

Neonatal Hypoglycemia

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THE STORY IN ONE SENTENCE

A newborn's blood sugar below 47 mg/dL after the first hour of life is dangerously low and the brain can be hurt if it stays low.

"A newborn's blood sugar can drop too low in the first hours and days — feed early, check the level, and give sugar through a vein if the baby is sick or the number stays under 47."

Normal anatomy — the body's job

In the womb, a baby gets a steady stream of sugar through the umbilical cord from the mother's blood. The moment the cord is cut, the baby's liver has to take over — it breaks down stored fuel called glycogen (a chain of sugar molecules packed in the liver) and releases glucose (sugar) into the blood so the brain, heart, and muscles stay fed. At the same time, the pancreas (a small organ behind the stomach) releases just enough insulin (a hormone that moves sugar from blood into cells) to keep the level steady, and other hormones like glucagon (made by the pancreas), cortisol (made by the adrenal glands on top of the kidneys), and growth hormone (made by the pituitary gland at the base of the brain) push sugar up when it starts to drop.

BODY'S JOB

The liver is the body's sugar warehouse and factory. Between feedings, it breaks down glycogen into glucose and pours it into the blood so the brain never runs out of fuel. The pancreas is the thermostat: it senses the blood sugar level every second and releases insulin to lower it or glucagon to raise it. In a healthy full-term newborn, this system kicks in within minutes after birth, and blood sugar stays above 47 mg/dL after the first hour.

1. Before birth: sugar flows from the mother's blood → through the placenta → through the umbilical vein → into the baby's blood → the baby's pancreas makes extra insulin to handle the load → the liver stores extra sugar as glycogen.
2. The cord is cut: the sugar stream stops instantly → blood sugar starts to fall in the first 30 minutes (this is normal and expected).

3. First hour: the baby's liver breaks down glycogen → pours glucose into the blood → glucagon, cortisol, and growth hormone all push sugar up → the pancreas stops making so much insulin → blood sugar climbs back to a safe level (above 47 mg/dL).
4. First day and beyond: the baby eats breast milk or formula → sugar from milk enters the blood → insulin moves it into cells for energy → between feedings, the liver releases stored sugar → the cycle repeats, and blood sugar stays steady.

What breaks

The baby's blood sugar drops below 47 mg/dL and stays low because the liver cannot release enough sugar, the pancreas makes too much insulin, or the baby is burning through sugar faster than the body can replace it.

CLINICAL TERM

Neonatal low blood sugar (hypoglycemia) — blood glucose less than 47 mg/dL after the first hour of life, or any symptomatic low glucose level at any time in the first 28 days.

How the body compensates

At first, the body tries to raise blood sugar by releasing stress hormones — epinephrine (adrenaline, made by the adrenal glands) and cortisol — that make the baby jittery, sweaty, and fussy. The liver tries to squeeze out any remaining glycogen. But if sugar stays low, the brain runs out of fuel and shuts down nonessential functions to save energy, so the baby gets quiet, floppy, and sleepy. This quiet phase looks calm but is actually more dangerous, because the brain is starving.

1. {'step': 'Blood sugar drops below 50 mg/dL', 'mechanism': 'The pancreas stops releasing insulin and starts releasing glucagon (a hormone that tells the liver to break down glycogen and release glucose). The adrenal glands pour out epinephrine, which also signals the liver to release sugar and tells fat cells to release fatty acids for backup fuel.'}
2. {'step': 'The baby gets jittery, sweaty, fussy, and hungry (autonomic/adrenergic symptoms)', 'mechanism': 'Epinephrine revs up the heart, opens the pupils, and makes the baby tremble and sweat — these are alarm bells that say 'feed me now.' This is the body's early warning system and the safest time to catch and fix the problem.'}
3. {'step': 'If sugar keeps falling (below 40 mg/dL), the brain does not have enough glucose to run its electrical signals', 'mechanism': 'Neurons (brain cells) need a steady supply of glucose to fire action potentials (electrical messages). When glucose runs out, the neurons slow down or misfire. You see neuroglycopenic symptoms: the baby gets sleepy, floppy (poor muscle tone), stops eating (weak suck), stares blankly, or has abnormal eye movements.'}

