

Type 1 Diabetes

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THE STORY IN ONE SENTENCE

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“Type 1 Diabetes — immune attack wipes out beta cells; lifelong insulin injections, finger-stick or sensor glucose checks, and yearly eye/kidney/foot screening to catch damage early”

Normal anatomy — the body's job

Beta cells sit inside tiny clusters in the pancreas called the islets of Langerhans. Their job is to sense rising blood glucose after you eat and immediately release insulin into the bloodstream. Insulin is the only key that opens the gates on muscle, fat, and liver cells so glucose can move from blood into cells and be burned for energy or stored for later.

BODY'S JOB

Normally, when you eat, carbohydrates break down into glucose and enter your blood. Beta cells detect the glucose rise within seconds and pour out insulin. Insulin binds to receptors on cell surfaces like a key fitting a lock, and the cell opens channels that pull glucose inside. The liver also listens to insulin and stops making new glucose, keeping blood sugar in a tight, safe range (roughly 70–100 mg/dL fasting). This cycle happens every time you eat, all day long, so your cells stay fed and your blood sugar stays steady.

1. You eat a meal, and carbs become glucose in your gut.
2. Glucose enters the bloodstream, and blood sugar starts to climb.
3. Beta cells in the pancreas sense the glucose rise within seconds.
4. Beta cells release insulin into the blood.
5. Insulin travels to muscle, fat, and liver cells and binds to receptors on their surface.
6. The receptor signals the cell to open glucose gates, and glucose flows from blood into the cell.
7. Inside the cell, glucose is burned for energy or stored as glycogen or fat.

8. Blood glucose drops back to the normal range, and beta cells dial back insulin release.
9. Between meals, the pancreas releases a tiny, steady trickle of background insulin to keep the liver from dumping too much stored glucose.
10. This cycle repeats every time you eat, keeping fuel delivery smooth and blood sugar stable.

What breaks

The immune system — which normally attacks only germs — mistakenly targets the beta cells in the pancreas and destroys them. Over weeks to months, sometimes years in young children, more and more beta cells die until almost none are left. Once they're gone, the pancreas makes little to no insulin, so glucose cannot enter cells no matter how high it climbs in the blood.

CLINICAL TERM

Type 1 diabetes mellitus: autoimmune destruction of pancreatic beta cells leading to absolute insulin deficiency.

How the body compensates

The body cannot fix the missing insulin, so it tries to survive by dumping excess glucose in urine, burning fat and muscle for fuel, and increasing thirst to replace lost water. These moves keep the person alive short-term but cause weight loss, dehydration, and — if untreated — a dangerous acid buildup called diabetic ketoacidosis (the acid crisis of missing insulin). Vital signs may look near-normal at first, which is why early symptoms are easy to miss until the child or adult becomes very sick.

1. Kidneys filter all the blood and normally reabsorb every bit of glucose back into the body, but when blood glucose climbs above roughly 180 mg/dL (the renal threshold), the kidneys cannot pull it all back, so glucose spills into urine.
2. Glucose in urine acts like a sponge and drags water with it (osmotic diuresis), so the person pees large amounts many times a day and night — this is excessive urination (polyuria).
3. Losing water triggers intense thirst (polydipsia) to try to keep blood volume and blood pressure stable.
4. Because glucose cannot enter cells to feed them, cells signal the brain that they are starving, so hunger increases (polyphagia) even though the person is eating.
5. When food intake cannot overcome the cell starvation, the body breaks down muscle protein and stored fat to make fuel, causing weight loss and fatigue.
6. Burning fat for energy produces ketones (acetoacetate, beta-hydroxybutyrate, and acetone) in the liver. Normally insulin keeps ketone production low, but without insulin the liver makes ketones in huge amounts.

7. Ketones are acids, so they lower blood pH and cause metabolic acidosis (acid building up in the blood). The lungs try to blow off carbon dioxide to compensate, producing deep, fast breathing called Kussmaul respirations.
8. Dehydration plus too much acid in the blood (acidosis) plus electrolyte shifts (especially low potassium inside cells) can lead to confusion, vomiting, abdominal pain, and eventually coma if untreated — this full picture is diabetic ketoacidosis (the acid crisis of missing insulin) (DKA).
9. These compensations buy a little time but cannot fix the root problem. Without insulin replacement, the downhill slide accelerates and DKA becomes life-threatening within hours to days.

