ALL THINGS FOOD: PEDIATRIC KIDNEY TRANSPLANT, FOOD SAFETY AND DRUG-NUTRIENT INTERACTIONS

Christina L. Nelms, MS RDN LMNT
Western Society of Pediatric Nephrology meeting
January 26, 2019
OBJECTIVES

Discuss the role of food safety in pediatric renal transplant nutrition care

Outline potential alternative medicine, herbal and drug-nutrient concerns

Identify resources that can help the pediatric renal dietitian facilitate best patient care

Problem solve solutions to patient barriers regarding diet limitations in these areas
“YOU MEAN I HAVE TO CHANGE MORE THINGS IN MY DIET?!?”

- Typical transplant patients may need to be counseled on:
  - Drinking PLENTY of fluid
  - Nutrients important for bone health
  - Limiting sodium
  - Limiting simple carbohydrates
  - Weight management
  - Dyslipidemia management
  - Transient limitations of potassium and increases in magnesium or phosphorus
  - Healthful diet to prevent chronic disease
  - Return of previous “renal diet” restrictions as transplant declines

So, how important is it to add food safety and drug-nutrient interactions to this list?!?
FOOD SAFETY
WHY FOOD SAFETY MATTERS

• Increased importance due to impaired immune function!
  • Immunosuppressive medications target T-cell and B-cell lymphocytes
  • Increased medication load means increased risk – so risk is higher in early transplant and when treating rejection
  • Risk may increase if on acid reducing agents
• Statistics from the CDC for the US population:
  • Annually, 48 million people develop foodborne illness
  • 128,000 are hospitalized
  • 3000 die from complications
• Transplant patients in the highest risk group to develop, have lengthier illness/hospitalization and death – 15-20% more susceptible
• Listeria risk 2500 times more likely in a transplant recipient
• Risks also include vomiting, diarrhea, loss of allograft

Obasyashi, 2012, FDA 2011, Chen, 2010
• Education inconsistent
  • UK/Ireland study of 25 transplant centers (38 RDs) showed great variability in food safety information provided, especially regarding which foods should be avoided. One center provided no education.

• RD typically provides education
  • Standardized information improves outcomes

• Healthcare providers considered credible source of information; patients receptive to information and education

• Stem cell transplant patients take food safety much more seriously than organ transplant recipients

McGeeney, 2014, Chen 2010
CORE FOUR PRACTICES

• Clean
  • Handwashing for 20 seconds, wash counter tops well, rinse produce well

• Separate
  • Use different cutting boards/serving dishes for meats vs produce, separate groceries

• Cook
  • Use a thermometer! Cook ground meat and eggs to 160° F, non-ground meat and fish to 145° F, poultry to 165° F and reheat food to 165° F. Don’t eat uncooked eggs

• Chill
  • Bring food to <40° F quickly in shallow pans, thaw or marinate in safe temperatures, food should not be at room temperature more than 2 hours

