Module 13
Nutrition Guidelines for People with Intellectual and Developmental Disabilities
I. Build on the Basics-Part 2

https://www.the-ntg.org/

tional Task Group
Intellectual Disabilities
d Dementia Practices

Section Learning Objectives

Upon completion of this webinar, the participants will be able to:

- Relate the pillars of brain health to lifestyle factors, including healthy eating
- Summarize the major principles in planning a healthy diet
- State the classes of nutrients, their general functions, health benefits, and major food sources.
- Describe how some nutrients may protect the brain from damage and ADRD development.
- Discuss the overall results of studies on the effects of dietary factors on risk reduction for ADRD
- Explain how different diets can be individualized for each person.

Overview of topics

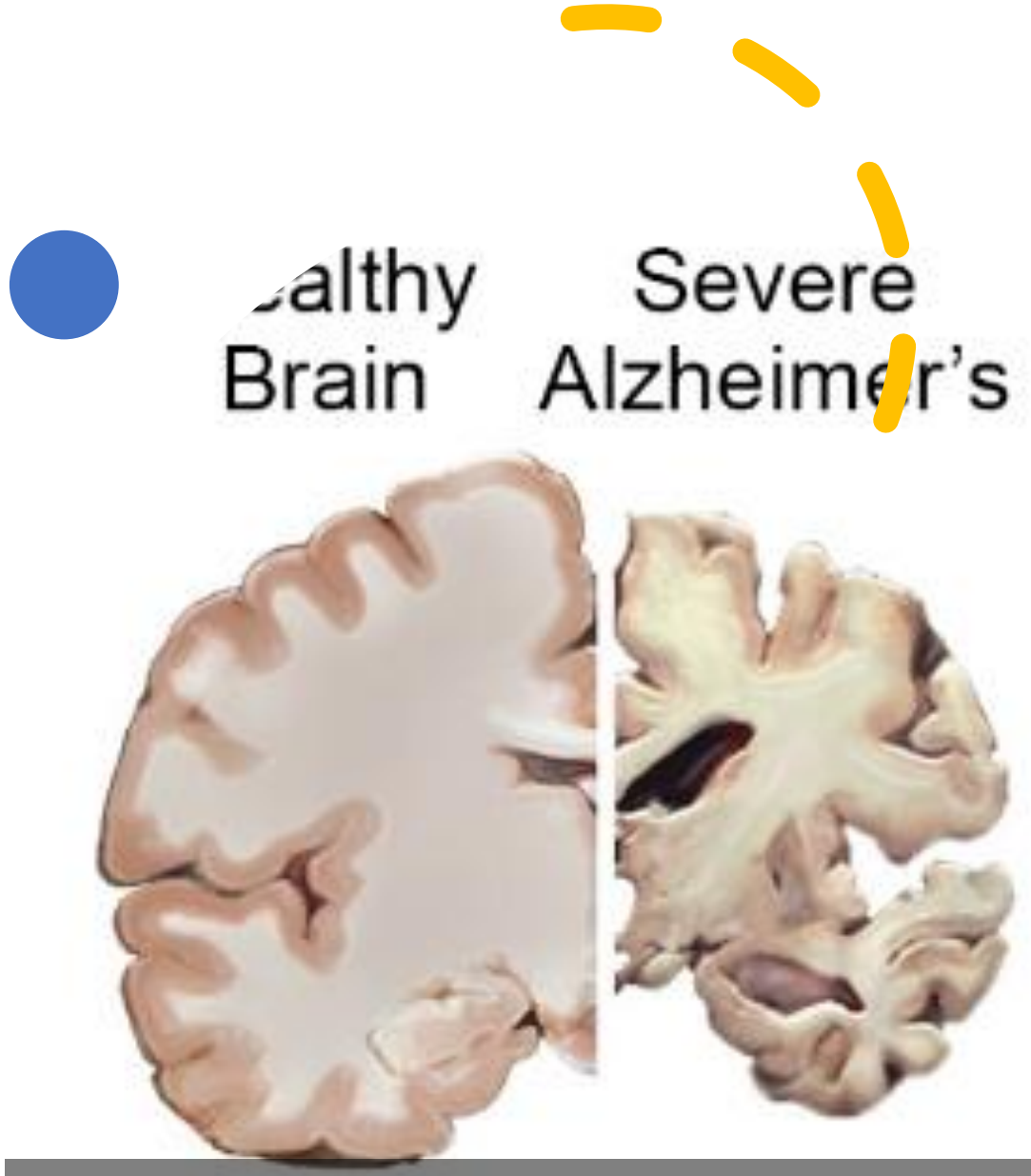
Part 2 of the module on the Basics continues the story in part 1 about healthy eating and the nutrients that foods provide

