American Kidney Fund®

Phosphorus in the Kidney Disease Diet: Become a Phosphorus Detective

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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 general public about the importance of early detection of kidney disease and the importance of a healthy diet for kidney health

Objectives

Managing your phosphorus can be overwhelming!

Today we will look at:

- what is phosphorus, why it is important
- how **you** can manage your phosphorus with kidney disease/ on dialysis
- what can happen if your phosphorus is out of range (high or low)

After today you will be a Master Phosphorus Detective – with the skills to find all sources of phosphorus and how to keep your phos in range.

Phosphorus

- Phosphorus is vital to the production and storage of energy in the human body. It is a main component in ATP (Adenosine Tri**phos**phate). It is widely available in food, and is a important to bone building and health.
- About 85% to 90% of total body phosphorus is found in bones and teeth.
- Phosphorus is also a component of fats, proteins, and cell membranes.

Phosphorus

- High levels of phosphorus in your blood are not ***IMMEDIATELY*** harmful but can cause ***SEVERE*** long term problems.
- 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 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 (also called 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

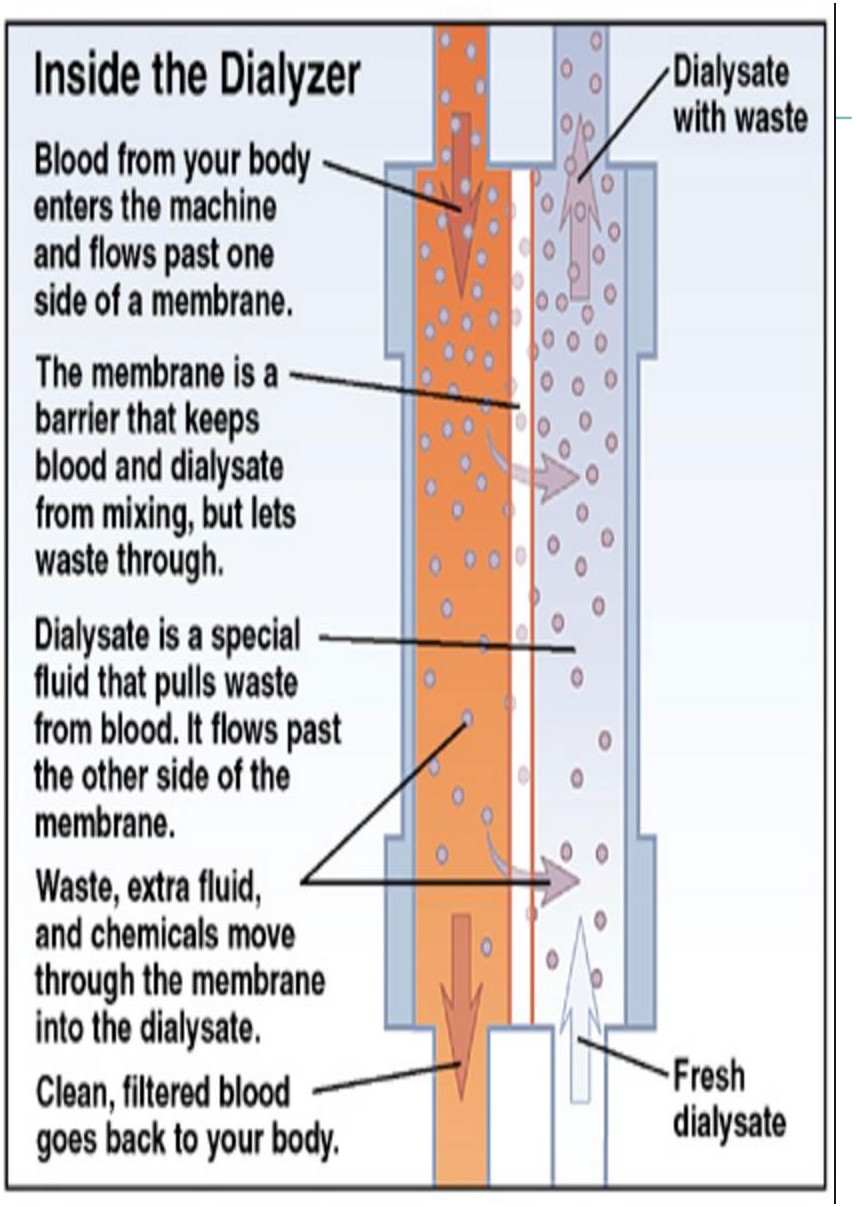
- In severe cases, calciphications can lead to calciphylaxis.
- Calciphylaxis: when calcium & phosphorus build up in the blood vessels and in the body's soft tissue and skin. It causes painful skin ulcers and may cause serious infections that can lead to death.
- Skin lesions due to calciphylaxis is the end-stage result if PTH, calcium, phosphorus, and vitamin D are not well managed.

