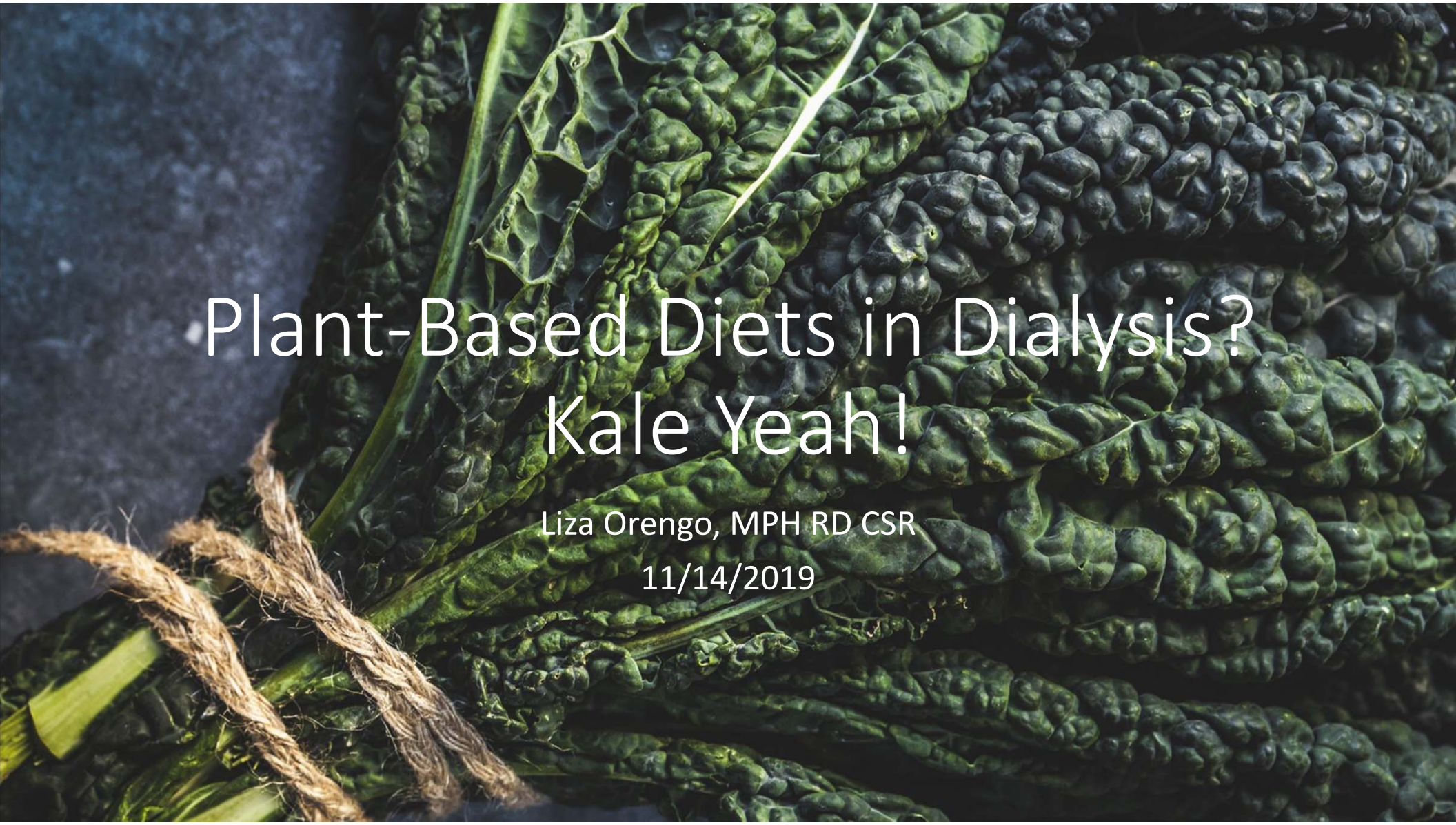


Plant-Based Diets in Dialysis? Kale Yeah!

Liza Orengo, MPH RD CSR

11/14/2019

ACORN Dietetics, LLC

Advancing Clinical Outcomes with Renal Nutrition

About Me

- Renal Dietitian for DaVita 2009-2015
- Facility Administrator for DaVita 2015-2018
- 2019: Owner of ACORN Dietetics, LLC, a renal-specific private practice
- 2019: Renal Dietitian for Fresenius in Dodgeville and Madison, WI

Financial disclosure

I have nothing to disclose

Learning Objectives

Apply evidence-based findings to improve the practice, service-delivery, and health and nutrition of dialysis patients (6.3.11)

Assess the current knowledge and skills of your patient population to adopt a plant-based diet (9.4)

Implement an individualized teaching plan that facilitates integration of plant-based eating (9.4)

