Grade 5: Healthy Eating

Lesson 3: Exploring the Impact of Sensory Input (Taste & Color) On the Brain

Lesson 4: Nutrients for a Healthy Brain & Nervous System

Objectives:

Lesson 3:

- ✓ Students will draw conclusions about the connection between taste and sight.
- ✓ Students will draw conclusions about the impact taste and sight has on the brain and how taste and sight affects the body's decision on what to eat.
- ✓ Students will experience how sight and taste are two ways in which the brain sorts sensory data.

Lesson 4:

- ✓ Students will identify foods that contain helpful nutrients important for brain and nervous system health.
- ✓ Students will identify cause and effect relationships between eating certain substances and the effect on the brain and nervous system.
- ✓ Students will communicate the importance of avoiding or limiting substances such as caffeine, sugar, alcohol and drugs.

Materials:

Lesson 3:

- Four large containers of lemon-lime soda or sweet colorless lemonade
- Cups (three dozen)
- Food coloring—red, yellow, blue
- Lemon
- Knife (to cut the lemon)

Lesson 4:

- Nutrition and Your Brain article **(See Figure 1)**
- Cause and Effect Graphic Organizer **(See Figure 2)**
- Cause and Effect Graphic Organizer Answer Key **(See Figure 3)**
- A variety of foods from home (see Lesson 4 below)
- Choose My Plate visual from www.choosemyplate.gov (optional)

Activity Summary:

In these lessons students will explore foods that support the development of a healthy brain and nervous system, focusing on variety and a balance of nutritional foods in the diet. Students will also experiment with taste and color.

Background Information for the Teacher:

A Feast for Taste and Sight: Many foods contribute to the development of a healthy brain and nervous system. The most important thing for students to remember is that a **balanced variety** of nutritional foods is necessary to provide the vitamins, minerals, enzymes, and micronutrients our bodies need.

"Good" foods include those that are fresh and/or relatively unrefined. Foods that contain a high amount of sugar, saturated or trans fats, refined white flour, or many chemicals are not typically good for us.

Foods such as sodas, candy, chips, and other packaged snack foods often have high concentrations of refined sugar, sodium and saturated or trans fats, with little or no nutritional value. Sodas also are likely to have caffeine—a drug that stimulates the central nervous system, resulting in increased alertness, but can also reduce fine motor coordination, and cause insomnia, headaches, nervousness and dizziness even in moderate doses. Caffeine acts in the body to increase the heart rate and constrict blood vessels. It can also cause air passages to relax (which helps improve breathing) and allows some muscles to contract more easily. Routine caffeine consumption may lead to some degree of physical dependence, resulting in withdrawal symptoms (headache, fatigue and muscle pain) if consumption is suddenly stopped.

Foods that are good for the development of the brain and nervous system include:

- fresh vegetables
- fresh fruits
- whole grains (brown rice, oatmeal, millet, etc.)
- meat (fish, chicken, beef, pork)
- dairy (milk, cheese, yogurt)
- eggs
- nuts and seeds
- beans

The most important thing to remember is that we need to choose foods from **all** of these food categories. **A variety of foods** will help supply a growing body with the vitamins and minerals it needs in order to develop a healthy brain and nervous system. One way to include a wide variety of foods is to **include a rainbow of colors at every meal—green, yellow, orange, red and blue.** Ingesting a range of colorful foods also helps ensure a wider range of vitamins, minerals, antioxidants, enzymes, and micronutrients. Plus, food that is visually appealing may actually taste better. (See the experiment on taste and sight in Lesson 3 as an example of how sight may influence taste.)

For more information on health and nutrition, see the following websites:

- http://www.health.gov/dietaryguidelines - This site contains the most current information to help you make smart food choices, find balance between food and physical activity, and get the most out of calories consumed. It includes downloadable resources, including personal profiles, diet and physical activity trackers, recipes, etc.
- http://www.choosemyplate.gov/ - This site includes a Menu Planner, a Get Your Choose My Plate Plan link: https://www.choosemyplate.gov/resources/MyPlatePlan (an in-depth assessment of your individual diet quality and physical activity status), and other tips and resources for making smart food choices. Also featured are a menu planner, a tracker, tips and other resources, including information and activities specifically for children.
- http://healthfinder.gov – Contains tips and tools for staying healthy, including prevention and wellness information, a drug interaction checker, online check-ups and more.
- http://www.healthierus.gov – This site features information about healthy choices, nutrition, physical activity and preventive screenings. Also includes "Small Steps" programs for both kids and adults.

