Medical Nutritional therapy of Diabetes Mellitus

Assistant Professor Mayasah A. Sadiq FICMS-FM

Objectives

- Define diabetes and classify types.
- Enumerate Goals of Nutritional management for DM.
- Enumerate ADA targets for diabetes control.
- Identify food exchange system.
- Identify diabetes feeding pattern.

Nutritional Management of DM

- • Diabetes mellitus is "A group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action or both
- • Nutrition and lifestyle play an important role in the etiology of chronic diseases like Diabetes mellitus and Obesity.
- Medical nutrition therapy is the first line of treatment for the prevention and management of type 2 diabetes and plays an essential part in the management of type I DM.

CLASSIFICATION OF DIABETES MELLITUS AND GLUCOSE INTOLERANCE

- Various types of diabetes mellitus are classified according to the pathogenic process of the disease.
- Type 1 Diabetes Mellitus accounts for 5% to 10% of all cases of diabetes.
- It develops rapidly, and it tends to be more severe and unstable than other forms of diabetes.

Type II DM

- Type 2 Diabetes Mellitus Approximately 90% to 95% of individuals with diabetes have type 2 diabetes.
- This form is most closely associated with lifestyle and environmental factors that lead to excess body fat, particularly in the abdominal region, and lack of physical activity.

Box 20-1 Risk Factors for Type 2 Diabetes Mellitus

- Overweight (i.e., a body mass index ≥25 kg/m^2)
- Not physically active on a regular basis
- A first-degree relative with diabetes
- High-risk race/ethnicity (e.g., African American, Latino, Native American, Asian American, and Pacific Islander)
- Women with a history of gestational diabetes or who have delivered an infant weighing ≥9 pounds
- Hypertension (≥140/90 mm Hg or on therapy for hypertension)
- HDL-cholesterol level <35 mg/dL and/or triglyceride level >250 mg/dL
- Woman with polycystic ovarian syndrome
- HgA_{1c} ≥5.7%
- Previously identified as having impaired glucose tolerance or prediabetes
- History of cardiovascular disease
- Other clinical conditions associated with insulin resistance (e.g., severe obesity, acanthosis nigricans)
- Age ≥45 years

Acanthosis nigricans

- It usually develops in skin folds, such as the back of the neck, axilla, and groin, where it presents as velvety hyper-pigmented patches with poorly defined borders.
- Acanthosis nigricans is most commonly associated with diabetes and insulin resistance, but rarely it can be a sign of internal malignancy.
- Nigricans is a strong predictor of future diabetes

Impaired Glucose Tolerance

- Individuals whose fasting blood glucose level is higher than normal (>100 mg/dL) but less than the level for the clinical diagnosis of diabetes (≥126 mg/ dL) are defined as impaired glucose tolerance (IGT), which is also known as prediabetes.
- IGT is a strong risk factor for the future development of type 2 diabetes.
- Dietary and lifestyle treatment guidelines follow those that are designed for patients with type 2 diabetes, and can help to prevent or prolong the progression into full-blown diabetes.
- Overweight individuals with IGT can significantly reduce their risk for developing diabetes by increasing physical activity and by losing 5% to 10% of body weight.
- Aerobic exercise and resistance training are particularly important aspects of treatment because they increase insulin sensitivity and glucose utilization in skeletal muscles.


VIRUS

MNT Preventive role in type II DM

- Primary, Secondary, and Tertiary forms.
- In primary prevention, high-risk individuals are identified. These are people with a body mass index of more than 25, obesity, or a prediabetic state. Diet and lifestyle changes are implemented.
- Secondary prevention is the utilization of nutrition to achieve euglycemia in diabetic patients.
- Tertiary prevention utilizes nutrition to manage macrovascular and microvascular complications, and to delay morbidity and mortality.

- MNT is necessary for preventing diabetes, managing existing diabetes, and preventing, or at least slowing, the rate of development of diabetes complications :
- 1. acute : hypoglycemia, diabetic ketoacidosis and hyperosmolar hyperglycemic syndrome.
- 2. chronic: macrovascular and microvascular(retinopathy, nephropathy, neuropathy).

