Should I Eat This or This? Exchange List and Carbohydrate Counting to Manage Diabetes

Faculty
Linda Jennings, MS, RD, LD
Nutrition Assistant Administrator
Alabama Department of Public Health

Satellite Conference and Live Webcast Wednesday, October 20, 2010 2:00 - 4:00 p.m. Central Time
Produced by the Alabama Department of Public Health Video Communications and Distance Learning Division

Objectives
• To list similarities and differences between the ADA Exchange List and Carbohydrate Counting as methods of blood glucose control
• Use the ADA Exchange List in meal planning
• Calculate grams of carbohydrate in a meal

Objectives
• Determine units of insulin per grams of carbohydrate

Brief History of Diabetes
• 1552 BC
  – From 3rd Dynasty Egyptian papyrus, physician Hesv-Ra mentions polvuria as a symptom
• 150 AD
  – Diabetes described by Aretaeus as “the melting down of flesh and limbs into urine”
  – Gave the condition the name dia-bainein which means “to siphon”

Brief History of Diabetes
• Up to 11th Century
  – Diabetes commonly diagnosed by “water tasters” who drank the urine of those suspected of having diabetes
  – The Latin word for honey, “mellitus,” added to the term diabetes as a result
**Brief History of Diabetes**

- **1870s**
  - French physician, Bouchardat, noted the disappearance of glycosuria in diabetic patients during the siege of Paris in the Franco-Prussian War
  - Formulates idea of individualized diets for his diabetes patients

- **1900-1915**
  - 'Fad' diabetes diets
    - The "oat-cure"
      - Majority of diet is oatmeal
    - The milk diet
    - The rice cure
    - "Potato therapy"
    - Use of opium

- **1919**
  - Frederick Allen published Total Dietary Regulation in the Treatment of Diabetes

- **1920**
  - In England, R.D. Lawrence developed the dietary exchange scheme
  - Summer 1921
    - Insulin is "discovered" by Frederick Banting and Charles Best

- **Late 19th Century**
  - Italian diabetes specialist, Catoni, isolates his patients under lock and key in order to get them to follow their diets

- **1950's**
  - The American Diabetes Association, in conjunction with the U.S. Public Health Service, brought forth the "exchange scheme" in the U.S.
Dr. Lawrence Diet Schemes
• Three main criteria
  – It must contain sufficient carbohydrate to prevent ketosis
  – It must satisfy the patient in quantity and quality as much as possible
  – It must be accurate, simple to calculate, and varied

Diet Planning
• Connects nutrition theory with food on the table
• For people with diabetes a few minutes invested in planning pays off in better blood glucose control

Goals of Medical Nutrition Therapy
• Achieve blood glucose goals
• Achieve optimal lipid goals
• Provide appropriate calories
  – Reasonable weight
  – Normal growth and development
• Prevent, delay, or treat nutrition-related complications

Principle Diet Management Tools
• Exchange List for Diabetes
  – In 2008 the name of this tool was changed from Food Exchange System
• Carbohydrate Counting

Similarities
• Both methods can be effectively used by individuals with diabetes to plan meals
• Both highlight importance of carbohydrates in food intake to manage blood glucose levels

Similarities
• Both focus in varying degrees on foods with carbohydrates and have recommended amounts to consume at a meal
### Differences

- **Exchange List**
  - Calorie based
  - There are recommended servings from all food groups at each meal
  - Weighing and measuring foods are recommended, at least in the beginning

- **Carbohydrate Counting**
  - Focuses on foods with carbohydrates, not other food groups
  - Need to recognize foods that contain carbohydrates and grams per serving size

### Exchange List

- Food divided into 6 categories based on amount of carbohydrates, protein and fat, and total calories per serving
- Individuals must become familiar with specified serving sizes
- Scales and measuring cups are needed for compliance

- Any food on a list can be traded for any other food on the same list, in the specified serving
- Allows for variety but planning ahead is important for best results
- The list has been used with weight loss programs like Weight Watchers, ‘Deal-A-Meal’
Exchange List

<table>
<thead>
<tr>
<th>Food list</th>
<th>Grams of Carb</th>
<th>Calories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starch/bread</td>
<td>15</td>
<td>80</td>
</tr>
<tr>
<td>Fruit</td>
<td>15</td>
<td>60</td>
</tr>
<tr>
<td>Milk (skim)</td>
<td>12</td>
<td>90</td>
</tr>
<tr>
<td>Meat (medium fat)</td>
<td>0</td>
<td>75</td>
</tr>
<tr>
<td>Vegetables</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>Fat</td>
<td>0</td>
<td>45</td>
</tr>
</tbody>
</table>

Resources for Exchange List

- American Dietetic Association
  - www.eatright.org
  - Search for exchange list
- Mayo Clinic

Carbohydrate Counting

- A newer method used by diabetics to manage food intake
- Emphasis is on amount of carbohydrates instead of calories
- Elements of Exchange List can help to categorize food into groups with carbohydrates for calculation