Nutrients for the Brain

Fats and carbohydrates provide essential building blocks for the brain and nervous system. Carbohydrates provide the fuel for the brain in the form of glucose. Fats make up the membrane of brain cells as well as the myelin sheath, the protective membrane of nerve cells. The brain also needs a range of vitamins and minerals that it gets from variety in the diet, as described above.

Good Fats, Bad Fats: Fats are an essential nutrient for the brain. Fats provide fatty acids that nourish brain and nervous system cells. The body gets fats by eating foods that contain fat. Fats are contained in foods such as nuts and seeds, and some fruits and vegetables. Fats are also present in many high-protein foods such as fish, meat and milk. Essential fatty acids (EFAs) are fats that we must ingest, since our bodies can't manufacture them. These are linoleic acid (LA or omega-6) and linolenic acid (LNA or omega-3)—two very important dietary components.

Fats are important to the brain. The body converts good fats into myelin, a substance that coats the **axons**. This fatty covering, which is 70% fat, is known as the **myelin sheath**. **Omega-3** (linolenic) and **omega-6 fats** (linoleic) are both important for this work. When your body digests food, fats like omega-3 and omega-6 are broken down into fatty acid molecules that the brain uses in its cell membranes. These fatty acids affect the correct functioning of neurotransmitters in the brain. A deficiency of good fatty acids can cause learning and motor problems.

When the body has sufficient omega-3 and omega-6 fatty acids, it can create other fatty acids from them. **Omega-3 fatty acids** in particular help protect the nervous system and the cell membrane in the brain. Omega-3 fatty acids are found in foods such as **fish** (especially oily fish such as salmon), **dark leafy greens**, **pumpkin seeds**, **walnuts**, **flax seed** and **flax seed oil**, **canola oil**, and **soybean oil**. These foods should be generously included in the diet, particularly fish, which may be considered the ultimate "brain food."

Omega-6 fatty acids are found in foods such as **sunflower seeds and oil**, **peanuts and peanut oil**, **safflower oil**, **corn oil**, and **sesame seeds and oil**. They are also found in **meat** and **dairy products**. Diets in this country tend to be higher in omega-6 fatty acids and lower in omega-3 fatty acids, but they should be consumed in a balanced ratio of 1:1. It has been estimated that Western diets may have twenty times more omega-6 fats than omega-3 fats. Research is currently being conducted to determine the degree to which this kind of imbalance might contribute to disorders such as hyperactivity, depression, and other mental conditions.

Monounsaturated fats are particularly beneficial, especially when they replace hydrogenated and partially hydrogenated fats. Excellent examples of monounsaturated fats are olive oil, avocados and avocado oil.

Trans fatty acids (TFAs) are fats that are **not** good for you. They come from hydrogenated fats found in margarines, potato chips, packaged desserts, many other packaged foods, and deep fried food such as French fries. These are fats that have been modified from their original molecular structure through high heat or chemical processes—becoming longer and narrower, and acting differently than natural fatty acids. These trans fatty acids (TFAs) can find their way into the myelin of brain cells and change the conductivity of the cells. TFAs literally clog up your brain, making you think more slowly. They push the good fats out of the way and take up more room on the myelin sheath, making it less flexible and more rigid. Trans fatty acids also raise bad cholesterol (LDL) and lower good cholesterol (HDL).

Good Carbohydrates, Bad Carbohydrates: Carbohydrates are the primary energy source for the human body, which convert to **glucose** when digested, which is the primary **fuel for the brain**. Carbohydrates are made up of sugar and fiber. Foods such as fruit are high in sugar but also contain fiber. Fruit juices, on the other hand, are almost entirely sugar because the fiber has largely been removed. Whole grains such as oatmeal are high in fiber. Fruits and whole grains also contain many vitamins, minerals, and enzymes that we need to maintain healthy bodies. Some foods, such as milk, contain a balance of carbohydrates, fats, and protein.

Our bodies need carbohydrates, but eating an excess of refined sugar can cause the body to store extra fat and leads to diseases such as Type 2 diabetes. Snack foods such as candy, sodas and cookies contain a high percentage of refined "simple" sugar with little beneficial fiber. KidsHealth reports that drinking one sweetened soft drink a day can increase a child's risk of obesity by as much as 60%. (www.kidshealth.org) and obesity can lead to diabetes. People with diabetes run a greater risk of damage to the nervous system because the fluctuation in blood sugar can affect the protective coating on the nerves.

