Objectives

As a result of completing this training, you should be able to:

- Identify nutrition-related factors associated with changes in Chronic Kidney Disease risk.
- Describe the focal points of Medical Nutrition Therapy for Chronic Kidney Disease (CKD) and End Stage Renal Disease (ESRD).
- Educate patients with various nutrition-related tools for the management of kidney disease and complications.

Topics we will review today:

- Kidney Health
- Chronic Kidney Disease
- End Stage Renal Disease
Kidney Health
Eating Well for Kidney Health

- Water instead of sugar-sweetened beverages
- Plant-Based Diet low in red and processed meats
- Lower Sodium Intake
- No Smoking
- Healthy Weight Status and Physical Activity
- Diabetes and Hypertension Control

- Dietary risk factors
- Lifestyle risk factors
- Dietary protective factors
- Lifestyle protective factors
Plant-based Diet

- What is it?
- Patterns
- Benefits
- Foods and nutrients
- How to get started
Chronic Kidney Disease
New KDOQI (2020) guidelines on dietary patterns and food groups:

- “In adults with CKD 1-5 not on dialysis or post transplantation, with or without dyslipidemia, we suggest that prescribing a Mediterranean Diet may improve lipid profiles (2C).”

- “In adults with CKD 1-4, we suggest that prescribing increased fruit and vegetable intake may decrease body weight, blood pressure, and net acid production (NEAP) (2C).”

- “In adults with CKD 1-4, we suggest reducing net acid production (NEAP) through increased dietary intake of fruits and vegetables (2C) in order to reduce the rate of decline of residual kidney function.”
Chronic Kidney Disease
Calories

Considerations:

● Guideline: **25-35 kcal/kg** for CKD 1-5D (KDOQI 2020)
  ○ Affected by: age, sex, level of physical activity, body composition, weight status goals, CKD stage, and concurrent illness or presence of inflammation.

● Current weight status – miscalculations with under/overweight

● Nutritional Assessment
  ○ Dietary intake: Appetite, Quality of calories, Satiety, Taste alterations.
  ○ Body composition, body weight changes, anthropometric measurements, nutrition-focused physical findings, biochemical data.
  ○ Other factors to assess for CKD 3-5D or post transplantation: medication use, knowledge, beliefs, attitudes, behavior, access to food, depression, cognitive function (O).

Actual/adjusted/standard/ideal weight?

Use your clinical judgment

● Obesity management in CKD → Individualized

● Methods of dietary intake assessment:
  ○ 3-day food record is preferred for CKD 3-5D (2C)
  ○ Alternatives: 24-hour food recalls, food frequency questionnaires, nPCR for CKD 3-5 (O) or CKD 5D (2D).
Chronic Kidney Disease Protein

Considerations:

❖ Guideline for adults with CKD 3-5 who are metabolically stable (KDOQI 2020):
  ◦ 0.55-0.6 g/kg OR
  ◦ 0.28-0.43 g/kg + keto acid analogs
  ◦ with diabetes: 0.6-0.8 g/kg → for better glycemic control

❖ Sources/Type: Animal vs Plant
  ◦ “In adults with CKD 1-5D (1B) and post-transplant (OPINION), there is insufficient evidence to make conclusions about the effects of protein type (plant vs animal) on nutritional status, calcium or phosphorus levels, or the blood lipid profile.”

❖ Keto acid analogs: Nitrogen-free precursors of amino acids.

❖ Determinants:
  ▪ Cost
  ▪ Availability
  ▪ Patient preference
  ▪ Clinician judgment

❖ Protein restriction → Caloric restriction

❖ Protein-energy wasting → Supplementation
Protein – Patient Education

Protein
Tips for People with Chronic Kidney Disease (CKD)

What Is Protein?
Protein is in many foods that you eat. Protein can be found in foods from animals and from plants. Most diets include both types of protein. Protein provides the building blocks that help maintain and repair muscles, organs, and other parts of the body.