- Review of the pillars of brain health
- The context: Good nutrition is good for the brain
- Classes of nutrients and the general functions of each class
- Selected nutrients, functions, health benefits and major food sources
- Factors that damage the brain and nutrients that may protect the brain
- Characteristics of a healthy diet and how they can be individualized
- Resources

The Brain: Pillars of Brain Health

- Stay active
- Eat well
- Sleep well
- Exercise your brain
- Connect with friends and family
- Relax and reduce stress
- Control risk factors (diabetes, Hypertension, obesity, depression)

(Source: Acti-v8 Your Brain, Global Alzheimer's Platform)



National Institute on Aging, 2019

Nutrients Nourish the Brain

- **The brain: Active metabolism**
- Needs sufficient calories and nutrients for health.
- Foods deliver these.
- Carbohydrates (glucose for the brain) & fiber, proteins, lipids/fats, vitamins, minerals and water/fluid. Note: The brain can use ketones.
- Malnutrition affects brain structure and function throughout the life course

(Dauncey, 2012; Morris ,2012; Cusick & Georgieff,.2016; Camandola & Mattson, 2017)

Photos Courtesy of USDA ARS Snaped fns USDA

Carbohydrates, Proteins, and Lipids/Fats

- Carbohydrates, proteins, and fats: Provide calories
- Carbohydrate: 4 kcal per gram
- Protein: 4 kcal per gram
- Fats: 9 kcal per gram

(IOM, DRI, 2005)

Table 2. Proportion of calories from nutrients in day's total calories(2,000 Cal -used as reference)

Nutrients	Percent (%)	Comments
Carbohydrate	45-65	Supplies large proportion. The range offers flexibility.
Protein	10-35	The range offers flexibility.
Fat/Lipid	20-35	Most concentrated source of calories. Has a place in healthy diets. The range offers flexibility

Photo Courtesy of USDA ARS

Photo Courtesy of USDA ARS

Carbohydrate & Fiber

Carbohydrate (Complex and Simple forms)

- Main energy source
- Important to the central nervous system & brain
- Protects protein from being used for energy
- Promotes complete breakdown of fat
- Excess→ Stored as fat (energy reserve)
- **Fiber:** Not digested; does not yield energy
- Promotes bowel regularity
- Helps lower blood cholesterol
- Benefits the gut microbiome

Carbohydrates: Selected Major Food Sources

- Grains and grain products
- Fruits (Fresh, frozen, dried, canned, juices)
- Vegetables, especially the starchy ones (corn, peas, potatoes)
- Milk & milk products. Milk has lactose. Non-dairy alternative (soy milk). Read labels.
- Sugars
- Use the link for specific foods and portion

USDGA 2020-2025

Whole grains and their products, fruits and vegetables are also high in fiber.

Proteins: Functions and Major Food Sources

Proteins: Functions

- Critical to growth, maintenance, and tissue repair
- Are used to make
  - -Enzymes
  - -Hormones
  - -Antibodies for immunity
  - - Bone and red blood cells
- Can be used as alternative fuel source

Excess➔ Stored as fat (energy reserve)

Use the link for specific foods and portions.

(Reference)

Sources: Animals and Plants

- Animal-derived
- Meats, poultry, fish, milk, cheese, eggs
- Higher quality than plant proteins

Plant-derived

- Beans, lentils, nuts
- Soy: Good quality protein

Eating a variety of plant proteins can enhance their quality.

