

Nutrition Essentials: Carbohydrates

Section 1: Welcome

SLIDE # 1: Welcome to Nutrition Essentials, a Texas AgriLife Extension Service Professional Development Training Program. Nutrition Essentials covers seven basic relevant nutrition topics: Overview, **Carbohydrates**, Protein, Fat, Vitamins, Minerals, and Beverages. Each module is approximately one hour in length.

This course will be presented in a voice-narrated format that allows you to follow along with a PowerPoint slide presentation. A high-speed Internet connection is required to complete Nutrition Essentials. Content for this module, Nutrition Essentials: Carbohydrates, is divided into multiple sections (see menu bar on the left for the course outline), enabling you to complete and/or review content at your own pace. Printable handouts, if applicable, will be presented prior to the section in which they are referenced.

In the next section, you will be directed to complete a brief, multiple-choice pre-learning assessment. Once you have completed the pre-learning assessment, you will be free to advance to the course content by checking the “Next Section” button at the bottom of the page. At the conclusion of this module, you will be directed to complete a post-learning assessment that will determine if you successfully pass the course.

If at any time you wish to take a break from the module, simply log out and return to the course when you are ready to continue. When you sign back in to the module, you will be taken directly to the section where you left off. To review a section you have already completed, click on the desired section on the left menu bar.

SLIDE # 2: This module, Nutrition Essentials: Carbohydrates, provides information about this food component and nutrient. Other modules in this include: Protein, Fat, Vitamins, Minerals, and Beverages. Modules build on one another and are best when taken in this sequence.

Section 2: Learning Objectives

At the conclusion of this module, participants will be able to:

- Discuss carbohydrates as a main source of energy in the diet and the percentages of meal calories that should come from carbohydrates;
- Give examples of simple and complex carbohydrates;
- Discuss the phytonutrient fiber and compare soluble to insoluble fibers relative to physical state in water, food sources, and the effects on the digestive tract;
- Name common medical conditions that are related to carbohydrate consumption and metabolism;
- List 4 food groups and food examples that have the most impact on the blood glucose level, and list 3 food groups and food examples that have the least impact on carbohydrate levels;
- Tell which carbohydrate sources are to be reduced and which carbohydrate/fiber sources are to be increased according to the 2010 Dietary Guidelines for Americans;

- Discuss how food labels can assist consumers in knowing the total carbohydrates and fiber sources in foods; and
- Be able to discuss MyPlate and how carbohydrates can be an important part of a healthful meal plan.

Section 3: Definition, Categories, and Fiber

SLIDE # 3: As the main energy source for the body, carbohydrates are composed of carbon, hydrogen, and oxygen in various amounts and arrangements.

Think of carbohydrates as belonging to two major groups: sugars, which are simple carbohydrates, and complex, which are starches plus fiber.

SLIDE # 4: Carbohydrate categories include:

- Simple, or Monosaccharides. “Mono” means 1, or 1 sugar unit
- Simple, or Disaccharides. “Di” means 2, or 2 sugar units. These are monosaccharides that are linked together.
- Complex, or Polysaccharides. “Poly” means more than 10 sugar units that are linked together.

SLIDE # 5: Simple carbohydrates or sugars are the first major group. They’re known as monosaccharides and are found in:

- the blood as glucose or dextrose;
- sugars found naturally in fruits, such as fructose or fruit sugar;
- high fructose sweetener in beverages or other processed foods; and
- milk sugar galactose and lactose found in fluid milk and milk products.

An interesting fact is that all of these monosaccharides have the same chemical composition of carbon, hydrogen, and oxygen, but they differ in their molecular arrangement.

SLIDE # 6: Another simple carbohydrates class is known as disaccharides. These simple sugars are found naturally in beer and broken-down starches, such as maltose, which is glucose added to glucose.

Another disaccharide is sucrose, which is glucose added to fructose. It’s found in fruits and white granulated table sugar.

Finally, lactose is made of glucose plus galactose. It’s found in fluid milk, cheese, and other dairy or milk products.

