amiodarone

*ah-me-**oh**-dah-roan*

(Apo-Amiodarone, Cordarone, Novo-Amiodarone, Pacerone)

BLACK BOX ALERT Pts should be hospitalized when amiodarone is initiated. Alternative therapies to be tried fi rst before using amiodarone. Only indicated for pts with life-threatening arrhythmias due to risk of toxicity. Lung damage may occur without symptoms. Hepatotoxicity is common, usually mild (rarely possible). Can exacerbate arrhythmias.

Do not confuse amiodarone with amiloride, or Cordarone with Cardura.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Cardiac agent.

CLINICAL: Antiarrhythmic (see p. 17C).

ACTION

Prolongs duration of myocardial cell action potential and refractory period by acting directly on all cardiac tissue. Decreases AV and sinus node function.

Therapeutic Effect: Suppresses arrhythmias.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	3 days–3 wks	1 wk–5 mos	7–50 days after discontinuation

Slowly, variably absorbed from GI tract. Protein binding: 96%. Extensively metabolized in the liver to active metabolite. Excreted via bile; not removed by hemodialysis. Half-life: 26–107 days; metabolite, 61 days.

USES

PO: Management of life-threatening recurrent ventricular fibrillation, hemodynamically unstable ventricular tachycardia (VT).

IV: Management/prophylaxis of frequently occurring ventricular fibrillation, unstable VT unresponsive to other therapy.

OFF-LABEL: Control of hemodynamically stable VT, control of rapid ventricular rate due to accessory pathway conduction in pre-excited atrial arrhythmias, conversion of atrial fibrillation to normal sinus rhythm, in cardiac arrest with persistent VT or ventricular fibrillation, paroxysmal supraventricular tachycardia (PSVT), polymorphic VT or wide complex tachycardia of uncertain origin, prevention of postop atrial fibrillation.

PRECAUTIONS

CONTRAINDICATIONS: Bradycardia-induced syncope (except in the presence of a pacemaker), second- and third-degree AV block, severe hepatic disease, severe sinus node dysfunction. Hypersensitivity to iodine.

CAUTIONS: Thyroid disease, electrolyte imbalance, hepatic disease, hypotension, left ventricular dysfunction, photosensitivity, pulmonary disease.

LIFESPAN CONSIDERATIONS

Pregnancy/Lactation: Crosses placenta; distributed in breast milk. May adversely affect fetal development. **Pregnancy Category D**.

Children: Safety and efficacy not established.

Elderly: May be more sensitive to effects on thyroid function. May experience increased incidence of ataxia, other neurotoxic effects.

INTERACTIONS

DRUG: May increase cardiac effects with other antiarrhythmics. May increase effect of beta-blockers, oral anticoagulants. May increase concentration, toxicity of digoxin, phenytoin. Simvastatin may increase risk for myopathy, rhabdomyolysis.

HERBAL: St. John's wort may decrease effect.

FOOD: Grapefruit, grapefruit juice may decrease effect.

LAB VALUES: May increase serum AST, ALT, alkaline phosphatase, ANA titer. May cause changes in EKG, thyroid function test results. Therapeutic serum level: 0.5–2.5 mcg/ml; toxic serum level not established.

AVAILABILITY (Rx)

INJECTION, SOLUTION (CORDARONE I.V.): 50 mg/ml.

TABLETS: 100 mg (Pacerone), 200 mg (Cordarone, Pacerone), 400 mg (Pacerone).

ADMINISTRATION/HANDLING

IV

Reconstitution

- Infusions longer than 2 hrs must be administered/diluted in glass or polyolefin bottles.
- Dilute loading dose (150 mg) in 100 ml D_5W (1.5 mg/ml).
- Dilute maintenance dose (900 mg) in 500 ml D_5W (1.8 mg/ml). Concentrations greater than 3 mg/ml cause peripheral vein phlebitis.

Rate of administration

- Does not need protection from light during administration.
- Administer through central venous catheter (CVC) if possible, using in-line filter.
- Bolus over 10 min (15 mg/min) not to exceed 30 mg/min; then 1 mg/min over 6 hrs; then 0.5 mg/min over 18 hrs.
- Infusions longer than 1 hr, concentration not to exceed 2 mg/ml unless CVC used.

Storage

- Store at room temperature.
- Stable for 24 hrs when diluted in glass or polyolefin containers; stable for 2 hrs when diluted in PVC containers.

PO

- Give with meals to reduce GI distress.
- Tablets may be crushed.

IV INCOMPATIBILITIES

Aminophylline (theophylline), cefazolin (Ancef), heparin, sodium bicarbonate.

IV COMPATIBILITIES

Dobutamine (Dobutrex), dopamine (Intropin), furosemide (Lasix), insulin (regular), labetalol (Normodyne), lidocaine, lorazepam (Ativan), midazolam (Versed), morphine, nitroglycerin, norepinephrine (Levophed), phenylephrine (Neo-Synephrine), potassium chloride, vancomycin.

INDICATIONS/ROUTES/DOSAGE

VENTRICULAR ARRHYTHMIAS

PO:

ADULTS, ELDERLY: Initially, 800–1,600 mg/day in 2–4 divided doses for 1–3 wks. After arrhythmia is controlled or side effects occur, reduce to 600–800 mg/day for 4 wks.
Maintenance: 200–600 mg/day.
CHILDREN: Initially, 10–20 mg/kg/day for 4–14 days, then 5 mg/kg/day for several wks. **Maintenance:** 2.5 mg/kg/day or lowest effective maintenance dose for 5–7 days/wk.

