MEDICAL NUTRITION THERAPY FOR DIABETES

Courtney Morrissey, MS, RD, LD
Clinical Dietitian, Sodexo Healthcare/ MUSC

OBJECTIVES

- Review recommendations for Medical Nutrition Therapy from the American Diabetes Association and Academy of Nutrition and Dietetics
- Review strategies to aid patients with diabetes in controlling their BG levels with diet
- Tips to help create a realistic and individualized nutrition plan for patients
- Review the current trends in nutrition affecting counseling
OVERVIEW

- Guidelines for MNT
- Goal of MNT in specific populations and diabetes related conditions
- Basics of nutrition and food science

- Break for lunch

- Specific recommendations for diabetes diet
- Current trends in nutrition
- Nutrition-related tools and applications
- Motivational Interviewing
EVERYBODY EATS

- Easy to become the Food Police
- Family and Friends all have opinions on food
- Patient needs to develop their own relationship with food
  - Education is needed to help patients make better food choices

DSME

- Diabetes Self Management Education:
  - Ongoing process of facilitating the knowledge, skill and ability necessary for diabetes and pre-diabetes self-care.
  - Process incorporates the needs, goals and life experiences of the person with diabetes or pre-diabetes and is guided by evidence-based standards
  - Includes nutrition education:
    - 3-4 encounters with an RD lasting 45-90 minutes
    - Should begin at diagnosis of DM or at first referral to an RD for MNT for DM and should be completed within 3-6 months
    - At least 1 follow up encounter is recommended annually to reinforce lifestyle changes and to evaluate and monitor MNT or medications
Medical Nutrition Therapy (MNT) is the legal definition of nutrition counseling provided by a Registered Dietitian.

- “Nutritional diagnostic, therapy, and counseling services for the purpose of disease management which are furnished by a registered dietitian or nutrition professional...” (source Medicare MNT legislation, 2000).
- MNT reductions in A1c values range from 0.25% to 2.9% (depending on type and duration of diabetes)
- MNT was found the most effective at diagnosis of diabetes
Institute of Medicine (IOM) report: MNT can improve outcomes
- Pre-diabetes
  - 58% reduction in progression to diabetes
- Diabetes
  - Decrease A1c
  - Decrease LDL cholesterol by 7-22% (15-25 mg/dL)
  - Decrease systolic and diastolic blood pressure by average 5 mmHg

Growing evidence shows that MNT can result in cost savings, as well
GOALS OF MNT IN DIABETES

- Assist in attaining & maintaining optimal metabolic outcomes
  - Blood glucose levels
    - Pre-prandial: 80-130mg/dL
    - Peak post-prandial: <180mg/dL
  - HgbA1C <7%
  - Optimal serum lipids
    - LDL: <100mg/dL
    - Triglycerides <150mg/dL
    - HDL
      - Men: <40mg/dL
      - Women: <50mg/dL
  - Blood Pressure: <140/80mm/Hg
- Improve health through food choices, physical activity and weight loss
- Individualize nutrition care; these goals may change based on patient’s age, duration of diabetes, healthy history and present health conditions.

MNT IN SPECIFIC POPULATIONS

- Youth with Type 1
  - Provide adequate kcals to ensure normal growth and development
- Youth with Type 2
  - Recommend lifestyle changes to decrease complications
    - Increased physical activity, healthy eating, weight loss
- Pregnancy and lactation
  - Provide adequate calories and nutrients
MNT IN SPECIFIC POPULATIONS

- Patients treated with insulin or glucose-lowering agents
  - Provide nutrition guidelines for hypoglycemia treatment

- Patients at increased risk of diabetes
  - Recommend ways to decrease risk by improving lifestyle factors
    - Becoming physically active, maintaining activity, and sustaining weight loss or preventing weight gain

MNT IN SPECIFIC POPULATIONS

- Type 1:
  - Flexible insulin schedule: CHO-counting can improve glycemic control
  - Fixed insulin regimen: consistent CHO intake can improve glycemic control & minimize risk for hypoglycemia

- Type 2:
  - portion control & basic nutrition recommendations, usually with goal of weight loss, can improve glycemic control

- Diabetes Self Management Education (DSME) includes nutrition education, preferably provided by an RD/RDN with the components of MNT

GENERAL MNT RULES

- Develop individualized meal plans to meet a patient's lifestyle
- Avoid restriction of foods, instead balance insulin, exercise and food
  - Sugar may be incorporated into a healthy eating plan
- For a person with type 2, restriction of certain foods can help with control of body weight, lipids, and glucose

PRE-DIABETES

- A1c of >5.7% - ≤6.4%
- Fasting blood glucose >100mg/dL - <126mg/dL
- Decrease risk factors:
  - Quit smoking
  - Develop exercise routine
    - Regular physical activity (150min/week)
  - Maintain a healthy weight
    - Moderate weight loss 10-20 lb
  - Encourage intake of healthy carbohydrates
    - Whole grains, beans, nuts, fresh fruits and vegetables
  - Sleep tight
    - Sleeping less than 6 hrs a night has been found to increase for type 2 DM
    - Impaired sleep has been found to reduce insulin levels produced by the body after eating.
GESTATIONAL DIABETES (GDM)

