



**NUTRITION AND THE SCIENCE OF AGING:
KEY NUTRIENTS IN AGING**

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NUTRITION AND THE SCIENCE OF AGING- PART 2

- Katie M. Dodd, MS, RDN, CSG, LD, FAND
- The Geriatric Dietitian
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AGENDA

- Recap from Part 1
- Key Nutrients
- Protein
- Fiber
- Vitamin B-12
- Vitamin B-6
- Calcium
- Vitamin D
- Take Home Messages
- Call to Action



LEARNING OBJECTIVES

Upon successful completion of these webinars, the participant should be able to:

- Recognize the *changing nutrition needs* in the older adult
- Identify *key nutrients* with higher requirements in the aging body
- Be able to identify *food sources* of key nutrients for older adults
- Implement *practical techniques* to improve nutrition status in older adults



RECAP FROM PART 1

- The **physiology of aging** is complex
 - Biological, physical, and functional changes



- **Increased risk of:**
 - Nutrient deficiency
 - Muscle loss
 - Malnutrition

- Good nutrition= **Maintaining independence**



POLL

What nutrient has a lower Recommended Dietary Intake (RDA) level for older adults?

- a. Protein
- b. Fiber
- c. Vitamin B-12
- d. Calcium



KEY NUTRIENTS

- **Every nutrient is important**
- Key nutrients covering:
 - **Protein** (↑ needs)
 - **Fiber** (↓ needs)
 - **Vitamin B-12**
 - **Vitamin B-6** (↑ needs)
 - **Calcium** (↑ needs)
 - **Vitamin D** (↑ needs)



DRUG-NUTRIENT INTERACTIONS

- **Prescription medications and older adults:**
 - 90% take at least one
 - 80% take at least two
 - 35% take five or more
- **Drug-nutrient interactions**
- **Work with healthcare team**



PROTEIN: INTRODUCTION

- Protein is found in every cell in the body!



- **Involved in:**
 - Overall health
 - Immunity
 - Muscle
 - Physical Function
- Promotes independence



PROTEIN: HOW MUCH?

Recommended Dietary Allowance

Life Stage Group	Needs for Men and Women
19+ years	0.8 grams per kilogram body weight

- **Needs may be higher in older adults:**
 - 1-1.2 grams per kilogram body weight
 - Along with endurance and resistance exercise
- Too little can cause malnutrition or muscle loss



PROTEIN: FOOD SOURCES

Animal products, legumes, nuts, grains, produce

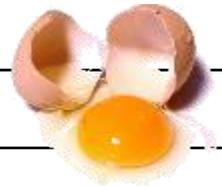
Food Source	Amount per serving	Gms per serving
Beef	3 ounces	24
Greek Yogurt (low fat)	1 cup	24
Salmon	3 ounces	22
Chicken	3 ounces	20
Lentils (cooked)	1 cup	17
Almonds	0.3 cups	10
Milk (low fat)	1 cup	8
Quinoa (cooked)	1 cup	8



PROTEIN: FOOD SOURCES

Vegetarians should eat a wide variety of high protein

Food Source	Amount per serving	Gms per serving
Chickpeas	0.5 cup	7
Egg	1 large	6
Oatmeal (cooked)	1 cup	5
Spinach (cooked)	1 cup	5
Green peas	0.5 cups	4
Avocado	0.5 cup	2
Apricot	1 cup	2



PROTEIN: STRATEGIES TO OPTIMIZE INTAKE

- *When Shopping:*
 - Purchase foods naturally high in protein like meat, lentils, and eggs
 - Read food labels for protein content

Nutrition Facts	
8 servings per container	
Serving size	2/3 cup (55g)
<hr/>	
Amount per serving	230
Calories	
<hr/>	
% Daily Value*	
Total Fat 8g	10%
Saturated Fat 1g	5%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 160g	7%
Total Carbohydrate 37g	13%
Dietary Fiber 4g	14%
Total Sugars 12g	
Includes 10g Added Sugars	20%
Protein 3g	
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Vitamin D 2mcg	10%
Calcium 280mg	20%
Iron 8mg	45%
Potassium 240mg	6%
<hr/>	
<small>*The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.</small>	