USDA 2011, Partnership
FOODS OF CONCERN

Meats Poultry, Fish/Shellfish undercooked

Raw foods like unpasteurized milk, honey and cider, alfalfa sprouts

Soft cheeses, foods with uncooked eggs

Deli meat, hotdog, dry sausage that aren’t reheated

Unproperly handled food or contaminated water

Chen, 2010, USDA 2011, Partnership
## Refrigerator Storage Guidelines

<table>
<thead>
<tr>
<th>Food</th>
<th>Safe time for refrigerator storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eggs</td>
<td>in shell – 3-5 weeks, hard cooked – 1 week</td>
</tr>
<tr>
<td>Egg product/substitute</td>
<td>opened – 3 days, unopened -10 days</td>
</tr>
<tr>
<td>Deli/vacuum packed products</td>
<td>3-5 days</td>
</tr>
<tr>
<td>Hot dogs</td>
<td>opened – 1 week, unopened -2 weeks</td>
</tr>
<tr>
<td>Lunch meat</td>
<td>opened – 3-5 days, unopened -2 weeks</td>
</tr>
<tr>
<td>Bacon</td>
<td>1 week</td>
</tr>
<tr>
<td>Sausage, raw</td>
<td>1-2 days</td>
</tr>
<tr>
<td>Ground meats</td>
<td>1-2 days</td>
</tr>
<tr>
<td>Solid meats (steaks, chops, roasts)</td>
<td>3-5 days</td>
</tr>
<tr>
<td>Poultry</td>
<td>1-2 days</td>
</tr>
<tr>
<td>Seafood</td>
<td>1-2 days</td>
</tr>
<tr>
<td>Leftovers (pizza, cooked meats, etc.)</td>
<td>3-4 days</td>
</tr>
</tbody>
</table>

Adapted from Food Safety for Transplant Recipients, 2011
**USDA/FDA RECOMMENDED MINIMAL INTERNAL TEMPERATURES**

<table>
<thead>
<tr>
<th>Food</th>
<th>Temperature (deg F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef, Pork, Lamb – roasts, steaks or chops</td>
<td>145</td>
</tr>
<tr>
<td>Fish</td>
<td>145</td>
</tr>
<tr>
<td>Beef, Pork, Lamb - ground</td>
<td>160</td>
</tr>
<tr>
<td>Egg dishes</td>
<td>160</td>
</tr>
<tr>
<td>Chicken, Turkey, Duck – whole, pieces or ground</td>
<td>165</td>
</tr>
</tbody>
</table>

Adapted from Food Safety for Transplant Recipients, 2011
FAMILY EDUCATION TIPS

- A thermometer is a necessity
- Thoroughly wash and rub all produce
- Pick up extra bags in the produce aisles to double bag meats
- Keep well stocked with plenty of cutting boards and knives, sanitize frequently
- Importance of “sell by” dates
- Refrigerate served food before 2 hours, 1 hour if >90 deg F, get groceries home quickly
- Cool quickly in flat containers
- Avoid keeping partially eaten food
- Use pasteurized egg product for “no cook” recipes
- Don’t assume food eaten away from home is safe
SUSPECTED FOODBORNE ILLNESS

• Be aware of symptoms:
  • fever
  • diarrhea (especially bloody)
  • nausea/vomiting
  • severe abdominal pain
  • neurological symptoms

• Contact health care provider, report concerns

• Save/freeze suspect food if possible
Food Safety

For Transplant Recipients

A need-to-know guide for bone marrow and solid organ transplant recipients
NUTRITION, MEDICATIONS AND CAM
TRANSPLANT MEDICATIONS

• Nutrition related risks of transplant medications:
  • Infection
  • Hypomagnesemia
  • Hyperkalemia
  • Hyperglycemia
  • HTN
  • GI side effects
  • Bone health

When in doubt – check out the medication!

KDOQI 2009, Coelho 2012
<table>
<thead>
<tr>
<th>Medication Common Name/Brand</th>
<th>Nutrition related side-effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Induction agents (Thymoglobulin®, OKT3, ATG):</td>
<td>Gastrointestinal (GI) side effects (nausea, vomiting, diarrhea, dyspepsia, etc.)</td>
</tr>
<tr>
<td>Intense immunosuppression therapy right after transplant or to</td>
<td></td>
</tr>
<tr>
<td>treat rejection</td>
<td></td>
</tr>
<tr>
<td>Azathioprine (Immunuran®)</td>
<td>N/V, taste changes, sore throat</td>
</tr>
<tr>
<td>Corticosteroids (Prednisone®, Methylprednisolone®)</td>
<td>Elevated lipids, glucose, blood pressure, sodium retention, weight gain and increased appetite,</td>
</tr>
<tr>
<td></td>
<td>urine calcium excretion, bone health concerns, muscle wasting, PUD, poor healing, electrolyte</td>
</tr>
<tr>
<td></td>
<td>imbalance</td>
</tr>
<tr>
<td>Calcineurin inhibitors (Tacrolimus/Prograf®, cyclosporine)</td>
<td>Elevated lipids, glucose, blood pressure, potassium, low magnesium</td>
</tr>
<tr>
<td>Sirolimus (Rapamune®)</td>
<td>Elevated lipids, GI side effects</td>
</tr>
<tr>
<td>Mycophenolate/mycophenolic acid (Cellcept®)</td>
<td>diarrhea, nausea, growth impairment</td>
</tr>
</tbody>
</table>
**DRUG-NUTRIENT INTERACTIONS**

