Diabetes Nutrition Therapy

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Overview

- Current Nutrition Recommendations
- Carbohydrate Counting Review
- Strategies for Type 2
- Strategies for Insulin Requiring Patients

It is easier to change a man’s religion than to change his diet.
Margaret Mead

Evolution of Man

- We are expending less energy and eating more calories
- Weight loss, lifestyle changes & beta cell preservation are critically important in reducing the risk of developing diabetes and in the treatment of type 2 diabetes
- Exercise can help improve insulin sensitivity & aid weight loss efforts – “if” performed

The Economist, December 2003

Diabetes Nutrition Therapy

- What guides practice? Evidenced-based practice! Nutrition is a science too 😊
- American Diabetes and Dietetic Association – Nutrition Practice Guidelines
- It’s effective! Reduction in A1C in RCT:
  - Type 2 – ↓ -1.4 to -2%
  - Type 1 – ↓ -0.3 to -1%
- All members of the TEAM need to be knowledgeable about diabetes nutrition

Goals of Diabetes Nutrition Therapy

- Achieve and maintain:
  - Blood glucose control
  - Lipid profile reduces risk for vascular disease
  - Blood pressure in normal levels
- To prevent/slow rate of complications by modifying nutrient intake and lifestyle
- Address individual nutrition needs
- Maintain the pleasure of eating
- Don’t restrict food choices unless needed!
Why Count Carbs?
Number one “diet” question to the American Diabetes Association Call Center!

Why Count Carbs?
- Promotes better blood glucose control
- In both type 1 and type 2 diabetes
- Carbohydrate intake and available insulin are main determinant of post-prandial BG
- More flexibility with food choices

Why Count Carbs?
- Being able to “count carbs” helps to:
  - “Match” insulin dose to carbohydrate intake in order to mimic normal physiologic insulin secretion
  - Therefore the individual with diabetes can determine “how much” insulin is needed to “cover” meal for type 1 and insulin requiring type 2

Failure of “Diet and Exercise”
- Due to the pathophysiology of type 2
  - Beta cell decline
  - Insulin resistance
- It is not a question of “if” insulin will be needed, rather it is “when”
- At diagnosis – lost 50% of beta cell function

When “diet & exercise” fail…
- Within 10 to 15 years most patients with Type 2 diabetes will need insulin
- Once again, “It’s not a personal failure – it’s a “pancreatic” failure!”
- To be successful – must integrate with nutrition therapy

Natural History of Type 2 Diabetes

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What Is A Carb?

Step 1

Carbohydrate Terms

Institute of Medicine and the ADA promote:
- Starches
- Sugar – fructose, lactose, sucrose
- Fiber – insoluble, soluble

Discourage use of terms:
- Complex carbohydrates
- Simple sugars

Carbohydrates
- Starch
- Fruit
- Milk
- "Other Carbohydrates"
- Non-starchy Vegetables
- Sugar

How Do Carbs Impact BG?

Step 2

Impact of Nutrients on Glycemic Control
- Carbohydrates
  - 90 to 100% convert to glucose in 1-2 hours

Impact of Nutrients on Glycemic Control
- Protein
  - Minimal impact on blood glucose level
  - However, protein potent stimulant to insulin secretion
  - Insulin is needed to metabolize
  - Takes several hours to digest
- Fat
  - Minimal impact on blood glucose level
  - Promote heart healthy foods
How To Count Carbs?

Step 3

Getting Started

How Much Carb in Packaged Foods?

Need to be a Carb Detective!

- Check serving size
- & no. of servings

However.....

“food for thought” are we promoting use of packaged foods????

When is a Cereal Bowl Not a Cereal Bowl?

Portion Control Tools
Next Step - Counting Carbs in “Real Food”

- One choice (15 grams)
  - 1 cup milk or 1 slice bread or 1 handful fruit
- Two choices (30 grams)
  - Sandwich with 2 slices of bread
- Three choices (45 grams)
  - 1 cup of rice or pasta
- Four choices (60 grams)
  - Sandwich, glass of milk, and a piece of fruit

Build a LIBRARY of foods

- People “counting carbs” should learn carb content of about 100 foods:
  - 3 Breakfasts
  - 5-7 Lunches
  - 7-10 Dinners
  - What they DON’T need to learn - all the foods at the grocery store!

Management of Type 2

- Eat at regular times
- Spread food (carbohydrates) throughout the day
- “Carbohydrate Budget” per meal/snack
- Whole foods, less refined foods

Type 2 Guidelines

- Women
  - Weight loss:
  - 2-3 carb choices per meal (30-45 grams)
  - Maintenance:
  - 3-4 carb choices per meal (45-60 grams)

Type 2 Guidelines

- Men
  - Weight loss:
  - 3-4 carb choices per meal (45-60 grams)
  - Maintenance:
  - 4-5 carb choices per meal (60-75 grams)

What is realistic?

- 60% of Adults in US are overweight - best strategy: EAT LESS
Food Industry and Diabetes

“Chronic diseases are an opportunity for food companies to create illness specific food-like products.”

Michael Pollan

What is realistic?

- Not everybody with diabetes needs to learn to count carbs.
- Teach “carb awareness.”
- Teach concept of small, medium, and large meals.

Management of Type 2

- Drink water for thirst.
- Eat your food, don’t drink it.
- Don’t be a passive participant in the digestive process.
- Fiber - make your body work to digest your food.

