium. Now on the right; you can see that fast food double cheeseburger meal deal. It includes the bun, the cheese and the meat. We all know fast foods contribute to sodium intake so I don't believe this is news to you. I was concerned about the children. So look at that. The four nuggets in that kid's meal have 340 milligrams of sodium. Ten of those nuggets have 900 milligrams of sodium. That is almost half of what an adult needs for the entire day. So eating out usually means more sodium. If we are going to eat out, we can get a single burger without the cheese. We can hold the fries. Now, we can get a smaller portion of whatever it is. So eating out usually means a lot more sodium.

I've been telling you that cooking at home can be lower in sodium, and most of the time it is. You already know that meat has sodium in it naturally. Now fresh pork and poultry may have sodium additives as well. They do this to keep the items moist and tender. They may add broth that has salt in it. You may see fine print that reads something like 8% or 15% broth added, that means broth with salt. They may add sodium phosphate to these products. Now I challenge you to read the labels on fresh pork if you cook and eat pork and poultry if you cook and eat fresh poultry, or even frozen poultry. The turkeys can really have a lot of added salt. I was really surprised how hard it was to find pork and poultry that do not have these sodium additives. And of course those rotisserie chickens that we all love because they're so convenient, those are high in sodium as well. So if that is what we have to eat, we can eat a smaller amount because then we'll have less salt.

Commodity canned vegetables are pretty low in sodium as I had mentioned before, 140 milligrams of sodium in a half-a-cup. And those are lower in sodium than most of the brand names of canned vegetables. The commodity program also offers some no-added salt canned vegetables. Those would be a great choice. Remember, most people don't eat enough vegetables. Frozen vegetables are not shown here. They are pretty much sodium free, unless they are seasoned or have a sauce. You can lower the sodium in the canned vegetables by draining and rinsing them with water. That removes about 40% of the sodium. So if your patients have these regular store brand canned vegetables in their cupboards, we don't want them to throw those away, we want them to open the can, drain out the water, rinse them with some fresh water and heat them up, and they'll get veggies but there'll be less sodium in those veggies.

All right the second step was to eat the right amount and type of protein. If we reduce protein intake, we decrease nitrogen, sodium, phosphorus and potassium. I mentioned that people with abnormal urine albumin may benefit from eating less protein. Now in reality to some people, that may feel like they are eating a low protein diet. That 0.8 grams per kilogram body weight is not a lot of protein. People on dialysis may need 1 to 1.2 grams per kilogram body weight. People on peritoneal dialysis may need a little bit more because they dialyze every day and they lose some amino acids every day as a result.

And I've also seen, getting back to CKD, that people with lower GFRs may not want to eat much meat. It tastes bad to them. So we have to ask, "Are they eating? What are they eating? How much are they eating?" and we have to listen and we have to individualize this. There have been times when I've actually had to talk to someone with CKD and a low GFR, maybe 20 or 23, I have to encourage them to eat some kind of food with protein in it because they won't want to eat it. So we go from eating too much to not eating enough. So that's why it's really important to send them to the dietitian so that they can really work with them.

Now, proteins aren't bad, they are actually really rich in nutrients. We need protein to repair and maintain the protein in our body. What I tell people is that blood, skin, our organs, our muscles, those are some of the proteins we need to maintain on a daily basis. Hormones such insulin, and erythropoietin are made of protein. LDL and HDL are lipoproteins, basically lipids or fats carried on a protein. Now the thing is we can only make so much protein in a day. We do not store that extra protein as muscle. Don't we wish we did? If we were eating that big old steak and we got all these muscles and we didn't have to exercise, that would be nice. However, that is not what happens. If we eat a lot more protein than we need, we have extra leftovers to deal with. The extra amino acids are deaminated, meaning the nitrogen is removed and it has to be excreted into the urine. The calories in this protein, if they are in excess of the daily need are turned into fat.

Now you can see that proteins contribute -- you've heard that proteins contribute to phosphorus and potassium intakes. They also contain other nutrients. Red meats are an excellent source of iron and zinc. Pork is rich in some B vitamins. Dairy foods contribute to calcium intake. Plant proteins, such as beans and peas are some of the richest sources of dietary fiber we have. So it's not that proteins are bad, it's just -- if someone with CKD eats a little less protein, it may be helpful to their kidneys. Less



nitrogenous waste, less phosphorus, less potassium, that's good, their kidneys have to work less. So that's why it's really important for people with CKD to eat the right amount and type of protein. Now you've already seen this slide, it's just to remind you that foods from animal sources are rich in protein. The next slide will show how much certain -- how much other foods in these foods groups contribute to phosphorus and potassium intake.

Here, you can see protein, phosphorus, and potassium in some dairy foods and a few beverages. The other beverages are listed at the bottom and it includes a couple of milk substitutes and one type of bottled nutrition shake. The protein-fortified milk has dry milk powder added to it. So that means more protein, more phosphorus and more potassium in that type of milk. So someone with CKD should use plain milk, not the one with added protein. Greek yogurt always has more protein than the other types of yogurt. So they should be looking at that if they are eating Greek yogurt, you can see that they get more phosphorus and they do have potassium in it. You can see the chocolate nutrition shake at the bottom. That's one of those post-exercise recovery type beverages, the ones that people do take in after they exercise. You can see that there's some protein in it. And no matter where you get the chocolate, the chocolate contributes to potassium intake. That's just the way it is. So if we add chocolate to the milk at the top, there will be more potassium in that milk, the chocolate milk.

