



CURRICULUM ON WELLNESS: Nutrition for the Student

Strand W4 Nutrition for the Student

Level 11

This Strand is composed of the following components:

- A. **Nutrition for the Student**
- B. Nutrition for the Cadet
- C. Nutrition of the Athlete/Field

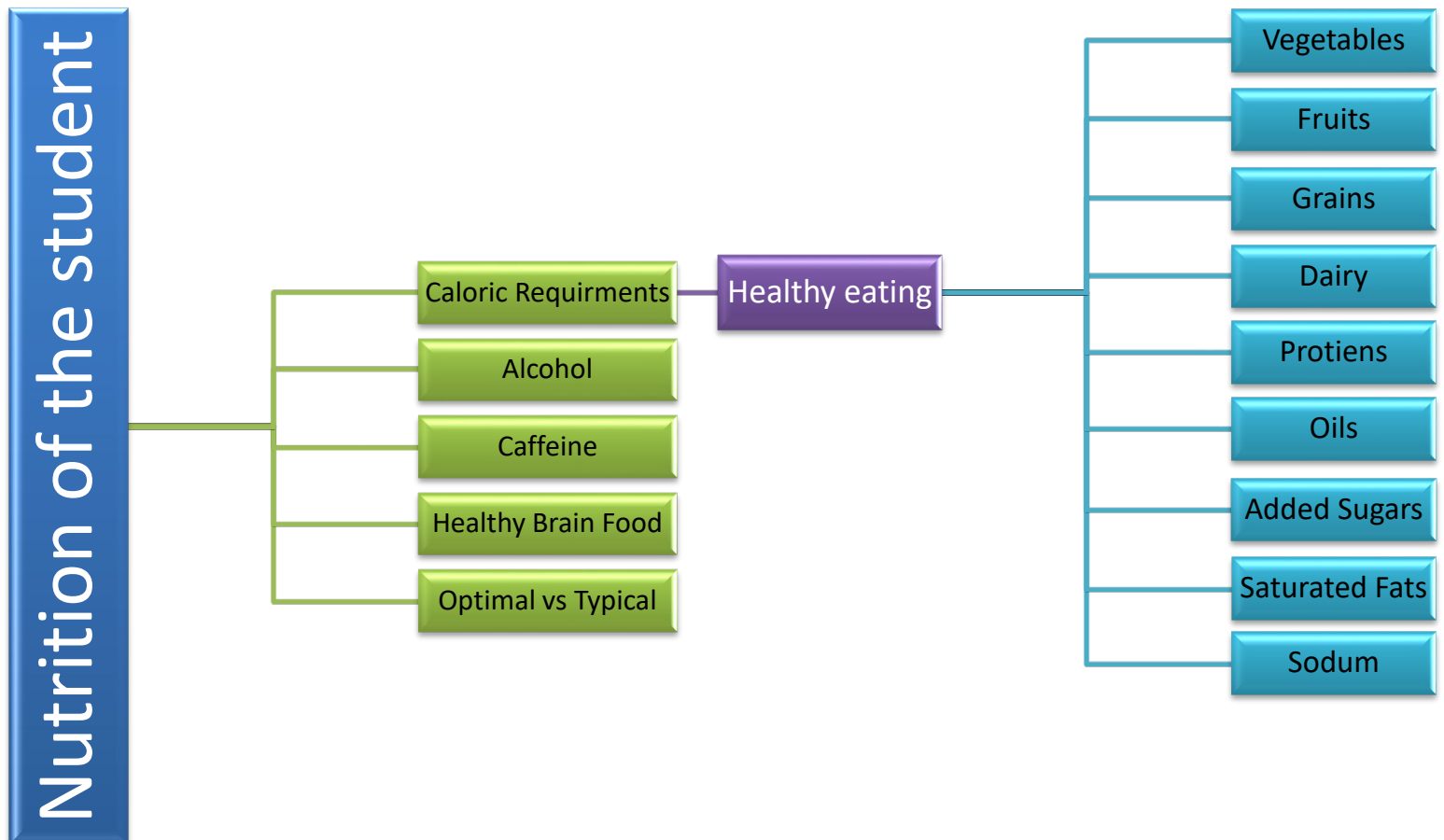


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A. Nutrition for the Student

STANDARD #4: Cadets participate in a variety of fitness and wellness activities.

OBJECTIVES

DESIRED OUTCOME (Self-Mastery)

The desired outcome of this unit is for students to learn various nutritional facts, proper diets of nutrition, and planning for specific activities in a student cadet's life.

Plan of Action:

1. Understand caloric requirements for sustainment
2. Define and apply estimated energy requirements (EER).
3. Define Basal Metabolic Rate (BMR)
4. Compare and contrast and apply macronutrients and micronutrients.
5. Define carbohydrates, simple and complex carbohydrates.
6. Apply Recommended Dietary Allowance (RDA)
7. Understand empty calories and apply steps to avoid them
8. Understand and apply the FIT nutrition model, and its role in "meal prepping"
9. Compare the difference between a portion and a serving size
10. Define and give examples of the 6 sub-categories of vegetables.
11. Express reasons why vegetables are difficult for an individual to have in their daily diet.
12. Define nutrient-dense foods
13. Apply the difference between hypokalemia and hypokalemia.
14. Understand the chemical grains become in the digestion process
15. Understand and define the key vitamins/minerals grains contain
16. List the similarities and differences of whole grains, refined grains, and enriched refined grains
17. Understands dairy products chemical contents
18. Define probiotics and prebiotics give examples of where to find each.
19. Understand vitamins/minerals found in dairy products
20. Understand proteins roles in body functions/body chemistry
21. Explain nonessential amino acids, essential amino acids, and amino acids role/functions in the body
22. Express where to find proteins in various foods.
23. Understand various nutrients found in oils
24. Define and understand the roles of sugars, glucose, isomers, cellulose, disaccharides, polysaccharides, and glycogen
25. Understand and explain in relative terms type 1 diabetes, type 2 diabetes, hyperglycemic, and hypoglycemic.
26. Compare and contrast saturated and unsaturated fats.
27. Identify two types(subtypes) of trans fats
28. Relate sodium's role to hypertension
29. Understand sodium's overall role in body chemistry
30. Understand and apply blood pressure classification levels to their identifications.

31. Define alcohol
32. Explain why alcohol is a psychoactive drug.
33. Explain and relate the Brain Blood Barriers (BBB) roles with alcohol
34. Evaluate the outcome information on alcohol abuse, alcoholism, fetal alcohol syndrome, and cirrhosis.
35. Explain the combination of energy drinks and alcohol
36. List issues and prospective positives caused by caffeine use
37. List and explain various brain foods for large concentration days or events
38. Explain with reason why aspartame is possibly dangerous
39. Define adenosines triphosphate (ATP)
40. Discuss and reason optimal vs typical health perspectives or dietary intakes.

A1. Caloric Requirements for A Student

The body runs off of fuel known as calories. Calories come from the food that we intake; the body turns it into energy to support the basic functions of living. Different people have different caloric needs.