IV INFUSION:

ADULTS: Initially, 1,050 mg over 24 hrs; 150 mg over 10 min, then 360 mg over 6 hrs; then 540 mg over 18 hrs. May continue at 0.5 mg/min. After first 24 hrs, infuse 720 mg/24 hrs with a concentration of 1–6 mg/ml.

SIDE EFFECTS

EXPECTED: Corneal microdeposits noted in almost all pts treated for more than 6 mos (can lead to blurry vision).
FREQUENT (greater than 3%): PO: Constipation, headache, decreased appetite, nausea, vomiting, paresthesias, photosensitivity, muscular incoordination. Parenteral: Hypotension, nausea, fever, bradycardia.
OCCASIONAL (less than 3%): PO: Bitter or metallic taste; decreased libido; dizziness; facial flushing; blue-gray coloring of skin (face, arms, and neck); blurred vision; bradycardia; asymptomatic corneal deposits.
RARE (less than 1%): PO: Rash, vision loss, blindness.

ADVERSE EFFECTS/TOXIC REACTIONS

Serious, potentially fatal pulmonary toxicity (alveolitis, pulmonary fibrosis, pneumonitis, acute respiratory distress syndrome) may begin with progressive dyspnea and cough with crackles, decreased breath sounds, pleurisy, CHF, or hepatotoxicity. May worsen existing arrhythmias or produce new arrhythmias.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Obtain baseline pulmonary function tests, chest x-ray, hepatic enzyme tests, serum AST, ALT, alkaline phosphatase, 12-lead EKG. Assess B/P, apical pulse immediately before drug is administered (if pulse is 60/min or less or systolic B/P is less than 90 mm Hg, withhold medication, contact physician).

INTERVENTION/EVALUATION

Monitor for symptoms of pulmonary toxicity (progressively worsening dyspnea, cough). Dosage should be discontinued or reduced if toxicity occurs. Assess pulse for quality, rhythm, bradycardia. Monitor EKG for cardiac changes (e.g., widening of QRS, prolongation of PR and QT intervals). Notify physician of any significant interval changes. Assess for nausea, fatigue, paresthesia, tremor. Monitor for signs of hypothyroidism (periorbital edema,

lethargy, pudgy hands/feet, cool/pale skin, vertigo, night cramps) and hyperthyroidism (hot/dry skin, bulging eyes [exophthalmos], frequent urination, eyelid edema, weight loss, difficulty breathing). Monitor serum AST, ALT, alkaline phosphatase for evidence of hepatic toxicity. Assess skin, cornea for bluish discoloration in those who have been on drug therapy longer than 2 mos. Monitor hepatic function tests, thyroid test results. If elevated hepatic enzymes occur, dosage reduction or discontinuation is necessary. Monitor for therapeutic serum level (0.5–2.5 mcg/ml). Toxic serum level not established.

PATIENT/FAMILY TEACHING

- Protect against photosensitivity reaction on skin exposed to sunlight.
- Bluish skin discoloration gradually disappears when drug is discontinued.
- Report shortness of breath, cough.
- Outpatients should monitor pulse before taking medication.
- Do not abruptly discontinue medication.
- Compliance with therapy regimen is essential to control arrhythmias.
- Restrict salt, alcohol intake.
- Recommend ophthalmic exams q6mo.
- Report any vision changes.

baclofen

bak*-loe-fen*

(Apo-Baclofen, Lioresal, Liotec, Nu-Baclo)

BLACK BOX ALERT Abrupt withdrawal of intrathecal form has resulted in severe hyperpyrexia, obtundation, rebound or exaggerated spasticity, muscle rigidity, leading to organ failure, death.

Do not confuse baclofen with Bactroban or Beclovent, or Lioresal with lisinopril or Lotensin.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Skeletal muscle relaxant.

CLINICAL: Antispastic, analgesic in trigeminal neuralgia (see p. 149C).

ACTION

Inhibits transmission of reflexes at spinal cord level.

Therapeutic Effect: Relieves muscle spasticity.

PHARMACOKINETICS

Well absorbed from GI tract. Protein binding: 30%. Partially metabolized in the liver. Primarily excreted in urine. Half-life: 2.5–4 hrs.

USES

Treatment of cerebral spasticity, reversible spasticity associated with multiple sclerosis, spinal cord lesions. Intrathecal: For those unresponsive to oral therapy or exhibiting intolerable side effects.

OFF-LABEL: Treatment of bladder spasms, cerebral palsy, intractable hiccups or pain, Huntington's chorea, trigeminal neuralgia.

PRECAUTIONS

CONTRAINDICATIONS: Skeletal muscle spasm due to cerebral palsy, Parkinson's disease, rheumatic disorders, CVA, cough, intractable hiccups, neuropathic pain.

CAUTIONS: Renal impairment, CVA, diabetes mellitus, epilepsy, preexisting psychiatric disorders.

LIFESPAN CONSIDERATIONS

Pregnancy/Lactation: Unknown if drug crosses placenta or is distributed in breast milk. **Pregnancy Category C.**

Children: Safety and efficacy not established in those younger than 12 yrs.

