

< 40 mg/dl	40 – 80 mg/dl	120 – 400 mg/dl	400 – 800 mg/dl		> 800 mg/dl
Insulin Shock	hypoglycemia	HYPERglycemia	Diabetic Ketoacidosis (DKA)	Hyperglycemic Hyperosmolar Nonketotic Coma (HHNC)	Diabetic Coma
<p>- Result of hypoglycemia.</p> <p>- If circulating blood glucose decreases to the brain (the brain doesn't need insulin to utilize glucose), neural cells begin to shut down, causing AMS => Hypoxia develops</p> <p>Typically occurs when the pt: - took too much insulin - took a regular insulin dose but didn't eat adequate amounts of food - had an unusual amount of activity or vigorous exercise.</p> <p>Develops much more quickly than diabetic coma.</p> <p>Acute condition that develops rapidly, requiring rapid glucose admin. Without it, the pt may have permanent brain damage.</p> <p>Decreased sensitivity to pain is a result of diabetic neuropathy or permanent damage of the nerve fibers.</p>	<p>Typically occurs when the pt: - took too much insulin - took a regular insulin dose but didn't eat adequate amounts of food - had an unusual amount of activity or vigorous exercise.</p> <p>- Onset rapid, within minutes</p>	<p>- Occurs in pt who can produce enough insulin to prevent DKA, but NOT enough to prevent severe HYPERglycemia.</p> <p>- Usually accompanied by: - an inadequate fluid intake - excessive eating - insulin dose is insufficient - infection is common</p> <p>- Onset is gradual</p>	<p>- Occurs in Type I diabetes</p> <p>- The form of acidosis seen in uncontrolled diabetes in which accumulation of certain acids occur when insulin is not available in the body.</p> <p>- Onset is gradual</p>	<p>- Occurs in Type II diabetes</p> <p>- Characterized by severe HYPERglycemia + dehydration, but NO ketoacidosis</p> <p>- High levels of glucose in the cerebrospinal fluid lead to dehydration of the brain and ΔLOC, specially in geriatrics</p> <p>- Usually precipitated by infection, dehydration or extreme cold</p> <p>-Tends to attend elderly pt with poor health</p> <p>- Onset: gradually decrease in mental status</p>	<p>The state of unresponsiveness resulting from several problems, including: - Ketoacidosis - Dehydration bcos excessive urination - HYPERglycemia</p> <p>May occur in pt who is: - not under medical treatment - takes insufficient insulin - markedly overeats - is undergoing a stressful event - drinking alcohol</p> <p>- Onset is gradual, usually develops during a period of hours to days</p>
<p>s/s:</p> <ul style="list-style-type: none"> - Normal or rapid respirations - Pale, moist (clammy) skin, Sweating - Dizziness, headache - Rapid, weak pulse - Normal to low blood pressure - AMS including: aggression, confusion, lethargy, anxiety, unusual or combative behavior - Hunger - Seizure, fainting or coma - Weakness on one side of the body (similar to stroke) 	<p>s/s:</p> <ul style="list-style-type: none"> - Normal or rapid respirations - Skin pale + warm - Pulse rapid + weak - BP low - Irritability, confusion, seizures or coma - Intense hunger 	<p>s/s:</p> <ul style="list-style-type: none"> - Deep rapid breathing (Kussmaul Resp) - Skin is warm and dry - Intense thirst - Vomiting - Sweet + fruity breath - BP normal to low - Tachycardia - Restlessness 	<p>s/s:</p> <ul style="list-style-type: none"> - Deep rapid breathing (Kussmaul Resp) - Vomiting - Abdominal pain - Sweet + fruity breath <p>If untreated, DKA will progress to unresponsiveness, diabetic coma and death.</p>	<p>s/s:</p> <ul style="list-style-type: none"> - Coma - Seizures - Hemiparesis - Aphasia - Abnormal increase urination - Increase mental depression <p>s/s are similar to DKA, but since ketoacidosis is NOT present, there is NO:</p> <ul style="list-style-type: none"> - Kussmaul Respiration - Sweet breath 	<p>s/s:</p> <ul style="list-style-type: none"> - Kussmaul respirations - Dehydration (dry, warm skin and sunken eyes) - Acetone breath - Tachycardia - Normal or slightly low blood pressure - AMS - Weight loss - Abnormal increased in urination
<p>Tx:</p> <ul style="list-style-type: none"> - ABC - Position of comfort - Provide O₂ + assist w/ventilations as needed. Consider Combitube if pt unable to maintain airway. - Pharmacological interventions: <ul style="list-style-type: none"> ➢ Oral glucose ➢ D50 ➢ Glucagon - Monitor the cardiac rhythm and treat arrhythmias according to standard local protocols. -Transport 		<p>Tx:</p> <ul style="list-style-type: none"> - ABC - Position of comfort - Provide O₂ + assist w/ventilations as needed. Consider Combitube if pt unable to maintain airway. - Rehydration (admin a bolus of 20 ml/kg of an isotonic crystalloid solution such as NS or Lactated Ringer's) - Monitor the cardiac rhythm and treat arrhythmias according to standard local protocols. - Transport 			
Pt responds immediately after administration of glucose. Without tx, permanent brain damage and death can occur.		Pt must be treated in the hospital with insulin + IV fluid Rehydration. Pt response is gradual, within 6 – 12 hours following medication + fluid.			

