



MCT2D Q&A Session 1

**Rina Hisamatsu, MPH
RDN**

Health Educator, MCT2D

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Overview

- Introduction
- Burden of diabetes in Michigan
- MCT2D core goals and low-carb initiative
- Fundamentals of the low-carbohydrate eating pattern
- Open discussion and Q/A

Disclaimer

Low and very low carbohydrate diets should not be used in patients on an SGLT2 inhibitor. Patients on an SGLT2 inhibitor should eat at least 130 grams of carbohydrates per day. The SGLT2i should be discontinued if the patient prefers to follow a lower carbohydrate meal plan.

Other medications such as insulin, sulfonylureas, and blood pressure medications may need to be adjusted at the start of the diet to avoid the risk of hypoglycemia or hypotension.

<https://www.frontiersin-org.proxy.lib.umich.edu/articles/10.3389/fnut.2021.688540/full>



Rina Hisamatsu, MPH RDN

*Health Educator, Michigan
Collaborative For Type 2
Diabetes*

Clinical Registered Dietitian,
Domino's Farms Family
Medicine and Michigan
Interdisciplinary Clinic for
Obesity and Reproduction



A Quick Bio

Hello!

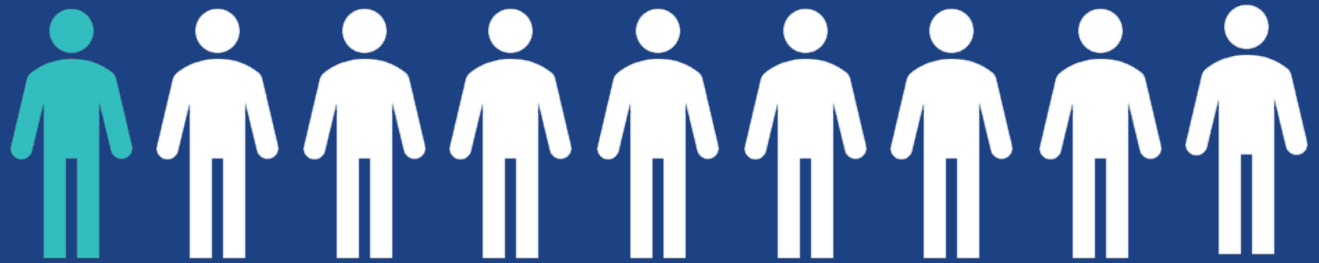
- **B.S in Biological Sciences** @ Nagoya University, Japan
- **Masters in Public Health, Nutritional Sciences** @ University of Michigan School of Public Health, Ann Arbor MI
- **Dietetic internship** @ University of Michigan School of Public Health
- **Outpatient clinician** @ Michigan Medicine
- Dominos Farms Family Medicine (Primary Care, Integrative Family Medicine, Japanese Family Medicine, Non-Pharma Pain Clinic)
- Weight Navigation Program (WNP)
- Michigan Interdisciplinary Clinic for Obesity and Reproduction (MICOR)
- **Health Educator** for the Michigan Collaborative for Type 2 Diabetes (MCT2D)

Diabetes Statistics in Michigan

Over **34 million** Americans are living with diabetes today.

More than 1 in 9

Or 11.5% of adults in Michigan have diabetes (~912,794 adults)



Approx. 239,000 Michiganders **have diabetes but don't know it**

Over 2.7 million people in Michigan are living with **prediabetes**

CDC's National Center for Chronic Disease Prevention and Health Promotion



Age-Adjusted Prevalence of Diagnosed Diabetes and Obesity Among Adults, by County, United States (2004, 2009, 2014, 2019)

2004

Obesity (%)



Diagnosed Diabetes (%)

Diagnosed Diabetes and Obesity estimates are percentage; natural breaks were used to create categories using all data from 2004-2019. Diagnosed Diabetes (%): <7.1, 7.1-8.6, 8.6-10.5, >10.5. Obesity (%): <21.2, 21.2-25.5, 25.5-30.5, >30.5