Box 20-3 Criteria for the Diagnosis of Diabetes Mellitus

- HbA_{1c} ≥6.5%. The test should be performed in a laboratory using a method that is National Glycohemoglobin Standardization Program (NGSP) certified and standardized to the Diabetes Control and Complications Trial (DCCT) assay*
  or
- Fasting plasma glucose level of ≥126 mg/dL (7.0 mmol/L)
  Fasting is defined as no caloric intake for at least 8 hours*
  or
- A 2-hour plasma glucose level of ≥200 mg/dL (11.1 mmol/L) during an oral glucose tolerance test
  The oral glucose tolerance test should be performed as described by the World Health Organization with the use of a glucose load that contains the equivalent of 75 g of anhydrous glucose dissolved in water*
  or
- In a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose level of ≥200 mg/dL (11.1 mmol/L)

Nutritional management for DM

- – A therapeutic approach to treating DM and associated symptoms through use of a specifically planned diet therapy.
- • It involves:
- – Nutritional assessment
- –Diet history, 24h recall, history of wt. loss, anthropometry etc.
- – Planning appropriate dietary interventions using evidence based practice guidelines.
- – Certain lifestyle modifications required.
- – Regular monitoring and follow-up.

Glucose self monitoring

- The two techniques most frequently used are self-testing of capillary glucose levels by finger or forearm stick to obtain:
- a measure of current blood sugar levels
- glycosylated hemoglobin (HbA1C) levels to indicate average blood glucose control over the preceding 2-3 months.
- To optimize wound healing in patients with diabetes, blood glucose levels should be kept below 200 mg/dl.

ADA Recommended Blood Glucose Targets (Most Adults)

- A1C: Less than 7%
- Before a meal (Preprandial): 80–130 mg/dL .
- 1–2 hours after a meal (Postprandial): Less than 180 mg/dL (10 mmol/L)

ADA 2025 Lipid Profile Goals & Recommendations

- LDL Goal (Primary Prevention): **<70 mg/dL**(Age 40–75 is primary target).
- LDL Goal (Secondary Prevention/ASCVD) **<55mg/dL**

For most diabetics, the ADA's 2025 recommended blood pressure

- The goal is <130/80 mmHg if safely achievable,
- with a more intensive <120 mmHg systolic target for very high-risk individuals.
- Treatment often begins at 130/80 mmHg,

Goals of Nutritional management for DM

- Maintain near-normal blood glucose levels.
- - Achieve optimal serum lipid levels.
- - Achieve and maintain a reasonable weight for adults.
- - Achieve normal growth and development in children and adolescents.
- - Balanced nutrition and positive outcomes for pregnancy and lactation.
- - Prevent and treat acute complications such as hypoglycemia and short-term illnesses.
- - Strike a balance between food, medication, and exercise.
- - Prevent, slow the development of, or treat co-morbidities such as hypertension, cardiovascular disease, and nephropathy.

Nutritional management of DM

- • Nutritional Therapy may be used alone or in combination with oral hypoglycemic drugs or insulin.
- • Nutritional Therapy is integral to DM control and management and requires an individualized approach.
- • The diet plan of an individual is based on height, weight, age, sex, physical activity and nature of diabetes.

Nutritional Management and requirements in Diabetes Mellitus

- Determine Energy requirements:
- – Calculate Energy value of diet and its proportionate distribution for each patient individually.
- – For Type 1 DM: Kcals are based on needs for normal growth, development, physical activity and maintenance of desirable body weight.
- – For Type 2 DM: as majority cases are obese, the Kcals adjustments are made to achieve weight loss.

Nutritional Management and requirements in Diabetes Mellitus

- This can be done in following way:
- –Calculate the ideal body wt. (IBW) on the basis of weight and height.
- –Determine energy intake on basis of kcals for different activity levels and whether the individual is normal wt., obese or underweight.

Nutritional Management and requirements in Diabetes Mellitus{Hamwi formula}

Built	Women	Men
Medium	Allow 100 lbs (45.5 kg) for first 5 ft (152 cms) height, plus 5 lb for each additional inch.	Allow 106 lbs (48 kgs) for first 5 ft. (152 cms) of height, plus 6 lb for each additional inch.
Small	Subtract 10%	Subtract 10%
Large	Add 10%	Add 10%

General Calorie Guidelines (per kg of IBW)

- Current clinical guidelines often use the following ranges to determine daily energy needs:
- Sedentary/Light Activity: 25–30 kcal/kg of IBW per day (e.g., desk jobs, limited exercise).
- Moderate Activity: 30–35 kcal/kg of IBW per day (e.g., jobs involving standing, light sports).
- Heavy Activity: >35 kcal/kg of IBW per day (e.g., heavy physical labor, intense training).

Weight Management:

- For obese patients with type 2 diabetes, a common starting point is 25 kcal/kg IBW/day.

Distribution of energy in terms of carbohydrate, fat and protein:

- The energy value of diet and its propotionate distribution needs to be calculated for each patient individually.
- Diabetics should consume –
- – 45-65% energy from carbohydrates
- – 20-30% energy from fats
- – 10-30% energy from proteins

The food exchange system (or exchange lists)

- is a meal planning tool that groups foods with similar macronutrient (carbohydrate, protein, and fat) and calorie content into specific categories.
- Originally developed in 1950 by the American Diabetes Association and the American Dietetic Association (now the Academy of Nutrition and Dietetics).
- it was designed to help people with diabetes maintain consistent blood sugar levels while allowing for variety in their diet.