Photo: Courtesy ARS USDA, Unsplashcom.

Sarcopenia and Aging: Protein and Calorie Needs

- **Sarcopenia**
  - Age- associated loss of muscle and function
  - **Poor muscle quality**: Weakness, decreased activities of daily living. Risks for falls and fractures, increased morbidity (Morley et al, 2010)
  - Prevalence of sarcopenia in older adults with IDD
    - (54+ years old, n=884), 14.3%
    - Associated with mobility impairment and inflammation (Bastiaanse et al, 2012)

  Sarcopenic obesity: Presence of both sarcopenia and obesity. This leads to frailty, disability, morbidity and mortality.

  Malnutrition-Sarcopenia syndrome: Another condition (Barazonni et al, 2018; Vandewoude et al., 2012).

Sarcopenia: Recommended Protein Intake

Persons with sarcopenia:

- Increased protein **and** calorie intake
- Recommended amount of protein for treating frailty:
  - **1.2-1.5 g/kg of body weight (**Morley, 2011**)**
  - **Note: RDA for healthy adult:**
  - **0.8 g /kg of body weight** (IOM, 2005)

OpenStax, Anatomy and Physiology. OpenStax CNX. May 2, 2019

Protein quality matters. Choose protein foods with high quality.
Animal-derived: Meats, poultry, fish, cheese, milk, eggs
Plant-derived: Soy. Eat a variety of plant proteins.

- Resistance training
- Adequate vitamin D intake
- Leucine in the essential amino acid mix (Morley, 2011**)**

- Many individuals with IDD have risk factors for sarcopenia (Evenhus et al, 2012)

Fats: Functions and Major Food Sources

- Concentrated energy source
- Help in absorption of fat-soluble vitamins
- Cushion vital organs
- Spare protein from use for energy
- Provide essential fatty acids
  and vitamin E
- Omega-3 fatty acids: “Healthy fats”
  Polyunsaturated: (See the slides specific to them.)
- Add palatability to foods

(Callahan, 2020)

Water

- People live longer without food that they do with out water
- Water maintains cell volume
- Acts as a solvent
- Transports nutrients and other substances in the circulation,
- Excretes waste products of metabolism
- Regulates body temperature, and maintains normal fluid and electrolyte balance (Armstrong, 2010)
- Aids in maintaining normal blood pressure and cardiac and renal function (Roumelioti et al., 2018).
- Dehydration disrupts cognitive and physical performance and causes fatigue and delirium (Popkin, D'Anci & Rosenberg, 2010)

Water-Continued

- Monitor fluid balance.
- Establish a hydration schedule .
- Flavoring water with orange or lime slices can enhance the appeal of plain water. Watery fruits and vegetables, milk, and fruit juices add not only fluid but also nutrients.
- Sugar-sweetened beverages should be avoided as they supply calories without the nutrients. Excessive sugar intake contributes to obesity. (DHHS/USDA, 2020-25).
- Recommended fluid take intake includes water, beverages and water in foods. For men and women (19 + years) ,3.7 L and 2.7 L, respectively

(IOM, 2005)

Links to the Food Groups : Specific Foods, Portion Sizes and Other Information

- https://www.myplate.gov/eat-healthy/food-group-gallery
- https://www.nia.nih.gov/health/know-your-food-groups
- https://www.myplate.gov/eat-healthy/grains
- https://www.myplate.gov/eat-healthy/fruits
- https://www.myplate.gov/eat-healthy/vegetables
- https://www.myplate.gov/eat-healthy/protein-foods
- https://www.myplate.gov/eat-healthy/dairy
- https://www.nia.nih.gov/health/know-your-food-groups#oils

Vitamins

Vitamins

Do not yield energy, but help in many body functions and processes.

