Adenosine

Generic: Adenosine | Brand: Adenocard, Adenoscan

Class V antiarrhythmic | Cardiovascular system | First-line: stable SVT

1 · Drug overview

- **First-line** for acute termination of **stable paroxysmal supraventricular tachycardia (PSVT)**
- Used when vagal maneuvers (Valsalva, carotid massage) fail
- Pharmacologic stress testing (Adenoscan) for patients unable to exercise
- Diagnostic: helps unmask underlying rhythm in wide-complex tachycardias of unclear origin
- **NOT** indicated for atrial fibrillation, atrial flutter, or ventricular tachycardia

2 · Mechanism of action

Binds A1 receptors → ↑ K^+ efflux, ↓ Ca^{2+} influx → slows AV node conduction → transient AV block → interrupts reentry circuit → brief asystole → heart resets to NSR

- Endogenous nucleoside (naturally occurring in the body)
- Acts primarily at the **AV node** — slows conduction, prolongs refractoriness
- **Half-life < 10 seconds** — rapidly metabolized by red blood cells and endothelium
- Think of it as **CTRL+ALT+DEL for the heart** — reboot to sinus rhythm

3 · Therapeutic effects

- Conversion of SVT to **normal sinus rhythm**
- Heart rate drops from **150–220 bpm → 60–100 bpm**
- **3–6 second asystole pause is EXPECTED** — not an emergency
- Patient typically reports relief of palpitations, chest pressure, dyspnea within seconds
- Onset: 10–20 seconds | Duration: 1–2 minutes

⚠ **Expected findings during push:** brief asystole, flushing, chest pressure, dyspnea, sense of "impending doom." These are signs the drug is **working**, not toxicity.

4 · Side effects & adverse reactions

COMMON (TRANSIENT, SELF-LIMITING)

- Flushing, facial warmth
- Chest pressure / tightness
- Dyspnea, shortness of breath
- Headache, dizziness, lightheadedness
- Sense of impending doom or anxiety
- Nausea, metallic taste

SERIOUS / LIFE-THREATENING

- **Bronchospasm** — contraindicated in active asthma / severe COPD
- **Prolonged asystole** (>10 seconds) → call code
- New high-grade AV block (2nd- or 3rd-degree)
- Ventricular arrhythmias — VT, VF, torsades de pointes
- Severe bradycardia in sick sinus syndrome without pacemaker
- Rare: hypotension, syncope

5 · Priority nursing considerations

- **Assess** → baseline 12-lead ECG, continuous cardiac monitor, rhythm strip before + during + after
- **Monitor** → HR, BP, SpO_2, LOC, respiratory status continuously throughout push
- **Hold** for:
  - 2nd- or 3rd-degree AV block (without pacemaker)
  - Sick sinus syndrome (without pacemaker)
  - Active asthma attack / severe bronchospasm
  - Hypersensitivity
- **Notify provider** → asystole >10 sec, new-onset VT/VF, severe bronchospasm, persistent hypotension
- **Crash cart + defibrillator + airway equipment at the bedside BEFORE administration**
- Two-nurse verification (high-alert medication at many facilities)
- Drug interactions:
  - **Caffeine / theophylline** → BLOCK adenosine (may need higher dose or won't work)
  - **Dipyridamole** → POTENTIATES effect (use 25–50% lower dose)
  - **Carbamazepine** → may increase degree of heart block

6 · Labs & diagnostics

- **12-lead ECG** — before administration AND after conversion
- **Continuous telemetry / rhythm strip** running during the push (documents conversion)
- Baseline electrolytes — especially **K^+ and Mg^{2+}** (low levels → pro-arrhythmic)
- No therapeutic drug level to monitor (half-life too short)

LAB	WHY IT MATTERS
Potassium (K^+)	Low K → ↑ risk of VT/torsades after conversion
Magnesium (Mg^{2+})	Low Mg → ↑ risk of ventricular arrhythmia
ECG rhythm strip	Document pre-push rhythm, conversion, post-push rhythm

7 · Administration & safety

- **Route:** IV **rapid** push over **1–2 seconds** — never slow
- **IV site:** use the **most proximal vein** possible — antecubital or central line. Avoid hand/distal veins (drug degrades before reaching heart)
- **Immediately follow with 20 mL normal saline flush** — elevate the arm if peripheral
- Use a **two-syringe technique** or **stopcock / Y-site** — adenosine and flush pushed back-to-back
- **Dose ladder (adult SVT):**
  - 1st dose: **6 mg** IV rapid push
  - 2nd dose (if no conversion in 1–2 min): **12 mg** IV rapid push
  - 3rd dose (if still no conversion): **12 mg** IV rapid push
- Pediatric: 0.1 mg/kg (max 6 mg) → 0.2 mg/kg (max 12 mg)

HIGH-ALERT: Slow push = drug is metabolized before reaching the AV node = **ineffective**, not dangerous. The error is treatment failure, so verify rapid push + saline flush + proximal IV every time.