- Impaired glucose tolerance first diagnosed during pregnancy
- Associated with excess weight gain and saturated fat and sugar intake prior to pregnancy
- Regular physical activity reduces risk of GDM
- Increased postprandial blood glucose levels may result in:
  - Increase incidence of large-for-gestational age infant
  - Increased rate of Cesarean sections
  - Increased risk of perinatal mortality
  - Increased risk of pre-eclampsia
- Complications for baby include shoulder dystocia, birth injuries (eg, bone fractures and nerve palsies) and hypoglycemia
- A minimum of 175gm CHO per day based on DRI to support fetal brain and prevent ketosis
- Breastfeeding should be encouraged, even short duration
  - Improves long term glucose metabolism
  - Reduce risk of type 2 in children
- Increased risk of developing type 2 DM after pregnancy

DIABETES AND KIDNEY DISEASE

- Diet interventions in Kidney Disease
  - Limit dietary sodium < 2300 mg/day
  - Avoid salt substitutes
  - Choose heart healthy foods
  - Limit high potassium and phosphorus foods
  - Adequate protein intake 0.8g/kg/day
- Diabetic nephropathy
  - 1 gram protein per kg body weight per day
  - Diets less than 1 gm/kg/day show improved albuminuria, no improvement on glomerular filtration rates (GFR)
- Late stage nephropathy
  - Chronic Kidney Disease (stages 3-5)
    - 0.7-0.9 grams of protein per kg body weight per day
- Achieving and maintaining optimal glucose control may reduce the risk of developing albuminuria
**DIABETES AND HEART DISEASE**

- Diet interventions in cardiovascular disease (CVD)
  - Reductions in the following:
    - Saturated fat
    - Trans fat
    - Dietary cholesterol
    - Interventions to improve blood pressure
      - DASH diet
      - Reduce sodium < 1500 mg/day
      - Medication compliance
      - Weight loss and physical activity
  - Interventions have been shown to reduce CVD risk and improve cardiovascular outcomes in individuals with DM

**DIABETES AND GASTROPARESIS**

- Delayed gastric emptying due to nerve damage
- Recommendations:
  - Small, frequent meals (5-6 meals per day)
  - Soft, easily digestible foods
  - Low fat to aid in digestion
  - Avoid carbonated beverages and straws
  - Alterations in insulin regimen
BASICS OF NUTRITION

- Calories
  - Macronutrients
    - Fats
    - Protein
    - Carbohydrates
  - Macronutrients
- Micronutrients
  - Vitamins and minerals
  - Sodium
- Water
- Alcohol

ESTIMATING CALORIES

Adult Population:
- Estimated
  - Obese, very inactive: 20 kcals/kg/day
  - >55 yo, active women, sedentary men: 25 kcals/kg/day
  - Active men, very active women: 30 kcals/kg/day
  - Athletes: 40 kcals/kg/day
- Pregnancy
  - Add 340 kcals/day for 2nd trimester
  - Add 450 kcals/day for 3rd trimester
  - For twin/multiple gestation, 3000-4000 kcal/day is recommended
- Lactation
  - Add 500 kcals/day for the first 6 months
    - Add 800 kcals/day for the first 6 months with twins
    - Add 400 kcals/day during second 6 months
  - For weight loss: add 350 kcals/day for first 6 months
ESTIMATING CALORIES

- Pediatric Population
  - Type 1: adequate calories to meet growth & development needs
  - Type 2 (usually accompanied by overweight status): increase physical activity & decrease caloric intake (subtract ~300-400 calories from number listed below for weight loss)

<table>
<thead>
<tr>
<th>Age</th>
<th>Sedentary</th>
<th>Mod Active</th>
<th>Active</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child 2-3</td>
<td>1,000</td>
<td>1,000-1,400</td>
<td>1,000-1,400</td>
</tr>
</tbody>
</table>
| Female
  - 4-8
  - 9-13
  - 14-18 | 1,200     | 1,400-1,600 | 1,400-1,800 |
| Male
  - 4-8
  - 9-13
  - 14-18 | 1,400     | 1,400-1,600 | 1,600-2,000 |

MIXING MACRONUTRIENTS

- Rate of absorption:
  - CHO 1-2 hours
  - Protein 2-4 hours
  - Fat 4-6 hours (can cause mismatch of food and insulin)

- Recommend consumption:
  - 45-65% calories from CHO
  - ≤30% calories from fat
  - 10-35% calories from protein
Divided into three groups:
- Unsaturated Fats
  - Monounsaturated
  - Polyunsaturated
  - Omega-3
- Saturated Fats
- Trans Fats

Provides 9 calories per 1 g fat

Help lower LDL (bad) cholesterol levels
Raise HDL (good) cholesterol levels
Sources include plant based fats:
- Olive oil
- Canola Oil
- Peanut Oil
- Nuts
- Avocado
**POLYUNSATURATED FATS**

- Lower all cholesterol levels (HDL and LDL)
  - Sources include:
    - Safflower oil
    - Sunflower oil
    - Soybean oil
    - Corn oil
    - Cottonseed oil

**OMEGA-3 FATTY ACIDS**

- Type of Polyunsaturated fat
- Helps to lower triglyceride levels
- Sources:
  - Fish such as albacore tuna, halibut, herring, mackerei, salmon, sardines, and trout
  - Flaxseeds and English walnuts
  - Oils such as canola, soybean, flaxseed and walnut
SATURATED FATS

- No required role in the body other than energy source
  - Body can synthesize its needs from other sources
- Raise LDL (bad) cholesterol levels
- Solid at room temperature
  - Found in meat fats and butter fat, coconut and palm kernel oil