4. {'step': 'The body tries to use backup fuels — ketones (made by the liver from fat) and lactate (made by muscles)', 'mechanism': 'In older children and adults, the liver can make ketones from fat and the brain can burn them for fuel when glucose is low. But newborns — especially in the first 24 hours — cannot make ketones fast enough, so the brain stays starved even when fat stores exist. This is why newborn low blood sugar (hypoglycemia) is more dangerous than low sugar in an older child.'}
5. {'step': "If sugar stays low for hours, the brain's electrical system breaks down and the baby seizes or stops breathing", 'mechanism': 'Neurons fire chaotically (seizure) or shut off completely (apnea, loss of consciousness). Brain cells start to die, and long-term damage can happen — this is why we treat low blood sugar (hypoglycemia) fast and do not wait for symptoms.'}
6. {'step': "The dangerous middle: a baby can look quiet and 'sleepy' while the brain is actually starving", 'mechanism': 'After the jittery phase, the baby may stop crying and seem calm — but this is not recovery, it is the brain shutting down to save energy. Vital signs can still look okay (heart rate and blood pressure may be normal), but the baby is heading toward seizure or coma. This is why we check blood sugar with a number, not just by looking at the baby.'}

Domino effect

1. Blood sugar drops below 47 mg/dL in the first hours after birth — The liver cannot release enough glucose (because glycogen stores are empty or the enzymes are missing), or insulin is too high and keeps shoving glucose out of the blood into cells, or the baby is burning sugar faster than the body can replace it (from infection, cold, or breathing trouble). No matter the cause, the blood glucose level falls and the brain's fuel tank starts to run dry.
2. The adrenal glands pour out epinephrine (adrenaline) and the baby gets jittery, sweaty, irritable, and hungry — Epinephrine is the body's alarm hormone — it tells the liver to dump glucose, the heart to speed up, and the baby to wake up and cry for food. The jitteriness (fine trembling of the hands and jaw), sweating, fast heart rate, and fussiness are all signs that the body knows sugar is low and is trying to fix it. This is the early warning — if we feed the baby or give sugar now, the brain stays safe.

3. If the blood sugar stays low, the brain runs out of fuel and neurons start to misfire — the baby gets lethargic (very sleepy, hard to wake), floppy (low muscle tone, like a rag doll), stops sucking, or stares blankly — Brain cells (neurons) need glucose to make ATP (the energy molecule that powers every electrical signal). When glucose runs out, the neurons slow down or stop firing. The baby looks calm and quiet, but this is not sleep — it is the brain shutting down nonessential functions to save the last bit of energy for the heart and lungs. The floppy muscles happen because the motor cortex (the part of the brain that tells muscles to move) cannot send signals, and the weak suck happens because the brainstem (the part that controls sucking and swallowing) is starving.
4. The brain's electrical system breaks down completely — the baby has a seizure (jerking or stiffening of the arms and legs, eyes rolling back, not breathing for seconds), pauses in breathing (apnea) (stops breathing for more than 20 seconds), or loses consciousness (cannot be woken up) — When neurons have no fuel, they either fire all at once in a chaotic storm (seizure) or stop firing completely (apnea, coma). Seizures happen because the cerebral cortex (the outer layer of the brain that controls movement and thought) loses its normal rhythm and fires randomly. Pauses in breathing (Apnea) happens because the brainstem's breathing center shuts off. Both are life-threatening emergencies — the brain is dying from lack of fuel.
5. If the low blood sugar lasts for hours or keeps happening over days without treatment, brain cells die and the baby can have permanent injury — cerebral palsy (trouble controlling muscles), intellectual disability, vision problems, or seizures that come back later in life — Neurons can survive a few minutes without glucose, but after 1–2 hours of severe low blood sugar (hypoglycemia) (below 25–30 mg/dL) or repeated episodes of moderate low blood sugar (below 47 mg/dL), cells in the hippocampus (the memory center), occipital cortex (the vision center), and motor cortex start to die. This damage is permanent because brain cells do not grow back. This is why we screen every at-risk newborn, treat fast, and keep checking until the levels stay safe.
6. The moment we give the baby a feeding (breast milk, formula, or sugar water by mouth) or a bolus of dextrose (sugar solution) through an IV, the blood glucose rises, the brain gets fuel again, and the scary signs reverse — Glucose enters the blood, crosses into the brain within seconds, and neurons start firing normally again. The jitteriness stops, the baby wakes up, muscle tone comes back, the sucking reflex returns, and if there was a seizure or pauses in breathing (apnea), it stops. This is why early feeding or IV dextrose is life-saving — it fixes the one broken step (low blood glucose) and stops the domino chain before permanent damage happens.

