Sugar…… Diabetes and Other Endocrine Disorders

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April 2021

South Cook County EMS

Objectives

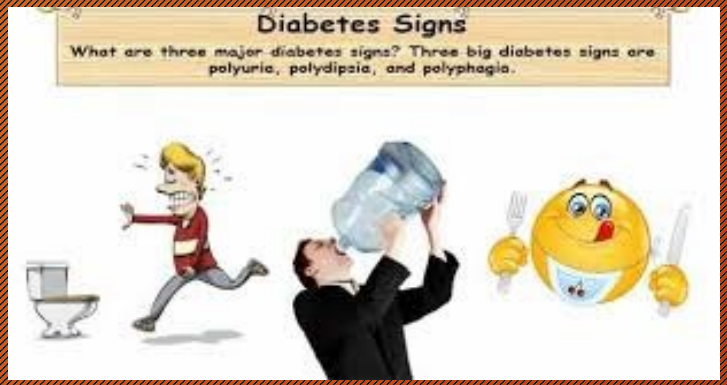
- Learn the differences between Type 1 and Type 2 Diabetes
- Management of the diabetic patient
- Dextrose vs. Glucagon
- The pathophysiology, s/s and assessment and management of hyper/hypothyroid
- Type of diabetic neuropathy

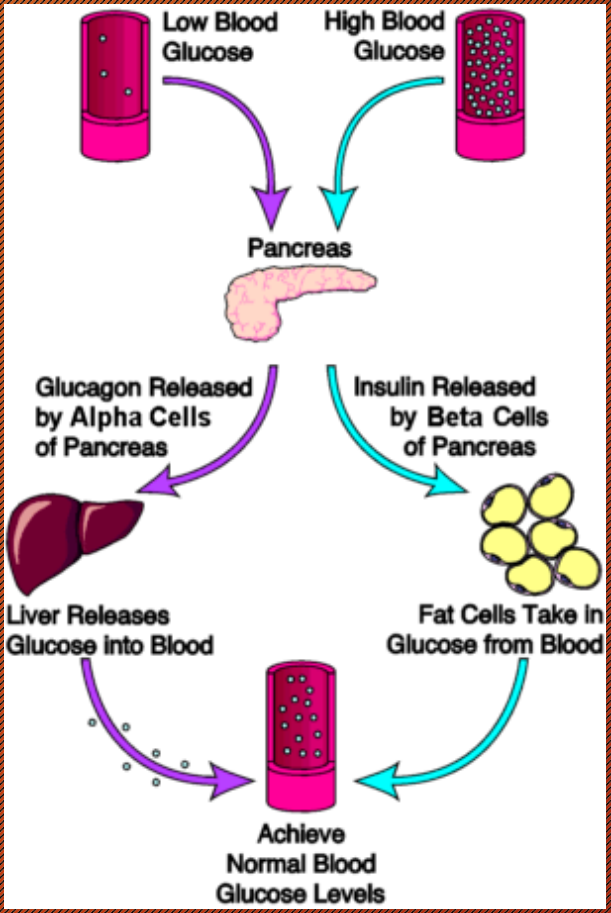
Diabetes

- **Diabetes** is a disorder characterized by hyperglycemia or elevated blood glucose (blood sugar).
- It is the most common endocrine disorder.
- There are two types of diabetes, one caused by insulin deficiency and the other by insulin resistance.

Diabetes

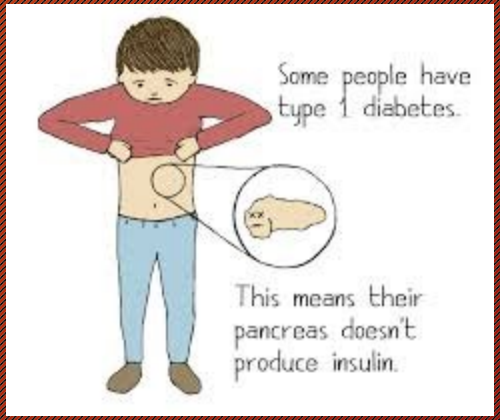
The Classic Symptoms	Other Symptoms Might Include
Polyphagia (frequently hungry)	Blurred vision
Polyuria (frequently urinating)	Fatigue
Polydipsia (frequently thirsty)	Weight loss
	Poor wound healing (cuts, scrapes, etc.)
	Dry mouth
	Dry or itchy skin
	Impotence (male)




Low Blood Glucose
High Blood Glucose
Pancreas
Glucagon Released by Alpha Cells of Pancreas
Insulin Released by Beta Cells of Pancreas
Liver Releases Glucose into Blood
Fat Cells Take in Glucose from Blood
Achieve Normal Blood Glucose Levels

Type 1 Diabetes

More than 700,000 Americans have this type of diabetes characterized by the onset in young persons (average age at diagnosis is 14).