Management of Type 2

- When water isn’t really water!

Sugary Beverages

- “Empty” calories.
- Illusion that anything claiming a nutritional benefit must be good for you.
- High Fructose Corn Syrup = Sugar… really
- Both are disaccharides
- 50% Glucose + 50% Fructose
- Your body doesn’t know the difference in small amounts…… However many people drink too much!
- Glucose stimulates insulin response
- Fructose metabolized by the liver
Use A Plate!

- RECOMMEND - “Chinet” picnic plate - 9”
- Also use smaller glasses
- Eight ounce glasses

Plate Method

Management of Type 1 or Insulin Requiring Type 2

- New era after 1922
- Introduction of Traveling Nurse by Elliot Joslin
- RNs - the first documented diabetes educators!
- Emergence of the dietetic professional after World War 1

Patient JL (age 3) on December 15, 1922, weighed a mere 15 pounds.
Nutrition Plan: Starvation Diet!

Patient JL on February 15, 1923, two months after taking insulin had nearly doubled his weight to 29 pounds.

New Era of Diabetes Management for Type 1 Diabetes
Physiologic Insulin Replacement

- Why does good blood glucose control matter?
- Results of the DCCT – confirmed value of glycemic control in the delay or prevention of complications of diabetes.

DCCT – Intensive insulin therapy

- Shots > 4 per day
- Pumps
  - to match how insulin is secreted in people without diabetes
  - Renewed interest in producing insulin that could duplicate endogenous insulin secretion

Insulin “Action” Terms

- Onset – when the insulin starts to lower the blood glucose
- Peak – when blood glucose lowering effect has the greatest impact
- Duration – how long it continues to have a blood glucose lowering effect

Normal Insulin Secretion

Basal insulin:
- Not secreted in response to food by the pancreas
- Adults secrete 0.5 to 1.0 units per hour
- Approximately 50% of the insulin produced

Normal Insulin Secretion

Bolus insulin
- Secreted in response to food in 2 phases
- Secreted when blood glucose rises above 100 mg/dl
- The other 50% of the insulin produced

2 Phases of Bolus Secretion

- First phase
  - Food eaten and blood glucose starts to rise
  - Insulin released in ~ 15 minutes
- Second phase
  - Continued release of insulin over next 1 ½ – 3 hours
  - Insulin matches the rise in blood glucose from carbohydrate food eaten
Normal Insulin Secretion

Quest for the Ideal Insulin
- A bolus insulin that mimics normal prandial insulin secretion
  - Onset in ~15 min
  - Peak at 1 ½ to 3 hours
- A basal insulin that mimics normal pancreatic basal insulin secretion
  - 24-hr effect
  - No pronounced peak
  - Consistent onset
  - Reproducible

Comparison of Human Insulins and Analogs

<table>
<thead>
<tr>
<th>Insulin Action (hr)</th>
<th>Onset of Duration Preparations Action (hr)</th>
<th>Peak of Action (hr)</th>
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</thead>
<tbody>
<tr>
<td>Lispro/Aspart/Apidra</td>
<td>5–15 min</td>
<td>1–2</td>
</tr>
<tr>
<td>Regular human</td>
<td>30–60 min</td>
<td>2–4</td>
</tr>
<tr>
<td>Human NPH/Lente</td>
<td>1–2 hr</td>
<td>4–8</td>
</tr>
<tr>
<td>Glargine/Detemir</td>
<td>1–2 hr</td>
<td>flat</td>
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Traditional Insulin Plans
- Traditional “fixed” insulin injection plans
  - Consistent carb intake to match peaking insulin (NPH or 70/30 insulin or 75/25 insulin)

Traditional Insulin Plans
- Work well for many
- Fewer shots
- Costs less
- However:
  - Must eat at regular times
  - Must eat consistent amounts of carbohydrate
### Basal/Bolus Insulin Plans

- **Long-acting insulin**
  - glargine (Lantus®)
  - determir (Levemir®)
- **Rapid-acting insulin**
- **Insulin pumps**

### Advantages:
- Flexible eating times
- “Match” rapid-acting insulin to desired food intake
- Don’t need to snack – unless you want too!

### Teach How Carbs Affect Blood Glucose Levels

- Starches and sugars will result in a post-prandial blood glucose excursion in ~ 1 to 2 hours
- Carb is the nutrient that most affects glucose levels when compared to protein or fat
- The amount of carb consumed determines the post-prandial rise in the BG level

### Putting It Together

Match amount of carb to rapid-acting insulin!

### Helpful Hints

- Patients may not know “how much” carb they are eating
- Focus Grams vs Carb Choices
- Need to know carb content of their common foods
  - 3 breakfasts
  - 5 lunches
  - 7-10 dinners
Helpful Hints

- Still need to eat healthful foods
- Too many calories = weight gain
- Meal times can be varied
- Amount of carb consumed at meal can be varied
- May need to cover snacks with insulin

Don’t Forget Physical Activity!

Alison’s Recommendations for Treatment of Diabetes & Obesity

- Spread food out throughout the day.
- If not eating breakfast, start with something small.
- Use a plate - 9” (aka - Chinet plate).
- Don’t eat out of a package, box, or bag.
- Eat less refined, less processed food.
- Drink water for thirst.

Carb Counting Resources

- Web-based:
  - www.calorieking.com
  - www.dietfacts.com
- ADietA/ADbA – Carbohydrate Counting
- Calorie King – Pocket Guide