These needs are determined by the individual's age, height, weight, sex, and how active they are if the individual's goal is to maintain, gain, or lose weight. By adjusting the caloric intake it can curve the results. **Estimated Energy Requirements (EER)** are equations that are used to predict energy

maintenance factoring in height, weight, age, and sex. The basic guidelines for sustenance (maintain/sustain) for an adult

female are 1,600-2,400 calories a day. Adolescents range from 1,400-3,200 calories, and males usually are higher in calorie needs. The table using EER is shown in **Table A2-1** (Services, 2015)

Basal metabolic rate (BMR) is the rate of the energy expenditure (calories burned) of a person after they have slept for 8 hours and fasted for 12 hours in the supine (laying down) position in a hospital or laboratory setting; essentially it's the "do nothing but breathe for 16 hours" metabolic rate. **Resting Metabolic rate (RMR)** is a test that is the same test except it does not require the patient to stay at the

Table A2-1. Estimated Calorie Needs per Day, by Age, Sex, and Physical Activity Level

MALES				FEMALES ^(a)			
AGE	Sedentary ^(a)	Moderately active ^(a)	Active ^(a)	AGE	Sedentary ^(a)	Moderately active ^(a)	Active ^(a)
11	1,800	2,000	2,200	11	1,600	1,800	2,000
12	1,800	2,200	2,400	12	1,600	2,000	2,200
13	2,000	2,200	2,600	13	1,600	2,000	2,200
14	2,000	2,400	2,800	14	1,800	2,000	2,400
15	2,200	2,600	3,000	15	1,800	2,000	2,400
16	2,400	2,800	3,200	16	1,800	2,000	2,400
17	2,400	2,800	3,200	17	1,800	2,000	2,400
18	2,400	2,800	3,200	18	1,800	2,000	2,400
19-20	2,600	2,800	3,000	19-20	2,000	2,200	2,400
21-25	2,400	2,800	3,000	21-25	2,000	2,200	2,400
26-30	2,400	2,600	3,000	26-30	1,800	2,000	2,400
31-35	2,400	2,600	3,000	31-35	1,800	2,000	2,200
36-40	2,400	2,600	2,800	36-40	1,800	2,000	2,200
41-45	2,200	2,600	2,800	41-45	1,800	2,000	2,200
46-50	2,200	2,400	2,800	46-50	1,800	2,000	2,200
51-55	2,200	2,400	2,800	51-55	1,600	1,800	2,200

hospital because the values were identical (Wilmore, 2008).

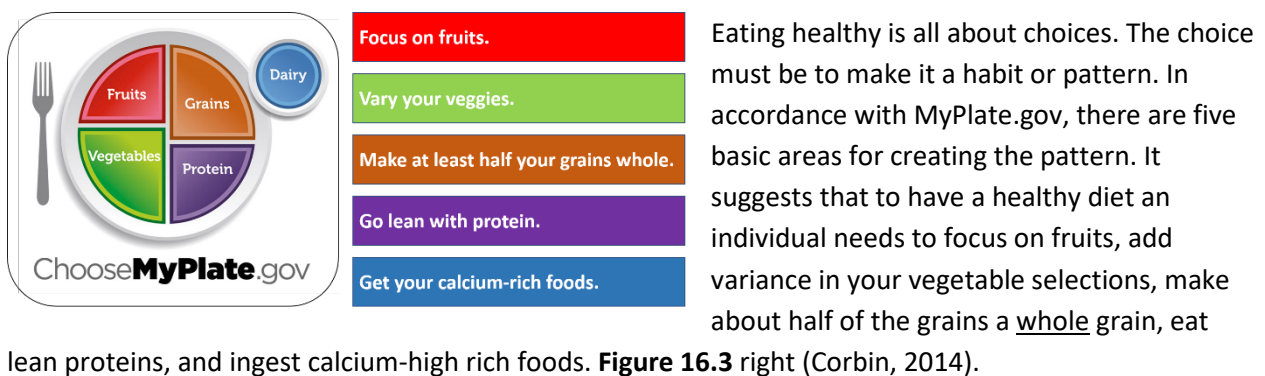
Macronutrients are types of food that provides the energy that is required in our diet. The three basic categories of macronutrients are fats, carbohydrates, and proteins. (Titchenal et al., 2018). On a large scale, weight is determined by calories in vs. calories out. This is true, but the caveat of this principle is explained in *Human Nutrition* that macronutrients burn at different heats. This means that where you get your calories from has an effect on how many calories you burn off. This translates into, for example, low-fat or low-carb or high-protein diets.

Check on Understanding:

1. What does EER stand for?
2. According to the table, moderate exercising females and males at 16 have the same caloric need (T/F)
3. Basal metabolic Rate and Resting Metabolic Rate are not the same test; what makes them different?

A2. Healthy eating patterns for a student

Your body absolutely needs macronutrients to complete daily tasks. Not all macronutrients are equal to their weight per unit so in order to eat healthy, there has to be a ratio of intake of the food energy of those three types of macronutrients. It is suggested that a typical diet should consist of 45-65% carbohydrates, 20-35% fat, and 10-35% protein. There has to be a balance to be the best combination for an individual's body. **Carbohydrates** are the body's main source of energy; there are two types - simple and complex. **Simple carbohydrates** are sugars, including basic table sugar, fructose sugar from fruit, and sucrose, mostly found in soft drinks. They are the quick fuel. **Complex carbohydrates** are carbohydrates that take longer to digest because their chemical structure is harder to break down, such as bread, beans, and vegetables. **Micronutrients** are items that the body needs smaller amounts of such as vitamins and minerals. **Dietary Reference Intake (DRI)** is the system the Food and Nutrition Board of the Institute of Medicine publishes to designate recommended amounts of micronutrients needed to be consumed. **Recommended Dietary Allowance (RDA)** tells us the minimum amount of nutrients to maintain and meet the health needs of most people. **Adequate Intake (AI)** is commonly used when the RDA of a micronutrient is not sufficient. **Tolerable Upper Intake Level (UL)** is the maximum number of a vitamin or mineral that can be consumed without causing a health risk (Corbin, 2014).



Examples of how to develop the patterns of healthy eating are to use the principles in the figure. The first thing is to ditch excess **empty calories**, which are foods that are full of simple carbohydrates like candy, pastries, and sugary soft drinks. The model shows the majority of the amount of consumed food should be vegetables such as dark green and orange produce. The next largest section is grains, ensuring they are the whole grain variety in bread or cereals. Fruits are the third-largest portion; any form - fresh, canned, frozen, or dried - are encouraged. The smallest portion on the plate is the protein section. This section includes things such as beef, poultry, pork, seafood (fresh or canned), beans, peas, nuts, or seeds. It suggests making sure they are lean cuts such as skinless and fish with high omega 3 fatty acids, (salmon, tuna, mackerel, trout, halibut, sardines, herring are the best sources). The portion outside the plate contains dairies such as milk, cheese, yogurts, or milk-based desserts. Choosing low fat or fat-free options is optimal, but the tastes may vary (Corbin, 2014).