How the System Works

- In this system, a specific portion size of any food within a group is considered one "exchange".
- You can swap any food on a list for another on the same list because they provide roughly the same nutritional value.

- Starch/Carbohydrates: 1 exchange ≈ 15g carbs, 3g protein, 0–1g fat, and 80 calories.
- Examples: 1 slice of bread, 1/3 cup of rice, or 1/2 cup of corn.
- Fruits: 1 exchange ≈ 15g carbs and 60 calories.
- Examples: 1 small apple or 1/2 cup of fruit juice.
- Vegetables (Non-starchy): 1 exchange ≈ 5g carbs, 2g protein, and 25 calories.
- Examples: 1/2 cup of cooked broccoli or 1 cup of raw leafy greens.

- Meat and Substitutes: 1 exchange ≈ 7g protein (fat and calories vary by fat content).
- Examples: 1 oz of chicken (lean) or 1 oz of cheese (high-fat).
- Fats: 1 exchange ≈ 5g fat and 45 calories.
- Examples: 1 tsp of oil, 1 tsp of butter, or 6 almonds.
- Milk: 1 exchange ≈ 12g carbs and 8g protein (fat and calories vary by type).
- Examples: 1 cup of skim milk (100 kcal) or 1 cup of whole milk (150 kcal).

Core Benefits

- Flexibility: Allows users to choose foods they enjoy rather than following a rigid menu.
- Consistency: Helps maintain a steady intake of nutrients, which is crucial for managing conditions like diabetes, obesity, and heart disease.
- Portion Awareness: Teaches users what standard serving sizes look like, supporting weight management.

Carbohydrates

- • Not only amount but type of CHO and its distribution are important and depends on the type of treatment being followed.
- • CHO content of the diet can be estimated by use of exchange lists and CHO counting.
- • Distribution of CHOs and their type:
- – Carbohydrate counting: Food portions containing 15g of CHO are taken as 1 CHO serving/ count.
- – Type: More of CHO to be given as complex CHOs than simpler ones as complex CHOs breakdown more slowly to release glucose.

Carbohydrates

- Presence of dietary fiber in complex CHO sources leads to increase in intestinal transit time, delays gastric emptying and slows glucose absorption.
- Soluble fiber lowers fasting blood sugar and glycosuria and improve sensitivity to insulin.
- Rise in post prandial blood glucose does not merely depend on amount of CHO ingested but also on rapidity of absorption.

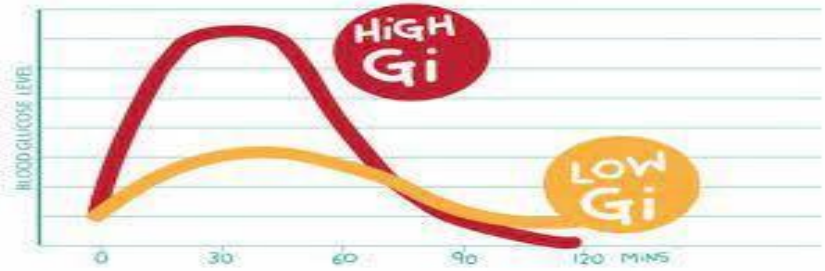
Glycemic Index (GI)

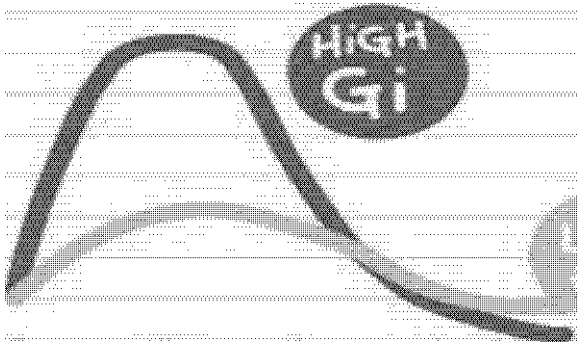
- The glycemic index (GI) is **a value used to measure how much specific foods increase blood sugar levels**.

Foods are classified as low, medium, or high glycemic foods and ranked on a scale of 0–100.

The lower the GI of a specific food, the less it may affect blood sugar levels

- Foods with a higher GI should be avoided in diets of diabetic individuals.

