

BPPV (Benign Paroxysmal Positional Vertigo)

Tiny calcium crystals break free inside your ear and tumble into the wrong tube—so every time you tip your head, they roll and trick your brain into thinking you're spinning when you're not.

THE ONE-LINE TRUTH

Brief spinning spells triggered by head movement, caused by loose calcium crystals floating in the inner ear's balance canals.

The chain — how it unfolds

1. Otoconia break free from the utricular macula (the gel patch in the utricle) and become loose particles floating in the inner ear. — why: The crystals detach because of head trauma, viral labyrinthitis (inflammation of the inner ear), natural aging (the organic matrix holding the crystals weakens, especially after age fifty), prolonged inactivity (bed rest or immobilization reduces normal crystal turnover), or with no known cause (idiopathic) degeneration (no clear cause, which is the most common scenario). Women are affected about twice as often as men, possibly due to hormonal influences on calcium metabolism and bone health.
2. The free-floating crystals drift through a small opening (the crus commune or individual canal opening) into one of the three semicircular canals, most often the posterior canal. — why: Gravity and head position during sleep or rest allow the loose crystals to tumble into the canal. The posterior canal is lowest when lying supine, so it collects crystals in seventy to ninety percent of cases; the horizontal (lateral) canal accounts for five to fifteen percent, and the superior (anterior) canal is rarely affected (under three percent) because it is positioned highest.
3. When you move your head into the plane of the affected canal—for example, lying down, rolling over, tipping your head back, or bending forward—the heavy otoconia sink or tumble along the canal, pulled by gravity. — why: Otoconia are denser than the surrounding endolymph (canal fluid), so they act like tiny weights. As they roll downward through the canal, they drag a wave of fluid with them—this is called endolymphatic flow—creating pressure that pushes the cupula at the far end of the canal.

4. The abnormal fluid wave deflects the cupula (the jelly cone that blocks the canal), bending it and the hair cells embedded in it. — why: Normally, the cupula only bends when the entire head rotates and inertia causes the canal's fluid to lag behind, creating relative fluid flow. In BPPV, the cupula bends during a position change (a tilt or slow movement) because the rolling crystals generate a fluid current that mimics rapid rotation—even though the head is not spinning. This is a false-positive rotation signal.
5. The bent hair cells in the cupula fire a burst of nerve impulses through the vestibular branch of cranial nerve VIII (the vestibulocochlear nerve) to the vestibular nuclei in the brainstem. — why: Hair cells are mechanoreceptors: when their stereocilia (tiny hair-like projections) bend in one direction, ion channels open, the cell depolarizes, and it releases neurotransmitter (glutamate) onto the vestibular nerve fiber. The brain interprets this signal as 'The head is rotating rapidly in the plane of this canal'—for the posterior canal, that means rotation as if somersaulting backward.
6. The vestibular nuclei in the brainstem instantly activate the vestibulo-ocular reflex (VOR), commanding the eye muscles to move the eyes in the opposite direction of the perceived spin to stabilize vision. — why: The VOR is a hardwired, automatic reflex with a three-neuron arc: vestibular nerve → vestibular nuclei → oculomotor nuclei (controlling eye muscles). When the brain believes the head is spinning, it moves the eyes the opposite way at the same speed to keep images steady on the retina. In BPPV, because the head is not actually spinning, the reflex produces involuntary eye jerking (nystagmus)—rapid, involuntary, rhythmic eye jerking. For posterior-canal BPPV, the involuntary eye jerking is typically upbeat (eyes jerk upward) and torsional (eyes rotate slightly), and it lasts ten to sixty seconds, matching the time it takes for the crystals to settle.
7. You experience intense rotational a spinning sensation (vertigo)—the sensation that you or the room is spinning or tumbling—and often nausea or even vomiting. — why: Your inner ear (via the false signal) says you are spinning rapidly, but your eyes (when open), proprioception (muscle and joint sensors), and your cerebellar expectation all say you are nearly still. This sensory mismatch—called sensory conflict—triggers a spinning sensation (vertigo), the illusion of motion. The vestibular nuclei also project to the chemoreceptor trigger zone and the vomiting center in the medulla, so strong vestibular stimulation or conflict commonly causes nausea and vomiting. The a spinning sensation is abrupt, severe, and can be frightening, but it is self-limited.

8. After ten to sixty seconds, the crystals settle at the lowest point in the canal and stop moving; the fluid calms, the cupula returns to neutral, the nerve signal stops, and the spinning sensation (vertigo) fades. — why: Once the otoconia reach the bottom of the canal and quit rolling, there is no more abnormal endolymph flow. The cupula straightens, hair cells return to their resting firing rate, the false rotation signal ends, and the vestibulo-ocular reflex stops driving the eyes. You may feel unsteady or 'off' for a few minutes to a few hours afterward—a phenomenon called post-a spinning sensation (vertigo) imbalance—but the acute spinning sensation is gone.