"Meal prepping" is a newer term or buzz word that enthusiasts use in exchange for using the **FIT formula for nutrition**. **Nutrition** uses the FIT formula in the perspective of

- **Frequency:** eating three meals a day with planned snacks

- **Intensity:** calories are measured to its relative amount and balancing the 5 food groupings
- **Time:** spacing out meals - morning, noon, and evening. Skipping meals can negatively impact performance as an athlete, and cause health complications.

Servings and portions are the biggest roles in eating healthy, and they are not the same thing. A **portion** is the amount of food on the plate. It can be under or over the recommended serving. A **serving** is what is recommended for each component of food as shown in **Table 16.3** (Corbin, 2014).

TABLE 16.3 Recommended Number and Size of Servings

Food group	Calorie range			Serving size examples
	<2,200	2,200–2,800	>2,800	
Grain	6 servings	9 servings	11 servings	1 slice bread; 1/2 cup cooked cereal, rice, or pasta; 1 cup cold cereal; 1/4 cup wheat germ; 1 6-in. (15 cm) tortilla
Vegetable	3 servings	4 servings	5 servings	1 cup raw leafy vegetables, 1/2 cup other vegetables (chopped or cooked), 3/4 cup vegetable juice, 1/2 cup cooked vegetables
Fruit	2 servings	2 or 3 servings	3 or 4 servings	1 orange, 3/4 cup fruit juice, 1 cup cooked fruit
Dairy	2 or 3 servings	2 or 3 servings	2 or 3 servings	1 cup milk or yogurt, 1 1/2 cups ice cream, 1 1/2 oz. (43 g) cheese
Protein	2 servings	3 servings	3 servings	2–3 oz. (57–85 g) cooked meat, poultry, or fish; 1/2 cup cooked dried beans; 2 tbsp. peanut butter; 1/4 cup nuts or seeds; 1 whole egg

More information about servings of specific foods is available in the student section of the Fitness for Life website.

Check on Understanding:

1. Define the FIT Formula as it relates to nutrition.
2. What is the academic word for quick fuel?
3. _____ are found in pastries and soft drinks.

A3. Vegetables.

Vegetables are carbohydrates. They are divided into dark green, orange, dried peas, beans, starchy, and other (Corbin, 2014). **Dark green** vegetables are veggies such as broccoli, spinach, and kale. **Orange**



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vegetables are items like carrots, butternut squash, pumpkin, and tomatoes.

Dried peas are the various peas such as black-eyed peas, chickpeas, and green peas. **Beans** are a type of protein but are still a vegetable, some examples of those are, black beans, pinto beans, and kidney beans. **Starchy** vegetables are potatoes, corn, yams, and sweet potatoes. The **other** category for vegetables is a compilation of various veggies, such as onions, artichokes, celery, cucumbers, and many others. A chart showing amounts is found in **Table A3-1** (Services, 2015). (Titchenal, 2018)

There is a variety of reasons why choosing vegetables may be difficult for some individuals. **Taste/texture:** some people simply dislike the taste or texture of certain vegetables. **Economics:** accessing fresh veggies is hard due to stores not carrying quality produce, or the money it costs to buy fresh veggies. **Food experiences:** individuals may have had a negative

interaction with some or all veggies as a younger child. **Habits:** people will not eat veggies because it's not part of their daily routine. **Culture:** can play a part in the type or amount of vegetables in someone's diet. **Geography:** where the person live, there are no fresh vegetables. **Advertising:** the media does not promote healthy eating. **Social factors:** the individual has not enjoyed that particular item because of how someone else prepared them. **Health concerns:** food allergies and digestive impacts. **Emotions:** stress may affect the overall eating habits. **Green food/sustainability:** even though it is a vegetarian diet base, the cruelty-free element makes some vegetables inaccessible for those who follow that ideal, due to them being grown using animal products (Titchenal, 2018).

Check on Understanding:

1. List 3 reasons why choosing vegetables may be difficult.
2. All vegetables are carbohydrates? (T/F)
3. Which category of vegetables has more varieties?

A4. Fruits

Fruits are also carbohydrates. An adequate diet must include fruit. This is because fruits are a nutrient-dense food. **Nutrient-dense** foods are considered the opposite of empty calorie foods, meaning they are full of vitamins and minerals. Fruits in diet have been found to be a factor in brain health, improving cognitive function. Some fruits are high in water content, sometimes containing between 80%-99% of water. Examples are watermelons, cantaloupes, strawberries, apples, grapes, oranges, pears, and pineapples (Titchenal, 2018).

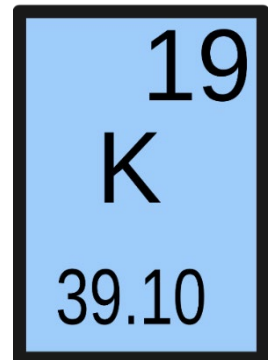


Table A3-1.

Healthy U.S.-Style Eating Pattern: Recommended Amounts of Food From Each Food Group at 12 Calorie Levels

Calorie Level of Pattern ^a	1,000	1,200	1,400	1,600	1,800	2,000
Food Group ^b	Daily Amount ^c of Food From Each Group (vegetable and protein foods subgroup amounts are per week)					
Vegetables	1 c-eq	1½ c-eq	1½ c-eq	2 c-eq	2½ c-eq	2½ c-eq
Dark-green vegetables (c-eq/wk)	½	1	1	1½	1½	1½
Red and orange vegetables (c-eq/wk)	2½	3	3	4	5½	5½
Legumes (beans and peas) (c-eq/wk)	½	½	½	1	1½	1½
Starchy vegetables (c-eq/wk)	2	3½	3½	4	5	5
Other vegetables (c-eq/wk)	1½	2½	2½	3½	4	4

Potassium is an element which is needed for the human body to function. It can be found in fruits like bananas, apples, and apricots. Potassium is essential to body function, impacting the body systems that involve the kidneys, blood plasma, and intracellular fluid. An imbalance of potassium can cause issues such as muscle weakness, cramps, breathing issues, and constipation. Too little or too much potassium can cause the heart to abnormally contract, leading to death. **Hypokalemia** is an insufficient amount of potassium in the body. **Hyperkalemia** is high levels of potassium in the blood, usually disrupting the electrical impulses and signals and mostly a result of a kidney dysfunction (Titchenal, 2018).



Check on Understanding:

1. What is the difference between Hyperkalemia and Hypokalemia?
2. Nutrient-dense is the opposite of empty-calorie (T/F)
3. What is the largest component of fruits like watermelons, apples, and pears?

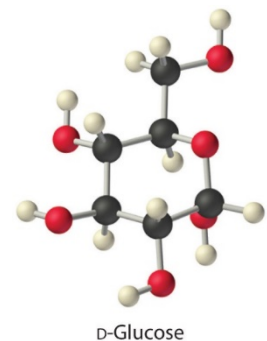
A5. Grains



Grains are the most well-known carbohydrate.

