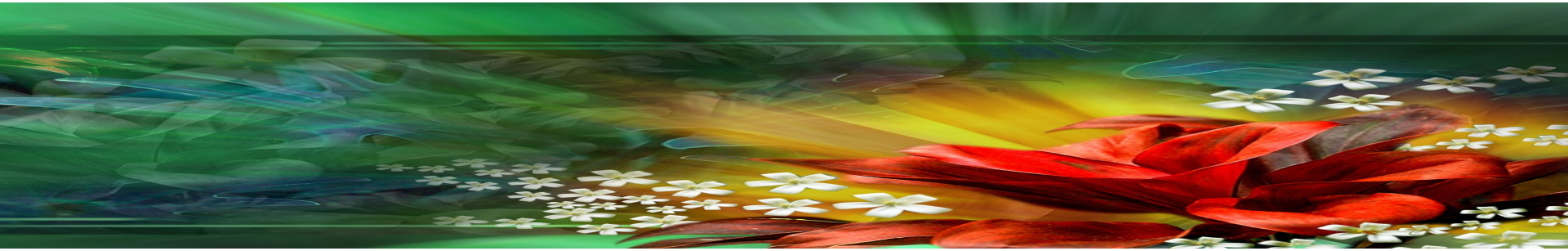
Diabetes

Multiple Nutritional Considerations

Sherri Shafer RD, CDE



About Me

- Employed by UCSF Medical Center since 1990
- Registered Dietitian and Certified Diabetes Educator
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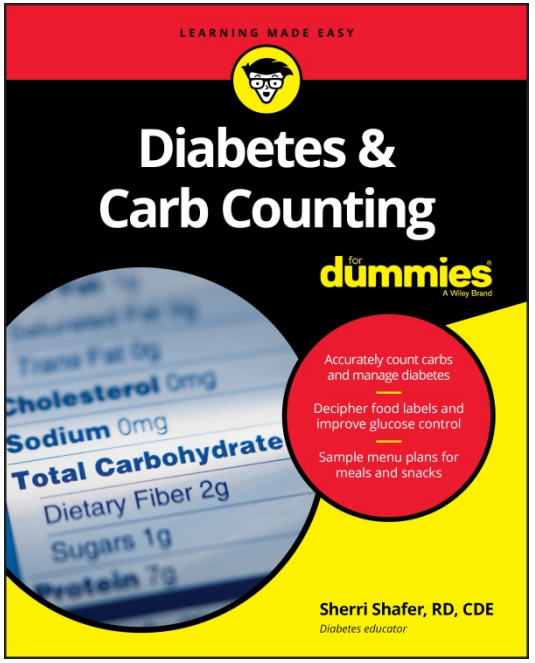
Author

Diabetes and Carb Counting for Dummies



Nutrition:
A key component to managing diabetes

Diabetes is largely self-managed.

Diet + Exercise – the foundations of care

- Associated health issues:
  - Weight control
  - Heart health: lipids and blood pressure

Diabetes Epidemic

Almost 30 million Americans have Diabetes

- 90-95% have Type 2

≈ 86 million Americans have pre-diabetes

- 35% of adults > 20 y/o
- 50% of adults > 65 y/o

	Normal	Pre-diabetes	Diabetes
Fasting BG	< 100	100 - 125	126
OGGT	< 140	140 - 199	200
A1c	< 5.7	5.7 - 6.4	6.5

Many with Type 2 have:

Metabolic Syndrome

- Obesity
  - Apple Shaped
- Insulin Resistance
- Lipid Abnormalities
  - High triglycerides
  - Low HDL
  - High LDL
- Hypertension

When Weight becomes a Risk

body mass index

BMI *(kilograms of weight) divided by (height in meters)^2*

BMI	< 18.5	Under Weight
BMI	18.5 - 24.9	Normal Weight
BMI	25.0 - 29.9	Overweight
BMI	30.0 - 34.9	Grade 1 Obesity
BMI	35.0 - 35.9	Grade 2 Obesity
BMI	≥ 40	Grade 3 Obesity

Obesity = Insulin Resistance

- 3 of 4 adults with DM are overweight or obese
- Mild to moderate weight, 5-10% of starting weight, and 150 min exercise per week, has been shown to:
  - decrease insulin resistance
  - improve blood glucose control
  - improve blood pressure
  - improve lipids

- Studies such as the Diabetes Prevention Program, support the idea that weight control and exercise can reduce incidence of type 2 diabetes.

Weight Loss Diets

- Most women lose weight on 1200-1500 calories/day
- Most men lose weight on 1500-1800 calories/day
  - When restricting calories may need vitamin mineral supplements

- People can lose weight on various types of diets:
  - Must "burn" more calories than you eat.

- The best diets are individualized and remain balanced and nutritionally sound… and are sustainable long-term!

- 1 pound body fat = 3500 calories

  500 calorie deficit per day x 7 days per week to lose 1 pound

Managing Meals

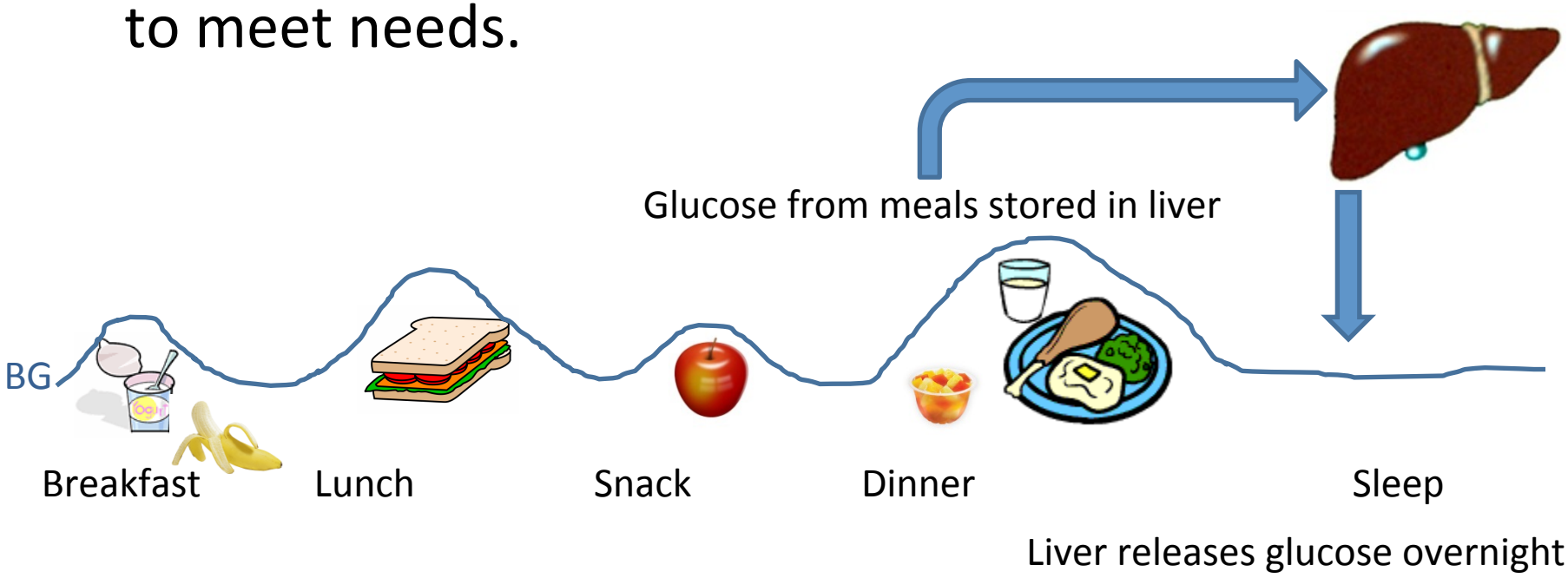
When you eat, **what** you eat, and **how much** you eat… all affect blood glucose levels.

- Aim to eat 3 main meals per day.
- Space meals 4-6 hours apart.
- Consume last meal at least 3 hours before bed.
- Choose healthy snacks.
- Limit sweets and refined grains.

- Don't skip meals.
  - doing so may result in overeating later in day
  - going long periods without food can lead to hypoglycemia

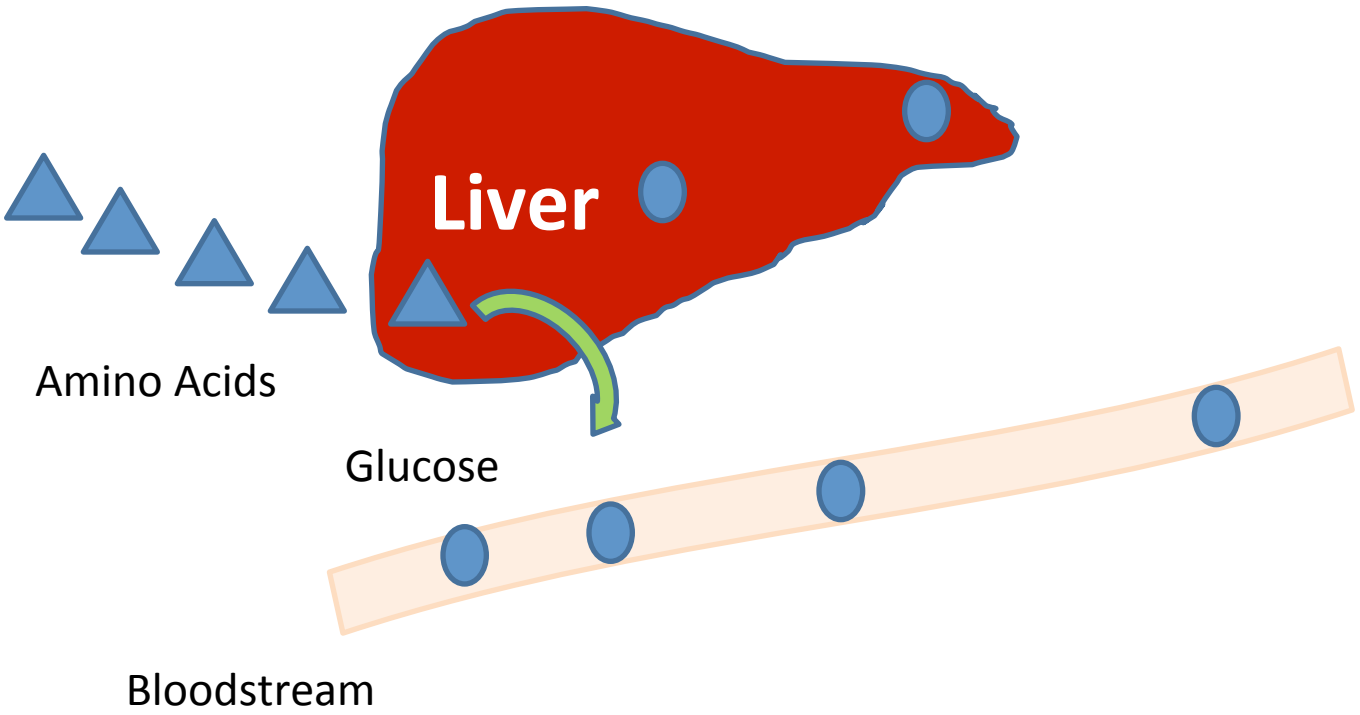
Blood Glucose

- Blood glucose levels rise after carb meals
- Some glucose is stored in liver and muscles
- Liver releases glucose between meals and overnight to meet needs.



