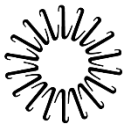


Lifespan Cardiovascular Institute

Rhode Island Hospital • The Miriam Hospital
Newport Hospital

Delivering health with care®

Diabetes Mellitus

STATISTIC

- According to the ADA there are 26 million people living with diabetes.

- Recent numbers by the CDC indicate that every 17 seconds someone is diagnosed with diabetes
- Diabetes is the 7th leading cause of death in the US

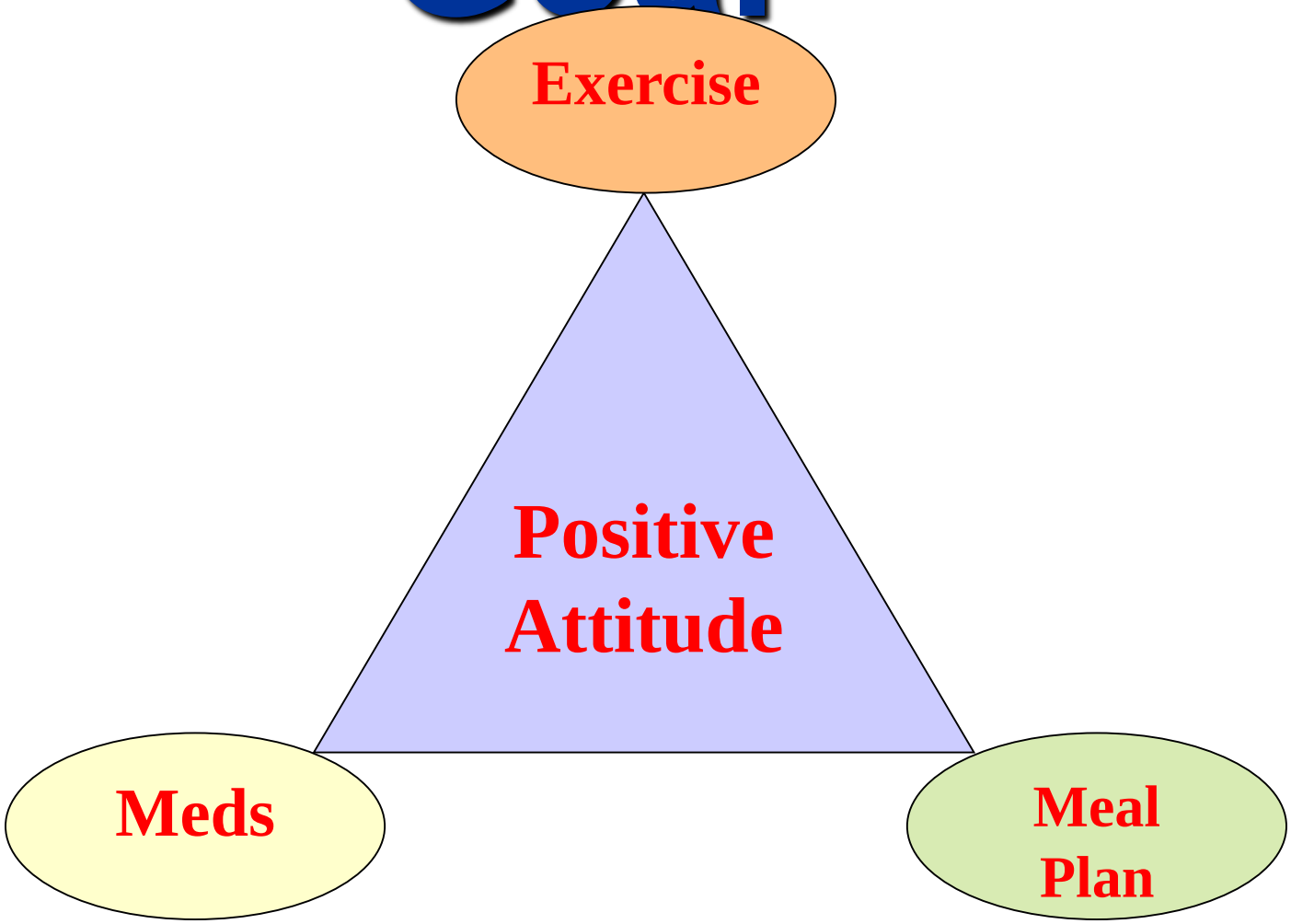
What is Diabetes?

