Person Centered Implementation of Low Carbohydrate Eating Plans

Disclosure to Participants

- Notice of Requirements For Successful Completion
  - Please refer to learning goals and objectives
  - Learners must attend the full activity and complete the evaluation in order to claim continuing education credit/hours

- Conflict of Interest (COI) and Financial Relationship Disclosures:
  - Presenter: Diana Isaacs, PharmD, CDE – Speaker’s Bureau: Abbott Advisory Board; Sanofi, BD
  - Presenter: Dawn Noe, RDN, CDE – No COI/Financial Relationship to disclose

- Non-Endorsement of Products:
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- Off-Label Use:
  - Participants will be notified by speakers in any product used for a purpose other than for which it was approved by the Food and Drug Administration.
Learning Objectives

- Describe the evidence for low carbohydrate meal plans for people with diabetes.
- Review low carbohydrate eating patterns and how they can be incorporated into diabetes care.
- Discuss cases and medication adjustments for people with diabetes following a low carbohydrate lifestyle.

Nutrition Therapy for Adults with Diabetes or Prediabetes: A Consensus Report

- There is not an ideal percentage of calories from carbohydrate, protein, and fat. Macronutrient distribution should be based on individualized assessment of current eating patterns, preferences, and metabolic goals.
- The amount of carbohydrate required for optimal health in humans is unknown.
- For select adults with type 2 diabetes not meeting glycemic targets or where reducing antihyperglycemic medications is a priority, reducing overall carbohydrate intake with low or very low carbohydrate eating plans is a viable approach.

Evert AB et al. Diabetes Care 2019;42:731-754
The Evidence for Low Carb

- Type 2 Diabetes
  - A1C/glucose
  - Blood Pressure
  - Weight
  - HDL/Trig
  - Long-term outcomes

- Type 1 Diabetes
  - Minimal Data - Clinical Trials Needed
  - Survey of the TYPEONEGRIT Facebook Community
    - Of 316 respondents, 131 (42%) were parents of children with T1DM

Evert AB et al. Diabetes Care 2019;42:731-754


Defining Low Carb

- Lower carb meal plans
  - Meta-analysis of RCT: < 45% of calories
    - A1C benefits more pronounced in VLC (< 26%) at 3-6 months
  - Meta-analysis of RCT: < 40% of calories
  - Ketogenic meal plans are typically 5-10% of calories (~20-50 grams carbs per day)

Table 4

<table>
<thead>
<tr>
<th>Carbohydrates</th>
<th>Protein</th>
<th>Fat</th>
<th>Total</th>
<th>3 meals</th>
<th>6 meals</th>
<th>9 meals</th>
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<td>500 g</td>
<td>1250 g</td>
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</table>

Evert AB et al. Diabetes Care 2019;42:731-754

Teaching Low Carb

- Sample menus/grocery lists
- Food Lists
- Carb counting and food label reading
- Plate Method
- Recipes
- Low carb alternatives
  - Gluten-free
  - Vegetarian
  - Mediterranean
  - Paleo Diet

Chick Pea Pasta

Evert AB et al. Diabetes Care 2019;42:731-754
Teaching Low Carb

Teaching Low Carb – Make it Easy!

Clinical Pearls for Providing Support

- Real food when possible
- Options when convenience needed
- Consider discussing the carb foods that the PWD already eats and find a way to make these a bit less carb/sugar and more whole grain, etc.
  - Ex: flavored sweetened yogurt ➔ plain yogurt, add own vanilla, berries, etc.
- Address and assess for hunger - emphasize protein, fiber, fat for satiety
Ketogenic Meal Plan

or better yet...

Source: https://www.dietdoctor.com/low-carb/keto

Well Formulated Ketogenic Meal Plans

Source: https://www.dietdoctor.com/low-carb/keto

Ketogenic Meal Plans

- ~20-50 grams carbs per day
  - 5-10% Carbohydrates
  - 70-85% Fat
  - 10-25% Protein
- Adequate electrolyte supplementation
  - Sodium – 2,000-5,000 mg per day
  - Potassium
  - Magnesium
- Sample plans, food lists, recipes, and pictures, Carb Counting, Tracking Macronutrients

Carb Manager App
Ketogenic Meal Plans

Examples of breakfast, lunch, and dinner:

#AADE

Ketogenic Meal Plans – Keep It Simple

<table>
<thead>
<tr>
<th>Vegetables</th>
<th>Protein Foods</th>
<th>Fats</th>
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<tbody>
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#AADE

Ketogenic Meal Plans – Keep It Simple

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Ketogenic Meal Plans
Common Side Effects and Clinical Pearls

- Recommend a multivitamin
- Muscle Cramping
  - Drink 64 ounces of water per day
  - Add magnesium
- "Keto Flu" Dizziness
  - Electrolyte drinks or broth for salt/sodium
- Hunger the first week
  - Enjoy fat/proteins until satiety, especially at the beginning
- How much ketonemia?
  - Eating for satiety and/or limiting fat and total calories for weight
- Screening for eating disorders prior to starting a ketogenic meal plan
- Dry mouth, funny taste in the mouth
- Minimize Risk of Hypoglycemia