8 · Patient education

- **Warn before the push:** "You may feel chest pressure, warmth, shortness of breath, or a brief sense that something is wrong — it lasts only a few seconds."
- Bearing down (Valsalva) or coughing during push may ease the sensation
- **Adenosine stress test prep:** no caffeine for **24 hours** (coffee, tea, chocolate, soda, energy drinks) — caffeine blocks the drug
- Hold theophylline/aminophylline per provider orders before stress testing
- After discharge: report new palpitations, syncope, chest pain, or shortness of breath
- Keep follow-up cardiology appointments — evaluation for underlying arrhythmia

9 · NCLEX test traps ⚠️

⚠ **Slow push = WRONG.** Must be < 2 seconds or the drug degrades before reaching the heart.

⚠ Brief asystole / pause is **EXPECTED**, not an emergency. Don't pick "call a code" as the first action for a 4-second pause.

⚠ Adenosine is for **narrow-complex SVT with a pulse** — NOT for A-fib, A-flutter, VT, or VF.

⚠ Distal IV (hand, wrist) = ineffective. Always pick the **most proximal** site in test questions.

⚠ **Caffeine & theophylline BLOCK** adenosine → watch for "patient drank coffee this morning before stress test."

⚠ **Dipyridamole POTENTIATES** adenosine → dose must be reduced.

⚠ Don't confuse the A-drugs:

- ⚠ **Adenosine** → stable SVT (narrow, fast, with pulse)
- ⚠ **Amiodarone** → VT / wide-complex / A-fib
- ⚠ **Atropine** → symptomatic bradycardia

⚠ Select-all-that-apply expected findings: flushing, chest pressure, asystole, sense of doom. Students often drop "asystole" — it's the mechanism working.

10 · Memory boosters

★ **"6–12–12"** → the SVT dose ladder

★ **"A = Asystole"** → brief pause is expected with Adenosine

★ **CTRL+ALT+DEL for the heart** → reboots the rhythm to NSR

★ **"FAST in, FAST out"** → half-life < 10 sec = rapid push + rapid flush

★ **"Narrow & fast → adenosine blast"** → narrow-QRS SVT only

★ **"CAP" contraindications** → **C**affeine interferes, **A**sthma, **P**acemaker-less heart block

★ **"PROXIMAL + PUSH + POTENT flush"** → the 3 P's of adenosine admin

⭐ Most tested antiarrhythmics — know the differences

DRUG	CLASS	USED FOR	KEY NCLEX POINT
Adenosine	V (nucleoside)	Stable narrow-complex SVT	Rapid push + proximal IV + 20 mL flush; brief asystole expected
Amiodarone	III (K^+ blocker)	VT, VF, A-fib	Pulmonary fibrosis, thyroid & liver toxicity, corneal deposits; long half-life
Atropine	Anticholinergic	Symptomatic bradycardia	Dry mouth, blurred vision, urinary retention; increases HR
Diltiazem / Verapamil	IV (Ca^{2+} channel blockers)	Rate control in A-fib/flutter, SVT	Hold for HR < 60 or SBP < 90; watch for heart block
Lidocaine	IB (Na^+ blocker)	VT, VF	CNS toxicity: confusion, seizures, slurred speech
Digoxin	Cardiac glycoside	A-fib rate control, HF	Narrow therapeutic range (0.5–2.0 ng/mL); hold for HR < 60

🧠 Clinical judgment snapshot (NCJMM/NGN)

#1 PRIORITY RISK

Prolonged asystole + bronchospasm — especially in asthmatic patients or those on dipyridamole

WHAT HARMS THE PATIENT FIRST

Airway compromise from bronchospasm → hypoxia → cardiac arrest; or prolonged asystole if pacemaker-less high-grade AV block

FIRST NURSING ACTION IN A SCENARIO

Before pushing: confirm continuous cardiac monitor, crash cart + defibrillator at bedside, proximal IV access, and 20 mL saline flush ready. Verify no contraindications (asthma, high-grade block, caffeine within 24h for stress test).

RECOGNIZE: CUES → ANALYSIS

HR 180, narrow QRS, stable BP = SVT → adenosine. Wide QRS = NOT adenosine, think amiodarone/cardioversion.

TAKE ACTION

6 mg rapid IV push over 1–2 sec → 20 mL NS flush → observe monitor for conversion. If no response in 1–2 min → 12 mg, then 12 mg.

EVALUATE OUTCOME

Success = conversion to NSR, HR 60–100, symptom relief, stable BP, return of baseline

LOC. Document rhythm strip pre/post conversion.

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