- Diabetes consists of a group of metabolic diseases characterized by inappropriate hyperglycemia resulting from defects in insulin secretion, insulin action, or both

What is Diabetes

- Diabetes can lead to serious complications and premature death, but you can take measures to reduce the chance of such occurrences.
- Diabetes can lead to blindness, heart attack, stroke, and kidney failure

Goal



GOAL

- Become active participant in your care.
- Gain knowledge about nutrition and medications.
- Self monitoring of your blood glucose.
- Prevention and treatment of short and long term complications, foot care, travel tips, managing stress, exercise, and care on sick days.

Understanding Diabetes

- Foods we eat are made up of carbohydrates, protein, fats.
- These nutrients are essential in a healthy diet
- After we have eaten, the glucose (sugar) is absorbed from the small intestine into the blood stream and carried throughout the body to be used by the cells for energy.

Understanding Diabetes

Carbohydrates

The Body's Prime Source of Energy

Understanding Diabetes

Protein

Necessary for growth and tissue maintenance and is a potential source of energy

Understanding Diabetes

Fats

Used as an energy source
Also is an insulator
and Protects our vital organs

Glucose

- All cells in our body need glucose for energy.
- Muscle cells use it to walk.
- Brain cells use it to think.
- Nerve cells use it to feel.
- Glucose can not enter the cells without a hormone called insulin.

Insulin

- Insulin is a hormone produced in the beta cells of the pancreas.
- Insulin is the "key" that unlocks the door to the cell so glucose can enter.
- Once glucose enters the cell it is changed into energy and used by the body or stored for later use in the form of glycogen or fat.

- In diabetes there is either no insulin produced, or not enough insulin, or the body can not use the insulin efficiently.
- Glucose builds up in the blood stream and this is called Hyperglycemia (High blood sugar)

What Do The Numbers Mean?

- Normal Fast Blood Sugar 70-110
- Impaired Fasting Blood Sugar 111-125
- Diagnosed with DM=
- Any Blood Sugar Fasting Over 126
- Not Fasting Over 200 with symptoms

DIAGNOSIS

- Acute symptoms of diabetes plus random plasma glucose ≥200mg/dl
- Fasting plasma glucose ≥126mg/dl
- Two-hour plasma glucose ≥200mg/dl during a 75-g oral glucose tolerance test (OGTT).

RISK FACTORS

- Family History
- WEIGHT
- RACE
- AGE
- PREGNANCY
- STRESS AND TRAUMA

OTHER RISKS FACTORES

- Overweight/Central obesity
- Inactivity
- High triglycerides
- Pima Indians, Asian, Hispanic, African and Native Americans
- History of large babies (over 9 lbs)
- Gestational diabetes during pregnancy

Types of Diabetes

- Type 1 Pancreas does not produce any insulin. Absolute insulin deficiency

- Type 2 Something wrong with cell membrane, decreased sensitivity, insulin resistant, decreased production of insulin by the pancreas

STATISTICS

- Type 1 about 5-10% have it.
- Type 2 about 90% of all diabetics
- Gestational Diabetes occurs during pregnancy at 6-9 months because hormone levels are high, and pancreas can not produce enough insulin.