Animal-protein Foods
- Meat, such as pork, beef, chicken, turkey, duck
- Eggs
- Dairy products, such as milk, yogurt, cheese
- Fish

Plant-protein Foods

High Protein Foods
- Beans, peas, lentils
- Soy foods, such as soy milk, tofu
- Nuts and nut spreads, such as almond butter, peanut butter, sunflower seeds

Low Protein Foods
- Bread, tortillas
- Oatmeal, grits, cereals
- Pasta, noodles, rice
- Rice milk (not enriched)

Why Is Protein Important for People with CKD?
When your body uses protein, it produces waste. This waste is removed by the kidneys. Too much protein can make the kidneys work harder, so people with CKD may need to eat less protein.

Animal protein includes all of the building blocks that your body needs. Plant proteins need to be combined to get all of the building blocks that your body needs.

Protein

How Do I Eat the Right Amount of Protein?
Your dietitian will tell you what amount and types of protein are right for you. Here is some general information about protein types and serving sizes:
- Meat, poultry, and fish: A cooked portion should be about 2 to 3 ounces or about the size of a deck of cards.
- Dairy foods: A portion is ½ cup of milk or yogurt, or one slice of cheese.
- Plant proteins: Some plant proteins should make up the rest of the protein that you eat. A serving is:
  - ½ cup of cooked beans
  - ¼ cup of nuts
  - a slice of bread
  - ½ cup of cooked rice or noodles

What if I Am a Vegetarian?
There are many good sources of protein for people who do not eat meat or dairy foods. Talk to your dietitian about how to combine plant proteins to be sure you are getting all of the building blocks your body needs.

Notes:

For more information, visit www.niddk.nih.gov or call 1-800-860-8747.

This content is provided as a service of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), part of the National Institutes of Health. The NIDDK translation and dissemination reviews content to increase knowledge and understanding about health and disease among patient, public, and health-care providers. Created primarily for the NIDDK Information Needs Registry and other user groups.
Chronic Kidney Disease
Sodium

Considerations:

- Average intake for Americans: 3393 mg/d
- Guideline: <2300 mg/d (KDOQI 2020)
- Examples of significance in CKD: volume control, BP management, effectiveness of RAAS blockers, thirst management, proteinuria and albuminuria decreases
- Sources
- Teaching tools
Chronic Kidney Disease

Sodium

Added in home cooking/preparation
- 6.00%
- 5.00%
- <1.00%

From other sources like tap water
- 14.00%

From processed and restaurant foods
- 71.00%

Naturally occurring
- 5.00%

Sodium – Patient Education

What Is Sodium?
Sodium is a part of salt. Sodium is found in many canned, packaged, and “fast” foods. It is also found in many condiments, seasonings, and meats.

Why Is Sodium Important for People with CKD?
Eating less sodium helps lower blood pressure and may slow down CKD. Talk with your provider about the right blood pressure goal for you.

One of the kidneys’ important jobs is to filter sodium out of the body and into the urine. Damaged kidneys cannot filter as well as healthy kidneys can. This can cause sodium to stay in your body and make your blood pressure go up.

How Much Sodium Should I Eat Every Day?
Most people need to eat less sodium than they are eating. Aim for less than 1,500 milligrams of sodium each day. Much of the sodium you eat does not come from a salt shaker. Sodium is added to the prepared foods you buy at the supermarket or at restaurants.

Foods Lower in Sodium
- Fresh or frozen fruits and vegetables
- Rice, noodles
- Cooked cereal without added salt
- Fresh meat, poultry, seafood
- Low-fat, low-sodium cheese
- Unsalted nuts
- Low- and reduced-sodium frozen dinners, peanut butter, salad dressings
- Air-popped popcorn

Foods Higher in Sodium
- Bacon, corned beef, ham, hot dogs, lunchmeat meat, sausage
- Bouillon, canned, and instant soups
- Baked mixes, like hamburger meals and pancake mix
- Canned beans, chicken, fish, and meat
- Canned tomato products, including juice
- Canned and pickled vegetables, vegetable juice
- Cottage cheese
- Frozen meals
- Frozen vegetables with sauce
- Olives, pickles, relish
- Pretzels, chips, crackers, salted nuts
- Salt and salt seasonings, like garlic salt
- Seasoning mix and sauce packets
- Soy sauce
- Salad dressings, bottled sauces, marinades
- Some ready-to-eat cereals, baked goods, breads
- Ready-to-eat boxed meals and side dishes