SLIDE # 7: Added disaccharides or sugars contribute an average of 16% of the total calories in American diets. These sugars include high fructose corn syrup, white sugar, brown sugar, corn syrup, corn syrup solids, raw sugar, malt syrup, maple syrup, pancake syrup, fructose sweetener, liquid fructose, honey, molasses, anhydrous dextrose, and crystal dextrose.

The majority of sugars in typical American diets are sugars that are added to foods during processing, preparation, or at the table. These “added sugars” sweeten the flavor of foods and beverages; contribute to the preservation purposes; and improve the functional properties, such as the food thickness, texture, body, and browning capability. However, high intakes of sugars can be associated with consuming fewer nutrients and other healthful dietary

components. For example, many foods that contain added sugars often supply calories, but they supply few or no essential nutrients and no dietary fiber.

SLIDE # 8: The other major carbohydrates category is known as complex carbohydrates, or polysaccharides. Polysaccharides food sources are starches that are the storage form of energy in plants, such as grains from wheat and/or rice; legumes, such as dried peas or beans; and potatoes.

Glycogen is another form of complex carbohydrates that is found in meat since glycogen is the storage form of energy found in the muscles and liver of both humans and animals. Glycogen helps the central nervous system, which includes the brain and the spinal column, by supplying energy during fasting periods.

SLIDE # 9: Fiber is not a nutrient, so it is not a polysaccharide. Other complex carbohydrates, including starches and glycogen, are classified as nutrients. Fiber is classified as phytonutrient – not a nutrient! Fiber includes the structural part of the plant in which long chains of glucose are linked so digestive enzymes cannot separate during the digestive process, which results in no energy being available.

Fiber food sources include vegetables; fruits; grains, such as oats, wheat, or unmilled rice; and bran.

SLIDE # 10: Fiber is classified as being either soluble or insoluble. Let's take a look at what determines this classification.

Soluble fiber dissolves in water. Food sources of soluble fiber include oats, fruits, barley, flaxseeds, legumes, and vegetables. The role of soluble fiber is delaying or slowing down the gastrointestinal, or GI, transit; delaying the absorption of glucose; and helping to reduce blood cholesterol.

Insoluble fiber does not dissolve in water. Food sources of insoluble fiber include wheat, corn, and oat bran; whole grain breads and cereals; fruit skins; root vegetables, such as carrots, beets, and turnips; green beans; the cabbage family, such as broccoli, Brussels sprouts, or cauliflower; and white or sweet potatoes. The role of insoluble fiber is to speed up GI transit time; delay glucose absorption; slow starch digestion and absorption; and increase stool bulk.

Section 4: Carbohydrates Digestion/Absorption and Related Medical Conditions

SLIDE # 11: In this section, the focus will be on the digestion and absorption of carbohydrates. Additionally, we'll review some of the common medical conditions related to carbohydrates and carbohydrate metabolism, such as overweight and obesity, diabetes, lactose intolerance, dental caries, and constipation.

The digestion of carbohydrates involves the breakdown of food particles from larger compounds to smaller molecules that the body can absorb. The digestion of carbohydrates begins in the mouth. Digestion of carbohydrates does not take place in the stomach. Enzymes in the small intestine perform the task of further breakdown of carbohydrates, protein, and fat. Amylase is the digestive enzyme needed to digest carbohydrates into small molecules that are known as monosaccharides so the body can absorb them.

Carbohydrate absorption occurs following digestion, where individual monosaccharides are absorbed by the cells that line the intestinal wall. The sugars fructose and galactose travel to the liver to be converted into glucose. Glucose remains in the bloodstream for distribution into all cells requiring energy, which is used for the body to do work. In response to the rise in blood

glucose, insulin is needed so the blood glucose can be utilized by the cells. Once insulin is released, glucose is utilized by the cells.

SLIDE # 12: Poor diet and physical inactivity are the most important factors contributing to an epidemic of overweight and obesity in this country. The most recent data indicate that 72% of men and 64% of women are overweight or obese, with about one-third of adults being obese. Even in the absence of overweight, poor diet and physical inactivity are associated with major causes of morbidity and mortality. Eating too many calories from carbohydrates in sweetened beverages, processed foods, and desserts are one of the factors in the overweight and obesity crisis today. It leads to degenerative diseases such as cardiovascular disease, type 2 diabetes, and some types of cancer. Other conditions unique to carbohydrates include lactose intolerance, dental caries, and constipation.