Examples:

- Growth, maintenance and repair of tissues
- Energy production
- Bone formation
- Red blood cell formation
- Maintenance of vision
- Blood clotting

(Callahan 2020)

Vitamins are divided by their solubility:

Fat-soluble: Vitamins A, D, E, and K

Water-Soluble: (See the links for details)
Some examples: Vitamin C

B1-Thiamine

B2-Riboflavin

B3-Niacin

B12-Cyanocobalamin

B9- Folate (Folic acid) (Medline Plus, 2021)

https://www.nia.nih.gov/health/vitamins-and-minerals-older-adults

https://www.accessdata.fda.gov/scripts/interactivenutritionfactslabel/assets/InteractiveNFL_Vitamins&MineralsChart_March2020.pdf

Minerals

Do not yield energy but some help in energy production.

Regulate body functions and processes

Examples

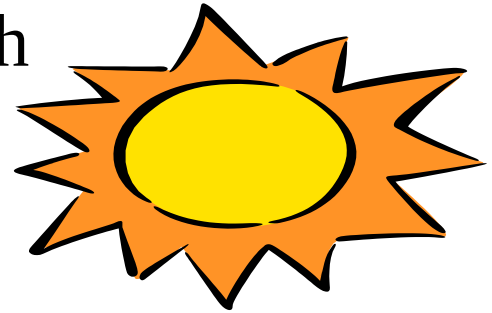
- Growth, maintenance & repair of tissues
- Bone formation
- Red blood cell formation
- Fluid & electrolyte balance
- Nerve transmission
- See the link for complete list.

Examples:

- Calcium
- Iron
- Iodine
- Phosphorus
- Magnesium
- Sodium
- Potassium
- Zinc

- https://www.accessdata.fda.gov/scripts/interactivenutritionfactslabel/assets/InteractiveNFL_Vitamins&MineralsChart_March2020.pdf

Selected Vitamins: Vitamin D



- Vitamin D: Group of fat-soluble vitamins that includes both vitamin D2 and vitamin D3.
- Both a nutrient and a prohormone
- **Manufactured in the skin:** Direct exposure to sun.
- **Amount varies** with time of day, season, latitude, and skin pigmentation
- **10–15 minutes exposure of hands, arms and face** 2–3 times/week may be sufficient (depending on skin sensitivity).

- Clothing, aging, skin pigmentation, sunscreen, window glass and pollution → Reduced amount produced

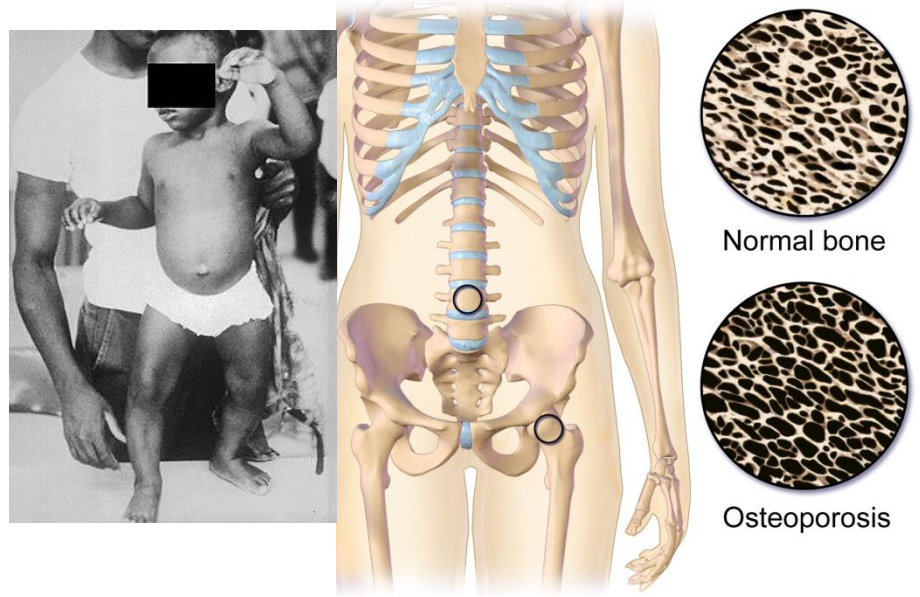
(IOM, 2011; Bikle,2017

Vitamin D Deficiency

- Regulates calcium and phosphorus balance

→Maintains healthy bones

- Rickets: Children
- Osteomalacia: Adult rickets
- Osteoporosis: Multifactorial disease
- The prevalence of osteopenia and osteoporosis, including their risk factors, in adults with IDD is well documented (Frighi et al, 2014;Jasien et al, 2012; Srikanth et al,2011).



