Functional Foods Part 2

Richard Collins, MD
Susan Buckley, RD
South Denver Cardiology

Let food be thy medicine and medicine be thy food . . .

Hippocrates

What is Diabetes?

- Food we eat is broken down by the body into glucose and released into the bloodstream
- Glucose is the body's primary source of fuel
- In response to glucose levels, the pancreas releases the hormone insulin
- Insulin attaches to insulin receptors and allows glucose to move from the bloodstream into cells for energy

Diabetes

- Type 1 diabetes is an autoimmune disorder in which the immune system attacks the insulin producing cells of the pancreas
- Type 2 diabetes - the pancreas produces insulin but cell receptors become insulin resistant, and glucose remains in the bloodstream
- The pancreas works overtime producing more insulin to try to get the cells to respond. Eventually the pancreas becomes exhausted and is unable to make as much insulin.

- Nearly 24 million Americans have diabetes (8% of population), an increase of 3 million in last 2 years. 85-90% of diabetes cases are Type 2.

What do we know

- Data also show that 57 million people have pre-diabetes
- Pre-diabetes puts people at increased risk for diabetes (fasting blood glucose 100-125 mg/dL)
- 25% of people with diabetes do not know they have it
- 25% of population 60 years and older have diabetes
- 7th leading cause of death in the U.S.

How Do You Get Type 2 Diabetes?

- **Lifestyle factors increase your odds of getting type 2 diabetes.**
- **Weight**
  - Fat cells have fewer insulin receptors than muscle cells, and being overweight or obese can lead to insulin resistance.
- **Diet**
  - Diets containing high amounts of refined carbohydrates and processed foods are more likely to raise blood sugar levels. This creates more work for the pancreas and promotes weight gain.

- **Activity**
  - Being inactive elevates blood sugar levels and may lead to weight gain. Regular exercise helps lower blood sugar levels.
- **Stress**
  - Prolonged periods of stress increase levels of cortisol in the body, which antagonizes insulin.
- **Genetics**
  - Certain ethnic groups have a higher incidence of diabetes including African American, Native American, Pacific Islander, Latino, and Asian.

How is Diabetes Diagnosed?

- There are some symptoms associated with diabetes, but often people may not experience any symptoms. Routine blood and urine tests can confirm a diagnosis of diabetes.

- **Symptoms-**
- Increased thirst
- Unusually Frequent Hunger
- Frequent Urination
- Fatigue
- Infections
- Blurred vision
- Cramps or burning sensation in the feet and/or legs
- Unexplained weight loss
- Nausea or vomiting
- Sores that do not heal

Diagnosis

- **The most common diagnostic tests include the Fasting Plasma Glucose Test, Random Plasma Glucose Test, and the Oral Glucose Tolerance Test.**
- **Fasting Plasma Glucose Test:**

  Normal fasting blood glucose is between 70-99 mg/dL

  Pre-diabetes: 100-125 mg/dL

  Diabetes: Greater than or = to 126 mg/dL on 2 separate blood tests

HbA1c

- Non-fasting (casual plasma glucose test): glucose level greater than 200 mg/dL may indicate diabetes
- Hemoglobin A1c (HbA1c): glycated hemoglobin provides an average of blood sugar over a 6-12 week period
- Non-diabetic: 4%-6%
- Diabetes: 7% or lower

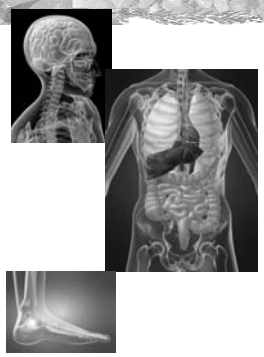
Diabetes and Heart Disease

- High levels of blood sugar cause damage to nerves and blood vessels. Blood vessels become thicker, narrower and less elastic which reduces the ability of blood to pass through.
- High blood glucose levels are also associated with higher levels of fat in the blood. These fats, known as lipids, narrow and clog blood vessels.
- Inadequate circulation due to the narrowing or clogging of vessels restricts blood flow to vital organs, like the heart and brain, and throughout the body.

Diabetes and Heart Disease

- Heart disease is the leading cause of death in people with diabetes, and has been coined "the frequent, forgotten, and often fatal complication of diabetes."
- People with diabetes are up to 5 x more likely to develop heart disease or suffer a stroke than those without this condition.