Elderly: Increased risk of CNS toxicity (hallucinations, sedation, confusion, mental depression); age-related renal impairment may require decreased dosage.

INTERACTIONS

DRUG: Potentiated effects when used with other CNS depressants (including alcohol). MAOIs may increase CNS depression, hypotensive effect.
HERBAL: Gotu kola, kava kava, St. John's wort, valerian may increase CNS sedation.
FOOD: None known.
LAB VALUES: May increase serum AST, ALT, alkaline phosphatase, blood glucose.

AVAILABILITY (Rx)

INTRATHECAL INJECTION SOLUTION: 50 mcg/ml, 500 mcg/ml, 2,000 mcg/ml.
TABLETS: 10 mg, 20 mg.

ADMINISTRATION/HANDLING

PO

- Give without regard to food.
- Tablets may be crushed.

INTRATHECAL

- For screening, a 50 mcg/ml concentration should be used for injection.
- For maintenance therapy, solution should be diluted for pts who require concentrations other than 500 mcg/ml or 2,000 mcg/ml.

INDICATIONS/ROUTES/DOSAGE

ALERT Avoid abrupt withdrawal.

SPASTICITY

PO:
ADULTS: Initially, 5 mg 3 times a day. May increase by 15 mg/day at 3-day intervals. Range: 40–80 mg/day.
Maximum: 80 mg/day.
ELDERLY: Initially, 5 mg 2–3 times a day. May gradually increase dosage.
CHILDREN 8 YRS AND OLDER: 30–40 mg/day in divided doses q8h. May increase dose by 5–15 mg/day q3days.
Maximum: 120 mg/day.
CHILDREN 2–7 YRS: 20–30 mg/day in divided doses q8h. May increase dose by 5–15 mg/day q3days.
Maximum: 60 mg/day.
CHILDREN YOUNGER THAN 2 YRS: 10–20 mg/day in divided doses q8h. May increase dose by 5–15 mg/day.
Maximum: 40 mg/day.
Intrathecal Dose
ADULTS, ELDERLY, CHILDREN: Test dose: 50–100 mcg. Dose greater than 50 mcg given in 25-mcg increments, separated by 24 hrs. Following positive response to test dose, maintenance infusion can be given via implanted intrathecal pump. Initial dose is twice the test dose.

SIDE EFFECTS

FREQUENT (greater than 10%): Transient drowsiness, asthenia (loss of strength, energy), dizziness, light-headedness, nausea, vomiting.
OCCASIONAL (10%–2%): Headache, paresthesia, constipation, anorexia, hypotension, confusion, nasal congestion.
RARE (less than 1%): Paradoxical CNS excitement or restlessness, slurred speech, tremor, dry mouth, diarrhea, nocturia, impotence.

ADVERSE EFFECTS/TOXIC REACTIONS

Abrupt discontinuation may produce hallucinations, seizures. Overdose results in blurred vision, seizures, myosis, mydriasis, severe muscle weakness, strabismus, respiratory depression, vomiting.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Record onset, type, location, duration of muscular spasm. Check for immobility, stiffness, swelling.

INTERVENTION/EVALUATION

Assess for paradoxical reaction. Assist with ambulation at all times. For those on long-term therapy, hepatic/renal function tests, blood counts should be performed periodically. Evaluate for therapeutic response: decreased intensity of skeletal muscle pain.

PATIENT/FAMILY TEACHING

- Drowsiness usually diminishes with continued therapy.
- Avoid tasks that require alertness, motor skills until response to drug is established.
- Do not abruptly withdraw medication after long-term therapy.
- Avoid alcohol, CNS depressants.

epinephrine

*eh-pih-**nef**-rin*

(Adrenalin, EpiPen, EpiPen Jr., Primatene Mist, Twinject)

Do not confuse epinephrine with ephedrine.

FIXED-COMBINATION(S)

LidoSite: epinephrine/lidocaine (anesthetic): 0.1%/10%.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Sympathomimetic (adrenergic agonist).

CLINICAL: Antiglaucoma, bronchodilator, cardiac stimulant, antiallergic, antihemorrhagic, priapism reversal agent (see pp. 51C, 156C).

ACTION

Stimulates alpha-adrenergic receptors (vasoconstriction, pressor effects), $beta_1$-adrenergic receptors (cardiac stimulation), $beta_2$-adrenergic receptors (bronchial dilation, vasodilation). Ophthalmic: Increases outflow of aqueous humor from anterior eye chamber.

Therapeutic Effect: Relaxes smooth muscle of bronchial tree, produces cardiac stimulation, dilates skeletal muscle vasculature. Ophthalmic: Dilates pupils, constricts conjunctival blood vessels.

PHARMACOKINETICS

Route	Onset	Peak	Duration
IM	5–10 min	20 min	1–4 hrs
Subcutaneous	5–10 min	20 min	1–4 hrs
Inhalation	3–5 min	20 min	1–3 hrs
Ophthalmic	1 hr	4–8 hrs	12–24 hrs

Well absorbed after parenteral administration; minimally absorbed after inhalation. Metabolized in liver, other tissues, sympathetic nerve endings. Excreted in urine. Ophthalmic form may be systemically absorbed as a result of drainage into nasal pharyngeal passages. Mydriasis occurs within several min and persists several hrs; vasoconstriction occurs within 5 min and lasts less than 1 hr.