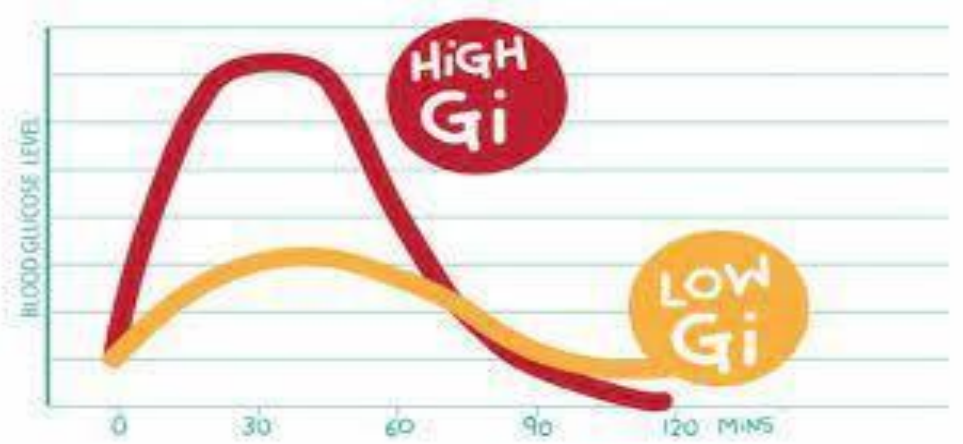




GI	GI rating	Blood glucose level	A few exampl
High	Over 70	Increases rapidly	• White rice • White bread • Baked potato • Water melon
Medium	56 to 69	Increases moderately	It Brown rice • Oatmeal • Macaroni cheese • Sugar
Low	Less than 55	Increases slowly	• Chickpeas • Bean sprouts • Spaghetti • Carrots

Glycemic Index (GI)

- The glycemic index tables compare various individual foods and rank the foods according to the blood glucose response they cause.
- Foods that raise the blood sugar more are said to have a high glycemic index,
- Foods that provide a flatter blood glucose response are labeled low glycemic index foods.



Glycemic Index (GI)(CONT.)

GI of any food depends on:

– Composition and size of starch molecules

– smaller the size more the glycemic effect.

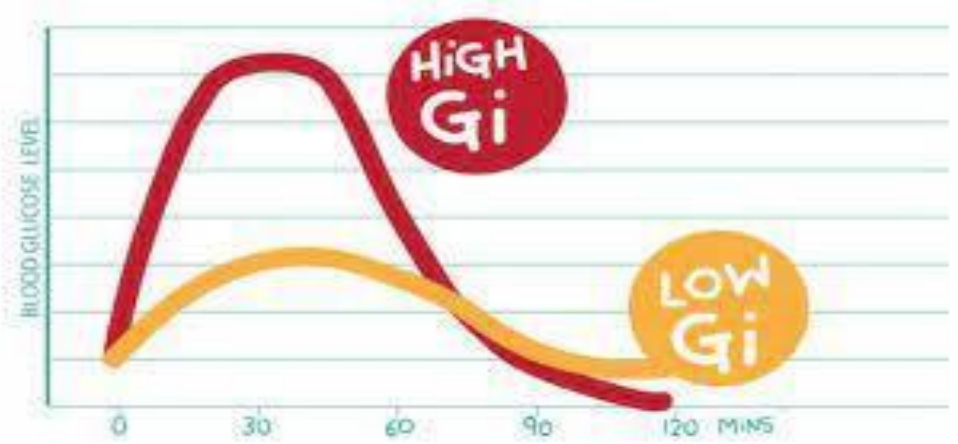
– Digestibility

– presence of amylopectin than amylose has greater glycemic effect

. – Cooking methods employed also affect the GI of a particular food item.

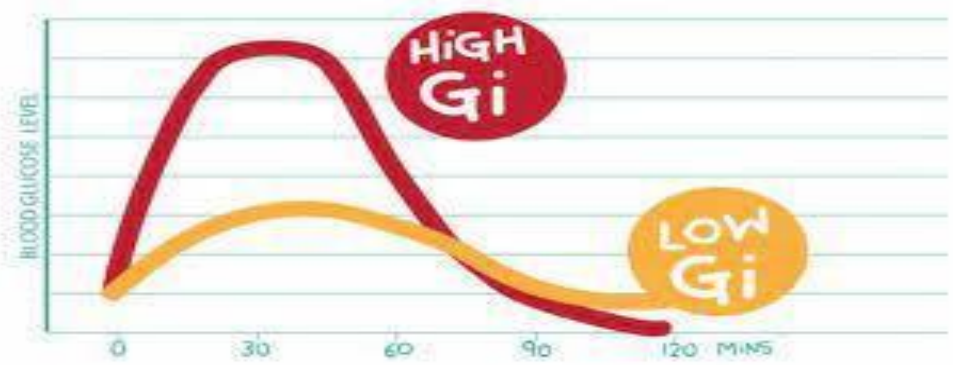
Glycemic Index (GI)(CONT.)