"Simple" sugars are substances such as refined white sugar, corn syrup, maple syrup, fruit juices, and the sugar in sodas. Since they contain little or no fiber they move through the body quickly, raising blood sugar then letting it drop after they are metabolized. Sugars that are naturally associated with fiber such as the sugar in fruits (like apples or bananas) and root vegetables (like beets or sweet potatoes) act much more slowly in the body. The fiber content slows down the action of the sugar, so blood sugar doesn't spike as quickly or as high. The combination of sugar and fiber in fruits and vegetables also provides a range of vitamins, minerals, and micronutrients.

If students want to choose a healthy snack, an apple is preferable to apple juice because the fiber slows down the action of the sugar and benefits the health of the digestive tract. The best snack would pair an apple with a piece of cheese and a few walnuts, balancing carbohydrates, fats and protein all in one snack: the carbohydrates providing glucose (fuel) for the brain while the nuts provide omega-3 fatty acids to benefit the myelin sheath.

Substances to Avoid: Most students have heard that it's important to avoid alcohol and drugs and limit caffeine. What they may not understand is how these substances affect the brain and nervous system.

- **Caffeine:** Students are most likely to consume caffeine in sodas, but they hey may also get caffeine from coffee drinks, tea, and chocolate candy and beverages. Caffeine provides a burst of energy, followed by a slump. When combined with the sugar in most sodas and other non-nutritious beverages, the highs and lows can be pronounced and affect the nervous system by causing jitteriness, headaches, and difficulty sleeping. Caffeine can also aggravate heart problems and nervous disorders.

- **Alcohol, Tobacco and Drugs:** Alcohol acts as a depressant to the brain and nervous system. Smoking tobacco is extremely habit-forming and detrimental to the brain and nervous system, an may be the hardest habit to break. Other types of drugs can either stimulate or depress the brain and nervous system, depending upon the drug. Only drugs prescribed by a doctor should be used (as prescribed) and alcohol should be avoided. (See the Healthy Habits lesson for extensive information on this topic.)

Summary: In helping students better understand this information, focus on the importance of **variety** in the diet, emphasizing the importance of **essential fatty acids** such as omega-3 and omega-6 fatty acids. Have students avoid **trans fatty acids** altogether. Differentiate between simple sugars such as the sugar found in sodas and beneficial **carbohydrates** that include both sugar and fiber such as fruits, vegetables, and whole grains. Emphasize the importance of limiting caffeine and avoiding alcohol and drugs.

It might be interesting to note that scientists are beginning to link mental disorders, including attention-deficit disorders, to a lack of nutrients in the diet. As a population, we consume **34% fewer vegetables** and **66% less fish** than people did in 1955. In addition, we eat more packaged food and less fresh food (British Mental Health Foundation.)

Vocabulary:

Fats
Essential fatty acids
Omega-3 fatty acids
Omega-6 fatty acids
Trans fatty acids
Carbohydrates
Sugar
Fiber

Lesson 3: Exploring the Impact of Sensory Input (Taste and Color) on the Brain

Use the following experiment to illustrate that our brain must sort out sensory data in order to think and make judgments. Sometimes this sensory data can be confusing. This experiment focuses students on the link between taste and sight.

Materials and preparation:

- Get four large containers of lemon-lime soda or sweet colorless lemonade.
- Add food coloring to each bottle to make four different colored drinks—red, orange, yellow-green, and blue.
- Have sufficient cups so that each group can have at least four cups.
- Have a sliced lemon available.

Engage:

Suck on a wedge of lemon in front of the class and note what happens. (Most students should either find their mouths puckering or salivating.) Discuss the connection between what you see and your sense of taste—how are they connected? Are they connected?

Explore:

- **Step 1:** Divide the class into groups—four students in each group. Decide if there are enough supplies for all the students in the group to taste or if their will be one **designated taster** per group. If one person is the taster, have another be the recorder. If **all** students taste, have each student record their own observations.

- **Step 2:** Give each group a cup of the red drink. Have them taste and record what flavor they think the drink is. Don't share observations at this point. Repeat the procedure with each of the other colors. Have students record the color and flavor of each drink.