Some racial and ethnic population groups are disproportionately affected by the high rates of overweight, obesity, and associated chronic diseases. The connection between diet and health make a focus on improved nutrition and physical activity choices even more urgent. It also provides important opportunities to reduce health disparities through dietary and physical activity changes.

SLIDE # 13: Diabetes is a disease that affects the way your body utilizes food. The food you eat turns to glucose, which is sometimes called blood sugar. Insulin helps the glucose to enter the cell so it can be utilized as energy.

- When you have diabetes, your body has trouble making and/or using insulin. Because of this, your body lacks the fuel it needs, and your blood glucose stays excessively high. Therefore, you have a problem with carbohydrate metabolism. You have to learn to control carbohydrates to know which ones cause your blood glucose to increase more and those carbohydrates that have less impact on your blood glucose.
- With type 1 diabetes, the body doesn't make any insulin. Insulin usually has to be injected every day.
- With type 2 diabetes, the body doesn't make enough insulin or use insulin well. As a result, the body lacks fuel, which is a problem with carbohydrate use.

SLIDE # 14: A person with diabetes and a problem with carbohydrate metabolism needs to learn which foods cause their blood glucose to increase more and those foods with less impact on their blood glucose. Let's take a look at these categories:

Food groups with more carbohydrates and more impact on blood glucose levels include:

- Grains, such as starch with fiber like whole grain breads and cereals; and starchy vegetables, such as corn, potatoes, green peas, rice, and pasta;
- Fruits;
- Dairy, such as low-fat milk, yogurt, or dairy-like foods; and
- Sweets, desserts, or other carbohydrates.

Food groups with less carbohydrates and less impact on blood glucose levels include:

- Vegetables that are the nonstarchy or high in fiber content;
- Protein foods, such as lean meats, poultry, fish, or eggs; and
- Other foods, such as fats like bacon, butter, margarines, nuts, salad dressings, and other fat-containing foods.

SLIDE # 15: Lactose intolerance is another disease unique to carbohydrates. Persons with lactose intolerance are unable to digest the large quantities of lactose that are found in dairy products. This is due to an enzyme deficiency of lactase in the gastro-intestinal tract. Symptoms include bloating, flatulence, cramps, and diarrhea. However, it is important to caution that when dairy products are eliminated, care must be taken in selecting other calcium food sources or supplements as these dairy products are the major source of calcium in the U.S. diet. Additionally, they provide vitamin A and protein.

Lactose intolerance has a higher prevalence in special populations, such as certain ethnic groups. These groups include Asian Americans, Native Americans, African Americans, Hispanic Americans, and the elderly. Also, lactose intolerance is more prevalent in persons who have temporary side effects associated with surgery and certain disease states, such as HIV/AIDS.

SLIDE # 16: If a person can't tolerate lactose in his or her meal plan, what can be done to ensure that a healthful meal plan is still possible?

Here are some lactose tips for tolerance or treatment if dairy products can't be tolerated:

- Instead of totally cutting out all dairy food, first try to eat small amounts of a dairy food with your meal.
- The best dairy food choices to select are those that have been more highly processed, such as: yogurt, buttermilk, and hard aged cheeses.
- If neither of these tips are successful, then select milk products treated with lactase, such as the Lactaid® brand.
- Lastly, try taking a lactase supplement before eating.

SLIDE # 17: Carbohydrates, which are sugars and starches, increase the risk of tooth decay, or dental caries. Sticky foods are more harmful than non-sticky foods because they remain on the surface of the teeth. Frequent snacking increases the time that acids are in contact with the surface of the teeth.

Let's consider who might be in high-risk populations for dental caries. Those more prone to dental caries are from certain ethnic and racial groups, such as Black, non-Hispanic children, and Hispanic children of Mexican origin who had significantly higher percentages of untreated cavities than white, non-Hispanic children.