Overview

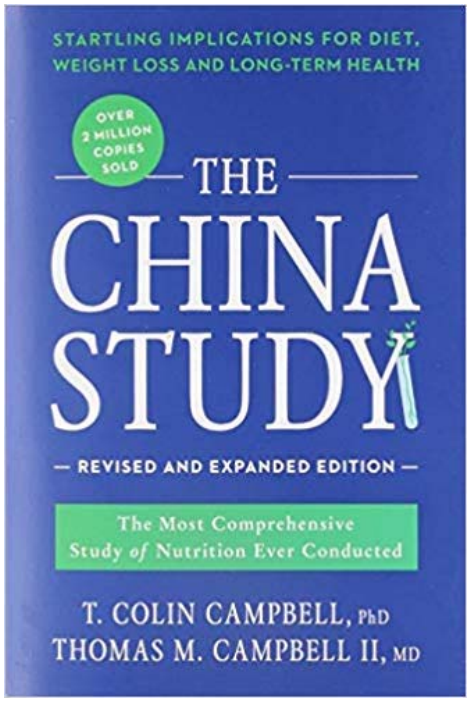
KEY ELEMENTS OF A PLANT-BASED DIET

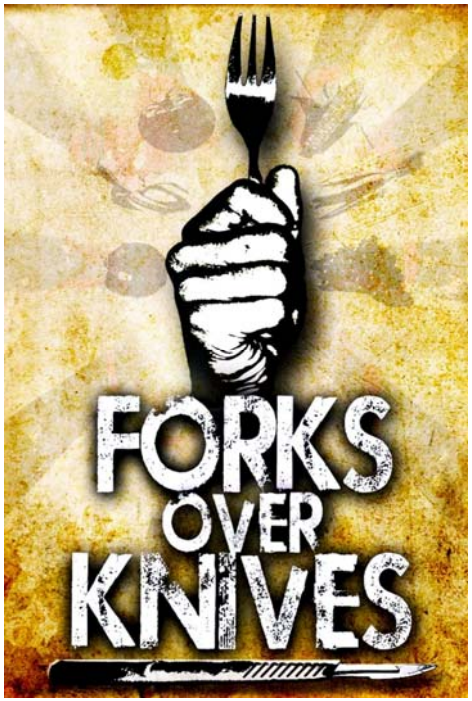
CLINICAL CONSIDERATIONS IN PLANT-BASED EATING FOR ESRD PATIENTS

SUPPORTING YOUR PATIENTS' TRANSITION TO PLANT-BASED EATING

Plant-Based Eating 101

Plant-Based Popularity





Plant-Based Eating

Whole grains

Vegetables

Fruit

Plant-based protein

Plant-based fats

Red meat

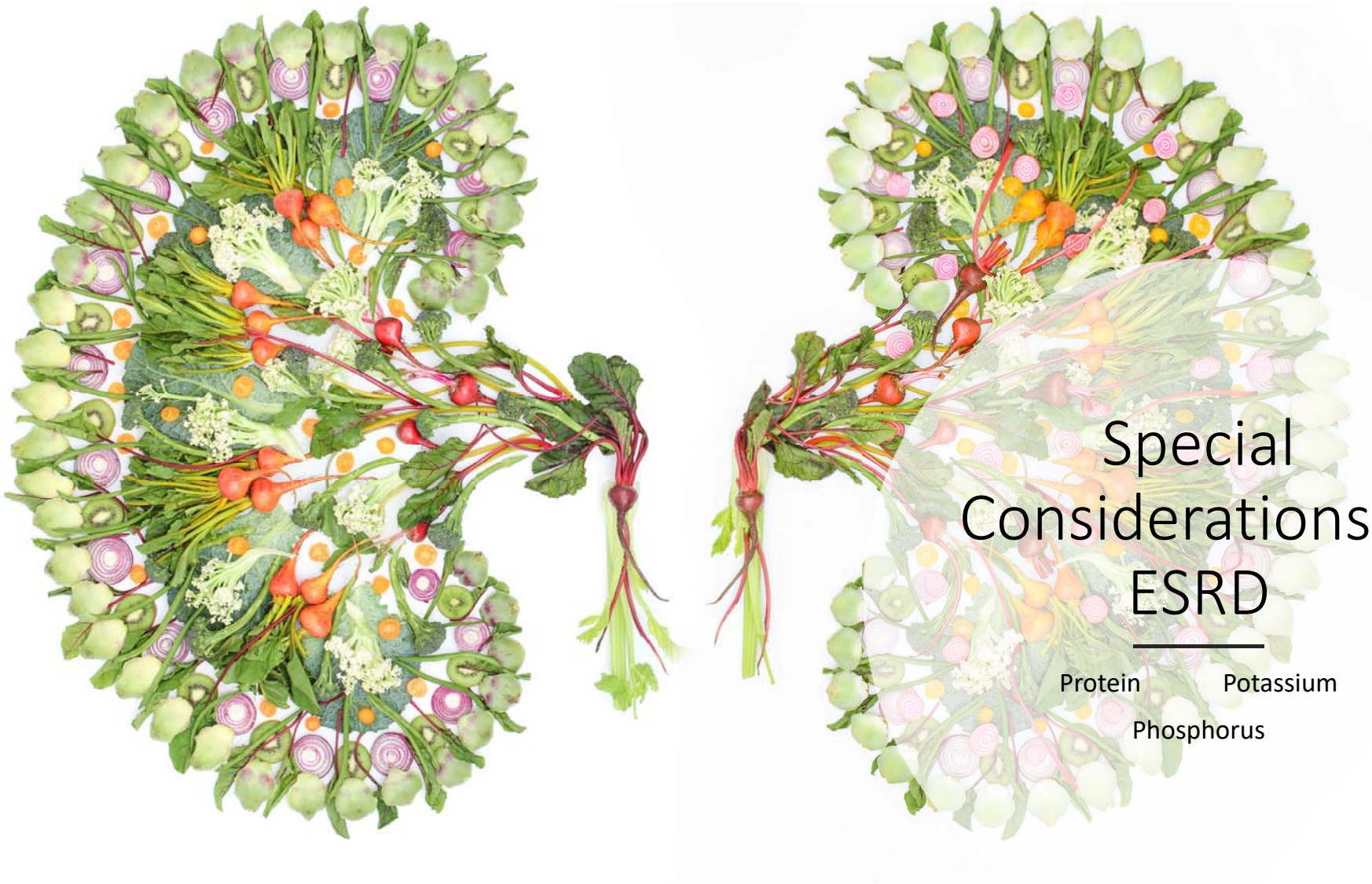
Processed Sugar

Dairy

Refined grains

Animal fats

Plant-based diets in current literature



Special Considerations in ESRD

Protein Potassium