<table>
<thead>
<tr>
<th>Animal Fats</th>
<th>Vegetable Fats</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Meat Fat</td>
<td>• Palm and Palm Kernel Oil</td>
</tr>
<tr>
<td>• Butter</td>
<td>• Coconut Oil</td>
</tr>
<tr>
<td>• Lard</td>
<td>• Cocoa Butter</td>
</tr>
<tr>
<td>• Dairy Products</td>
<td>• Shortening</td>
</tr>
<tr>
<td>• Chicken and Turkey Skins</td>
<td>• Hydrogenated Fats</td>
</tr>
</tbody>
</table>

TRANS FAT

- Created by changing vegetable oil into semi-solid fats
- Raise cholesterol levels
- Sources include:
  - Pre-prepared food items (crackers, cookies, cakes, frozen pies and other baked goods)
  - Stick margarines
  - Refrigerated dough products
  - Ready to use frosting
  - Foods containing hydrogenated or partially-hydrogenated vegetables shortenings

---

**Nutrition Facts**

<table>
<thead>
<tr>
<th>Serving Size</th>
<th>1 Tbsp (14g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Servings Per Container</td>
<td>about 32</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Amount Per Serving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
</tr>
<tr>
<td>% Daily Value</td>
</tr>
<tr>
<td>Total Fat</td>
</tr>
<tr>
<td>Saturated Fat</td>
</tr>
<tr>
<td>Trans Fat</td>
</tr>
<tr>
<td>Cholesterol</td>
</tr>
<tr>
<td>Sodium</td>
</tr>
<tr>
<td>Total Carbohydrate</td>
</tr>
<tr>
<td>Dietary Fiber</td>
</tr>
<tr>
<td>Sugars</td>
</tr>
</tbody>
</table>

*Ingredients: Water, HIGH OLEIC SOYBEAN OIL, PARTIALLY HYDROGENATED SOYBEAN OIL, DEXTROSE, SALT, NATURAL AND Artificial Flavors, SOY LECITHIN, SUGAR, SODIUM CITRATE, SORBIC ACID (PRESERVATIVE), VITAMIN E (TERTIARY BUTYL HIDDENOXYL). FRESHNESS PRESERVED BY PROPYL GALLATE.*
OVERALL FAT RECOMMENDATIONS

- All fats are high in calories
  - Limit serving sizes for good health
- Limit fried food intake
- RDA Recommendations:
  - ≤30% of total calories should come from fat
    - ≤10% saturated fats
    - ≤10% polyunsaturated fats
    - ≤10% monounsaturated fats
    - Zero trans fat intake
  - ≤200 mg cholesterol

PLANT STANOLS AND STEROLS

- Plant-derived
- Block absorption of cholesterol (mimic and compete with the molecule)
- Recommendation of 2 gm/day
- 1.6-3g/day may reduce total and LDL cholesterol (a little)
- Most research done with enriched foods (spreads, dairy, grains/breads, yogurt), but can contribute more calories (careful!)
- Also found naturally, but would be difficult to get the 1.6-3g/day

<table>
<thead>
<tr>
<th>Wheat germ</th>
<th>vegetable oils (corn, sesame, canola and olive oil),</th>
</tr>
</thead>
<tbody>
<tr>
<td>wheat bran</td>
<td>almonds</td>
</tr>
<tr>
<td>peanuts</td>
<td>Brussels sprouts</td>
</tr>
</tbody>
</table>
PROTEIN

- RDA recommendation is 10-35% of calories
  - 0.8gm/kg/day for most adults
  - Extra protein is needed for wound healing and dialysis patients
- High protein diet > 20% of total kcals
- Complete proteins = Protein from animal sources
  - Meat, poultry, fish, eggs, milk, cheese, and yogurt
- Incomplete proteins = Proteins from vegetable sources
  - Plants, grains, nuts, seeds, vegetables
    - Usually lacking one or more essential amino acids
  - Rice and beans combined create a complete protein
- Provides 4 calories per 1 gram Protein
- In Type 2 DM, protein can increase insulin without increasing blood sugar, so CHO with protein is not recommended in hypoglycemia

CARBOHYDRATES (CHO)

- RDA recommendation is 45-65% of total kcals
- Monosaccharide
  - “Simple sugar”
    - Consists of one sugar molecule
      - Glucose, fructose, galactose
- Disaccharides
  - “Common sugar”
    - Consist of two sugar molecules
      - Lactose: glucose + galactose
      - Sucrose: glucose + fructose
      - Maltose: glucose + glucose
- Polysaccharides
  - “Complex Carbohydrate”
    - Consist of a chain of monosaccharides joined together
      - Cellulose, starch, glycogen
- Provides 4 calories per 1 gram carbohydrate
**FIBER**

- Non-digestible CHO
- Average daily intake = 10-30 gm/day
- Recommended 20-35gm/day
- High fiber (25-35mg/day) reduce risk of CVD
- Soluble: forms a gel in water, slows absorption of nutrients
  - Beans, fruit, oat bran, rice bran, barley
- Insoluble: does not dissolve in water, but absorbs water, helps treat constipation
  - Wheat bran, whole grains, root vegetables
- When increasing fiber intake, don’t forget to increase water intake

