Phosphorus and the Kidney Disease Diet: Become a Phosphorus Detective - *Holiday Edition*

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Thanks to our speaker!

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- Kidney Transplant Dietitian at the George Washington University Hospital
- Passionate about educating the public about the importance of early detection of kidney disease and eating a healthy diet
Objectives

Managing your phosphorus can be overwhelming, especially during the holiday season!

Today we will look at:

- what is phosphorus, why it is important
- what can happen if your phosphorus is out of range (high or low)
- how you can manage your phosphorus with kidney disease / on dialysis
- tips for managing your phosphorus during the holiday season
Your Kidneys

• Each kidney has over 1 million nephrons. When your kidneys are working correctly, the nephron is what filters your blood.

• The nephron is responsible for resorption of water, and the balancing of electrolytes – including phosphorus.

• Nephrons filter approximately 1600 L/day of blood and form about 180 L of ultrafiltrate (which contains fluid & electrolytes), of which most is goes back into your blood supply and the rest is removed as urine, around 1.5 L as waste.
Dialysis

Blood from your body enters the machine and flows past one side of a membrane. The membrane is a barrier that keeps blood and dialysate from mixing, but lets waste through.

Dialysate is a special fluid that pulls waste from blood. It flows past the other side of the membrane. Waste, extra fluid, and chemicals move through the membrane into the dialysate.

Clean, filtered blood goes back to your body.
Phosphorus and Dialysis

• Phosphorus in our food/blood are in the form of phosphates.
• Phosphates are made up of multiple atoms. Because of that, it is a large molecule and harder to remove through dialysis.
• The best way to manage your phosphorus levels it to limit how much phosphorus you take in.
Phosphorus

• Phosphorus is vital, or necessary, to the production and storage of energy in the human body. It is a main component in ATP (Adenosine Triphosphate). It is widely available in food, and is important to bone building and health.
• About 85% to 90% of total body phosphorus is found in bones and teeth.
• Phosphorus is also an important part of our body’s fats, proteins, and cell membranes.
**Phosphorus**

- High levels of phosphorus in your blood are not **IMMEDIATELY** harmful but can cause **SEVERE** long term damage.
- The recommended range for dialysis patients is 3.0 to 5.5 mg/dL.
- The following slides discuss what happens when your phosphorus is high **BUT** low phos can also be cause for **immediate** concern:
  - Although rare, a severe drop in serum phosphorus 1.5 mg/dL or below, can cause neuromuscular disturbances, coma and death due to impaired cellular metabolism.
High Phosphorus (Hyperphosphatemia)

• Phosphorus is not removed very well during dialysis.

• Chronic high phosphorus can lead to:
  – Bone disease – weak and brittle bones
  – Calcification of the arteries, veins, eyes, and muscles
    (Remember our organs are muscles too)

• Phosphorus + Calcium = Bone
Bone Disease

- High phosphorus (hyperphosphatemia) can lead to weak and brittle bones.
  - Too much phosphorus build-up in the blood causes calcium to be pulled from the bones, making them weak and brittle.
  - Kidney disease can cause problems with the way the body uses vitamin D, causing the bones to become weak.
  - Bone disease usually does not show symptoms until it has become very bad.
Calciphylaxis

• In severe cases, high phosphorus can cause calciphications that can lead to calciphylaxis.

• **Calciphications**: when calcium & phosphorus build up in the blood vessels and in the body’s soft tissue and skin.

• **Calciphylaxis**: When the calciphication build lead to painful skin ulcers (wounds). Which may cause serious infections that can lead to death.

• Skin ulcers due to calciphylaxis is the end-stage result if PTH, calcium, phosphorus, and vitamin D are not well managed.
Calciphylaxis
Calciphyaxis

- Calciphyaxis is the end result of long term high phosphorus, calcium, and PTH.

- You can make sure this doesn’t happen to you!
  - By eating foods lower in phosphorus
  - AND making sure you take your phosphorus binders every time you eat and drink!
Phosphorus in your Diet

• Limiting foods high in phosphorus can help keep phosphorus within normal limits. (3.0-5.5mg/dL)
• Phosphorus is highly absorbable and is found in most foods. A good rule of thumb is “Where there is protein there is phosphorus”.

  – High phos: Meats*, whole grains*, dairy*, beans*, and nuts* (*foods high in phos and K+)
  – Low/no phos: Fruits and vegetables
Phosphorus in your Diet

- Phosphorus is found in MANY processed foods. You need to be very careful when buying any food in a package, because of the addition of.....

PHOSPHORUS ADDITIVES
Phosphorus Detective

• Phosphorus is not included on the nutrition label like calories, grams of fat, sodium, and now potassium!

• To become a phosphorus detective you have to know what your are looking for and where to find it.
Phosphorus Detective

• If you are buying food in a box or bag there is a good chance it could have added phosphorus.

• All packaged foods must have a list of ingredients.

