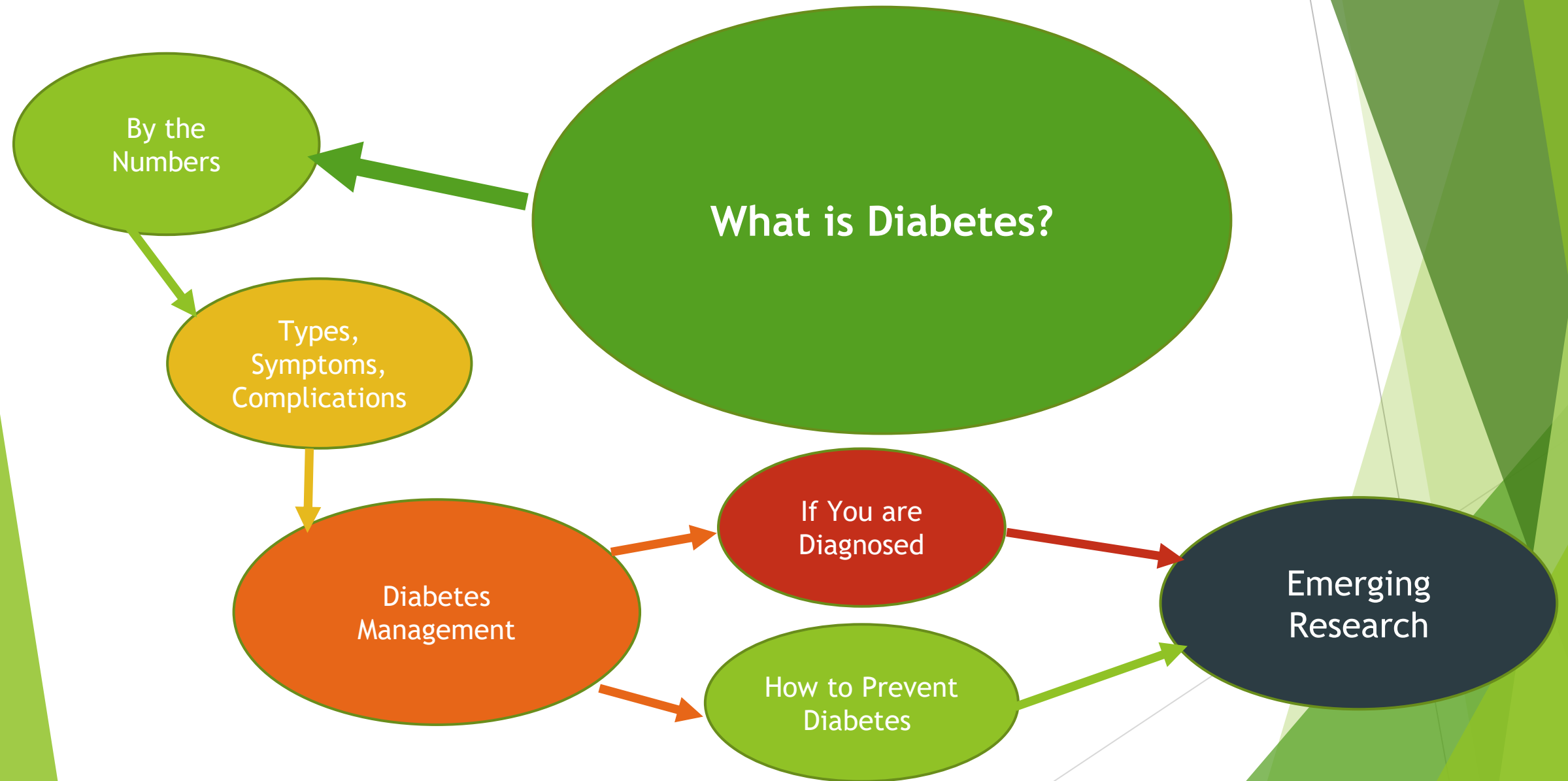


How to Prevent and Treat Type II Diabetes with Nutrition

Presented by Schuyler
Distelzweig
WSU CPD Student



What are we going to cover today?



