Type 2 Diabetes

Multiple Nutritional Considerations

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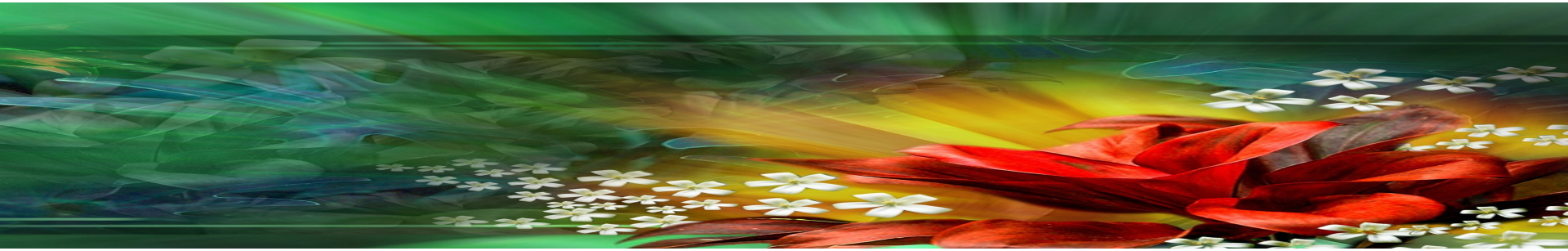


Lecture Focus

- Lifestyle interventions for Type 2
  - Diet + Exercise – the foundation of care
  - Comorbidities: weight, lipid, BP
  - Type 2 DM in youth

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

Obesity = Insulin Resistance

- 3 of 4 adults with DM are overweight or obese
- Mild to moderate weight loss 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.

Diabetes Prevention Program

- Studied 3,234 patients with **pre-diabetes** x 3 years
- Intensive lifestyle: *healthy low fat diet & exercise*
  - reduced incidence of diabetes by 58 %
- Metformin (glucophage): *diabetes medication*
  - reduced incidence of diabetes by 31 %
- Lifestyle modifications are most effective in delaying progression to Type 2 diabetes.

Preventing T2DM in at Risk Populations

- Lifestyle changes
  - moderate weight loss: lose 7% body weight
  - regular physical activity at least 150 min/week
- Dietary strategies
  - reduced calories and reduced dietary fats
  - increase dietary fiber
  - whole grains for at least half of grain intake
- Limit or avoid sugar-sweetened beverages.

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

Weight

Weight status is influenced by:
calories eaten versus calories burned.

If you eat more than you burn, you gain weight.
If you eat less than you burn, you lose weight.

- ADA rec caloric deficit of 500-750 calories per day to lose

Calories In	
Carb:	4 kcals/g
Protein:	4 kcals/g
Alcohol:	7 kcals/g
Fat:	9 kcals/g

Calories Out

- Metabolism
- Daily Activities
- Exercise

Weight Loss Diets

Calories Count… But the type of diet…not so much

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

- People can lose weight on various types of diets:
  - The most important factor is that energy expenditure must exceed caloric intake.
- The best diets are individualized to patient preference but 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 Weight

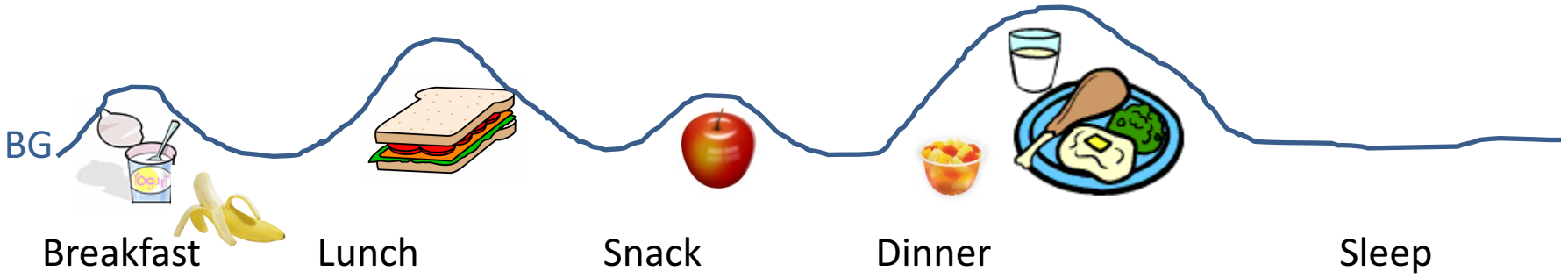
- Don’t skip meals, do control portions
- Include more vegetables
- Begin meals with salad or low calorie soups
- Choose higher fiber, whole grains
- Choose healthier snacks

- Behavior modification + support groups
- Limit eating for emotional or situational reasons
- Enlist support of family and friends

- Exercise regularly: aim for sessions lasting > 30 min to maximize burning fat for fuel. Total 200-300 min/week.