- **Step 3:** Show each color of drink, then make a chart on the board indicating the different flavors the students assigned to that color. Do the same for each successive color. At the end, tell the students that all the drinks were lemon-lime (or lemonade) and ask them why they think some people thought they were other flavors. Ask students to consider whether they think the color of a food might influence their decision whether or not to try a new food. Finally, ask what color foods they like or dislike.

Explain:
You may want to point out that colorful fruits and vegetables are full of vitamins, minerals, and fiber that are good for us. One type of "healthy eating plan" recommends eating a rainbow of colors of fresh foods every day—green, yellow, orange, red, and blue. The theory behind this is that by eating a variety of different colors of foods you will be getting all the beneficial antioxidants, enzymes, vitamins and minerals that are necessary for a healthy diet.

Have students write a paragraph explaining the experiment and their findings. You may have them use a standard reporting format such as:

- Question: (What question are you trying to answer?) Ex: Are taste and sight connected?
- Procedure: (What steps did you take to answer the question?)
- Findings: (What did you discover?)
- Conclusion: (What's your answer to the question posed at the beginning? Why have you reached this conclusion?)

Extend:
Have students list the different food groups and have them create a healthy meal that both **looks good** AND **tastes good**. As they name each food group show them the food you brought from that food group to create a healthy meal.

Fruit: Strawberry
Vegetable: Carrot
Grains: Whole wheat bread
Dairy: Milk

Protein: Peanut butter

Note to Teacher: The foods you bring in may vary depending on what you have available. Be sure to pick a variety of colors and try to create an appealing meal that the students would actually *want* to eat.

After creating the meal ask: ***"Who would like to eat this meal? Who would eat the strawberry? What looks really good about this meal? Is the meal colorful?"*** Tell the students that you would like each of them to have this healthy meal but there isn't enough. Then tell them you have an idea how to make it so **everyone** can get a taste of the **whole mea**l.

Now take the blender and puree all of the foods together. Now offer a spoonful of the meal to each of the students. Ask: ***"Who would like to eat this meal NOW?"***

Have students draw conclusions:

1. How does sight affect our desire to eat?
2. How does taste affect our desire to eat?
3. What is the brain's role in eating?
4. We have identified two sensory inputs that the brain uses to sort information and make decisions. What are the two sensory inputs that we have explored? (Sight and Taste.)
5. Ask for a volunteer. Have the student close their eyes, taking away the sense of sight, and also tell them they will not be tasting the food. Take some leftover food and **one at a time** place each food under the student's nose. Based on what they smell ask what it is they think they are smelling and if they would want to eat it based on the smell. After going through a lot of foods have them smell a cup of the pureed mixture. Ask: ***"Does this food smell good? Based on how it smells, would you like to eat it?"***
6. Review: ***"What is another method of sensory input?"*** (Smell.) ***"Are there others?"***

Evaluate:
Use the Explain portion of the lesson to measure student understanding.

Lesson 4: Nutrients for a Healthy Brain and Nervous System

Use this activity to focus students on the kinds of foods students should be eating to feed their brain and nervous systems. Help them discover the cause and effect relationship between what they eat and how they think.

Materials and Preparation:

- "Nutrition and Your Brain" article
- Cause and Effect graphic organizer

- A variety of foods from home (can of tuna, can of sardines, canola oil, peanuts, walnuts, potato chips, soda, cookies or cupcakes in their package, candy bar, dark leafy greens.)
- Choose My Plate visual from www.choosemyplate.gov.

Engage:
Divide students into small groups. Give each group one or more food items. Have the group decide whether that food is good for the brain and nervous system or not. Have them write their conclusion, including the reasons for their conclusions.

Explore:
Working in their groups, have all students read the article **(See Figure 1)** on nutrition and the brain and nervous system. Give each group a large piece of paper with the graphic organizer below. **(See Figure 2)** Have the groups work to fill in the second and third columns. When groups are finished, post them on the board and discuss the results.

After discussing the results from the article, compare results with the Engage activity. Compare what they **now** know about the foods to their original **hypothesis** about the foods.

See the reduced version of the graphic organizer below. Download the student Cause and Effect organizer and the answer key:

Healthy Brain and Nervous System
Cause and Effect Graphic Organizer

Substance or action	Helpful or harmful?	Why?
Eating a variety of fresh, whole foods.		
Eating foods like fish and walnuts.		
Eating foods like potato chips and french fries.		
Having a snack of an apple, some walnuts, and a piece of cheese.		
Drinking sodas every day.		
Eating sugary snacks like candy and cookies.		
Using alcohol, tobacco or drugs.		

