

Concept- Metabolism

Exemplar- Diabetes

Type 1 Diabetes

- Usually diagnosed before age 20
- Caused by autoimmune destruction of the pancreatic Beta cells- results in total absence of insulin production
- Can be genetically linked

Diagnosis

- Symptoms develop when the pancreas can no longer produce sufficient amounts of insulin to maintain normal glucose.
- Onset of symptoms is usually rapid- patients are often initially seen with impending or actual ketoacidosis.
- Patient usually has a history of recent and sudden weight loss, polyuria, polyphagia, polydipsia, weakness, and fatigue.

Medical Management

- Requires insulin from an outside source to sustain life.

Type 2 Diabetes

- Pancreas produces insufficient amounts of insulin, insulin is poorly used by the tissues, or both.
- Risk factors- Obesity, family history, and increased age

Diagnosis

- Onset is usually gradual. Can go undetected for many years.
- Usually diagnosed through routine laboratory testing.
- Symptoms usually include polyuria, polyphagia, polydipsia, fatigue, recurrent infections, prolonged wound healing, and vision disturbances/changes. (Hyperglycemia)

Hypoglycemia

- Symptoms- mostly CNS related- cold, clammy skin, numbness/tingling, dizziness, unsteady gait, tremors
- Usually rapid onset
- Use the "Rule of 15" to treat- 15g of simple carbohydrate and recheck capillary blood glucose in 15 minutes.
- Preventative Management-
 - Take medications as directed
 - Accurately administer injections
 - Ingest all recommended foods at proper time
 - Provide adequate food intake for activity
 - Recognize symptoms and treat immediately
 - Carry simple carbohydrates

- o Educate family and caregiver about symptoms and treatments
- o Check blood glucose as ordered
- o Wear a medical alert ID
- Treatment (Interventions)
 - o "Rule of 15"- Consume 15g of simple carbohydrates and recheck blood glucose in 15 minutes (example- 4-6oz regular soda, 8-10 lifesavers, 1 tablespoon of syrup or honey, 4 teaspoons of jelly, 4-6oz of orange juice)
 - o Worsening/Unconscious Patient- SubQ or IM (faster acting than SubQ) injection of 1mg Glucagon, IV administration of 25-50mL of 50% glucose
 - o Nausea is a common reaction to Glucagon injection, turn patient on side as an aspiration precaution

Negative Consequences

- Diabetic Ketoacidosis (DKA)- profound insulin deficiency characterized by hyperglycemia, ketosis, acidosis, and dehydration.
 - o Symptoms- tachycardia, orthostatic hypotension, "sweet" acetone breath
- Hyperosmolar Hyperglycemic Syndrome (HHS)
- Macrovascular
 - o Diseases of the large and medium sized blood vessels
 - o Cerebrovascular disease, cardiovascular disease, PVD
- Microvascular
 - o Thickening of the membranes in the capillaries and arterioles
 - o Retinopathy, neuropathy, nephropathy, dermopathy

Medical Management

- Goal for A1C- 6-7%
- Meal Planning-
 - o Minimum of 130g/day of total carbs
 - o Fiber intake 25-30g/day
 - o Protein 15-20% of total calories
 - o Limit saturated fat and alcohol intake
 - o Consistency in timing and amount of food eaten daily
- Activity-
 - o 30 minutes 5 days/week of moderate intensity aerobic physical activity
 - o Schedule exercise about 1 hour after a meal
 - o Keep a 10-15g carbohydrate snack within reach
 - o Check capillary blood glucose before exercising
- Blood Glucose Monitoring-
 - o Enables the patient to make decisions regarding food intake, exercise/activity patterns and medication dosages
 - o Produces accurate records of daily glucose fluctuations and trends and alerts the patient to acute episodes of hypo and hyperglycemia
- Medications

- o *Biguanides* (Metformin)- Increases rate of hepatic glucose production. Side effects- diarrhea and lactic acidosis. Hold 1-2 days before IV contrast is used and 48 hours after.
- o *Sulfonylureas* (Glipizide)- Stimulates the release of insulin from the pancreas. Side effects- weight gain, hypoglycemia.
- o *Thiazolidinediones*- Increase glucose uptake in muscle, decreases glucose production. Side effects- weight gain, edema.
- o *Alpha Glucosidase Inhibitors*- Delay absorption of glucose from GI tract. Side effects- gas, abdominal pain, diarrhea.
- o *Meglitinides*- Stimulate a rapid and short lived release of insulin from the pancreas. Side effects- weight gain, hypoglycemia
- **Insulins**
 - o Rapid acting (Humalog, Novolog)- Onset 10-30 minutes, Peak 30 minutes-3 hours, Duration 3-5 hours
 - o Short acting (Regular)- Onset 30 minutes- 1 hour, Peak 2-5 hours, Duration 5-8 hours
 - o Intermediate (NPH)- Onset 1.5-4 hours, Peak 4-12 hours, Duration 12-18 hours
 - o Long acting (Lantus, Levemir)- Onset 0.8-4 hours, Peak none, Duration 24+ hours

Teaching Needs

- Disease process- Relationship of insulin and glucose, Type 1 vs. Type 2
- Physical activity- Effects on the management of blood glucose and general health management
- Menu planning- Importance of a well-balanced diet, effect of carbs on blood glucose
- Medication adherence- Proper use of prescribed meds, side effects of medications
- Blood Glucose Monitoring- Correct method, when to take, how to record, how to adjust insulin if necessary
- Risk reduction- Signs and symptoms and treatments for hyper and hypoglycemia
- Psychosocial- Diabetic resources and support groups available

Exemplar- Cushing's Syndrome

- Hyperfunction of the adrenal cortex

Symptoms/Assessment

- Personality changes
- Moon face
- Increased susceptibility to infection
- Males- gynecomastia
- Fat deposits on back
- Osteoporosis
- Hyperglycemia
- CNS irritability
- Na and fluid retention
- Thin extremities
- Purple striae