What happens if the liver runs out of glycogen?

If liver glycogen stores fall too low…
it must make new glucose from scratch- gluconeogenesis.



Carbohydrate Foods

Carbohydrate intake, both type and amount, affects BG levels.
Digestion→ carbs broken down into single sugars and enter bloodstream








Foods that have Little or No Carbs

- Meat, chicken, fish
- Cheese, cream cheese, cottage cheese
- Cream, half & half
- Eggs, tofu
- Seeds, nuts, nut butters
- Avocado, olives
- Oils, butter, margarine, mayonnaise, sour cream
- Lettuce, cucumbers, celery, radish
- Lemons, limes

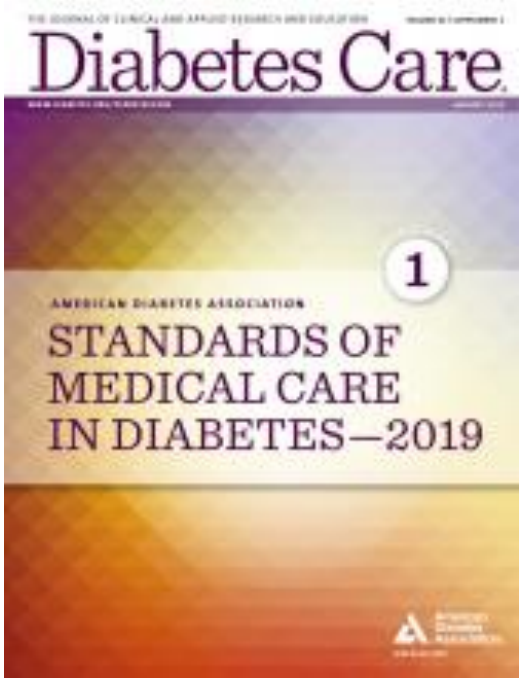
Why are Carbs Important

- Provide glucose: body's main fuel source
- Rich is specific vitamins and minerals
- Source of soluble and insoluble fibers
- Naturally low in saturated fat

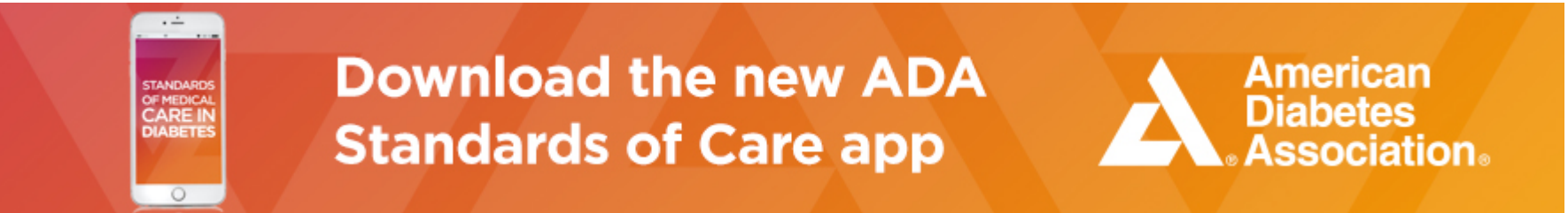
ADA Advice

- Carb intake from vegetables, fruits, whole grains, legumes and dairy products should be advised over intake from foods with added fats, sugars, or sodium.

- Avoid sugar sweetened beverages



American Diabetes Association:
www.diabetes.org
Click on **Professionals** section
Click on **Standards of Care**



Comparing Macronutrient Targets

	2015-2020 IOM Dietary Guidelines	Observed average intake for people with diabetes
Carbs	45 - 65 %	**45 %**
Protein	10 - 35 %	**15 - 20 %**
Fat	20 - 35 %	**35 - 40 %**

IOM: institutes of medicine

Diabetes Care, pg. S50 Jan. 2019

Calorie Intakes	40% Carb grams	45% Carb grams	50% Carb grams	55% Carb grams
1200	130	135	150	165
1300	130	146	163	179
1400	140	158	175	193
1500	150	169	188	206
1600	160	180	200	220
1700	170	191	213	234
1800	180	203	225	248
1900	190	214	238	261
2000	200	225	250	275
2100	210	236	263	289
2200	220	248	275	303
2300	230	259	288	316
2400	240	270	300	330
2500	250	281	313	344
2600	260	293	325	358
2700	270	304	338	371
2800	280	315	350	385
2900	290	326	363	399
3000	300	338	375	413

Daily Carb Targets

Based on Estimated Calorie Goals

www.calorieking.com

- ▼ Tools
- ▼ Calculators
- ▼ How many calories should you eat?

  Ht Wt Gender Age Activity

Dietary Reference Intakes (DRI)
For Carbohydrate = 130 g/day.

Food and Nutrition Board Institute of Medicine, National Academy of Sciences

https://www.nal.usda.gov/fnic/dri-tables-and-application-reports

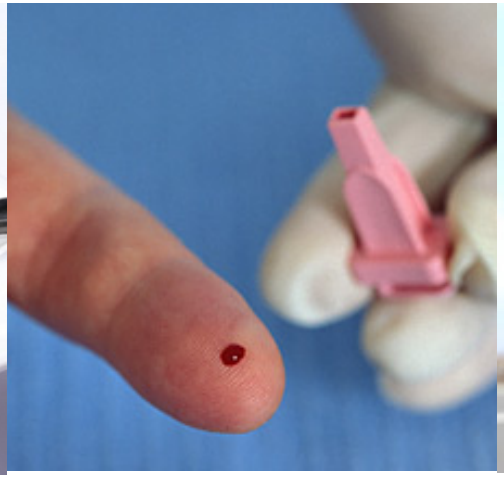
Choosing Carb Targets at mealtime

- Women
  - Older or sedentary or controlling portions 30 - 60 g/meal
  - Younger or more active or at healthy weight 60 - 75 g/meal
  - Athletes with high calorie and carb needs 75 - 120 g/meal

- Men
  - Older or sedentary or controlling portions 45 - 75 g/meal
  - Younger or more active or at healthy weight 75 - 90 g/meal
  - Athletes with high calorie and carb needs 90 -150 g/meal

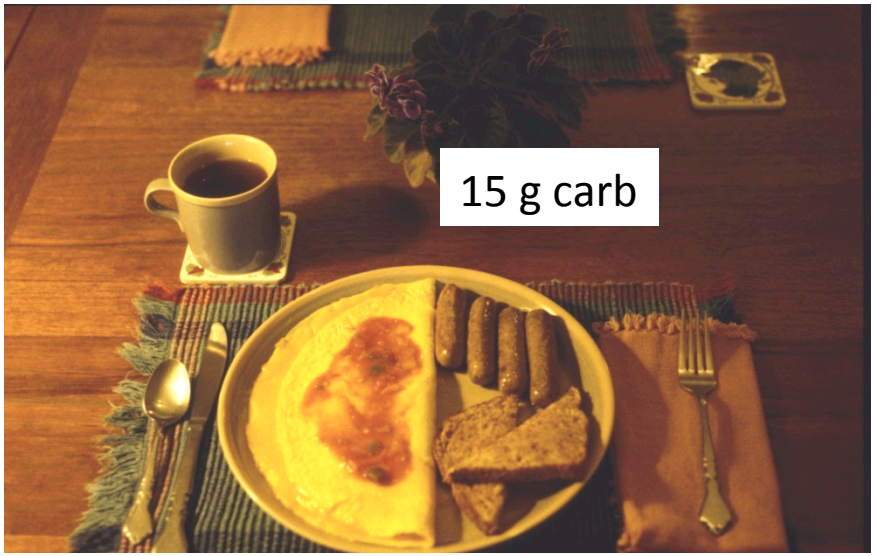
Insulin Dosing

- Type 1 diabetes:
  - Mealtime insulin is dosed based on:
    - **Carbohydrate content of meal**
    - Current BG level
    - Level of physical activity and exercise


Same dose cannot cover all meals

- Low carb meal
  - Omelet: 0 carb
  - Sausages: 0 carb
  - Toast: 15 g carb
  - Butter: 0 carb
  - Coffee: 0 carb
- High carb meal
  - Bagel: 60 g carb
  - Banana: 30 g carb
  - Juice: 30 g carb



4 units too **much** insulin?

4 units too **little** insulin?

Insulin Timing Matters with 70/30

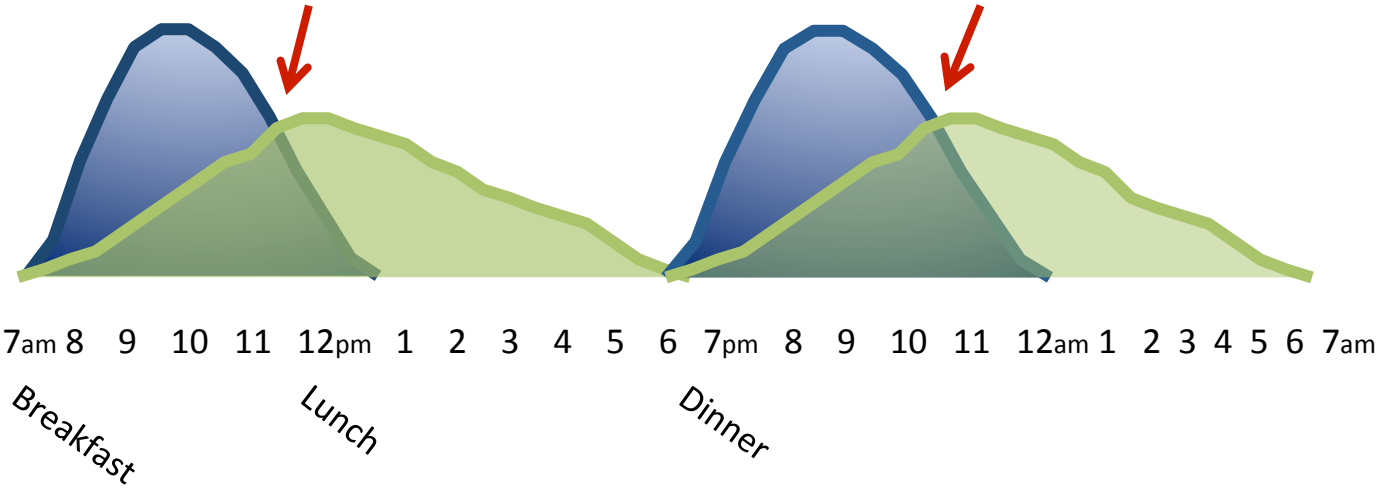
70/30 = **70% NPH** **30% Regular**

Rapid-acting blends
- 70/30 Humalog
- 75/25 Novolog

Provide more physiologic coverage for breakfast and dinner, and less cross-over

Lunch: Must eat 4-5 hours after AM injection to match NPH.
Meal times and amount of carbohydrates are FIXED!
NPH lasts all afternoon so may need unwanted snacks.
May get low in middle of night.
Insulin wanes early morning.
Cross-over insulin action increases risk of hypoglycemia.