Healthy Brain and Nervous System
Cause and Effect Graphic Organizer
Answer Key

Substance or action	Helpful or harmful?	Why?
Eating a variety of fresh, whole foods.	Helpful	Provides a range of nutrients that the brain and nervous system need—lots of vitamins, minerals, and micronutrients.
Eating foods like fish and walnuts.	Helpful	Provide omega-3 fatty acids, essential fatty acids for the brain cells and myelin sheath.
Eating foods like potato chips and french fries.	Harmful	Contain trans fatty acids (TFAs) that compromise the flexibility of the brain cells and myelin sheath—they clog your brain.
Having a snack of an apple, some walnuts, and a piece of cheese.	Helpful	Has protein, good fats (walnuts) and good carbohydrates (apple—sugar with fiber.)
Drinking sodas every day.	Harmful	Have sugar, which can cause obesity (and diabetes over time) and caffeine, which affects the nervous system.
Eating sugary snacks like candy and cookies.	Harmful	Can cause obesity and cause blood sugar to spike and drop, which over time can lead to diabetes. Blood sugar drops also cause fuzzy thinking.
Using alcohol, tobacco or drugs.	Harmful	Depressant and/or stimulant substances with no nutrient value. Detrimental to the brain and nervous system.

Explain:

Students will write a Cause and Effect paragraph using **one** of the following writing prompts. Have students supply examples from their reading or from personal knowledge. You may wish to print the writing prompts on card stock so students can select one randomly (ex: drawing cards from a hat.) **NOTE: You can have students complete this assignment on their own or in small groups. If you choose to have them work in groups, designate one person as the recorder.**

Choosing **one** of the following prompts, have students write a **cause and effect paragraph**. Remind students to support their cause and effect statement with examples and details.

CAUSE & EFFECT WRITING PROMPTS:

1. What might happen to your brain and nervous system if you drank sodas every day?

2. What might happen to your brain and nervous system if you used alcohol or drugs?

3. What might happen to your brain and nervous system if you ate a variety of fresh, whole foods?

4. What might happen to your brain and nervous system if you ate foods like fish, walnuts, canola oil, and flax seed?

5. What might happen to your brain and nervous system if you ate fast foods and processed/packaged snacks all the time?

Extend:
Have students go to the library, go online, or read a daily newspaper or other periodical to find an article or a book about the effects on the brain and body from **one** of the following:

- Sugar
- Trans fatty acids
- Caffeine
- Alcohol
- Tobacco
- Drugs

Have students write a **one-page report** summarizing the article, then prepare a five-minute presentation to a small group about the article.

Evaluate:
Use the Cause and Effect paragraphs to evaluate your students' understanding of the concepts in this lesson. (NOTE: If you had students complete the paragraphs as a group, you may wish to have each student do a different paragraph as homework.)

Web Resources:
- www.kidshealth.org: "The Brain is Boss"

- www.kidshealth.org: “Caffeine and Your Child”

- http://faculty.washington.edu/chudler/nutr.html: “Nutrition and the Brain”

Missouri Standards:

Frameworks: Health and Physical Education

I. Function and Interrelationships of Systems

What All Students Should Know:

3. The Nervous System includes the brain, nerves, and spinal cord. It is the communication center for the body, sending and receiving messages, regulating body functions and serving as the control center for the five senses and for emotions, speech, coordination, balance, and learning. Learning is influenced by the brain’s short-term and long-term memory as well as learning styles and the environment.

II. Health Maintenance and Enhancement

What All Students Should Know:

1. Fats provide the body with a stored form of energy, warmth and insulation for body organs. Carbohydrates provide the body with an immediate source of energy. Protein helps the body grow, makes muscles strong, and repairs body tissues. Vitamins and minerals help release energy and allow the body to perform many functions including fighting infections, making strong bones, teeth, etc…

What All Students Should Be Able To Do:

b. Identify food sources that supply each of the essential nutrients.

What All Students Should Know:

5. Balance, moderation and variety are important concepts to be considered when making food choices.

What All Students Should Be Able To Do:

a. Make informed decisions regarding food choices based on an understanding of balance, moderation and variety.