How Do I Lower the Sodium in My Diet?
- Buy fresh foods more often.
- Cook foods from scratch, instead of eating prepared foods, “fast” foods, frozen dinners, and canned foods that are higher in sodium.
- Use spices, herbs, and sodium-free seasonings in place of salt. Check with your health care provider about using salt substitutes.
- Rinse canned vegetables, beans, meats, and fish with water to remove extra sodium.
Sodium – Patient Education (continued)

Always read the Nutrition Facts label to compare foods. Choose foods with the lowest Percent Daily Value (%DV) for sodium. The %DV lets you see if a food is high or low in sodium. 5% or less is low and 20% or more is high.

- Check the label on fresh meats and poultry. Sodium additives can be used to make meat last longer.
- Look for foods labeled sodium free, salt free, very low sodium, low sodium, reduced or less sodium, light in sodium, no salt added, unsalted, and lightly salted.

Check the Ingredient Label for Added Sodium

- Salt (sodium chloride)
- Monosodium glutamate or MSG
- Baking soda (sodium bicarbonate)
- Baking powder
- Sodium nitrate
- Sodium sulfate
- Sodium phosphate
- Sodium alginate
- Sodium benzoate
- Sodium hydroxide
- Sodium propionate

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Chronic Kidney Disease — Potassium

**Considerations:**

- **When is modification appropriate?**
  - In the presence of hypo/hyperkalemia → Identify contributing factors

- **Guideline: Individualize (KDOQI 2020)**
  - Previously: 2000-3000 mg/d or 2000-4000 mg/d

- **Sources:** Animals, Plants, Additives, Salt substitutes

- **Bioavailability** – seems to be lower in plant-based diets

- **Food preparation can alter potassium content:**
  - Rinse, peel, cut in small pieces, boil for 10’, drain, boil for 10’, drain, cook.

- **Binders**

**Effects of Hypokalemia:**

- Muscle weakness, twitching, cramps, paralysis
- Cardiac arrhythmias
- Lower insulin production, Glucose intolerance

**Effects of Hyperkalemia:**

- Cardiac arrhythmia or cardiac arrest
- Muscle weakness
Potassium – Patient Education

Potassium
Tips for People with Chronic Kidney Disease (CKD)

What Is Potassium?
Potassium is a mineral that helps your nerves and muscles work the right way.

Why Is Potassium Important for People with CKD?
In some people with CKD, the kidneys may not remove extra potassium from the blood. Some medicines also can raise your potassium level. Your food choices can help you lower your potassium level.

How Do I Know My Potassium Level Is High?
People often do not feel any different when their potassium is high. Your health care provider will check the level of potassium in your blood and the medicines you take. The level of potassium in your blood should be between 3.5 to 5.0.*

How Do I Lower Potassium in My Diet?
- Eat smaller portions of foods high in potassium at meals and for snacks: meat, poultry, fish, beans, dairy, and nuts.
- Use spices and herbs in cooking and at the table. Salt substitutes often contain potassium and should not be used.
- Potassium chloride can be used in place of salt in some packaged foods, like canned soups and tomato products. Limit foods with potassium chloride on the ingredient list.
- Drain canned fruits and vegetables before eating.
- If you have diabetes, choose apple, grape, or cranberry juice when your blood sugar goes down.

<table>
<thead>
<tr>
<th>Eat These Foods</th>
<th>Instead of These Foods</th>
</tr>
</thead>
<tbody>
<tr>
<td>White rice</td>
<td>Brown and wild rice</td>
</tr>
<tr>
<td>White bread and pasta</td>
<td>Whole wheat bread and pasta</td>
</tr>
<tr>
<td>Cooked rice and wheat cereals</td>
<td>Bran cereals</td>
</tr>
<tr>
<td>Rice milk (not enriched)</td>
<td>Cow’s milk</td>
</tr>
</tbody>
</table>

*Normal ranges may vary.

How Do I Lower Potassium in My Diet? (continued)
- Choose fruits and vegetables that are lower in potassium. Have very small portions of foods that are higher in potassium, like one slice of tomato on a sandwich, a few slices of bananas on cereal, or half of an orange.

