NUTRITION AND CHRONIC KIDNEY DISEASE

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Content

- Basics of Kidney
- What Should You Eat for Your Chronic Kidney Disease (CKD)?
- Is Herbal Supplement Beneficial or Harmful for CKD?
Basics of Kidney

- Maintain homeostatic balance
  - Fluid
  - Electrolytes
- Excretion of metabolic waste
  - Urine
- Produce hormones
  - Renin
  - Erythropoietin
  - Vitamin D
Basics of Kidney

- Measurement of Kidney Function
  - Glomerular Filtration Rate (GFR): GFR is a measure of how well your kidneys filter blood.
  - Use estimated GFR called "eGFR".

- Stages of Chronic Kidney Disease (CKD)
  - 5 stages (1-5)
  - Stage 3-5
# CKD Stages

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
<th>eGFR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kidney damage but normal eGFR</td>
<td>90 or more</td>
</tr>
<tr>
<td>2</td>
<td>Kidney damage with mild decrease of eGFR</td>
<td>60 - 89</td>
</tr>
<tr>
<td>3</td>
<td>Kidney damage with moderate decrease of eGFR</td>
<td>30 - 59</td>
</tr>
<tr>
<td>4</td>
<td>Kidney damage with severe decrease of eGFR</td>
<td>15 - 29</td>
</tr>
<tr>
<td>5</td>
<td>Kidney failure: need renal replacement therapy</td>
<td>Less than 15</td>
</tr>
<tr>
<td>5D</td>
<td>Dialysis</td>
<td></td>
</tr>
</tbody>
</table>
CKD Risk Factors

- Diabetes
- Hypertension
- Family history of kidney failure
  - Polycystic kidney disease (PKD)
- Cardiovascular disease
- Prolonged consumption of over the counter medication (i.e. ibuprofen) or herbal supplements (Aristolochic acid, Echinacea, Creatine, Chromium, Cat’s claw)
What is Healthy Eating for CKD?

- Purpose
  - To maintain good nutritional status
  - Slow progression of CKD
  - To treat complications

- Key Diet Components
  - Controlling blood pressure: Low sodium intake
  - Reducing protein intake if EXCESS
  - Managing diabetes
There is no DIET call “RENAL DIET”
What Should I Eat with My CKD???
Everything is Individualized Based on your own Medical Problems
In General

- Low Sodium

- Low Potassium
  - Is your blood potassium level high?
  - Do you take medication called “ACEI or ARB”?

- Moderate Amount of Protein
  - Do you spill protein in urine?

- Low Phosphorus
Low Sodium Diet

- What does sodium do in the body?
  - Thirst
  - Fluid gain
  - Increase blood pressure

- How much sodium should I take a day?
  - Please choose
    - 1 Table spoon of salt
    - 1 teaspoon of salt
    - 2000mg of sodium
Low Sodium Diet

- **Nutrition Label**
- **What should you read?**
  - Portion size
  - Servings per container
  - Nutrients
    - Calories
    - Protein
    - Fat (total, saturated fat, trans fat)
    - Cholesterol
    - Carbohydrates (sugar, fiber)
    - Vitamins and Minerals
    - **Sodium**
      - Your restriction
      - Healthy population
### Nutrition Facts

**Serving Size**: 1 cup (228g)  
**Servings Per Container**: 2

<table>
<thead>
<tr>
<th>Amount Per Serving</th>
<th>Calories: 250</th>
<th>Calories from Fat 110</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Fat</strong></td>
<td>12g</td>
<td>18%</td>
</tr>
<tr>
<td>Saturated Fat</td>
<td>3g</td>
<td>15%</td>
</tr>
<tr>
<td>Trans Fat</td>
<td>3g</td>
<td>3%</td>
</tr>
<tr>
<td><strong>Cholesterol</strong></td>
<td>30mg</td>
<td>10%</td>
</tr>
<tr>
<td>Sodium</td>
<td>470mg</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Total Carbohydrate</strong></td>
<td>31g</td>
<td>10%</td>
</tr>
<tr>
<td>Dietary Fiber</td>
<td>0g</td>
<td>0%</td>
</tr>
<tr>
<td>Sugars</td>
<td>5g</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Protein</strong></td>
<td>5g</td>
<td>2%</td>
</tr>
</tbody>
</table>