Map made by [Garten](#) on [GeoDa](#) for [series](#), and the [GIS user community](#)

2009

Obesity (%)



Diagnosed Diabetes (%)

Diagnosed Diabetes and Obesity estimates are percentage; natural breaks were used to create categories using all data from 2004-2019; Diagnosed Diabetes (%): <7.1, 7.1-8.6, 8.6-10.5, >10.5; Obesity (%): <21.2, 21.2-25.5, 25.5-30.5, >30.5

Map made by Center for GeoInformation Systems and the GIS user community

2014

Obesity (%)



Diagnosed Diabetes (%)

Diagnosed Diabetes and Obesity estimates are percentage; natural breaks were used to create categories using all data from 2004-2019; Diagnosed Diabetes (%): <7.1, 7.1-8.6, 8.6-10.5, >10.5; Obesity (%): <21.2, 21.2-25.5, 25.5-30.5, >30.5

Map made by [Garten](#) on [GeoDa](#) for [series](#), and the [GIS user community](#)

2019

Obesity (%)



Diagnosed Diabetes (%)

Diagnosed Diabetes and Obesity estimates are percentage; natural breaks were used to create categories using all data from 2004-2019; Diagnosed Diabetes (%): <7.1, 7.1-8.6, 8.6-10.5, >10.5; Obesity (%): <21.2, 21.2-25.5, 25.5-30.5, >30.5

Map made by [Gardner on GeoDa/Mapbox servers](#), and the GIS user community

OLD PARADIGM OF T2 DIABETES

Current Standard of Care

RISK IS GENETIC

Patient says: "Diabetes runs in my family"



IT'S HARD TO CHANGE BEHAVIORS



Diabetes cannot be PREVENTED.

PROGRESSIVE LIFELONG DISEASE

"I saw what it did to my family member. It just gets worse and worse until they start cutting tiny pieces off you."



At best, we can aim to

REDUCE RISKS OF COMPLICATIONS, SLOW PROGRESSION

Insulin is the best treatment.



Diabetes cannot be REVERSED.

NEW PARADIGM of T2D

Diabetes is preventable and reversible. Shifting towards a culture of healing and repair.