PROTEIN: STRATEGIES TO OPTIMIZE INTAKE

- ***During Meal Preparation:***

- Include high protein foods at every meal throughout the day
- Breakfast is a good opportunity for protein
- Include meat, beans, and lentils throughout week



- ***At the table:***

- Offer beverages high in protein such as milk or milk-alternatives
- Provide high protein foods as snacks

FIBER: INTRODUCTION

- Type of carbohydrate unable to digest.
- **Involved in:**
 - Healthy digestion
 - Reducing risk of heart disease, diabetes, some cancers
 - Reducing inflammation



FIBER: HOW MUCH?

Recommended Dietary Allowance:

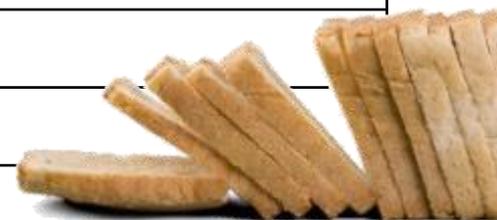
Life Stage Group	Men	Women
31-50 years	38 grams	25 grams
51-70 years	30 grams	21 grams
>70 years	30 grams	21 grams

- **Too little:** constipation, increased risk chronic disease
- **Too much (too quickly):** gastrointestinal issues



FIBER: FOOD SOURCES

Food Source	Amount per serving	Gms per serving
Chickpeas	0.5 cups	11
Black beans	0.5 cups	7
Almonds	0.3 cups	6
Quinoa (cooked)	1 cup	5
Broccoli	1 cup	5
Oatmeal (cooked)	1 cup	4
Apple	1 medium	4
Banana	1 medium	3
Whole wheat bread	1 slice	2
Brown rice	0.5 cups	2
Cabbage (raw)	1 cup	2
Shelled pumpkin seeds	1 ounce	2



FIBER: STRATEGIES TO OPTIMIZE INTAKE

- *When Shopping:*
 - Purchase foods naturally high in fiber like fruits, vegetables, and whole grains
 - Read food labels for fiber content

Nutrition Facts	
8 servings per container	
Serving size	2/3 cup (55g)
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Amount per serving	
Calories	230
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% Daily Value*	
Total Fat 8g	10%
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Calcium 260mg	20%
Iron 8mg	45%
Potassium 240mg	6%
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FIBER: STRATEGIES TO OPTIMIZE INTAKE

- ***During Meal Preparation:***

- Incorporate plant-based food options into meal planning
- Add vegetables or salad with lunch or dinner
- Prepare whole grains more often than refined grains



- ***At the table:***

- Serve cooked and/or chopped vegetables for older adults with difficulty chewing
- Offer fruits and vegetables as snacks



VITAMIN B-12: INTRODUCTION

- Water-soluble vitamin
- **Involved in:**
 - Making DNA
 - Red blood cell formation
 - Nerve function
 - Bone health
- Found in animal products



VITAMIN B-12: HOW MUCH?

Recommended Dietary Allowance

Life Stage Group	Needs for Men and Women
14+ years	2.4 mcg

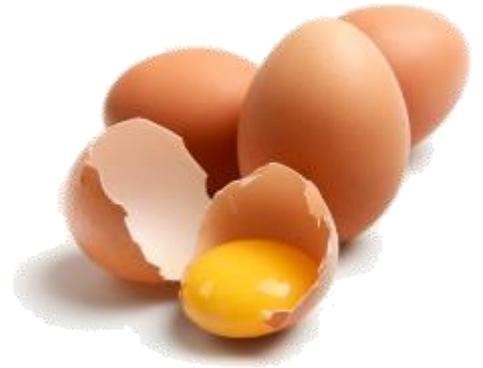
- 10-30% older adults unable to absorb vitamin B-12 through food sources
- **Too little:** anemia, fatigue, GI issues, weight loss, neurological changes, confusion, sore mouth/tongue
- **Too much:** unlikely (no UL)