- **Not everyone with diabetes will develop all or any complications, but damage to vessels and nerves from uncontrolled blood sugar levels can effect the whole body.**



- **Heart**
- **Mouth**: severe gum disease
- **Lungs**: decreased function, increased breathing problems
- **Gastrointestinal Tract**: bloating, diarrhea, and constipation. People with diabetes have 3 x the normal risk of developing colorectal cancer
- **Skin**: dry and itchy skin, increased risk of fungal and other infections
- **Genitals**: decreased blood flow which may impair function and raises the incidence of yeast infections
- **Feet**: increased risk for injury and infection due to reduced sensation
- **Brain**: increased risk for Alzheimer's disease and other forms of dementia
- **Eyes**: retinopathy and glaucoma
- **Liver**: nonalcoholic steatohepatitis (NASH), increased risk of liver cancer
- **Kidneys**: impaired function which may lead to kidney failure
- **Bladder**: incontinence and increased urinary tract infections
- **Immunity**: slower reacting white blood cells, increased risk and severity of infections, flu and pneumonia

Why is Good Nutrition Important?

- Eating a healthy diet can:
- Help you control blood sugar and lipids
- Help you maintain a healthy weight or lose weight if you are overweight
- Allow you to take less medication or avoid taking medication for Type 2 diabetes

Why is Good Nutrition Important?

- Prevent complications from high blood sugar:
- Nerve problems
- Kidney problems
- Vision problems
- Heart disease
- Circulatory problems

Each person with Diabetes is Different

- Every person with diabetes should receive medical nutrition therapy based on his/her medical needs
- Your dietitian/doctor/nurse/Certified Diabetes Educator may suggest very specific goals for your weight, diet and exercise depending on your health status

Nutrition Guidelines for Type 2 Diabetes

- Lose weight if you are overweight
- Exercise to promote or maintain weight loss and to control blood sugar
- Monitor carbohydrate intake to maintain blood sugar control
- Eat carbohydrates mainly from fruits, vegetables, whole grains, legumes and low-fat or skim milk

Guidelines for a Healthy Diet

- **Estimated Calorie Intake**:
  - On average, women should consume no less than 1,200 calories a day, and men no less than 1,500 calories to ensure adequate nutrition. Calorie needs based on height, weight, age, activity level. www.mypyramid.gov (-500 calories per day to lose wt.)
- **Distribution of Calories from Major Nutrients:**
  - **Carbohydrates: ~40%**
  - **Fat: "healthy fats" ~30%**
    - with ≤7% from saturated fat
  - **Protein: non-animal/animal ~30%**

Nutrition Guidelines for Type 2 Diabetes

- Consume 40% of calories from **carbohydrates** (do not use extremely low carbohydrate diets to treat diabetes) – example: 1500 calories x .40 = 600 calories from carbs, divided by 4 (calories per gram) = 150 grams of carbs per day

Carbohydrate Intake

Total Calorie	Carbs (grams)	Each Meal (3)	Snack
1200	120	30 g	30 g
1500	150	30-45 g	15-30g
2000	200	45-60 g	30-45g
2500	250	60 g	60 g

Fat Intake

- Consume 30% of calories from **fat:**

  Example: 1500 x .30 = 450, divided by 9 (calories per gram) = 50 grams total fat per day

  Best fat sources: olive oil, nut oils, canola oil, nuts, seeds, salmon, avocado

Low-fat protein foods

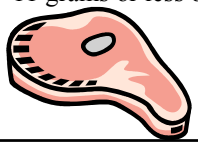
- Foods high in protein have little effect on blood sugar but have a satisfying and filling effect.
- **Best protein sources**; skinless chicken or turkey, nonfat/low-fat dairy products, beans/peas soy foods, fish, especially fatty fish like salmon and sardines, cottage cheese and other low-fat cheese, eggs in moderation (egg beaters)

Protein Intake

- Consume 30% of calories from protein- for those without existing kidney problems- from non-animal as well as animal sources: example: 1500 x .30 = 450 divided by 4 (calories per gram) = 112 grams of protein per day
- Always follow the advise of your physician/dietitian/nurse/CDE

Saturated Fat Intake

- Saturated (animal) fats: meat, cheese, dairy, etc.
- Limit saturated fat to 7% of calories
- Example: 1500 x .07 = 105, divided by 9 (calories per gram) = 11 grams or less of saturated fat per day



Trans Fats

- Found mainly in packaged and processed foods. Look for "partially hydrogenated"
- Ideal intake: 0 grams
  - Limit use of packaged crackers and cookies
  - Limit use of commercial bakery products like cakes, cookies, etc
  - Use soft margarine instead of stick
  - Read food labels for trans fat (can have .5 grams)

Use a food log to start

- Once you know how many grams of:
- Carbohydrates
- Fats
- Protein
- Start keeping a food log to see how you are progressing and adjust accordingly

Carbohydrates

- Carbohydrates are broken down and converted to glucose, the body's primary source of energy.
- Carbohydrates activate a stronger insulin release and response than protein or fats.
- Even distribution of carbohydrates throughout the day are important for good control of blood sugar levels.
- Consuming smaller amounts of food more frequently results in steadier, more even blood glucose levels.