**Vitamin A**: 4%  
**Vitamin C**: 2%  
**Calcium**: 20%  
**Iron**: 4%

*Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.*

<table>
<thead>
<tr>
<th>Calories:</th>
<th>2,000</th>
<th>2,500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Fat</td>
<td>Less than 65g</td>
<td>80g</td>
</tr>
<tr>
<td>Sat Fat</td>
<td>Less than 20g</td>
<td>25g</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>Less than 300mg</td>
<td>300mg</td>
</tr>
<tr>
<td>Sodium</td>
<td>Less than 2,400mg</td>
<td>2,400mg</td>
</tr>
<tr>
<td>Total Carbohydrate</td>
<td>300g</td>
<td>375g</td>
</tr>
<tr>
<td>Dietary Fiber</td>
<td>25g</td>
<td>30g</td>
</tr>
</tbody>
</table>

**Sodium Recommendation For Healthy People**
Low Potassium

- What is normal potassium level?
- Do you take medication called “ACEI or ARB”?
  - What are these?
    - ACEI: Angiotensin Converting Enzyme Inhibitor
      - Lisinopril, Enalapril
    - ARB: Angiotensin Receptor Blocker
      - Avapro
  - Why do you need this meds?
- What is your potassium level?
What is Normal Potassium Level?

- **Safe Zone**
  - 3.5 – 5.0 (mmol/L)
  - Harvard Vanguard Medical Associate: 3.3 – 5.3

- **CAUTION**
  - 5.1 (5.4) – 6.0

- **DANGER**
  - Greater than 6.0
To Keep Potassium Level in Safe Zone

- Limit high potassium foods
- Eat a variety of foods in moderation
- Modify cooking methods to lower potassium content of the foods
- Do not drink or use the liquid from canned fruits or vegetables
- Remember portion size!!
# High Potassium Foods

<table>
<thead>
<tr>
<th>Food</th>
<th>Amount</th>
<th>Potassium (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fruits, Dried Fruits and Fruit juices</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avocado</td>
<td>¼</td>
<td>149</td>
</tr>
<tr>
<td>Banana</td>
<td>½ or 7”</td>
<td>422</td>
</tr>
<tr>
<td>Cantaloupe</td>
<td>¾ cup (1/8)</td>
<td>320</td>
</tr>
<tr>
<td>Dates</td>
<td>¼ c</td>
<td>292</td>
</tr>
<tr>
<td>Honeydew</td>
<td>¾ cup (1/8)</td>
<td>303</td>
</tr>
<tr>
<td>Kiwi</td>
<td>1</td>
<td>237</td>
</tr>
<tr>
<td>Mango</td>
<td>1</td>
<td>323</td>
</tr>
<tr>
<td>Nectarine</td>
<td>1</td>
<td>277</td>
</tr>
<tr>
<td>Orange</td>
<td>1</td>
<td>237</td>
</tr>
<tr>
<td>Prunes</td>
<td>1 cup</td>
<td>796</td>
</tr>
<tr>
<td>Raisins</td>
<td>¼ cup</td>
<td>272</td>
</tr>
<tr>
<td>Orange Juice</td>
<td>8 floz</td>
<td>496</td>
</tr>
<tr>
<td>Prune Juice</td>
<td>8 floz</td>
<td>706</td>
</tr>
</tbody>
</table>
# High Potassium Foods

<table>
<thead>
<tr>
<th>Food</th>
<th>Amount</th>
<th>Potassium (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Other Foods</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chocolate</td>
<td>1 bar (1.5 oz)</td>
<td>150</td>
</tr>
<tr>
<td>Granola</td>
<td>½ cup</td>
<td>330</td>
</tr>
<tr>
<td>Milk (all type)</td>
<td>8 fl oz</td>
<td>348</td>
</tr>
<tr>
<td>Yogurt</td>
<td>8 oz</td>
<td>380</td>
</tr>
<tr>
<td>Organ meat</td>
<td>3 oz</td>
<td>340</td>
</tr>
<tr>
<td>Molasses</td>
<td>1 Tbsp</td>
<td>292</td>
</tr>
<tr>
<td>Nuts and seeds</td>
<td>1 oz</td>
<td>206</td>
</tr>
<tr>
<td>Peanut butter</td>
<td>2 Tbsp</td>
<td>207</td>
</tr>
<tr>
<td>Lite salt</td>
<td>¼ tsp</td>
<td>354</td>
</tr>
</tbody>
</table>
## Low Potassium Foods

