Potassium and kidney disease: What you need to know

Kam Kalantar-Zadeh, MD, MPH, PhD, FACP, FASN, FAAP, FAHA, FNKF
Thanks to our speaker!

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- Board certified physician in Internal Medicine, Nephrology and Pediatrics
- Professor and chief of Nephrology & Hypertension at the University of California, Irvine
- Member of the international steering committee of the World Kidney Day
- Immediate past president of the International Society of Renal Nutrition & Metabolism
What is potassium?

- Potassium is a mineral and electrolyte.
- It is found in most foods and your body needs it for many things.
- Potassium plays an important role in helping your muscles expand and contract.
  - Your heart is a muscle; so, when your body’s potassium is at a healthy level, it helps your heart to beat the right way.
What is hyperkalemia?

- High potassium is called **hyperkalemia**.
- Hyperkalemia is a chronic condition, meaning it is long-lasting.
- Can be caused by kidney disease.
- Lowering potassium should be a long-term goal, not a short-term objective.
If you have kidney disease, you are at risk for high potassium because your kidneys cannot remove the extra potassium in your blood.
Symptoms of high potassium

- Feeling tired or weak
- Feeling sick to the stomach (nausea)
- Muscle pains or cramps
- Trouble breathing, unusual heartbeat, chest pains
Consequences of not managing high potassium

• Managing high potassium is important if you want to protect your heart.
• Having too much potassium in your blood can be dangerous.
• High potassium can even cause a heart attack or death!
Measuring your potassium level

• Your doctor will take a blood test to measure your potassium level.
• Potassium levels can vary day to day based on:
  – what you ate
  – what you drank
  – how regularly you take your medicines
  – how well your kidneys are working
Tracking your potassium level

• Track all the foods you eat that may contain potassium.
  – Even one single food or drink item can make a difference.
  – Food shoppers and food preparers must play a central role in tracking potassium intake.

• Keep a daily log of when you take your potassium binder.
Dietary potassium restrictions

• In the general population (no CKD):
  – High potassium diet is beneficial for hypertension and cardiovascular events
  – Minimal concern for hyperkalemia

• For CKD patients with risk for hyperkalemia:
  – Dietary potassium restrictions often start before kidney failure.
  – Restrictions are reinforced as patients transition to dialysis.
  – Recommended potassium intake depends on eGFR.

Appel LJ et al., *Hypertension* 2006;47(2):296-308
Hunt BD et al., *Stroke* 2014;45(5):1519-1522
Dietary potassium restrictions

• Significant uncertainty about dietary potassium restriction in CKD
  – Ideal amount
  – Net effect on health outcomes
Dietary potassium intake recommendations for adults in the general population and in people with CKD

<table>
<thead>
<tr>
<th>Source</th>
<th>Recommended g/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institute of Medicine (2005)</td>
<td>4.7&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>World Health Organization (2012)</td>
<td>3.5&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>CKD G1-G2</td>
<td>&gt; 4.0</td>
</tr>
<tr>
<td>CKD G3a-G4</td>
<td>2.0–4.0</td>
</tr>
<tr>
<td>NEJM 2017 paper:</td>
<td></td>
</tr>
<tr>
<td>eGFR&gt;30</td>
<td>4.7</td>
</tr>
<tr>
<td>CKD 4 and 5</td>
<td>&lt;3</td>
</tr>
<tr>
<td>Expert opinion&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>HD</td>
<td>2.7–3.0</td>
</tr>
<tr>
<td>PD</td>
<td>3.0–4.0</td>
</tr>
<tr>
<td>Hyperkalemia</td>
<td>&lt; 3.0</td>
</tr>
</tbody>
</table>
### Dietary approach in CKD

<table>
<thead>
<tr>
<th>Dietary constituent</th>
<th>Normal kidney function w/ ↑ CKD risk</th>
<th>Mild to moderate CKD</th>
<th>Advanced CKD</th>
<th>Transition to dialysis</th>
<th>Ongoing dialysis or any stage with PEW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein (g/kg/d)</td>
<td>&lt;1.0</td>
<td>&lt;1.0</td>
<td>0.6-0.8</td>
<td>0.6-0.8</td>
<td>1.2-1.4</td>
</tr>
<tr>
<td>Sodium (g/d)</td>
<td>&lt;4</td>
<td>&lt;4</td>
<td>&lt;3</td>
<td>&lt;3</td>
<td>&lt;3</td>
</tr>
<tr>
<td>Potassium (g/d)</td>
<td>4.7</td>
<td>4.7</td>
<td>&lt;3</td>
<td>&lt;3</td>
<td>&lt;3</td>
</tr>
<tr>
<td>Phosphorus (mg/d)</td>
<td>&lt;1000</td>
<td>&lt;800</td>
<td>&lt;800</td>
<td>&lt;800</td>
<td>&lt;800</td>
</tr>
<tr>
<td>Calcium (mg/d)</td>
<td>1000-1300</td>
<td>800-1000</td>
<td>800-1000</td>
<td>800-1000 or less</td>
<td>&lt;800</td>
</tr>
<tr>
<td>Fibers, alkali, plant-based foods (g/d)</td>
<td>25-30</td>
<td>25-30 or more</td>
<td>25-30 or more</td>
<td>25-30 or more</td>
<td>25-30 or more</td>
</tr>
<tr>
<td>Energy (kcal/kg/d)</td>
<td>30-35</td>
<td>30-35</td>
<td>30-35</td>
<td>30-35</td>
<td>30-35</td>
</tr>
<tr>
<td>Fats</td>
<td>Mostly mono- &amp; polyunsaturated</td>
<td>Mostly mono- &amp; polyunsaturated</td>
<td>Mostly mono- &amp; polyunsaturated</td>
<td>Mostly mono- &amp; polyunsaturated</td>
<td>Mostly mono- &amp; polyunsaturated</td>
</tr>
</tbody>
</table>