- Interactions that involve stimulating the immune system or affecting the ability of medication to enter or exit the body
- Half of drugs use the same enzyme pathway for metabolism, increasing risk for drug-drug, drug-nutrient and drug-botanical interactions
- Many foods/botanicals are known to inhibit or enhance this metabolic pathway (cytochrome p450 – found in intestines and liver)

IS THERE A ROLE FOR THE RDN IN TRANSPLANT MEDICATION CARE?

- RDN can plan for and counsel regarding transplant medication side effects
- Value of the diet review:
  - Identify foods that may have drug nutrient interactions, including hidden sources
  - Awareness of foods or spices that are consumed in large quantities
  - Discussion of complementary or alternative practices such as herbs and supplements
  - Ability to monitor diet patterns and trends
Hidden Sources of Grapefruit in Beverages: Potential Interactions with Immunosuppressant Medications

Ashley A. Auten, PharmD, Candidate, Lauren N. Beauchamp, PharmD, Candidate, Joshua Taylor, PharmD, Candidate, and Karen L. Hardinger, PharmD, PhD

Results:

Twenty-three beverage products were identified that contained grapefruit in the product name. In addition to the confirmed grapefruit-containing products, 17 products were identified as possibly containing grapefruit juice or grapefruit extract.

<table>
<thead>
<tr>
<th>Coca-Cola Products</th>
<th>Dr. Pepper/7-Up Products</th>
<th>Pepsi-Cola Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada Dry Citrus Blend</td>
<td>7-Up (multiple flavors)</td>
<td>Lipton Diet Green Tea with Citrus</td>
</tr>
<tr>
<td>Full Throttle Citrus Blend</td>
<td>Country Time Lemonade</td>
<td>Propel - Citrus Punch with Calcium</td>
</tr>
<tr>
<td>Nestea Grapefruit Honey Green Tea</td>
<td>Crush (citrus flavors)</td>
<td>Sierra Mist (multiple flavors)</td>
</tr>
<tr>
<td>Nestea Grapefruit Citrus Blend</td>
<td>Orangeina</td>
<td>SoBe Energy Citrus Energy</td>
</tr>
<tr>
<td>Fanta Grapefruit</td>
<td>Grapefruit</td>
<td>Fanta Grapefruit Juice</td>
</tr>
<tr>
<td>Fanta Grapefruit Lemon-Lime</td>
<td>Sun Drop Diet Sun Drop</td>
<td>Fanta Grapefruit Raspberry</td>
</tr>
<tr>
<td>Fanta Grapefruit Orange</td>
<td>Ocean Spray Ruby Red Grapefruit Juice Drink</td>
<td></td>
</tr>
<tr>
<td>Fanta Grapefruit Diet</td>
<td>Fanta Premium Golden Grapefruit Juice</td>
<td></td>
</tr>
<tr>
<td>Minute Maid Grapefruit Juice</td>
<td>Tropicana Pure Premium Ruby Red Grapefruit Juice</td>
<td></td>
</tr>
<tr>
<td>Simply Grapefruit</td>
<td>Tropicana Pure Premium Golden Grapefruit Juice Calcium &amp; Vitamin D</td>
<td></td>
</tr>
</tbody>
</table>
WELL KNOWN DRUG-NUTRIENT INTERACTIONS