Now this is not news to you. You've heard that protein contributes to intakes of sodium and phosphorus and potassium. Canned meats and canned fish have added salt as the preservative. I have this delusion that when I open a can of tuna and I squeeze out all that water, and I put a little water in it and let it soak for a minute or so, that I get less sodium -- kind of like those beans or the vegetables. I'm not really sure it lowers it, but it makes me feel better. Now, not all meats can have that done. We couldn't do that canned lunchmeat that I talked about before; rinsing that would be kind of gross.

I have mentioned that pork may have additives to enhance the texture. You can see the pork chop with the added solution means more sodium, more phosphorus and more potassium. Again, I challenge you to read the labels and find the ones without the extra additives. Now egg whites are the exception to that general rule that proteins are rich in phosphorus. Two egg whites contribute about ten milligrams of phosphorus and I always recommend eggs to people with CKD. Egg white is egg albumin; that means we have all the ingredients to make our own albumin. Now the egg whites do have a little bit of potassium, but I have never seen anybody's potassium level get too high from eating egg whites. And I have seen serum albumin levels increase when people include one or two egg whites a day. And eggs seem to taste okay. You may remember that I mentioned that meat may taste bad to them. Most people seem to still tolerate the eggs. The other thing they like to eat is cottage cheese. That's another protein that is acceptable. Now that one can be a little bit high in salt. So if they can find a lower salt type cottage cheese that would be a good thing.

Now, I hope I had made the case that decreasing protein from excessive to the recommended intake will decrease phosphorus intake. I mentioned that phosphorus found naturally in food is not all absorbed. And that phosphorus added to food is readily absorbed. I believe most of you are aware that people with CKD should choose light colored soda pop if they are drinking soda pop. Any type of cola has phosphoric acid added to it. You just saw that the pork may have added sodium phosphate.

And you remember that phosphorus is not required to be listed on the nutrition facts label. However phosphorus that is added to the foods must be listed in the ingredients, so people need to check the ingredients to identify foods with added phosphorus. To find it, all you have to do is get out your magnifying glass. I'm getting a little old, so those ingredient lists are kind of small. Anyway, read the ingredients on the package and look for any word that says P-H-O-S. Here, you can see a sample from a canned beef stew that has phosphorus additives. You can also see a partial list of food items found to have phosphorus additives, prepared frozen foods, dry food mixes, and packaged meats are at the top of this list. Now the people who did this study found that if people were not aware of the phosphorus that was added to all of these food items, that phosphorus can contribute to over 700

milligrams of phosphorus per day. So it's really important for people with CKD and on dialysis to avoid those additives. This phosphorus is the stuff that can get stuck in their blood vessels.

The next step is to choose foods with the right amount of potassium. You've seen that foods rich in protein are rich in potassium. You've heard that the new label will list the amount of potassium per serving. And that's going to help lots of us. You've heard that the lower sodium items may use potassium chloride in place of sodium chloride. Those items include things like low sodium canned soups. You've heard that light salt, that salt substitute, is potassium chloride. Now this table shows some of the foods that my patients have had to limit to lower their serum potassium.

One lady was drinking two pots of brewed coffee everyday and her potassium was too high. She wasn't really eating vegetables or fruits. So we have to ask people more questions about what they eat and drink as far as potassium intake goes. Just handing them a list of high potassium fruits and vegetables may not be everything that they need to know.

You do know that vegetables contribute to potassium intake. This list was adapted from an NKDEP Handout, 200 milligrams or less is considered low and this may be helpful when you look at the new labels with the potassium content listed. Of course none of these foods actually have a label on them. You know, if we buy fresh peppers or broccoli, we're not going to have the label. And you know that all fruits have potassium and some have more than others. Cranberry juice is very low in potassium. So if your patient with a high potassium level has a low sugar, suggest that they use cranberry juice instead of orange juice to treat it. And of course the amount someone eats matters. If someone eats a large piece of watermelon, they're going to get more potassium. If someone eats half of a small banana, they get less potassium than if they eat the whole thing.

All right, so we're just going to look at a few examples of ingredients from labels. The diet cola has phosphoric acid and some additives with potassium. And you remember that that added phosphorus is almost all absorbed. And truly the potassium in this cola does not add up to much. I did have one patient stop drinking his diet sodas because he saw that potassium -- but it's not a lot. You can see canned iced tea can have that added P-H-O-S and some potassium. I was actually shocked at how much phosphorus there was in that iced tea. And the ready to eat low sodium soup on the right has potassium chloride in place of sodium chloride. You look at the sodium content. It looks great. However if you look at the potassium content, someone with CKD and high potassium levels should avoid this food. It was really hard actually to find the amounts of the phosphorus and potassium in these foods. This data or these data are from the websites of food companies.

All right, so briefly, to remind you that we need to choose foods with less salt and sodium. People with CKD need to eat the right amount and type of protein. People on dialysis will need to eat more protein. We want them to eat foods that are healthy for their heart. We want them all to choose foods with less phosphorus, particularly less added phosphorus. We want them to eat real food. And some people will need to limit the potassium intake if their potassium level is high when they have CKD.

Now all of you have access to these handouts at NKDEP.gov. There are tip sheets for each of the nutrients I talked about today, as well as, a label reading tip. According to the most recent CDC Vital Signs, that's the graphics I showed you at the very beginning, this is what the CDC says for anyone who has diabetes regardless of ethnicity. Get the urine and blood test to check for kidney disease. Work on managing blood pressure and blood sugars. Take the medications as prescribed. And here, you can see that they focus on the nutrition message, the sodium. You know a little bit more than what this shows, but we know that lowering sodium intake is a good first step. With that, I thank you and I look forward to questions.