- T2D ≠ insulin deficiency
- Insulin, in fact, accelerates T2D

The Michigan Collaborative for **TYPE 2 DIABETES**



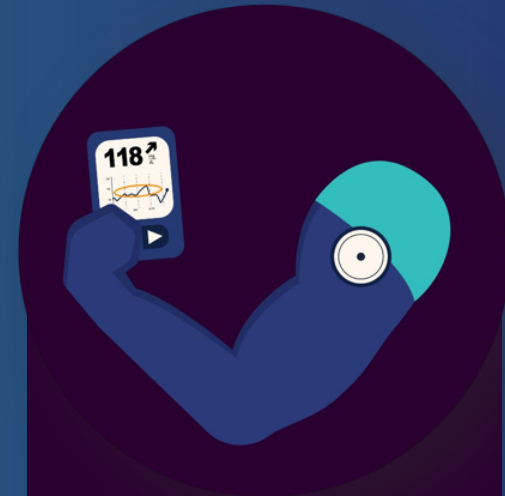
MCT2D Quality Improvement Goals



Prescribing of
GLP1 Receptor
Agonists & SGLT2
inhibitors



Supporting Lower
Carbohydrate Diets



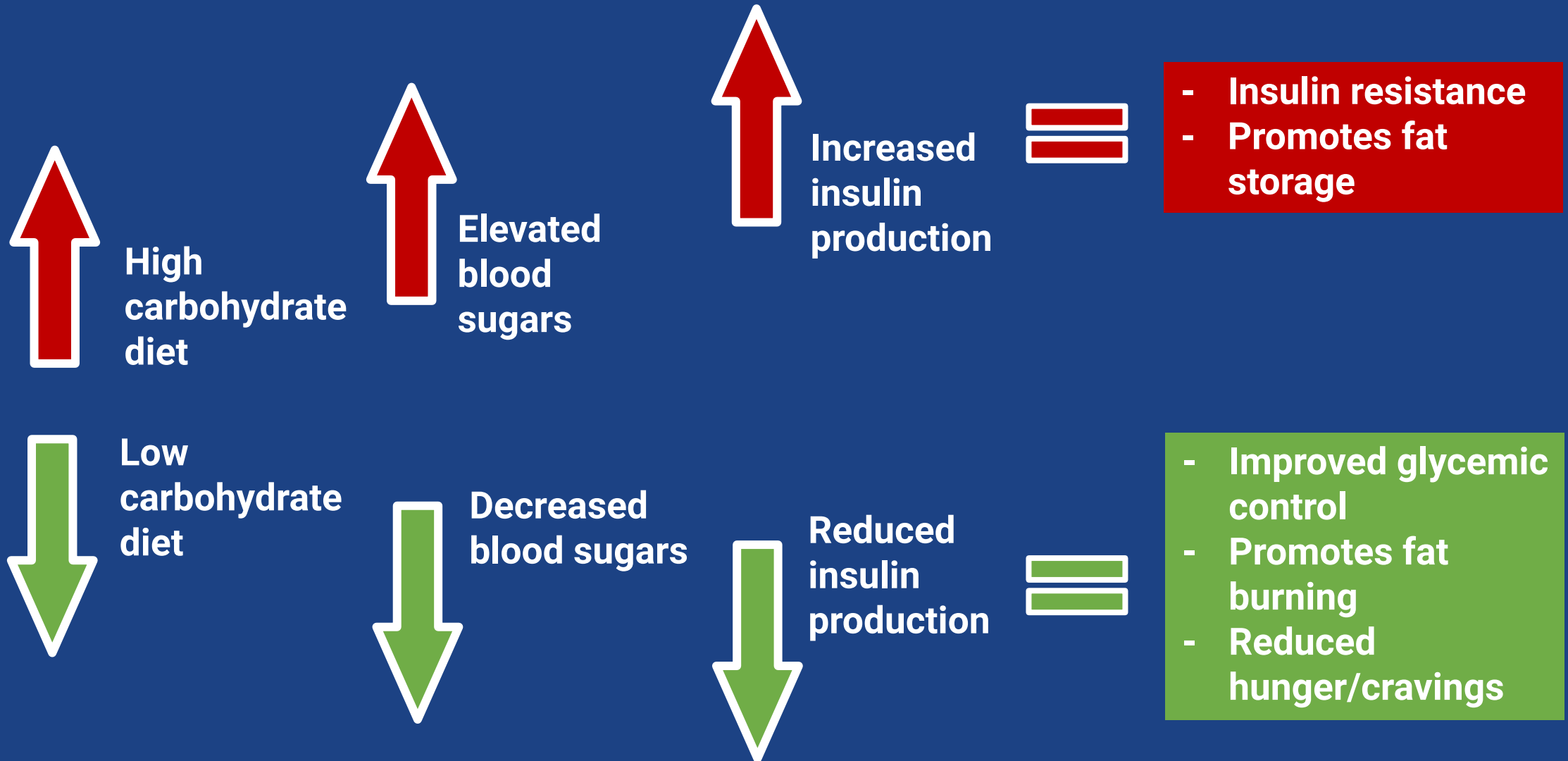
Expanding use of
Continuous Glucose
Monitoring (CGM)

Focus for Today



Supporting lower carbohydrate diets as an effective means of blood sugar control

Shifting from “Glucocentric” to “Adipocentric”





260 lb
Metformin
1000mg BID
20 units insulin
glargine

8.2%
A1C

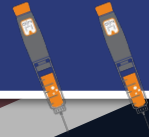
- Increase insulin glargine to 40 units
- Add 6 units insulin lispro with each meal



3 mo 7.6%
A1C



Insulin lispro increased to 8 units each meal



6 mo 7.4%
A1C



Prescribed once weekly GLP1-RA

Insulin glargine reduced to 10 units



12 mo 7.0%
A1C

- 45 units insulin glargine and 8 units insulin lispro each meal
- Gained 40lb
- Decreased quality of life

- Off insulin completely
- Maintaining weight with diet/exercise
- Training to run a 5K next month



What is a Low-Carbohydrate Eating Pattern?