Whole grains are also considered a nutrient-dense type of food option. Whole grains are usually high in potassium. Grains are full of starch molecules turning into glucose in the body. The starches turn into chains and there two different chains,

amylose contains hundreds of glucose units, **amylopectin** contains thousands of glucose units (Titchenal et al., 2018). Grains are sources of many minerals and vitamins such as zinc, iron, magnesium, and niacin (Corbin, 2014). (Agriculture, Grains Group, 2020)



The following minerals and vitamins are laid out not primarily by definition but by function: **Zinc's** major functions include protein along with DNA production, healing wounds, boosting the immune system,

and assisting in growth. **Iron** carries oxygen and supports in energy production.

Magnesium is the protein producer, aiding in muscle contractions and nerve transmissions.

Niacin is a vitamin that assists in

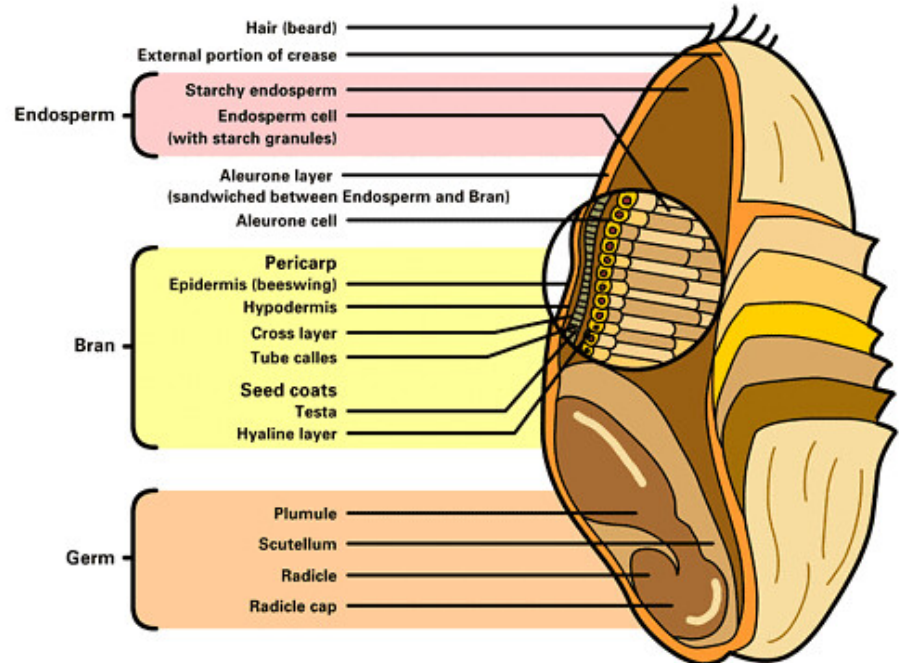
TABLE 16.1 Functions and Sources of Minerals

Mineral	Function in the body	Food sources
Calcium	Builds and maintains teeth and bones; helps blood clot; helps nerves and muscles function	Cheese, milk, dark green vegetables, sardines, legumes
Iron	Helps transfer oxygen in red blood cells and other cells	Liver, red meat, dark green vegetables, shellfish, whole-grain cereals
Magnesium	Aids breakdown of glucose and proteins; regulates body fluids	Green vegetables, grains, nuts, beans, yeast
Phosphorus	Builds and maintains teeth and bones; helps release energy from nutrients	Meat, poultry, fish, eggs, legumes, milk products
Potassium	Regulates fluid balance in cells; helps nerves function	Oranges, bananas, meat, bran, potatoes, dried beans
Sodium	Regulates internal water balance; helps nerves function	Most foods, table salt
Zinc	Aids transport of carbon dioxide; aids healing of wounds	Meat, shellfish, whole grains, milk, legumes

energy metabolism (Titchenal, 2018). These are further shown in table 16.1. (Corbin, 2014). Health benefits of eating whole grains are reducing the risk of heart disease, helping manage weight, and supporting digestion. (Agriculture, Grains Group, 2020)

Whole grain and refined grains are the two subgroups of grains. **Whole grains** are comprised of grains with whole kernels. Anatomy of grain is defined by the **bran** (outside/shell), the **germ** (the innermost segment), and the **endosperm** (the largest inside portion). These are items like oatmeal, buckwheat, whole cornmeal, quinoa, and brown rice.

Refined grains are grains that have gone through the milling process which removes the bran and germ from the grain granule. This process may increase shelf life and give the grain a finer feel but it removes the elements such as fiber, iron, and multiple B vitamins. Examples of foods made of refined grains are bagels, cakes, cookies, corn flakes, tortillas, crackers, pasta, pancakes, pie crust, white bread, pizza crust, and noodles. An **enriched refined grain** has been fortified with additional nutrients. Although many of the vitamins lost in the refining process can be added, the lost fiber is not replaced.



Daily dietary needs are dependent on age, sex, and physical activity level, but at least half of the ingested grains should be a whole grain (Agriculture, Grains Group, 2020).

Check on Understanding:

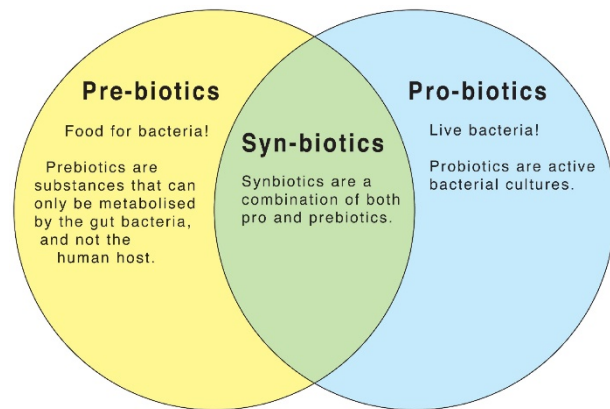
1. What are the three structures in the grain anatomy?
2. Which are healthier, refined grains or enriched refined grains?
3. Grains turn into _____ in the body to be used as fuel.

A6. Dairy

Dairy is an important component of maintaining overall health and body chemistry. All dairy contains **lipids** which are fatty acids. There are three types of lipids. **Triglycerides** make up 95% of lipids ingested, found in fried food, cheeses, whole milk, and vegetable oil. **Phospholipids** only makes up 2% of lipids found in foods, and their job is to enclose fat cells while in transport through the bloodstream. **Sterols**

are the least common but the most known lipid because their full name is *cholesterol* and their major function is producing sex hormones (testosterone, estrogen, etc.), vitamin D, and bile salts.

Some dairy products have things called probiotics and prebiotics, both considered good/friendly bacteria that aid your digestive system. **Probiotics** are lactic acid bacteria, also known as lactobacilli. They are added as a live culture bacteria to food items that go through a fermentation process such as yogurt and Kefir. **Prebiotics** are soluble fibers that fuel the growth of select bacteria to grow in the large intestinal tract (Titchenal, 2018).