Fruits and Vegetables Lower in Potassium (200 mg or less*):

<table>
<thead>
<tr>
<th>FRUITS</th>
<th>VEGETABLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>Eggplant</td>
</tr>
<tr>
<td>Apple</td>
<td>Green beans</td>
</tr>
<tr>
<td>Apple</td>
<td>Kale</td>
</tr>
<tr>
<td>Apple</td>
<td>Lattuce</td>
</tr>
<tr>
<td>Apple</td>
<td>Mushrooms (fresh)</td>
</tr>
<tr>
<td>Apple</td>
<td>Okra</td>
</tr>
<tr>
<td>Apple</td>
<td>Summer squash (cooked)</td>
</tr>
<tr>
<td>Pears</td>
<td></td>
</tr>
<tr>
<td>Peaches</td>
<td></td>
</tr>
<tr>
<td>Plums</td>
<td></td>
</tr>
<tr>
<td>Pineapple</td>
<td></td>
</tr>
<tr>
<td>Rhubarb</td>
<td></td>
</tr>
<tr>
<td>Tangerines</td>
<td></td>
</tr>
<tr>
<td>Watermelon</td>
<td></td>
</tr>
</tbody>
</table>

*Potassium level is based on one serving. One serving of fruit is one small piece; ½ cup fresh, canned, or cooked fruits is cup dried fruit; or ½ cup juice. One serving of vegetables is ½ cup fresh or cooked vegetables, 1 cup raw leafy vegetables, or ½ cup juice.
Potassium – Patient Education (continued)

<table>
<thead>
<tr>
<th>Fruits and Vegetables Higher in Potassium (More than 200 mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FRUITS</strong></td>
</tr>
<tr>
<td>Apricots (fresh)</td>
</tr>
<tr>
<td>Bananas</td>
</tr>
<tr>
<td>Cantaloupe</td>
</tr>
<tr>
<td>Dates</td>
</tr>
<tr>
<td>Nectarines</td>
</tr>
<tr>
<td>Kiwi</td>
</tr>
<tr>
<td>Prunes/prune juice</td>
</tr>
<tr>
<td>Oranges/orange juice</td>
</tr>
<tr>
<td>Raisins</td>
</tr>
<tr>
<td><strong>VEGETABLES</strong></td>
</tr>
<tr>
<td>Acorn and butternut squash</td>
</tr>
<tr>
<td>Avocado</td>
</tr>
<tr>
<td>Baked beans</td>
</tr>
<tr>
<td>Beet and other greens</td>
</tr>
<tr>
<td>Broccoli (cooked)</td>
</tr>
<tr>
<td>Brussel sprouts (cooked)</td>
</tr>
<tr>
<td>Chard</td>
</tr>
<tr>
<td>Chile peppers</td>
</tr>
<tr>
<td>Mushrooms (cooked)</td>
</tr>
<tr>
<td>Potatoes</td>
</tr>
<tr>
<td>Pumpkin</td>
</tr>
<tr>
<td>Spinach (cooked)</td>
</tr>
<tr>
<td>Split peas, lentils, beans</td>
</tr>
<tr>
<td>Sweet potatoes, yams, Vegetable juice</td>
</tr>
<tr>
<td>Tomatoes/tomato juice/tomato sauce</td>
</tr>
</tbody>
</table>

*Potassium level is based on one serving. One serving of fruit is one small piece; 1/2 cup fresh, canned, or cooked fruit; 1/2 cup dried fruit; or 1/2 cup juice. One serving of vegetables is 1/2 cup fresh or cooked vegetables, 1 cup raw leafy vegetables, or 1/2 cup juice.*

For more information, visit www.niddk.nih.gov or call 1-800-866-8747.
Lower Potassium Fruits

Less than 200mg per 1/2 cup fresh, canned, or 1 small fruit (unless otherwise listed)

- Apple
- Applesauce
- Apricot, fresh
- Berries
- Cherries
- Clementine
- Dried apples, blueberries, cherries, or cranberries (1/4 cup)
- Fruit cup; any fruit, fruit cocktail
- Grapes
- Lemon or lime
- Pear
- Pineapple
- Plum
- Tangerine or mandarin orange
- Watermelon (1 cup)

Juices (1/2 cup)