What is Diabetes?

Main Characteristics

- Caused by impaired carbohydrate metabolism
 - Either insulin resistant or don't produce enough
 - Leads to elevated blood glucose levels (hyperglycemia)

Symptoms

- ▶ Polyuria (excessive urination)
- ▶ Polydipsia (excessive thirst)
- ▶ Unexplained weight loss
- ▶ Dehydration and electrolyte disturbances
- ▶ Ketoacidosis
- ▶ Hyperglycemia

By the Numbers

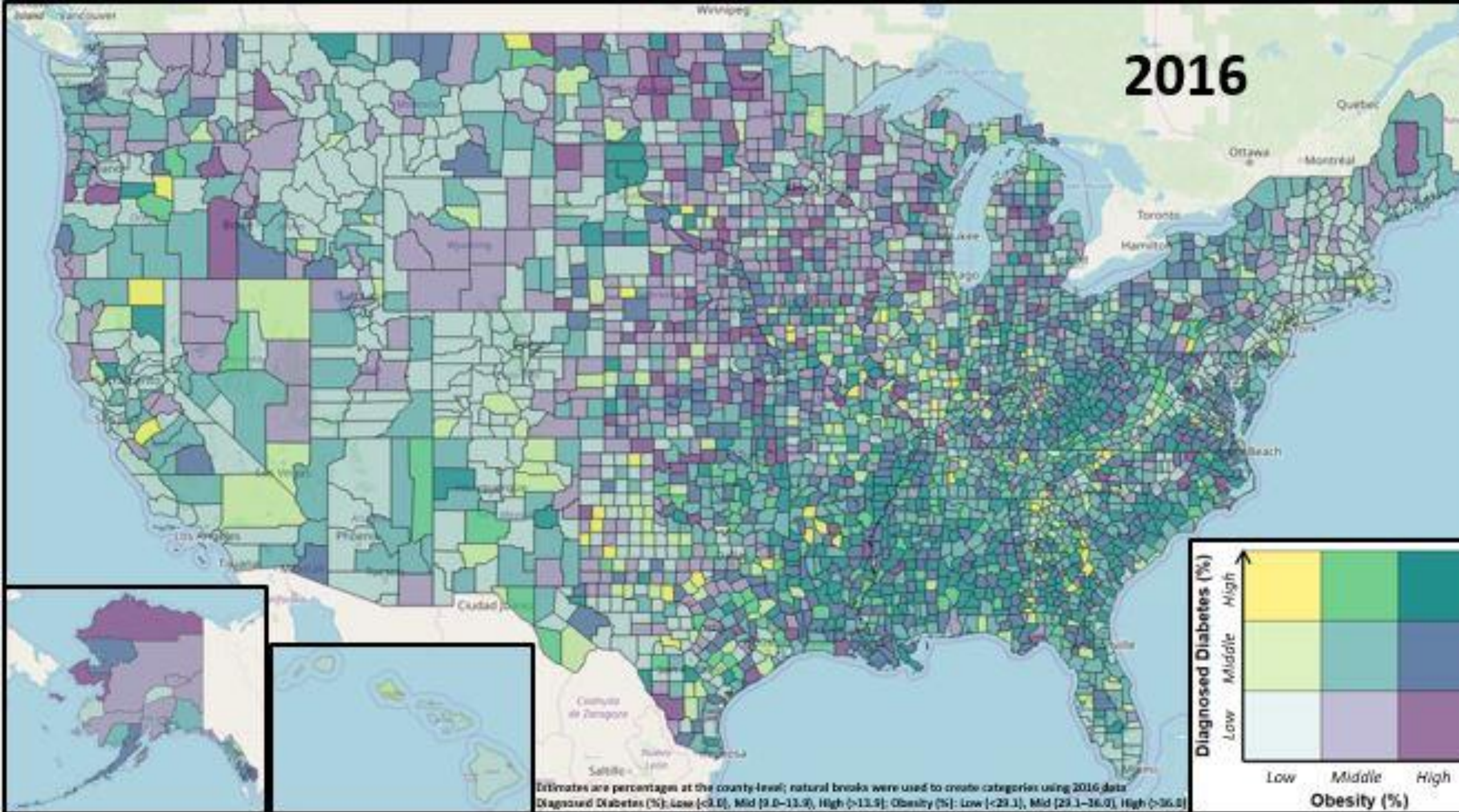
34.2 million people have diabetes (10.5% of the US population)