(Public domain)
Blausen Medical. Wikimedia.org/Wikipedia commons

- Timely screening and risk assessment for osteoporosis can identify the disorder early for further assessment and intervention (Srikanth et al, 2011). Osteoporosis is preventable and treatable.
- Low vitamin D level and depression? Observed an association but not supported by clinical trial. https://ods.od.nih.gov/factsheets/VitaminD-HealthProfessional/

Vitamin D and COVID-19?

Vitamin D: RDA and Sources

- **Sources**

  -Diet

  Vitamin D-fortified foods, cod liver oil, some fish

  -Production in the skin

  From cholesterol precursor and solar energy

  - Supplements: D_2 or D_3

RDA: 51-70 years old: 600 IU (15 micrograms)

> 70 years: 800 IU (20 micrograms)

Excessive vitamins A and D intake: Toxic

Recommended limit: Tolerable Upper Intake Level(UL): 4000 IU (100 micrograms)per day

(IOM.2011)

Selected Minerals- Calcium

Functions

- Bone mineralization/hardening

(Works with vitamin D and other bone forming nutrients)

- Contraction and relaxation of blood vessels
- Nerve transmission
- Blood clotting

Note: Blood calcium level is tightly controlled by hormones. Excess PTH→thin fragile bones

(IOM .2011)

Food sources

- Dairy –dependable source
- Calcium-fortified juice and non-dairy alternative (soy milk)
- Some vegetables: Kale, turnip greens, broccoli
- Fish: Sardines and salmon with bones

RDA for CALCIUM

Age Group	Amount (mg per day)
19–50 Years	1,000
51–70	1,200
Over 70	**1,200**

(IOM, 2011)

1 dairy equivalent*

Access the link for sources of calcium

https://www.dietaryguidelines.gov/food-sources-calcium

*1 equivalent of dairy:

- 1 cup yogurt, 2 cups cottage cheese, 1 ½ oz hard cheese, 1/3 cup shredded cheese, 1 cup milk or calcium-fortified soy milk, or 1 cup pudding made with milk

Videos on Vitamin D and Calcium

- Video: Vitamin D- Benefits, Functions, Sources, Effects of Deficiency and Recommended Dietary Allowance
- https://www.youtube.com/watch?v=tKd4XPaUQoU

- Video: The Truth About Calcium-Benefits and Food Sources (1.11 minutes)
- https://www.webmd.com/vitamins-and supplements/video/video-truth-about-calcium

Review: Practice Questions

1. Someone advises you, “Don’t eat bread and potatoes. These foods are fattening.”

- How would you respond to this statement?

2. Someone says, “You should completely avoid fat because fat is bad for you.”

- How would you respond to this statement?

For review, please view this video.

- A video on Healthy Eating: My Plate My Wins.What is Your Eating Style? 1.46 minutes.
- https://www.myplate.gov/resources/videos

- Rice and beans recipe video (1.21 minutes)
- https://www.youtube.com/watch?v=nNFnLKULbxY&list=PLBccton6gOdrIKFFh-M9mf8VkPEV2ZVr_&index=13