Type 1 Diabetes

- Type 1 diabetics are less likely to have family members affected with diabetes than Type 2.
- Type 1 diabetes usually develops due to an autoimmune disorder.
- Type 1 diabetes must be treated with insulin shots.
- The amount of insulin must be balanced with food intake and daily activities.

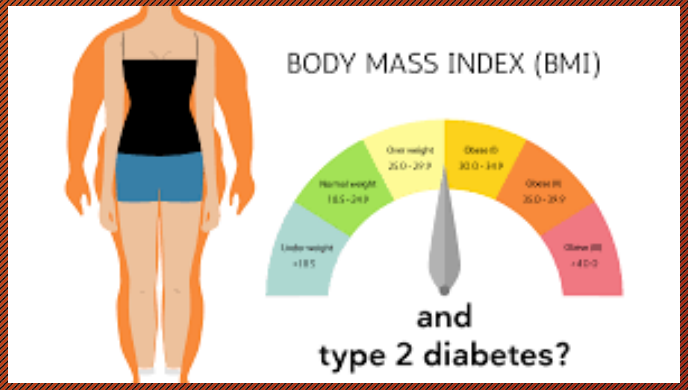
Type 2 Diabetes

Type 2 diabetes is more common than Type 1 and usually develops in middle age or later.

Type 2 diabetes tends to be fairly hereditary.

The degree of obesity also seems to be a factor.

The keys to disease management are diet, exercise, weight loss, oral anti-hyperglycemic agents and possibly insulin.



Insulin

- Insulin is a hormone produced by the pancreas that regulates the level of glucose, a simple sugar that provides energy, in the blood.
- Insulin is closely related to glucagon, another hormone secreted by the pancreas.

Types of Insulin

Name	Type	Onset	Peak	Duration
Humalog (Lispro)	Rapid	5-15 minutes	30-75 minutes	2-3 hours
Apidra (glulisine)	Rapid	5-15 minutes	30-75 minutes	2-4 hours
Novolog (Aspart)	Rapid	10-20 minutes	1-3 hours	3-5 hours
Regular (R)	Short-Acting	30 minutes	2-5 hours	5-8 hours
NPH (N)	Intermediate	1-3 hours	6-12 hours	16-24 hours
Lente (L)	Intermediate	1-3 hours	6-12 hours	16-24 hours
Ultralente (U)	Long-Acting	3-5 hours	8-14 hours	18 hours
Glargine Lantus	Very Long-Acting	1 hour	Evenly for 24 hours	24-28 hours
NPH & Regular Mixed in either 50/50 mix, or 70/30 mix	Premixed	30-60 minutes	2-12 hours	up to 18 hours

The insulin pump & other delivery routes

Currently, patients can deliver insulin by syringe, pen, infusion set and insulin pump.

The Insulin Pump:

- Becoming more popular
- Small electronic device which attaches subcutaneously
- Usually changed every two to three days

Got pump? ….

Do not touch the pump!

Did someone say dextrose?

- Should all hypoglycemic patients get dextrose IV? Not necessarily. If your patient is awake and able to swallow, administering a rapidly acting oral carbohydrates will increase blood glucose effectively.

Glucagon

- If no IV/IO dextrose is available, administer Glucagon 1 mg IM/IN for adults (.03 mg/kg IM/IN, not to exceed 1mg for peds). Observe and record responses to treatment. Recheck glucose level in five minutes. Remember that IM glucagon raises glucose more slowly than IV dextrose. Contact Medical Control if needed.

Hypoglycemia

Occurs when there is not enough glucose circulating in the blood stream. Usually below 60 on the glucose monitor.