Phosphorus

Protein/Energy Wasting

- Defined as ”a form of chronic disease-related malnutrition that is contributed to, and complicated by, exposure to chronic inflammatory, hypermetabolic, and/or hypercatabolic conditions.”

Protein/Energy Requirements

Energy: 30-35 kcal/kg ABW

Protein:

1.2 g/kg ABW (HD)

1.3 g/kg ABW (PD & HHD)

- 8-10 ounces protein per day
- 50% High Biological Value

Animal Protein vs. Plant Protein

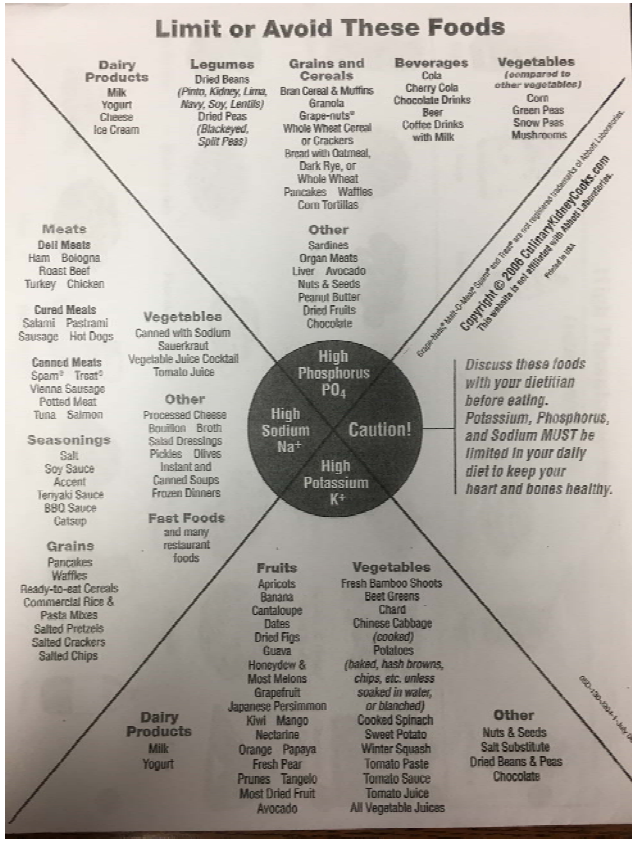
Animal Protein

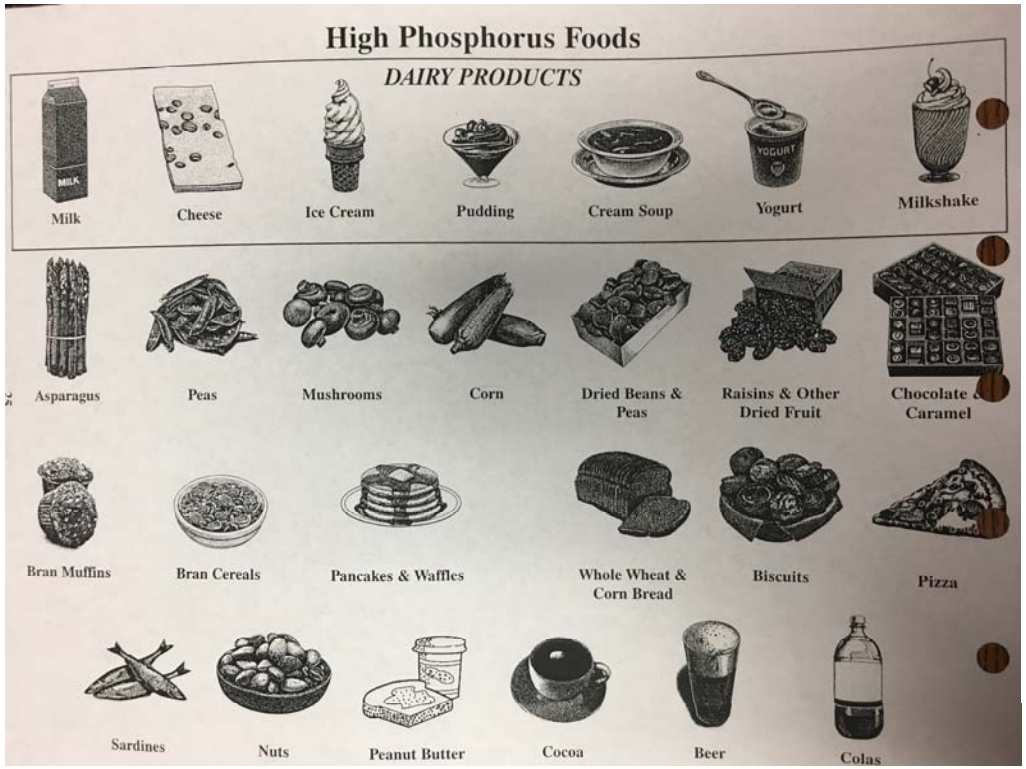
- 2-7x protein per calorie
- 2-3x protein per serving