<table>
<thead>
<tr>
<th>Fruits</th>
<th>Vegetables</th>
<th>Other foods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apples – 1</td>
<td>Alfalfa Sprouts</td>
<td>Rice</td>
</tr>
<tr>
<td>Applesauce</td>
<td>Asparagus – 6 spears</td>
<td>Noodles</td>
</tr>
<tr>
<td>Apricots (fresh) – 1 medium (canned) – ½ cup</td>
<td>Beans: green or wax</td>
<td>Pasta</td>
</tr>
<tr>
<td>Blackberries</td>
<td>Bean Sprouts</td>
<td>Bread and bread products – not whole grain</td>
</tr>
<tr>
<td>Blueberries</td>
<td>Beets, cooked</td>
<td>Cereals – not bran or whole grain</td>
</tr>
<tr>
<td>Cherries</td>
<td>Cabbage</td>
<td>Cake – not carrot or chocolate</td>
</tr>
<tr>
<td>Cranberries</td>
<td>Carrots, cooked</td>
<td>Cookies – without nut or chocolate</td>
</tr>
<tr>
<td>Fruit Cocktail</td>
<td>Cauliflower</td>
<td>Pies – without chocolate or high potassium fruits</td>
</tr>
<tr>
<td>Grapefruit – ½</td>
<td>Celery – 1 stalk</td>
<td>Tea – limit 2 cups</td>
</tr>
<tr>
<td>Grapes</td>
<td>Corn</td>
<td></td>
</tr>
</tbody>
</table>
Low Potassium Diet

- Know your potassium level
- Know your current medications
  - ACEI
  - Diuretics (water pill)
- Watch very high potassium foods and portions
- Ask your dietitian
Protein

What is protein?
- Essential nutrient in the body
  - Growth
  - Build muscles
  - Repair tissues

Why do you concern protein with CKD?
- Body uses protein and produce waste product called “urea” which is removed by kidney
- In CKD, urea accumulate in the body
Protein

- What are protein sources?
  - High biologic value protein (HBV): animal products
  - Low biologic value protein (LBV): plant products

- Do you spill protein in the urine?
  - Amount of protein in the urine determine whether you should restrict protein
Protein

- How much should I eat protein daily?
  - 0.8 – 1.3gm/kg/body weight/day
  - Half (50%) to 2/3 (67%) should come from HBV protein foods

- DO NOT FOLLOW LOW CARBOHYDRATE HIGH PROTEIN WEIGHT LOSS DIET
Protein

- Be sure to eat all of the servings of protein in your diet plan
- Eat enough calories to avoid your body using protein as an energy source
- Portion size is important
- Meat, fish and poultry must be measured after cooking without bone, skin or fat
- Consult with your renal nutritionist before you start low protein diet
Phosphorus

- What is phosphorus?
  - Mineral that helps bone healthy
  - Keep blood vessels and muscles working

- Why should you watch phosphorus in CKD?
  - Phosphorus can build up in the blood vessels, making bones thins, weak and break
Phosphorus

- What foods are high in phosphorus?
  - All foods rich in protein especially dairy products, organ meats
  - Beans, bran products, nuts and seeds
  - Dark soda (cola, root beer) and bottled iced tea

- What foods are low in phosphorus?
  - Fresh fruits and vegetables
  - Rice milk (if not enriched)
  - Bread, pasta and rice
  - Corn and rice cereals
Phosphorus

- Do not consume excess protein in your diet
  - Meat, poultry, fish
  - Dairy foods: 1 cup milk or 1 oz cheese max

- Eat more fresh fruits and vegetables

- Many packaged foods contain additives containing phosphorus: READ LABEL and avoid for words with PHOS

**Ingredients:** Potatoes, vegetable oil (partially hydrated soybean oil), salt, dextrose, disodium dihydrogen pyrophosphate ............
Vitamins and Mineral Supplement
Do you need supplements?
Vitamins and Mineral Supplement

- **Multivitamin and Minerals**
  - Usually good for most patients
  - MVI for women: be careful for mineral especially calcium

- **Vitamin D**
  - Most people living in Northeast of the US have vitamin D insufficiency or deficiency
  - Take over the counter vitamin D3 if you are insufficient but not with other minerals such as calcium, magnesium etc

- **Calcium**
  - Most postmenopausal women take calcium supplement however be careful with CKD
  - DO NOT take Tums of calcium containing Antacid if you have high calcium level
Vitamins and Mineral Supplement