Carbohydrate Management
for blood sugar control

- Distribute carbohydrate intake throughout the day
  - 3 main meals, 4 - 6 hours apart
  - Small snacks if desired
- Use more whole grains and legumes
- Limit refined grains and sweets



Avoid Liquid Sugar:

rapid absorption and BG rise

6 tsp sugar

9 tsp sugar

12 tsp sugar

14 tsp sugar

15 tsp sugar "natural"

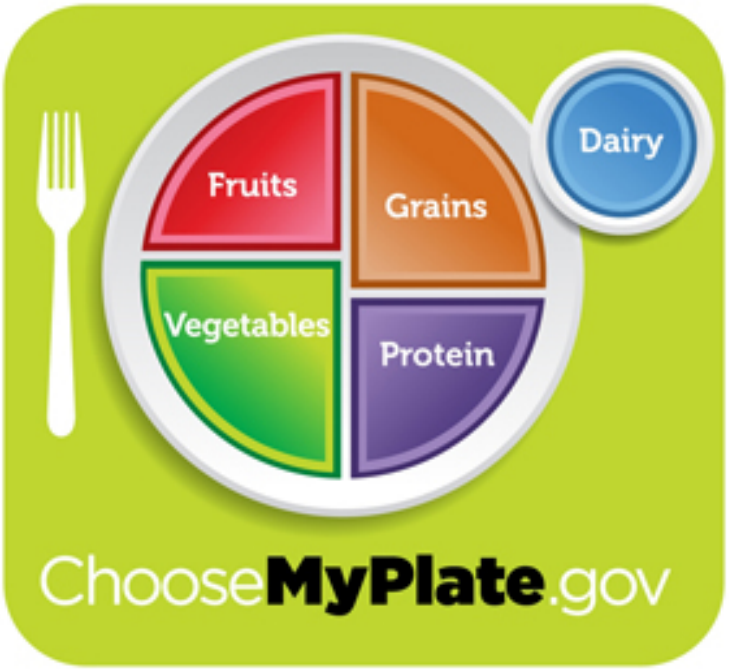
2015 American Diabetes Association guidelines:
avoid sugar-sweetened beverages

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

Tip: Use Smaller Plates

It looks like you are eating more.

Hand Portioning Visuals

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

Fat Counts – Read Labels

Definition	Total Fat Grams
Low Fat	0-3
Medium Fat	4-7
High Fat	8 or more

Per ***ounce*** of meat or cheese
Per ***serving*** of everything else

Limit saturated fats and avoid trans fats

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

Find the Fat

Food Item	total grams fat
1 tsp oil, butter, margarine	5
6 almonds or cashews	5
½ cup mixed nuts	35
1 cup whole milk	8
1 ounce cheese	8
1 ounce potato chips	15
1 cup premium ice cream	28
French fries (large)	24
Double Whopper with cheese	63

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

Trimming Calories

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


Types of Dietary Fats

Monounsaturated ♥ ♥ ♥ ♥ ***Heart Healthy***	**Polyunsaturated** ♥ ♥ ♥ ♥ ***Heart Healthy***	**Limit Saturated Fats & Hydrogenated Fats** **Avoid Trans Fats**
Vegetable Oils: olive oil, canola oil, peanut oil Others: avocados, peanuts, olives	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

Hypertension Management

- Blood Pressure target for patients with Diabetes 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

    Angiotensin converting enzyme (ACE) inhibitors
    Angiotensin receptor blockers (ARB's)

71% of adults with diabetes have HTN.

Tips for Limiting Sodium

- Don’t add salt in cooking or at table
- Limit intake cured meats
- Reduce pickled products
- Watch out for convenience foods
- Don’t eat at fast food restaurants
- Use herbs, spices, salt-free seasonings
- Read labels. Look for “low-sodium”
  - 140 mg/serving is considered low
  - 400 mg/serving is considered high

1 tsp salt = 2,300 mg sodium

Sodium Counts

Regular
1340 mg sodium
per 18.6 oz can

Reduced Sodium
1116 mg sodium
per 18.6 oz can

Regular
980 mg sodium
per 11.5 oz can

Low Sodium
200 mg sodium
per 11.5 oz can

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
- Work on weight control and BG control
- Add omega 3 fats (fish oil)
- Add medications if needed

Heart Healthy Plan

Limit portion of meat to the size of palm or your hand…twice a day.