Domino effect

1. Immune cells attack and destroy beta cells in the pancreas. — T lymphocytes infiltrate the islets and kill beta cells, likely triggered by genes (HLA-DR3/DR4) plus an unknown environmental spark like a virus. Autoantibodies (anti-GAD65, anti-IA-2, anti-insulin, anti-ZnT8) mark the attack and can show up months to years before symptoms.
2. The pancreas makes less and less insulin until it makes almost none. — Beta cells do not grow back once destroyed. By the time the person feels sick, 80–90% of beta cells are already gone, and the few left cannot keep up with the body's need for insulin.
3. Blood glucose climbs high because cells cannot pull it in, and the liver keeps dumping more glucose into the blood. — Muscle and fat cells need insulin to unlock their glucose gates. Without insulin, glucose stays in the blood. At the same time, the liver — which normally stops making glucose when insulin is present — keeps breaking down glycogen and making new glucose (gluconeogenesis), pushing blood sugar even higher.
4. The kidneys spill glucose into urine, and water follows it out, so the person pees huge amounts and becomes dehydrated. — When blood glucose rises above about 180 mg/dL, it exceeds the kidney's ability to reabsorb it, so glucose leaks into urine. Glucose pulls water with it by osmosis, causing excessive urination (polyuria) (excessive urination) and triggering intense thirst (polydipsia).
5. Cells are starving for fuel, so the body breaks down muscle and fat, causing weight loss and weakness. — Even though blood is flooded with glucose, cells cannot use it without insulin. The brain interprets this as starvation and signals the body to burn protein from muscle and fat stores, leading to rapid weight loss despite eating more (polyphagia).

6. Burning fat makes ketones, which are acids that poison the blood and cause nausea, vomiting, belly pain, and deep rapid breathing. — The liver turns fatty acids into ketones (beta-hydroxybutyrate and acetoacetate) for emergency fuel. Without insulin to shut this down, ketones flood the blood and lower pH (metabolic too much acid in the blood (acidosis)). The lungs try to compensate by blowing off CO₂, producing the deep, labored breaths called Kussmaul respirations. Acetone (another ketone) gives the breath a fruity smell.
7. Severe dehydration plus acid buildup plus electrolyte chaos leads to confusion, shock, and coma — this is diabetic ketoacidosis (the acid crisis of missing insulin), the emergency that often brings the diagnosis to light. — Ketoacidosis plus dehydration causes potassium, sodium, and other electrolytes to shift dangerously. Brain function slows, blood pressure drops, and without immediate IV fluids and insulin, the person can die. In children, DKA is the presenting sign in about 30–40% of new Type 1 diabetes cases (ADA/ISPAD guidelines).
8. Even after starting insulin, the beta cells never grow back, so the person needs insulin injections or a pump every day for life to survive. — Autoimmune destruction is permanent. The only treatment is to replace the missing insulin from outside — via multiple daily injections or a continuous subcutaneous insulin pump — and to monitor blood glucose many times a day with finger sticks or a continuous glucose monitor (CGM) to avoid both high sugar (leading to long-term eye, kidney, nerve, and heart damage) and low sugar (hypoglycemia, which can cause confusion, seizures, or loss of consciousness).

Symptoms · what the patient feels, and why

- Drinking huge amounts of water all day (polydipsia): When blood sugar climbs very high, the kidneys dump it into the urine and water follows it out, making the person very thirsty to replace what was lost.
- Peeing much more often than usual, including at night (polyuria): The kidneys pull extra water out of the blood to flush away the high sugar, so urine volume shoots up.
- Losing weight fast without trying: The body cannot use sugar for energy without insulin, so it starts burning fat and muscle instead, causing weight to drop.
- Feeling very tired and weak: Cells are starving because sugar cannot get inside them without insulin, even though there is plenty of sugar in the blood.
- Always hungry (polyphagia): The body's cells are not getting fuel, so the brain sends hunger signals to try to get more energy in.
- Blurry vision: High blood sugar pulls water out of the lens of the eye, changing its shape and making it hard to focus clearly.