USES

Systemic: Treatment of asthma (acute exacerbation, reversible bronchospasm), anaphylaxis, hypersensitivity reaction, cardiac arrest. Added to local anesthetics to decrease systemic absorption and increase duration of activity of local anesthetic. Ophthalmic: Management of chronic open-angle glaucoma.

OFF-LABEL: Systemic: Treatment of gingival, pulpal hemorrhage; priapism. Ventricular fibrillation or pulseless ventricular tachycardia unresponsive to initial defibrillatory shocks; pulseless electrical activity, asystole, hypotension unresponsive to volume resuscitation; bradycardia/hypotension unresponsive to atropine or pacing; inotropic support. Ophthalmic: Treatment of conjunctival congestion during surgery, secondary glaucoma.

PRECAUTIONS

CONTRAINDICATIONS: Cardiac arrhythmias, cerebrovascular insufficiency, hypertension, hyperthyroidism, ischemic heart disease, narrow-angle glaucoma, shock-type states.

CAUTIONS: Elderly, diabetes mellitus, angina pectoris, tachycardia, MI, severe renal/hepatic impairment, psychoneurotic disorders, hypoxia.

LIFESPAN CONSIDERATIONS

Pregnancy/Lactation: Crosses placenta. Distributed in breast milk. **Pregnancy Category C.**

Children/Elderly: No age-related precautions noted.

INTERACTIONS

DRUG: May decrease effects of betablockers. Digoxin, sympathomimetics may increase risk of arrhythmias. Ergonovine, methergine, oxytocin may increase vasoconstriction. MAOIs, tricyclic antidepressants may increase cardiovascular effects.

HERBAL: Ephedra, yohimbe may increase CNS stimulation.

FOOD: None known.

LAB VALUES: May decrease serum potassium.

AVAILABILITY (Rx)

AEROSOL FOR ORAL INHALATION: (Primatene Mist): 0.22 mg/inhalation.
INJECTION, SOLUTION (PREFILLED SYRINGES): (EpiPen): 0.3 mg/0.3 ml, (EpiPen Jr.): 0.15 mg/0.3 ml, (Twinject): 0.15 mg/0.15 ml.
INJECTION, SOLUTION: 0.1 mg/ml (1:10,000), 1 mg/ml (1:1,000).
SOLUTION FOR ORAL INHALATION: (Adrenalin): 2.25% (0.5 ml).

ADMINISTRATION/HANDLING

IV

Reconstitution

- For injection, dilute each 1 mg of 1:1,000 solution with 10 ml 0.9% NaCl to provide 1:10,000 solution and inject each 1 mg or fraction thereof over 1 min or more (except in cardiac arrest).
- For infusion, further dilute with 250–500 ml D_5W. Maximum concentration: 64 mg/250 ml.

Rate of administration

- For IV infusion, give at 1–10 mcg/min (titrate to desired response).

Storage

- Store parenteral forms at room temperature.
- Do not use if solution appears discolored or contains a precipitate.

SUBCUTANEOUS

- Shake ampule thoroughly.
- Use tuberculin syringe for injection into lateral deltoid region.
- Massage injection site (minimizes vasoconstriction effect).

INHALATION

- Shake container well.
- Instruct pt to exhale completely, place mouthpiece between lips, inhale deeply and slowly while pressing top of canister, hold breath as long as possible, then exhale slowly.
- Allow at least 1 min between inhalations when multiple inhalations are ordered (allows for deeper bronchial penetration).
- Rinsing mouth after each use decreases dry mouth, hoarseness.

NEBULIZER

- No more than 10 drops Adrenalin Chloride solution 1:100 should be placed in reservoir of nebulizer.
- Place nozzle just inside pt's partially opened mouth.
- As bulb is squeezed once or twice, instruct pt to inhale deeply, drawing vaporized solution into lungs.
- Rinse mouth with water immediately after inhalation (prevents mouth/throat dryness).
- When nebulizer is not in use, replace stopper, keep in upright position.

OPHTHALMIC

- Place gloved finger on lower eyelid and pull out until a pocket is formed between eye and lower lid.
- Place prescribed number of drops into pocket.
- Instruct pt to close eye gently for 1–2 min (so medication will not be squeezed out of sac).
- Apply digital pressure to lacrimal sac at inner canthus for 1 min (to minimize systemic absorption).

IV INCOMPATIBILITIES

Aminophylline, ampicillin (Omnipen, Polycillin), sodium bicarbonate.

IV COMPATIBILITIES

Calcium chloride, calcium gluconate, diltiazem (Cardizem), dobutamine (Dobutrex), dopamine (Intropin), fentanyl (Sublimaze), heparin, hydromorphone (Dilaudid), lorazepam (Ativan), midazolam (Versed), milrinone (Primacor), morphine, nitroglycerin, norepinephrine (Levophed), potassium chloride, propofol (Diprivan).

INDICATIONS/ROUTES/DOSAGE

ANAPHYLAXIS

IM:
ADULTS, ELDERLY: 0.3–0.5 mg (0.3–0.5 ml of 1:1,000 solution). May repeat if anaphylaxis persists.
CHILDREN WEIGHING 30 KG OR MORE: 0.15–0.3 mg. **WEIGHING LESS THAN 30 KG:** 0.01 mg/kg. May repeat if anaphylaxis persists.