Dairy is full of vitamins and minerals the body needs to maintain function. Dairy is most known for being a calcium resource, but has many more micronutrient benefits. **Calcium**, the chemical element that builds and maintains bones, aids in blood clotting and muscular and nerve functions. **Phosphorous**, a body chemical that aids in the maintenance of teeth and bones, supports the release of energy from nutrients. **Vitamin B₂** also known as riboflavin, breaks down proteins and carbohydrates. **Vitamin B₁₂** (chemical name cobalamin) is the element that supports the formation of nucleic and amino acids. **Vitamin D** helps the body absorb calcium and phosphorous (Corbin, 2014).



Dairy comes in four categories. **Milk**, including skim milk, flavored milks, lactose-free, 2%, and whole milk. Also includes substances like frozen yogurt, ice cream, puddings, sherbets, and smoothies. **Non-dairy calcium** such as soymilk and rice milk. **Cheese** is any of the three different types of cheeses, including naturally *hard* cheeses such as cheddar, mozzarella, Swiss, and many more, and *soft* cheeses like brie, cottage cheese, feta, and ricotta, as well as *processed cheeses* like cheese spreads and America cheese. The **yogurt** category includes all yogurts and soymilk yogurts (Agriculture, Dairy Group Food Gallery, 2020).

Check on Understanding:

1. _____ makes up 95% of all lipids.
2. My common name is cholesterol, but my scientific name is _____?
3. In order for the body to be able to absorb calcium, milk also provides what vitamin?

A7. Proteins

Protein is a very common word used in nutrition, with many different applicable meanings and components that make up its structure. **Proteins** are a class of nitrogen-containing biomolecule composed of amino acids. There are several functions of proteins: they are the main component of the cell, used to grow, repair and maintain muscles and connective tissues; assist in the production of hemoglobin, enzymes, and hormones; control acid to base balance; maintain osmotic pressure in the blood; support the formation of antibodies/ disease protection; and produce energy.

Amino acids are components of proteins that the body needs to either self-create or acquire from a diet source. They are considered the body's building blocks because of the connection to growing and building muscles and other body tissues. **Nonessential amino acids** are 11-12 (children/adults) amino acids that are synthesized by the body, but the body does not rely on them. **Essential Amino acids** are the 8-9 (adults/children) amino acids that the body cannot self-create/synthesize and must be part of daily food intake. (Wilmore, 2008).

	Amount that counts as 1 ounce-equivalent (oz-equiv) in the Protein Foods Group	Common portions and ounce-equivalents (oz-equivs)
Meats	1 ounce cooked lean beef 1 ounce cooked lean pork or ham	1 small steak (eye of round, filet) = 3 to 4 oz-equivs 1 small lean hamburger = 2 to 3 oz-equivs
Poultry	1 ounce cooked chicken or turkey, without skin 1 sandwich slice of turkey (4½ x 2½ x 1/8")	1 small chicken breast half = 3 oz-equivs ½ Cornish game hen = 4 oz-equivs
Seafood	1 ounce cooked fish or shell fish	1 can of tuna, drained = 3 to 4 oz-equivs 1 salmon steak = 4 to 6 oz-equivs 1 small trout = 3 oz-equivs
Eggs	1 egg	3 egg whites = 2 oz-equivs 3 egg yolks = 1 oz-equiv
Nuts and seeds	½ ounce of nuts (12 almonds, 24 pistachios, 7 walnut halves) ½ ounce of seeds (pumpkin, sunflower, or squash seeds, hulled, roasted) 1 Tablespoon of peanut butter or almond butter	1 ounce of nuts or seeds = 2 oz-equivs
Beans and peas	¼ cup of cooked beans (such as black, kidney, pinto, or white beans) ¼ cup of cooked peas (such as chickpeas, cowpeas, lentils, or split peas) ¼ cup of baked beans or refried beans ¼ cup (about 2 ounces) of tofu 1 oz tempeh, cooked ¼ cup roasted soybeans 1 falafel patty (2¼", 4 oz) 2 Tablespoons hummus	1 cup split pea soup, lentil soup, or bean soup = 2 oz-equivs 1 soy or bean burger patty = 2 oz-equivs

Proteins are ingested through consuming items such as milk, eggs, nuts, seeds, beans, meat, poultry, and fish even though some items are shared into other food groups. The chart to the right is the equivalents of protein as suggested by the U.S. Department of Agriculture. Proteins are broken into subgroups: meats, poultry, beans and peas, soy products, eggs, nuts and seeds, and seafood. **Meats** consist of beef, ham, lamb, bison, rabbit, venison, and pork. **Poultry** includes chicken, duck, goose, and turkey. **Beans and peas** are lentils, pinto beans, black beans, kidney beans, and edamame, among others. Some **soy products** are tempeh, tofu, and veggie burgers. **Eggs** include chicken eggs and duck

eggs. **Nuts and Seeds** include almonds, peanuts, pecans, pumpkin seeds, sunflower seeds, and walnuts. **Seafood** is a misleading name, as not all items in the category come from the ocean. It has its three subcategories: *finfish* like catfish, cod, seas bass, snapper, trout, and tuna, *shellfish* such as clams, crab, lobster, oysters, shrimp, mussels, squid and octopus, *canned fish* are items like anchovies, sardines, and tuna. It is also important to ingest 8 ounces of seafood at least once a week to replenish the omega-3 fatty acids that seafood contains. The omega-3 fatty acids help deter heart disease. Iron provided through eating protein can also aid in prevention of anemia (Agriculture, Protein Foods , 2020)



Check on Understanding:

1. _____ is a self-created or synthesized amino acid that is not vital.
2. Protein has no shared elements/items in any other food group (T/F)
3. Name at least 2 functions of proteins in the body.

A8. Oils

Oils are a type of lipid and are primarily fat in liquid form. It is not its own food group, but does provide significant nutrients. Since oils are fat, the intake of them must be limited. **Omega -3 fatty acid** is an oil mostly found in fish and is a healthy portion of the daily diet. **Polyunsaturated fatty acids (PUFA)** are things like corn oil, olive oil, and canola oil (Corbin, 2014). Some oils are primarily used in a manner to flavor food such as walnut oil and sesame seed oil. Some foods naturally have oils in them, such as various nuts, certain fish, and avocados. Condiments like mayonnaise, salad dressings, and squeeze margarine are mostly made up of oils (U.S. Department of Agriculture, 2020).

- Even though oils are not their own food group they are essential to human health due to the nutrients they provide. **Monounsaturated fats (MUFA)** are oils found in plant-based items, vegetables, and fruits. Poly and monounsaturated fats do not elevate the bad (LDL) cholesterol levels in the blood supply. Most oils contain vitamin E that is important to vision, reproduction, and the health of your blood, brain and skin. It is an antioxidant, protecting cells and the body against cancer and other diseases. (Agriculture, Oils, 2020)



Check on Understanding:

1. _____ is a lipid in liquid form.
2. What oil is mostly found in fish?
3. What does MUFA stand for?

A9. Added Sugars

Sugar is an organic compound that the body uses as fuel or energy to complete work. The everyday name for **monosaccharide** is simple sugar, fructose, or glucose. **Glucose** is a molecule of metabolic fuel known as $C_6H_{12}O_6$. Glucose and fructose are a type of monosaccharide that dissolve in water.

