

Ventricular Tachycardia and Ventricular Fibrillation

The ventricles beat so fast or so chaotically that they can't pump blood. If unstable, shock or pace right away. If stable, use medicine. If it happens twice, put in a defibrillator to prevent sudden death.

THE ONE-LINE TRUTH

The heart's lower chambers fire too fast (ventricular a fast heart rate (tachycardia)) or shake chaotically (ventricular fibrillation), stopping all blood flow. If the person has no pulse, shock immediately at 200 joules biphasic, do CPR, give epinephrine and amiodarone per ACLS.

The chain — how it unfolds

1. A patch of ventricle muscle fires rapidly on its own, or multiple patches fire chaotically, taking over from the normal sinoatrial node pacemaker. — why: Scar tissue from an old heart attack, low potassium, an inherited ion-channel mutation, or acute starved blood flow (ischemia) makes the ventricle electrically unstable. A single extra beat at just the wrong moment can start a reentry loop or trigger chaotic firing.
2. In ventricular a fast heart rate (tachycardia), the ventricles beat so fast—often 150 to 250 times per minute—that they cannot relax and fill with blood between beats. Cardiac output drops sharply. — why: The person feels their heart racing (palpitations), becomes dizzy or short of breath, has chest pain, and may faint (syncope) as blood pressure falls. If VT is very fast or lasts more than a few seconds, it often degenerates into ventricular fibrillation.
3. In ventricular fibrillation, the ventricles quiver in a completely disorganized way—no coordinated squeeze at all. Cardiac output is zero. — why: The person collapses instantly, loses consciousness, stops breathing normally (may gasp a few times), and has no pulse. This is sudden cardiac arrest. Without CPR and defibrillation within minutes, brain death and irreversible organ failure follow.

4. The brain, heart, kidneys, liver, and all organs are starved of oxygen and nutrients. Lactic acid builds up as cells switch to anaerobic metabolism. — why: Brain cells start dying after four to six minutes. Heart muscle that is already blood-starved (ischemic) suffers more damage. Kidneys shut down. The longer the arrest lasts, the lower the chance of survival and the higher the risk of permanent brain injury even if the heart is restarted.
5. If the rhythm is shocked back to normal (or if VT spontaneously stops), the heart may restart but remain weak and unstable. — why: The underlying cause—scar, low electrolytes, starved blood flow (ischemia), or genetic mutation—is still there. Without fixing the root problem and protecting the heart (often with an implantable cardioverter-defibrillator, or ICD), VT or VF will likely happen again, sometimes within hours or days.
6. Recurrent VT or VF leads to progressive heart failure, repeated shocks from an ICD, and eventual death if the cycle is not broken. — why: Each episode injures the heart a little more. Treatment must address the cause: revascularization (stents or bypass) for blocked arteries, correcting potassium and magnesium, stopping toxic drugs, ablating the scar tissue that creates reentry circuits, or placing an ICD to shock any future VF automatically and save the person's life.

Spot it — what you see, and why

- Fast, wide heartbeat pattern on the monitor (ventricular a fast heart rate (tachycardia)) or chaotic squiggly line (ventricular fibrillation): The bottom pumping chambers (ventricles) are firing signals on their own instead of waiting for the normal pacemaker up top, so the whole heart rhythm is taken over by the wrong part. In VT the ventricles beat very fast but in a steady pattern; in VFib they just quiver and can't pump at all.
- Sudden collapse or loss of consciousness: When the ventricles beat so fast or quiver uselessly, they can't fill with blood properly between beats, so almost no blood is pumped to the brain. The brain runs out of oxygen in seconds and the person passes out or collapses.
- No pulse or very weak pulse: The ventricles are either beating too fast to squeeze out blood properly (VT) or just shaking and not pumping at all (VFib), so little or no blood reaches the arteries where we feel a pulse.
- Chest pain or pressure: The heart muscle itself needs steady blood flow through the coronary arteries. When the ventricles can't pump well, blood pressure drops and the heart muscle may not get enough oxygen, causing pain. Also, VT and VFib are often triggered by a heart attack, which hurts on its own.
- Sudden shortness of breath or gasping: The lungs depend on the heart to pump oxygen-rich blood back out to the body. When the ventricles fail to pump, blood backs up in the lungs and oxygen delivery drops, so the person feels starved for air.