Insulin action

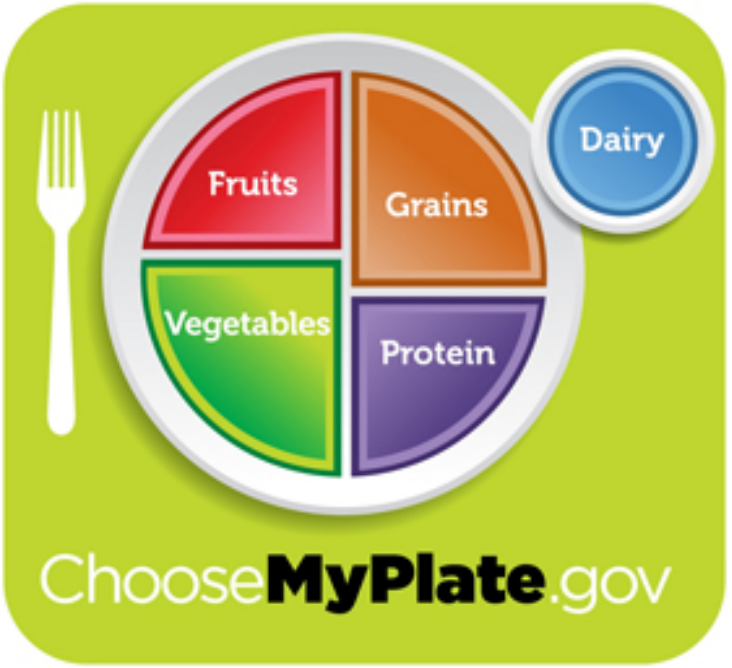


My Plate by USDA

www.myplate.gov

Balancing Calories

- Enjoy food, but eat less
- Avoid oversized portions



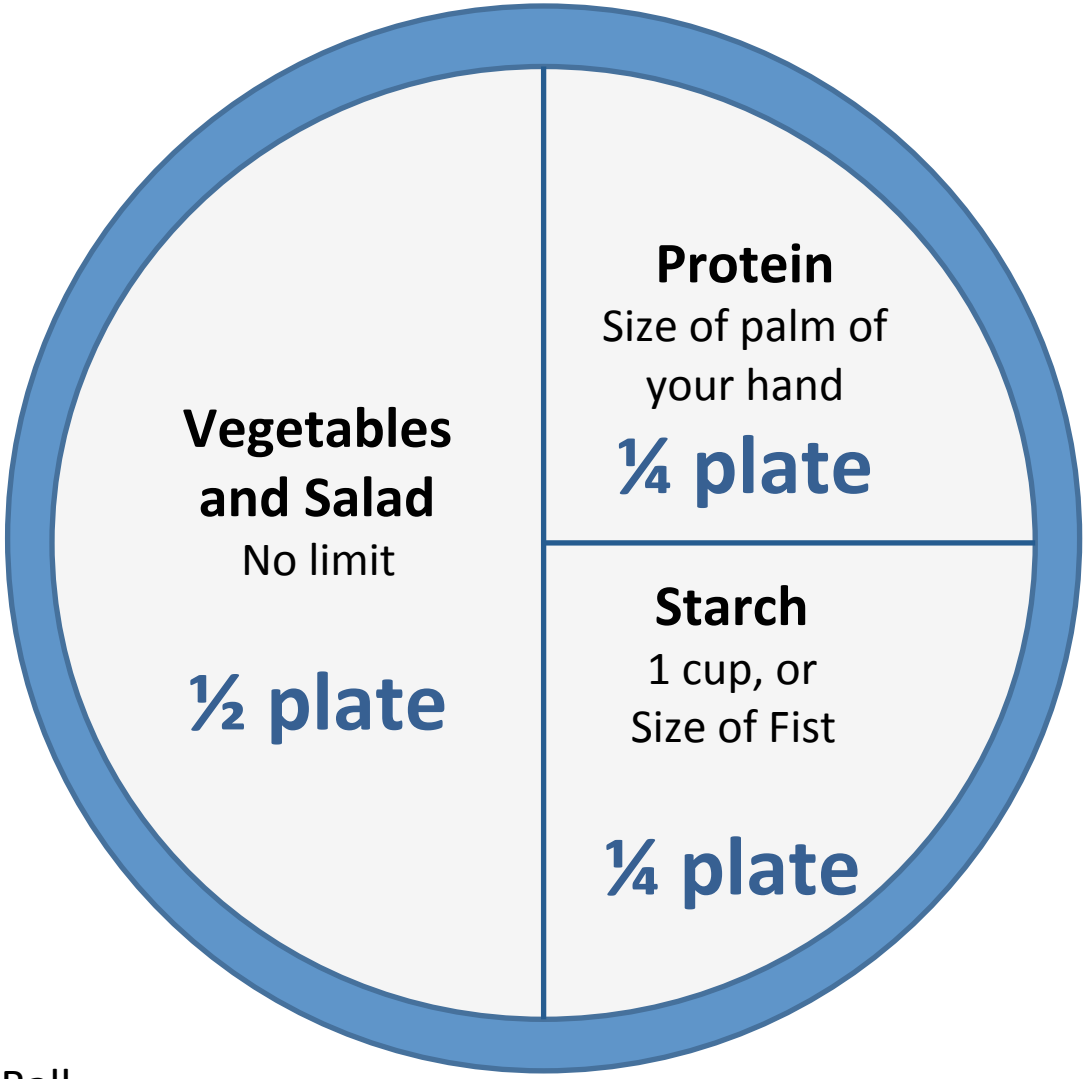
Foods to Increase

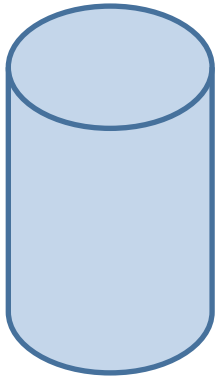
- Make half your plate fruits and vegetables
- Make at least half your grains whole grains
- Switch to fat-free or low fat (1%) milk

Foods to Reduce

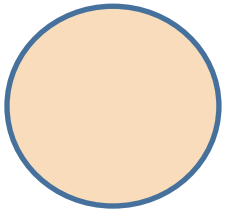
- Eat less sodium
- Drink water instead of sugary drinks

Alternate Plate Model





Milk or Yogurt
1 cup
Optional

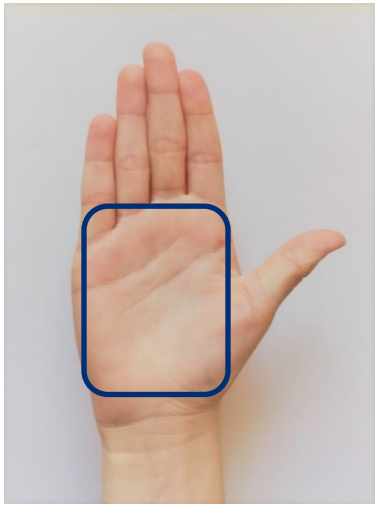


Fruit
Size of Tennis Ball
With meal or later as snack

Portion Control: Serving Size Suggestions

Starch
Size of clenched fist

Fat
Size of thumb



Protein
Size of palm

Fruit
Size of cupped hand

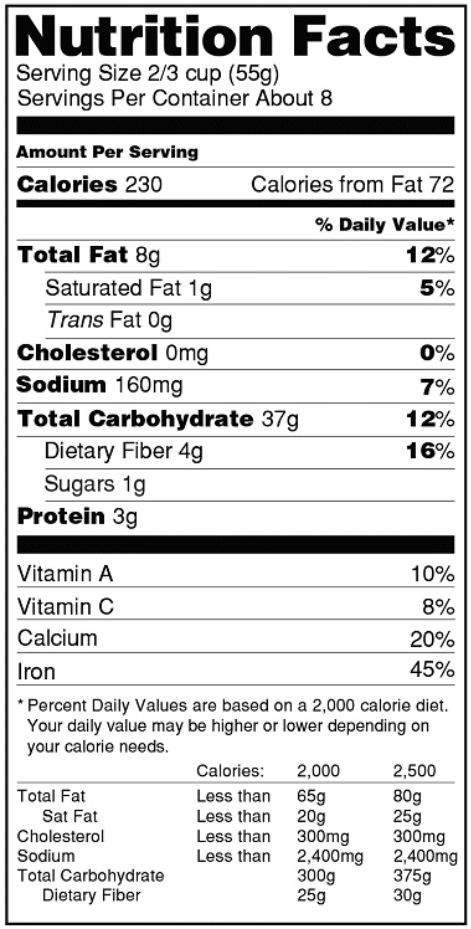
Vegetables and Salad
Size of both hands cupped

Carb Counting Tools

- Food labels
- Food composition tables
- Carb counting books
  - Diabetes and Carb Counting For Dummies -by Sherri Shafer
- Fast food and chain restaurant brochures and websites
- Websites
  - calorieking.com - food database for looking up nutrition info
  - deo.ucsf.edu - UCSF diabetes education online
- Apps
  - Calorie King: food search engine, BMI and calorie calculators
  - My Fitness Pal: food search engine and tracker
  - KingFit: 4 diabetes experts with dozens of 5-10 min video lessons