- Fruity-smelling breath, fast deep breathing, belly pain, confusion (signs of diabetic ketoacidosis (the acid crisis of missing insulin) or DKA): When the body burns fat instead of sugar, it makes acids called ketones that pile up in the blood, turning it dangerously acidic and making the person very sick.
- Usually starts in childhood, teens, or young adults (most often under age 30): The immune system attacks and destroys the insulin-making beta cells in the pancreas, and this autoimmune attack most often starts early in life.
- Blood test shows antibodies against pancreas cells (GAD, IA-2, or insulin antibodies): The immune system mistakenly makes proteins (antibodies) that attack the pancreas, and finding these in the blood confirms the autoimmune cause.
- Family history of type 1 diabetes or other autoimmune diseases like thyroid problems or celiac disease: Genes that make the immune system prone to attacking the body's own tissues run in families, raising the risk of type 1 diabetes and related autoimmune conditions.

Focused exam

- Fruity breath smell (like nail polish remover or sweet fruit): This smell is acetone, a ketone that appears when the body breaks down fat for energy because there is no insulin to move glucose into cells. It signals that fat is being burned instead of sugar, which happens in Type 1 Diabetes when beta cells in the pancreas (the cells that make insulin) have been destroyed.
- Very dry mouth, lips, and skin: High blood sugar pulls water out of cells and into the blood, then the kidneys flush that extra water out as urine. The body becomes dehydrated because glucose is stuck in the blood and cannot get into cells without insulin to unlock the door.
- Fast, deep breathing (Kussmaul respirations): The body is trying to blow off carbon dioxide to balance out the acid (ketoacids) building up in the blood. This deep, fast breathing is the lungs trying to rescue the blood pH when Type 1 Diabetes has caused diabetic ketoacidosis (the acid crisis of missing insulin) (DKA), a dangerous state where the blood becomes too acidic.
- Thin or normal weight, even with a big appetite: Without insulin, cells cannot take in glucose for energy, so the body burns muscle and fat instead. Even though blood glucose is very high, the cells are starving, which is why children with new Type 1 Diabetes often lose weight quickly despite eating more.
- Urinating often and in large amounts (polyuria): When blood sugar rises above about 180 mg/dL, glucose spills into the urine. Glucose pulls water with it (osmotic diuresis), so the kidneys make a lot of urine, and the child has to pee frequently, sometimes wetting the bed after years of being dry at night.

- Confusion, drowsiness, or hard to wake up: Acid from ketones (beta-hydroxybutyrate and acetoacetate) changes how the brain works and can lead to altered mental status. This means diabetic ketoacidosis (the acid crisis of missing insulin) (DKA) is present, and Type 1 Diabetes has become a life-threatening emergency that needs IV fluids and insulin right away.

Diagnostics · every test answers a question

- Random or fasting blood glucose → Is blood sugar high enough to confirm diabetes?
- Hemoglobin A1c → What has the average blood sugar been over the past 2-3 months?
- Venous pH and serum bicarbonate → Is the blood too acidic from ketones (diabetic ketoacidosis)?
- Serum or urine ketones (beta-hydroxybutyrate preferred) → Are ketones present from fat breakdown?
- C-peptide (fasting or random) → Is the pancreas still making any insulin?
- Autoantibodies (GAD-65, IA-2, ZnT8, insulin autoantibodies) → Is the immune system attacking the beta cells?
- Urine microalbumin-to-creatinine ratio (yearly after 5 years of diabetes or at puberty) → Is there early kidney damage from high blood sugar?
- Dilated eye exam (yearly after 5 years of diabetes or at puberty) → Is there damage to the blood vessels in the back of the eye?

Treatment logic

- Insulin replacement (basal-bolus injections or insulin pump with continuous glucose monitor) → Insulin does the job the destroyed beta cells can no longer do. It unlocks cells so glucose can move out of the blood and into muscle, fat, and liver cells for energy. Basal insulin (long-acting, like glargine or degludec) covers background needs all day, and bolus insulin (rapid-acting, like lispro or aspart) covers meals and corrects high glucose. Without insulin, glucose stays trapped in the blood and cells starve.
- Carbohydrate counting and meal-time insulin dosing (insulin-to-carb ratio) → Matching rapid-acting insulin doses to the grams of carbohydrate you eat keeps blood glucose from spiking too high after meals (postprandial high blood sugar (hyperglycemia)) and prevents dangerous lows (hypoglycemia) between meals. Each person has their own insulin-to-carb ratio (for example, 1 unit of insulin for every 10 grams of carb) that is adjusted based on response.