Very Low Carbohydrate (Keto) Diet

- $\leq 10\%$
- 20-50g
carbs/day

Low Carbohydrate Diet

- $> 10-26\%$
- 50-130g
carbs/day

Moderate Carbohydrate Diet

- 26-45%
- 130-225g
carbs/day

High Carbohydrate Diet

- $> 45\%$
- $> 225\text{g carbs/day}$

Based on 2000 kcal/day

Positive Outcomes

Based on Current Literature

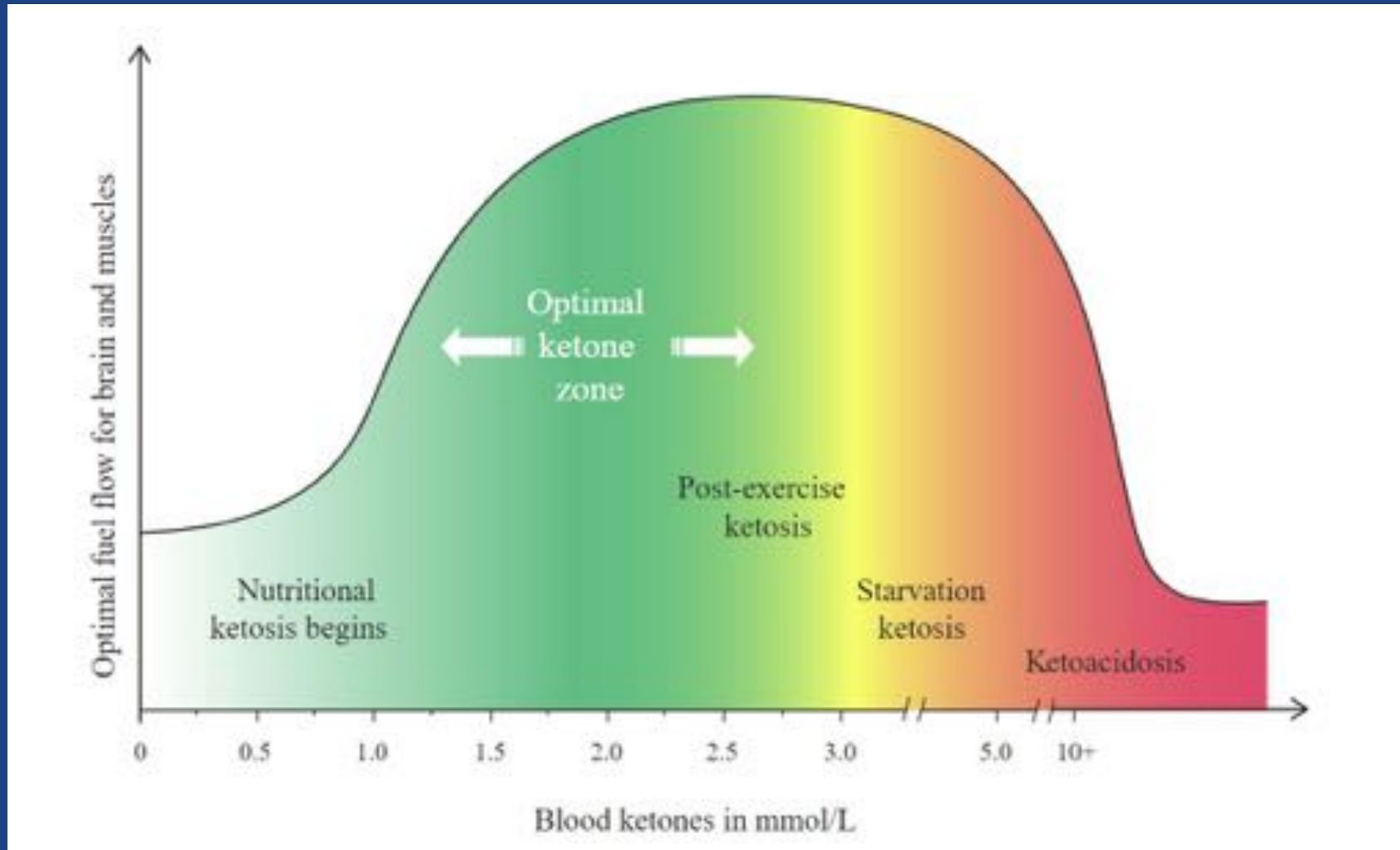
- Hemoglobin A1c reduction
- Reduction in antihyperglycemic medications
- Weight loss
- Reduction in antihypertensive medications
- Increased HDL-C and lowered TGs
- Reduced hunger/cravings