- Apple juice
- Cranberry juice
- Grape juice
- Lemon or lime juice
- Pineapple juice
- Nectars: apricot, mango, papaya, peach, or pear

Foods listed are based on USDA Nutrient Database averages.
Higher Potassium Fruits

More than 200mg per 1/2 cup fresh, canned, or 1 small fruit (unless otherwise listed)

- Avocado
- Banana
- Cantaloupe
- Dried fruit: raisins, dates, figs, apricots, bananas, peaches, pears, or prunes (1/4 cup)
- Honeydew
- Kiwi
- Mango

Nectarine
Orange
Pomegranate juice
Prune juice
Orange juice

Juices (1/2 cup)

Foods listed are based on USDA Nutrient Database averages.
Potassium – Patient Education (continued)

Lower Potassium Vegetables

Less than 200mg per 1 cup leafy greens or 1/2 cup fresh, cooked, or canned vegetable (unless otherwise listed)

- Alfalfa sprouts
- Asparagus
- Bamboo shoots (canned)
- Bean sprouts
- Beets (canned)
- Broccoli
- Cabbage
- Carrots
- Cauliflower
- Celery
- Corn (1/2 cup)
- Cucumber
- Eggplant
- Garbanzo beans/chickpeas (canned)
- Green or wax beans
- Greens: collard, mustard, or turnip
- Jicama/yambean
- Kale
- Lettuce: all types
- Mushrooms (raw or canned)
- Okra
- Onion or leek
- Peas: green, sugar snap, or snow peas
- Peppers: green, red, or yellow
- Radish
- Rhubarb
- Spinach (raw)
- Spaghetti squash
- Cherry tomatoes
- Turnip
- Yellow summer squash
- Water chestnuts (canned)

Foods listed are based on USDA Nutrient Database averages.
Potassium – Patient Education (continued)

Higher Potassium Vegetables

More than 200mg per 1 cup leafy greens or 1/2 cup fresh, cooked, or canned vegetable
(unless otherwise listed)

- Acorn squash
- Artichoke
- Beans: such as black, kidney, pinto, or white beans
- Beet greens
- Brussel sprouts
- Butternut squash
- Chard (cooked)
- Chinese cabbage (cooked)
- Corn (1 ear)
- Edamame
- Hubbard squash
- Kohlrabi
- Lentils
- Parsnips
- Potatoes
- Pumpkin
- Rutabaga
- Spinach (cooked)
- Sweet potatoes
- Tomato
- Tomato sauce or tomato paste
- Yams
- Zucchini

Juices (1/2 cup)
- Carrot
- Tomato
- Vegetable

Foods listed are based on USDA Nutrient Database averages.

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Chronic Kidney Disease — Phosphorus

Considerations:

- **When is adjustment appropriate?**
  - Elevated serum phosphate levels, PTH above target range (KDOQI 2003)

- **Guideline: Adjust dietary intake (KDOQI 2020)**
  - Previously: 800-1000 mg/d (KDOQI 2003)

- **Sources: Animals, Plants, Additives**
  - Protein restriction → Phosphorus reduction

- **Bioavailability: Additives > Animals > Plants**
  - Look for “PHOS” in ingredients list

- **Binders**

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Dysregulation of phosphate metabolism:

- **Cardiovascular Disease**
- **Mineral & Bone Disorder**
  - Abnormal metabolism of calcium, phosphorus, PTH, vitamin D.
  - Impaired bone growth, fractures.
  - Vascular and soft tissue calcification.
Phosphorus – Patient Education

Phosphorus
Tips for People with Chronic Kidney Disease (CKD)

What is Phosphorus?
Phosphorus is a mineral that helps keep your bones healthy. It also helps keep blood vessels and muscles working. Phosphorus is found naturally in foods rich in protein, such as meat, poultry, fish, nuts, beans, and dairy products. Phosphorus is also added to many processed foods.

Why is Phosphorus Important for People with CKD?
When you have CKD, phosphorus can build up in your blood, making your bones thin, weak, and more likely to break. It can cause itchy skin, and bone and joint pain.

Most people with CKD need to eat foods with less phosphorus than they are used to eating.

Your health care provider may talk to you about taking a phosphate binder with meals to lower the amount of phosphorus in your blood.