FDA Updates Food Label

Compliance Date 7/26/18



Nutrition Facts

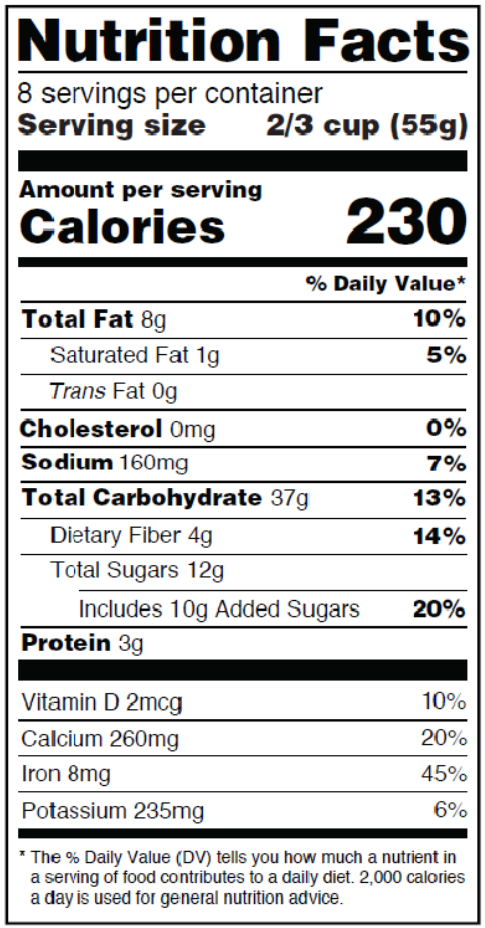
Serving Size 2/3 cup (55g)
Servings Per Container About 8

Amount Per Serving

Calories 230	Calories from Fat 72
	% Daily Value*
Total Fat 8g	**12%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 160mg	**7%**
Total Carbohydrate 37g	**12%**
Dietary Fiber 4g	**16%**
Sugars 1g	
Protein 3g	
Vitamin A	10%
Vitamin C	8%
Calcium	20%
Iron	45%

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

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g



Nutrition Facts

8 servings per container
Serving size **2/3 cup (55g)**

Amount per serving
Calories **230**

	% Daily Value*
Total Fat 8g	**10%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 160mg	**7%**
Total Carbohydrate 37g	**13%**
Dietary Fiber 4g	**14%**
Total Sugars 12g	
Includes 10g Added Sugars	**20%**
Protein 3g	
Vitamin D 2mcg	10%
Calcium 260mg	20%
Iron 8mg	45%
Potassium 235mg	6%

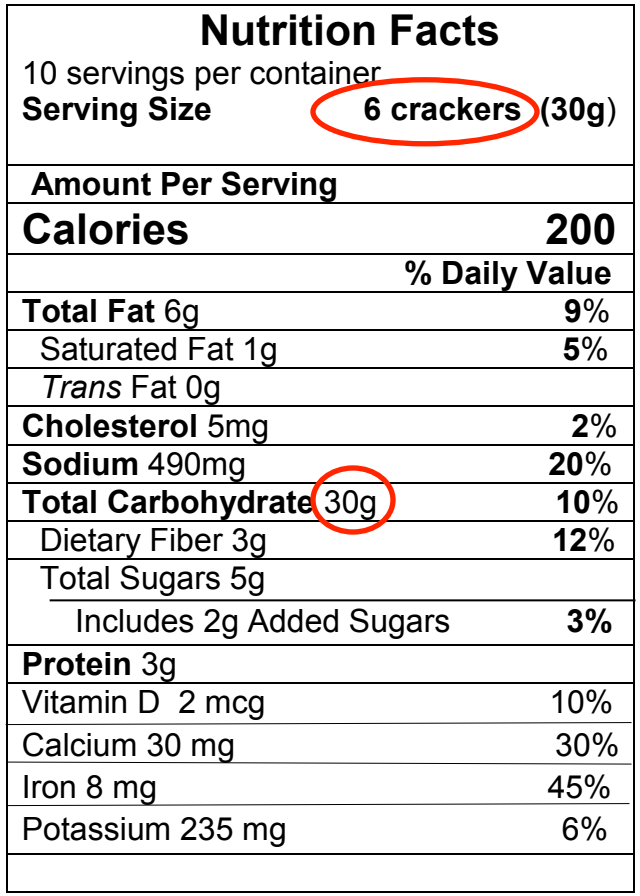
* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Food Labels

First check **Serving Size**

Next check grams of **Total Carbohydrate**

- The **Total Carbohydrate** includes:
  - Fiber, sugar, starches, other carbs
- **Total Sugars** includes added & natural but the amount of **Added Sugar** is now noted.



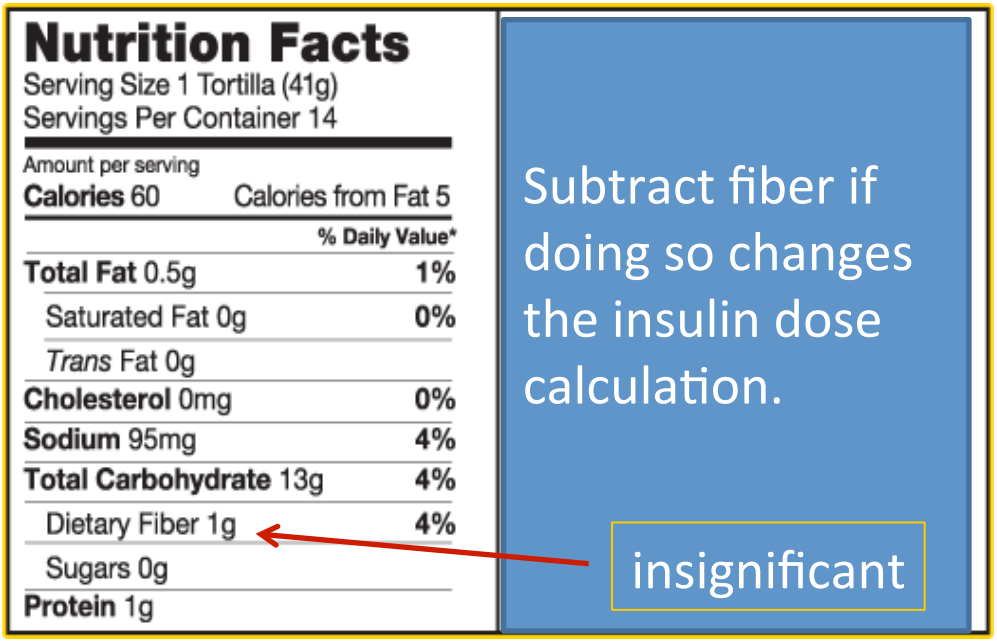
Nutrition Facts

10 servings per container

Serving Size **6 crackers (30g)**

Amount Per Serving	
Calories	**200**
	% Daily Value
Total Fat 6g	**9%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 5mg	**2%**
Sodium 490mg	**20%**
Total Carbohydrate 30g	**10%**
Dietary Fiber 3g	**12%**
Total Sugars 5g	
Includes 2g Added Sugars	**3%**
Protein 3g	
Vitamin D 2 mcg	10%
Calcium 30 mg	30%
Iron 8 mg	45%
Potassium 235 mg	6%

Fiber is non-digestible…but should you bother to subtract it?



Nutrition Facts

Serving Size 1 Tortilla (41g)
Servings Per Container 14

Amount per serving
Calories 60 Calories from Fat 5

	% Daily Value*
Total Fat 0.5g	1%
Saturated Fat 0g	0%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 95mg	4%
Total Carbohydrate 13g	4%
Dietary Fiber 1g	4%
Sugars 0g	
Protein 1g	

Subtract fiber if doing so changes the insulin dose calculation.

insignificant

Nutrition Facts

Serving Size 1 Tortilla (36g)
Servings Per Container 10

Amount Per Serving
Calories 50 Calories from Fat 15

	% Daily Value*
Total Fat 2g	3%
Saturated Fat 0g	0%
Trans Fat 0g	
Polyunsaturated Fat 0.5g	
Monounsaturated Fat 1g	
Cholesterol 0mg	0%
Sodium 210mg	9%
Total Carbohydrate 10g	3%
Dietary Fiber 7g	28%
Sugars 0g	
Protein 5g	

This tortilla ↑ has just 3 grams of digestible carb after subtracting the fiber.

Carb Counting Lists

Each example ≈ 15 g Carb

1 cup milk

½ cup potatoes, corn, peas, legumes, oatmeal

⅓ cup cooked rice, pasta, millet, quinoa, stuffing

1 slice bread

1 small tortilla, ⅓ large tortilla

½ hamburger bun, ½ pita bread, ¼ bagel

3 cups popcorn

1 cup cantaloupe, papaya, raspberries

1 “small” apple, orange, banana, 4 oz fruit juice

Non-Starchy Vegetables

- ½ cup cooked ≈ 5 g carb

Asparagus, beets, broccoli, cabbage, carrots, cauliflower, eggplant, green beans, mushrooms, onions, pea pods, peppers, spinach, tomatoes, zucchini

Less carbs, but can be significant for T1DM dosing.

Vegetables: to count or not to count

- Example 1:
  - Liz has type 1 diabetes: her insulin:carb ratio 1:5
    - 1 unit rapid acting insulin for every 5 g carb
  - She eats 2 cups veggies
    - 1/2 cup cooked = 5 g carb
    - 2 cups cooked = 20 g carb
    - 1:5 ratio so needs 4 units of insulin
      - If she doesn't count the carbs in vegetables she is under-dosing by 4 units → hyperglycemic

Vegetables: to count or not to count

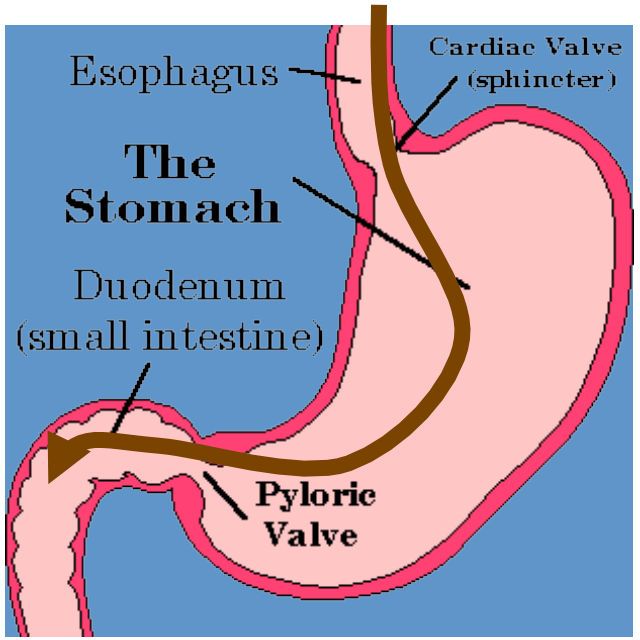
- Example 2:
  - Ed has type 1 diabetes, his insulin:carb ratio 1:20
    - 1 unit rapid acting insulin for every 20 g carb
  - He eats ½ cup veggies
    - 1/2 cup cooked = 5 g carb
    - 1:20 ratio so needs ¼ unit of insulin
      - Insignificant; with syringe cannot be measured
      - With a pump 0.25 units can be delivered but is likely not going cause hyperglycemia if the ½ cup vegetables is not dosed for.