Symptoms · what the patient feels, and why

- **Jitteriness or trembling:** The brain runs almost entirely on sugar (glucose). When blood sugar drops too low, the nervous system misfires, causing shaky, jerky movements—like a car engine sputtering when it runs out of gas.
- **Poor feeding or weak sucking:** Low blood sugar drains energy from muscles, including the tongue and jaw. The baby doesn't have enough fuel to suck strongly or stay awake long enough to finish a feeding.
- **Irritability or high-pitched cry:** The brain's neurons (nerve cells) become irritable when they lack glucose. This triggers crying that sounds sharper or more frantic than usual—the baby's way of signaling distress.
- **Lethargy or floppiness (hypotonia):** When the brain doesn't get enough sugar for too long, it slows down to conserve energy. The baby becomes unusually sleepy, hard to wake, or limp—like a phone in low-power mode shutting off non-essential functions.
- **Breathing problems (apnea, fast breathing, or grunting):** The brainstem (the lower part of the brain that controls automatic breathing) needs steady glucose. Low sugar disrupts its rhythm, causing pauses in breathing (apnea), shallow breaths, or grunting as the baby works harder to get oxygen.
- **Sweating or pale, cool skin:** When blood sugar drops, the adrenal glands (small glands above the kidneys) release epinephrine (a hormone that preps the body for emergencies). Epinephrine makes blood vessels tighten and sweat glands open, so the skin turns pale, clammy, and cool to the touch.
- **Seizures (sudden stiffening, jerking, or staring spells):** Severe or prolonged low blood sugar starves brain cells. Groups of neurons fire all at once in a chaotic burst—like an electrical storm—causing a seizure. This is a medical emergency because it means the brain is in crisis.
- **Abnormal eye movements or a blank stare:** The parts of the brain that control eye movements and attention (including the brainstem and cerebral cortex) are very sensitive to low glucose. When fuel runs out, the baby's eyes may roll, flutter, or fix in one direction, and the baby may not track faces or light.
- **No symptoms at all (asymptomatic low blood sugar (hypoglycemia)):** Some newborns—especially those born early, small, or to mothers with diabetes—can have dangerously low blood sugar without obvious signs. Their brains may not yet signal distress clearly, or symptoms are so mild they're missed. This is why high-risk babies get routine blood sugar checks.

Focused exam

- Blood sugar below 47 mg/dL on finger stick in the first hours after birth: Neonatal low blood sugar (hypoglycemia) means the newborn's body cannot make or keep enough sugar. The brain runs on sugar the way a car runs on gas — below 47 mg/dL, the baby's brain starts to run out of fuel and cannot work right. This number tells you the problem is real and needs fixing now.
- Jitteriness, tremors, or shaking in arms and legs: When blood sugar drops in neonatal low blood sugar (hypoglycemia), the nervous system cannot send smooth signals. The motor neurons (the wires that tell muscles when to move) fire in wild bursts instead of steady pulses. Shaking is the body's alarm bell calling for fuel.
- Poor feeding, weak suck, or refusal to eat: Low blood sugar in a newborn weakens the muscles of the mouth and throat. The baby cannot suck hard enough or swallow safely, which means no new sugar comes in — so blood sugar stays low or drops further. It is a trap that gets worse on its own.
- Lethargy, sleepiness, or hard to wake: In neonatal low blood sugar (hypoglycemia), the brain does not have enough glucose to power thinking, alertness, or movement. The baby shuts down to save the last bit of fuel for the heart and lungs. This is the body going into emergency-save mode.
- Pauses in breathing (Apnea) or stopped breathing, blue color around the lips: Severe neonatal low blood sugar (hypoglycemia) can stop the brainstem (the part of the brain at the base that runs breathing) from sending the signal to breathe. Blue lips mean not enough oxygen is reaching the blood. This is a red alarm — the brain is failing.
- Seizures or abnormal jerking movements: Neonatal low blood sugar (hypoglycemia) that lasts too long starves the cerebral cortex (the outer brain layer that controls thought and movement). Brain cells fire chaotically when they run out of fuel, causing a seizure. Seizures mean the brain is in danger of lasting damage right now.
- Big baby (over 4 kg) or very small baby (under 2.5 kg), or baby born before 37 weeks: These babies have high risk for neonatal low blood sugar (hypoglycemia). Big babies from diabetic moms have extra insulin (the hormone that pushes sugar out of blood into cells), so their blood sugar drops fast. Small or early babies have tiny livers with almost no stored sugar (glycogen) to release when they need it.