7.3 million people (21.4% are undiagnosed)

88 million people aged 18 years or older have prediabetes (34.5% of the adult US population)

In 2016, one in 10 Michigan adults 18 years and older were diagnosed with diabetes - 870,000 people

2016



The background features a series of overlapping, semi-transparent green geometric shapes, including triangles and polygons, that create a dynamic, layered effect. The colors range from light, pale greens to deep, vibrant forest greens. The shapes are primarily concentrated on the right side of the frame, with some extending towards the center.

Types of Diabetes

Type I

- Autoimmune Disease - Antibodies attack islet cells in the pancreas that produce insulin
- Usually diagnosed early in life, can be diagnosed as late 30
- Requires exogenous insulin
- Genetic component
- Rare - roughly 10% of new cases¹



Type II

- Onset is typically later (Previously called adult onset)
- Can go undiagnosed for a long time without being life threatening
- Highly associated with obesity
- Insulin Receptor Defects
- Environmental factors responsible for onset however genetics play a big role as well

Complications of Diabetes

➤ Short Term (acute)

- Diabetic Coma
 - Diabetic Ketoacidosis
 - Hyperosmolar Hyperglycemic Syndrome
- Hypoglycemia
 - Most frequent comp. In type I and can occur in type II
 - Caused by disease mismanagement (eg. Excessive insulin or drugs, skipped meals, alcohol etc).

Complications of Diabetes Cont.

➤ Long Term (chronic)

- Main cause is Advanced Glycation End Products
 - Stimulate pathways that are damaging to tissues
- Sorbitol build up causes cellular injury



- Macrovascular
 - Accelerates atherosclerosis
 - Increased risk for cardiovascular disease due to high blood pressure, blood lipid abnormalities - leading cause of death³
- Microvascular
 - Retinopathy may occur in up to 80% of patients⁴
 - Nephropathy due to damage to the capillaries in the kidneys
- Neuropathy
 - Peripheral (limbs/extremities)
 - Autonomic (erectile dysfunction, gastroparesis, cardiac arrhythmias)

Diabetes Prevention



Prevention of Type II Diabetes

- ▶ Prediabetes or "increased risk for diabetes" (IRD) affects approximately 37% of US adults and 23% of adolescents¹
- ▶ Prediabetes diagnostics: Fasting Plasma Glucose of 100-125 mg/dl, A1C 5.7-6.4%

Pillars of Diabetes Prevention

- ❖ Weight Management
- ❖ Dietary Modification
- ❖ Physical Activity
- ❖ Monitoring for Diabetes
 - Should be tested yearly and given additional counseling if necessary

Weight Management



- ▶ Weight loss of 2-8 kg or 7% of total weight improves risk in overweight and obese individuals²
- ▶ Weight loss must be sustainable
 - ½ - 1lb per week
 - Risks of weight cycling
- ▶ Monitoring weight should begin in adolescence - consult a pediatric dietitian if possible
- ▶ All at risk patients should consult a dietitian or weight loss professional if possible

Weight Management Cont.