Disaccharide is two or more monosaccharides, such as sucrose. A **polysaccharide** is complex sugars known as glycogen or starches. **Cellulose** is a structural component some plants have and is a polysaccharide that the human body cannot digest; a common example of this is celery. Celery chemically and biomedically is famous for burning more calories to chew it than a human can gain from eating it. **Glycogen** is a polysaccharide that is deposited in muscle cells and is stored to be used as energy in the form of glucose (Martini, 2006)

Sugar is needed for the body to function. It is involved in the circulation of the blood. In order to enter that circulation, sugars are ingested, digested by the body, and sent to the intestinal cells to the capillaries to the blood vessels. The simple way to imagine how the process goes is that the blood vessels are a highway and blood is the vehicle on the highway and the converted sugars are the engine in the vehicle.

The brain's key fuel to function comes from sugar, but it's not an excuse to overdo it on sugary sodas. Both too much sugar and not enough sugar in the body are bad for organs and the brain (Titchenal, 2018). **Diabetes mellitus** is commonly named simple diabetes and is characterized by the blood glucose levels being high, also known as **hyperglycemia**, which results in insufficient production of insulin due to a malfunction in the pancreas. This is known as **Type 2 diabetes**, also referred to as **non-insulin-dependent diabetes mellitus (NIDDM)**. Simply put, the body does not produce enough insulin or is insulin resistant. **Insulin resistance** target cell response to insulin is insufficient. Type 2 diabetes is also a health problem associated with being obese or overweight. **Type 1 diabetes** is due to the inability to produce insulin as needed sufficiently, due to failure of the **β -Cells (beta-cells)** inside the pancreas. This type is also known as **Insulin-dependent diabetes mellitus (IDDM)**. Simply put, the pancreas produces little to no insulin. **Hypoglycemia** is a low blood sugar level that mostly happens with Type I diabetes but can happen to anyone if there is not enough glucose in the body to facilitate work, energy, or homeostasis. Exercise can improve glycemic control resulting in less hypoglycemic episodes (Wilmore, 2008) (Wilmore, 2008).

Check on Understanding:

1. _____ means the blood sugar is too high.
2. Chemical equation or name for glucose is $C_H_O_$
3. What type of diabetes is due to the inability to produce insulin?

A10. Saturated and Unsaturated Fats

Fatty acids are long chains of carbon with hydrogen atoms combined.

Saturated fat is an acid that each carbon atom has 4 single bonds.

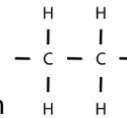
Unsaturated fat has one or more double bonds making it easier to metabolize (Martini, 2006). Saturated fats are normally solids at room temperature. They are found in food like beef, lamb pork, lard,



cream, butter, and cheese.

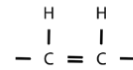
Unsaturated fats (mono or poly) are oils and liquid at room temperature. **Trans-fat** have two types, naturally occurring and artificial. **Naturally occurring trans-fat** occurs in the gut of animals and food made from various animals' meat and milk. **Artificial trans-fat** occurs in the process of adding hydrogen to vegetable oils in order to solidify them more. They're found in foods like doughnuts, cakes, margarine, crackers, frozen pizzas, and cookies (AHA, 2020)

Saturated Fat



No double bond indicates the carbon is fully saturated with hydrogen.

Unsaturated Fat
(cis configuration)



Double bond indicates the carbon is not fully saturated with hydrogen.

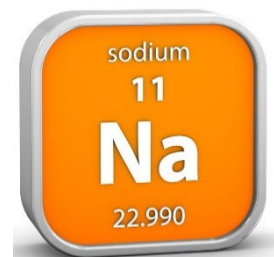
- Researchers have not been able to prove that saturated fats are bad for you. They have generally been connected with heart disease, but studies have not proven this.
- Trans-fats are bad for you!
- Unsaturated fats may help lower your risk for heart disease.
- Polyunsaturated fats (Omega-3 and Omega-6 fatty acids) are healthy and needed by the body

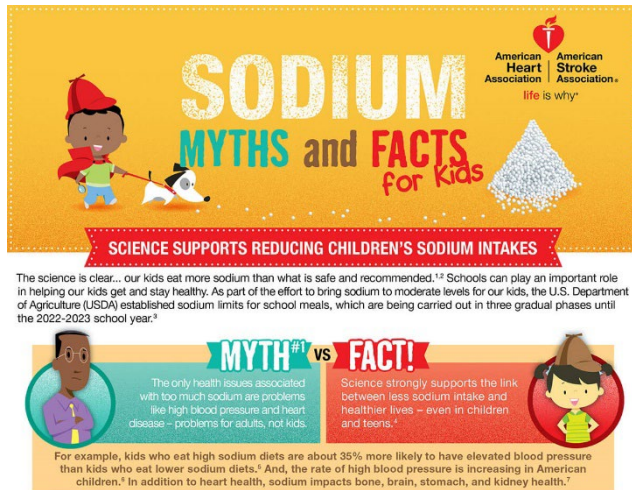
Check on Understanding:

1. _____ has 4 single bonds to each carbon atom.
2. All trans-fat is good for you T/F?
3. Of the types of fat, which is the best for your health?

A11. Sodium

Sodium (Na) is an element on the periodic table of elements, but usually refers commonly to salt. Its function in the body is to regulate blood volume, membrane functions, impulses of nerves and aid in muscle contraction. It makes up .2 % of the body's total weight. Table salt is actually **NaCl**, sodium chloride, which like most salts disassociate or dissolves in water (Martini, 2006). Sodium has many types because it bonds with different elements such as sodium bicarbonate (baking soda) and sodium citrate (from citric acid/ citrus fruits). Due to western diets, sodium depletion is highly unlikely because most preserved foods contain sodium. Sodium is found mostly in packaged and canned foods, such as soups, lunch meats, frozen dinners, burritos, tacos, and pizzas (AHA, 2020).





Sweating allows for the loss of salts and minerals through exercise. Having too much of certain minerals can cause negative effects. Too much sodium can cause high blood pressure and lead to hypertension. **Hypertension** is defined as abnormally high **blood pressure**, **stage 1** at $\frac{140-159}{90-99}$, **stage 2** at greater than or equal to $\frac{160+}{100+}$. Hypertension causes the heart to work harder than it should and over time it can lead to scarring of the heart and losing its elasticity, which may lead to stroke. **Prehypertension**

classified as $\frac{120-139}{80-89}$. **Blood pressure** is the amount of pressure applied/pressed on the vessel walls by the blood. **Systolic blood pressure (SBP)** is represented by the higher number and means it's the amount of pressure in the artery during ventricular systole (when the heart contracts to push blood out). **Diastolic blood pressure (DBP)** is the amount of pressure represented by the lower number during ventricular diastole (when the heart is refilling with blood). An average/normal blood pressure at rest is usually $\frac{120}{80}$, can be defined as less than 120 over 80 (Wilmore, 2008).