VITAMIN B-12: FOOD SOURCES

- **Found in animal products**

- Seafood
- Meat
- Dairy
- Eggs



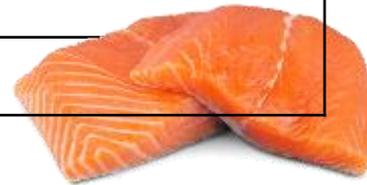
- **And fortified foods**

- Nutritional yeast
- Cereals
- Milk-substitutes



VITAMIN B-12: FOOD SOURCES

Food Source	Amount per serving	mcg per serving
Clams	3 ounces	84.1
Beef liver	3 ounces	70.7
Fortified nutritional yeast	1 serving	6.0
Salmon	3 ounces	4.8
Tuna	3 ounces	2.5
Fortified cereal	1 serving	1.5
Beef	3 ounces	1.4
Milk (low-fat)	8 ounces	1.2
Yogurt (low-fat)	8 ounces	1.1
Egg	1 large	0.6
Chicken breast	3 ounces	0.3



VITAMIN B-12: STRATEGIES TO OPTIMIZE INTAKE

- *When Shopping:*
 - Purchase foods naturally high in vitamin B-12 like seafood and meat
 - Look for food items fortified with vitamin B-12 nutritional yeast and cereals
 - Read food labels for vitamin B-12 content

Nutrition Facts	
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Serving size	2/3 cup (55g)
Amount per serving	
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% Daily Value*	
Total Fat 8g	10%
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VITAMIN B-12: STRATEGIES TO OPTIMIZE INTAKE

- ***During Meal Preparation:***

- Breakfast: eggs, to cereal, to milk
- Lunch and dinner: meat
- Include seafood at least 2 days of the week

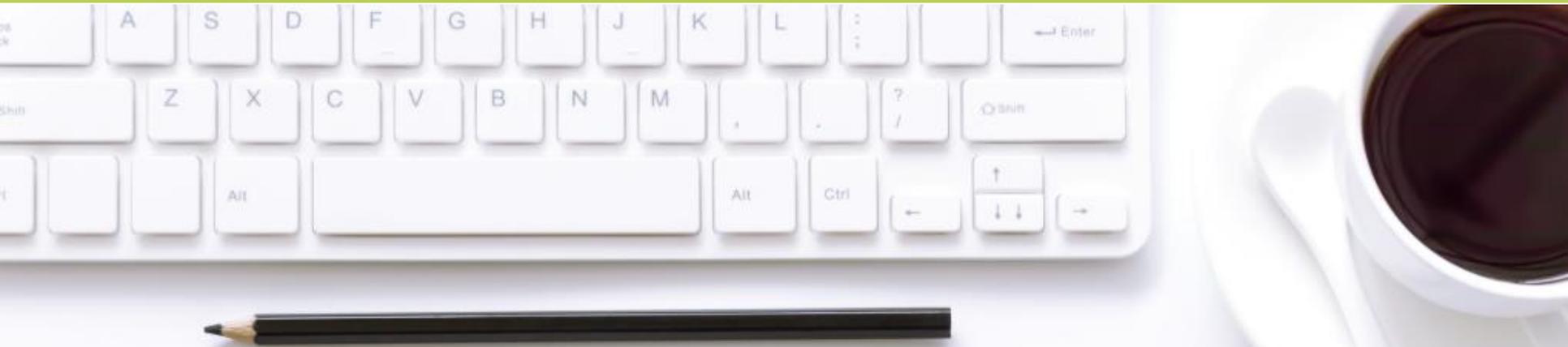


- ***At the table:***

- Offer beverages such as milk or vitamin B-12 fortified beverages
- Provide foods and snacks with fortified vitamin B-12



DISCUSSION QUESTION



What is the biggest barrier you face in ensuring older adults get adequate nutrition?

Enter responses into the chat box on your screen.