Calciphylaxis

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 ultrafliltrate (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


Inside the Dialyzer
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.
Dialysate with waste
Fresh dialysate

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 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 phosphorous”.
  - 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!!!!

INGREDIENTS: WATER, VEGETABLE OIL (SOYBEAN AND/OR CANOLA), BUTTERMILK, MALTODEXTRIN, SUGAR, SALT, LESS THAN 2% OF: DRIED GARLIC, DRIED ONION, NATURAL AND ARTIFICIAL FLAVORS (SOY), EGG YOLK, SPICES, PHOSPHORIC ACID, VINEGAR, PROPYLENE GLYCOL ALGINATE, SORBIC ACID AND CALCIUM DISODIUM EDTA AS PRESERVATIVES, MONOSODIUM GLUTAMATE, DISODIUM INOSINATE, DISODIUM GUANYLATE, ARTIFICIAL COLOR, DISODIUM PHOSPHATE, MODIFIED FOOD STARCH, XANTHAN GUM.
CONTAINS: MILK, SOY, EGG.
GLUTEN-FREE.

Nutrition Facts
Serv. Size 2 Tbsp (30mL)
Servings about 16
Calories 70
Calories from fat 45
*Percent Daily Values (DV) are based on a 2,000 calorie diet.

Amount/Serving	% DV*	Amount/Serving	% DV*
Total Fat 5g	7%	**Total Carb.** 3g	1%
Sat. Fat 1g	4%	Fiber 0g	0%
Trans Fat 0g		Sugars 2g	
Cholest. 5mg	1%	**Protein** 1g	
Sodium 310mg	13%		
Vitamin A 0%	•	Vitamin C 0%	
Calcium 2%	•	Iron 0%	

Phosphorus Detective

- **Phos**phoric Acid
- Sodium Poly**phos**phate
- Pyro**phos**phate
- Sodium Tripoly**phos**phate
- Poly**phos**phate
- Tricalcium **Phos**phate
- Hexameta**phos**phate
- Trisodium **Phos**phate
- Dicalcium **Phos**phate
- Sodium **Phos**phate
- Monocalcium **Phos**phate
- Tetrasodium **Phos**phate
- Aluminum **Phos**phate
- Ferric **Phos**phate

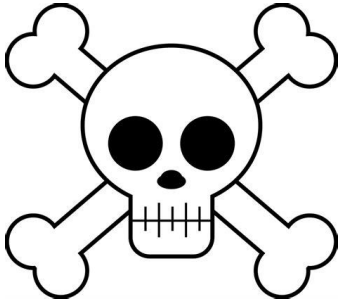
Foods with Added Phosphorus

Well Known

- Pancake/Biscuit mixes
- Fast food
- Frozen dinners
- Lunch meats
- Hot dogs
- Breading mixes
- Hot dog & Hamburger buns