Another factor for tooth decay is known as the "baby bottle syndrome." Tooth decay can occur when the baby is put to bed with a bottle or when a bottle is used as a pacifier for a fussy baby. The sugary liquids pool around the teeth while the child sleeps. Bacteria in the mouth use these sugars as food.

Avoid high-risk foods that stick to the teeth, such as candy, raisins, dried cranberries, sweetened beverages, and white bread. For prevention of dental caries:

- eat sweetened foods during meals instead of alone;
- drink beverages with less added sugar with meals;
- brush teeth regularly; and
- chew gums with artificial sweeteners.

SLIDE # 18: So, what's the connection between carbohydrates and constipation? First, let's consider the definition of constipation, which is the condition of infrequent bowel movements that produce hard stools and require straining. Prolonged constipation is linked to *hemorrhoids*

and *diverticulitis*, which is damage the colon caused from straining and causes the colon to become inflamed or infected.

Common causes of constipation include:

- Eating a poor diet that has very little fiber and limited fluid intake; most people only eat from 11-14 grams of fiber when 25-35 grams are recommended daily;
- Lack of physical activity;
- Certain medications and the chronic use of laxatives;
- Traveling; and
- Ignoring the urge to defecate.

The treatment of constipation should include:

- Gradually increasing fiber intake to the recommended levels of at least 25 grams per day;
- Drinking up to 8 to 10 cups of fluid daily;
- Trying foods with a natural laxative effect, like prunes, grapes, and wheat bran;
- Engaging in daily exercise or activities; and
- Following the urge to defecate.

Section 5: 2010 Dietary Guidelines

SLIDE # 19: In this section, we'll see the 2010 Dietary Guidelines for Americans' recommendations for planning carbohydrates into healthful meals.

The Guidelines recommend that at least 130 grams of carbohydrates be eaten each day. This should be about 45-65% of the total calories eaten daily.

Added sugars should be no more than 25% of calories.

The phytonutrient fiber should be 14 grams per 1,000 calories, which equals 25 grams for women and 35 grams for men. The average person eats only about 11-14 grams of fiber daily, but the Guidelines recommend that we eat 25-35 grams of fiber per day.

Print the handout, *Nutrient Needs at a Glance*. Review the amount of carbohydrate required, the food sources, their functions within the body, and symptoms of nutrient deficiencies. This publication defines nutritional terms and lists the all of the nutrients, vitamins, minerals, and electrolytes for which recommended dietary allowances have been established.

SLIDE # 20: So, what does the term, "nutrient-dense" foods and beverages, mean? Nutrient dense means that the food or beverage provides vitamins, minerals, and other substances that have positive health effects, with relatively few calories.

The term "nutrient dense" indicates that the nutrients and other beneficial substances in a food have not been "diluted" by the addition of calories from added solid fats, added sugars, or added refined starches; or by solid fats naturally present in a food, such as the fat in meats, poultry, fluid milk, and other milk products, such as cheese. The fat in fluid milk fat is considered to be a "solid fat." It is solid at room temperature, but it is suspended in milk by the process of homogenization.

Nutrient-dense foods and beverages are lean or low in solid fats, and they minimize or exclude added solid fats, sugars, starches, and sodium. Ideally, they also are in forms that retain naturally occurring components, such as dietary fiber.

All vegetables, fruits, whole grains, seafood, eggs, beans and peas, unsalted nuts and seeds, fat-free and low-fat milk and milk products, and lean meats and poultry – when they are prepared without adding solid fats, sugars, or salt – are nutrient-dense foods.

SLIDE # 21: Refined grains are processed, which results in the loss of vitamins, minerals, and dietary fiber. Although they're enriched with iron, thiamin, riboflavin, niacin, and folic acid before being used as a food ingredient, some of the benefits, like fiber content, are lost in processing. The chart on this slide shows the sources of refined grains in the diets of the U.S. population.