ASTHMA

SUBCUTANEOUS:
ADULTS, ELDERLY: 0.3–0.5 mg (0.3–0.5 ml of 1:1,000 solution) q2h as needed. In severe attacks, may repeat q20min times 3 doses.
CHILDREN: 0.01 ml/kg/dose (1:1,000 solution).
Maximum: 0.4–0.5 ml/dose. May repeat q15–20min for 3–4 doses or q4h as needed.
INHALATION:
ADULTS, ELDERLY, CHILDREN 4 YRS AND OLDER: 1 inhalation, wait at least 1 min. May repeat once. Do not use again for at least 3 hrs.

CARDIAC ARREST

IV:

ADULTS, ELDERLY: Initially, 1 mg. May repeat q3–5min as needed.

CHILDREN: Initially, 0.01 mg/kg (0.1 ml/kg of a 1:10,000 solution). May repeat q3–5min as needed.

ENDOTRACHEAL:

CHILDREN: 0.1 mg/kg (0.1 ml/kg of a 1:1,000 solution). May repeat q3–5min as needed.

HYPERSENSITIVITY REACTION

IM, SUBCUTANEOUS:

ADULTS, ELDERLY: 0.3–0.5 mg (1:1,000) q15–20min. IV: 0.1 mg (1:10,000) over 5 min.

SUBCUTANEOUS: CHILDREN: 0.01 mg/kg every 20 min.

Maximum single dose: 0.5 mg.

GLAUCOMA

OPHTHALMIC:

ADULTS, ELDERLY: 1–2 drops 1–2 times a day.

SIDE EFFECTS

FREQUENT: Systemic: Tachycardia, palpitations, anxiety. Ophthalmic: Headache, eye irritation, watering of eyes.

OCCASIONAL: Systemic: Dizziness, light-headedness, facial flushing, headache, diaphoresis, increased B/P, nausea, trembling, insomnia, vomiting, fatigue. Ophthalmic: Blurred/decreased vision, eye pain.

RARE: Systemic: Chest discomfort/pain, arrhythmias, bronchospasm, dry mouth/throat.

ADVERSE EFFECTS/TOXIC REACTIONS

Excessive doses may cause acute hypertension, arrhythmias. Prolonged/excessive use may result in metabolic acidosis due to increased serum lactic acid. Metabolic acidosis may cause disorientation, fatigue, hyperventilation, headache, nausea, vomiting, diarrhea.

NURSING CONSIDERATIONS

INTERVENTION/EVALUATION

Monitor for vital sign changes. Assess lung sounds for rhonchi, wheezing, rales. Monitor ABGs. In cardiac arrest, monitor EKG, pt condition.

PATIENT/FAMILY TEACHING

- Avoid excessive use of caffeine derivatives (chocolate, coffee, tea, cola, cocoa).
- Ophthalmic: Slight burning, stinging may occur on initial instillation.
- Report any new symptoms (tachycardia, shortness of breath, dizziness) immediately: may be systemic effects.

lidocaine

__lye__-doe-kane

(Anestacon, Betacaine, Lidoderm, Xylocaine, Zingo)

FIXED-COMBINATION(S)

EMLA: lidocaine/prilocaine (an anesthetic): 2.5%/2.5%.
Lidosite: lidocaine/epinephrine (a sympathomimetic):10%/0.1%.
Lidocaine with epinephrine: lidocaine/epinephrine (a sympathomimetic): 2%/1:50,000, 1%/1:100,000, 1%/1:200,000, 0.5%/1:200,000.
Synéra: lidocaine/tetracaine (an anesthetic): 70 mg/70 mg.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Amide anesthetic.
CLINICAL: Antiarrhythmic, anesthetic (see pp. 7C, 16C).

ACTION

Anesthetic: Inhibits conduction of nerve impulses.
Therapeutic Effect: Causes temporary loss of feeling/sensation.
Antiarrhythmic: Decreases depolarization, automaticity, excitability of ventricle during diastole by direct action.
Therapeutic Effect: Inhibits ventricular arrhythmias.

PHARMACOKINETICS

Route	Onset	Peak	Duration
IV	30-90 sec	N/A	10-20 min
Local anesthetic	2.5 min	N/A	30-60 min

Completely absorbed after IM administration. Protein binding: 60%–80%. Widely distributed. Metabolized in liver. Primarily excreted in urine. Minimally removed by hemodialysis. Half-life: 1–2 hrs.

USES

Antiarrhythmic: Rapid control of acute ventricular arrhythmias following MI, cardiac catheterization, cardiac surgery, digitalis-induced ventricular arrhythmias. Local Anesthetic: Infiltration/nerve block for dental/surgical procedures, childbirth. Topical Anesthetic: Local skin disorders (minor burns, insect bites, prickly heat, skin manifestations of chickenpox, abrasions). Mucous membranes (local anesthesia of oral, nasal, laryngeal mucous membranes; local anesthesia of respiratory, urinary tracts; relief of discomfort of pruritus ani, hemorrhoids, pruritus vulvae). Dermal patch: Relief of chronic pain in post-herpetic neuralgia, allodynia (painful hypersensitivity). Zingo: Reduces pain associated with venous access procedures (e.g., blood draws) in children 3–18 yrs.
OFF-LABEL: Fentanyl-induced cough.