Variables affecting digestion times

Normally BG peak is about 1-2 hours post meal

Exceptions:

- Liquid carbs: fastest
- Highly refined grains: fast
- High fiber foods: slower
- High fat, fried: slowest



Avoid Liquid Sugar:

rapid absorption and BG rise

6 tsp sugar

9 tsp sugar

12 tsp sugar

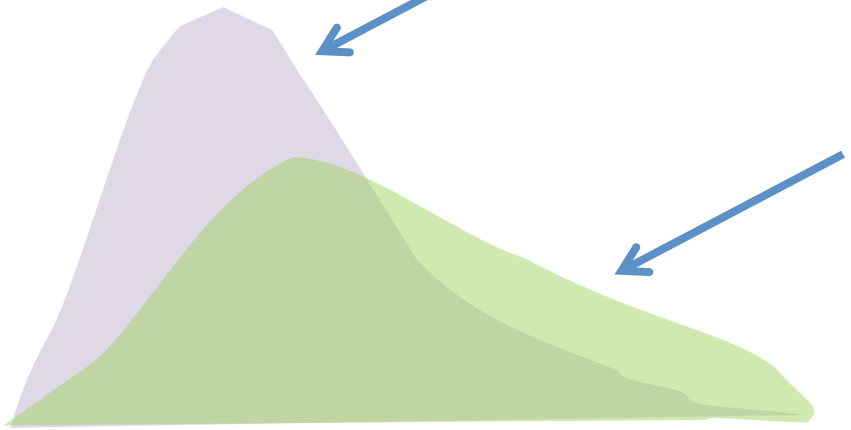
14 tsp sugar

15 tsp sugar "natural"

American Diabetes Association guidelines:
Avoid sugar-sweetened beverages

Refined vs Whole Grains

White rice, white bread,
refined breakfast cereals, sweets



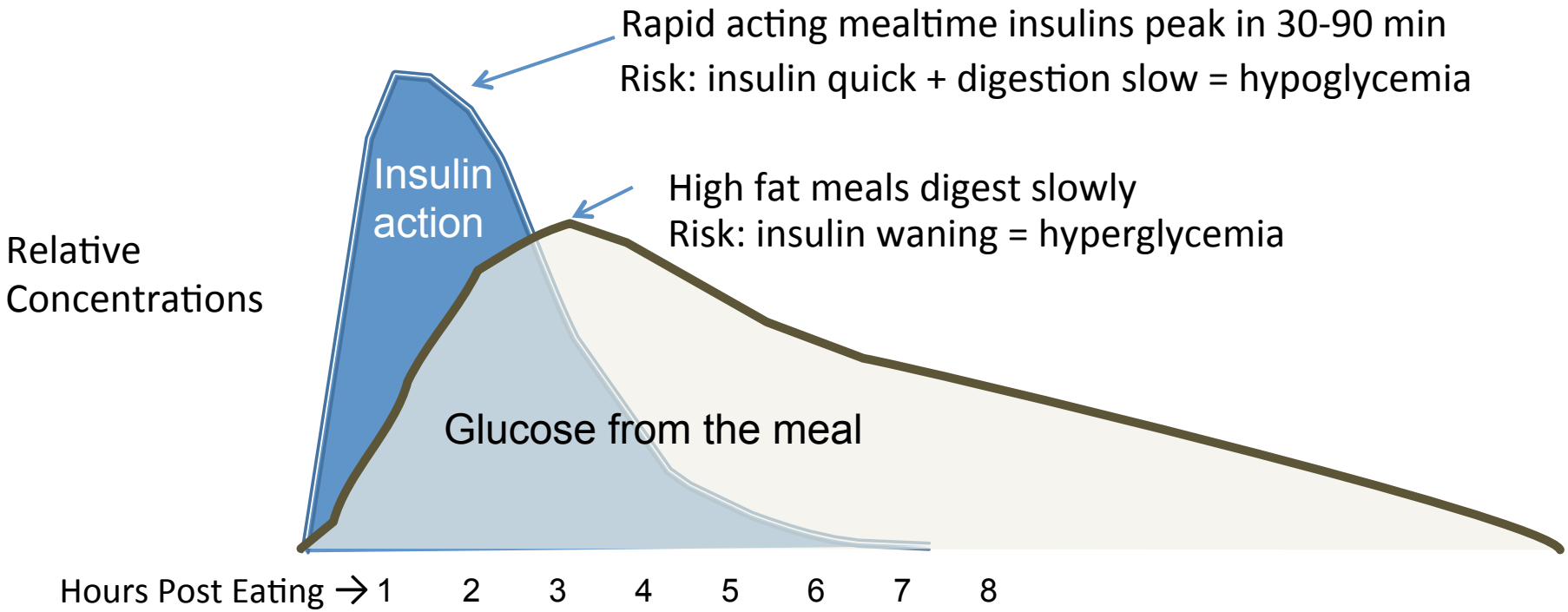
Brown rice, whole grain breads, oats,
quinoa, legumes

Blood Glucose Profiles After Eating

- Refined carbs usually cause a sharper rise in blood glucose.
- Whole grains take longer to digest so may result lower BG rise.

Insulin Timing Matters: High Fat Meals

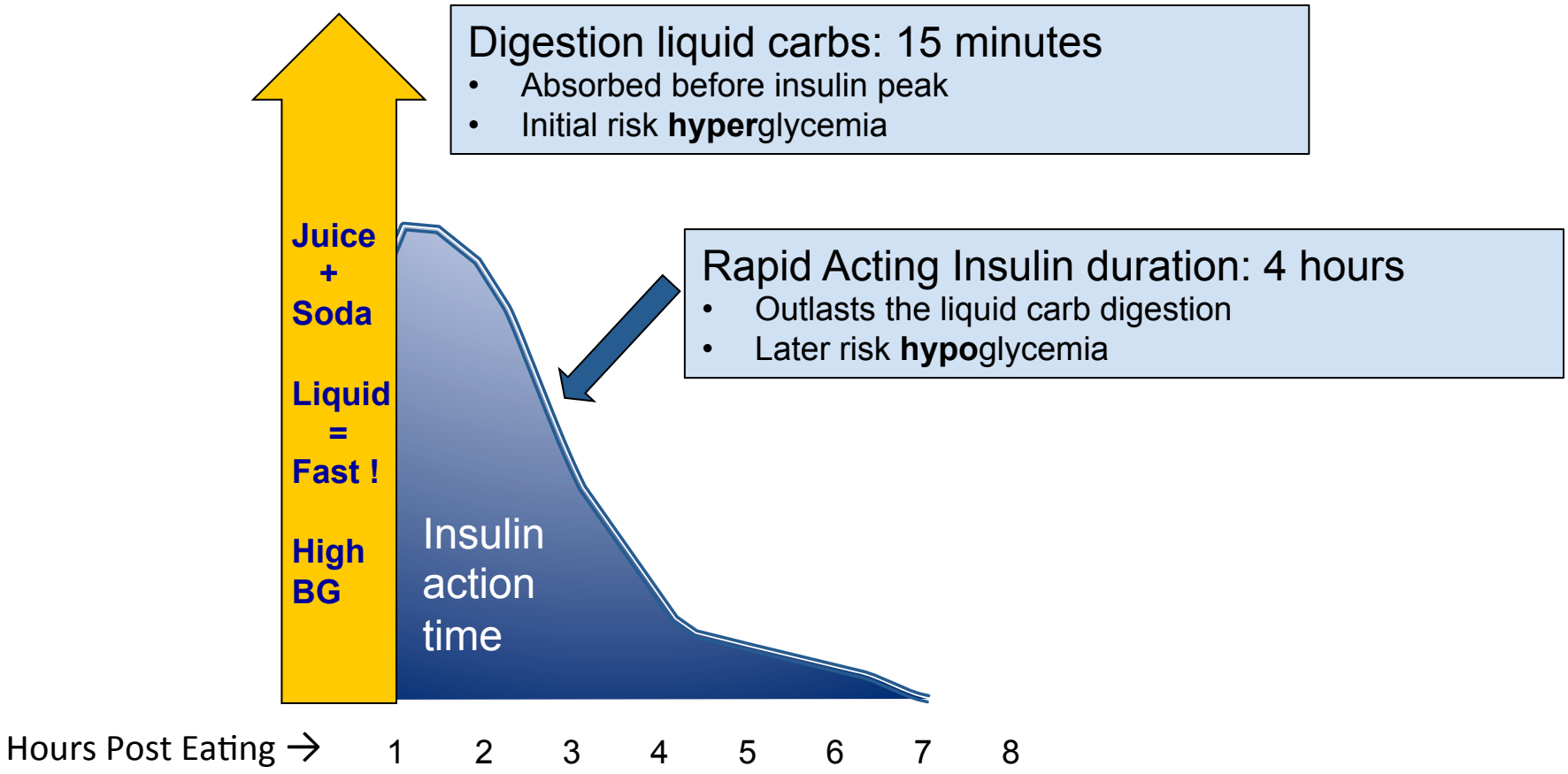
Graphs show mismatch in timing between rapid-acting insulin and delayed BG rise after eating a high fat meal.



Solutions?

Pump users can use the combo bolus to deliver insulin slowly in pulses over time.
Injection users can eat first and inject mid- to end of meal to give food a head start

Insulin Timing Matters: Liquid Carbs



Nonnutritive Sweeteners

Type of sweetener	Product names
Saccharin	Sweet'N Low Sweet Twin
Aspartame	NutraSweet Equal
Acesulfame-K	Sweet One Sunette
Sucralose	Splenda
Stevia	Truvia

FDA approved

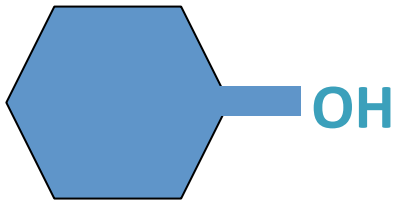
These do not raise blood glucose and do not contribute calories.