- Continuous glucose monitor (CGM) with real-time alerts → A CGM shows glucose every 1-5 minutes and alerts you when glucose is dropping too fast or rising too high. This lets you catch dangerous lows (< 70 mg/dL) before they cause confusion, seizures, or loss of consciousness, and lets you see trends (arrows showing direction and speed) so you can adjust insulin or food in real time.
- Glucagon emergency kit (injectable or nasal) available at all times → If insulin pushes blood glucose dangerously low (< 54 mg/dL or the person cannot swallow), glucagon tells the liver to release stored glucose into the blood within 10-15 minutes. This can prevent brain damage, seizures, or death from severe low blood sugar (hypoglycemia) when the person is unconscious or too confused to eat or drink.
- Annual screening for thyroid disease (TSH, free T4) and celiac disease (tissue transglutaminase IgA, total IgA) → People with Type 1 Diabetes have a higher risk of other autoimmune diseases. Catching hypothyroidism (low thyroid, which slows metabolism) or celiac disease (autoimmune damage to the small intestine from gluten) early prevents them from making glucose control harder, causing growth delays, or leading to nutrient deficiencies.
- Hemoglobin A1c checked every 3 months → A1c shows your average blood glucose over the past 2-3 months, giving a bigger picture than daily fingersticks. It tells you whether your insulin doses, carb counting, and overall diabetes plan are keeping glucose in the target range (A1c goal $< 7.0\%$ for most children and teens). An A1c $> 7.5\%$ means the risk of long-term complications (kidney damage, eye damage, nerve damage) is rising.
- Diabetes self-management education and support (DSMES) → Teaching the person and family how to count carbs, adjust insulin for exercise and illness, recognize and treat lows and highs, and use devices (pump, CGM) makes living with Type 1 safer and less overwhelming. Studies show DSMES lowers A1c, reduces severe low blood sugar (hypoglycemia) and DKA admissions, and improves quality of life.

Medications

Basal insulin (long-acting, e.g., glargine, detemir, degludec) · Long-acting insulin analog

Insulin is the key that unlocks your cells so glucose (sugar) from food can go inside and be turned into energy. In type 1 diabetes, the immune system has destroyed the beta cells in the pancreas (the insulin factory), so the body can make almost no insulin on its own. Basal insulin replaces the steady, background level of insulin a healthy pancreas normally drips into the blood all day and night to keep your baseline blood sugar stable between meals and while you sleep. It acts slowly and smoothly, not in a big spike, so it covers your body's baseline needs.

1. You inject the long-acting insulin under the skin (usually once or twice a day).

2. It absorbs slowly and steadily over 12 to 42 hours (depending on which one you use).
3. The insulin travels through your blood and docks onto insulin receptors (lock sites) on muscle, fat, and liver cells.
4. When insulin docks, a gate opens and glucose moves from the blood into the cell, lowering blood sugar.
5. In the liver, insulin also tells it to stop churning out extra glucose and to pack glucose away as glycogen (the storage form).

SAFETY WATCH

Low blood sugar (Hypoglycemia) (low blood sugar) – if you take too much or skip a meal, your blood sugar can drop too low, causing shakiness, sweating, confusion, or even passing out. Always carry fast-acting carbs (glucose tabs, juice). · Injection-site reactions – redness, swelling, or lumps under the skin (lipohypertrophy) if you inject in the same spot every time. Rotate your sites. · Weight gain – insulin helps store glucose as fat, so you may gain a few pounds. · Severe allergic reaction is very rare but call 911 if you get hives, throat swelling, or trouble breathing.

Bolus insulin (rapid-acting, e.g., aspart, lispro, glulisine) · Rapid-acting insulin analog

Bolus insulin is the quick-acting insulin you take right before or at the start of a meal to handle the spike in blood sugar that happens when carbohydrates (bread, rice, fruit, sweets) are broken down into glucose and flood into your bloodstream. Because your pancreas cannot release insulin in response to food anymore, you calculate how many grams of carbs you are about to eat (carb counting), then give yourself the matching dose of rapid insulin to cover that meal. It works fast and then fades quickly, mimicking the normal mealtime insulin burst a healthy pancreas would deliver.

1. You inject the rapid-acting insulin under the skin (or deliver it through an insulin pump) 0 to 15 minutes before eating.
2. It starts working in 10 to 20 minutes, peaks (strongest effect) around 1 to 2 hours, and lasts about 3 to 5 hours total.
3. The insulin molecules dock onto insulin receptors on your cells.
4. The receptors open gates, and glucose rushes from the blood into muscle and fat cells, dropping your blood sugar.
5. In the liver, insulin turns off the glucose factory and turns on glucose storage, keeping your blood sugar from climbing too high after the meal.