Type 1

- Insulin deficient
- Under 20
- Develops suddenly
- Hereditary minor role

Type 2

- Insulin resistance, not enough
- After 40
- Develops over years
- Hereditary 80%

Type 1

- Weight not factor
- Virus triggered immune response
- Only RX Insulin
- More common with Caucasian

Type 2

- 80% overweight at diagnosis
- sedentary lifestyle
- Hispanic, Asian, Native American, African American

DCCT STUDY

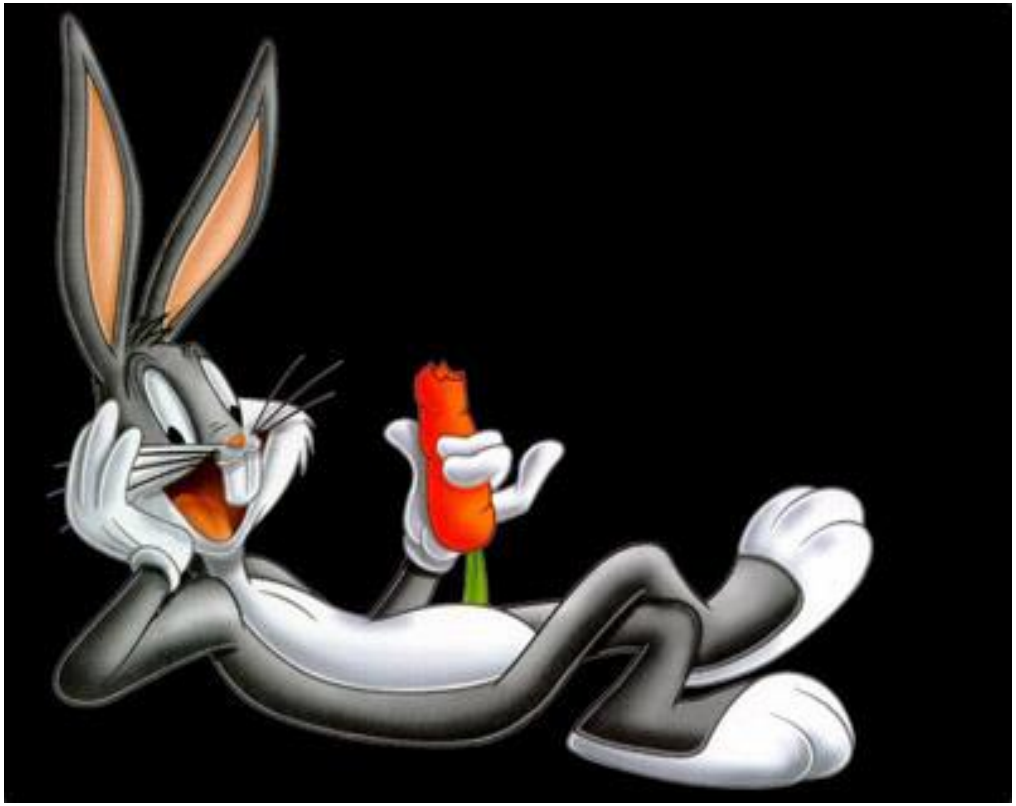
- Diabetes Control and complication Trial
- Lowering Blood Sugar Reduced Risks of Diabetic complications- here are the results:
- Eye diseases 76%
- Kidney diseases 50%
- Nerve diseases 60%

Feelings

- How did you feel when you were first diagnosed with Diabetes?

- Natural to feel angry, sad, alone, and scared
- Relieved
- Denial
- Important to share your feelings
- Keep a positive attitude

BREAK



SIGNS AND SYMPTOMS

HYPERGLYCEMIA

- Blood sugar over 200
- Extreme thirst, frequent urination, dry skin, hunger, blurred vision, drowsiness, and decreased healing

Hyperglycemia

- Frequent infections
- Unexplained weight loss
- Fatigue
- Muscle cramps
- Impotence
- Some people have no symptoms

REASONS

- Not enough insulin and too much food
- Infection, Illness , Fever
- Emotional stress
- Poor food choices
- Not enough or forgot medication
- Change in medication