Foods Lower in Phosphorus
- Fresh fruits and vegetables
- Rice milk (not enriched)
- Beans, pasta, not
- Corn and rice cereals
- Light-colored soda pop
- Home-brewed iced tea

Foods Higher in Phosphorus
- Meat, poultry, fish
- Dairy foods
- Beans, lentils, nuts
- Bran cereals and oatmeal
- Cereal
- Some bottled soda tea

How Do I Lower Phosphorus in My Diet?
- Know what foods are lower in phosphorus (see page 1).
- Eat smaller portions of foods high in protein at meals and for snacks.
- Meat, poultry, and fish: A cooked portion should be about 2 to 3 ounces or about the size of a deck of cards.
- Dairy foods: Keep your portions to ½ cup of milk or yogurt, or one slice of cheese.
- Beans and lentils: Portions should be about ½ cup of cooked beans or lentils.
- Nuts: Keep your portions to about ¼ cup of nuts.
- Eat fresh fruits and vegetables—if you have not been told to watch your potassium.
- Many packaged foods have added phosphorus. Look for phosphorus, or for word with PHOS, on ingredient labels, like the one below. Choose a different food when the ingredient list has PHOS on the label.

Ingredients: Potatoes, Vegetable Oil (Partially Hydrogenated Soybean Oil), Salt, Dextrose, Dried Hydrogen Phosphatize...

Examples of Foods that May Have Added Phosphorus
- Sausage and frozen uncooked meats and poultry
- Chicken nuggets
- Baking mixes

- Frozen baked goods
- Cereal, cereal bars
- Instant puddings and sauces

*Ask the butcher to show you which fresh meats do not have added phosphorus.

For more information, visit www.cdc.gov or call 1-800-869-8747.
Phosphorus – Patient Education (continued)

Making Sense of Phosphorus

Phosphorus is an important mineral that your body uses for energy and overall health. What you eat and drink can affect the amount of phosphorus in your blood. To lower your risk of heart disease, weak bones and death, choose foods and drinks with natural phosphorus and avoid phosphate additives.

Phosphorus in Foods and Drinks

Natural Phosphorus

Phosphorus occurs naturally in meats, dairy, greens, and vegetables. About half of the natural phosphorus is absorbed.

Added Phosphorus

Phosphorous is also added to many foods and drinks as a preservative. Nearly all of added phosphorus is absorbed. Foods and drinks with added phosphorus can be more harmful to your health than those with natural phosphorus.

Did You Know?

Even if phosphorus is not listed on the Nutrition Facts, the food or drink may still contain added phosphorus. Read the ingredient list to find out.

What Foods Are Highest in Added Phosphorus?

The foods with the most added phosphorus are usually processed foods, packaged foods, and fast food.

Higher Phosphorus Protein

- Processed meats like bacon, ham, hot dogs, chicken nuggets, or strips, bologna, salami, or sausage
- Breaded or fried meats, chicken, fish, or seafood
- Organ meats, such as kidney or liver

Higher Phosphorus Dairy

- Non-dairy creamers, enriched almond or rice milk
- Processed cheese, such as American
- Processed cheese spreads and dips, such as Velveeta®, Ched’Whip™, fat-free cream cheese or sour cream
- Ice cream, pudding, yogurt, or frozen yogurt

Higher Phosphorus Fast Food

- Grilled or fried chicken, including nuggets, sandwiches, strips, or wings
- Pizza, tacos, or hot dogs
- Any sandwiches with ham, American cheese, or bacon
- French fries, other fried potatoes, biscuits, or macaroni & cheese

Better Choices

- All-natural chicken, turkey, fish or seafood
- Lean and fresh beef, lamb, pork, veal, or wild game
- Cottage cheese with no “phos” ingredients
- Whole eggs or egg whites
- Tofu, beans, lentils

- Unenriched almond- or rice milk
- A small amount of natural cheese, such as Brie, Feta, Swiss, cheddar, or mozzarella
- Regular or low-fat cream cheese, Neufchatel, or sour cream
- Sherbet, sorbet, fruit ice, or popsicles

Better Choices

- Fish fillet sandwich (no cheese)
- Hamburger (no cheese)
- Tuna or egg salad sandwich (no cheese)
- Side salad without cheese
- Celery sticks, apple slices, applesauce, grapes, or carrots

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Phosphorus – Patient Education (continued)

Tips to Limit Phosphorus

**do less**
- Limit processed meats and chicken.
- Limit dairy products such as cheese, ice cream, and milk to the amount recommended by your RDN, and avoid processed or imitation cheeses.
- Limit fast food and restaurant foods since many are high in added phosphorus.