It shows the reason for the recommendation to substitute whole-grain products for refined-grain products. Over ¼ of all refined grains consumed are from yeast breads, rolls, and bagels. These items and many other foods on the chart have whole-grain counterparts in the marketplace that can readily be selected by consumers. Other refined-grain sources are from pizza, grain-based desserts, and tortillas. Pasta dishes, rice, and chicken-mixed dishes are also a source for refined grains. You can identify other sources that are refined grains on this slide, as well.

SLIDE # 22: This chart shows the sources of added sugars in our diets. It highlights the contribution of sodas and similar calorically sweetened beverages as the major source of added sugars in the American diet.

Starting on the right side of the pie chart, you'll see that most added sugars come from sodas or sports and energy drinks. They're followed by grain-based desserts, fruit drinks, dairy desserts and candy, ready-to-eat cereals, sugars and honey, and sweet tea. About 2.1 % is from yeast breads. All other categories of food account for about 15.4% of added sugars in the diet.

SLIDE # 23: The Dietary Guidelines for Americans provide consumer tips on how to balance calories, which foods to increase, and which foods to decrease. Calories should be balanced by eating less food while enjoying the food that is eaten and by avoiding the temptation to oversize portions. To improve our diets, Americans need to eat more from the following food groups in nutrient-dense forms, which contain carbohydrates: vegetables, fruits, whole grains, and fat-free and low-fat milk.

The total amount of protein foods Americans eat is adequate on average, but within that food group, seafood should be consumed in greater amounts and meat and poultry in smaller amounts. Oils should be used to replace solid fats, when possible.

The four nutrients the Dietary Guidelines for Americans Committee concluded were of public health concern are: potassium, dietary fiber, calcium, and vitamin D. The new Recommended Dietary Allowances for vitamin D are included in an appendix of the 2010 Dietary Guidelines for Americans. They were set under the assumption of minimal sun exposure.

SLIDE # 24: Another new key recommendation is to limit refined grains, especially those that contain solid fats, added sugars in foods and beverages, and added or higher levels of sodium.

Enriched refined grain products provide some vitamins and minerals but not the fiber provided by whole grains.

Replace refined grains with whole grains.

Section 6: Nutrition Educational Tools: Food Labels and MyPlate

SLIDE # 25: In this section, we'll learn about some educational tools, including the Nutrition Facts label, ingredients listing label, and the new MyPlate recommended meal plans. These tools will help us to have a better understanding of carbohydrates in our meal plans.

The Nutrition Facts label and ingredients listing label, which are found on processed food packaging, are educational tools to help consumers know what nutrients and calories are in the foods they buy.

Let's briefly go over ingredient and Nutrition Facts information on food labels regarding carbohydrates and sugars. As we all know, some products contain sugars. People need to check product labels so they can avoid eating large amounts of concentrated sources of sugars, such as table sugar. Research has found that people can eat some sugar and other nutritive sweeteners within the context of a healthful meal plan.

We don't have to avoid sugars altogether, but we do need to eat them in moderation. Sugars are easily absorbed into the bloodstream. Carbohydrates and sugars have the greatest impact on blood glucose levels.

Let's look at the ingredients listing on the food label shown here. One way to know whether a food has too much sugar is to look for where the sugar falls in the list of ingredients on the label. The first ingredient listed on the label is the one that the food contains the most of, by weight. The second ingredient listed has the second largest amount in the food item, and the ingredient with the third-most amount is listed third. The remaining ingredients are also listed in descending order of amount by weight. If sugar is listed as the first, second, third, or fourth ingredient, then the product probably contains too much sugar.

You might be able to eat the food if sugar is listed as the fourth, fifth, or sixth ingredient. There's probably a small enough amount of sugar that it doesn't matter. Or you might consider avoiding this food altogether or eating only a little of it. If you aren't sure, look at the total carbohydrates and the amounts of fiber and sugar on the Nutrition Facts information to help you decide if you can eat that product or not.

On the Nutrition Facts label on this slide, how much of each of these items is contained in this product? Take a look at the serving size and the number of calories per serving.

- What is the serving size for this container? The answer is ½ cup.
- How many calories do you get from eating one serving? The answer is 90 calories.
- What is the total carbohydrate amount for 1 serving? The answer is 13 grams.
- What is the amount of fiber? The answer is 3 grams.
- What is the amount of sugar? The answer is 3 grams.