• Ingredients are listed in order of amount.
  – Ingredients at the beginning of the list have higher amounts than ingredients towards the end of the list.

• If the ingredient has **PHOS** in the word that means it has added phosphorus!!!!
Phosphorus Detective

- Phosphoric Acid
- Sodium Polyphosphate
- Pyrophosphate
- Sodium Tripolyphosphate
- Polyphosphate
- Tricalcium Phosphate
- Hexameta phosphate
- Trisodium Phosphate
- Dicalcium Phosphate
- Sodium Phosphate
- Monocalcium Phosphate
- Tetrasodium Phosphate
- Aluminum Phosphate
- Ferric Phosphate
## Foods with Added Phosphorus

<table>
<thead>
<tr>
<th>Well Known</th>
<th>Less Well Known</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pancake/Biscuit mixes</td>
<td>White rice</td>
</tr>
<tr>
<td>Fast food</td>
<td>White bread / many bread products</td>
</tr>
<tr>
<td>Frozen dinners</td>
<td>Non-dairy creamer</td>
</tr>
<tr>
<td>Lunch meats</td>
<td>Cool whip (and the such)</td>
</tr>
<tr>
<td>Hot dogs</td>
<td>Prepackaged meats</td>
</tr>
<tr>
<td>Breading mixes</td>
<td>Flour tortillas</td>
</tr>
<tr>
<td>Hot dog &amp; Hamburger buns</td>
<td>Rice/soy milk</td>
</tr>
<tr>
<td></td>
<td>Jell-O</td>
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<tr>
<td></td>
<td>Tums</td>
</tr>
<tr>
<td></td>
<td>Albacore canned tuna</td>
</tr>
</tbody>
</table>
Phosphorus Detective

• Phosphorus additives are very damaging to people on dialysis.
  — Our body absorbs 100% of added phosphorus.
• Our body does NOT absorb 100% of phosphorus that is naturally found in food.
• Foods that have high natural levels of phosphorus such as: dairy, meat, whole grains, beans and nuts are considered better options (as long as, your potassium is in with in normal limits).
Phosphorus Detective

- Our body absorbs:
  - 100% of phosphorus additives
  - 80% of natural phos in dairy
  - 60% of natural phos in meat and nuts
  - 40% of natural phos in grains
Phosphorus

• Your body needs phosphorus to keep your bones and teeth healthy, keep a high energy level, and sustain many cellular functions.

• BUT you need to keep your phosphorus in the “Sweet Spot” – 3.0-5.5mg/dL
Phosphorus Binders

- Besides limiting how much phosphorus you eat you may need to take a phosphorus binder.
- The phos binder acts like a phosphorus net – catching some of the phosphorus you eat during your meal.
- Remember – phosphorus isn’t removed well during dialysis, so it is best not to eat too much
Phosphorus Binders

- It is recommend to take a binder 5-15 min before eating. Due to the need for the binder (pill) to break down in the stomach.
  - This makes the binder work better.

- What happens if you forget to take your binder 5-15 min before the meal/snack?
  - Right before/with the first couple bites – is best
  - The middle of the meal – is ok
  - Right after the meal – is better than nothing
  - Over 30 mins after the meal – does little to nothing
Phosphorus Binders

Types of binders:

- **Sevelamer** (a non-absorbable substance)
- **Calcium Carbonate**
- **Lanthanum Carbonate** (a non-absorbable substance)
- **Sucroferric Oxyhydroxide** (a non-absorbable form of iron)
- **Ferric Citrate** (made from iron)

Binders don’t bind **ALL** of the phosphorus we eat.

The average binder binds between 40-100mg of phos.

½ of a skinless roasted chicken breast has 
~ 196mg of phosphorus

*Remember our body absorbs around 60% of the phosphorus found in chicken.
  60% of 196 = 118mg
Phosphorus Tips

• Avoid pre-packaged foods as much as possible.
• Finds foods that don’t have added phos on the label.
  – There are ranch dressings and snack crackers without added phos!
• Cook at home – you are in control.
• Avoid fast food.
• Stay away from canned and bottled beverages. Colas and some root beers, orange sodas, teas and coffees can have added phos – Always read the label
Phosphorus Tips

• Increase your daily activity (remember – the energy molecule – ATP).
• Take your binders before you eat.
• Take an extra binder if eating something that is high in phosphorus.
• Keep binders in many different places so that way you always have some nearby.
  – By the couch
  – On the table
  – In your glove compartment
  – In your wallet or purse
The Holidays and your Kidney Diet

• The holiday season can seem overwhelming
  – Managing your phosphorus and potassium
• A lot of times people on dialysis avoid holiday gatherings
  – Feel it is easier not to go
• Hopefully the following slides will give you good tips how to avoid the