Less Well Known

- White Rice
- White bread / many bread products
- Non-dairy creamer
- Cool whip (and the such)
- Prepackaged meats
- Flour tortillas
- Rice/soy milk
- Jell-O
- Tums
- Albacore canned tuna

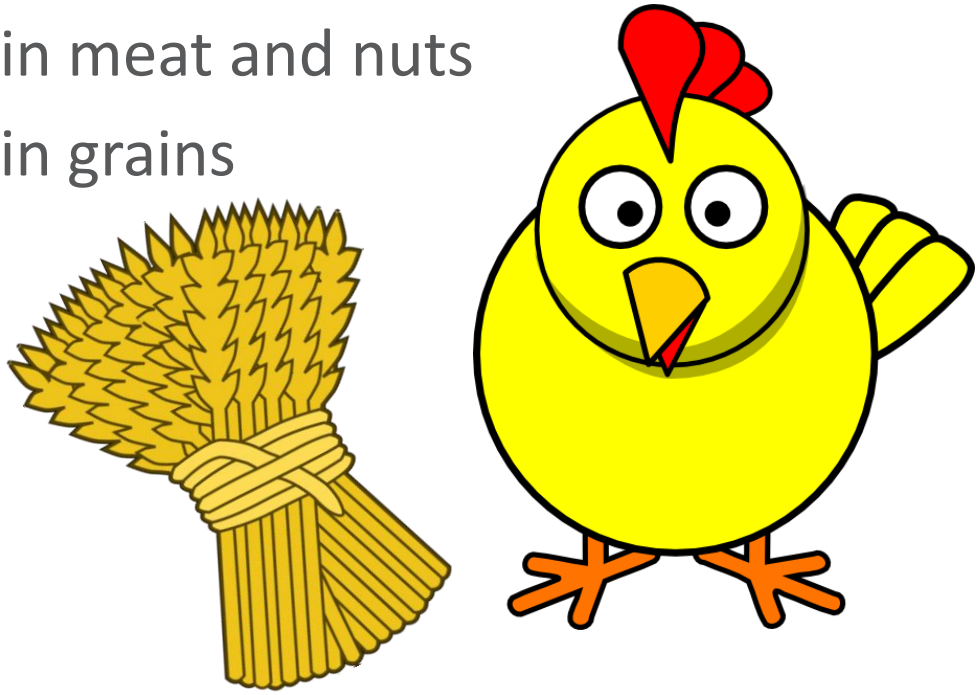


Phosphorus Detective

- 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 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 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 take in too much

Phosphorus Binders

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

- What happens if you forget to take your binder 5-15min 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:

- Renvela/Renagel (made from a non-absorbable substance)
- Phos Lo (made with Calcium)
- Fosernol (made from a non-absorbable substance)
- Velphoro (made from iron)
- Auryxia (made from iron)

- Binders don't bind with 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

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 Control

- Avoid pre-packaged foods as much as possible.
- Finds foods that don't have added phos on the label.
  - There are ranch dressings without added phos!!!
- Cook at home – you are in control.
- Avoid fast food.
- Stay away from Cola. Even some root beers, orange sodas, and canned/bottled teas have added phos – always read the label!!!

Phosphorus Control

- 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

Phosphorus Master Detective

- Read the food label and choose foods that don't have add phos
- Choose foods low in phos
- Remember to take your binders
- Increase your daily activity level (Remember it is a main part of our energy molecule – ATP)

Questions?

References

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- K/DOQI: Clinical Practice Guidelines for Chronic Kidney Disease: Evaluation, Classification, and Stratification. Am J Kidney Dis, Suppl 1, February 2002
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Join us for next month's webinar!

Holly Bode
Vice President of Government Affairs
American Kidney Fund

Angeles Herrera
Assistant Director
US Environmental Protection Agency

Advocating for a rare disease

June 2018, date and time TBD

Join us to hear more about:

- How to become an advocate when you have a rare disease
- Overcoming challenges to being an advocate when you have a rare disease

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