---

**GLYCEMIC INDEX (GI)**

- Definition:
  - Glycemic index—speed of rise in blood sugar after eating a particular food
  - Glycemic load—a number that estimates how much the food will raise a person’s blood sugar, taking into account how much CHO is in the food & how much each gram of CHO raises blood sugar (GI)
    \[
    \text{glycemic load} = \frac{\text{grams of carbohydrate in the food} \times \text{the food’s GI}}{100}
    \]
  - Ranks carbohydrate foods according to their effect on blood glucose levels
    - High GI foods raise Blood Glucose levels
    - Low GI foods have less of an effect
  - Food items high in fiber will have a lower GI
  - Differs from person to person
  - Differs based on combination of food eaten
GLYCEMIC LOAD

- GL = (Glycemic index (GI) x CHO content per serving) / 100
- Helps to relate GI to actual food servings (quantity)

- 1 cup of Carrots
  \[(35 \text{ GI} \times 6 \text{ gm CHO}) / 100 = 2 \text{ GL}\]
- 1 snickers bar
  \[(68 \text{ GI} \times 34 \text{ gm CHO}) / 100 = 23 \text{ GL}\]
Low or no calories
- FDA approved, but moderation is recommended
- Safe for use during pregnancy
- ADI = acceptable daily intake

Saccharine (Sweet ‘N Low)
- ADI= 5mg/kg/d
  - 150# = 341mg/day
  - Each packet contains 40mg
  - 8.5 packets
- Not recommended in pregnancy

Aspartame (Equal/Nutrasweet)
- ADI= 50mg/kg/d
  - 150# = 3410mg/d
  - 12 oz soda contains 200mg
  - 17 diet sodas a day

Sucralose (Splenda)
- ADI= 5mg/kg/d
  - 150# = 341mg/day
  - Each packet contains 5mg
  - 68 packets/day

Stevia
- Herb in the Chrysanthemum family
- 10-15% sweeter than sugar
- Has a metallic/butter taste when heated
- FDA - “Generally Recognized As Safe” label
NUTRITIVE SWEETENERS

- Contain calories and CHO
- Fructose
  - Produce glycemic response, but less than sucrose or starch
- Sugar Alcohols
  - Sorbitol, Mannitol, Xylitol
  - Can be identified in the ingredient list
  - Lower glucose response than sucrose or glucose
  - Consuming >10gm/day may cause GI upset and diarrhea
  - Found in sugar free candies and chewing gum, protein bars, and cough drops
- Agave nectar, maple syrup, sucrose, honey
  - 1 tbsp contains 15gm CHO

VITAMINS AND MINERALS

- Vitamins D
  - There is some research showing that young people who have higher vitamin D levels decreased their chances of developing type 2 DM later in life compared to people who had lower vitamin D levels.
  - Studies have also shown that vitamin D supplements can help some symptoms of type 2 DM.
  - People newly diagnosed with type 2 DM often have lower vitamin D levels than people without diabetes.
  - Doctors and scientists think that vitamin D may have a hand in type 2 DM by playing a role in pancreatic beta-cell function, insulin action, and inflammation.
VITAMINS AND MINERALS

- Chromium
  - Increased glycemic control and lipid levels

- Cinnamon
  - Intake of 1, 3, or 6 g of cinnamon per day
  - Reduced serum glucose, triglyceride, LDL cholesterol, and total cholesterol
  - Inclusion of cinnamon reduce risk factors associated with diabetes and cardiovascular diseases.
  - There not enough data to justify supplementation

SODIUM

- <1500mg/d if >40yo with HTN or AA without HTN or <20yo with HTN
- 2300mg/d (1 tsp) for everyone else (only 30% of population)
- ~75% of Na in the diet comes from processed foods

Photo from www.mayoclinic.com
**WATER**

- Recommendation 1 mL/kcal/day
- Estimated at 64 oz per day
- Hyperglycemia can lead to dehydration: Dehydration can lead to hyperglycemia
- Water regulates body temperature and helps to carry waste products and nutrients through the body

---

**ALCOHOL**

- Bypasses the pancreas to be metabolized in the liver
  - Interferes with counter-regulation of insulin-induced hypoglycemia
  - Hypoglycemia risk following intake
- To reduce risk of hypoglycemia
  - Eat food when consuming alcohol
  - Check BG levels frequently
- Carbs ingested with alcohol (mixers) may influence BG levels
- Moderation: 1 drink/day women, 2 drinks/day men
  - Drink is defined as: 5 oz of wine, 1.5 oz spirits, 12 oz of beer
OVERVIEW

- Guidelines for MNT
- Goal of MNT in specific populations and diabetes related conditions
- Basics of nutrition and food science

- Break for lunch

- Specific recommendations for CHO counting diet
- Current trends in nutrition
- Nutrition-related tools and applications
- Motivational Interviewing
CALORIE ESTIMATION

Adult Needs:
- Estimated
  - Obese, very inactive: 20 kcals/kg/day
  - >55 yo, active women, sedentary men: 25kcals/kg/day
  - Active men, very active women: 30kcals/kg/day
  - Athletes: 40kcals/kg/day
- Use of Formulas
  - Mifflin St. Joer Energy Estimation Equation
    - Male BMR: (10 x wt in kg)+(6.25 x ht in cm)-(5 x age in yrs) +5
    - Female BMR: (10 x wt) +(6.25 x ht in cm)-(5 x age) – 161
  - BMI > 30kg/m^2: Recommend no activity factor
    - Little to no exercise= BMR x 1.2
    - Light activity = BMR x 1.3
    - Moderately active/ healing / infection = BMR x 1.5