Patient-Centered, Individualized Care Plan

- **Not a “one-size-fits-all” approach**
- Variation in the extent to which individuals need to restrict carbohydrate intake to achieve metabolic benefit
- Important to assess patient’s desire and level of comfort
- Provide adequate support and ensure patient safety



Nutritional Ketosis vs. Ketoacidosis



What Is Ketosis, What Are the Benefits, and Is It Safe? — Diet Doctor

Nutritional Ketosis vs. Ketoacidosis

- Distinction between nutritional ketosis and diabetic ketoacidosis (DKA)
- Nutritional ketosis: 0.5 – 5.0 mmol/L
- DKA: >10 mmol/L
- **Caution: Very low carb should not be initiated for individuals who are taking SGLT2 inhibitors**

A Well-Formulated Low-Carbohydrate Meal Plan...



**Prioritizes
protein
intake**

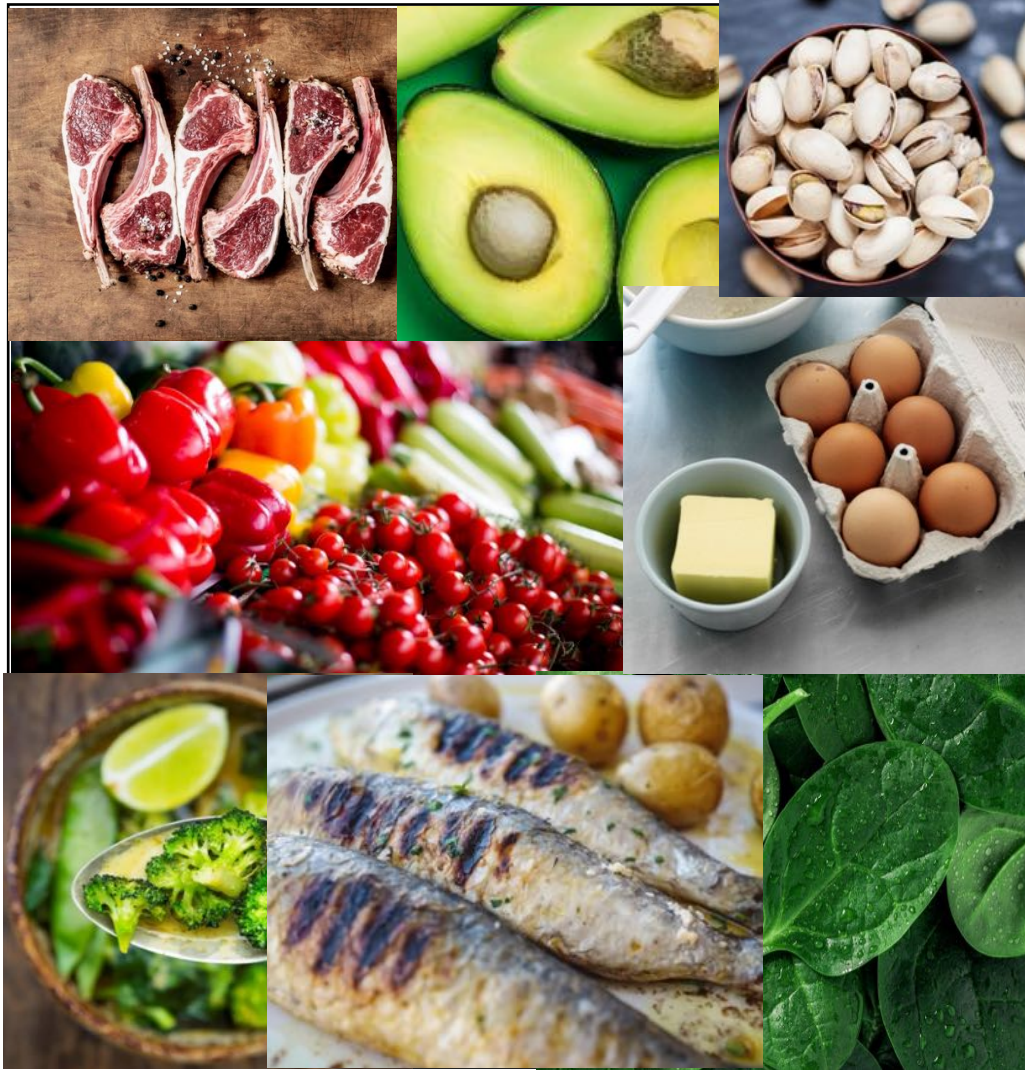


**Includes an
abundance of
non-starchy
vegetables**



**Includes
some fats for
satiety**

A Well-Formulated Low-Carbohydrate Meal Plan



Low Carbohydrate Foods

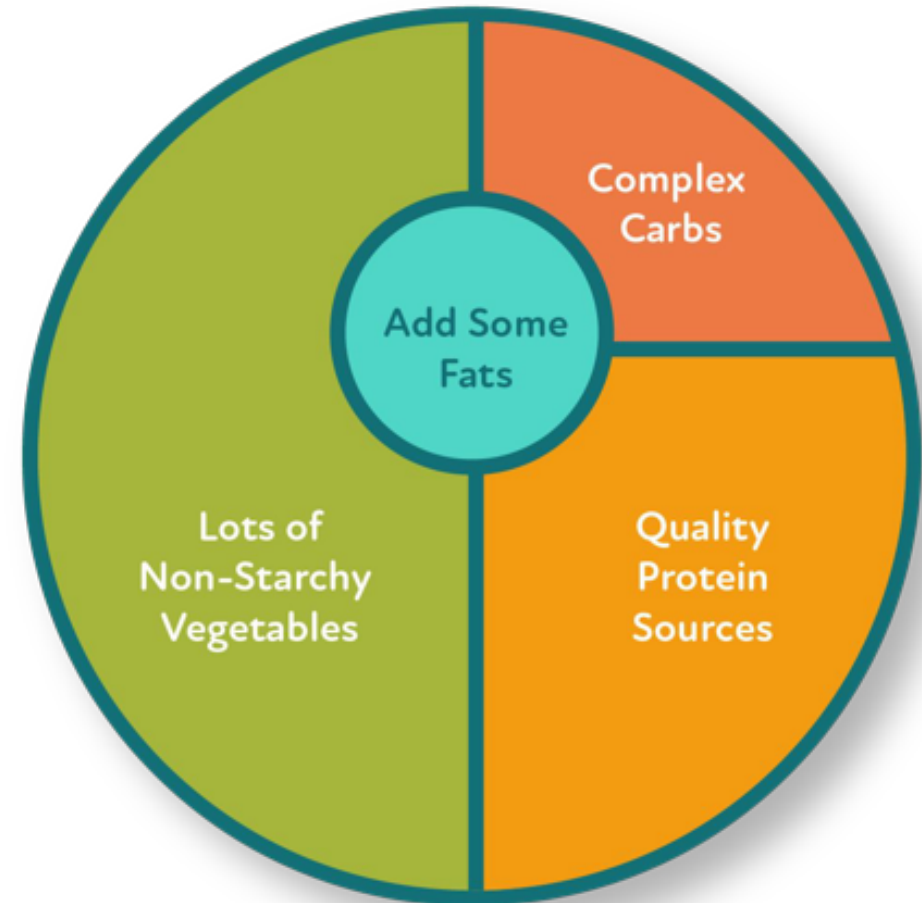


High Carbohydrate Foods

<50g carbs/day



50-130g carbs/day



Complex Carbohydrates to Enjoy in Small Amounts

**On a low-carbohydrate meal plan (<130g
carbohydrates/day)**