SLIDE # 26: Everyone should be alert and able to recognize all forms of sugar that can be mentioned on the ingredients listing of a food label, because sugar is not always identified by the word "sugar." Sugar plus many different sweeteners that are known as "nutritive sweeteners" contribute about the same 4 calories per gram as sugar. Sugar has many disguises on food labels.

Sugar can be disguised on the label as many of the terms ending in "ose," such as: sucrose, fructose, levulose, lactose, dextrose, maltose and glucose. It's worth noting that non-nutritive sweeteners, which contain few or no calories and nutrition, are saccharin, aspartame, ace-

sulfame-K, neotame, and sucralose. Since sucralose, which is also known as Splenda®, ends in the “ose” ending, that could be confusing.

Sugar may not be so disguised with the more commonly known sugars of other names such as molasses, maple syrup, corn syrup, sorghum, honey, and brown sugar.

Sugar can also be disguised in some of the manufacturer’s ingredients as invert sugar, high fructose corn syrup, and dextrin.

Other forms of sugars end in “ol” and are known as polyols, which are commonly referred to as sugar alcohols. They include mannitol, sorbitol, and xylitol.

SLIDE # 27: Let’s take a closer look at the polyol sweeteners, or sugar alcohols, that are like sugar and provide energy, or calories. They don’t contain ethanol as in alcoholic beverages. They may be referred to as sugar replacers.

Sugar alcohols are naturally present in many foods, like berries, other fruits, and vegetables. Some sugar alcohols are hydrogenated starch hydrolysate, sorbitol, xylitol, maltitol, isomalt, lactitol, mannitol, and erythritol (*\i- 'rith-rə -tō*).

Compared to sugar at 4 calories per gram, these sweeteners have fewer calories per gram at .2 to 3 calories/gram than sugar, are less sweet, and are similar in bulk and texture.

Polyols don’t promote tooth cavities because they aren’t converted to acids like sugar. Oral bacteria need sugar to produce cavities. The Food and Drug Administration approved the health claim for gum, candies, beverages, and snack foods with sugar alcohols, noting that the sugar alcohols in these foods do not cause tooth decay.

Polyols – especially mannitol and sorbitol – produce abdominal gas and have a laxative effect if eaten in excess. So eat foods with sugar alcohols in moderation and along with other foods in case your tolerance is lower.

Sugar alcohols are absorbed slowly and incompletely by the body. The body uses little or no insulin with sugar alcohols.

SLIDE #28: Fiber is another dietary concern. Remember that fiber is the part of plants that your body can’t digest. Most people need to increase their intake of fiber because it aids in digestion and increases the amount of fiber in relation to the starch content of foods. The jury is still out as to whether or not fiber might help lower the levels of glucose and fat in your blood.

A food is a good source of fiber if it has between 3 to less than 5 grams of fiber. It’s a high-fiber food if it has 5 or more grams of fiber. It’s a poor-fiber food if it has 1 to 2 grams of fiber.

Let’s look at this Nutrition Facts label to find the amount of both total carbs and dietary fiber.

Look on the ingredients listing for whole grains, cellulose, etc. Remember that whole grains will provide higher amounts of fiber in your meal plan.

To put more fiber in your meal plan, look at both the ingredients listing and the Nutrition Facts information for the items listed on this slide.

SLIDE # 29: Let’s take a look at the Nutrition Facts information on this slide to see the fiber amounts in various foods.

We’ll first look at the total carbohydrate on this label for black beans, which is 16 grams. We also see that it has 6 grams of dietary fiber and 3 grams of sugar.

Remember that the rule is that a product is considered high-fiber if it contains 5 or more grams of fiber. These black beans would be an excellent fiber source!

SLIDE # 30: Let's take a look at the Nutrition Facts information on these two cereal labels to see the fiber amounts and which would be the best choice, Shredded Wheat® or Fruit Loops®. One cup of each cereal is one serving.

