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

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Faculty

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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 siege of Paris in the Franco-Prussian War
    - Formulates idea of individualized diets for his diabetes patients

Brief History of Diabetes

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

Brief History of Diabetes

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

Brief History of Diabetes

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

Brief History of Diabetes

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

Brief History of Diabetes

- 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

Differences

- Encourages overall balance in the foods eaten and can help with weight loss
- Can be confusing for some individuals

Differences

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

Differences

- Allows more flexibility in food choices
- Easier for some individuals to manage
- Importance of balance of food choices may not be understood as well

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

Exchange List

- 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

Food list	Grams of Carb	Calories
Starch/bread	15	80
Fruit	15	60
Milk (skim)	12	90
Meat (medium fat)	0	75
Vegetables	5	25
Fat	0	45

Resources for Exchange List

- American Dietetic Association
  - www.eatright.org
    - Search for exchange list
- Mayo Clinic
  - http://www.mayoclinic.com/health/diabetes-diet/DA00077

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 data base 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

Menu	Amount of Carbs	
3 oz. Chicken	0 gm Carb	Meat Ex
1/3 Cup Rice	15 gm Carb	Starch Ex
1/2 Cup Lima Beans	15 gm Carb	Starch Ex
1 slice Tomato	5 gm Carb*	Veg Ex
1 Dinner Roll	15 gm Carb	Starch Ex
3/4 Cup Yogurt	12 gm Carb	Milk Ex
1¼ Cup Whole Strawberries	15 gm Carb	Fruit Ex
1 tsp Butter	0 gm Carb	Fat Ex
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)

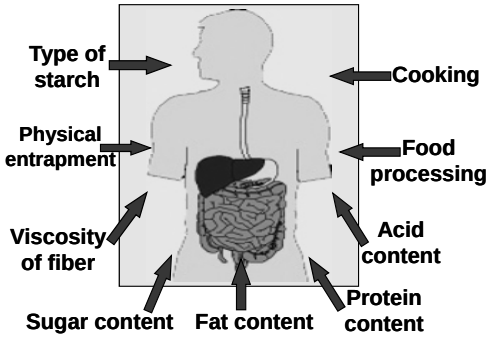
Glycemic Index of Selected Foods

- Peanuts
- Milk
- Bran Cereal, Black Eyed Peas
- Ice Cream, Raisins, White Rice
- Baked Potato
- White Bread

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
  - Brand-Miller J, Hayne S, Petocz P, Colagiuri S: Low-glycemic index diets in the management of diabetes: a meta-analysis of randomized controlled trials. *Diabetes Care* 26:2261–2267, 2003

Factors Influencing GI Ranking



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