- Beans/legumes/lentils
- Whole grains (quinoa/farro/barley/oats/rye/wheat)
- Winter squash
- Fruit

Alternatives to High Carbohydrate Foods

- **Potatoes** □ mashed cauliflower/celery root, roasted kohlrabi, cauliflower, rutabaga
- **Spaghetti/pasta** □ spiralized zucchini/rutabaga, spaghetti squash, shirataki noodles, sliced eggplant/zucchini for lasagna sheets
- **Rice** □ riced cauliflower or broccoli
- **Bread** □ lettuce wrap, low-carb bread, portabella mushroom “burger bun”
- **Desserts** □ Berries with whipped cream, Dark chocolate (80% cacao or greater)

Delicious Ways to Enjoy Low-Carb Meals



Please complete our short 3-question survey
link in chat or scan QR



1) What future topics would you like to see covered in these sessions?

2) What are some challenges you face when counseling on the low carbohydrate diet?

3) Any other comments?



THANK YOU!

Open Discussion

*How can we best support
you going forward?*

Teaching Tools and Resources

- MCT2D Resource Library
- Low-Carbohydrate and Very Low-Carbohydrate Eating Patterns in Adults with Diabetes: A Guide for Health Care Providers (ADA)
- The Art and Science of Low Carbohydrate Eating