VITAMIN B-6: INTRODUCTION

- Water-soluble vitamin
- Involved in:
 - Metabolism
 - Cognition
 - Enzyme reactions
- Found in a wide variety of foods



VITAMIN B-6: HOW MUCH?

Recommended Dietary Allowance:

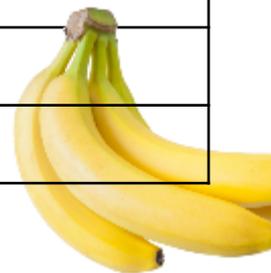
Life Stage Group	Men	Women
51-70 years	1.3 mg	1.3 mg
71+ years	1.7 mg	1.5 mg

- **Too little:** anemia, cracks in corners of mouth, swollen tongue, depression, poor immunity
- **Too much:** Rare, usually from supplementation
- **Upper Limit:** 100 mg



VITAMIN B-6: FOOD SOURCES

Food Source	Amount per serving	mg per serving
Chickpeas	1 cup	1.1 mg
Beef liver	3 ounces	0.9 mg
Salmon	3 ounces	0.6 mg
Chicken breast	3 ounces	0.5 mg
Potatoes (cooked)	1 cup	0.4 mg
Banana	1 medium	0.4 mg
Cottage cheese	1 cup	0.2 mg
White rice	1 cup	0.1 mg
Onions	0.5 cups	0.1 mg
Spinach (cooked)	0.5 cups	0.1 mg
Watermelon	1 cup	0.1 mg



VITAMIN B-6: STRATEGIES TO OPTIMIZE INTAKE

- *When Shopping:*

- Purchase foods naturally high in vitamin B-6 like meats, nuts, fruits, vegetables
- Look for food items fortified with vitamin B-6 like cereals
- Read food labels for vitamin B-6 content

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VITAMIN B-6: STRATEGIES TO OPTIMIZE INTAKE

- ***During Meal Preparation:***

- Lunch and dinner: high vitamin B-6 foods like meat
- Serve a variety of different foods throughout the week

- ***At the table:***

- Offer beverages with vitamin B-6 such as milk
- Provide high vitamin B-6 snacks



CALCIUM: INTRODUCTION

- Calcium is a mineral primarily found in bones & teeth
- **Involved in:**
 - Bone health
 - Muscle function
 - Nerve transmission
 - Hormone secretion
- Oxalic acid decreases absorption of calcium.



POLL

Which food is high in calcium but also contains oxalic acid?

- a. Spinach
- b. Broccoli
- c. Bok Choy
- d. Kale



CALCIUM: HOW MUCH?

Recommended Dietary Allowance:

Life Stage Group	Men	Women
19-50 years	1,000 mg	1,000 mg
51-70 years	1,000 mg	1,200 mg
>70 years	1,200 mg	1,200 mg

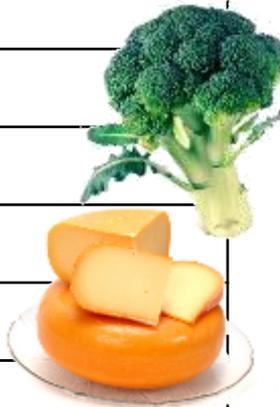


- **Too little:** hypocalcemia, weak bones, fractures
- **Too much:** hypercalcemia, kidney damage, kidney stones
- **Upper Limit:** 2,000 mg



CALCIUM: FOOD SOURCES

Food Source	Amount per serving	mg per serving
Yogurt (plain)	8 ounces	415
Mozzarella cheese	1.5 ounces	333
Milk (nonfat)	8 ounces	299
Fortified soy milk	8 ounces	299
Fortified orange juice	8 ounces	261
Fortified cereal	1 cup	100+
Turnip greens (cooked)	1 cup	197
Almonds	0.3 cup	152
Kale (cooked)	1 cup	94
Bok choy	1 cup	74
Kale (raw)	1 cup	24
Broccoli (raw)	0.5 cup	21