Treatment

- Test blood sugar frequently
- Check urine for ketones (type 1)
- Call Doctor (over 300mg/dl)
- Drink extra sugar-free liquids
- Determine cause and prevent in future if possible

Hyperglycemia

- Call your physician if your blood sugar is persistently over 200
- Take medication as prescribed by your physician
- Treat any infection or illness

Hypoglycemia

- Blood sugar below 70
- Sweaty
- Fast heart beat
- Shaky
- Anxious
- Hunger
- weakness
- Fatigue
- Headache

- Irritability, unusual angry, crying, and nervousness hungry
- Cold sweat
- “wet” symptoms/signs
- Lower blood sugars- loss of consciousness, confusion

REASONS

- Too much insulin/medication
- Not enough food
- Unusual amount exercise
- Delayed or skipped meals

Treatment

Fast acting sugar

1cup skim milk

4oz orange juice

4oz regular soda

3tsp sugar or honey

6 lifesavers

3 glucose tablets
re-test after 15 min

Blood sugar low or symptoms, repeat fast acting sugar

Wait 15 min retest

If, have snack

Blood sugar testing (HBGM)

- WHY TEST- guidelines for treatment and plan, gives you feedback
- WHO TEST- Type 1 3-4xday. Type 2 reach optimal goals.
- WHEN- fasting, 2 hour after meals, bedtime, 2 or 4 am
- WHERE- Finger and alternate sites (forearm, palm of hand)
- HOW- Proper technique, side of finger

GUIDELINES FOR TESTING

- Store strips and solution according to manufactures guidelines
- Avoid exposure to heat, cold, and humidity
- Check expiration dates and calibrate meter (control solution)
- Keep cap on the strips
- Match code numbers
- 10-15% difference serum vs. whole blood
- Monitoring has revolutionized management of diabetes

Types of Meters

- light reflectance meters.
- Electrophoresis technology meters.
- All kinds to suit individual needs.
- Find out from insurance where to purchase meters.
- Companies that will come to house and demonstrate meters.

OBTAINING BLOOD

- Warm fingers , Hang hand lower than heart
- Dry finger, Locate site, Use proper lancing device, Press end-cap against finger when puncturing
- Relax hand, gentle squeeze
- Let drop collect, touch drop to strip or cover strip completely

COMMON ERRORS

- Not enough blood (some meters require more blood than others)
- Uncovered bottle/storing strips in bathroom (moisture)
- Code strips do not match
- Outdated supplies

HbA1c

- The HbA1c test measures the amount of glucose in your blood over 3 month period
- Glucose binds to your hemoglobin molecule
- Test is done upon diagnosis then usually every 3 months

HbA1c

Blood sugar

Target Glucose levels

TIME	ADULT	ELDERLY
Fasting	80 – 100 mg/dL	100-150 mg/dL
1 Hour after	140 – 160 mg/dL	150 – 200 mg/dL
2 Hour after	120 – 140 mg/dL	100 – 160 mg/dL
Bedtime	100 – 140 mg/dL	100 – 160 mg/dL
2 – 4 a.m.	80 – 120 mg/dL	100 – 160 mg/dL

ACTION NEEDED

- Pre-meal- < 70 or > 130 mg/dl
- 1 Hour after meal - Over 180mg/dl
- 2 Hours after meal - Over 150mg/dl
- Bedtime - <80 or > 160mg/dl

Pattern Management

- Review several days of glucose records.
- Look for a pattern (sugars out of range)
- Food, exercise, stress, illness
- Timing is variable depending on goals and meds.