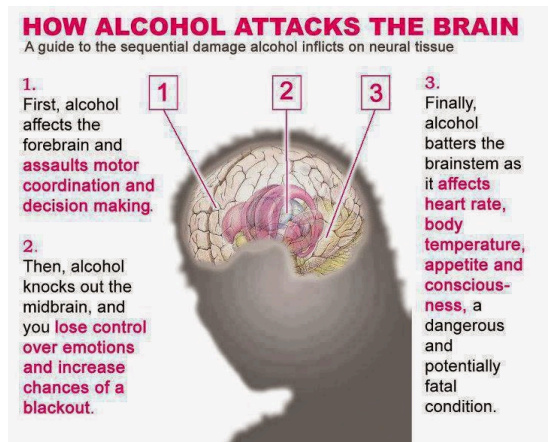
Sodium maintains fluid balance, which is why it plays a key role in blood pressure control. There is a direct relationship between sodium intake and blood pressure. Reducing sodium to 2.3 grams sodium (6 g table salt) daily is linked with decreased blood pressure levels.

Check on Understanding:

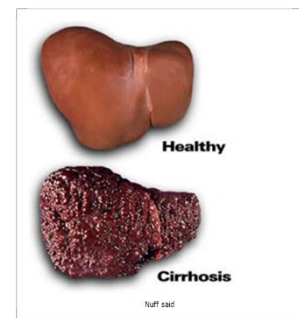
1. Sodium's chemical name is?
2. Too much sodium has no effects on the body T/F?
3. What is considered an average/normal blood pressure?

A12. Alcohol

Alcohol is a beverage that is a psychoactive drug. This substance is volatile and is also known as *liquor* or its chemical name of *ethanol*. **Psychoactive drug** means that when the substance is ingested it crosses the *blood-brain barrier* affecting the actions of the body, altering the mood, thinking, decision making, memory, motor control, and social behavior. The **blood-brain barrier (BBB)** is the barricade for the neural tissue in the central nervous system from the general blood circulation. Drinking alcohol can be detrimental to the overall



health of a human; over time abuse of amount and frequency will damage the liver, whose function is to filter or metabolize the substance. **Binge-Drinking** by definition is when a male consumes five or more alcoholic drinks, and a female consumes four or more alcoholic drinks. This is extremely dangerous and will lead to degrading health complications (Titchenal et al., 2018). **Alcohol abuse** is the overuse of drinking alcohol that results in behavioral and/or physical effects due to the overindulgence. **Alcoholism** is the continuing/ unending abuse of drinking alcohol paired with physiological changes aligned with addiction. Statistics express that alcohol affects 10 million Americans. It is a leading cause of expensive health problems (car accidents, innocent death victims, property, etc.), accounts for over 200,000 deaths in the United States a year, and is responsible for 60-90% of all documented liver disease cases. **Fetal alcohol syndrome (FAS)** is a condition assumed by a newborn due to a pregnant woman drinking while pregnant, with characteristics of deformities/defects such as small head, slow growth, and scientifically termed mental retardation. **Cirrhosis** is a liver disease that is characterized by the destruction of hepatocytes replacing healthy tissue in the liver with fibrous tissue/scar tissue which will lead to liver failure. (Martini, 2006). Cirrhosis is a deadly disease. As it progresses it leads to multisystem failure and advanced deterioration of the body, such as rupturing submucosal tissues, jaundice, hypertension, and disorientation of the brain function, confusion, or the inability to communicate (Martini & Welch, 2006).



Check on Understanding:

1. Alcohol is not considered a psychoactive drug T/F?
2. Define alcoholism.
3. What organ is most affected by cirrhosis?



A13. Caffeine

Caffeine is a central nervous system (CNS) stimulant, chemical, or drug and is widely consumed. It is found in coffee, soft drinks/soda, teas, and energy drinks. It is also



available as an over the counter medication. It has a proposed/suggested benefit of improving alertness, energy, ability to concentrate, reaction time, and prolonging endurance. Through studies, the proven effect was as follows: increased alertness, concentration, elevated mood, but decreased reaction time and fatigue. Even though it's widely accessible and not regulated, consuming it comes with risks such as nervousness, restlessness, insomnia, headaches, gastrointestinal problems, and tremors. A withdrawal of intake can result in distress of the gastrointestinal tract, fatigue, and irritability.

Caffeine is also a **diuretic** (speeds up water excretion from the body) (Wilmore, 2008). **Psychotropics** is a category of drug that are known as mood changers. They alter the CNS pattern of functioning and change or alter the mental state or mood, and can be highly addictive agents. **Withdrawal** is the physical and psychological suffering of symptoms when an individual stops or is prevented from taking drugs, substances, etc. (Martini, 2006).

Check on Understanding:

1. Caffeine is not considered a drug T/F?
2. Name 3 proposed ergogenic benefits
3. What symptoms result in the withdrawal from caffeine in the body?

A14. Healthy Brain Food for Test Day

Eating healthy in preparation for any important day, such as test day, academic presentations, and other tasks that take a large amount of concentration is a healthy way to enhance your performance. With large amounts of research on the topic of food for the brain, to this day science does not have an exact path recorded and proven of responding to particular foods, but only that eating healthy can encourage emotional response control in humans. Food and a healthy balance of combinations of food are symbolic in traditions, cultures, and special events: birthdays, weddings, funerals, graduations, sporting events, festivals, etc. In order to remain alert, the brain must metabolize 6 grams of glucose per hour from the blood, in order to not slide into a state of confusion, coma, or death. The **blueberry** is linked to brain health because it has a high content of anthocyanins. **Anthocyanins** are a powerful antioxidant that decreases inflammation. **Adenosine** (adenosine triphosphate [ATP]), is a caffeine-like organic compound that provides energy to cells or metabolism for energy production. It energizes the brain to function fully in alertness.



Foods for brain health in terms of focus are carbohydrates with caloric limits, digestible carbohydrates, water, vitamins, and minerals all in reasonable amount limits. Stay away from artificial sweeteners such as **aspartame**, which is possibly linked to brain tumors, autism, emotional disorders, etc. Omega-3 fatty acids and omega-6 essential fatty acids are a key supplement source found in fish, poultry, and grain-fed animals. Vitamin C is a supplement that aids in brain health within limits. *White rice* contains **Thiamin (B₁)**, a vitamin whose role is to be an



energy source and in charge of manufacturing neurotransmitters

required for RNA, DNA, and ATP; deficiency in this vitamin can cause brain and heart issues. **Choline**, a beneficial compound found in egg yolk, wheat, meat, and fish, is a non-classified vitamin with the role of making cell



membranes, lipid transport, and metabolism of homocysteine. In order to improve brain functionality through nutrition, recommendations of the Center of Disease Control (CDC) is to increase fruit and vegetable intake (Titchenal, 2018)

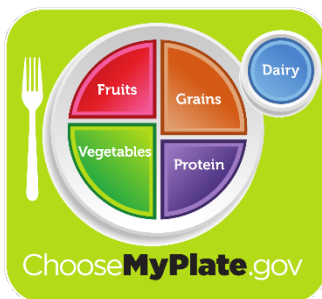
Check on Understanding:

1. It is scientifically proven that food for the brain has an exact path. (T/F)
2. _____ is the antioxidant that the blueberry contains.
3. The vitamin/supplement _____ is found in white rice.