Diagnostics · every test answers a question

- Bedside blood glucose check (finger or heel stick with meter) → What is the baby's blood sugar right now, and is it low enough to harm the brain?
- Serum glucose (lab draw, confirms the meter number) → Is the meter number accurate, and exactly how low is the blood sugar?

- Insulin level (drawn when blood sugar is low, before you treat it) → Is the baby's pancreas making too much insulin and pushing sugar out of the blood?
- Beta-hydroxybutyrate (a ketone in the blood) → Is the baby burning fat for fuel because blood sugar is low, or is insulin blocking fat breakdown?
- Cortisol and growth hormone (drawn when blood sugar is low) → Are the baby's stress hormones working to raise blood sugar when it drops?
- Lactate and ammonia (blood tests) → Does the baby have a hidden metabolic disorder that breaks the steps of making or using sugar?
- Blood culture and complete blood count (CBC) → Does the baby have an infection that is burning through sugar too fast?

Treatment logic

- Feed baby within one hour of birth (breast milk or formula) → Eating triggers the baby's own gut to absorb sugar and the liver to release stored glucose (glycogen) into the blood. Feeding early fills the fuel tank before it runs dry. This prevents low blood sugar (hypoglycemia) in most healthy babies.
- Check blood sugar at 30 minutes after birth, then before feeds for the first 24 hours → Knowing the actual number tells you if feeding alone is keeping blood sugar safe, or if the baby needs dextrose gel or IV sugar right now. Checking catches dangerous drops before the baby seizes or stops breathing.
- Apply dextrose gel 200 mg/kg (0.5 mL/kg of 40% gel) to the inside of the cheek, then feed → Sugar soaks through the thin skin inside the mouth (buccal mucosa) straight into the bloodstream, raising blood sugar in 10 to 15 minutes without needing a needle. The gel buys time while you feed the baby so the gut can take over.
- Start IV dextrose 10% at 5 to 8 mg/kg/min (about 80 mL/kg/day) for babies who stay low after gel and feeding, or who are too sick to eat → Sugar goes straight into the vein, bypassing the mouth and gut, so it works even if the baby cannot swallow or absorb food. IV dextrose raises blood sugar in minutes and keeps it steady while you hunt for the root cause.
- Give diazoxide 5 to 15 mg/kg/day by mouth (split into 2 or 3 doses) for babies with hyperinsulinism → Diazoxide opens potassium channels in the pancreas beta cells (the cells that make insulin), which tells them to stop releasing insulin. With less insulin, the liver can release stored sugar and fat breakdown can start again, so blood sugar climbs and stays up.

- Treat the root cause: warm the cold baby, give antibiotics for sepsis, support breathing in premature babies, feed small-for-gestational-age babies every 2 to 3 hours → Fixing what broke in the first place — cold stress, infection, lung immaturity, or poor growth — stops the body from burning through sugar too fast and lets the baby's own fuel-making system catch up. Warming a cold baby cuts energy waste in half. Killing bacteria stops the metabolic bonfire.
- Give hydrocortisone 5 mg/kg/day IV or by mouth if cortisol is low, or octreotide 5 to 10 µg/kg/day by injection if diazoxide fails → Hydrocortisone replaces missing cortisol (the adrenal stress hormone that tells the liver to make new sugar from protein). Octreotide blocks insulin release when diazoxide cannot. Both are rescue tools for rare, stubborn cases.