Exercise

- Helps control blood glucose
- Improves insulin sensitivity
- Improves glucose tolerance

EXERCISE BENEFITS

- Feel better physically and mentally
- Improve cardiac function and circulatory function
- Improves self esteem and self image
- Manage stress
- Provides social interaction
- Controls weight

SAFTEY TIPS- EXERCISE

- Start out gradually
- Carry short acting sugar source
- Test blood sugar before and after
- Do not inject in muscle arm or leg
- Wear proper identification
- Carry ID bracelet

SAFTEY TIPS- EXERCISE

- Find exercise you enjoy 10-30 minute a day, 3 times a week
- Bring a friend
- Wear supportive shoes and sneakers
- Do not exercise in extreme weather (too hot or cold)

SAFTEY TIPS

- Exercise 1 hour after meal and not while insulin peaking
- Stop if you develop any chest pain, SOB, lightheadedness, or low blood sugar symptoms
- Include warm up and cool down
- Drink enough fluids and maintain hydration while exercising

Carbohydrate replacement during exercise

- Intensity Duration Replacement frequency
- Mild to moderate <30 may not be needed =0
- Moderate 30-60=15 Grams each hour
- High 60=30-50 Grams each hour

CAUTION

- Neuropathy- water aerobics, swimming, biking. No impact exercises
- Retinopathy-no holding breath, resistance training, or high impact aerobics
- Unable to walk- Do chair exercises
- Do not exercise if blood sugar over 300mg/dl – or below 100mg/dl
- Avoid if having blood sugar problems
- Be aware if on beta blockers hypoglycemia can be masked

CAUTION

- Use caution walking outdoors
- Avoid lower head position
- Avoid weight training
- Blood sugar levels can be affected for up to 24 hours, and peak effect after 4 hours

THINGS TO DO

- Exercise with a partner
- Use proper footwear and protective equipment
- Inspect feet daily
- Monitor blood glucose before and after exercise
- Stay in your safe target heart rate zone

TARGET HEART RATE

- Measurement obtained from a stress test
- Stress test preformed on everyone over 35 with diabetes
- Different formulas used for safe target heart rates
- Percentage of max heart rates

TYPES OF EXERCISE

- **AEROBIC**- greatest benefit
- Exercise includes repetitive sub maximal contraction of muscle groups and requires oxygen to sustain muscle effort.
- **ANAEROBIC**
- Exercise that does not require sustained oxygen to meet energy demands

EXERCISE

AEROBIC

- Swimming, cycling, jogging, walking
- Greatest benefit for people with diabetes in terms of blood glucose control and cardiovascular status

ANAEROBIC

- Strength training
- Improves strength and body composition
- Improves cardiovascular function and glucose tolerance

EXERCISE PROGRESSION

- USE TARGET HEART RATE AND RPE SCALE
- DURATION- Amount of time on equipment
- INTENSITY- Work load set on equipment
- FREQUENCY- How often exercise in a week

GOALS

- Pick something fun that you will continue
- Plan exercise time appropriately
- Stick to your plan
- Reward yourself (BUT NOT WITH FOOD)

BREAK

COMPLICATIONS

- Studies show that complications are not inevitable. (DCCT, UKPDS)
- Reduction of modifiable risk factors essential in diabetes self management
- It is never too late to improve control and halt progression of illness

COMPLICATIONS

- DCCT studies lowering blood sugar reduce
- Eye diseases 76%
- Kidney diseases 50%
- Nerve diseases 60%

RISK FACTORS

Modifiable

- Hyperglycemia
- Smoking
- High blood pressure
- High lipid levels
- Increase platelet adherence
- Stress
- Eating habits
- Obesity
- Lack of exercise
- Type A personality

RISK FACTORS

Non-Modifiable

- Age
- Genetics
- Race
- Gender
- Length of time have diabetes

Large Vessel Disease

- Coronary artery disease- Heart circulation
- Myocardial infarction- death of heart tissue
- Peripheral vascular disease- circulation of arms and legs
- Cerebral vascular disease- Circulation of the brain

Complications

- 40% decrease in large vessel damaged with good control
- High glucose speeds up process of arteriosclerosis (hardening of artery) high risks of heart disease
- Large vessels in the legs can be affected by arteriosclerosis
- Circulations impaired ends to ulcers, infection, and gangrene