**do more**
- Select fresh meats and home-cooking instead of convenience foods or packaged foods.
- Choose soft drinks or other bottled beverages without “phos” in the ingredients.
- Read the list of ingredients on all packaged foods, and limit foods with “phos” ingredients.

Ask your RDN for tips making healthier choices.

goal summary

I plan to:
1.
2.
3.

Inclusion of these materials is not a representation endorsement by AAF, the Academy of Nutrition and Dietetics, or its Foundation. Additional Patient-related resources can be found at: www.nutrition.org

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Chronic Kidney Disease
Vitamins – Minerals – Supplements

Guidelines (KDOQI 2020):

• CKD 3-5D or post transplantation (PT): encourage diet that meets the RDA for all vitamins and minerals (O).

• CKD 3-5D or PT: assess dietary vitamin intake periodically, consider multivitamin for inadequate intake (O).

• CKD 3-5D or PT with hyperhomocysteinemia: no routine supplementation of folate.

• CKD 1-5D (2B) or PT (O) with folate/vitamin B12 deficiency/insufficiency: prescribe folate, vitamin B12, and/or B complex supplement.

• CKD 1-5D or PT and at risk of vitamin C deficiency: supplement to meet RDA (90 mg/d for men and 75 mg/d for women (O). *(+35 mg/d for smokers)

• CKD 3-4 w/o active vitamin D analogs: prescribe 800-1,000 mg/d total elemental calcium intake (from diet, supplements, binders) (2B).

• CKD 1-5D (2C) or PT (O) with 25-hydroxyvitamin D (25(OH)D) deficiency/insufficiency: prescribe cholecalciferol or ergocalciferol.

• CKD 1-5 with nephrotic-range proteinuria: consider supplementation of cholecalciferol, ergocalciferol, or other 25(OH)D precursors (O).

• CKD 1-5D or PT with anticoagulants- inhibitors of vitamin K: avoid vitamin K supplements (O).

• CKD 1-5D: do not routinely supplement selenium or zinc (2C).

• CKD 3-5D: reduce net acid production (NEAP) through increased bicarbonate or a citric acid/sodium citrate solution supplementation (1C).

• CKD 3-5: prescribe ~2 g/d LC n-3 PUFA to lower serum triglyceride levels (2C).
### Food Groups

#### Fruits
- Sodium: Small amount
- Potassium: Varies
  - Canned < Frozen < Fresh
  - Whole fruit < Juice < Dried fruit
- Phosphorus: Small amount
- Other: Base-producing, can help correct acidosis, Fiber can help with gut microbiota

#### Vegetables
- Sodium: If canned → NO SALT ADDED
  - Pickling brine often has salt
- Potassium: Content varies
  - Canned < Frozen < Fresh
  - Whole vegetable < Juice
  - Food prep affects content
- Phosphorus: Content varies
  - Legumes highest
- Other: Base-producing, can help correct acidosis, Fiber can help with gut microbiota

#### Grains
- Sodium: Content varies, bread in top 10 sources
- Potassium: Higher in whole grains
- Phosphorus: Higher in whole grains, bran, enriched grains, more bioavailable in leavened vs unleavened bread
- Other: Fiber can help with gut microbiota

#### Dairy
- Sodium: Content varies, cheese in top 10 sources
- Potassium: Varies
- Phosphorus: Usually high
- Other: Cheese has high potential renal acid load

#### Protein
- Sodium: Content varies – higher in processed animal sources
- Potassium: Varies
- Phosphorus: Content varies – higher in processed animal sources
- Other: Animal protein → dietary acidosis

#### Fats & Condiments
- Sodium: Use garlic powder instead of garlic salt, sauces are high
- Potassium: Cream of tartar and many sauces are high
- Phosphorus: Replace baking powder with baking soda + acid (e.g. vinegar)
- Other: Sodium bicarbonate can help correct acidosis, Choose heart-healthy fats
CKD Algorithm