PRECAUTIONS

CONTRAINDICATIONS: Adams-Stokes syndrome, hypersensitivity to amide-type local anesthetics, supraventricular arrhythmias, Wolff-Parkinson-White syndrome. Spinal anesthesia contraindicated in septicemia.
CAUTIONS: Hepatic disease, marked hypoxia, severe respiratory depression, hypovolemia, heart block, bradycardia, atrial fibrillation.

LIFESPAN CONSIDERATIONS

Pregnancy/Lactation: Crosses placenta. Distributed in breast milk. **Pregnancy Category B.**
Children: No age-related precautions noted.
Elderly: More sensitive to adverse effects. Dose, rate of infusion should be reduced. Age-related renal impairment may require dosage adjustment.

INTERACTIONS

DRUG: Anticonvulsants may increase cardiac depressant effects. Beta-adrenergic blockers may increase risk of toxicity. Other antiarrhythmics may increase cardiac effects.
HERBAL: St. John's wort may decrease concentration.
FOOD: None known.
LAB VALUES: IM lidocaine may increase creatine kinase (CK) level (used to diagnose acute MI). Therapeutic serum level: 1.5 to 6 mcg/ml; toxic serum level: greater than 6 mcg/ml.

AVAILABILITY (Rx)

CREAM, TOPICAL: 4%.
INFUSION PREMIX: 0.4% (4 mg/ml in 250 ml, 500 ml); 0.8% (8 mg/ml in 250 ml, 500 ml).
INJECTION, SOLUTION: 0.5% (5 mg/ml), 1% (10 mg/ml), 2% (20 mg/ml).

INTRADERMAL INJECTION SYSTEM (ZINGO): 0.5 mg lidocaine powder.
JELLY, TOPICAL: 2%.
SOLUTION, TOPICAL: 4%.
SOLUTION, VISCOUS: 2%.
TRANSDERMAL, TOPICAL (LIDODERM): 5%.

ADMINISTRATION/HANDLING

ALERT Resuscitative equipment, drugs (including O_2) must always be readily available when administering lidocaine by any route.

IV

ALERT Use only lidocaine without preservative, clearly marked for IV use.

Reconstitution

- For IV infusion, prepare solution by adding 1 g to 1 L D_5W to provide concentration of 1 mg/ml (0.1%).
- Commercially available preparations of 0.2%, 0.4%, and 0.8% may be used for IV infusion.

Maximum concentration: 4 g/250 ml.

Rate of administration

- For IV push, use 1% (10 mg/ml) or 2% (20 mg/ml).
- Administer IV push at rate of 25–50 mg/min.
- Administer for IV infusion at rate of 1–4 mg/min (1–4 ml); use volume control IV set.

Storage

- Store at room temperature.

IM

- Use 10% (100 mg/ml); clearly identify lidocaine that is for IM use.
- Give in deltoid muscle (serum level is significantly higher than if injection is given in gluteus muscle or lateral thigh).

TOPICAL

- Not for ophthalmic use.
- For skin disorders, apply directly to affected area or put on gauze or bandage, which is then applied to the skin.
- For mucous membrane use, apply to desired area per manufacturer's insert.
- Administer lowest dosage possible that still provides anesthesia.

ZINGO:

- Use only on intact skin.
- For external use only.

IV INCOMPATIBILITIES

Amphotericin B complex (Abelcet, AmBisome, Amphotec), thiopental.

IV COMPATIBILITIES

Aminophylline, amiodarone (Cordarone), calcium gluconate, digoxin (Lanoxin), diltiazem (Cardizem), dobutamine (Dobutrex), dopamine (Intropin), enalapril (Vasotec), furosemide (Lasix), heparin, insulin, lipids, nitroglycerin, potassium chloride.

INDICATIONS/ROUTES/DOSAGE

VENTRICULAR ARRHYTHMIAS

IM:

ADULTS, ELDERLY: 300 mg (or 4.3 mg/kg). May repeat in 60–90 min.

IV:

ADULTS, ELDERLY: Initially, 1–1.5 mg/kg. Refractory ventricular tachycardia, fibrillation: Repeat dose at 0.5–0.75 mg/kg q10–15min after initial dose for a maximum of 3 doses. Total dose not to exceed 3 mg/kg. Follow with continuous infusion (1–4 mg/min) after return of perfusion. Reappearance of arrhythmia during infusion: 0.5 mg/kg, reassess infusion.

CHILDREN, INFANTS: Initially, 1 mg/kg (maximum: 100 mg). May repeat second dose of 0.5–1 mg/kg if start of infusion longer than 15 min. Maintenance: 20–50 mcg/kg/min as IV infusion.

LOCAL ANESTHESIA

INFILTRATION, NERVE BLOCK:

ADULTS: Local anesthetic dosage varies with procedure, degree of anesthesia, vascularity, duration. Maximum dose: 4.5 mg/kg. Do not repeat within 2 hrs.

TOPICAL LOCAL ANESTHESIA

TOPICAL:
ADULTS, ELDERLY: Apply to affected areas as needed.