Position paper on sweeteners from the **Academy of Nutrition & Dietetics** https://www.andeal.org/vault/2440/web/JADA_NNS.pdf

Nonnutritive Sweeteners: Current Use and Health Perspectives **ADA, AHA** http://care.diabetesjournals.org/content/35/8/1798.full

Sugar Alcohol

- Products can claim: **Sugar-Free**
- Still is carbohydrate- oxygen + hydrogen added
- Slower absorption: less effect on BG
- Some cause gas, laxative effect



Sorbitol, Mannitol,
Maltitol, Isomalt, Xylitol,
Lactitol, Erythritol,
Hydrogenated Starch Hydrolysates

Beware Labeling

Nutrition Facts

Serving Size 4 Pieces

Amount Per Serving

Calories 108

	% Daily Values*
Total Fat 2.5g	**4%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 39mg	**2%**
Total Carbohydrate 25g	**8%**
Dietary Fiber 0g	**0%**
Sugars 0g	
Sugar Alcohol 21g	
Protein 0g	**0%**

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

	Calories	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2400mg	2400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Sugar-Free Candy

Nutrition Facts

Serving Size One Bar (63g)
Servings Per Container 12

Amount Per Serving

Calories 180 Calories from Fat 100

	% Daily Value*
Total Fat 11g	**17%**
Saturated Fat 10g	**49%**
Trans Fat 0g	
Cholesterol 5mg	**2%**
Sodium 50mg	**2%**
Total Carbohydrate 18g	**6%**
Dietary Fiber 1g	**4%**
Sugars 4g	
Sugar Alcohol 11g	
Protein 3g	

Vitamin A 2% • Vitamin C 0%

Calcium 10% • Iron 2%

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

	Calories	2,000	2,500
Total Fat	Less Than	65g	80g
Saturated Fat	Less Than	20g	25g
Cholesterol	Less Than	300mg	300 mg
Sodium	Less Than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4

No-Sugar-Added Ice Cream

Skewing a Balanced Diet

- Some people continually respond to elevated BG by restricting healthy carb containing foods.
  - Example: if pre-meal high BG, parent might give water instead of milk, or withhold fruit.
  - To avoid injecting for snacks, people may rely on high saturated fat snacks like salami or cheese.
- Some people might think giving more insulin must be "bad" so they restrict carbs in the diet.

- What are the long-term health implications of restricting healthy carb-containing foods?

Look for Leaner Meats and Proteins

Lean	Medium Fat	High Fat
0-3 grams of fat per ounce	4-7 grams of fat per ounce	≥ 8 grams of fat per ounce
Beef: sirloin, tenderloin, flank, round Pork: tenderloin, ham, Canadian bacon Skinless Poultry Fish and Shellfish	Beef: corned beef, ground Pork: cutlet, shoulder roast Lamb: ground, rib roast Poultry with skin on Fried fish	Bacon Sausages Salami Pork spareribs Bratwurst
Low fat hot dogs Low fat cheeses Egg whites	Medium fat hot dogs Reduced fat 2% cheeses Mozzarella and ricotta Eggs	Hot dogs Cheeses: cheddar, Swiss, Jack, Colby, Brie, Bleu

Or opt for vegetarian meat substitutes such as: vegetarian hot dogs, burgers, and sausages.

6 oz Lean versus High Fat Meat

- Lean Meats

  45 kcals/oz 0-3 g fat/oz
  - Pork Tenderloin
  - Ham, Canadian Bacon
  - Sirloin Steak
  - Flank Steak
  - Lamb Chop
  - Poultry
  - Salmon

  6 oz = 270 calories

  ≤ 18 grams fat

- High Fat Proteins

  100 kcals/oz ≥ 8 g fat/oz
  - Ribs
  - Sausage
  - Bacon
  - Salami
  - Bologna
  - Hot Dog
  - Cheese

  6 oz = 600 calories

  ≥ 48 grams fat

Rec'd Fat Gram Budgets

Institutes of Medicine

Calorie Level	20-35% kcals total fat grams
1200	26 - 47
1400	31 - 54
1600	35 - 62
1800	40 - 70
2000	44 - 78
2200	48 - 86
2400	53 - 93
2600	57- 101

Fast Food is Often Fat Food

	Grams of fat
Deluxe Cheese Burger	45
French fries, large order	25
16 ounce chocolate shake	30
Total	100 g

Trimming Calories

- Limit fast food dining
- Use lean proteins *0-3 g fat/oz*
- Choose low fat dairy products *0-3 g fat/serving*
- Use added fats in moderation *butter, margarine, mayo*
- Cook in a low fat method *not fried*
- Opt for low calorie beverages *limit alcohol*
- Use plate model of portioning or hand method.

Lipid Targets with Diabetes

Serum Lipid Goals (mg/dl):

- Total Cholesterol < 200
- Triglycerides < 150
- LDL Cholesterol < 100
  < 70 if multiple risk factors
- HDL Cholesterol > 40 for men
  > 50 for women

Lipid Management

- Weight loss – if overweight
- Exercise
- Reduce saturated, hydrogenated, and trans fats
- Increase soluble fiber
- For elevated triglycerides
  - Optimize blood glucose control
  - Limit sweets, refined grains, and alcohol
  - Include Omega 3 fats

Check the Label for Fat

Nutrition Facts	
Serving Size 1 cup cooked (90g)	
Servings Per Container 4	
Amount Per Serving	
Calories 200	Calories from Fat 50
	% Daily Value
Total Fat 6g	**9**%
Saturated Fat 0.5g	**3**%
Trans Fat 0g	
Cholesterol 5mg	**2**%
Sodium 490mg	**20**%
Total Carbohydrate 30g	**10**%
Dietary Fiber 5g	**21**%
Sugars 2g	
Protein 6g	
Vitamin A 4% ·	Vitamin C 8%
Calcium 15% ·	Iron 10%

- ✓ Check the grams and types of fat

- Low Total Fat 0-3 grams
- Low in Saturated Fat 0-1 gram
- Goal is 0 grams of Trans Fat

Warning:

Label can say 0 grams if < 0.5 g

- under ½ gram per serving

Check ingredients list: hydrogenated oils indicate risk of trans fats.

Quick Tips to Identify Fats

Heart ♥ Healthy Fats + Oils

- ✓ Usually liquid at room temperature
- ✓ Typically from plant sources

Not So Heart Healthy Fats + Oils

- ✓ Usually solid at room temperature
- ✓ Typically from animal sources
  – meat fats , dairy fats

Types of Dietary Fats

Monounsaturated ♥ ♥ ♥ ♥ ***Heart Healthy***	**Polyunsaturated** ♥ ♥ ♥ ♥ ***Heart Healthy***	**Limit Saturated Fats & Hydrogenated Fats**
Vegetable Oils: olive oil, canola oil, peanut oil Others: avocados, peanuts	Vegetable Oils: safflower, corn, sesame, almond, sunflower oils Omega 3 Fats: fresh fish fish oil supplements flax seeds, walnuts, soy products, tofu, canola oil, flax oil	Animal Fats: butter, lard, cheese, cream, chicken skin, sour cream, bacon, half & half, meat fats Solid Fats: margarine, shortening Tropical Oils

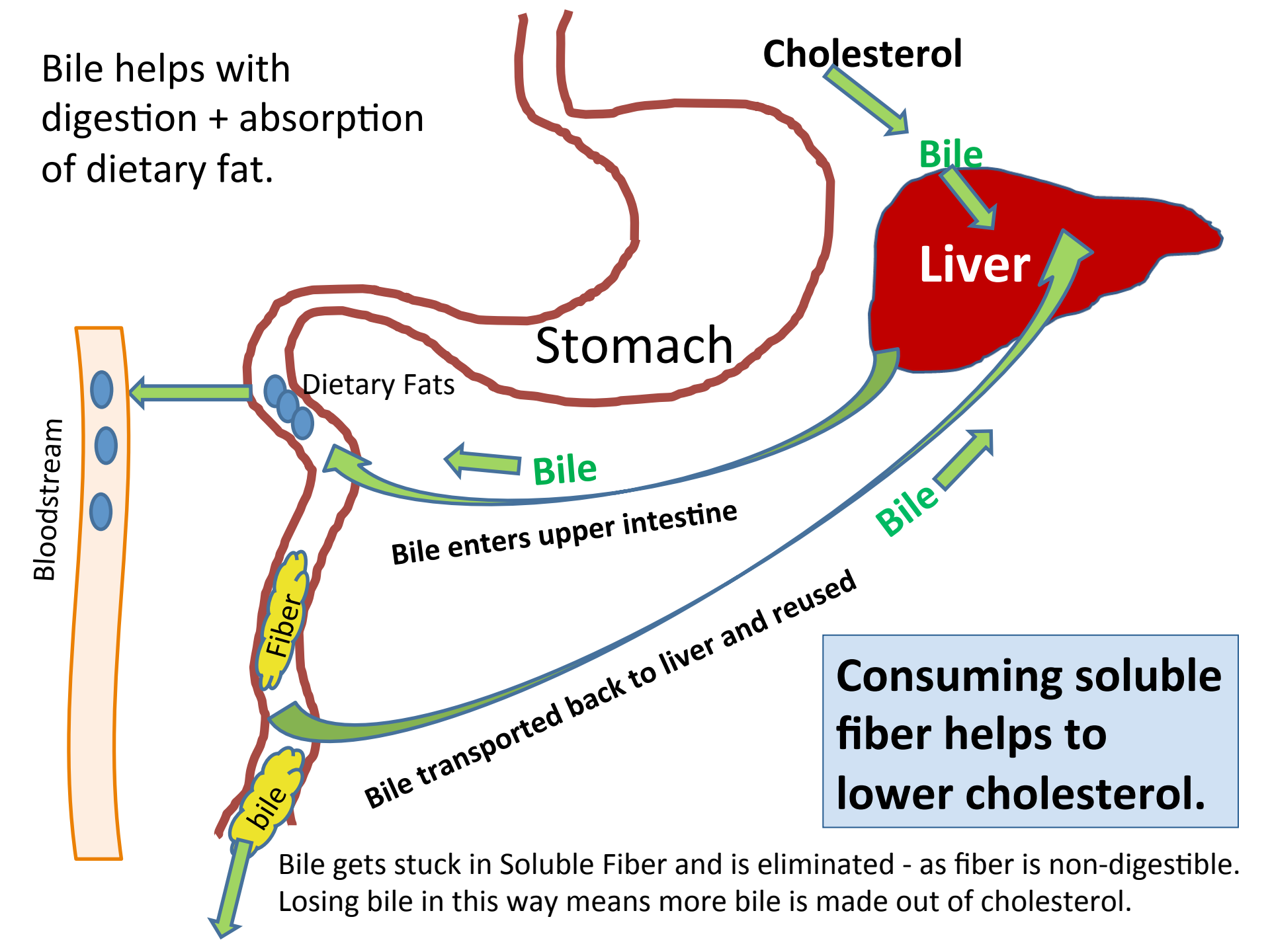
Include Soluble Fiber

- Soluble fiber binds bile acids.
- Instead of being reabsorbed by the terminal ileum, bile acids are excreted.
- The body must make new bile acids out of circulating cholesterol.

Soluble Fiber Sources:

cereal grains, oatmeal, rice bran, legumes, barley, papayas, citrus fruit, strawberries…

and soluble fiber supplements, psyllium


Bile helps with digestion + absorption of dietary fat.
Cholesterol
Bile
Liver
Stomach
Dietary Fats
Bloodstream
Bile
Bile enters upper intestine
Bile
Fiber
Bile transported back to liver and reused
bile
Consuming soluble fiber helps to lower cholesterol.
Bile gets stuck in Soluble Fiber and is eliminated - as fiber is non-digestible.
Losing bile in this way means more bile is made out of cholesterol.