Dietary Restrictions in Dialysis Patients: Is There Anything Left to Eat?


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High potassium foods

• A food with 250 mg (milligrams) of potassium (or more) per serving is considered a high potassium food.

• If you are on dialysis or your doctor has recommended that you eat low-potassium foods, you should aim for a daily potassium goal of 2,500 mg and no more than 3,000 mg per day.

• Your doctor or dietitian may adjust these goals to fit your needs.
High potassium foods

<table>
<thead>
<tr>
<th>Food</th>
<th>Serving Size</th>
<th>Potassium (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canned Navy Beans</td>
<td>½ cup</td>
<td>587</td>
</tr>
<tr>
<td>Cod Fish</td>
<td>3 oz</td>
<td>440</td>
</tr>
<tr>
<td>Tomato Paste</td>
<td>½ cup</td>
<td>1228</td>
</tr>
<tr>
<td>Raisins</td>
<td>½ cup</td>
<td>545</td>
</tr>
<tr>
<td>Avocado</td>
<td>½ cup</td>
<td>558</td>
</tr>
<tr>
<td>Beet greens</td>
<td>½ cup</td>
<td>650</td>
</tr>
<tr>
<td>Sweet Potato</td>
<td>1 medium sized</td>
<td>855</td>
</tr>
</tbody>
</table>
Low potassium diet

<2-3 g (<50-75 mEq)

(whereas the recommended potassium intake is 4.7 g/day)
Low-potassium foods and drinks are those with no more than 100 mg of potassium per serving.

Your doctor or dietitian may suggest you eat foods that are low in potassium if you tend to have too much potassium in your blood.
### Low Potassium Foods
(150 mg or less per serving)

<table>
<thead>
<tr>
<th>Food</th>
<th>Serving Size</th>
<th>Potassium (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cream Cheese</td>
<td>1 oz</td>
<td>17</td>
</tr>
<tr>
<td>Fresh Egg</td>
<td>3 oz</td>
<td>70</td>
</tr>
<tr>
<td>Cucumber, with peel</td>
<td>½ cup</td>
<td>75</td>
</tr>
<tr>
<td>Lettuce</td>
<td>½ cup</td>
<td>43</td>
</tr>
<tr>
<td>Corn Flakes®</td>
<td>1 cup</td>
<td>22</td>
</tr>
<tr>
<td>White Rice</td>
<td>1/2 cup cooked</td>
<td>33</td>
</tr>
<tr>
<td>Bread</td>
<td>1 slice, white/wheat</td>
<td>50</td>
</tr>
</tbody>
</table>
Potassium binders

- Potassium binders work by sticking to the potassium in your body and preventing some of it from being taken into your bloodstream.
- Talk to your healthcare provider about finding a potassium binder that is right for you.
Other medicines that can affect your potassium level

Always talk to your doctor about the different medicines you are taking. The following may raise your potassium levels. Examples include:

- RAASi: ACEI and ARBs
- NSAID
- Potassium-sparing diuretics: spironolactone, eplerenone
- Betablockers (non-selective and B2)
- Trimethoprim, Pentamidine
- Heparin (Remember SC Heparin!!)
- Digoxin (toxic levels)
- Succinylcholine (intubated in ER!)
- Calcineurin Inhibitors: Cyclosporine A, FK (Tacrolimus)
- Potassium: KCl, K-Dur
Key Take-aways

- Manage potassium through diet and medicine.
- Take potassium binders as prescribed.
- Talk to your doctor about medicines you are taking that may affect your potassium levels.
- Work with your doctor and dietitian to create a potassium management plan that works best for you.
Beyond Bananas Campaign:
KidneyFund.org/BeyondBananas

- What is potassium:
  - https://kitchen.kidneyfund.org/general-nutrients/potassium/

- Potassium food guide:

- Potassium tracker:
Thank you!

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Wednesday, February 19, 2020 from 12:00 – 1:00 p.m. EST

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• Tips for kidney-friendly food shopping
• Resources for kidney-friendly cooking

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