Carbohydrate Quality

- Various forms of carbohydrates affect blood glucose levels in different ways
- Carbohydrates containing soluble fiber can help slow the release of glucose
- **Best sources are:**
  - Fruits
  - Vegetables
  - Oat bran and barley
  - Legumes/ beans and peas

Functional Foods: Fruits and Vegetables

- Packed with powerhouse nutrients, vegetables and fruits are low in fat, high in fiber and lower in calories than most all other foods
- Fruits and Vegetables help to fill you up and increase satiety
- Aim for at least 2 cups of vegetables per day and 2-4 fruits depending on calorie intake
- Choose whole fruits over juice or dried

Oatmeal, Oat Bran, Beans and Barley

- Loaded with soluble fiber, these foods help to slow down digestion and keep blood sugar from spiking
- Can significantly lower LDL cholesterol
- Helps to control appetite by increasing feelings of fullness
- If it came in a prescription – YOU WOULD WANT ONE!!!

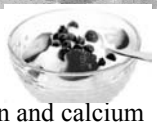
Nuts

- The "good" fat
- Shown to help reduce insulin resistance and make blood sugar easier to control
- Reduce risk of heart disease
- Excellent source of vitamin E, fiber, magnesium
- High in calories and fat – one flat palm full per day – about 15 grams of fat

Cinnamon

- Helps to lower blood sugar!
- Components in cinnamon help body use insulin more efficiently so more glucose can enter cells
- ½ - 1 teaspoon per day can significantly lower blood sugar
- Add to oatmeal, toast, baked apples, even chicken dishes

Yogurt



- Rich in protein and calcium
- Studies show that people who eat plenty of calcium-rich foods are less likely to become insulin resistant
- Try Greek yogurt – higher in protein and lower in carbs
- For breakfast, snacks – tastes wonderful with fresh fruit, nuts and cinnamon!

Carbohydrate Quality Matters

- The more refined a food substance is, the faster the release of glucose into the blood stream. Example: whole potato vs fries or chips
- Choose solid forms of foods rather than liquid
  - For example: an orange instead of orange juice
- Raw and whole foods are generally more slowly absorbed than cooked and processed carbohydrates
- Avoid/limit foods high in simple sugars which hasten the release of glucose
  - For example: white bread, white rice, cookies, candies, cake, pie, etc.

Choose high-fiber Carbs

- Fiber can significantly reduce risk of **heart disease, diabetes, cancer and obesity**
- Fiber is one of the best ways to control blood sugar and decrease insulin levels
- Soluble fiber delays movement of food into small intestines
- Slows post-meal surges in blood sugar

Fiber

- Aim for 25-40 grams per day or 20 grams per 1,000 calories
- **Best sources of soluble fiber**: fruits, vegetables, oatmeal, barley, beans/legumes and lentils and peas

Best Fiber Supplements

- Best fiber supplements for reducing blood sugar levels, lowering cholesterol and promoting weight loss:
- Glucomannan, Slim Styles PGX
- Psyllium; Metamucil, Konsyl
- Guar gum; Benefiber
- These fibers bind to water in stomach and small intestine to form gelatinous, viscous mass – slows down absorption of glucose and *increases satiety*

Whole Grains

- Always choose whole grains over refined "white carbs"
- 100% whole wheat, corn, oat, etc.
- Quinoa, oats, corn, barley, whole-wheat, brown rice, amaranth, buckwheat, kamut, millet
- SLOW carbs, not NO carbs