- ▶ Losing weight on your own
 - Calculate your energy needs and eat at a 250-500 calorie deficit
 - ½ - 1lb per week is healthy and sustainable
 - [Mifflin St. Jeor Calculator - Find Your Daily Caloric Burn Here](#)

- ▶ Use an app such as MyFitnessPal so you can easily add meals and track your calories

Dietary Modification



- ▶ Increase your intake of whole grains, nuts/seeds, and fruits/vegetables
 - Try oatmeal for breakfast - lowers LDL chol. can reduce risk of cardiovascular disease⁵
 - Make smoothies
- ▶ Limit added sugar
 - Sweetened beverages etc.
- ▶ Try to limit fat
 - Don't avoid but don't eat in excess eg. fast food
- ▶ Eat at consistent times and avoid snacking

Active Lifestyle



- ▶ Try to aim for 150 minutes of moderate physical activity per week
 - Equivalent to 30 minutes, 5 days/week
- ▶ Do something active that you enjoy
 - Sport or other rec. Activity
 - Have a workout partner
- ▶ For individuals who don't want to track calories, exercise combined with dietary modification helps aid in losing and maintaining a healthy weight and reducing risk

Diabetes Management



Nutrition Management of Diabetes

- ▶ An individualized sustainable diet plan is key to good long-term outcomes
- ▶ Regular follow up every 3 months with a dietitian has been shown to increase adherence, leads to an average drop in A1c of 1-2%, and leads to better health outcomes⁶

Nutrition Intervention

- ❖ Promotes Healthful Eating Patterns
 - To achieve bodyweight, glycemic, blood pressure, and lipid goals
 - Delay/prevent complications
- ❖ Provides Individuals With Tools For Meal Planning
 - Rather than focusing on individual nutrients
- ❖ Maintain Consistent BGL
 - Consistency in intake in type II, and insulin regimen to match intake in type I

How To Improve Your Diet: Macronutrients

Carbohydrates

- Spread out your intake
- Focus on complex carbohydrates
- Make sure to eat your fiber
- Use a strategy such as carbohydrate counting when planning your meals
- Limit added sugar to 10% and don't cut out natural sugar

Fat

- 20-35% of calories from fat for cardiovascular pro.⁷
- Increase mono and poly-unsaturated fat
- Nuts, vegetable oil etc.
- Reduce saturated fat
- Cut out trans-fat completely if possible

Protein

- Meet standard protein requirements
- Focus on lean sources of protein and vary between sources
- Some healthy examples: salmon, nuts, kidney beans, chicken etc.

Carbohydrate Counting



- ▶ Easiest method to teach for practical meal planning
 - May not be appropriate for all cases
 - Type I or other cases where blood glucose level needs to be tightly controlled
- ▶ Based on carbohydrate choices
 - Each choice is a 15g serving
 - Patient chooses options based on preference and eat them evenly throughout the day
- ▶ Patient is then taught to measure their own portions or use a food list
 - [Carbohydrate Choice Lists \(cdc.gov\)](https://www.cdc.gov/diabetes/managing-your-diabetes/meal-planning/carbohydrate-counting/)

Carbohydrate Counting Example

TABLE 26-5 Sample Carbohydrate Distribution for a 2000-kCalorie Diet

Meals	Carbohydrate Allowance	
	Grams	Portions ^a
Breakfast	60	4
Lunch	60	4
Afternoon snack	30	2
Dinner	75	5
Evening snack	30	2
Totals	255 g	17

NOTE: The carbohydrate allowance in this example is approximately 50% of total kcalories.

^a1 portion = 15 g carbohydrate = 1 portion of starchy food, milk, or fruit.