Medications

Dextrose gel (glucose gel rubbed inside the cheek) · Fast-acting sugar supplement

This is a thick gel with pure sugar (glucose) that you rub on the inside of the baby's cheek. The sugar soaks through the lining of the mouth and goes straight into the bloodstream within minutes, giving a quick boost to blood sugar without needing a needle. It works best for babies who are awake enough to swallow and who have mild low blood sugar (around 35–47 mg/dL) but are otherwise acting okay—not sick, not having seizures, and able to feed.

1. You squeeze about 200 mg of glucose per kilogram of the baby's weight (roughly 0.5 mL of gel per kg) onto your gloved finger.
2. Rub the gel gently along the inside of the baby's cheek and gums so it spreads out on the lining.
3. The glucose dissolves and soaks through the thin, rich blood-vessel layer in the mouth.
4. Within 10–15 minutes, glucose enters the bloodstream and the baby's blood sugar starts to climb.
5. You recheck the blood sugar 30 minutes later; if it is still low, you give another dose of gel and also make sure the baby feeds well.

SAFETY WATCH

Never use the gel in a baby who is limp, seizing, or cannot swallow safely—they could choke or breathe it into their lungs. · Always follow up with a feeding (breast, bottle, or tube) because the gel's boost is short and the baby needs ongoing fuel. · Recheck blood sugar 30 minutes after each dose to make sure it is rising; if it stays low after two doses, start an IV with dextrose. · Watch for choking or gagging if you give too much gel at once; use the correct dose and spread it gently.

Intravenous dextrose (IV sugar water) · Intravenous glucose infusion

This is sterile water with dissolved glucose (sugar) given through a tiny IV catheter directly into the baby's vein. It delivers a steady, measured stream of sugar into the bloodstream so the baby's cells—especially the brain—get the fuel they need right away. You start with a quick mini-dose (a bolus) to bring blood sugar up fast, then switch to a continuous slow drip to keep it stable. IV dextrose is the standard treatment for any baby with severe low blood sugar (under 25–35 mg/dL), symptoms like seizures or extreme sleepiness, or blood sugar that does not come up with feeding and gel.

1. Place a small IV catheter in a vein; in newborns, the umbilical vein is often used because it is easy to reach and safe in the first few days.
2. Give a bolus (quick mini-dose) of 200 mg of glucose per kilogram of body weight—usually 2 mL/kg of 10 % dextrose solution (D10W)—pushed gently over about 1 minute.
3. This bolus floods the bloodstream with sugar and blood glucose jumps within minutes.
4. Immediately start a continuous IV drip—begin at 5–8 mg of glucose per kilogram per minute (often shortened to mg/kg/min)—using 10 % dextrose.
5. Recheck blood sugar every 30–60 minutes at first, then every few hours once stable, and adjust the drip rate up or down to keep blood sugar in the safe range (50–100 mg/dL for a newborn).
6. Once the baby is feeding well and blood sugar stays normal, slowly lower the drip rate over 24–48 hours and then stop the IV; checking blood sugar after stopping to be sure it does not drop again.

SAFETY WATCH

Never stop the IV suddenly; the baby's body may have turned down its own sugar-making in response to the constant drip, so stopping cold can cause a rebound crash. Always wean slowly. · Watch the IV site closely for redness, swelling, or coolness—signs that the fluid is leaking into the tissue (called infiltration or extravasation), which can injure the skin, especially with concentrated dextrose. · If blood sugar does not come up even with a high drip rate (more than 12–15 mg/kg/min), suspect hyperinsulinism or a hormone problem and involve a pediatric endocrinologist. · Monitor for signs of too much IV fluid (puffy face, fast breathing, poor urine output) and adjust the total volume of fluids the baby is getting. · Keep checking blood sugar frequently; going too high (hyperglycemia) can also be harmful to a newborn's developing brain.