SAFETY WATCH

Low blood sugar (Hypoglycemia) (low blood sugar) – if you take too much for the carbs you actually ate, or if you exercise hard right after, your blood sugar can drop dangerously low. Always carry fast-acting sugar. · Timing errors – if you inject too early or too late compared to when you eat, the insulin peak and the glucose peak can mismatch, causing a low or a high. · Injection-site reactions – redness, itching, or lumps. Rotate sites to prevent this. · Severe allergic reaction is very rare but seek emergency help if you get hives, throat swelling, or trouble breathing.

Insulin pump with continuous glucose monitor (CGM) and closed-loop system (automated insulin delivery, 'artificial pancreas') · Medical device system delivering rapid-acting insulin

An insulin pump is a small computerized device you wear on your body that delivers rapid-acting insulin through a tiny tube under your skin, replacing the need for multiple daily injections. A continuous glucose monitor (CGM) is a sensor you wear that checks your blood sugar every few minutes and sends the reading to the pump. In a closed-loop (hybrid or full) system, the pump and CGM talk to each other: when your sugar starts to rise, the pump automatically gives a little more insulin; when it starts to drop, the pump slows or stops the insulin. This mimics a real pancreas much better than fixed doses, keeping your blood sugar steadier day and night with less guesswork.

1. You attach a CGM sensor under your skin (usually on your belly or arm) that measures glucose in the fluid around your cells every 1 to 5 minutes.
2. The sensor sends a wireless signal to the pump (or your phone) showing your current glucose and which way it is moving (up, down, steady).
3. You wear the pump clipped to your belt or in your pocket; a thin plastic tube (infusion set) runs under your skin.
4. The pump delivers a slow trickle of rapid-acting insulin all the time (basal rate) and you press a button to give a bigger burst (bolus) at meals.
5. In a closed-loop mode, an algorithm (math program) predicts where your sugar is headed and auto-adjusts the basal insulin every few minutes—giving more if you are rising, cutting back or pausing if you are dropping—so you stay in your target range without constant finger pricks or manual doses.

SAFETY WATCH

Low blood sugar (Hypoglycemia) (low blood sugar) – the algorithm is smart but not perfect; you can still go low, especially with exercise or if you overcorrect a high. Always carry fast-acting carbs. · High blood sugar (Hyperglycemia) and diabetic ketoacidosis (the acid crisis of missing insulin) (DKA) – if the infusion site gets kinked, clogged, or falls out, insulin delivery stops and your blood sugar can skyrocket within hours. Without any insulin, your body starts burning fat for fuel and making acids (ketones) that poison your blood. Check your sugar and ketones if you feel sick, and have a backup pen or syringe ready. · Skin irritation or infection – the adhesive patch and infusion site can cause redness, itching, or (rarely) infection. Rotate sites every 2 to 3 days and keep the area clean. · Device malfunction – batteries die, software glitches, sensors fall off. Know how to give insulin by injection if the pump stops working. · Over-reliance – you still need to think and make decisions. The pump is a tool, not a substitute for learning how food, exercise, stress, and illness affect your sugar.

Glucagon (emergency injection or nasal spray, e.g., GlucaGen, Baqsimi) · Counter-regulatory hormone

Glucagon is a hormone that does the opposite of insulin: it tells your liver to break down stored glycogen (a starch made of chained glucose) and dump glucose into your bloodstream, quickly raising blood sugar. In a healthy person, the pancreas releases glucagon when sugar drops too low. In type 1 diabetes, you carry a glucagon kit for emergencies—if your blood sugar crashes so low that you pass out or cannot swallow, someone else can give you the glucagon injection (or puff the nasal spray) to wake you up by spiking your sugar fast. It is a rescue medicine, not a daily drug.

1. Someone (family member, friend, school nurse) grabs your emergency glucagon kit when you are unconscious or too confused to eat or drink.
2. They either inject the glucagon into your thigh or arm muscle (like an EpiPen) or puff the powder up your nose (nasal spray).
3. The glucagon travels through your blood to your liver.
4. It docks onto receptors on liver cells and flips a switch, activating an enzyme called glycogen phosphorylase.
5. That enzyme breaks glycogen (the stored sugar chain) into single glucose molecules and releases them into your bloodstream.
6. Your blood sugar rises within 5 to 15 minutes, and you start to wake up. Once you can swallow, you need to eat or drink carbs to keep your sugar from dropping again, because the glycogen stores run out quickly.