- It is safe to say that not all foods produce the same glycemic response.
- Foods that digest faster will provide a more rapid blood glucose rise.
- Foods that digest slower will have a more blunted effect on the blood glucose and will likely provide more satiety.



Glycemic Index (GI)(CONT.)

- Factors that appear to have the most influence on blood glucose response include:
- - Form: liquids digest faster than solids
- - Meal composition: fat slows gastric emptying
- - Particle size: smaller particles digest faster
- - Fiber content: fiber doesn't digest (doesn't contribute glucose); increases satiety



Artificial sweeteners

- •Artificial sweeteners like sorbitol, mannitol and xylitol have a lower calorie content than sucrose
- •Their consumption may cause gastric discomfort in some patients.
- •Non-nutritive sweeteners approved by the FDA like aspartame and sucralose must be consumed within Acceptable daily intakes (ADI).
- Acceptable Daily Intake: **5 milligrams for each kilogram of body weight.**

Protein

- •Protein requirements in children and young adults is same as the normal children or young adults (1.0 g/kg body wt.)
- •In patients with diabetic nephropathy – to control albuminuria, protein intake is lowered (0.6-0.8g/Kg body wt.) according to condition of the patient.
- •Rich sources – milk and its products, legumes, whole grains, fish, chicken, egg white etc.

Fats

- •Total fat intake should be lowered to 20% or less of the day’s energy requirements in case of obese, adult diabetics.
- •As diabetics have an increased risk of atherosclerosis, the total amount of fat must be restricted.
- •PUFAs (ployunsaturated fatty acids) and MUFA (monounsaturated fatty acids) should be preferred over SFAs (saturated fatty acids)

Fat(cont.)

- PUFAs sources to be included – corn, sunflower, safflower etc.
- • SFAs to be avoided include – butter,lard.
- • MUFAs sources to be included–olive oil, Avocado etc.

Fat (cont.)

- Total dietary cholesterol should be <200 mg per day.
- Saturated fat intake should be no more than 7% of daily food intake
- Nonfried fish should be eaten weekly, as a form of omega-3 fatty acids, which can reduce adverse cardiovascular disease outcomes
- **Plant sterols**(cholesterol-like compounds) can block intestinal absorption of cholesterol and lower total plasma low-density lipoprotein cholesterol, if intake is about 2 g per day(plant source).

Plant stanols and sterols

- Also known as phytosterols, are cholesterol-like compounds that are found naturally in a range of plant-based foods including vegetable oils, grain products such as breads and cereals, seeds, nuts, legumes, and fruits and vegetables.
- Nuts especially peanuts and its by- products of flour, oil and butter, soybeans, wheat germ, and corn oil are also good sources of sterols as well as stanols.
- Sparse evidence have suggested that a daily consumption of 1.5–2 g/day of plant sterols/stanols reduces triglycerides by 6–20% and increase high-density lipoprotein cholesterol (HDL-C) by 5–11%, but mainly in individuals with atherogenic dyslipidemia .

Common Foods Rich in Plant Sterols and Stanols

- Carrots.
- Sweet Potatoes.
- Pumpkins.
- Tomatoes.
- Apricots.
- Spinach.
- Broccoli.

Vitamins and Micronutrients

- • Vitamin and mineral requirements are same as healthy children or young adults.
- • Fresh fruits and vegetables should be recommended as they are rich sources of vitamins and minerals.
- Routine vitamin/mineral supplementation for people with diabetes is not currently recommended by the ADA.

Vitamins and Micronutrients(CONT.)

- Populations that may benefit from a multivitamin/mineral supplement include :
- The elderly,
- Pregnant or lactating women,
- Strict vegetarians,
- Individuals with digestive and absorptive abnormalities,
- And people on caloric restriction for weight loss purposes.

Salt

- Sodium Recommendations: < 2,300 mg/day is the general guideline when restricting sodium.
- Further reductions may be needed for some people.
- The first tip is to stop using the salt shaker.
- Salt has about 2,300 mg sodium per teaspoon.
- Processed foods are usually high in sodium.
- For label reading, low sodium is defined as < 140 mg/serving.

Antioxidants:

- Diabetes does increase oxidative stress, but to date, clinical trials have not supported the need for supplementation of antioxidants such as vitamin E, C, and carotene.
- There is lack of evidence for efficacy and concerns related to long-term safety.