- Grapefruit juice alters the rate that medication is broken down or how much medication is absorbed – examples: cyclosporine, methylprednisolone, statins, calcium channel blockers
  - Pomegranate/juices, Pomelos and Seville oranges may cause similar toxicity
  - Clementines, mandarins and limes may to a lesser extent
  - Avoid in excess: grapes/red wine, cranberries, tangerines, cauliflower, broccoli, caffeine, soy, coffee/chicory, tea, chocolate
- Supplemental vitamin C may impair immune-suppressing response
- Sirolimus – keep food intake consistent if consumed

HERBS, SUPPLEMENTS AND CAM

• Thirty-forty percent of Americans use herbal products regularly

• Single center study of 323 adult transplant patients indicated:
  • 20% of adult pre and post transplant patients used CAM
  • 67% were self-prescribed
  • Often mega-doses
  • Question left blank about whether discussed with health care providers

• National Center for CAM website: www.nccam.nih.gov

Crone 1997
MAJOR INTERACTIONS

- Prescribing information lists grapefruit/grapefruit juice and St. John’s Wort to be avoided; however, there may be other interactions
  - Grapefruit/juice enhances metabolism
  - St. John’s Wort slows metabolism
- Fish oil supplements may increase sirolimus levels
- Additional herbs to consider avoiding:
  - echinacea, ginseng/Asian ginseng, feverfew, herbal teas (chamomile*, green, peppermint, dandelion), large doses of garlic, berberine*, bergamottin, guggul*, goldenseal*, ephedra*, black cohosh, hawthorne, licorice, schisandra sphenanthera, kava, cat’s claw, frankincense, dong quai, phellodendron, testosterone, heavy use of: pepper, cloves, cucuma, ginger, thyme, sage, oregano, turmeric, and other pungent spices

MEMORIAL SLOAN KETTERING “ABOUT HERBS”

For Healthcare Professionals

Herb-Drug Interactions

- Anticoagulants / Antiplatelets: Turmeric may increase the risk of bleeding, as it also has anticoagulant properties.
- Camptothecin: Turmeric inhibits camptothecin-induced apoptosis of breast cancer cell lines.
- Methotrexate: Turmeric inhibits methotrexate-induced apoptosis of breast cancer cell lines.

Drugs metabolized by the CYP2D6 enzyme: Curcumin inhibits cytochrome 2D6 activity and has the potential to interact with CYP2D6 substrates.

- Tacrolimus: Pretreatment with turmeric increases the plasma levels of tacrolimus.
- Acetaminophen: The cytotoxic effects of curcumin increased significantly in the presence of acetaminophen.
- Ibuprofen: The cytotoxic effects of curcumin increased significantly in the presence of ibuprofen.
Peppermint

Common Names

- Balm mint
- Japanese peppermint
- Lamb mint
- Our Lady’s mint

For Patients & Caregivers

Contraindications

Adverse Reactions

Herb-Drug Interactions

- Peptidase: Peppermint oil has been reported to increase bioavailability of Peptidase D-herbal.

- Cyclosporine: Peppermint oil increases the bioavailability of cyclosporine in rats. However, a patient with renal transplant had decreased cyclosporine level after consumption of herbal tea containing peppermint.

References


• Avoid grapefruit, grapefruit juice and products with grapefruit juice/extract
• Avoid bitter citrus fruits such as Seville oranges and Pomelo
• Limit other citrus products such as clementines or mandarins
• Avoid eating any food in excess without discussing with your dietitian
• Spices or teas eaten often or in large amounts should be discussed with your dietitian
• Vitamin C and other supplements should only be consumed with supervision of the medical team
• If you take sirolimus (Rapamune®) follow instruction from your medical team regarding whether to eat or not and if food is consumed, keep the amount consistent
• If you wish to use complementary products, herbs or supplements, please discuss with your medical team. Although there is not regulation for supplements so no alternative products can be guaranteed, your team may be able to help you determine ones more safe for transplant versus products that could interfere with your kidney transplant or transplant medications
REFERENCES


Partnership for Food Safety Education: www.fightbac.org, accessed January 10, 2019


REFERENCES


THANK YOU FOR YOUR TIME!

Questions?