Plant Protein

- Fiber

Appetite & Intake





http://www.CulinaryKidneyCooks.com

Protein Content and Potential Renal Acid Load

Taken from St Jules DE, et al. "Managing protein-energy wasting in hemodialysis patients: A comparison of animal- and plant-based protein foods." Seminars in Dialysis 2019 32:41-46

TABLE 1 Protein content and potential renal acid load of animal- and plant-based protein foods

Food	USDA Code	Protein (g)		PRAL (mEq)
		3-oz	100-kcal	3-oz
Meat		23.4	13.3	12.3
Ground beef, 80% lean	23576	21.5	10.0	10.7
Chicken, mixed[a]	05041/05045	24.8	15.6	13.3
Ground pork, 84% lean	10975	22.7	9.2	11.2
Turkey, mixed[a]	05220/05188	24.6	18.3	14.0
Finfish		19.3	19.9	9.5
Salmon	15086	22.5	16.9	11.9
Tuna, canned light	15121	16.5	22.6	8.6
Tilapia	15262	22.2	20.4	9.6
Cod	15016	19.4	21.8	8.4
Catfish	15233	15.7	17.6	9.0
Shellfish		19.7	22.2	8.4
Shrimp	15271	20.4	24.3	11.2
Crab	15226	19.0	20.2	5.6
Eggs	01129	18.9	8.1	13.5
Nuts		7.3	2.8	1.6
Peanuts	16390	10.4	4.2	2.8
Almonds	12063	8.9	3.5	0.8
Pecans	12143	4.0	1.3	0.9
Walnuts	12157	6.0	2.2	2.0
Seeds		7.6	3.6	−3.1
Sesame seeds	12024	7.2	3.0	−0.1
Pumpkin seeds	12163	7.9	4.2	−6.1
Legumes		12.8	7.4	1.5
Pinto beans	16043	11.6	6.3	−1.5
Navy beans	16038	11.2	5.9	−1.5
Chickpeas	16057	10.9	5.4	3.2
Lentils	16070	13.4	7.8	3.2
Tofu, firm	16126	17.1	11.6	4.2

PRAL, potential renal acid load.

Animal Protein vs. Plant Protein

Animal Protein

- 2-7x protein per calorie
- 2-3x protein per serving
- 8-14mEq hydrogen ions

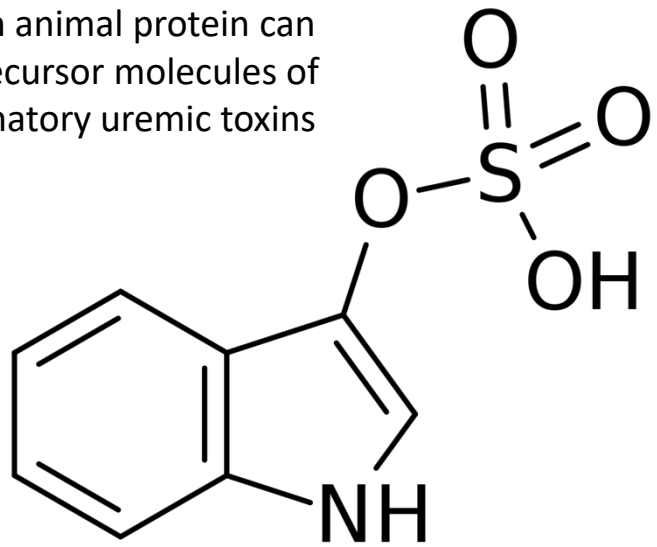
Plant Protein

- Fiber
- -3 to 2 mEq hydrogen ions

Uremic Toxins

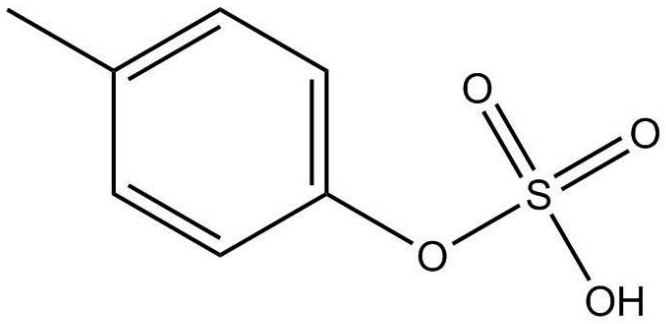
Indoxyl Sulfate

Diets high in animal protein can increase precursor molecules of pro-inflammatory uremic toxins



Precursor AA: Tryptophan

P-Cresyl Sulfate



Precursor AAs: Tyrosine and Phenylalanine

Microbiome

Diets low in fruits, vegetables, and yogurt have lower prevalence of fiber and probiotics present in the gut, which can lead to gut dysbiosis

Restoration of gut symbiosis via increased fruit, vegetable, yogurt, and/or probiotic intake may reduce inflammation and improve clinical outcomes in CKD patients