CALORIES

- Pregnancy
  - Add 340kcals/day for 2nd trimester
  - Add 450kcals/day for 3rd trimester
- For Lactation
  - Add 500 kcals/day for the first 6 months
  - Add 330kcals/day for 0.8kg weight loss per/d in first 6 months
  - Add 400 kcals/day during second 6 months
  - Add 800-1000 kcals/day for breastfeeding multiples
**Pediatric Population**

- 1000 kcals for the 1st year of life
- With an additional 100 kcals/year up to age 10

- **Girls 11-15yrs**
  - Add 100 kcals after age 10

- **Girls >15 years**
  - Calculate as an adult

- **Boys 11-15 yrs**
  - Add 200 kcals after age 10

- **Boys >15 years**
  - Active: 50 kcals/kg
  - Usual: 40 kcals/kg
  - Sedentary: 30-35 kcals/kg

---

**CALORIES**

- **1 pound = 3500 calories**

**Fat**

- 9 kcals/gram
- Digests in 4-6 hours
- High fat meals slow digestion
- Can often cause insulin resistance
- 10% of fat turns to glucose

**Protein**

- 4 kcals/gram
- Digest in 2-4hours
- 50% of protein turns to glucose

**Carbohydrates**

- 4 kcals/gram
- Digest in 1-2hours
- 100% of carbohydrate turns to glucose
**MEAL PLANNING**

- ADA diets are now outdated
  - Key is *INDIVIDUALIZED*
  - Consistent CHO intake daily
- No longer using: No Concentrated Sweets, No Sugar Added, Low Sugar Diet
- Full/Clear Liquid Diets when food if not tolerated:
  - Provide ~200gm CHO daily
  - Liquids do not need to be sugar-free

**CHO COUNTING**

- One CHO serving = 15gm of Carbohydrate
- Three food groups contain CHOs
  - Milk
  - Fruit
  - Starches/Breads/Sweets
- Sugar-free is not carbohydrate-free
- Typical recommended intake of CHO is 180-200gm CHO for individuals with DM
  - Broken down into consistent CHO intake daily
  - 45-60gm CHO at breakfast, lunch and dinner with optional snack of 15gm CHO + protein 1-3 times a day
  - For GDM, 45 gm CHO at breakfast, 60 gm CHO at lunch and dinner, and 15 gm CHO snack + protein between meals
**Milk Choices**

- 80-150 calories
- 12-15gm CHO
  - 1 cup of milk
  - 6-8oz of yogurt (plain or artificially sweetened)
  - 3-4oz sweet yogurt
  - ½ cup frozen yogurt/ice cream
  - ½ cup sugar free pudding
  - 1 cup soy milk

**Fruit Choices**

- 60 calories
- 15 gm CHO
  - 1 medium fruit (baseball sized)- Apple, Orange, Pear
  - ½ banana 9”
  - ½ grapefruit
  - 1 cup fresh fruit (strawberries, watermelon)
  - ½ cup juice
  - ½ cup canned fruit in juice or water
  - ¼ cup dried fruit
**STARCHES/BREAD/SWEET CHOICES**

- **80 calories**
- **15 gm CHO**
  - 1/3 cup cooked pasta or rice
  - ½ cup starchy vegetables (corn/peas/beans/potatoes)
  - 1 slice of bread (white or wheat)
  - ½ hamburger or hot dog bun
  - 1 tortilla- 6” across
  - 4-6 crackers, 15 pretzels or chips
  - 2” cube of cornbread
  - 3 cups popcorn
  - ½ cup oatmeal, grits, or cream of wheat
  - 1/3 cup humus

**PUTTING IT ALL TOGETHER**

- **Determine average caloric intake**
- **1800kcal diet**
  - Carbohydrate: 1800 x .50 = 900 kcals / 4 = 225 gm CHO
  - Divide CHO among 3 meals and 1-3 snacks
  - Fat: 1800 x .30 = 540 kcals / 9 = 60 gm fat
  - Protein: 1800 x .20 = 360 kcals / 4 = 90 gm protein
DEVELOPING A MEAL PLAN

- Should be set by the patients
  - Premade meal plans typically don’t work
- Include practical food choices
- Need to understand food preparation techniques
- Plan for follow-up
- Determine patient’s level of understanding prior to leaving
- Also discuss food safety

FOOD LABELS

**Nutrition Facts**

<table>
<thead>
<tr>
<th>Serving Size</th>
<th>1/2 cup dry (40 g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Servings Per container</td>
<td>13</td>
</tr>
<tr>
<td>Amount Per Serving</td>
<td></td>
</tr>
<tr>
<td>Calories</td>
<td>150</td>
</tr>
<tr>
<td>Calories from Fat</td>
<td>25</td>
</tr>
<tr>
<td>% Daily Value</td>
<td></td>
</tr>
<tr>
<td>Total Fat</td>
<td>3 g</td>
</tr>
<tr>
<td>Saturated Fat</td>
<td>0.5 g</td>
</tr>
<tr>
<td>Trans Fat</td>
<td>0 g</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>0 mg</td>
</tr>
<tr>
<td>Sodium</td>
<td>0 mg</td>
</tr>
<tr>
<td>Total Carbohydrate</td>
<td>27 g</td>
</tr>
<tr>
<td>Dietary Fiber</td>
<td>4 g</td>
</tr>
<tr>
<td>Sugars</td>
<td>1 g</td>
</tr>
<tr>
<td>Protein</td>
<td>5 g</td>
</tr>
</tbody>
</table>