SAFETY WATCH

Nausea and vomiting – glucagon often makes you throw up as you wake up. Turn the person on their side so they do not choke. · Rebound low – once the glycogen burst wears off (in 60 to 90 minutes), blood sugar can drop again. Eat a snack with carbs and protein as soon as you can swallow. · Does not work if glycogen is depleted – after heavy alcohol use or prolonged fasting, the liver has no glycogen left to release, so glucagon will not help. Call 911 and get IV dextrose. · Allergic reaction is very rare – hives, trouble breathing. If it happens, call 911. · Not a substitute for 911 – if the person does not wake up within 15 minutes after glucagon, or if you do not have glucagon, call emergency services immediately.

Red flags

- Fruity breath smell, very fast breathing, severe belly pain, vomiting, or confusion (diabetic ketoacidosis — a life-threatening emergency)
- Blood sugar above 250 mg/dL with ketones in urine or blood
- Severe confusion, not waking up, or seizure (dangerously low or high blood sugar)

Nursing priorities

1. Check blood glucose immediately with fingerstick or continuous glucose monitor reading, and assess mental status — Both high blood sugar (hyperglycemia) (high blood sugar above 250 mg/dL) and low blood sugar (hypoglycemia) (low blood sugar below 70 mg/dL) can cause confusion, altered consciousness, or life-threatening emergencies like DKA or seizures that need instant treatment
2. If blood glucose is below 70 mg/dL and patient is awake, give 15 grams of fast-acting carbohydrate like juice or glucose tablets, then recheck in 15 minutes — Low blood sugar (Hypoglycemia) starves the brain of glucose and can cause seizures, coma, or death within minutes; fast-acting carbohydrate raises blood sugar quickly while repeated checks confirm the glucose is rising to safe levels above 70 mg/dL
3. If blood glucose is above 250 mg/dL, check urine or blood ketones and assess for signs of diabetic ketoacidosis (the acid crisis of missing insulin): belly pain, vomiting, rapid deep breathing, fruity breath, or confusion — Without insulin, the body breaks down fat and produces ketones (acids that poison the blood); DKA causes severe dehydration, electrolyte imbalances, and too much acid in the blood (acidosis) that can lead to coma and death if not treated with IV fluids and insulin in the hospital

4. Review the patient's insulin regimen including types, doses, and timing, and confirm they know how to count carbohydrates and match bolus insulin to meals — Type 1 diabetes requires precise insulin dosing because the pancreas makes zero insulin; basal insulin covers background needs between meals, and bolus insulin must match the grams of carbohydrate eaten to prevent dangerous highs and lows
5. Teach or reinforce continuous glucose monitor use and interpretation of glucose trends, arrows, and alerts — CGM devices measure interstitial glucose (sugar in the fluid between cells) every few minutes and show whether glucose is rising, falling, or steady; this real-time data prevents dangerous lows and highs better than fingerstick checks alone
6. Assess feet for cuts, blisters, redness, or loss of sensation, and teach daily foot checks and proper footwear — High blood sugar damages nerves causing neuropathy (loss of feeling) and blood vessels causing poor circulation; patients may not feel injuries that can become infected ulcers leading to amputation if not caught early
7. Verify the patient has a current glucagon emergency kit, and teach family or roommates how to inject it and when to call 911 — Severe low blood sugar (hypoglycemia) can make a patient unconscious and unable to swallow; glucagon injected into muscle or sprayed into the nose raises blood sugar in 10 to 15 minutes and can save the patient's life while waiting for emergency help
8. Check when the patient last had hemoglobin A1c, urine microalbumin, dilated eye exam, thyroid-stimulating hormone, and celiac antibodies, and schedule any overdue screenings — Hemoglobin A1c (a blood test showing average glucose over 3 months) and microalbumin (a urine test for early kidney damage) track diabetes control; Type 1 patients have higher risk for thyroid disease, celiac disease, and diabetic complications in eyes and kidneys that need early detection and treatment

Sources

- American Diabetes Association Standards of Care 2024
- CDC Diabetes Basics
- Cochrane review on diagnosis and management of type 1 diabetes
- JDRF (Type 1 Diabetes Research Foundation) clinical guidelines

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