Fluids:

- When the blood sugar is elevated, the kidneys try to eliminate some of the glucose through increased urination.
- Hyperglycemia therefore increases the risks of dehydration.
- Individuals with diabetes should be encouraged to drink a minimum of 8-10 cups of fluid per day.
- Consider the carbohydrate intake of beverages chosen.
- Liquid concentrated carbohydrate sources such as juice, sports drinks, or regular soft drinks can exacerbate hyperglycemia

Fiber:

- 14 grams of fiber per 1,000 calories is the fiber goal for the general population.
- Women generally should aim for 21-25 grams of fiber per day, and men 30-38 grams per day.
- A food that has 5 or more grams of fiber per serving is considered a high fiber choice, foods with more than 3 grams of fiber per serving are good choices.
- A simple guideline is to make half of the grain foods “whole grains” when planning menus.
- Whole grain choices include brown rice, oatmeal, barley, quinoa, millet, and whole grain breads, pastas and tortillas.
- Legumes (beans and lentils) are excellent fiber sources

Diet and Feeding pattern

- •Amount and time of food intake particularly the carbohydrates, should be controlled to prevent fluctuations of blood glucose beyond the normal range.
- •Intake of refined sugar and refined cereals should be low as blood glucose levels rise sharply shortly after consumption.
- •Avoid “Fasting” and “Feasting” in diabetics – to avoid fluctuations – not miss a meal or overeat.

Diet and Feeding pattern(cont.)

- • Small and frequent meals with in between meal snacks should be provided according to the blood glucose levels at different meal timings – individualized approach is beneficial.
- • Adjustment should be made for exercise and appetite.

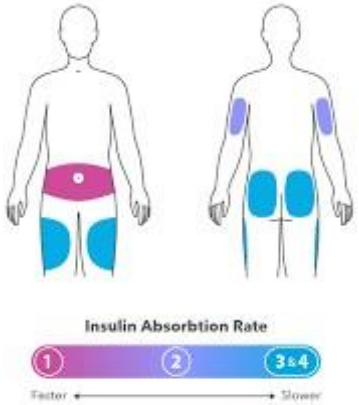
Diet and Feeding pattern(cont.)

- Foods not allowed: Glucose, sugar, honey, sweets of different types, chocolates, candies.
- Foods to be avoided: Potatoes, sweet potatoes, mangoes, grapes, bananas, alcohol, fried foods ,cakes, pastries etc.
- Foods to be used freely: Green leafy vegetables, tomatoes, cucumber, raddish, lemon, black coffee and tea without sugar.

Healthy eating guidelines(cont.)

- Aim to include at least 4-5 portions (3 veg, 2 fruits) of fruit and vegetables each day to increase dietary fiber.
- • Take more of Green leafy vegetables, whole grains, salads with every meal
- • Avoid baked items, red meats, salted nuts etc.
- • Regulate and reduce salt and sodium intake.
- • Watch for food selection while eating out.

Physical Activity and Exercise



- • It increases efficiency by increasing the number of i r rs on muscle cells.
- • Helps to reduce CVD risk factors, control weight.
- • Type1 DM: – glycemic response to exercise depends on overall diabetes control, plasma glucose, and insulin levels at start of exercise. As well as type and duration of exercise.
- – Hypoglycemia may occur due to increased glucose uptake by exercising muscles.
- – Extra exchanges of CHOs depending on these factors are given according to insulin dosages to avoid hypoglycemia.

Physical Activity and Exercise

- Type 2 DM:
- – Blood glucose levels improves due to increase in physical activity due to decreased insulin resistance, better insulin sensitivity.
- – Weight reduction in case of type 2 diabetes leads to overall improvement in the condition of diabetic patient.
- – CHOs may be adjusted after allowing sufficient exchanges for extra exercise/ physical activity.

Physical Activity and Exercise

- Safety note: Patients should be screened for cardiovascular problems, peripheral arterial disease, retinopathy, nephropathy, neuropathy (both peripheral and autonomic) and have a complete foot exam prior to beginning an exercise regimen.
- Sudden death and silent myocardial ischemia can occur in patients with cardiac autonomic neuropathy.
- The presence of complications may impose certain restrictions on the types of activities attempted.
- For example, individuals with peripheral neuropathy should not jog, jump rope or do stair master as diminished feeling in the feet can cause poor positioning and damage the feet.

Physical Activity and Exercise(cont.)

- . For many individuals who are not currently exercising, it is important to begin with even a small amount of increased activity and gradually work towards a more structured exercise routine.
- Even a 5 minute walk to the corner is a reasonable place to start for some very inactive individuals.
- Then week by week the duration can increase by 5 more minutes until the person is walking at least 30 minutes a day, most days of the week.