All Diabetes Treatment Algorithms here: https://www.ihs.gov/diabetes/clinician-resources/dm-treatment-algorithms/
End Stage Kidney Disease
Hemodialysis
Hemodialysis
Focal points

Calories
25-35 kcal/kg

Protein
1.0-1.2 g/kg

Sodium
<2300 mg

Potassium
Individualize

Phosphorus
Individualize

Fluids
Usually 1000 cc/1L + urine output

Iron
Supplement in anemia, deficiency

Calcium
Adjust to avoid overload
Fluid Restriction

What counts as fluid?

Water
Ice cubes, ice chips

Other beverages
Coffee, tea, alcohol, juices, soft drinks, nutritional drinks, smoothies

Dairy
Yogurt, ice cream, sherbet, milk, liquid creamer, pudding, custard, frozen yogurt

Other foods
Gelatin, gravy, popsicles, watermelon, soups, broth, syrups, snow cones, sorbet

Sodium restriction ➔ Better thirst management.
Glycemic control ➔ Prevention of hyperglycemia-induced thirst.

Fluid restriction tips for patients:
• Visualize daily fluid allowance.
  • Space out fluid intake throughout the day.
• Use smaller glasses/cups.
• Maintain mouth moisture with:
  • lip balms
  • mouth rinses
  • sugar-free gum/hard candy
  • frozen fruit/lemon wedges
• Maintain good oral health.
• Keep beverages cold with reusable ice cubes.
• Take medications with meals/applesauce.
Fluid Intake and Urine Output Diary

Typically used for urinary incontinence.

- Can be used to monitor fluid intake and urine output.

Available here:

Peritoneal Dialysis

![Diagram of Peritoneal Dialysis]

- **Dialysate**
- **Catheter**
- **Abdominal cavity**
- **Peritoneum**
Peritoneal Dialysis
Focal points

- **Calories**: 25-35 kcal/kg
- **Protein**: 1.0-1.2 g/kg
- **Sodium**: <2300 mg
- **Potassium**: May need restriction – Assess labs & Individualize
- **Phosphorus**: Individualize
- **Iron**: Supplement in anemia, deficiency
- **Fluids**: Usually 1000 cc/1L + urine output
- **Calcium**: Adjust to avoid overload
Kidney Transplantation

Considerations:

- Phase of transplant
- Kidney function after transplant
- Immunosuppressant medications
  - Food safety
- Caloric intake
  - Prevent weight gain after transplant
- Protein intake
  - May need to be higher right after the surgery.
  - Check kidney function to determine optimal intake.
- Sodium intake
  - May require restriction
Conservative Management

Goals:

- Deceleration of loss of kidney function.
- Symptom management.
- Comorbidity management.
- Preservation/optimization of quality of life.
- Creation of crisis management plan with the patient and caretakers.
Trainings in CKD Management

- Chronic Kidney Disease Nutrition Management Training Program (5 modules)

- Helping Diabetes Educators Care for Patients With Kidney Disease (4 modules)

- Individualizing Care for People with Progressive Kidney Disease (webinar)

- Answers to the Most Common Questions About Kidney Disease (webinar)
  [https://www.ihs.gov/diabetes/training/cmece-online-edu.recorded-cme-ce-webinars/clinical/](https://www.ihs.gov/diabetes/training/cmece-online-edu.recorded-cme-ce-webinars/clinical/)
Additional Resources for Educators


Kidney-friendly recipes:


- National Kidney Foundation – Resources for Plant-Based Eating: [https://www.kidney.org/atoz/content/plant-based](https://www.kidney.org/atoz/content/plant-based)


- Kidney Foundation of Canada – Kidney Community Kitchen Recipes: [https://www.kidneycommunitykitchen.ca/kkcookbook/recipes/](https://www.kidneycommunitykitchen.ca/kkcookbook/recipes/)


- Renal Diet HQ – Recipes: [https://www.renaldiethq.com/zydrecipes/zestify-diet-recipes/](https://www.renaldiethq.com/zydrecipes/zestify-diet-recipes/)
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Questions?
Thank You!

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