CALCIUM: STRATEGIES TO OPTIMIZE INTAKE

- *When Shopping:*

- Purchase foods naturally high in calcium like dairy products, kale, bok choy, and broccoli
- Look for food items fortified with calcium like beverages and cereals
- Read food labels for calcium content

Nutrition Facts	
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CALCIUM: STRATEGIES TO OPTIMIZE INTAKE

- ***During Meal Preparation:***

- Breakfast: high calcium foods, from cereal to milk
- Prepare cooked vegetables high in calcium (ex. kale, bok choy, and broccoli)



- ***At the table:***

- Offer beverages with calcium such as milk or fortified orange juice
- Include dairy for snacks such as cottage cheese, yogurt, and cheese



VITAMIN D: INTRODUCTION

- Fat-soluble vitamin
- Involved in:
 - Bone health
 - Muscle health
 - Immunity
 - Cognition



- Sunshine vitamin (older adults synthesize less)



VITAMIN D: HOW MUCH?

Recommended Dietary Allowance

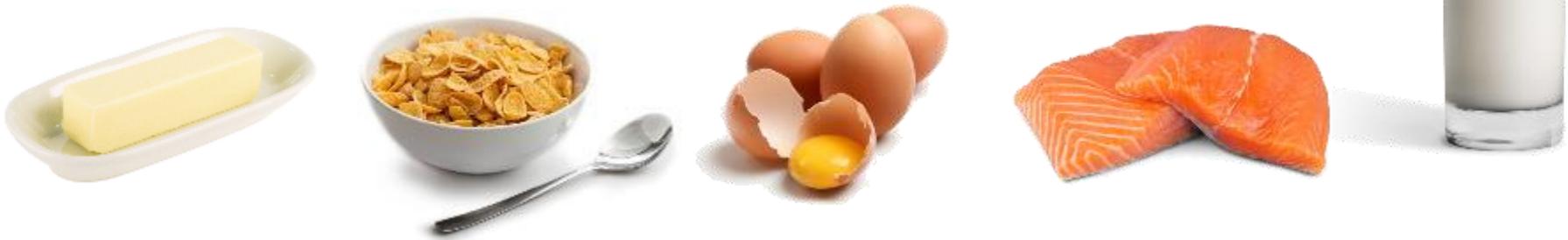
Life Stage Group	Needs for Men and Women
1 - 70 years	15 mcg (600 IU)
> 70 years	20 mcg (800 IU)

- **Too little:** weak bones, health issues
- **Too much:** weight loss, heart issues, kidney damage
- **Upper Limit:** 4,000 IU



VITAMIN D: FOOD SOURCES

Food Source	Amount per serving	IU per serving
Fish liver oil	1 Tbsp	1,360
Fatty fish (salmon)	3 ounces	566
Fortified orange juice	1 cup	137
Fortified milk	1 cup	124
Fortified margarine	1 Tbsp	60
Liver (beef)	3 ounces	42
Egg yolk	1 egg	41
Fortified cereal	1 cup	40



VITAMIN D: STRATEGIES TO OPTIMIZE INTAKE

- *When Shopping:*

- Purchase foods naturally high in vitamin D, like fish and eggs
- Look for food items fortified with vitamin D, like beverages and cereals
- Read food labels for vitamin D content

Nutrition Facts	
8 servings per container	
Serving size	2/3 cup (55g)
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Amount per serving	230
Calories	
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% Daily Value*	
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VITAMIN D: STRATEGIES TO OPTIMIZE INTAKE

- ***During Meal Preparation:***
 - Breakfast is a good opportunity for high vitamin D foods; from eggs, to cereal, to milk
 - Include fish at least 2 days of the week
- ***At the table:***
 - Offer beverages fortified with vitamin D, such as milk
 - Provide fortified soft spread margarines at the table



DISCUSSION QUESTION



What nutrient do you find is the most challenging to incorporate into meals?

Enter responses into the chat box on your screen.