Diazoxide (oral suspension) · Potassium-channel opener (insulin suppressor)

Diazoxide is a medicine that stops the pancreas from squirting out too much insulin. It works by opening special potassium gates (called KATP channels) on the surface of the insulin-making beta cells in the pancreas. When these gates swing open, potassium rushes out of the cell, and that makes the cell less excitable—so it releases less insulin. With less insulin in the bloodstream, the liver is free to release stored sugar and the blood glucose stays up. This drug is used when a baby has persistent low blood sugar caused by too much insulin, a condition called hyperinsulinism (or persistent hyperinsulinemic low blood sugar (hypoglycemia) of infancy, PHHI).

1. You give diazoxide by mouth (or through a feeding tube) as a liquid suspension, usually starting at 5–15 mg per kilogram per day split into two or three doses.
2. The drug travels through the bloodstream to the pancreas.
3. Diazoxide binds to and opens the KATP channels on the beta cells.
4. Potassium ions flow out of the cells, which keeps the cells in a calm, closed state so they do not dump insulin.
5. With less insulin around, the liver breaks down glycogen (stored sugar) into glucose and releases it into the blood, and blood sugar rises and stays stable between feedings.
6. You monitor blood sugar closely—several times a day at first—and adjust the dose until the baby can go several hours without eating and still have normal blood sugar.

SAFETY WATCH

Diazoxide can cause fluid retention (the body holds onto water and salt), so watch for puffiness, especially around the eyes and ankles, and listen to the lungs for crackles that could mean fluid is backing up. Many doctors prescribe a diuretic (a water pill like chlorothiazide or hydrochlorothiazide) along with diazoxide to prevent this. · It can lower blood pressure, so monitor the baby's blood pressure and watch for signs of dizziness or poor feeding. · Watch for too much hair growth (hypertrichosis)—fine, extra hair may appear on the forehead, back, or limbs after a few weeks; this is harmless but can be distressing to families. · Rarely, it can lower the number of white blood cells (neutropenia) or cause heart problems, so some centers check blood counts and get a baseline ECG. · If diazoxide does not work after a fair trial (a week or two at the right dose with good compliance), the baby may need surgery to remove part of the pancreas, especially if imaging (like a PET scan) shows a focal area making too much insulin.

Glucagon injection (emergency rescue) · Pancreatic hormone (glycogen-breakdown trigger)

Glucagon is a natural hormone—the opposite of insulin—that your body normally makes to raise blood sugar. When given as an injection, it tells the liver to break down stored glycogen (the stash of glucose chains) into free glucose and dump it into the bloodstream within minutes. This is used as a rescue treatment when a baby's blood sugar drops dangerously low and you cannot get an IV in quickly, or when you need to buy a few minutes to place an IV. It is NOT a long-term fix, because once the liver's glycogen stores are used up, glucagon stops working.

1. You give glucagon as an injection into a muscle (intramuscular, IM) or under the skin (subcutaneous, SC)—common sites are the thigh or upper arm—using a dose of 0.02–0.03 mg per kilogram (maximum 1 mg for a small baby).
2. Glucagon travels through the bloodstream to the liver.
3. It locks onto glucagon receptors on the surface of liver cells and activates an enzyme cascade inside the cell.
4. This cascade turns on glycogen phosphorylase, the enzyme that snips glucose units off the glycogen chain.
5. Free glucose pours into the bloodstream, and blood sugar climbs within 5–15 minutes.
6. Meanwhile, you place an IV and start a dextrose drip to keep blood sugar up, because the glucagon effect wears off in about an hour and the glycogen stores may be depleted.

SAFETY WATCH

Glucagon often causes nausea and vomiting a few minutes after the shot, so position the baby on their side or hold them upright to prevent choking if they throw up. · Do not rely on glucagon as the only treatment; always follow it with IV dextrose and feeding as soon as possible. · If the baby does not respond (blood sugar does not come up), suspect that glycogen stores are empty or that the baby has a disorder of glycogen breakdown, and escalate care immediately. · Watch for an allergic reaction (rash, swelling, trouble breathing), though this is very rare. · Make sure caregivers know how to mix and give the injection if the baby will go home with a glucagon kit (some babies with recurrent low blood sugar (hypoglycemia) get a kit for emergencies).