- ▶ First the amount of total carbs is calculated
 - 2000 kcal / 50% carb. Diet = 1000 kcal
 - 1000 kcal carb. / 4 kcal per gram = ~250 g carb divided into ~16 carb. choices
- ▶ The carb. Choices should be spread evenly with the goal of BGL control
 - Considerations for type I
 - Patient chooses options based on preference and eat them evenly throughout the day
- ▶ Patient is then taught to measure their own portions or use a food list
 - [Carbohydrate Choice Lists \(cdc.gov\)](http://www.cdc.gov)

Example Planning Breakfast




- ▶ Using our previous example we have 16 total choices, what do we want to eat for breakfast?
- ▶ We want a bowl of cereal with blueberries and half a bagel
- ▶ Check our food list
 - [Carbohydrate Choice Lists \(cdc.gov\)](https://www.cdc.gov/nczod/dnnd/ohrt/food-choices.html)
- ▶ This will use 4 choices; we have 12 left to spread throughout the day

Making Your Own Food List

Nutrition Facts	
Valeur nutritive	
Per 1 cup (250 mL) pour 1 tasse (250 mL)	
Calories 110	% Daily Value*
	% valeur quotidienne*
Fat / Lipides 0 g	0 %
Saturated / saturés 0 g	0 %
+ Trans / trans 0 g	
Carbohydrate / Glucides 26 g	
Fibre / Fibres 0 g	0 %
Sugars / Sucres 22 g	22 %
Protein / Protéines 2 g	
Cholesterol / Cholestérol 0 mg	
Sodium 0 mg	0 %
Potassium 470 mg	10 %
Calcium 26 mg	2 %
Iron / Fer 0 mg	0 %

*5% or less is a little, 15% or more is a lot
*5% ou moins c'est peu, 15% ou plus c'est beaucoup



1. Check the serving size
2. Find the number of grams of carbohydrate
1. Subtract fiber from grams of carbohydrate
1. Divide the total grams of carbohydrate by 15 to find the number of choices per serving.
 - $(26\text{g} - 0\text{g fiber}) / 15\text{g per choice} = \sim 2$ choices

The Plate Method



- ▶ May be easier and is great for those with diabetes and prediabetes

Include

- ½ plate non-starchy vegetables- eg. leafy greens, broccoli, cauliflower, carrots, zucchini, cucumber, etc.
- ¼ plate complex carbohydrates - eg. sweet potatoes, whole grains
- ¼ protein foods - eg. salmon, ground turkey



Emerging Nutrition Research

Probiotics and Prebiotics

Probiotics

- ▶ Microorganisms that are beneficial to gut health
- ▶ Review of randomized controlled trials using supplementation improved blood glucose control⁸
- ▶ You can find probiotic supplements or get them from foods like yogurt, sauerkraut, kimchi, or kombucha

Prebiotics

- ▶ Food ingredients that are non-digestible and promote the growth of good gut bacteria
- ▶ Research suggests that they improve metabolic and inflammatory markers and may improve glycemia⁹
- ▶ Foods containing: Cereal bran, bananas, garlic, high fiber foods



High Protein Diets

- ▶ Several studies indicate that high protein diets may be superior for weight loss, glycemic control, and cardiovascular disease risk in patients with type II¹⁰
- ▶ All the diets in these studies utilized calorie restriction and most moderately restricted fat
- ▶ Focus on lean, healthy protein sources like fish and beans for best cardio protection



In Summary



In Summary

- ▶ Find a way to lose and maintain a healthy weight
- ▶ Try to make healthy changes to your diet overall
 - Healthy fats - Nuts/seeds, avoid trans-fat, limit saturated fat
 - Lean healthy protein - Fish, beans, lean meat
 - Consistent carb intake - even intake, limit added sugar, complex carbs
- ▶ If you have diabetes use a consistent method to meal plan eg., carb counting
- ▶ Stay physically active - find a way to make it enjoyable
- ▶ Try incorporating some new healthy foods into your diet eg., fermented foods
- ▶ If you are at risk for diabetes, make sure to get a checkup at least once a year

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Campus Health Center

5285 Anthony Wayne Drive

Detroit, MI 48202

(313) 577-5041

Email at CampusHealth@wayne.edu

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