Risk factors:

- too much insulin, too little food
- Increased activity
- Increased alcohol consumption

Hypoglycemia (signs and symptoms)

- Hunger
- Agitation, irritability, combative behavior
- Altered mentation or confusion
- Nausea
- Weakness
- Tachycardia
- Cool, clammy, pale skin
- Slurred speech
- Often rapid onset
- Seizures and coma in severe cases

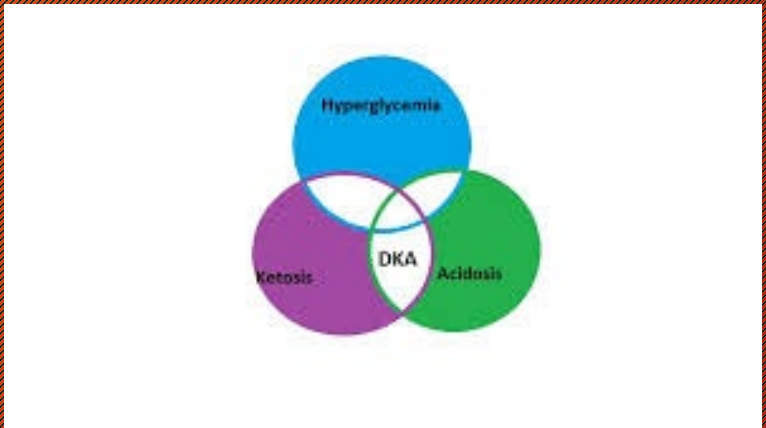
Hypoglycemia

Treatment is aimed at increasing blood glucose levels. The treatment may include, oral glucose, Glucagon IM or IN, or Dextrose 50% administered IV

Diabetic Ketoacidosis (DKA)

What is diabetic ketoacidosis (DKA)?

Diabetic ketoacidosis (DKA) is a life-threatening condition that develops when cells in the body are unable to get the sugar (glucose) they need for energy, such as when a diabetic does not take enough insulin.



What causes DKA?

Ketoacidosis can be caused by not taking enough insulin, having a severe infection or other illness, becoming severely dehydrated, or some combination of these factors. It can occur in people who have little or no insulin in their bodies (mostly people with Type 1 diabetes, but it can happen with Type 2 diabetes as well) when their blood sugar levels are high.

What are the symptoms of DKA?

The blood sugar may be quite high before symptoms appear. These include:

- Flushed, hot, dry skin
- Blurred vision
- Drowsiness or difficulty waking up. Young children may lack interest in their normal activities
- Rapid, deep breathing *(compensating for acidotic state)*
- A strong, fruity breath odor (similar to nail polish remover or acetone)
- Loss of appetite, abdominal pain, vomiting, intense thirst
- Confusion

How is it treated?

When ketoacidosis is severe, it must be treated in the hospital, often in an intensive care unit. Treatment involves giving insulin and fluids and closely monitoring electrolytes. It can take several days for the blood sugar level and fluid status to return to a safe range.

Prehospital treatment includes IV saline and rapid transport

Who is at risk for DKA?

People who have Type 1 diabetes are at risk for DKA if they do not take enough insulin, have a severe infection or other illness, or become severely dehydrated.

Diabetic Neuropathy

There are three kinds of diabetic neuropathy.

- Peripheral neuropathy
- Autonomic neuropathy

- Focal neuropathy

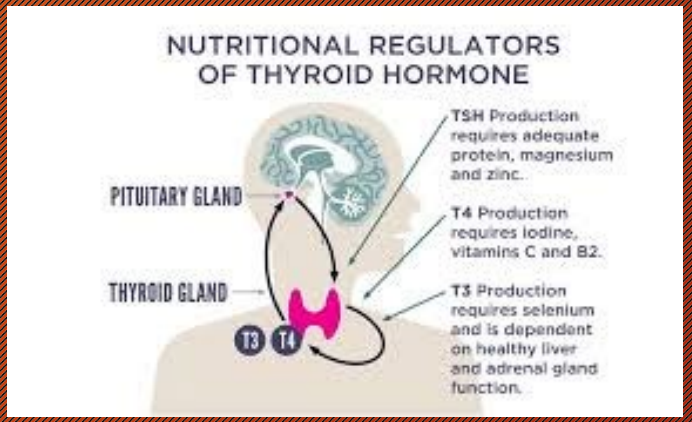
What causes diabetic neuropathy?

- Over time, high blood sugar levels from diabetes can damage nerves throughout the body. The higher the blood sugar levels, the more likely the nerve damage.
- The older a person gets, and the longer he has diabetes, the more likely the nerve damage. People with diabetes who drink too much alcohol are also more likely to have nerve damage.
- About half of all people with diabetes end up getting diabetic neuropathy

Hyperglycemic hyperosmolar nonketotic coma (HHNKC)

- Serious complication of type 2 diabetes, most often occurring in those who are non-insulin dependent
- HHNKC is caused by severely elevated blood glucose levels, usually over 600 mg/dl.

On to the thyroid ….