OBESITY &DM

- Obesity exacerbates insulin resistance.
- For patients with type 2 diabetes that are overweight or obese to begin with, moderate weight loss (5-7 % of body weight) has been shown to decrease insulin resistance, even if desirable body weight is not achieved.
- People who are at risk for getting type 2 diabetes, those that have "pre-diabetes", may reduce their risk of progressing to diabetes by losing weight, exercising (minimum of 150 minutes per week) and implementing healthy diet and lifestyle changes.

OBESITY &DM

- Central obesity, heavy around the waist, or apple shaped physique holds the highest risk for obesity related morbidities.
- A quick assessment tool is waist circumference.
- Men with a waist circumference greater than 40 inches, and women with a waist circumference greater than 35 inches are at the highest risk.
- Additionally the waist-hip ratio can be calculated.
- Waist measurement divided by hip measurements is the calculation.
- When the number is greater than 1.0 in men or 0.8 in women, the health risks increase.

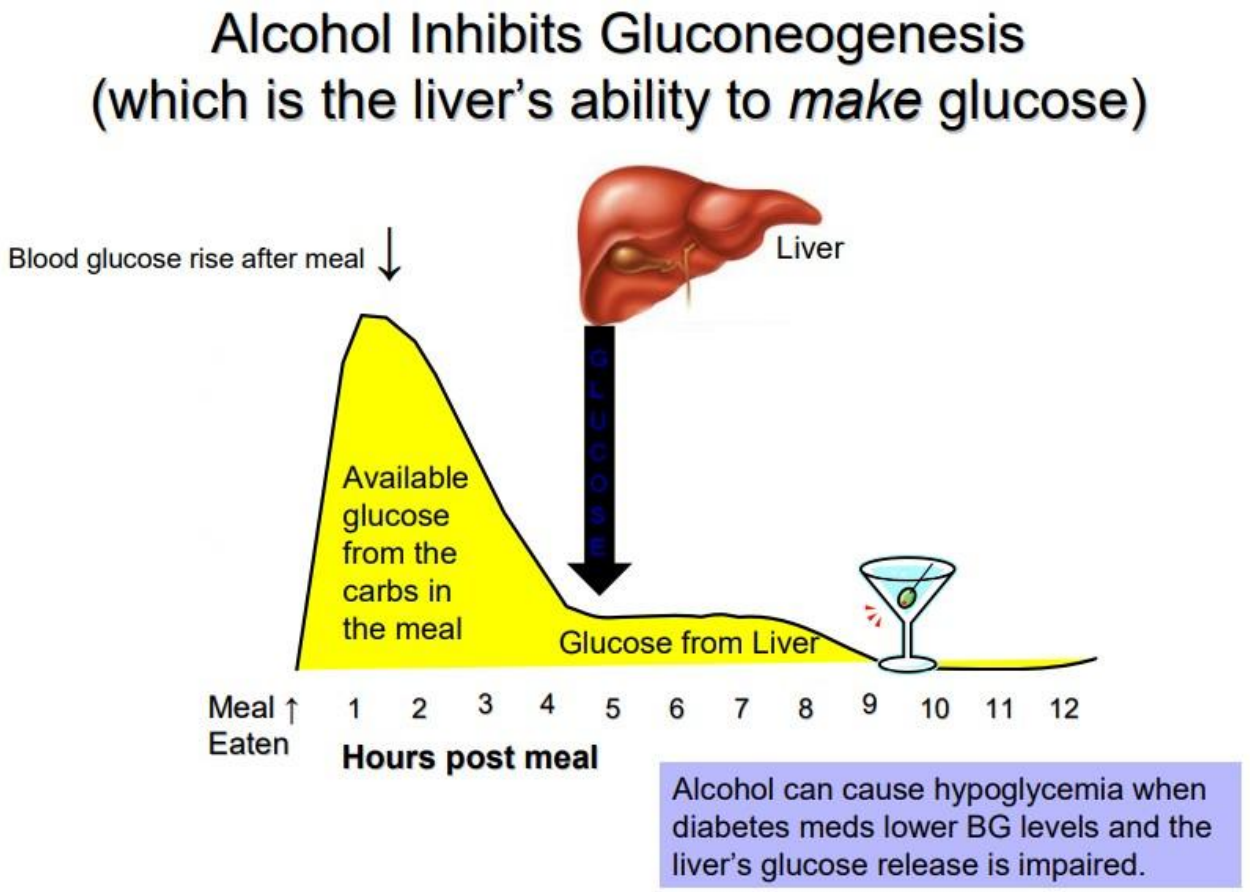
Screening children for type 2 diabetes.