- **Serving Size**
  - Reference for how the numbers below relate to a specific portion
- **Total Carbohydrate**
  - Reflects all CHO:
    - Sugars, fiber, sugar alcohols, and starch
- **Ingredients list**
  - Listed in order of weight within the product
<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Amount Per Serving</th>
<th>% Daily Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
<td>250</td>
<td>10%</td>
</tr>
<tr>
<td>Total Fat</td>
<td>10g</td>
<td>15%</td>
</tr>
<tr>
<td>Saturated Fat</td>
<td>3g</td>
<td>15%</td>
</tr>
<tr>
<td>Trans Fat</td>
<td>5g</td>
<td>3%</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>5mg</td>
<td>1%</td>
</tr>
<tr>
<td>Sodium</td>
<td>150mg</td>
<td>6%</td>
</tr>
<tr>
<td>Total Carbohydrate</td>
<td>7g</td>
<td>2%</td>
</tr>
<tr>
<td>Dietary Fiber</td>
<td>2g</td>
<td>0%</td>
</tr>
<tr>
<td>Sugars</td>
<td>5g</td>
<td>1%</td>
</tr>
<tr>
<td>Protein</td>
<td>3g</td>
<td>1%</td>
</tr>
</tbody>
</table>

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

### SUGAR-FREE VS CARB FREE

**Sugar-Free Snack Pack Pudding**

**Nutrition Facts**

<table>
<thead>
<tr>
<th>Serving Size 1 pudding (98g)</th>
<th>Servings Per Container 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
<td>70</td>
</tr>
<tr>
<td>Calories from Fat</td>
<td>3.5g</td>
</tr>
<tr>
<td>Total Fat</td>
<td>5%</td>
</tr>
<tr>
<td>Saturated Fat</td>
<td>2g</td>
</tr>
<tr>
<td>Trans Fat</td>
<td>0g</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>0mg</td>
</tr>
<tr>
<td>Sodium</td>
<td>110mg</td>
</tr>
<tr>
<td>Total Carbohydrate</td>
<td>15g</td>
</tr>
<tr>
<td>Dietary Fiber</td>
<td>1g</td>
</tr>
<tr>
<td>Sugars</td>
<td>0g</td>
</tr>
<tr>
<td>Sugar Alcohol</td>
<td>9g</td>
</tr>
<tr>
<td>Protein</td>
<td>less than 1g</td>
</tr>
</tbody>
</table>

**Regular Snack Pack Pudding**

**Nutrition Facts**

<table>
<thead>
<tr>
<th>Serving Size: 1 snack (110g)</th>
<th>Servings Per Container 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
<td>100</td>
</tr>
<tr>
<td>Calories from Fat</td>
<td>0g</td>
</tr>
<tr>
<td>Total Fat</td>
<td>0g</td>
</tr>
<tr>
<td>Saturated Fat</td>
<td>0g</td>
</tr>
<tr>
<td>Trans Fat</td>
<td>0g</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>0mg</td>
</tr>
<tr>
<td>Sodium</td>
<td>210mg</td>
</tr>
<tr>
<td>Total Carbohydrate</td>
<td>24g</td>
</tr>
<tr>
<td>Dietary Fiber</td>
<td>0g</td>
</tr>
<tr>
<td>Sugars</td>
<td>7g</td>
</tr>
<tr>
<td>Sugar Alcohol</td>
<td>9g</td>
</tr>
<tr>
<td>Protein</td>
<td>1g</td>
</tr>
</tbody>
</table>
### FOOD LABELS

- **Sugar Alcohols**
  - Sorbitol, Mannitol, Xylitol
  - 5gm or more on label
    - $\frac{1}{2}$ the sugar alcohol total can be subtracted from total CHO

- **Fiber**
  - 5gm or more on label
    - $\frac{1}{2}$ the fiber total can be subtracted from the total CHO

### CLAIMS OF FOOD LABELS

- **Fat free**: 0.5 g or less of fat per serving
- **Trans fat-free**: 0.5gm or less of trans fat per serving
- **Low fat**: 3 g or less of fat per serving
- **No sugar added**: no sugar added during the processing
- **Calorie free**: 5 calories or less per serving
- **Light/Lite**: $\frac{1}{2}$ fewer calories or 50% less sugar & fat than regular product.
- **Low sodium/salt**: 140 mg or less sodium per serving
- **Sugar free**: 0.5 g or less of sugar per serving
### NUTRITION FOR SICK DAYS

- **Try to eat normally**
  - Patients need at least 165gm CHO/day
  - Most pregnant women need at least 175gm CHO/day
- **If unable to eat and glucose is less than 200mg/dL**
  - Sip on liquids that DO contain sugar
    - 7-up, regular ginger ale, tea with honey or Gatorade
    - Prevents sugar from dropping too low
- **If patient is vomiting or has diarrhea**
  - Important to replace sodium and potassium losses
    - Na: Gatorade, tomato juice, broth or bouillon
    - K: Gatorade, tomato, grapefruit, or orange juice

### NUTRITION FOR SICK DAYS

- Small meals of CHO are usually easier to tolerate
  - Typically 6 small meals of 30gm of CHO