Thyroid Facts

- Biggest gland in the neck
- Wraps around the trachea
- Under the control of the pituitary gland
- Regulates the body's metabolism
- Changes iodine into hormone

Hypothyroidism

Hypothyroidism is a condition in which the body lacks sufficient thyroid hormone (T3, T4 and TSH)

Since the main purpose of thyroid hormone is to "run the body's metabolism," it is understandable that people with this condition will have symptoms associated with a slow metabolism.

Symptoms of Hypothyroidism

- Fatigue, weakness
- Weight gain or increased difficulty losing weight
- Coarse, dry hair and/or hair loss
- Dry, rough pale skin
- Cold intolerance
- Muscle cramps and frequent muscle aches
- Constipation
- Depression
- Irritability
- Memory loss
- Abnormal menstrual cycles
- Decreased libido

Levothyroxine

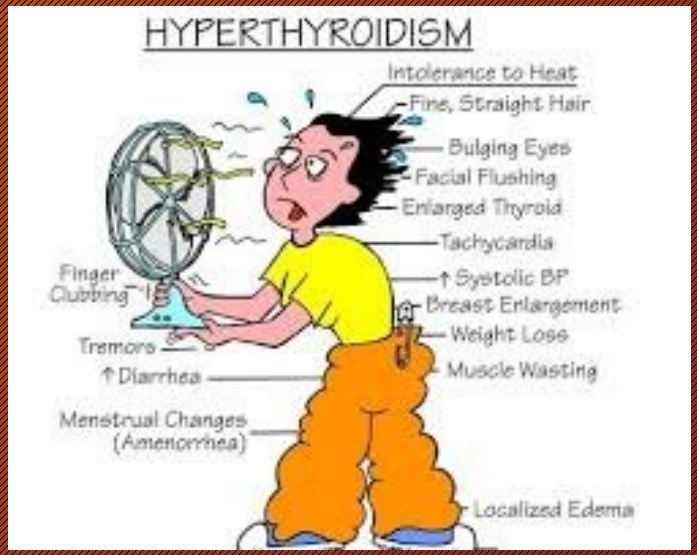
The easiest and most effective treatment is simply taking a thyroid hormone pill (Levothyroxine) once a day. This medication is a pure synthetic form of T4 which is made in a laboratory to be an exact replacement for the T4 that the human thyroid gland normally secretes.

Hyperthyroidism
Overactivity of the thyroid gland

Hyperthyroidism is the medical term to describe the signs and symptoms associated with an over production of thyroid hormone.

Symptoms of hyperthyroidism

Palpitations
Heat intolerance
Nervousness
Insomnia
Breathlessness
Increased bowel movements
Light or absent menstrual periods
Fatigue
Fast heart rate
Trembling hands
Weight loss
Muscle weakness
Warm moist skin
Hair loss
Staring gaze



Graves Disease

- The most common underlying cause of hyperthyroidism is Graves' disease.
- Classified as an autoimmune disease.
- Graves' Disease effects women much more often than men (about 8:1 ratio, thus 8 women get Graves Disease for every man that gets it.)
- Graves' Disease is uncommon over the age of 50 (more common in the 30's and 40's)

Treatment:

- **Anti-Thyroid Drugs**
- **Radioactive Iodine Treatment**
- **Surgical Removal of the Gland or Nodule**

Thyroid Storm

- Some people with Graves' disease or hyperthyroidism develop a condition known as thyroid storm.
- Only 1-2% of patients with hyperthyroidism develop thyroid storm.
- Heart rate, blood pressure and body temperature can become uncontrollably high
- Whenever thyroid storm is suspected, the patient must **go immediately to the closest emergency room**
- **Treat the symptoms and transport ASAP**

Who is at risk?

- Untreated Graves' Disease and/or hyperthyroidism
- Females
- Those with an infection
- Blood sugar changes
- Recent surgery to the thyroid
- Abrupt withdrawal of anti-thyroid medications
- Radioactive iodine (RAI) treatment of the thyroid
- Severe emotional stress
- An overdose of thyroid hormone
- Toxemia of pregnancy and labor

Symptoms of Thyroid Storm

- Fever of 100ºF to as high as 106ºF
- High heart rate that can be as high as 200 beats per minute
- Palpitations, chest pain, shortness of breath
- High blood pressure
- Confusion, delirium and even psychosis
- Extreme weakness and fatigue
- Exaggerated reflexes

Symptoms of Thyroid Storm (continued)

- Difficulty breathing
- Nervousness, mood swings
- Nausea, vomiting, diarrhea
- Recent dramatic weight loss may have taken place
- Profuse sweating, dehydration
- Stupor or coma

Treat the symptoms and transport ASAP