Animal Protein vs. Plant Protein

Animal Protein

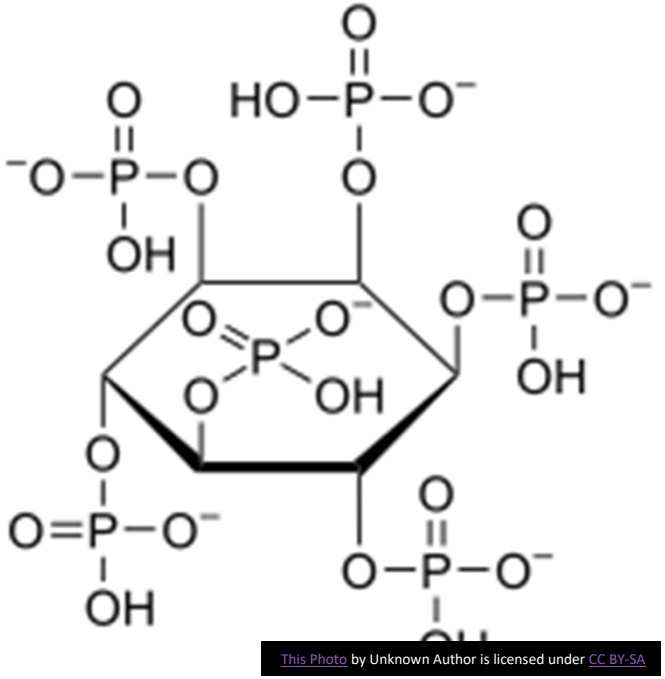
- 2-7x protein per calorie
- 2-3x protein per serving
- 8-14mEq hydrogen ions
- GDUT’s

Plant Protein

- Fiber
- -3 to 2 mEq hydrogen ions
- Fewer GDUT’s

Plant-based Protein Supplements

- Plant-based protein supplements can take many forms
  - Pea protein
  - Brown rice protein
  - Sunflower seed protein
  - Soy protein
  - Pumpkin seed protein
- Check micronutrient levels



Bone & Mineral Outcomes

- Phosphorus from plant foods
  - Stored in plants as phytate, also referred to as InsP6
  - Predominantly present in unprocessed foods
  - Plant-based dietary phosphate is less well-absorbed
    - <40% for plants, vs 40-60% for animal foods

Vascular Calcification

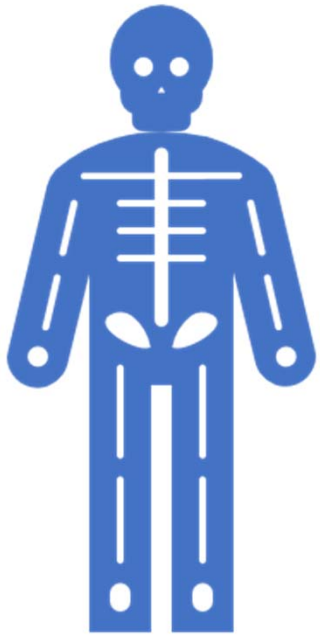
- Directly contributes to morbidity and mortality in the CKD population
  - Calcifications of the arterial wall
  - Calciphylaxis
  - Formed by hydroxyapatite
- InsP6 inhibits crystallization and has a higher potency than traditional pharmacological treatments for vascular calcification

Vascular Calcification

- Animals studies by Grases et al produced the following results:
  - Rats fed a diet high in InsP6 had calcium levels 40% lower than those on diets without InsP6
  - Two groups of rats were induced to have hypertension and hypercalcemia
    - The group on a diet devoid of InsP6 developed calcifications in renal papillae, renal interstitium, renal tubules, and renal vessels
    - The group that received InsP6 injections did not develop calcification.
  - Intravenous administration of InsP6 reduced calcifications by 60% in the aorta and 68% in myocardial tissue of male Sprague-Dawley rats. A control group treated by cinacalcet saw a reduction of vascular calcification of 24%.

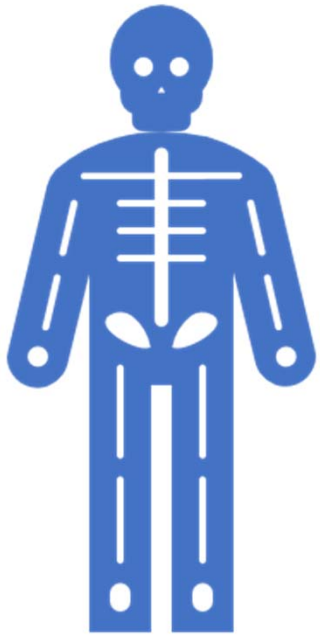
Vascular Calcification

- Prospective cross-sectional study by Sanchis et al looked at single lateral abdominal plaque in patients with CKD stage 2-3. Dietary survey completed to assess InsP6 intake and urine measured for InsP6 metabolites.
- Patients without calcifications had a significantly higher intake of InsP6 and greater elimination of InsP6 in urine
- Lentil consumption was higher among patients with less calcifications



Vascular Calcification

- Indoxyl sulfate (IS) is directly related to aortic calcification, vascular stiffness, and adverse cardiovascular events.[18]
- Higher serum indoxyl sulfate concentrations are associated with increased overall and cardiovascular mortality.[18]
- Key drivers:
  - IS induces oxidative stress
  - IS impairs the ability of endothelial cells to heal



Phosphate reduction can increase malnutrition

Restriction of dietary phosphorus may have unintended consequence of restricting protein sources.

Survival 27% higher in patients with >1000mg phosphorus rx, and 29% higher in patients with no phosphate restriction.