- **Vitamin C**
  - High dose > 1000mg is not good because of risk of kidney stone

- **Fish oil**
  - Not harmful and maybe useful for IgA nephropathy

- **Glucosamine and Condroitin**
  - Not beneficial but not harmful
HERBAL SUPPLEMENTS
Are They Beneficial or Harmful?
Herbal Supplements

- Herbal supplement manufacturers DO NOT have to get approval from the Food and Drug Administration (FDA) before putting the products on the market.
- Over 7,000 herbal supplements in late 1990’s.
- Are they safe?
  - FDA is monitoring the safety once they are on the market.
  - It may be harmful to use with prescription meds.
Herbal Supplements

- How to know what’s in an herbal supplement?
  - Name of herbal supplements
  - Name and address of manufacturer
  - Complete list of ingredients and serving size

- How to know if herbal supplement’s claims are true?
  - Ask your doctor or pharmacist
  - Look for scientific research findings
  - Contact manufacturer
Herbal Supplements

- Who shouldn’t use herbal supplements?
  - You are taking prescription or over the counter (OTC) medications
  - You are pregnant or lactating
  - You are having surgery
  - Children (< 18 years old) or elderly
  - You have chronic medical problems such as CKD
Herbal Supplements

- Safety tips for using herbal supplements
  - Follow supplement instructions
    - Don’t take extra dosage
  - Keep tract of what you take
    - How long and how much
  - Be extra cautious about supplements manufactured outside the USA
    - China, India and Mexico
  - Avoid products with tainted past
    - Most weight loss pills
  - Check alerts and advisories
    - FDA regulatory review
Herbal Supplements: Harmful for the Kidney

- Aristolochia serpentaria (Snakewood)
- Chromium picolinate
- Echinacea
- Bladderwrack
- Germanium
- Wormwood oil

- Salix daphnoides (willow bark)
- Uncaria tomentosa (cat’s claw)
- Pausinystalia yohimbe
- Chaparral
- Cranberry
- Licorice
## Herbal Supplements: Harmful for the Kidney

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Claims</th>
<th>Renal problems and other side effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aristolochic Acid (Snakewood)</td>
<td>Anticonvulsant, aphrodisiac, menstrual stimulant</td>
<td>Acute kidney failure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vomiting, gastroenteritis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Muscle spasms</td>
</tr>
<tr>
<td>Bladderwrack</td>
<td>Weight loss, thyroid disorder, antibiotic, antioxidant</td>
<td>Polyuria, proteinuria</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hyperthyroidism, goiter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gast disturbance, diarrhea</td>
</tr>
<tr>
<td>Cat’s claw</td>
<td>Dyspepsia, ulcer, anti-inflammatory</td>
<td>Acute nephritis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Diarrhea, hypotension, bleeding gums</td>
</tr>
<tr>
<td>Chaparral</td>
<td>Antioxidant, anti-inflammatory</td>
<td>Renal cyst</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rash, liver failure</td>
</tr>
<tr>
<td>Chromium picolinate</td>
<td>Weight loss, hypoglycemic</td>
<td>Acute and chronic nephritis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Anemia, cognitive dysfunction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hemolysis, hepatic dysfunction</td>
</tr>
</tbody>
</table>
# Herbal Supplements: Harmful for the Kidney

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Claim</th>
<th>Renal problems and other side effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cranberry</td>
<td>Urinary tract infection</td>
<td>Kidney stone, Nausea, diarrhea, dehydration</td>
</tr>
<tr>
<td>Echinacea</td>
<td>Upper respiratory infection</td>
<td>Acute renal failure, Fever, drowsiness, headache, nausea, vomit, abdominal pain</td>
</tr>
<tr>
<td>Germanium</td>
<td>Immunostimulant, anti inflammatory</td>
<td>Minor renal abnormalities, Anemia, muscle wasting</td>
</tr>
<tr>
<td>Licorice</td>
<td>Peptic ulcer, lupus, infection</td>
<td>Renal injury, acute renal failure, Amenorrhea, lethargy, pulmonary edema, weakness</td>
</tr>
<tr>
<td>Wormwood oil</td>
<td>Appetite stimulant, heartburn</td>
<td>Acute renal failure, Nausea, vomit, muscle ache</td>
</tr>
</tbody>
</table>
Summary

- There is no Renal Diet
- CKD diet should be individualized on your own medical condition
- Herbal supplement should be used with caution
Thank you