Hydrocortisone (intravenous or oral steroid) · Glucocorticoid (synthetic cortisol)

Hydrocortisone is a man-made version of cortisol, the body's main stress hormone that helps keep blood sugar steady. Cortisol tells the liver to make new glucose from building blocks like amino acids (a process called gluconeogenesis) and also makes the body's cells less sensitive to insulin, so more sugar stays in the bloodstream instead of being pulled into cells. If a baby's adrenal glands (two small glands that sit on top of the kidneys) are not making enough cortisol—because they are underdeveloped, injured, or part of a genetic condition like congenital adrenal hyperplasia—blood sugar can drop. Giving hydrocortisone replaces the missing hormone and helps blood sugar stay up.

1. You give hydrocortisone by IV (for a very sick baby) or by mouth (for a stable baby), usually 2–5 mg per kilogram per day split into two or three doses, depending on how much cortisol the baby is missing.
2. The drug enters the bloodstream and travels to cells all over the body.
3. Hydrocortisone passes through the cell membrane and binds to glucocorticoid receptors inside the cell.
4. The receptor-drug complex moves into the cell's nucleus and turns on genes that make enzymes for gluconeogenesis (making new glucose) and turns down genes that respond to insulin.
5. The liver starts churning out new glucose, muscle and fat cells release stored fuel into the blood, and blood sugar climbs and stays stable.
6. You monitor blood sugar, electrolytes (sodium and potassium, because cortisol affects salt balance), and blood pressure, and adjust the dose as the baby grows or as the underlying problem is treated.

SAFETY WATCH

Too much hydrocortisone over a long time can slow growth, weaken bones, raise blood pressure, and suppress the immune system, so use the lowest dose that keeps blood sugar and electrolytes normal. · Never stop hydrocortisone suddenly in a baby who has been on it for more than a few days—their adrenal glands may have stopped making cortisol on their own, and stopping cold can cause a life-threatening adrenal crisis (severe low blood sugar, shock, seizures). Always taper slowly under a doctor's guidance. · Watch for signs of infection (fever, poor feeding, irritability) because steroids can mask infection and make it harder to fight off germs. · Monitor blood sugar closely at first; if blood sugar goes too high, you may need to lower the dose. · Check sodium and potassium levels because hydrocortisone can cause the body to hold onto sodium and lose potassium, leading to high blood pressure or abnormal heart rhythms.

Octreotide (subcutaneous or intravenous injection) · Somatostatin analog (insulin suppressor)

Octreotide is a synthetic copy of somatostatin, a natural hormone that acts like a brake pedal on many hormones, including insulin. It binds to receptors on the insulin-making beta cells in the pancreas and tells them to stop releasing insulin. With less insulin in the blood, the liver can release stored glucose and blood sugar stays up. Octreotide is used when a baby has severe hyperinsulinism that does not respond to diazoxide, or when diazoxide cannot be used (for example, if the baby has severe fluid retention or heart problems from diazoxide). It is often a bridge to surgery or a longer-term option if surgery is too risky.

1. You give octreotide as an injection under the skin (subcutaneous) or into a vein (intravenous), starting at 2–10 micrograms per kilogram per day, split into several doses or given as a continuous infusion.
2. The drug travels through the bloodstream to the pancreas.
3. Octreotide locks onto somatostatin receptors on the beta cells.
4. This signal blocks the release of insulin from the cells, so insulin levels in the blood drop.
5. With less insulin, the liver breaks down glycogen and releases glucose, and blood sugar rises and stays more stable.
6. You monitor blood sugar frequently and adjust the dose; some babies respond well, others need higher doses or do not respond at all.