Potassium

Not all sources are created equally

Supporting Patients from Knowledge to Action

Barriers

Western culture places a high value on animal intake

Culture of dairy in the Dairyland

Attachment to meat

Lack of knowledge about plant-based diets

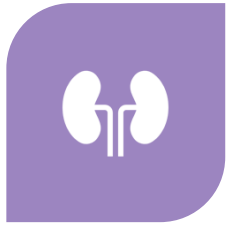
Food insecurity

Family support

GAUGE MOTIVATION AND INTEREST IN ADOPTING A PLANT-BASED DIET

IDENTIFY & ENGAGE SUPPORTIVE FAMILY MEMBERS

IS PHOSPHORUS BINDER PRESCRIPTION ADEQUATE TO COVER ACTUAL PHOSPHORUS INTAKE?



IS A POTASSIUM BINDER APPROPRIATE TO ADD?

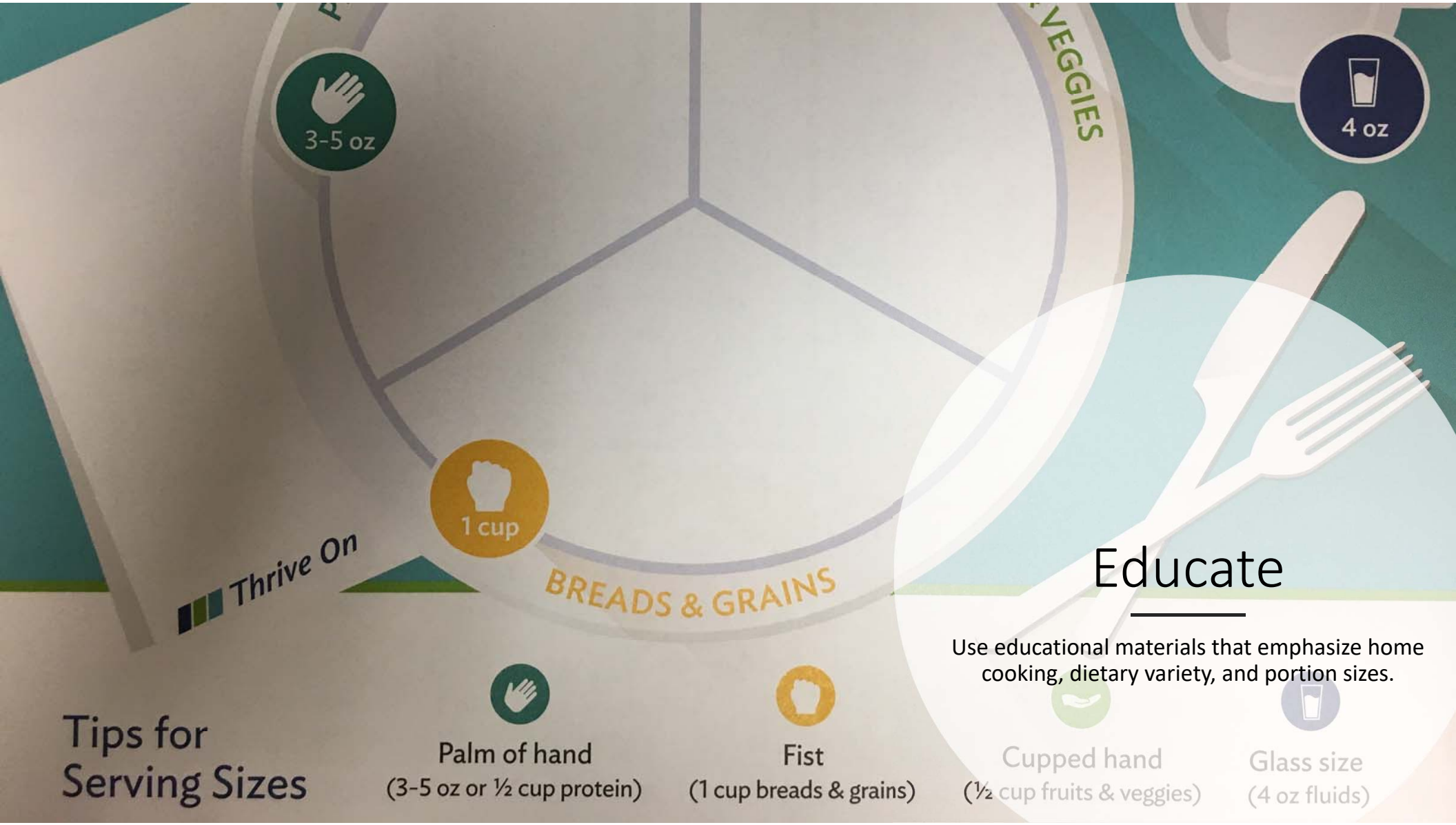
Evaluate

Learn

Give plant-based cooking a try

Educate

- Include those family, friends, and caregivers who help patients make dietary choices in our nutrition education sessions