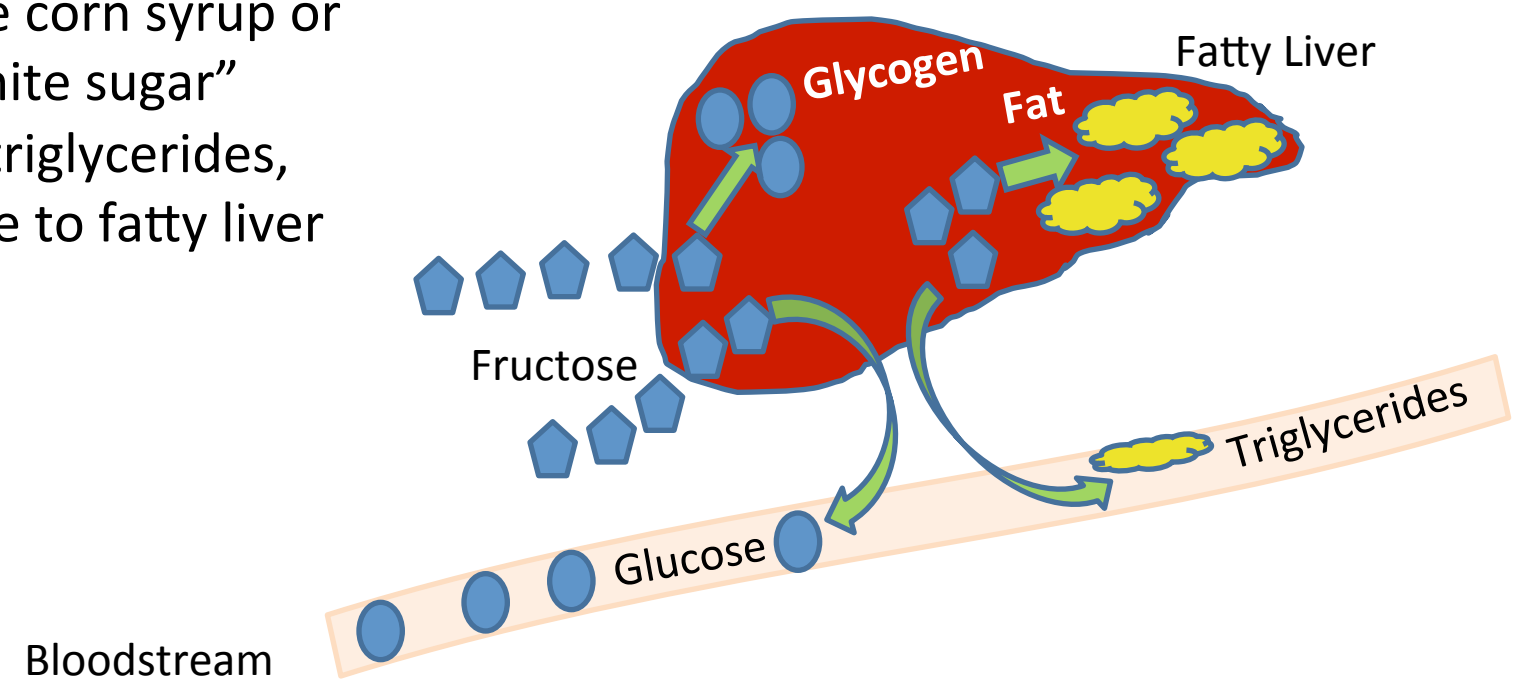
Managing High Triglycerides

- Limit intake of fats
  - Reduce intake monounsaturated fats
  - Reduce intake of polyunsaturated fats
  - Reduce intake of saturated, trans, and hydrogenated fat
- Limit sweets and refined grains
- Limit alcohol
- Weight control and Blood Glucose control
- Add omega 3 fats
- Add medications if needed

Fructose is processed in the liver...

Excess intakes of:
- high fructose corn syrup or
- sucrose- “white sugar”

Can increase triglycerides, and contribute to fatty liver



Eat fresh fruits, one serving at a time but limit fruit juices.

Hypertension Management

- Blood Pressure target for DM 140/90 mmHg, or less.

- Blood pressure lowering tips
  - Weight Loss
  - Exercise
  - Limiting Alcohol
  - Avoiding Smoking
  - Limiting Sodium < 2,300 mg/d (or less)
    - American Heart Association rec < 1500 mg/day if
      - HTN, DM, kidney disease, or over age 51
  - Blood Pressure Medications

Limit Sodium

- Use herbs, spices, pepper, salt-free seasoning.
- Limit cured meats and pickled products.
- Cut back on fast-foods and processed foods.

- Read labels look for
  - ✓ no-salt-added
  - ✓ low sodium

KEY	Low Sodium	High Sodium
% Daily Value	5% or less	20% or more
mg Sodium	140 mg or less	400 mg or more

Nutrition Facts

8 servings per container

Serving size **2/3 cup (55g)**

Amount per serving

Calories **230**

	% Daily Value*
Total Fat 8g	**10%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 160mg	**7%**
Total Carbohydrate 37g	**13%**
Dietary Fiber 4g	**14%**
Total Sugars 12g	
Includes 10g Added Sugars	**20%**
Protein 3g	

What about supplements?

- Vitamins, minerals, herbal products, and cinnamon, are marketed to people with DM:
  - but are not rec'd by ADA due to lack of scientific evidence demonstrating actual benefit.
  - Routine use of antioxidant supplements are not rec'd due to lack of evidence of efficacy and concerns regarding long-term safety.
  - Multi-vitamin-minerals supplement are recommended for-pregnancy, vegetarians, elderly, low calorie diets, or those with unbalanced diets.

Supplements are not regulated by the FDA

Case Study: Bob

- 55 y/o male with type 2 DM for 5 years
- Ht: 5’9” Wt: 205 # BMI 30
- LDL 124, HDL 23, Trig 279
- BP 144/94
- Sedentary
- Lives alone
- Low Literacy
- English is second language
- Scheduled appt because “his doctor said to…”
- Hasn’t been SMBG, no recent A1c

Case Study Bob:
Assessment

- Problems:

  T2DM, Grade 1 obesity, HTN, ↑ LDL, inactive

- Barriers to learning:

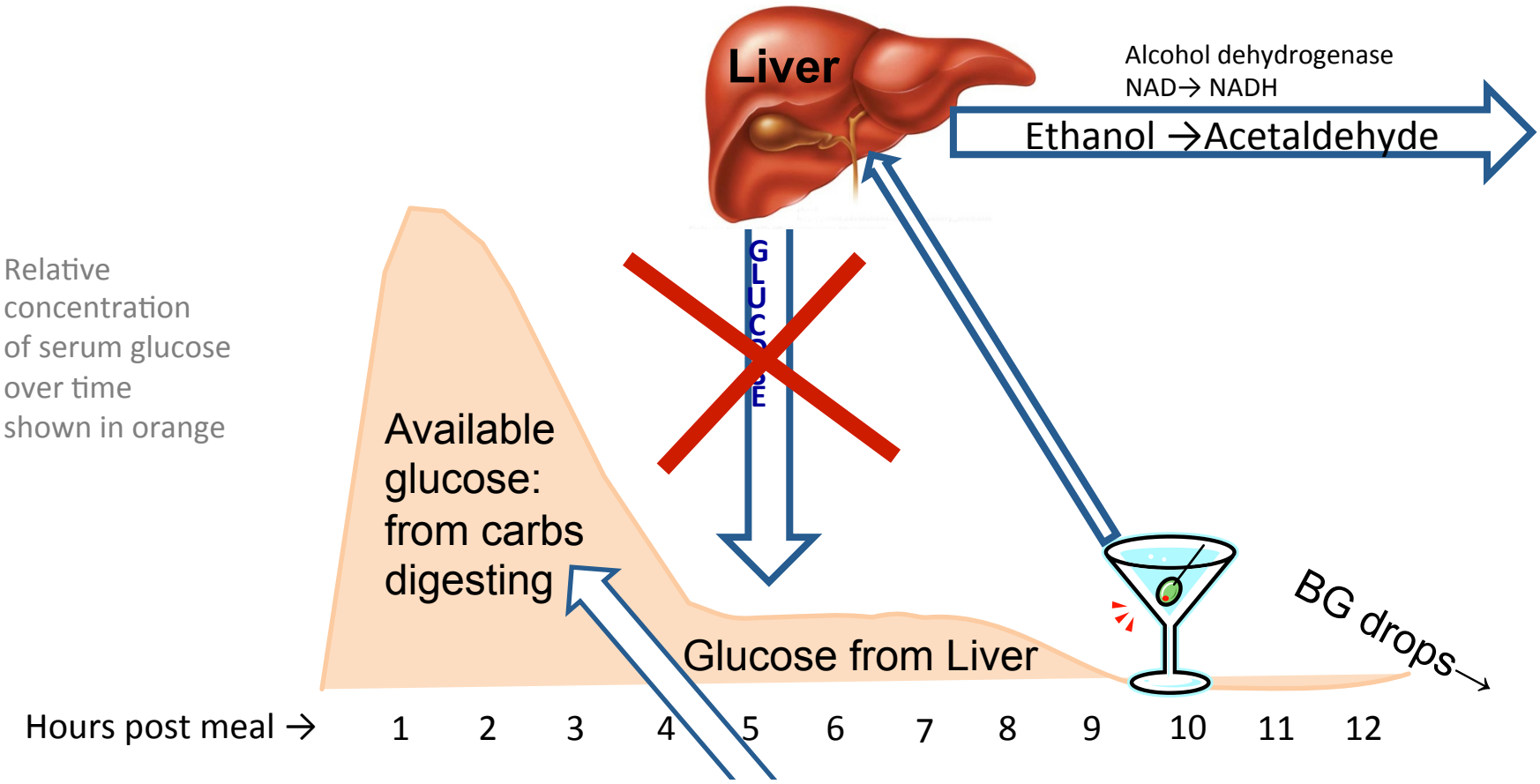
  ↓ low literacy, ESL, lives alone

Case Study Bob:
Plan

- Prioritize!
- Simple instructions, don't overwhelm
- Try to split info into multiple visits
- Prescriptions likely for lipids, BG, HTN
- RD consult and learning to monitor BG

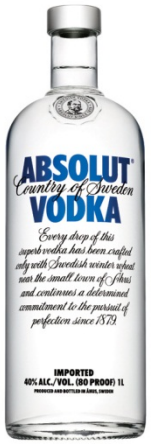
  - weight loss, exercise
  - carb control: plate model, hand model
  - teach basic healthy food choices, lean

Alcohol Increases Risk of Hypoglycemia



Exogenously administered insulin keeps pushing BG down despite falling serum glucose levels, whereas a functioning pancreas would reduce insulin production.