A15. Optimal Vs. Typical Sample Menus

The important thing about eating healthy/ healthier is to meet the needs specific to you. **Optimal**

health perspective choices are based on habitual routines and making intentional food choices. Believing in moderation in eating and embracing nutritional foods is likely to lead to a healthier, happier life. Experts recommend the following: fill half the plate with vegetables and fruits, one quarter with lean meat/protein, poultry or fish, one quarter with a grain/rice, and one serving of dairy (Titchenal et al., 2018).



The **typical health perspective** is a look at the reality of what many people eat. Sometimes the individual makes healthy choices and some not so healthy

choices in food, either because they don't understand the health benefits, or don't care (usually because they're in denial that bad health can happen to them). It is not the suggested amount that is bad, it is the typical pattern. The typical diet is shown in the figure U.S. Food Consumption from the USDA. The USDA, in their longitudinal study spanning from 1970-2005, tracked what individuals in the United States were consuming, which they call the typical health perspective choice (Wells, 2008).

U.S. FOOD CONSUMPTION AS A % OF CALORIES

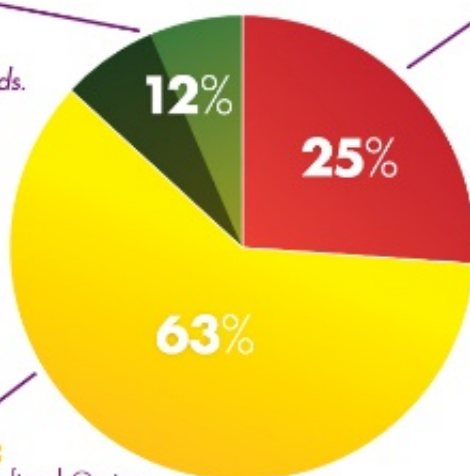
PLANT FOOD:

Vegetables, Fruits, Legumes,
Nuts & Seeds, Whole Grains
Fiber is found only in plant foods.

NOTE: Up to half of this category may be processed, for example almonds in candy bars, apples in apple pies or spinach in frozen spinach soufl  , and of course these would not be healthy choices. The focus should be on whole unprocessed vegetables, fruits, legumes, nuts and seeds and whole grains.

PROCESSED FOOD:

Added Fats & Oils, Sugars, Refined Grains



ANIMAL FOOD:

Meat, Dairy, Eggs, Fish, Seafood
Cholesterol is found only in animal foods. Animal foods are the **PRIMARY** source of saturated fat.

GUIDE TO HEALTHY EATING:

Much easier to understand than the USDA Food Pyramid, with no food industry influence.

Eat **LESS** from the animal and processed food groups and **MORE** whole foods from the plant food group.

In general, food from the animal and processed food group contribute to disease, while **WHOLE** foods from the plant group contribute to good health.

Source: USDA Economic Research Service, 2009; www.ers.usda.gov/publications/FRR33; www.ers.usda.gov/Data/FoodConsumption/FoodGuidelinesIndex.htm#calories
New York Coalition for Healthy School Food * www.healthychoolfood.org
Special thanks to Joel Fuhrman, MD, author of *Disease Proof Your Child: Feeding Kids Right* * Graphics by MichelleBanda.com
   2009, New York Coalition for Healthy School Food

The figure of the suggested food planner is an example of the choosemyplate.gov. The full attachment is in the strand's supplementary documents.



SAMPLE 2-WEEK MENUS

	DAY 1	DAY 2	DAY 3	DAY 4
BREAKFAST	Peanut Butter Raisin Oatmeal: 1 cup cooked oatmeal 1 Tbsp peanut butter ¼ cup raisins Beverage: 1 cup orange juice	Cereal with Fruit: 1 cup toasted oat cereal 1 medium banana ¼ cup lowfat milk 1 hard-cooked egg Beverage: Water, coffee, tea	Scrambled Eggs: 2 eggs 2 Tbsp lowfat milk 1 tsp vegetable oil 2 turkey sausage links 1 slice whole-wheat toast ½ tsp tub margarine 1 tsp jelly Beverage: 1 cup apple juice	Banana Walnut Oatmeal 1 large orange Beverage: 1 cup lowfat milk
LUNCH	Tuna-Cucumber Wrap: 1 8" flour tortilla 3 oz tuna (canned in water) 2 Tbsp mayonnaise 5 cucumber sticks ¼ cup lowfat vanilla yogurt Beverage: 1 cup lowfat milk	Green Salad with Honey Lemon Chicken: 1 cup romaine lettuce 3 oz sliced Honey Lemon Chicken* 3 slices tomato 5 slices cucumber 2 Tbsp vinaigrette dressing** 1 slice whole-wheat bread ½ tsp tub margarine 1 Chocolate Chip Yogurt Cookie* Beverage: 1 cup lowfat milk	One Pan Spaghetti* Side Salad: 1 cup romaine lettuce 3 medium slices tomato 5 slices cucumber 1 Tbsp vinaigrette dressing** 1 slice whole-wheat bread ½ tsp tub margarine Beverage: 1 cup lowfat milk	Green Salad with Tuna: 1 cup romaine lettuce 3 oz tuna (canned in water) ¼ cup sliced carrots 2 Tbsp vinaigrette dressing** 1 slice whole-wheat bread 1 tsp tub margarine Shake-A-Pudding* Beverage: 1 cup lowfat milk
DINNER	Honey Lemon Chicken* Brown Rice Pilaf 1 cup peas and corn: ½ cup corn (frozen) ½ cup green peas (frozen) 1 tsp tub margarine 1 Chocolate Chip Yogurt Cookie* Beverage: 1 cup lowfat milk	One Pan Spaghetti* (includes ground beef and tomato sauce) ½ cup steamed broccoli (frozen) ½ tsp tub margarine 1 white roll 1 tsp tub margarine Shake-A-Pudding* Beverage: 1 cup lowfat milk	Polenta with Pepper and Cheese (includes black or kidney beans) 1 cup cooked green beans (frozen) 1 tsp tub margarine 1 Chocolate Chip Yogurt Cookie* Beverage: 1 cup lowfat milk	Marinated Beef Mashed potatoes: 1 cup cooked potatoes 1 Tbsp lowfat milk 2 tsp tub margarine 1 cup mixed vegetables (frozen) 1 tsp tub margarine Beverage: Water, coffee, tea
SNACKS	Carrot Sticks with Dip: ½ cup carrot sticks 2 Tbsp hummus 6 whole-grain crackers	Popcorn (3 cups popped) 2 Tbsp kernels 1 tsp vegetable oil 1 large orange	Pretzels and Dip ½ cup pretzels 1 Tbsp hummus 1 medium banana	Banana Bread* ½ tsp tub margarine 1 cup grapes

Check on Understanding:

1. The typical health perspective represents a nutritious diet (T/F)
2. What slogan does the government use for health guidance for planning meals?
3. Using context clues, what does longitudinal mean?

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