- Dizziness or lightheadedness: Not enough blood is reaching the brain because the ventricles are pumping poorly or not at all. The brain notices the drop in oxygen and warns you by making you feel dizzy, like you might faint.

Red flags — act now

- No pulse and no breathing (cardiac arrest — start CPR and call for a defibrillator immediately)
- Sudden collapse or complete loss of consciousness
- Chest pain with a very fast heart rate and low blood pressure
- Ventricular fibrillation on the monitor (the heart is just quivering and must be shocked right away)

Treat it — in this order

1. CPR (chest compressions 100–120 per minute, at least 2 inches deep) + defibrillation (one shock at 200 J biphasic) immediately → Compressions push blood to the brain and heart to keep them alive. The shock stops the chaotic electrical signal in the ventricles and gives the heart a chance to reset to a normal rhythm. Together they can restart the heart and save the brain.
2. Epinephrine 1 mg IV push every 3–5 minutes during CPR → Squeezes blood vessels (vasoconstriction) and strengthens the heart's squeeze so more blood reaches the brain and coronary arteries while CPR and shocks are happening. This keeps vital organs alive long enough for the next shock to work.
3. Amiodarone 300 mg IV push after the first shock, then 150 mg IV if the rhythm returns within 3–5 minutes → Blocks chaotic electrical signals in the ventricles (blocks sodium, potassium, and calcium channels and beta receptors) and helps the shock reset the rhythm to normal. It also steadies the heart after rhythm returns so it does not break again immediately.
4. Correct potassium to 4.0–4.5 mEq/L and magnesium to ≥ 2.0 mEq/L — give IV potassium chloride and magnesium sulfate 2 g over 5–10 minutes → Potassium and magnesium stabilize the heart's electrical wiring. Low levels make the ventricles fire chaotically. Raising them back to normal steadies the rhythm and prevents it from breaking again. Magnesium is the specific fix for torsades de pointes.
5. Stop any drug that prolongs the QT interval (antipsychotics, certain antibiotics like azithromycin or fluoroquinolones, tricyclic antidepressants) → QT-prolonging drugs delay the heart's electrical reset and create a window where chaotic rhythms (especially torsades de pointes) can start. Stopping the drug closes that window.

Your top priorities at the bedside

1. Check for a pulse within 10 seconds. If no pulse, start chest compressions immediately at 100 to 120 pushes per minute, pushing down 2 inches on the center of the chest. — why: Without a pulse, the heart is not pumping blood to the brain and other organs. Brain cells die after 4 to 6 minutes without oxygen. Chest compressions squeeze the heart between the breastbone and spine to push blood out to the body until we can shock the heart back to normal rhythm.
2. Attach defibrillator pads to the bare chest. Charge to 200 joules (biphasic energy level) and deliver shock immediately if the rhythm is ventricular fibrillation or pulseless ventricular a fast heart rate (tachycardia). Resume compressions right after the shock without checking pulse. — why: The shock stops all heart electrical activity for a split second, allowing the heart's natural pacemaker to restart a normal rhythm. Every minute of delay reduces survival by 7 to 10 percent. Biphasic shocks use less energy but work better than old-style shocks.
3. Give epinephrine 1 milligram IV push (intravenous injection) every 3 to 5 minutes during CPR. Continue until the patient has a pulse and normal rhythm. — why: Epinephrine (also called adrenaline) squeezes blood vessels tight, which pushes more blood up to the brain during chest compressions. It also makes the heart muscle more likely to respond to the defibrillator shock. The medicine wears off quickly, so we repeat it every few minutes.