Carbs in Alcohol?



Hard liquor = 0 carbs

12 oz beer = 13 g carbs

Mixed drinks can have significant amounts of carb

Wine = 3 g carb

Recommended Limits on Alcohol

- If an adult with DM chooses to drink alcohol, they should be advised to drink in moderation:
  - Women: up to 1 drink per day
  - Men: up to 2 drinks per day

- What counts as a drink?
  - 12 oz beer
  - 5 oz wine
  - 1½ oz hard liquor

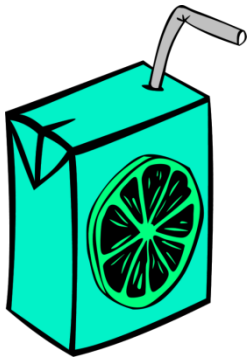
Don't drink on an empty stomach

When do people tend to drink?

- Older generation:
  - Pre-dinner cocktail
    - What if lunch was 5-6 hours ago?

- Younger generation:
  - Late at night, parties, clubs, bars
    - How many hours since dinner?
    - How many drinks…
      - and how many hours will gluconeogenesis be impaired?
    - If stumbling will other people assume intoxication?
    - What happens during sleep? Risk: severe nocturnal hypo's.

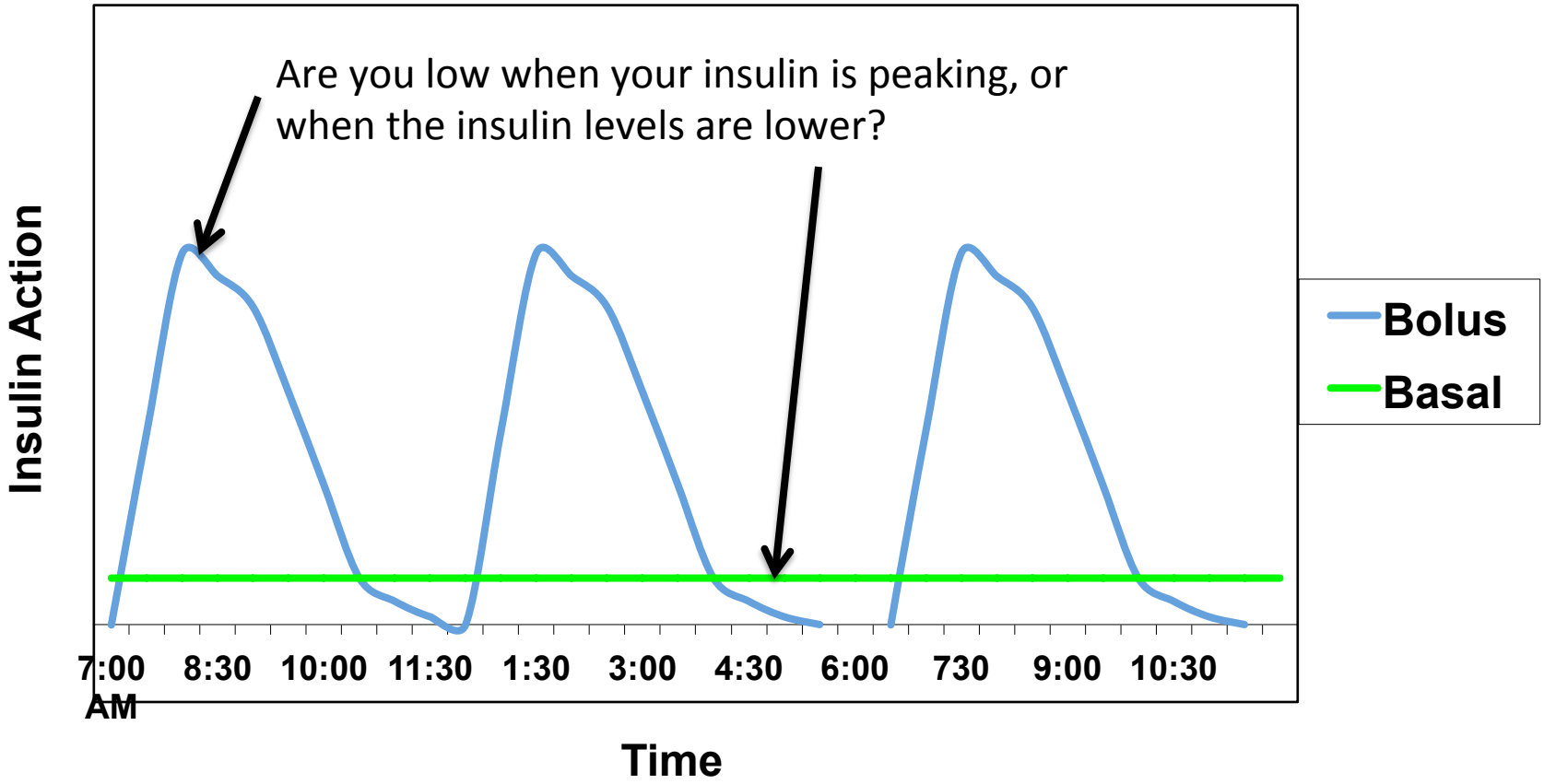
Treating Hypoglycemia



- BG below 70 mg/dl
  - take 15-20 grams of carbohydrate
    (young kids likely need less, such as 5-10 grams)
    - 4 oz juice or regular soda
    - 1 Tbsp sugar, jam, honey
    - 4 glucose tabs
  - recheck BG in 15-20 minutes
  - repeat as needed
  - BG below 50 mg/dl or low after exercise?
    - Likely need even more carbs to treat the initial low.

Consider Insulin on Board

When treating lows



Consider the times hypoglycemia could occur as indicated by the two arrows above. Which would take more carbohydrate to resolve the hypoglycemia?

Exercise for Type 2 Diabetes
A foundation treatment strategy

- Exercise
  - Decreases insulin resistance
  - Increases muscles' glucose uptake
  - Helps with weight management
  - Improves lipids: ↓ LDL ↓ trig ↑ HDL
  - Improves cardiovascular fitness
  - Improves blood pressure
  - Reduces stress, enhances quality of life
  - It can be as simple as walking regularly

Exercise Prescription

- Aerobic Exercise
  - walking, rowing, cycling, swimming, low impact aerobics, armchair exercises
    - moderate level at least 150 minutes per week
    - not more than 2 consecutive days without exercise
- Resistance Exercise
  - 2 or more times per week
- Limit sedentary time. Move around after every 90 minutes of sitting.

Exercising with Limited Mobility

- Most individuals can find some form of exercise that is suitable for them.

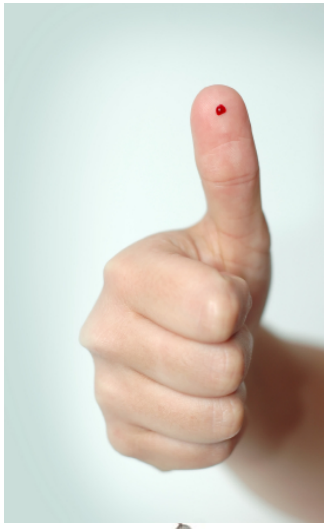
- Upper body exercises
  - Chair exercise home videos are available
- Some pools offer services for handicapped
- Stationary cycling or rowing machines
- Intermittent is fine: 5-10 min at a time

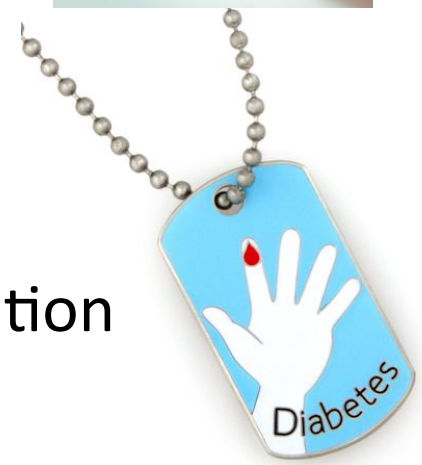
Fluid Requirements

- Elevated BG increases risk for dehydration
  - Kidneys excrete glucose in urine
- Exercise further increases fluid needs
  - Especially in hot climates
- Drink plenty of fluid
  - Choose water or other
  - Reserve juice for preventing and treating hypoglycemia

Exercise Safely

- Check BG
  - keep meter and supplies handy
- Hypoglycemia
  - may need to reduce insulin doses
  - carry carbs
- Hydration
  - heat, perspiration, high BG: ↑ fluid needs
- Foot care
  - wear proper shoes & socks
  - visually inspect feet every day
  - avoid pounding & jumping if loss of sensation
- Medical ID





Case Study Exercise

- Suggestions for an exercise routine for a 63 y/o female with 20 year history T2DM
  - Complains of tingling and numbness in her feet
  - Family history heart disease
  - BMI 41 – grade 3 obesity
  - Blood Pressure 152/94

Exercise with Peripheral Neuropathy

Discuss exercise benefits: weight, BG, BP, lipids
- Consider body weight and abilities.
- Start with 5 minutes, or what she will agree to and increase over time.
- Discuss ideas and options that appeal to her.
- Consider exercise logs and setting goals with rewards.

- **Avoid:** jogging, stair-master, stair exercises, jumping, prolonged walking, treadmill, and heavy weight bearing exercises.
- **Suggested:** swimming, bicycling, rowing, chair exercises and other non-weight bearing exercise.

Kids get type 2, too

Screening Children for T2DM

- Who to screen:
  - Kids who are overweight, >85% weight for height
  - and have at least 1 risk factors for T2DM
    - Family history, high risk ethnic group, HTN, acanthosis, dyslipidemia, PCOS
    - Was small for gestational age, or mom had GDM
- When:
  - Starting at age 10
  - or at puberty if it occurs before age 10
- How Often:
  - At least every 3 years

Healthy Tips for Healthy Kids

- balanced meals, appropriate snacks
- 5 servings/day from fruits & vegetables
- lean meats, low fat dairy products
- limit fats and fried foods
- fewer fast food meals
- reduce or avoid juices, avoid soft drinks
- healthy snacks
- Exercise:
  - aerobic: 30-60 min/day $\geq$ 5 d/wk
  - strength training $\geq$ 3 d/wk
  - limit screen time and sedentary behaviors

Review

- Diet and Exercise = foundation treatment in diabetes.
- Weight loss goal: 5-10% of starting weight if overweight
- While **carb counting** isn't always imperative for T2DM, **carb portion control** is. Type 1's should carb count.
- Simple strategies such as portion control, carbohydrate distribution, and avoidance of liquid concentrated sweets will significantly improve BG control.
- T2DM runs in families: get screened.
- Diabetes is largely self-managed: learn how to do so.

Thank You

Questions?