Figure 1:

Eat a Variety of Foods

Many foods help you grow a healthy brain and nervous system. The most important thing for you to remember is that you need to eat a **variety** of **good foods**. This will supply the vitamins and minerals you need to develop a healthy brain and nervous system.

Good foods are fresh and not packaged. Fresh vegetables, fruits, and whole grains like brown rice and oatmeal are very important. You should choose foods from **all** the categories of the Choose My Plate visual. Foods with a lot of sugar, fats, or white flour are not good for us.

Foods like sodas, candy, chips, and other packaged snack foods have a lot of refined sugar and bad fats, with little nutritional value. Sodas also have caffeine which can be detrimental to the nervous system.

These foods are good for your brain and nervous system:

- fresh vegetables
- fresh fruits
- whole grains (brown rice, oatmeal, millet, barley)
- meat (fish, chicken, beef, pork)
- dairy (milk, cheese, yogurt)
- eggs
- nuts and seeds (and oils made from nuts and seeds)
- beans

The most important thing to remember is that we need **all** these foods. Different foods supply the vitamins and minerals your growing body needs for a healthy brain and nervous system. One way to ensure you are eating many different foods is to **include a rainbow of colors** at every meal—green, yellow, orange, red and blue. Including all these colors helps you get the vitamins and minerals you need.

Brain Foods

Fats and carbohydrates build your brain and nervous system. Carbohydrates give you fuel called glucose. Fats help protect your brain and nerve cells. The brain also needs many of the vitamins and minerals that it gets from different foods.

Good Fats, Bad Fats

Your brain needs fats. Fats provide **fatty acids** that feed your brain and nervous system cells. The body gets fats by eating foods that contain fat. Fats are in foods such as nuts and seeds, as well as some fruits and vegetables. Fats are also in many high protein foods such as fish, meat and milk. **Essential fatty**

acids (EFAs) are fats that we must eat, because our bodies can't make them. These are called **omega-3** and **omega-6** fatty acids. They are very important fats to our diet.

Fats are important to the brain because the body uses good fats to coat the **axons** with **myelin**. This fatty covering is the **myelin sheath**. When your body digests food, fats like omega-3 and omega-6 are broken down into fatty acids that the brain uses in its cell membranes. These fatty acids affect the correct functioning of neurotransmitters in the brain. A deficiency of good fatty acids can cause learning and motor problems.

When the body has enough omega-3 and omega-6 fatty acids, it can make other fatty acids from them. Omega-3 fatty acids help protect the nervous system and the cell membrane in the brain.

Foods that have omega-3 fatty acids include:

- fish*
- dark green leafy vegetables
- pumpkin seeds
- walnuts
- flax seed and flax seed oil
- canola oil
- soybean oil

*Fish is an important source of omega-3 fatty acids and may really be "brain food."

Foods that have omega-6 fatty acids are:

- sunflower seeds and sunflower oil
- peanuts and peanut oil
- corn oil
- sesame seeds and sesame oil
- meat
- dairy products

You should eat about the same amount of omega-3 foods as omega-6 foods. But many people eat far more omega-6 than omega-3 foods. One way to be sure you have enough omega-3 is to eat an abundance of vegetables and fish and less red meat. Some scientists think too much omega-6 might be bad for you.

Trans fatty acids (TFAs) are fats that are **not** good for you. They come from **hydrogenated fats** found in margarines, potato chips, packaged desserts, many other packaged foods, and deep fried food such as French fries. Trans fatty acids are fats that have been changed by high heat or chemical processes. They can find their way into the myelin of brain cells and change how the cells work. TFAs

literally clog up your brain—they make you think more slowly. They push the good fats out of the way and take up more room on the myelin sheath, making it less flexible and more rigid.

Good Carbohydrates, Bad Carbohydrates

Carbohydrates are fuel for your body. Carbohydrates change to **glucose** when they are digested, which is the **fuel for the brain**. Carbohydrates are made up of sugar and fiber. Foods such as fruit are high in sugar but also contain fiber, whole grains such as oatmeal are high in fiber. Fruits and whole grains also contain many vitamins, minerals, and enzymes that we need for healthy bodies. Some foods, such as milk, contain a balance of carbohydrates, fats, and protein.