Nutritional Factors and Dementia Risk Reduction

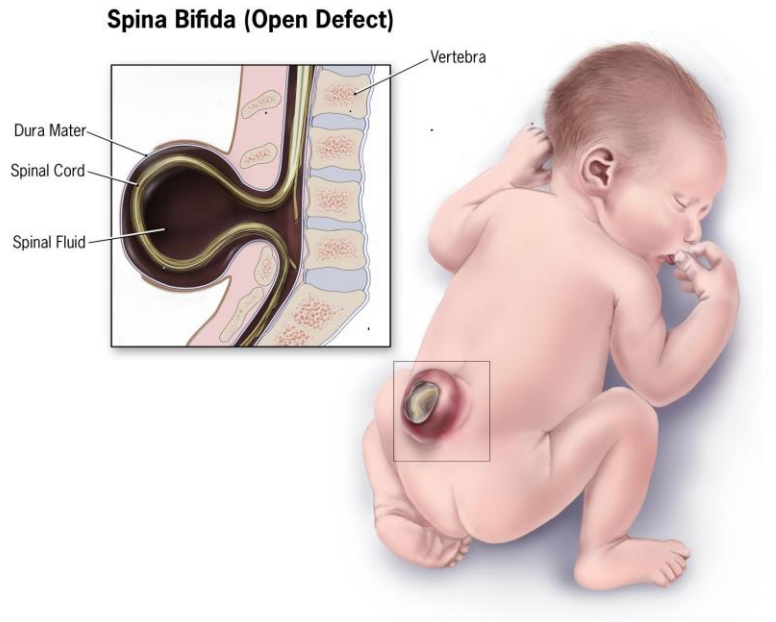
B Vitamins: Water-soluble

Folate (vitamin B-9) and vitamin B-12 (Cobalamin)

- Have interrelated roles in human health
- Affect neurological health
- Folate –preventive for neural tube defect

(such as spina bifida and anencephaly)

(Morris, 2012, ODS, 2021)



CDC used in https://upload.wikimedia.org/wikipedia/commons/7/7e/Spina-bifida.jpg

B Vitamins, **Continued**

Folate and vitamin B-12:Functions

- DNA and red blood cell and protein/ tissue formation
- Deficiency of vitamin B-12
  - Peripheral neuropathy
  - Megaloblastic anemia (large, Immature red blood cells)
  - Fatigue
  - Cognitive impairment

- (Morris, 2012) (Folate,ODS,2021)

B Vitamins, continued

Folate and vitamin B-12 deficiency

→ Associated with cognitive decline and dementia

Folate deficiency: Raises homocysteine blood level. A risk factor for cardiovascular disease (CVD)

CVD is a risk factor for Alzheimer's disease and related dementia (Alz Assoc 202`).

- **Conclusion**: Insufficient evidence to support an association between either folate or vitamin B12 deficiency
- Deficiency may contribute to amyloid and tau protein →Neuron death. How? Homocysteine may injure the brain, causing amyloid formation (reference)

(Mielech et al, 2020)

(Alzheimer's Disease International, 2014)

Folate: Recommended Allowance (RDA)

Folate

19+years old: 400 mcg DFE

Pregnancy : 600 mcg DFE

Selected Food Sources

- Spinach, frozen, cooked, boiled

  ½ cup: 100 mcg DFE

In general, green leafy vegetables

(DFE: Dietary Folate Equivalent)

Note: Folate & phenytoin

- Beef liver, cooked, braised

  3 ounces: 185 mcg DFE

- Breakfast cereals fortified(100% of the DV)

  ¾ cup: 400 mcg DFE

- Cowpeas (black-eyed), immature, cooked, boiled,

  ½ cup: 100 mcg DFE

Folate, ODS, 2021

Vitamin B-12

- Naturally found only in animal products

  Vitamin B-12 deficiency:

  More likely due to malabsorption (rather than dietary deficiency).