Small vessel disease

- Retinopathy- diseases of the eyes
- Nephropathy- diseases of the kidneys
- Neuropathy- diseases of the nerve endings

Small Vessel Disease

- Retinopathy is diseases of the eyes, such as high blood sugar damage tiny blood vessels of retina causes loss of vision, or blindness, blurred spots, and double visions
- 76% of diabetes eyes treatment with laser Rx
- Neuropathy is pain and loss of feeling in the hands and feet. Also, it can effect nerves in the heart, bladder, digestive system, and sexual organs

PREVENTION OF COMPLICATIONS

- Control blood sugars
- Eat healthy foods
- Quit smoking
- Control high blood pressure ideal 120/80
- Avoid salty food
- Exercise regularly
- Report infection
- Keep alcohol to a minimum
- Report any sudden or unusual change in vision
- Take your prescribed medications

PREVENTION OF COMPLICATIONS

- Cholesterol lower than 200
- Triglycerides lower than 150
- HDL high than 45
- LDL 70 or below
- Take cholesterol meds
- Exercise and eat healthy
- Quit smoking- damage vessels

DIABETES CARE SCHEDULE

- DAILY- foot inspection, HMBG
- EVERY 3 MONTHS- HgbA1c, Check blood pressure
- YEARLY- Dilated eye exam, kidney function tests, Dental check up, Lipid profile, See Podiatrist

FOOT CARE

- Inspect daily for redness, swelling, cuts, and sores
- Do not soak, but wash daily and use a mild soap
- Clean with dry pat
- Avoid extreme of temperatures
- Wear socks if cold no heating pads or water bottles.
- Never go out without shoes
- See podiatrist never walk on bare feet
- Review care of diabetic foot list
- Measure feet avoid high heels and pointed toes

Checklist for preventing complications - How Doctor can help

SICK DAYS

- Body breaks down fat for energy
- Ketones result
- Ketones are acids
- Acids lead to acidosis– Ketosis
- Causes- Infection, Injury, Surgery, Fever, Psychological upsets, Vomiting, Diarrhea, Head or Chest cold, Congestion, and flu

DKA-Diabetic keto acidosis

- Type 1
- Ketoacidosis
- Blood sugar 300-600mg/dl
- Severe GI symptoms
- Loss of appetite
- Vomiting
- Dehydrated
- Kussmall respirations
- Fruity breath
- Mentation alert to coma

HHNS- Hyperglycemic Hyperosmolar Non-ketotic Syndrome

- Type 2
- No Ketoacidosis
- Blood sugar 600-2000mg/dl
- Less GI symptoms
- Look like CVA
- Severe dehydration
- No Kussmall respirations
- Confusion to coma

HHNS

- If undetected lead to change in mental status or coma

  - Preventions
  - Test blood sugar regularly
  - Drink 8 oz/fl. of fluid first rapid diagnosis of flu or UTI
  - Educate yourself about diabetic symptoms

PREVENT DEHYDRATION

- Minimum amount of fluid
- Drink every half hour
- Monitor ketones
- Monitor for fever Call if fever is =>101.5

UNABLE TO EAT

- *If Able to eat regular meal*, drink ½ cup calorie free fluid every hour while awake. Broth, caffeine free tea, sugar free soda, water.
- *If Unable to eat regular meal*, try to drink fluid containing 15 grams of Carbohydrate every hour

WHEN TO GET HELP

- Unable to stop vomiting after 6 hours
- More than 5 diarrhea stools in day
- Unable to get minimum amount fluid in 6 hours
- If you have taken extra insulin and blood sugar still elevated
- Moderate to large ketones in urine
- Blood sugar over 250
- Fever above 101°F

WHEN TO GET HELP

- Dehydrated and getting worst
- Breathing rapid and deep
- Have infection in the legs
- Miss more than 1 day of work
- Pain upon urination or bladder infection
- Change in mental status