Educate

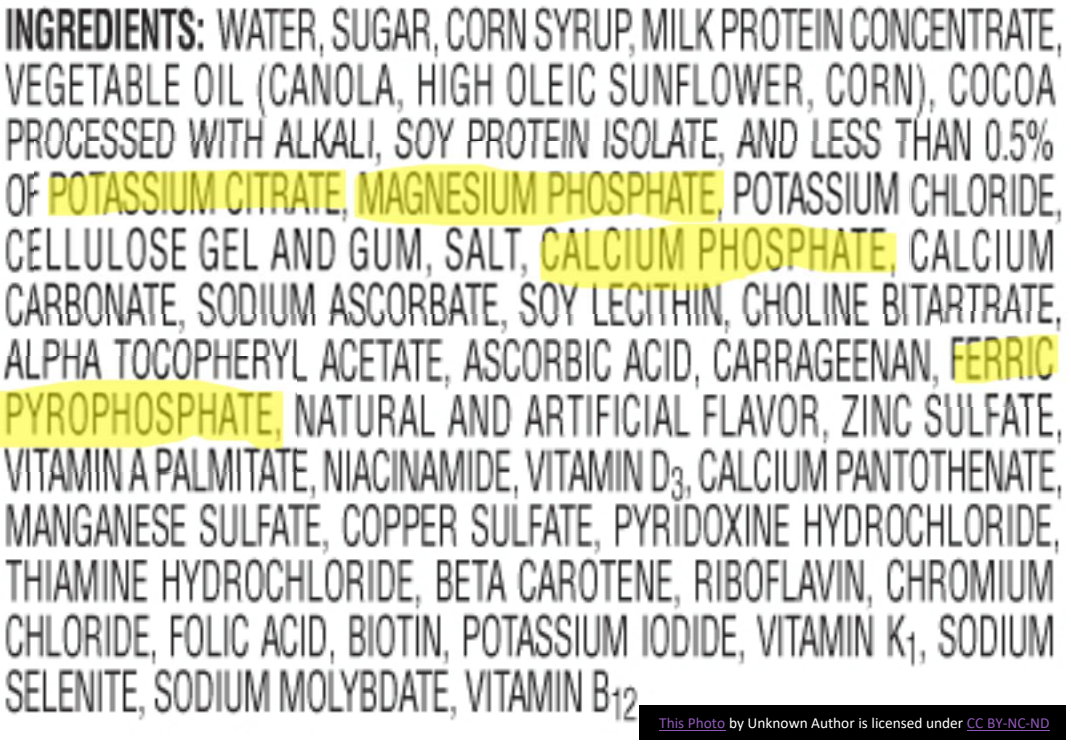
Use educational materials that emphasize home cooking, dietary variety, and portion sizes.

Educate

Teach patients how to take binders correctly, and how to adjust the number of binders per meal to account for the phosphorus content/meal

Educate

- How to evaluate different sources of dietary phosphate
- How choose foods with a lower phosphate to protein ratio



Educate

Teach patients how to cook

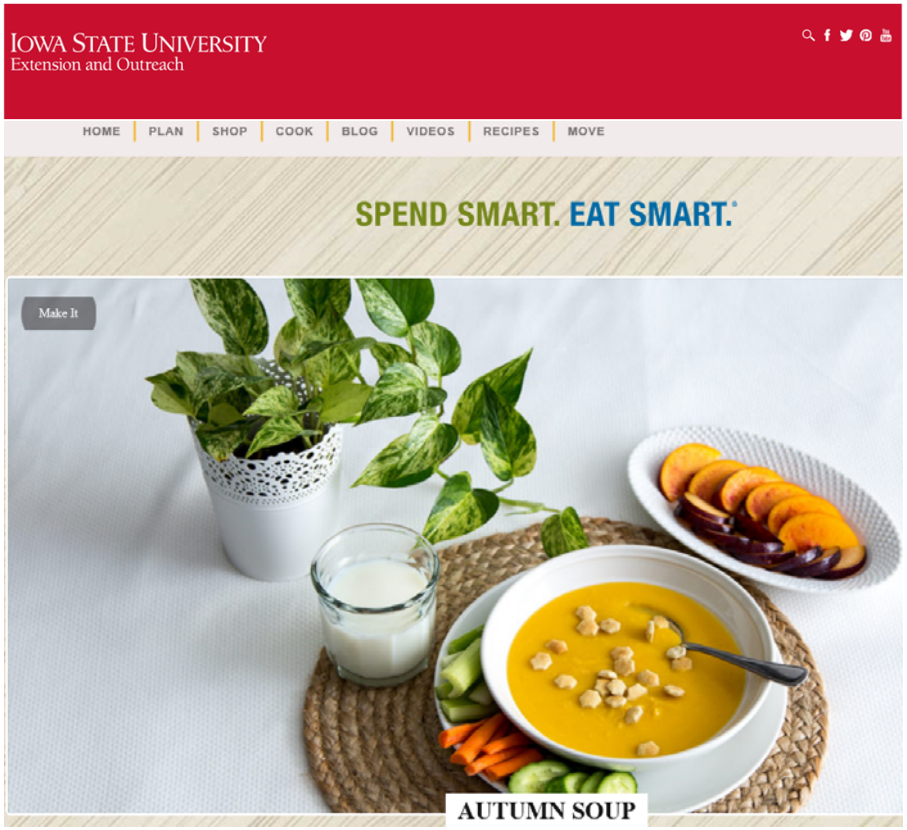
- Techniques to reduce potassium content
- How to handle unfamiliar foods
- How to season vegetables
- Plant-based recipes