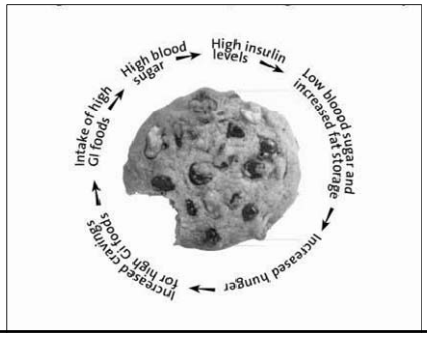
Sugar Substitutes

- Use sparingly in place of sugar
- Can promote weight gain

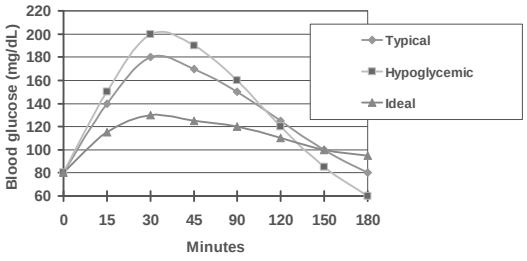
Insulin Response & Overweight

- **Insulin is a 'storage hormone'** – it signals the body to store sugar, fat, and protein.
- As long as your insulin level is high you are in storage mode and you cannot lose weight!
- High intake of sugar/refined carbs over time produces 'insulin resistant' cells.

Vicious Cookie Cycle



After Meal – Glucose Response



Glycemic Index and Glycemic Load

- The Glycemic Index (GI) and Glycemic Load (GL) can be used to predict how different types of food will affect blood glucose levels.
- GI and GL rank carbohydrates on a scale from 0 to 100 based on a food's glycemic response: how fast the carbohydrate is digested and how much your blood sugar increases after you eat.
- Being aware of the effects of different foods may assist in regulating blood sugar levels.
- www.glycemicindex.com
- http://www.mendosa.com/gilists.htm

Glycemic Index and Glycemic Load

- Diets composed mainly of high glycemic index and high glycemic load foods have been associated with a greater risk of type 2 diabetes in men and women
- Low GI and GL diets release glucose into the blood stream more slowly and steadily than high GI and GL foods, making blood sugar levels easier to regulate
- GI and GL indexes are simple tools for controlling blood sugar levels and measuring the carbohydrate content of foods, but do not account for calories, fats, or sodium content, or other nutrients and portion sizes

Bottom Line

- Eat Less: refined starches like white bread, white rice, white pasta, white potatos
- Eat Less: sugary foods like cookies, cake, pastry, sugary beverages
- Eat More: vegetables, fruit, whole grains and legumes
- Add lean protein and good fats to slow release of glucose

Combine Carbohydrate with Protein/Fat

- Foods comprised of protein and fat take longer to digest that carbohydrates
- Proteins and fat slow down digestion
- Foods break down to glucose much slower and raise blood sugar more slowly than carbohydrates alone
- Example: Apple with 10 almonds
  Whole grain crackers with low-fat cheese

Diabetes and Alcohol

- The enjoyment of social drinking makes eliminating alcohol from the diabetic diet difficult. Using proper precautions, diabetics can still take pleasure in drinking in moderation.
- When alcohol is consumed, the liver decreases its ability to release glucose. Instead the liver is busy trying to clean alcohol from the blood. Because glucose production is halted, diabetics are at risk for hypoglycemia, especially if you drink on an empty stomach or after taking insulin or glucose-lowering oral medications.
- It takes 2 hours for 1 ounce of alcohol to be broken down and leave the body's system, so the risk continues long after you finish a drink.

Alcohol

- For individuals with well-controlled diabetes, alcohol intake should follow the same guidelines established for the general population by the United States Department of Agriculture (USDA):
  - A maximum of two drinks per day for men and one drink for women (women have a lower body water content and metabolize alcohol more slowly than men)
  - A maximum of one drink for anyone over the age of 65.
- One drink is defined as:

  - 12 ounces of regular beer (150 calories)
  - 5 ounces of wine (100 calories)
  - 1.5 ounces of 80-proof distilled spirits (100 calories)
  - One drink = 2 fat exchanges; regular beer is an additional starch exchange

Alcohol

- Alcohol is a unique substance. The body processes alcohol before it metabolizes fat, protein, or carbs.
- A 5-ounce glass of wine typically contains 110 calories, 5 grams of carbs, and about 13 grams of alcohol (which accounts for 91 of the calories).
- These numbers are roughly the same as you will find in a 12-ounce light beer or 1.5 ounces of 80-proof liquor.
- Most people experience a dip in their blood sugar after consuming alcohol; the glycemic index of beer, wine, and hard liquor is zero.