Carbohydrate Counting

- Formula to calculate amount of insulin needed to cover grams of carbohydrates
- Method works well for users of insulin pumps
- Some pumps are very sophisticated and have database of foods, so individual computation of grams of carbohydrates in food is unnecessary

Insulin Pump Therapy

- Not all diabetics are appropriate candidates for insulin pumps
  - Must have knowledge of impact of nutrients on glycemic state
  - Strongly urged to use carbohydrate counting to self-dose with insulin

Insulin Pump Therapy

- Basal dose is given continually
- Bolus dose for meals
- Benefits to patient
  - More power in living with the disease
  - One stick every 2-3 days to replace sq catheter
Insulin Pump Therapy

- Rare hypoglycemia
- Connected monitors now provide 24-hour readout of BG
- Patient is more motivated to make lifestyle changes

Educational Reference Material

- Training on insulin pumps
  - Medtronic MiniMed
  - Pump School Online
  - Insulin Pump Tutorials
- Diabetes videos
  - HealthiNation.com

Basic Carb Counting

- Individual encouraged to have a set amount of carbohydrate choices at breakfast, lunch, etc.
  - 15 grams of carbohydrate is the standard amount per each serving
  - This may be expressed as either
    - 15 grams of carb
    - 1 unit of carb (still 15 grams)

Basic Carb Counting

- Amount of carbohydrates can be determined from exchange list or information on label

Basic Carb Counting

- From Exchange List
  - Carb/serving = 1 starch/bread = 1 milk = 1 fruit
  - Carbs from non-starchy vegetables may not be added to calculation

Basic Carb Counting

- Number of carbohydrate choices per meal is usually
  - 3 - 4 servings for women
  - 4 - 5 servings for men
- From a food label
  - Look at the Total Carbohydrates to find the grams
Reading Labels

- To use effectively, an individual needs
  - Mathematical aptitude
  - Scale
    - If more than 1 serving/container
  - To be able to determine serving size

Reading Labels

- Find total Carbs in grams
  - Avoid confusing weight of food with total Carbs
  - Sugars included in total Carbs

Reading Food Labels

- Tendency is to focus on word “sugar” under Total Carbohydrates but this includes a variety of different sugars, like milk sugar
  - Where sugar appears on list of ingredients is more important
  - Subtract fiber from total CHO if ≥ 5 grams per serving

Reading Food Labels

- Fat-gram counting
  - Saturated fat increases insulin resistance

Insulin to Carb Ratio (ICR)

- Identifiable ratio between the number of units of insulin needed to utilize a number of grams of CHO
  - The expected rise in blood glucose for a meal if the ICR is appropriate is 40 mg/dl
Insulin to Carb Ratio (ICR)

- The ratio most often used is either
  - 1 unit insulin/10 grams of carb
  - 1 unit insulin/15 grams of carb

Carbohydrate Counting

<table>
<thead>
<tr>
<th>Menu</th>
<th>Amount of Carbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 oz. Chicken</td>
<td>0 gm Carb</td>
</tr>
<tr>
<td>1/2 Cup Rice</td>
<td>15 gm Carb</td>
</tr>
<tr>
<td>1/2 Cup Lima Beans</td>
<td>15 gm Carb</td>
</tr>
<tr>
<td>1 slice Tomato</td>
<td>5 gm Carb*</td>
</tr>
<tr>
<td>1 Dinner Roll</td>
<td>15 gm Carb</td>
</tr>
<tr>
<td>1/2 Cup Yogurt</td>
<td>12 gm Carb</td>
</tr>
<tr>
<td>1 1/2 Cup Whole Strawberries</td>
<td>15 gm Carb</td>
</tr>
<tr>
<td>1 tsp Butter</td>
<td>0 gm Carb</td>
</tr>
</tbody>
</table>

TOTAL: 72 gm CHO

* Carbs in veg not included in calculation

Aren’t All Carbohydrates the Same?

- Yes and no

Glycemic Index for Fine Tuning Blood Glucose Levels

What is the Glycemic Response

- Certain foods with carbohydrates increase BGL and insulin concentrations higher compared to a reference food
- Seems to vary from person to person
  - Even by time of day in same person

What is the Glycemic Response

- Scale used to measure Glycemic Response is called the Glycemic Index (GI)
Glycemic Index (GI)

- May be of benefit to “fine tune” blood glucose levels
- Results of one study showed implementing a low-glycemic index diet lowered A1C values by 0.43% when compared with a high-glycemic index diet


Including More Fiber in Meals

- Helps with weight loss
  - Creates feeling of fullness if less is eaten
- Helps to maintain blood sugar level
  - Keeps it from going up so quickly
- Exercises the gut and helps maintain muscle tone
- Helps lower blood cholesterol levels

Including More Fiber in Meals

- Caution: When fiber is increased, fluids MUST be increased
  - If not, severe constipation or impaction can occur