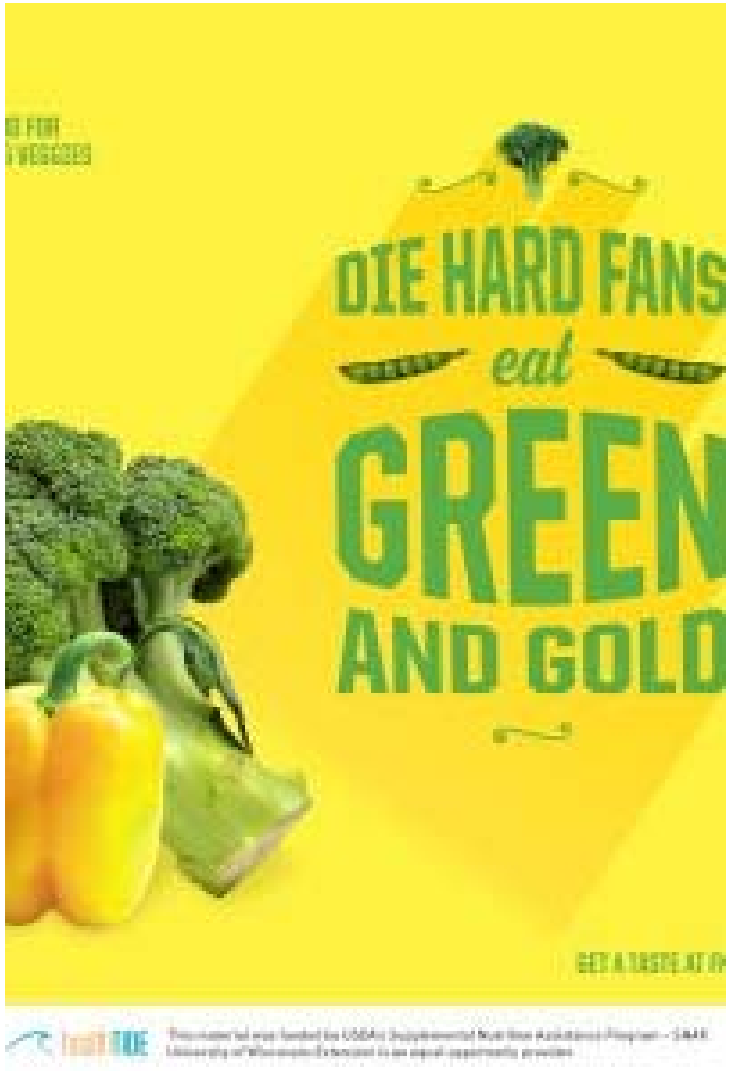
Educate

- How to properly select and store plant-based foods
- How to stock a plant-based pantry
- How to prevent food waste

Use Community Resources

- University of Wisconsin FoodWise
- Iowa State University Extension and Outreach Spend Smart. Eat Smart



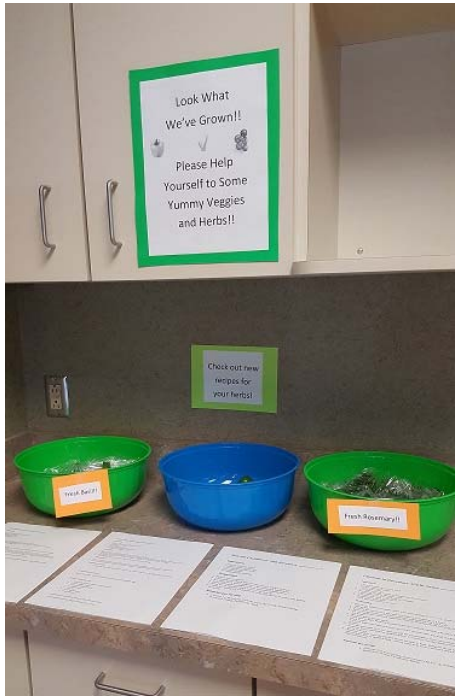


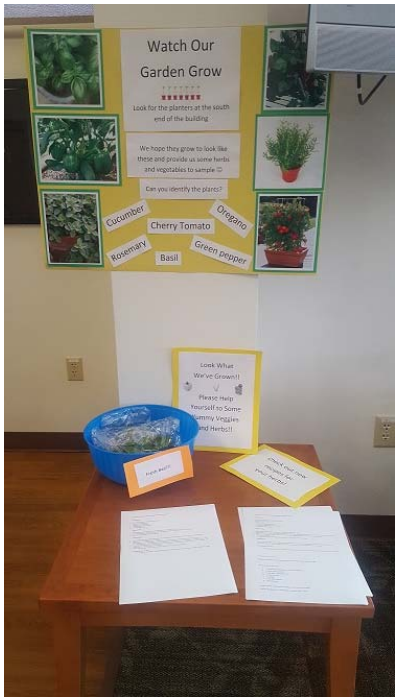
UW Extension healthTIDE This material was funded by USDA's Supplemental Nutrition Assistance Program – SNAP.

Market Fruits & Veggies

Connect Patients and Resources

- Wisconsin Seniors Farmers Market Program
- Did you know most local farmers markets have vendors that accept EBT?





Innovate

Photos courtesy of Jill Hoyt, RDN

FRESENIUS MEDICAL CARE

yammer

DaVita® Kidney Care

Collaborate

Summary

Liberalizing dietary options may help promote adequate protein/calorie intake for dialysis patients

Plant-based phosphorus and potassium may impact hyperkalemia and hyperphosphatemia differently than animal-based or inorganic forms of phosphorus and potassium

Plant foods may have beneficial effects on vascular calcification, the gut microbiome, and GI symptoms in dialysis patients

Culture change required to move away from a meat-based, plant-restricted diet model to one that considers individual patient needs and interests

Education, advocacy, and innovation among renal nutrition practitioners are essential to help patients increase proportion of plant foods in the diet

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Questions?