Weight Management

- Excess weight is an issue for many people living with type 2 diabetes, pre-diabetes and insulin resistance
- Being overweight or obese promotes insulin resistance and fat makes it harder for the body to use insulin to process blood glucose.
- Excess glucose is stored by the body as fat, making weight problems worse for people with uncontrolled diabetes.

Body Mass Index (BMI)

- BMI measures weight in relationship to height as an indicator of body fat.
- Adult BMI Range:
  - Normal: ≤24.9
  - Overweight: 25-29.9
  - Obese: 30-39.9
  - Extreme: ≥40

  (or morbid) Obesity

BMI – Body Mass Index

- Location of pounds also make a difference.
- People who have an apple-shaped body, that carry extra weight around the waist, are at a higher risk for developing type 2 diabetes and heart disease.
- http://www.nhlbi.nih.gov/guidelines/obesity/bmi_tbl.htm

Effective Weight Management

- The same things that are good for controlling diabetes are also key to weight control: healthy dietary habits and regular exercise.

Diabetes and Exercise

- Regular physical activity helps control blood sugar levels, reduces the risk of complications, increases energy, improves heart health, and promotes emotional well-being.
- Many diabetic complications occur as a result of poor circulation. Damage to blood vessels caused by high blood glucose levels decreases circulation throughout the body.
- Regular exercise promotes circulation, decreasing the risk of developing complications, and may help reduce the amount of medications needed.

Exercise

- Exercise also reduces stress, enhances your mood, improves body image, and promotes a sense of well-being.
- You will benefit from participating in at least 30 to 60 minutes of physical activity on most days of the week.
- Always consult your health care practitioner before starting a new exercise or fitness routine to determine which activities are safe and compatible with your individual health profile.

Supplements

- Very important not to replace conventional medical therapy for diabetes without communicating with health care professional
- Diet and exercise are key, but supplements can help.
- Work with a health care professional if you'd like to try supplements
- Start with one supplement at a time and see how blood sugar improves

Recommendations

- **GTF (glucose tolerance factor) chromium**: This trace element plays a role in blood sugar regulation by working with insulin to help transport glucose into cells. Can take 1,000 mcg daily.
- **Alpha-lipoic acid**: An antioxidant that can enhance glucose uptake, inhibit glycosylation (the abnormal attachment of sugar to protein), and helps promote and maintain eye and nerve health. Start with 100 milligrams a day. Higher doses (600 milligrams a day) help treat and prevent diabetic neuropathy (nerve damage from impaired circulation).
- **Magnesium**: To help promote healthy insulin production, take 400 mg daily. (Magnesium glycinate is a good form with less of a laxative effect.) Magnesium citrate is good to help move bowels.

Recommendations

- Vitamin D – at least 1,000 IU daily with food
- Large study showed a strong inverse association between blood levels of Vitamin D and diabetes
- Lower a person's Vitamin D level, higher chance they had diabetes – check your levels!
- Vitamin D in infancy helps prevent type 1 diabetes
- Vitamin D deficiency may also play a role in development of type 2

Supplements

- Coenzyme Q10: A powerful antioxidant that may help maintain a healthy heart. Take 60-100 milligrams of a softgel form with your largest meal.
- Cinnamon: ½ tsp in food or 1,000 mg/day
- Glucomannan – fiber
- Multivitamin/mineral

Summary

- Good nutrition is one of the keys to managing Type 2 Diabetes
- Nutrition guidelines for Type 2 Diabetes focus on controlling carbohydrate and fat intake
- Weight management and exercise are also key
- Seek help to set and reach your nutrition and exercise goals

Summary

- Talk to your doctor, dietitian, diabetes educator about which changes are most important for you
- Start slowly by changing your habits one at a time for a lifestyle program you can live with
- Seek support from your dietitian and/or diabetes support team

Resources

- American Diabetes Association www.diabetes.org
- Joslin Diabetes Center www.joslin.org
- National Diatetes Information Clearinghouse www.diabetes.niddk.nih/gov
- Calorieking.com
- Dwlz.com (Restaurants)
- http://www.changingdiabetes-us.com/

Resource Books

- *American Diabetes Association Complete Guide to Diabetes*
- *Diabetes for Dummies*
- *The All-Natural Diabetes Cookbook* by Jackie Newgent, RD
- *Magic Menus* – American Diabetes Assoc.
- *The New Glucose Revolution* by Jeannie Brand-Miller, PhD

Remember

- Type 2 Diabetes is mainly a disease of "lifestyle."
- You can prevent many of the complications of diabetes through diet, exercise and stress reduction
- Take care of yourself – you're worth it!!!