- Lack of factors in the stomach that promote B-12 absorption

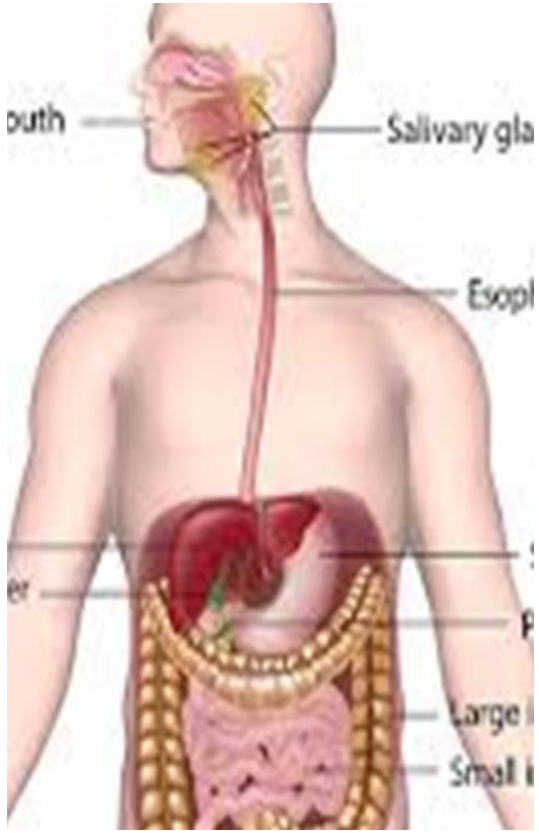
  -Intrinsic factor

  -Hydrochloric acid

- Atrophic gastritis in older adults

  -Up to 30% of older adults

- Helicobacter H pylori infections in the stomach



(IOM, 1998) Vitamin B-12 https://ods.od.nih.gov/factsheets/VitaminB12-HealthProfessional/#en77

RDA for VITAMIN B-12

- 14-18 years old: 2.4 micrograms per day

- 19 and older: 2.4 micrograms per day

Advice for older adults

- Meet the RDA by use of
  - Synthetic vit B-12 supplement
  - Vitamin B-12 -fortified foods

http://ods.od.nih.gov/factsheets/VitaminB12-HealthProfessional/

Niacin

Niacin: Water –soluble vitamin

- Functions in energy metabolism and production
- The body can form it from tryptophan, an essential amino acid
- The RDA: Expressed in niacin equivalent

Deficiency disease- Pellagra

Dermatitis, diarrhea, and dementia

- A study, with 3718 participants (65 yrs. and older), in 1993-2002 results: Higher dietary intake of niacin was associated with slower annual rate of cognitive decline. Dietary niacin may protect people from Alzheimer's dementia and age-related decline

(Morris et al 2004)

Oxidative Stress and Inflammation

Theory

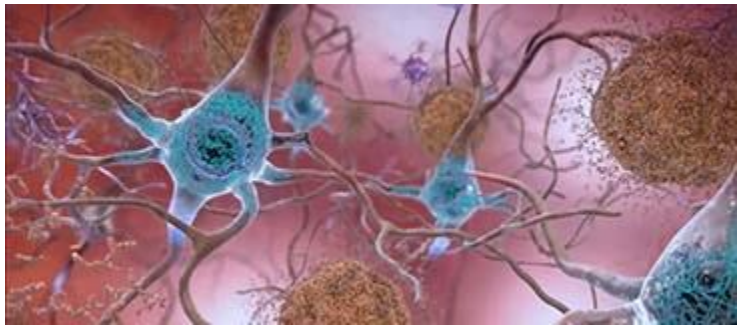
- Brain: Prone to oxidative stress and damage to neuronal tissue
- Oxidative damage and neuron inflammation
- Underlying cause of neurodegenerative diseases (AD and Parkinson's disease)

Other theories: Mitochondrial dysfunction, production of neurotransmitters

- Anti-oxidants may help prevent damage.

(Morris, 2012)) (Mielech et al, 2020)

- (Next are the antioxidant nutrients)
- Note: This needs brief explanation per literature



Selected Antioxidant Nutrients: RDA

Nutrients	**RDA (Per Day Basis)**	**Select Food Sources**
Vitamin C	Adults: Men 90 mg Women: 75 mg	Citrus fruits, red and green peppers, kiwi, Other fruits and vegetables: Broccoli, strawberries
Vitamin E	Adults 15 mg	Vegetable oils : Wheat germ, sunflower, and safflower oils Nuts : Peanuts, hazelnuts, and, especially, almonds) and seeds
Callahan et al. 2020		

Source: https://ods.od.nih.gov/factsheets/list-all/

How do omega-3s work in cardiovascular health?