Normalglycemia

*You must carefully monitor the airway in pt w/ diabetic coma, insulin shock, or other complications such as stroke and seizure. Place the pt in the recovery position + have suction readily available.

Endocrine System

Function of pancreatic hormones is the production of:

- Insulin: from the Beta cells
- Glucagon: from the Alfa cells

Insulin

Released in response of high levels of glucose
 Facilitates more glucose transport into the cell
 Blood glucose levels normalize as a result

A hormone produced by the pancreas that facilitates the uptake of glucose from the bloodstream into the cell. **Except for the brain, it doesn't need insulin to utilize glucose.**

Normal Glucose Metabolism

Glucose transported into the cell by insulin

Beta cells from the islets of Langerhans in the pancreas allow glucose to enter the cell. The cells then use the glucose + 6 O₂ molecules to convert it to energy.

Normal levels of glucose are in the range of 80 - 120 mg/dL

Aerobic metabolism

1. The most efficient cellular energy production process
2. High yield of ATP (adenosine triphosphate), this allows the conversion of glucose into energy.
3. By-products CO₂ AND H₂O easily eliminated by lungs and kidneys.

Excess glucose is stored in the liver and skeletal muscle as glycogen.

If glucose levels drop, Alpha cells are released from the islets of Langerhans (a hormone called glucagon) which converts glucagon into glucose.

Diabetes Mellitus (literally means "sweet diabetes): both types are serious, but Type II is easier to regulate.

	TYPE I	TYPE II
	<ul style="list-style-type: none"> - Insulin dependent diabetes mellitus (IDDM) - Juvenile-onset diabetes - Little or NO insulin is produced. - Pt requires daily injections of supplemental synthetic insulin throughout their lives to control blood glucose levels. 	<ul style="list-style-type: none"> - Non-insulin-dependent diabetes mellitus (NIDDM) - Adult onset diabetes - Pt do NOT produce enough insulin or the insulin that is produced is ineffective. - Most pt can be treated without using insulin injections. Diet + oral drugs.
% diabetes diagnoses	5-10%	90-95%
Typically diagnosed in	Children and Young adults, but can develop later in life	Adults
Long term implications	<ul style="list-style-type: none"> - Heart disease - Kidney disease - Blindness - Nerve disorders 	<ul style="list-style-type: none"> - Heart disease - Renal failure - Visual disturbances - Stroke - Ulcers or infections of feet or toes
Risks factors	Heredity	<ul style="list-style-type: none"> - Heredity (family hx) - Obesity

Terms

DKA:

- Mismatch of insulin-to-glucose molecules

1. low or no circulating insulin causing high blood glucose levels
2. cells must find alternative energy source for metabolism

- When the body has insufficient insulin to convert glucose into energy, it uses stored fat. This produces ketones and acids as waste. The increase of acids cause a decrease in the bodies PH, resulting in "metabolic acidosis". The body then uses buffer systems to return it's PH back to normal.

- CO₂ is an acid. With metabolic acidosis, the buffer system is the respiratory system. Respiratory rate increases in depth and rate (Kussmaul respirations) in an attempt to reduce the amount of acid in the body.

HYPERglycemia

A condition of high blood glucose.

When levels reach 200 mg/dl, the following s/s appear:

- **Polyuria:** frequent and plentiful urination, regardless of intake
- **Polydipsia:** frequent drinking of liquid to satisfy continuous thirst (secondary to loss of excessive body water)
- **Polyphagia:** excessive eating as a result of cellular "hunger or starvation"

Notes:

- Consider Combitube is the pt is unable to maintain the airway
- Check for emergency medical identification symbols (bracelet, etc.)
- Do **NOT give anything by mouth to an unresponsive** pt (risk for aspiration is high)
- Anytime you are unsure as to whether the pt's condition is diabetic coma or insulin shock, and you are unable to obtain a blood glucose reading, **you should err on the side of caution and give glucose.**
- if the pt is unconscious, check the blood glucose:
 - BG < 60 => give D50 or Glucagon
 - BG > 60 => give Narcan to check if the reason is overdose.