TREATMENT OF POST-HERPETIC NEURALGIA

ALERT Transdermal patch may contain conducting metal (e.g., aluminum). Remove patch prior to MRI.

TOPICAL (DERMAL PATCH):

ADULTS, ELDERLY: Apply to intact skin over most painful area (up to 3 applications once for up to 12 hrs in a 24-hr period).

PRETREATMENT (ZINGO)

TOPICAL:
CHILDREN 3–18 YRS: Apply 1–3 min prior to venipuncture.

INTRADERMAL INJECTION SYSTEM:

CHILDREN 3–10 YRS: Apply one 0.5-mg system to site planned for venipuncture or IV cannulation 1–3 min prior to needle insertion.

SIDE EFFECTS

CNS effects generally dose-related and of short duration.
OCCASIONAL: IM: Pain at injection site. Topical: Burning, stinging, tenderness at application site.
RARE: Generally with high dose: Drowsiness; dizziness; disorientation; light-headedness; tremors; apprehension; euphoria; sensation of heat, cold, numbness; blurred or double vision; tinnitus (ringing in ears); nausea.

ADVERSE EFFECTS/TOXIC REACTIONS

Serious adverse reactions to lidocaine are uncommon, but high dosage by any route may produce cardiovascular depression, bradycardia, hypotension, arrhythmias, heart block, cardiovascular collapse, cardiac arrest. Potential for malignant hyperthermia, CNS toxicity may occur, esp. with regional anesthesia use, progressing rapidly from mild side effects to tremors, drowsiness, seizures, vomiting, respiratory depression. Methemoglobinemia (evidenced by cyanosis) has occurred following topical application of lidocaine for teething discomfort and laryngeal anesthetic spray.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for hypersensitivity to lidocaine, amide anesthetics. Obtain baseline B/P, pulse, respiratory rate, EKG, serum electrolytes.

INTERVENTION/EVALUATION

Monitor EKG, vital signs closely during and following drug administration for cardiac performance. If EKG shows arrhythmias, prolongation of PR interval or QRS complex, inform physician immediately. Assess pulse for rhythm, rate, quality. Assess B/P for evidence of hypotension. Monitor for therapeutic serum level (1.5–6 mcg/ml). For lidocaine given by all routes, monitor vital signs, LOC. Drowsiness should be considered a warning sign of high serum levels of lidocaine. Therapeutic serum level: 1.5–6 mcg/ml; toxic serum level: greater than 6 mcg/ml.

PATIENT/FAMILY TEACHING

- Local anesthesia: Due to loss of feeling/sensation, protective measures may be needed until anesthetic wears off (no ambulation, including special positions for some regional anesthesia).
- Oral mucous membrane anesthesia: Do not eat, drink, chew gum for 1 hr after application (swallowing reflex may be impaired, increasing risk of aspiration; numbness of tongue, buccal mucosa may lead to bite trauma).

methylprednisolone

(Medrol)

Do not confuse methylprednisolone with medroxyprogesterone or prednisolone, Medrol with Mebaral, or DepoMedrol with SoluMedrol.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Adrenal corticosteroid.
CLINICAL: Anti-inflammatory (see p. 97C).

ACTION

Suppresses migration of polymorphonuclear leukocytes, reverses increased capillary permeability.
Therapeutic Effect: Decreases inflammation.

PHARMACOKINETICS

Route	Onset	Peak	Duration
PO	Rapid	1–2 hrs	30–36 hrs
IM	Rapid	4–8 days	1–4 wks
IV	Rapid	N/A	N/A

Well absorbed from GI tract after IM administration. Widely distributed. Metabolized in liver. Excreted in urine. Removed by hemodialysis. Half-life: 3.5 hrs.

USES

Endocrine Disorders: Substitution therapy for deficiency states (acute or chronic adrenal insufficiency, congenital adrenal hyperplasia, adrenal insufficiency secondary to pituitary insufficiency).
Nonendocrine Disorders: Arthritis; rheumatic carditis; allergic reaction; collagen, intestinal tract, hepatic, ocular, renal, skin diseases; bronchial asthma; cerebral edema; malignancies; spinal cord injury.

PRECAUTIONS

CONTRAINDICATIONS: Administration of live virus vaccines, systemic fungal infection.
CAUTIONS: Hypothyroidism, cirrhosis, hypertension, diabetes, CHF, ulcerative colitis, thromboembolic disorders.

LIFESPAN CONSIDERATIONS

Pregnancy/Lactation: Crosses placenta. Distributed in breast milk. May cause cleft palate (chronic use in first trimester). Breast-feeding not recommended. **Pregnancy Category C.**
Children: Prolonged treatment or high dosages may decrease short-term growth rate, cortisol secretion.
Elderly: No age-related precaution noted.

INTERACTIONS

DRUG: Amphotericin may increase hypokalemia. May increase risk of digoxin toxicity caused by hypokalemia. May decrease effects of diuretics, insulin, oral hypoglycemics, potassium supplements. Hepatic enzyme inducers may decrease effects. Live virus vaccines may decrease pt's antibody response to vaccine, increase vaccine side effects, potentiate virus replication.
HERBAL: Cat's claw, echinacea possess immunostimulant properties. St. John's wort may decrease concentration.
FOOD: None known.
LAB VALUES: May increase serum glucose, cholesterol, lipid, amylase, sodium. May decrease serum calcium, potassium, thyroxine, hypothalmic-pituitary-adrenal (HPA) axis.