<table>
<thead>
<tr>
<th>Starch/Treat Replacement</th>
<th>Servings size equal to one starch, 15 grams of carbohydrate</th>
<th>Fruit Replacement</th>
<th>Servings size equal to one fruit, 15 grams of carbohydrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bagel</td>
<td>1</td>
<td>Applesauce, unsweetened</td>
<td>¼ cup</td>
</tr>
<tr>
<td>Bread toast</td>
<td>1 slice</td>
<td>Popcicle</td>
<td>1</td>
</tr>
<tr>
<td>Cooked cereal</td>
<td>½ cup</td>
<td>Juice: apple, grapefruit, orange or pineapple</td>
<td>½ cup</td>
</tr>
<tr>
<td>Cream soup</td>
<td>½ cup</td>
<td>Fruit juice box</td>
<td>1</td>
</tr>
<tr>
<td>Graham crackers</td>
<td>3 squares</td>
<td>Juice: cranberry, grape or prune</td>
<td>½ cup</td>
</tr>
<tr>
<td>Sea cracker</td>
<td>½ cup</td>
<td>Honey or syrup</td>
<td>2 teaspoons</td>
</tr>
<tr>
<td>Mashed potatoes</td>
<td>½ cup</td>
<td>Swirled sauce</td>
<td>¼ cup</td>
</tr>
<tr>
<td>Noodle or rice soup</td>
<td>1 cup</td>
<td>Yogurt</td>
<td>¼ cup</td>
</tr>
<tr>
<td>Popsicle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saltines</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sausage</td>
<td>¼ cup</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweetened pâtéti</td>
<td>½ cup</td>
<td>Sugar free frozen yogurt</td>
<td>2 cup</td>
</tr>
<tr>
<td>Sweetened soda pop (7.4%)</td>
<td>½ cup</td>
<td>Sugar free pudding</td>
<td>½ cup</td>
</tr>
<tr>
<td>Vanilla wafers</td>
<td>6</td>
<td>Butterscotch</td>
<td>¼ cup</td>
</tr>
</tbody>
</table>
HYPOGLYCEMIA TREATMENT

- BG levels less than 70mg/dL (60mg/dL in pregnant)
  - What to do:
    - Take 15gm of FAST CHO
      - Take four Dex4 glucose tablets (16gm CHO)
      - ½ can of regular soda
      - ½ cup of juice
      - 1 tbsp of sugar (3 sugar packets)
      - *Avoid anything containing fat- Milk (even skim milk), peanut butter cookies/sandwich, candy bar
    - Wait 15 minutes and retest BG level
    - If BG level is still less than 70mg/dL then repeat and follow with a meal or snack that contains protein (1/2 turkey sandwich, ½ peanut butter sandwich, 3 peanut butter cracker sandwiches)

FREE FOODS

- Less than 20 calories and 5 grams of CHO per serving
  - Limited to 3 servings per day
  - Servings should be spread out

<table>
<thead>
<tr>
<th>Free Snack Ideas:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5 baby carrots and celery sticks</td>
<td>1 frozen cream pop, sugar-free</td>
</tr>
<tr>
<td>¼ cup of blueberries</td>
<td>10 goldfish-style crackers</td>
</tr>
<tr>
<td>1 cup light popcorn</td>
<td>Sugar-Free Gelatin</td>
</tr>
<tr>
<td>½ cup sliced cucumbers and vinegar</td>
<td>2 tsp no-sugar added Jam/Jelly</td>
</tr>
</tbody>
</table>
COMBINATION FOODS

Foods that combine foods together can be a challenge for CHO counters.

<table>
<thead>
<tr>
<th>Combination Food Examples</th>
<th>15gm CHO Serving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Casserole-type dish (tuna, lasagna, mac &amp; cheese)</td>
<td>¼ cup</td>
</tr>
<tr>
<td>Stews/Soups (beef/other meats and vegetables)</td>
<td>¼ cup</td>
</tr>
<tr>
<td>Tuna/Chicken Salad</td>
<td>1 cup</td>
</tr>
<tr>
<td>Cole Slaw</td>
<td>½ cup</td>
</tr>
<tr>
<td>Macaroni/Pasta/Potato Salad</td>
<td>¼ cup</td>
</tr>
<tr>
<td>Pot Pie</td>
<td>½ pie (~3.5oz)</td>
</tr>
<tr>
<td>Burrito (beef or bean)</td>
<td>½ of one 5oz burrito</td>
</tr>
</tbody>
</table>

INSULIN TO CHO RATIO

Matching the dose of insulin to the amount of carbohydrates eaten – varies for each person.

- For example: 1 unit insulin for every 15 grams of carbohydrates (1:15)
- Person consumes 60 grams of carbohydrates = 4 units of insulin
Anthropometrics
Labs
Medications
Medical History

Important to consider:
- Access and availability to food
- Family/friend support
- Work/school conditions
- Exercise habits
- Personal goals

NUTRITION ASSESSMENT

Adult Programs
- Supplemental Nutrition Assistance Program (SNAP)
  - Formerly the Food Stamp Program
- Older Americans Act Nutrition Program
- WIC Program
  - Special Supplemental Nutrition Program for Women, Infants, and Children

Children’s Programs
- National School Lunch Program
- School Breakfast Program
- Summer Food Service Program

http://fnic.nal.usda.gov/nutrition-assistance-programs

NUTRITION ASSISTANCE PROGRAMS
**NUTRITION APPS**

- Carbs to Go! (free)
- My Fitness Pal (free)
- mySugar (free)
- HEALTHeDiabetes ($5.99)
- MyNetDiary PRO- calorie counter ($3.99)
- Calorie King (free for iPhone)
- BG Monitor Diabetes (free for Android)

**COMMON DIET TRENDS**

- Atkins
  - Very low CHO ≤40 per day
- Paleo Diet (Caveman Diet)
  - Meat, fish, fruit, vegetables, eggs, nuts and seeds
  - No dairy, grains, processed foods, legumes, refined sugar
- Detox Diets
  - Dangerous for diabetics
- Gluten Free
- HcG Diet
- 21 Day Fix
- Whole30
I'd do anything to lose 10lbs, except eat healthy and work out.