Fish and omega-3 fatty acids

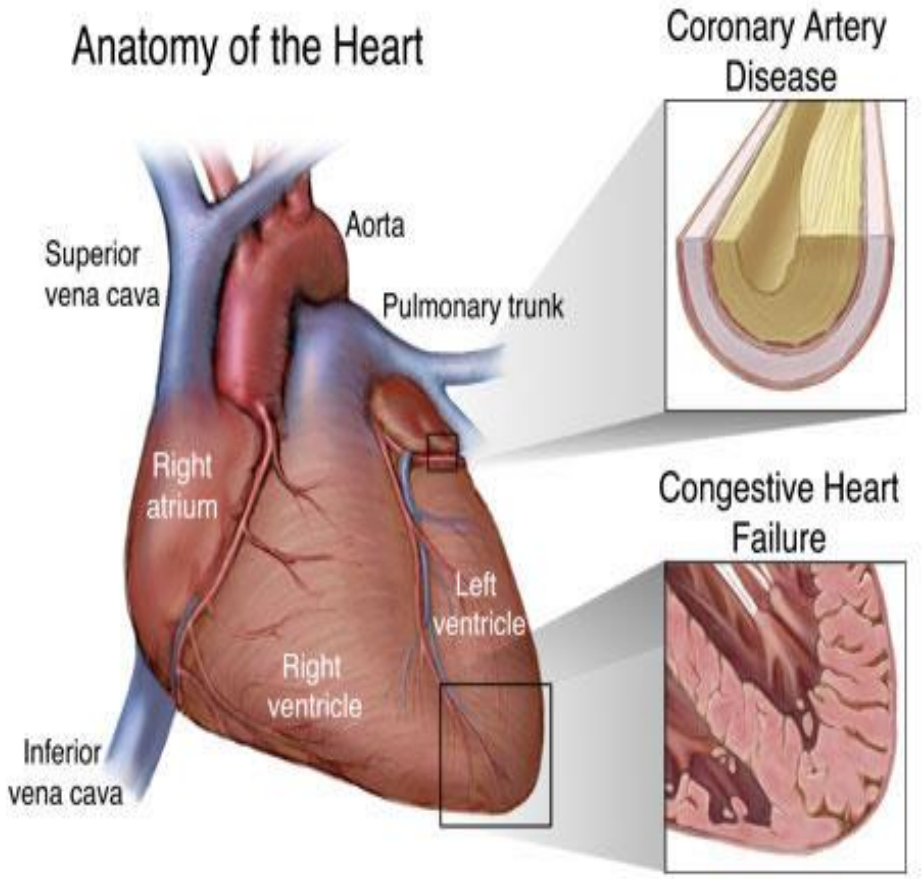
- Lower blood pressure
- Reduce blood triglyceride level
- Omega 3 may reduce inflammation. Inflammation can injure the arteries causing atherosclerosis. Blocked arteries can cause high blood pressure which can cause the heart to work harder. (Reference)

- 1.6 g a day for men; 1.1 g a day for women
- **Conclusion:** Evidence on beneficial effect is conflicting. Protective role does not exist.

(Morris, 2012)(ADI, 2014)

Heart and Brain Connection

http://tuftsjournal.tufts.edu/2008/07/briefs/03/



http://www.firstaidcafe.co.uk/clip-art/clipartlib/pages/heartAnatomy_jpg.htm

Microbiome and Brain health

- What do we know?
- This is a complex topic and the science is still evolving. I suggest that we include brief information on how diet affects the microbiome

Alternative products

- Do they work?
- I suggest that we add this. Some people may be using them

Summary

- Back to the food and the plate
- Repeat a healthy diet pattern mentioned in other slides. Reminding readers about the role of the other pillars.
- People eat food and not nutrients.

Practice Question

- See workbook