WRAPPING IT UP

Hopefully you now:

- Recognize the *changing nutrition needs* in the older adult
- Identify *key nutrients* with higher requirements in the aging body
- Are able to identify *food sources* of key nutrients for older adults
- Implement *practical techniques* to improve nutrition status in older adults



TAKE HOME MESSAGES

- **Key nutrients** for older adults
- **Food first** for nutrition
- Read **nutrition labels**
- Prepare a wide **variety** of foods
- It's all about **independence**



CALL TO ACTION

- **Evaluate** current strategies
- Identify areas for **improvement**
- **Involve** older adults in menu planning
- **Initiate change** to improve nutrition



REFERENCES

1. <https://www.merckmanuals.com/home/older-people%E2%80%99s-health-issues/aging-and-drugs/aging-and-drugs>
2. Institute of Medicine, Food and Nutrition Board. Dietary Reference Intakes for Energy, Carbohydrates, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids. Washington, DC: National Academy Press, 2005. <https://www.nap.edu/read/10490/chapter/1>
3. Bauer J, Biolo G, Cederholm T, et al. Evidence-based recommendations for optimal dietary protein intake in older people: a position paper from the PROT-AGE Study Group. *Journal Of The American Medical Directors Association*. 2013 Aug 1;14(8):542-59.
4. Deer RR, Volpi E. Protein intake and muscle function in older adults. *Current Opinion In Clinical Nutrition And Metabolic Care*. 2015 May;18(3):248.
5. FoodData Central. U.S. Department of Agriculture website. <https://fdc.nal.usda.gov/>. Accessed November 19, 2019.
6. Dahl WJ, Stewart ML. Position of the Academy of Nutrition and Dietetics: health implications of dietary fiber. *Journal of the Academy of Nutrition and Dietetics*. 2015 Nov 1;115(11):1861-70.
7. Nielsen SJ, Trak-Fellermeier MA, Joshipura K. The Association between Dietary Fiber Intake and CRP levels, US Adults, 2007–2010. *The FASEB Journal*. 2017 Apr;31(1_supplement):648-8.



REFERENCES

8. Institute of Medicine, Food and Nutrition Board. Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B6, Folate, Vitamin B12, Pantothenic Acid, Biotin, and Choline. Washington, DC: National Academy Press, 1998. <https://www.nap.edu/read/6015/chapter/1>
9. ter Borg S, Verlaan S, Hemsworth J et al. Micronutrient intakes and potential inadequacies of community-dwelling older adults: a systematic review. *British Journal of Nutrition*. 2015 Apr;113(8):1195-206.
10. Hughes C, Ward M, Tracey F, et al. B-vitamin intake and biomarker status in relation to cognitive decline in healthy older adults in a 4-year follow-up study. *Nutrients*. 2017;9(1):53.
11. Dietary Reference Intakes (DRIs): Tolerable Upper Intake Levels, Vitamins. National Institutes of Health website. <https://www.ncbi.nlm.nih.gov/books/NBK56068/table/summarytables.t7/?report=objectonly>. Accessed November 19, 2019.
12. Institute of Medicine, Food and Nutrition Board. Dietary Reference Intakes for Calcium and Vitamin D. Washington, DC: National Academy Press, 2011. <https://www.nap.edu/read/13050/chapter/5>
13. Annweiler C, Dursun E, Féron F, et al. 'Vitamin D and cognition in older adults': updated international recommendations. *Journal Of Internal Medicine*. 2015 Jan;277(1):45-57.
14. Miller JW, Harvey DJ, Beckett LA, et al. Vitamin D status and rates of cognitive decline in a multiethnic cohort of older adults. *JAMA Neurology*. 2015 Nov 1;72(11):1295-303.



QUESTIONS?

2020 NRCNA TRAINING OPPORTUNITIES

Stay tuned!

Plan to join us for exciting in-person and virtual training opportunities across a variety of topics:

- Emergency Preparedness
- Medical Nutrition Therapy
- Service Delivery Innovations
- Rural Hunger & Aging Services
- Medically Tailored Meals
- Business Acumen



THANK YOU!



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