Our bodies need carbohydrates, but eating too much refined sugar can cause the body to store extra fat and leads to diseases such as Type 2 Diabetes. Snack foods like candy, sodas and cookies contain a high percentage of refined "simple" sugar with little fiber. **Just drinking one sweetened soft drink a day can increase your risk of obesity by as much as 60%**.

"Simple" sugars are found in sodas and many fruit drinks. Since they don't have any fiber they move into the body quickly, raising blood sugar quickly, then letting it drop. However, fruits and vegetables like apples, bananas and potatoes have sugar **with fiber** so they act much more slowly in the body. The fiber slows down the action of the sugar, so blood sugar doesn't spike as quickly or as high. The combination of sugar and fiber in fruits and vegetables also provides a range of vitamins and minerals.

If you want to choose a healthy snack, an apple is better than apple juice because the fiber slows down the action of the sugar. The best snack would be an apple with a piece of cheese and a few walnuts to balance carbohydrates, fats and protein all in one snack. The carbohydrates provide glucose (fuel) for the brain while the nuts provide omega-3 fatty acids to benefit the myelin sheath.

Substances to Avoid

You've heard that it's important to avoid alcohol and drugs and limit caffeine. What you may not understand, however, is how these substances affect the brain and nervous system.

- **Caffeine** - You probably have consumed caffeine in sodas. You may also have had it in coffee drinks, iced tea, and chocolate candy and beverages. Caffeine can give you a burst of energy, followed by a slump. Sodas which contain both sugar and caffeine can give you extreme highs and lows. Caffeine can also affect your nervous system, causing jitteriness, headaches, and difficulty sleeping.

- **Alcohol, Tobacco and Drugs** - Alcohol depresses your brain and nervous system. Tobacco is extremely habit-forming and bad for the brain and nervous system, as well as your lungs and heart. Smoking may be one of the hardest habits to break. Drugs can either stimulate or depress the brain and nervous system depending upon the drug. Only take drugs that have been prescribed by your doctor when you are sick.

Summary

Remember to eat a **variety** of foods, especially foods with **essential fatty acids** like **omega-3** and **omega-6 fatty acids.** Avoid **trans fatty acids.** Good fatty acids protect your brain cells and nervous system by creating a protective coating called the **myelin sheath.**

Eat lots of fruits and vegetables for a combination of **fiber** and **sugar**. The sugar found in nutritionally healthy foods changes to **glucose**--fuel for the brain. Avoid the refined sugar found in sodas and candy. Also stay away from caffeine, alcohol, tobacco, and drugs.

Scientists say that what we eat makes a big difference in how well we think. Eat smart! Include fresh vegetables, fruits, whole grains, and fish in your diet. **Fish**, in particular, may be a real “brain food.”

Figure 2

Healthy Brain and Nervous System
Cause and Effect Graphic Organizer

Substance or action	Helpful or harmful?	Why?
Eating a variety of fresh, whole foods.		
Eating foods like fish and walnuts.		
Eating foods like potato chips and french fries.		
Having a snack of an apple, some walnuts, and a piece of cheese.		
Drinking sodas every day.		
Eating sugary snacks like candy and cookies.		
Using alcohol, tobacco or drugs.		

Figure 3

Healthy Brain and Nervous System
Cause and Effect Graphic Organizer (Answer Key)

Substance or action	Helpful or harmful?	Why?
Eating a variety of fresh, whole foods.	Helpful	Provides a range of nutrients that the brain and nervous system needs—lots of vitamins, minerals, and micronutrients.
Eating foods like fish and walnuts.	Helpful	Provides omega-3 fatty acids, essential fatty acids for the brain cells and myelin sheath.
Eating foods like potato chips and french fries.	Harmful	Contain trans fatty acids (TFAs) that compromise the flexibility of the brain cells and myelin sheath—they clog your brain.
Having a snack of an apple, some walnuts, and a piece of cheese.	Helpful	Has protein, good fats (walnuts) and good carbohydrates (apple contains sugar with fiber.)
Drinking sodas every day.	Harmful	Contains sugar, which can cause obesity (and diabetes over time) and caffeine, which affects the nervous system.
Eating sugary snacks like candy and cookies.	Harmful	Can cause obesity and cause the blood sugar to spike/drop, which over time can lead to diabetes. Blood sugar drops also cause fuzzy thinking.
Using alcohol, tobacco or drugs.	Harmful	Depressant and/or stimulant substances with no nutrient value. Detrimental for the brain and nervous system.