

Type 1 Diabetes

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

THE ONE-LINE TRUTH

The immune system destroys the insulin-making cells in the pancreas, so the body can never bring blood sugar into cells without outside insulin.

The chain — how it unfolds

1. Immune cells attack and destroy beta cells in the pancreas. — why: 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. — why: 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. — why: 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. — why: 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. — why: 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. — why: 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. — why: 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. — why: 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).

Spot it — what you see, 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.

Red flags — act now

- 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)

Treat it — in this order

1. 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.
2. 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.
3. 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.
4. 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.
5. 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.

Your top priorities at the bedside

1. Check blood glucose immediately with fingerstick or continuous glucose monitor reading, and assess mental status — why: 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 — why: 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 — why: 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