- All children who are overweight (BMI> 85th% or weight > 120% of ideal for height) and over 10 years old or onset of puberty should be screened every 3 years if they have any 2 of the following risk factors:
- Family history of type 2 diabetes
- Member of a high-risk ethnic group
- HTN

Screening children for type 2 diabetes

- Lipid abnormalities
- Polycystic ovary syndrome (syndrome of menstrual irregularities, obesity, hirsutism and multiple ovarian cysts)
- Acanthosis nigricans (dark, plaque-like skin lesions often associated
- with obesity)
- Maternal history of GDM

Alcohol &DM


Alcohol Inhibits Gluconeogenesis
(which is the liver's ability to *make* glucose)
Blood glucose rise after meal
Liver
Available glucose from the carbs in the meal
Glucose from Liver
Meal Eaten
1 2 3 4 5 6 7 8 9 10 11 12
Hours post meal
Alcohol can cause hypoglycemia when diabetes meds lower BG levels and the liver's glucose release is impaired.

Alcohol &diabetes

- . The liver can’t make glucose effectively if it is busy detoxifying alcohol.
- With alcohol in the system, and the diabetes medications at work, the blood sugar can quickly drop too low.
- Diabetics who drink alcohol must be educated about risks for nocturnal hypoglycemia if it is consumed at night without food.
- **Complete abstinence from alcohol should be advised if the patient has severe peripheral neuropathy and hypertriglyceridemia.**

Other Safety Considerations:

- Alcohol can mask the symptoms of low blood sugar, so someone who has been drinking may not realize he/she is hypoglycemic.
- Drinking alcohol may impair good judgment and interfere with diabetes self management.
- Glucagon injections may not work effectively to raise the blood sugar since glucagon hormone stimulates the liver to release glucose and alcohol impairs that process.
- If a person passes out from low blood sugar, other people may suspect intoxication and may not know to seek appropriate medical attention.

Gestational DM

- Gestational diabetes (GDM) was previously defined as glucose intolerance with onset or first recognition during pregnancy
- The mainstay of treatment for all women with GDM is medical nutrition therapy (MNT).
- MNT is sufficient as sole therapy for approximately 80%–90% of women.
- Lifestyle interventions have been associated with decreased risk
- of macrosomia and decreased neonatal adiposity,shoulder dystocia, caesarian section, preclampsia as well as decreased risk
- of postpartum depression and 1st trimester complications as congenital anomalies and abortion .

GDM Complications

- Women with gestational diabetes are at higher risk for:
- Caesarean delivery.
- Fetal birth defects.
- Stillbirth.
- Macrosomia
- Neonatal hypo glycemia.
- Additionally, these women have a 7-fold increased risk of developing type 2 diabetes later in life.

Risk factors for GDM:

- Overweight or obese
- Ethnicity: African American, Native American, Asian American, Hispanic American, Pacific Islander
- Age > 25
- Family history of diabetes History of abnormal glucose tolerance
- History of delivering a baby > 4000 grams, (8.8 pounds)
- History of poor obstetrical outcomes such as still birth

Gestational DM

- Screening for GDM is scheduled for 24-28 weeks gestational age:
- Perform 75 g OGTT after an 8 hour fast .
- Abnormal Values in mg/dl for OGTT :
- Fasting > 92
- 1 hour > 180
- 2 hour > 153

Gestational DM(CONT.)

- Women are advised to eat three small- to moderate-sized meals and two to four snacks that are balanced in whole-grain carbohydrates, protein, and unsaturated fats.
- Breakfast is typically smaller than lunch and dinner as carbohydrate intolerance is commonly more pronounced at the morning meal.
- Pairing protein with carbohydrate at all meals and snacks is emphasized, not only to increase satiety but also to blunt postprandial carbohydrate-induced glycemic excursion.
- A bedtime snack is often necessary counteract the tendency toward accelerated starvation (and resulting ketosis) that accompanies the overnight fasting state.
- When glycemic goals are not met with MNT, insulin therapy is added.

Gestational DM(CONT.)

- Women are asked to monitor capillary blood glucose fasting and 1 h after meals to guide insulin dose adjustments,
- and to monitor urine ketone levels 1–2 times daily to assess for excessive restriction of carbohydrate intake.
- Glucose targets are:

a) fasting ≤ 95 mg/dL (5.3 mmol/L)

b) 1-h postprandial glucose ≤ 140 mg/dL (7.8 mmol/L)

c) 2-h postprandial glucose ≤ 120 mg/dL (6.7 mmol/L)

Postpartum care:

- 1.) Women with GDM should be encouraged to breastfeed.
- 2.) ADA recommends screening women for type 2 diabetes 6-12 weeks postpartum and then every 3 years.
- We strongly recommend screening prior to subsequent conceptions to make sure type 2 diabetes hasn’t developed to decrease risk for congenital anomalies.
- 3) Women with history of GDM who develop pre-diabetes after delivery should be offered lifestyle interventions and metformin