Sick Day Box

- regular soda
- Canned soup, or Instant soup
- Regular pudding or jello made quickly, or snack pack
- Canned fruits or small bottle of juice
- Ensure-nutritional liquid supplementary

Additional items in sick box

- Diary to record blood sugars
- Doctors name and telephone number
- List of medications
- Ketone strips that are individually wrapped
- List of foods that give you 15gm. Of easily digested carbohydrates
- Menus that spell out what to eat when sick
- Extra testing supplies, such thermometer, Tylenol OTC meds

Doctor visits

- Think about why are you going
- What questions do you have
- Talk it over with someone else
- Write questions down
- Bring written questions
- Log book
- List of medications and dosages
- Paper and pencil

Break

Travel Tips

- Diabetes medication and supplies. Enough to last the duration of the trip and 1 extra week supplies.
- Written prescription from a physician
- Extra batteries for meter.
- If you take insulin use insulated carrying case for your supplies.
- Pack meds and supplies in your carry on bag.
- Do not store in glove compartment or

Travel Tips

- Keep quick-sugar source with you
- Glucagon emergency kit if you inject insulin
- Snacks that fit your meal plan
- Medical identification- card, necklace, or bracelet
- Diary or logbook with pen and paper
- Letter from doctor states diabetes, management plan, emergency instructions

Travel Tips

- Prescriptions for all medicines with generic names included that you take
- Medical insurance card and phone number
- Nonprescription meds such as pain relievers, sugar free cold medicine
- First aid supplies for minor cuts and blisters
- Doctors phone number and medical assistance numbers

Travel Tips

- Packets of sugar substitute
- Sunscreen with 15SPF sunglasses with 90%UVA and UBV protection
- Extra pair of eyeglasses or contacts
- Sturdy comfortable broken in shoes
- Lots of good socks
- Extra cash (for taxis, vending machines)
- Telephone calling cards for emergencies

TRAVEL

- Car travel- Do not store insulin or meds in the dash board, trunk
- Travel with someone
- Carry extra food
- Plane- plan appropriate snacks (flight delays, etc.) do not leave insulin in baggage keep in your carry-on with your glucose meter/supplies, medications
- Tell hostess your health problem

TRAVEL

- Drink plenty water
- Sugar free liquid
- Adjust meals, snacks for time zone
- If injecting insulin during flight, inject ½ air into syringe
- Keep supplies in carry on

WORLD TRAVELER

- Avoid drinking tap water in the following countries:
- Cuba, Mexico, South America, Asia, and Africa contain bacteria in the water that cause diarrhea and vomiting
- Bring sugar substitute packages
- Sunny place- use sunscreen with SPF-15, wear sandals, and hat on the beach
- Keep insulin in the small cooler where it can be protected
- Emergency kit with first aid supplies

STRESS

- A physical and emotional reaction to a situation that is perceived both as a threat to ones well being and as unmanageable.
- Stressor is a condition or situation that causes stress
- Name some stressors both good and bad
- Fight or flight reaction

THE BODY'S RESPONSE TO STRESS

- Endocrine system- thyroid releases thyroxin
- Adrenal glands- Cortex releases glucocorticoid (cortisol)
- Medulla releases epinephrine and norepinephrine
- Autonomic nervous system/ Sympathetic nervous system
- Gastrointestinal system-symptoms
- Blood serum cholesterol

ATTITUDE

- Positive attitude
- Personalities- Type A vs. Type B
- Coping style- Problem solving attitude
- Talk themselves into accepting situation
- Change mindset Persevere

Handling Stress

- Relaxation
- Exercise
- Support
- Humor
- Reality check
- Lifestyle

TREATMENT FOR STRESS

- GUIDED IMAGERY- Relax and use the power of your mind and mental energy on positive physical change
- PROGRESSIVE RELAXATION- This method contracts and relaxes muscle groups

EVALUATION

THANK YOU FOR ATTENDING