- Shredded Wheat® has 170 calories and contains 40 grams of Total Carbohydrates, 6 grams of Fiber, and 0 grams of Sugar.
- In comparison, Fruit Loops® has 120 calories and contains 28 Total Carbohydrates, 1 gram of Fiber, and 15 grams of Sugar.

Which has the higher sodium content? Fruit Loops®.

Which has more protein? Shredded Wheat®.

Would Shredded Wheat® be considered as a high-fiber, good fiber, or poor fiber source? It's a high-fiber source.

Would Fruit Loops® be considered as a high-fiber, good fiber, or poor fiber source? It's a poor fiber source.

Remember from our earlier discussion on fiber:

- A food is considered *high-fiber* if it has 5 or more grams of fiber.
- A food is a *good source* of fiber if it has between 3 to less than 5 grams of fiber.
- A food from 1 to 2 grams of fiber would be considered a *poor source* of fiber.

SLIDE # 31: The new MyPlate from ChooseMyPlate.gov was introduced in 2011, and it provides guidelines for eating healthfully. MyPlate is a visual system to help increase the consumption of plant-based foods. For example, a 9-inch plate can be divided into 4 quadrants. About ¼ of the plate should be for protein foods. The next ¼ plate would be for grain foods. The remaining ½ of the plate should be covered in vegetables, plus one fruit for each meal. One fat-free or low-fat milk should be added to each meal.

By using MyPlate as a daily food planning guide, you'll be eating healthfully each day!

Section 7: Summary

SLIDE # 32: In this Nutrition Essentials: Carbohydrates module, you became aware of carbohydrates as the main source of energy or calories, which should provide about 45-65% of calories in a meal plan. We described the carbohydrate categories "simple," which includes monosaccharides or disaccharides, and "complex," which includes starch or glycogen. Although fiber is not classified as a nutrient, it is important to include fiber-containing foods to aid in digestion.

Dietary carbohydrates and their relationship to common medical conditions were discussed. The 2010 Dietary Guidelines for Americans recommended intakes were given, as well as a discussion of nutrient-dense foods and beverages, refined grains, and foods with added sugars. Food sources of each were also given. Additionally, we discussed which carbohydrate foods need to be increased and those that need to be decreased.

Educational tools to help consumers learn about carbohydrates were provided and are included on the Nutrition Facts and ingredients listings on food labels, with attention to total carbohydrates, sugar, sugar alcohols, fiber, etc. The new MyPlate guideline for eating healthfully was also discussed.

If you need assistance with a meal plan for any type of special medical condition, contact a Registered and Licensed Dietitian to assist you with your special food needs for your medical condition.

Section 8: References and Additional Resources

To learn more about the topics we discussed today, visit the websites below:

- Academy of Nutrition and Dietetics (formerly American Dietetic Association), Nutrition Care Manual, accessed November 2011, nutritioncaremanual.org
- ChooseMyPlate.gov, US Departments of Agriculture & Health/Human Services, 2011, ChooseMyPlate.gov
- Dietary Guidelines for Americans, 2010 www.cnpp.usda.gov
- Dietary Reference Intakes (DRI), Institute of Medicine (IOM), 2011, www.iom.edu
- Insulin Production and Diabetes Illustrations, ADAM, MedlinePlus, US National Library of Medicine, National Institutes of Health, 2011, www.nlm.nih.gov
- Nutrients at a Glance, E589, 589S (Spanish) Texas AgriLife Extension Service, The Texas A&M System, Revised 2011, https://agrilifebookstore.org/publications_details.cfm?whichpublication=498 (English version); https://agrilifebookstore.org/publications_details.cfm?whichpublication=1492 (Spanish version)
- Nutrition Facts Label, US Food and Drug Administration (FDA), 2011, www.fda.gov
- Prevalence in Populations, Texas Diabetes Council, Texas Department of State Health Services, 2011, www.dshs.state.tx.us

This module was developed by:

Mary "Mickey" Kinney Bielamowicz, PhD, MS, RD, LD, CFCS
Regents Fellow
Professor and Nutrition Specialist
Texas AgriLife Extension Service
The Texas A&M System
2012