- Limit saturated, -trans and animal fats
- Eat moderate amounts of lean proteins
- Use liquid vegetable oils in moderation
- Include low fat dairy
- Include at least 8 portions per day from veg & fruit groups
- Eat foods with soluble fiber
- Eat $\geq$ 6 oz fish/week to provide omega 3 fats
- Limit sodium
- Control weight
- Exercise daily
- Don’t smoke

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 (Vit C, E and carotene) are not rec'd due to lack of evidence of efficacy and concerns regarding long-term safety.
  - Multi-vitamin-minerals supplement may be needed for select groups: 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
- MD Rx meds likely for lipids, BG, HTN
- RD consult and SMBG

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

Kids get type 2, too

Screening Children for T2DM

- Who to screen:
  - Kids who are overweight, >85% weight for height
  - and have at least 2 risk factors for T2DM
    - Family hx, Ethinicity, 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:
  - 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
- at least 60 min/day physical activity
- use positive motivators not scare tactics

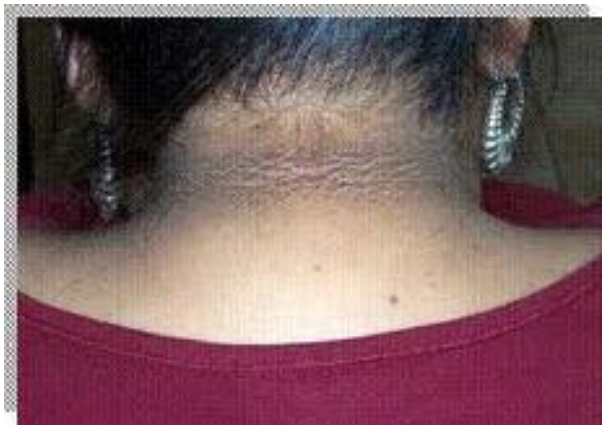
Kids with diabetes are still kids!

- Incorporate favorite foods in reasonable amounts.
- Over-restricting treats can lead to feelings of anger and isolation.
- Individuals with diabetes can still include reasonalbe amounts of sugar, in the context of a healthy diet.

Case Study Teen

- 16 y/o obese teen

- Acanthosis on physical exam
- Her mother has type 2 diabetes



- Obtain FBG

  Result: 126

  Diagnosis: Diabetes

You could also dx with A1c $\geq$ 6.5
or 75 g Glucose load, 2 hr > 200

Refer patient to:
UCSF Madison Diabetes Clinic for Pediatrics 415-514-6234

Case Teen: Treatment Plan

- RD consult
  - Weight Control
  - Exercise
  - Healthy Eating Strategies
    - portion control, carb distribution
    - plate model, hand model
    - limit concentrated sweets
    - avoid juice and regular soft drinks
    - lean and lower fat
- Exercise: 30-60 min
- Screenings: lipids, BP, albumin excretion (kidneys), dilated eye exam, psychosocial assessment

Case Teen: Other Considerations

Possible barriers?

Does her mom with T2DM set a positive example?

Who is going to support and supervise her?

Are there healthy food options at home?

Financial constraints?

Is she teased about her weight?
Does that affect her PE participation?

Is her neighborhood safe to exercise in?

Is she depressed?

Exercise for Type 2 Diabetes
A foundation treatment strategy

- Exercise
  - Decreases insulin resistance
  - Increases peripheral glucose uptake
  - Helps with weight management
  - Improves lipids: ↓ LDL ↓ trig ↑ HDL
  - Improves cardiovascular fitness
  - Improves HTN
  - 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
    - vigorous at least 75 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 60-90 minutes of sitting.

Exercise Safely

- Check BG
  - keep meter and supplies handy
- Hypoglycemia
  - risk if pt takes meds that lower blood glucose
  - may need to reduce med 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

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

Case Study Exercise

- Make suggestions for an exercise routine for a 63 y/o female with 20 year history T2DM
  - C/O tingling and numbness in her feet
  - Fm Hx CVD
  - BMI 41
  - BP 152/94

Exercise with Peripheral Neuropathy

Discuss exercise benefits: weight, BG, BP, lipids

- Consider exercise stress test.
- Be cognizant of her 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.

– **Suggest** swimming, bicycling, rowing, chair exercises and other non-weight bearing exercise.

Summary

- Diet and Exercise = foundation tx in T2DM.
- Weight loss goal: 5-10% of starting weight
- While **carb counting** isn't always imperative, **carb portion control** is.
- Simple strategies such as portion control, carbohydrate distribution, and avoidance of liquid concentrated sweets will significantly improve BG control for people with diabetes; whether they have type 1 or type 2.

Questions ?