SAFETY WATCH

Watch for tachyphylaxis (the drug stops working as well over time), which happens in some babies after days to weeks; you may need to increase the dose or switch to surgery. · Octreotide can cause serious gut problems: it slows the movement of food through the intestines, leading to bloating, vomiting, and in rare cases a dangerous condition called necrotizing enterocolitis (NEC, where parts of the intestine die). Watch for a swollen, tender belly, bloody stools, or poor feeding. · It can suppress other hormones too—growth hormone and thyroid-stimulating hormone—so monitor growth and thyroid function if the baby is on it for a long time. · Octreotide can cause gallstones (hardened bits of bile in the gallbladder) with long-term use, so some doctors check the gallbladder with ultrasound periodically. · It must be given by injection multiple times a day or as a continuous infusion, which is hard on the baby and the family; this limits its use to short-term or hospital-based care in many cases. · If octreotide does not control blood sugar after a fair trial, the baby will likely need surgery to remove the part of the pancreas that is making too much insulin.

Red flags

- Seizures (stiffening, jerking, or blank staring spells)—sign of severe brain fuel shortage
- Lethargy that won't improve with feeding or the baby is too floppy to wake or suck
- Pauses in breathing (Apnea) (pauses in breathing longer than 20 seconds) or blue skin (cyanosis)—the brainstem is struggling
- Blood sugar that stays low (under 50 mg/dL) despite feeding or IV glucose—suggests a deeper metabolic or hormone problem
- No symptoms even though blood sugar is very low—the baby may not be able to signal distress, raising the risk of silent brain injury

Nursing priorities

1. Check blood sugar with heel-stick glucose test at 30 minutes of life, then at 1 hour, 2 hours, 4 hours, and before every feed for the first 24 hours in at-risk babies — The brain needs constant glucose to work and early detection catches low blood sugar (hypoglycemia) before seizures or brain damage happen because newborn glucose drops fastest in the first 2 hours after the cord is cut
2. Feed the baby within the first hour of birth either by breastfeeding or giving formula, then every 2 to 3 hours around the clock — Feeding delivers glucose directly into the bloodstream through digestion and stimulates the baby's own glucose production from the liver which prevents and treats mild low blood sugar (hypoglycemia) without medicines

3. Apply 200 mg per kilogram of 40% dextrose gel to the inside of the baby's cheek and rub it in gently when blood sugar is under 47 mg/dL in a baby who looks well and can suck — Buccal dextrose gel absorbs directly through the mucous membranes (wet lining of the mouth) into tiny blood vessels and raises sugar in 10 to 15 minutes without needing an IV stick
4. Recheck blood sugar 30 minutes after giving gel or feeding to confirm the level rose above 47 mg/dL — Treatment only works if glucose actually goes up and stays up so rechecking proves the intervention succeeded and tells you whether the baby needs IV dextrose instead
5. Start an IV line and give 10% dextrose water at 5 to 8 mg per kilogram per minute when the baby is jittery, floppy, seizing, will not eat, or blood sugar stays under 47 mg/dL after two tries with feeding and gel — Sick babies and persistent low sugar mean the gut cannot absorb enough or the body is using or losing glucose faster than feeding can replace it so IV dextrose delivers sugar directly into the blood to protect the brain immediately
6. Never give an IV bolus or push of dextrose unless blood sugar is critically low under 25 mg/dL because rapid bolus causes rebound low blood sugar (hypoglycemia) — A big sugar spike makes the pancreas release a flood of insulin which then crashes the blood sugar even lower than before in 1 to 2 hours creating a dangerous cycle
7. Keep the baby warm under a radiant warmer or skin-to-skin with mother and dressed with a hat — Cold stress makes the body burn glucose very fast to create heat through thermogenesis (heat production) and also releases stress hormones that block insulin so the baby needs even more sugar
8. Notify the provider immediately if low blood sugar (hypoglycemia) continues after 48 hours of life or the baby needs IV dextrose concentrations higher than 12.5% to keep sugar normal — Persistent or severe low blood sugar (hypoglycemia) suggests hyperinsulinism or a metabolic disease that needs specialist testing and medications like diazoxide or octreotide to stop the pancreas from making too much insulin

Sources

- AAP Clinical Report on Postnatal Glucose Homeostasis in Late-Preterm and Term Infants (2011)
- Pediatric Endocrine Society guidelines on management of hypoglycemia in neonates and infants (2015)
- Cochrane reviews on neonatal hypoglycemia screening and treatment
- WHO guidelines on care of the preterm and low-birth-weight newborn

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