MYPLATE

Dietary Guidelines for Americans, 2015-2020

- Let's eat for the health of it:
  - Build a healthy plate
  - Cut back on foods high in solid fats, added sugars, and salt
  - Eat the right amount of calories for you
  - Be physically active
**MYPLATE**

- **Build a healthy plate**
  - Make half your plate fruits and vegetables
  - Eat vegetables as main and side dishes
  - Add fruit and vegetables as snacks
  - Switch to skim or 1% milk
    - Try calcium fortified soy products as a milk alternative
  - Make at least half your grains whole
    - Choose 100% whole-grain cereals/breads/crackers
  - Vary your protein food choices
    - Add seafood twice a week

---

**MYPLATE**

- Cut back on foods high in solid fats, added sugars, and salt
  - Choose foods and drinks with little or no added sugars
  - Look out for salt (sodium) in foods you buy
  - Eat fewer foods high in solid fats

<table>
<thead>
<tr>
<th>Solid Fats</th>
<th>Oils</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef, pork, and chicken fat</td>
<td>Canola/Olive oil</td>
</tr>
<tr>
<td>Butter, cream and milk fat</td>
<td>Corn/Peanut oil</td>
</tr>
<tr>
<td>Coconut, palm, and palm kernel oil</td>
<td>Cottonseed oil</td>
</tr>
<tr>
<td>Hydrogenated oil</td>
<td>Safflower oil</td>
</tr>
<tr>
<td>Partially hydrogenated oil</td>
<td>Sunflower oil</td>
</tr>
<tr>
<td>Shorting</td>
<td>Vegetable oil</td>
</tr>
<tr>
<td>Stick margarine</td>
<td>Tub (soft) margarine</td>
</tr>
</tbody>
</table>
MYPLATE

- Eat the right amount of calories for you
  - Enjoy your food, but less
    - Avoid oversized portions
    - Use a smaller plate, bowl and glass
  - Cook more often at home
    - Where you control what’s in the food
  - Write down what you eat to help you keep track
  - Drink alcohol sensibly
    - Limit to 1 drink per day for women
    - Limit to 2 drinks per day for men
  - Use food labels
    - Look for sugar on the ingredients list
      - Sucrose, glucose, high fructose corn syrup, corn syrup, maple syrup, and fructose

MYPLATE

- Be physically active
  - Pick activities that you like and start by doing what you can
    - At least 10 minutes at one time
  - Parents need to be the role model for their children
    - Don’t just tell children to eat their vegetables or exercise, show them that you eat vegetables and enjoy exercise
MOTIVATIONAL INTERVIEWING

- The crux of motivational interviewing is to enhance self-efficacy and personal control of behavior change.
- Needs active/ongoing support from the provider.
- Ineffective strategies:
  - Well-trained expert providers want to “fix” with good advice.
  - Message of “you should change.”
  - Patients who are not ready feel advice is intrusive, then labeled “noncompliant,” then become frustrated & no change is made.

MOTIVATIONAL INTERVIEWING

- Recent studies have demonstrated the efficacy of motivational interviewing in helping patients change their health behaviors.
- MI is a patient-centered method for enhancing intrinsic motivation to change by exploring and resolving ambivalence.
- The provider listens to the patient’s perspective on how the problem affects daily life and seeks to understand the patient’s point of view without judging or criticizing the behavior.
USING MOTIVATIONAL INTERVIEWING

- Ask open-ended questions
- Listen reflectively
- Ask permission
- Guide
  - The physician/clinician assists the patient in identifying behaviors that may need improvement—promotes “buy in”.
  - The patient is encouraged to explore his/her own motivation and goals.

FOUR GUIDING PRINCIPLES OF MOTIVATIONAL INTERVIEWING

- Resist arguing and trying to persuade your patient to change behavior
  - Patient may become defensive
- Understand your patient’s motivation
  - Ask them to elaborate on their reasons, without sounding like you are questioning them about it
- Listen to your patient
  - For example → Your patient may have the answers as to how to minimize the barriers to exercise in his daily life
- Empower your patient
  - A clinician’s belief in the patient’s ability to change can be all a patient needs to succeed
MOST IMPORTANT TO REMEMBER

- Change must to happen slowly
  - Diet changes will not occur overnight, it’s a process
- Diet must be individualized
  - Each person is different and requires a different plan
- Educators are to provide patients with the necessary tools to make appropriate changes
- Seek to understand your patient and their motivations for change

RESOURCES

- Medical Nutrition Therapy MNT Works. Academy of Nutrition and Dietetics
- Slow Progression and Reduce Complications, National Institute of Diabetes and Digestive and Kidney Disease. Available at: https://www.niddk.nih.gov/health-information/health-communication-programs/skip/identify-manage/manage-patients/slow-progression/Pages/slow-progression.aspx
- ChooseMyPlate.org website. Available at: http://www.choosemyplate.gov/index.html
- Joslin Diabetes Center. Available at: http://www.joslin.org/index.html
- Vitamin D Council. Available at: https://www.vitamindcouncil.org/.
QUESTIONS?

Courtney Morrissey, MS, RD, LD
norric@musc.edu
843-792-9522