Transitioning to Low Carb But Not Keto Meal Plan
Sara’s Grocery List and Meal Plan

<table>
<thead>
<tr>
<th>Protein</th>
<th>Carbs</th>
<th>Vegetables</th>
<th>Meal ideas:</th>
</tr>
</thead>
</table>
| Chicken for grilling, chicken burger, chicken thighs | Salads       | Steamed vegetables, cut potatoes, zucchini, carrots, broccoli, brussel sprouts, cauliflower, squash | - Grilled chicken, steamed vegetables, breadcrumbs, cauliflower rice | - Risotto, 2 English cucumbers  
- Cheese, kale, broccoli, zucchini, cauliflower, steamed vegetables, carrots, red peppers
- Rice, pasta, beans, lentils | Tuna fish salad or salmon | - Tuna salad with lemon juice on whole-grain bread  
- Hummus, chickpeas, curly kale, avocados, broccoli, red bell peppers | - Spanish Catfish with olives, olives, diced cauliflower, lettuce | - Barley in glass w/ salad dressing, rice in glass w/broth, green beans | - Spanish Catfish Rice, Low Carb soup

Clinical Pearls for Providing Support

- Real food when possible
- Options when convenience needed
- Options for favorite foods
  - Pizza
  - Keto dessert ideas
  - Recipes
- Address and assess for hunger - emphasize protein, fiber, fat for satiety
- Emphasize electrolyte needs
- Handling vacations, planning purposeful breaks if needed, emotional/stress eating
Medication Adjustments with Low Carb Eating

Nutrition Guidelines
- Adopting a VLC eating plan can cause diuresis and swiftly reduce blood glucose;
- Consultation with a knowledgeable practitioner at the onset is necessary to prevent dehydration and reduce insulin and hypoglycemic medications to prevent hypoglycemia.

Evert AB et al. Diabetes Care 2019;42:731‐754

Medication Adjustments in Type 2
- Limit medications that cause hypoglycemia
  - Insulin
  - Sulfonylureas
  - Meglitinides
- Other medications likely not needed/preferred
  - Alpha glucosidase inhibitors (prevent carbohydrate digestion)
  - TZD (cause weight gain)
Ketogenic: Meds to Stop

- Sulfonylurea
- Meglitinide
- Meal time insulin
- Combo insulins: 70/30
- Alpha glucosidase inhibitors

Ketogenic: Meds to Use Caution

- SGLT-2 inhibitors
- Long acting insulin
- Insulin U500
- TZD (weight gain)

Ketogenic: Meds are Ok

- Metformin
- GLP-1 agonist
- DPP-4 inhibitors
Medication Adjustments in Type 1

- Basal: 20-50% decrease
- Bolus: may need to intensify carb ratio, bolus for protein?
- Close follow-up
- Monitor ketones
- Avoid SGLT-2 inhibitor
- Caution with hybrid closed-loop pumps

Blood Pressure Medications

- Initial diuretic effect
- Consider halving or stopping diuretic (ex. HCTZ or chlorthalidone)
- Monitor blood pressure

Case: Meet Sally

- Sally is a 52 year old female with type 2 diabetes
- A1C=6.4%, BMI=40kg/m², normal kidney function
- Co-morbidities: hypertension, fatty liver, obesity
- Medications:
  - Insulin glargine 50 units qpm
  - Liraglutide (Victozia) 1.8mg daily
  - Metformin ER 2000mg daily
  - Acarbose 50mg before meals 3 times daily
  - Glimepiride 4mg daily
  - Insulin lispro (Humalog) 15 units at meals 3 times daily
Sally’s CGM Data

• Sally is now following a ketogenic diet. She reports losing 10lbs over 3 weeks and is in ketosis. She stopped her insulin lispro and continues to take the other meds.

Sally’s Ambulatory Glucose Profile

Focusing on the Lows

Acarbose stopped, Insulin glargine decreased to 40 units daily
After 6 weeks, Sally Has Lost 17 lbs

• Insulin glargine decreased to 20 units
• Metformin, Liraglutide, Glimepiride continued

Two Months Later (3.5 months total)

• Working with diabetes educator for bi-weekly nutrition and medication adjustments
• Sally lost 31 lbs
• Meds: metformin, liraglutide
• Stopped insulin glargine and glimepiride
• No hypoglycemia
• A1C=6.2%
• Sally is very happy 😊

Summary

• New evidence and guidelines support benefits of low carbohydrate meal plans in diabetes.
• The diabetes educator plays an important role in support the PWD in these plans.
• Medications should be frequently evaluated and adjusted to avoid hypoglycemia.
IT’S ALL HAPPENING HERE.