Spot it — what you see, and why

- Sudden spinning feeling when you move your head: Tiny calcium crystals called otoconia normally sit in the utricle (a pouch in your inner ear that senses gravity). When they break loose and float into the semicircular canals (curved tubes in your ear that sense head turns), they tumble around during head movement. This makes the fluid in the canals slosh when it shouldn't, sending false spinning signals to your brain even though you're standing still.
- Dizziness triggered by rolling over in bed: Rolling over shifts your head quickly, which moves the loose crystals inside the semicircular canals. The crystals push on tiny hair cells lining the canal, making them bend and fire signals that tell your brain you're spinning. Since you're actually lying still, the mismatch creates the dizzy, spinning feeling.
- A spinning sensation (Vertigo) when looking up or bending down: Tilting your head back to look up or forward to bend down changes where gravity pulls the loose crystals in the canal. This shifts the crystals and makes the canal fluid move, triggering the hair cells to send false spinning signals to the cerebellum (the brain's balance control center at the back of your head).
- Nausea or vomiting during a spinning episode: Your inner ear tells your brain you're spinning, but your eyes see that you're not moving. This mismatch confuses the vestibular nuclei (balance centers in your brainstem) and activates the area postrema (the brainstem's vomiting trigger zone), making you feel sick to your stomach or throw up.
- Brief episodes that last less than one minute: Once you stop moving your head, the loose crystals settle to the bottom of the canal and stop tumbling. The false spinning signals stop within seconds to a minute, so the spinning sensation (vertigo) fades quickly on its own without any treatment.
- Unsteadiness or feeling off-balance between spinning episodes: Even when the crystals aren't actively moving, your brain remembers the recent false spinning signals and stays on high alert. The cerebellum adjusts your posture and gait to be extra careful, so you may walk more slowly, feel wobbly, or avoid quick head turns.

Red flags — act now

- New severe headache or the worst headache of your life with the a spinning sensation (vertigo)
- Weakness, numbness, or trouble moving one side of your face, arm, or leg
- Double vision, slurred speech, or difficulty swallowing
- A spinning sensation (Vertigo) that lasts hours without stopping or keeps getting worse
- Loss of consciousness, confusion, or trouble staying awake during the spinning episode

Treat it — in this order

1. Epley maneuver (canalith repositioning) for posterior-canal BPPV — a series of four head positions, each held 30–60 seconds, to roll crystals out of the canal → Crystals tumble out of the semicircular canal back into the wide vestibule (utricle — a sac where they cannot trigger spinning). About 70–80% of people are cured in one session; a second session brings cure to ~90%. Spinning stops immediately or within 24–48 hours as debris clears.
2. BBQ roll (log roll) or Gufoni maneuver for horizontal (lateral) canal BPPV — rolling the patient 360° in steps, or a quick side-lying maneuver → Clears crystals from the horizontal canal, which the Epley does not reach. Success is also high (~70–90% in one to two sessions). Picks the correct physics for the canal involved.
3. Vestibular rehabilitation exercises (Brandt-Daroff or Cawthorne-Cooksey home exercises) if maneuvers fail or BPPV keeps coming back → Trains the brain to ignore false spinning signals and improves balance reflexes. Reduces how often BPPV returns and shortens each episode. Helpful for people with chronic imbalance after repeated BPPV or if crystals will not stay relocated.
4. Meclizine 25 mg by mouth (or dimenhydrinate 50 mg) for nausea during the maneuver or the first 24 hours after → Calms the vomit center in the brainstem (area postrema) and reduces the sick-to-your-stomach feeling that comes with spinning. Makes the patient comfortable enough to tolerate repositioning.
5. Vitamin D supplementation (1,000–2,000 IU daily or higher-dose repletion if severely low) if serum 25-OH vitamin D is < 20 ng/mL and BPPV recurs often → Low vitamin D may weaken the glue (otoconia matrix protein) holding crystals in place. Repleting vitamin D can cut recurrence roughly in half in people with low levels (per multiple small trials). Safe, cheap, and targets a modifiable cause.

Your top priorities at the bedside

1. Keep the patient safe from falls by staying close, using the call bell, and helping with all movement. — why: The sudden spinning makes balance impossible. Patients can fall and break bones or hit their head if they try to walk alone. We lower the bed, keep the path clear, and walk with them every time until the crystals are fixed and the spinning stops.
2. Help position the patient comfortably and teach them to move slowly, pausing between position changes. — why: Fast head movements stir up the loose crystals and make the spinning worse. Moving in stages—sit up slowly, pause, then stand—gives the crystals time to settle and reduces the intensity of each spin. Patients feel more in control and less frightened when they know how to minimize triggers.
3. Give anti-nausea medicine as ordered and offer small sips of clear fluids or bland crackers. — why: The brain's confusion from spinning signals often causes strong nausea and vomiting. Medicine blocks the nausea pathways in the brain. Keeping the stomach calm prevents dehydration and helps the patient feel well enough to cooperate with repositioning maneuvers that fix the problem.