Holiday Phos Pitfalls!!!
The Holidays and your Kidney Diet

General Tips

• Use a smaller plate
• Serving size matters
  – Boxed stuffing's usually have added phos
    • Take a computer mouse or tennis ball sized scoop
• Don’t skip on your favorites BUT....
  – Take smaller portions of the high phos and potassium dishes
  – Skip the seconds
• Always bring your binders
• Be active
The Holidays and your Kidney Diet

• Be active
  – Take a walk with family and friends after the meal
    • It’s a great way to burn extra phos and calories while catching up on old times
  – Dance while cleaning the house and clean daily
  – Do your own grocery shopping
  – Park further away from the door when shopping
  – Take the stairs

Remember the more activity the more phosphorus used!
The Holidays and your Kidney Diet

• Questions to think about before
  – Who hosts holiday dinners?
  – What are the traditional dishes on your table?
    • Which ones are high in phosphorus? potassium?
  – What are your favorite dishes?
  – What can you make and adjust to be lower in phosphorus and potassium?

• Plan ahead!
  – Have a game plan
    • For the different activities/parties/meals to help you successfully manage your phosphorus and potassium during the holidays
Plan Ahead

• Who is hosting the party/meal?
  – Tell them you are managing your CKD diet
    • Provide them a list of kidney friends foods
  – Ask for the menu ahead of time
  – Ask to bring a dish or two

• Eat before the party
  – Stand away from and don’t face the snacks, appetizers and desserts

• Chew gum

• Bring/take your phosphorus binders
  – Keep extra binders in your car, wallet or purse just in case
The Holidays and your Kidney Diet

• If you are hosting:
  – Skip the taste test
  – Dialyze your potatoes and squash
  – Invest in some disposable tupperware and
    • Send your guest home with the leftovers
  – See following slides for:
    • Kidney friendly snacks
    • Kidney friendly appetizes
    • Kidney friendly desserts
The Holidays and your Kidney Diet

• Snacks and appetizers
  – Make snacks that are low in phos and potassium
    • Have: peppermints, candy canes, homemade ChexMix, peppermint patties
    • Avoid: nuts, chocolates, cheese and snack crackers with added phos
  – Lower phos and potassium veggies and dip trays
The Holidays and your Kidney Diet

• Holiday vegetable trays
  – Choose low potassium vegetables like:
    • Bell peppers, cauliflower, broccoli, radishes, carrots and cucumbers
  – Make a low phos dip:
    • Choose cream cheese or cottage cheese add herbs and spices
    • Recipe:
      – Soften 1 block of cream cheese (or 8oz container of cottage cheese)
      – Add 1 tablespoon of the following:
        » Garlic powder, dried basil, dried oregano
      – Add 1 teaspoon of red pepper flakes (optional)
      – Mix well
The Holidays and your Kidney Diet

• Homemade Chex Mix:
  – Tips for making Chex Mix kidney friendly:
    • Skip the nuts
    • Add extra herbs and spices too avoid the salts: garlic salt, celery salt, seasoning salt
    • Use ½ the amount of butter

Ideas from the Chex Mix website

• Chili Lime Chex Mix
• Queso Taco Chex Party Mix
• Carmel Apple Chex Trail Mix
• Goin’ Fishin’ Chex Mix
• Original Chex Mix w/o nuts and ½ the seasoning salt
• Honey-Garlic Chex Party Mix w/o nuts
• Churro Chex Party Mix w/ ½ the butter
The Holidays and your Kidney Diet

• Dessert
  – Bring/Serve:
    • Shortbread cookies
    • Lower potassium fruit salad
    • Angel food cake w/fresh sliced strawberries and strawberry sauce
      – Take 1 8oz container of fresh strawberries (stems removed and cut in quarters), ¼ cup of strawberry jam, and 1 tablespoon of water.
      – Place in small sauce sauce pan bring to a simmer. Then place on low heat and cook for 20min (stir occasionally) until the fresh strawberries have broken down and become a sauce like consistency.
  • Or check out these websites for other recipes
The Holidays and your Kidney Diet

Find Kidney Friendly Holiday Recipes

• The American Kidney Fund:

• Davita:

• Chex Mix:
  – https://www.chex.com/recipes/
Phosphorus Master Detective

• Read the food label and choose foods that don’t have added phos
• Choose foods low in phos
• Be prepared for holiday parties and dinners
• Remember to take your binders
• Increase your daily activity level

(Remember it is a main part of our energy molecule – ATP)
References

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- Am J Kidney Dis, 55, No 5, 774, 2010
- Chex Mix ideas
  - https://www.chex.com/recipes/
Questions?
Join us for our next webinar!

Eating healthy with diabetes and kidney disease

Wednesday, November 28, 2018 from 1:00 – 2:00 p.m. EST

Join us to hear more about:

• How bloodwork results should affect food choices, with a specific focus on protein, potassium and phosphorus
• Monitoring one’s body weight with kidney disease, including dry weight and fluctuations
• How kidney disease affects blood sugar and what this means for treatment

Go to www.KidneyFund.org/webinars to learn more and register!