- Low Carb For Any Budget - Cooking Keto With Kristie

Low Carbohydrate Snacks

Savory

- Boiled egg(s)
- String cheese or 1-1.5oz cheese (2 dice-sized cubes)
- Chicken/tuna/egg salad, served with vegetable slices
- Palmful of nuts/seeds (1oz)
- Vegetable platter with dip (ranch, spinach and artichoke dip etc.)
- Mini meat and cheese board with olives/nuts/vegetables
- Roast beef with mustard/horseradish
- Meat jerky (with no added sugars)
- Tortilla 'chips' made with sliced low-carbohydrate tortillas (bake 8-10min or until golden at 400F), served with guacamole or salsa dip
- Celery sticks with natural unsweetened peanut/almond butter
- Parmesan "chips"

Sweet

- Low-carbohydrate smoothie ($\frac{1}{2}$ cup plain Greek yogurt, $\frac{1}{2}$ cup berries, 1 cup coconut milk, 1 handful ice cubes, stevia to taste) or ready-made low-carbohydrate shake
- Plain Greek yogurt with $\frac{1}{2}$ cup berries or $\frac{1}{2}$ cup fruit
- Chia pudding (chia seeds, coconut milk/cream, sugar substitute, vanilla)
- Sugar free Jell-o cup
- Dark chocolate (80% or greater)
- Avocado chocolate mousse ($\frac{1}{2}$ avocado, vanilla, sugar substitute, 1 tsp cacao powder, 2 tbsp coconut milk)