AVAILABILITY (Rx)

INJECTION, POWDER FOR RECONSTITUTION (SOLU-MEDROL): 40 mg, 125 mg, 500 mg, 1 g.
INJECTION SUSPENSION: 20 mg/ml, 40 mg/ml, 80 mg/ml.
TABLETS (MEDROL): 2 mg, 4 mg, 8 mg, 16 mg, 32 mg.
(MEDROL DOSEPAK): 4 mg (21 g).

ADMINISTRATION/HANDLING

IV
Reconstitution

- For infusion, add to D_5W, 0.9% NaCl.

Rate of administration

- Give IV push over 2–3 min.
- Give IV piggyback over 10–20 min.
- Do not give methylprednisolone acetate IV.

Storage

- Store vials at room temperature.

IM

- Methylprednisolone acetate should not be further diluted.
- Methylprednisolone sodium succinate should be reconstituted with Bacteriostatic Water for Injection.
- Give deep IM in gluteus maximus.

PO

- Give with food, milk.
- Give single doses before 9 AM; give multiple doses at evenly spaced intervals.

IV INCOMPATIBILITIES

Ciprofloxacin (Cipro), diltiazem (Cardizem), docetaxel (Taxotere), etoposide (VePesid), filgrastim (Neupogen), gemcitabine (Gemzar), paclitaxel (Taxol), potassium chloride, propofol (Diprivan), vinorelbine (Navelbine).

IV COMPATIBILITIES

Dopamine (Intropin), heparin, lipids, midazolam (Versed), theophylline.

INDICATIONS/ROUTES/DOSAGE

ANTI-INFLAMMATORY, IMMUNOSUPPRESSIVE

IV:
ADULTS, ELDERLY: 10–40 mg. May repeat as needed.
CHILDREN: 0.5–1.7 mg/kg/day or 5–25 mg/m^2/day in 2–4 divided doses.
PO:
ADULTS, ELDERLY: 2–60 mg/day in 1–4 divided doses.
CHILDREN: 0.5–1.7 mg/kg/day or 5–25 mg/m^2/day in 2–4 divided doses.
IM (METHYLPREDNISOLONE ACETATE):
ADULTS, ELDERLY: 10–80 mg/day.
CHILDREN: 0.5–1.7 mg/kg/day or 5–25 mg/m^2/day in 2–4 divided doses.

INTRA-ARTICULAR, INTRALESIONAL:

ADULTS, ELDERLY: 20–60 mg q1–5wk.

STATUS ASTHMATICUS

IV:
ADULTS, ELDERLY, CHILDREN: Initially, 2 mg/kg/dose, then 0.5–1 mg/kg/dose q6h for up to 5 days.

SPINAL CORD INJURY

IV BOLUS:
ADULTS, ELDERLY: 30 mg/kg over 15 min, followed by 5.4 mg/kg/hr over 23 hrs, to be given within 45 min of bolus dose.

SIDE EFFECTS

FREQUENT: Insomnia, heartburn, anxiety, abdominal distention, diaphoresis, acne, mood swings, increased appetite, facial flushing, GI distress, delayed wound healing, increased susceptibility to infection, diarrhea, constipation.
OCCASIONAL: Headache, edema, tachycardia, change in skin color, frequent urination, depression.
RARE: Psychosis, increased blood coagulability, hallucinations.

ADVERSE EFFECTS/TOXIC REACTIONS

Long-term therapy: Hypocalcemia, hypokalemia, muscle wasting (esp. in arms, legs), osteoporosis, spontaneous fractures, amenorrhea, cataracts, glaucoma, peptic ulcer, CHF. Abrupt withdrawal after long-term therapy: Anorexia, nausea, fever, headache, severe arthralgia, rebound inflammation, fatigue, weakness, lethargy, dizziness, orthostatic hypotension.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Question for hypersensitivity to any of the corticosteroids, components. Obtain baselines for height, weight, B/P, serum glucose, electrolytes. Check results of initial tests (tuberculosis [TB] skin test, x-rays, EKG).

INTERVENTION/EVALUATION

Monitor I&O, daily weight; assess for edema. Monitor daily pattern of bowel activity and stool consistency. Check vital signs at least twice a day. Be alert for infection (sore throat, fever, vague symptoms). Monitor serum electrolytes. Monitor for hypocalcemia (muscle twitching, cramps, positive Trousseau's or Chvostek's signs), hypokalemia (weakness, muscle cramps, numbness, tingling [esp. lower extremities], nausea/vomiting, irritability, EKG changes). Assess emotional status, ability to sleep. Check lab results for blood coagulability, clinical evidence of thromboembolism.

PATIENT/FAMILY TEACHING

- Take oral dose with food, milk.
- Do not change dose/schedule or stop taking drug; must taper off gradually under medical supervision.
- Notify physician of fever, sore throat, muscle aches, sudden weight gain, edema.
- Maintain fastidious personal hygiene, avoid exposure to disease, trauma.
- Severe stress (serious infection, surgery, trauma) may require increased dosage.
- Follow-up visits, lab tests are necessary.
- Children must be assessed for growth retardation.
- Inform dentist, other physicians of methylprednisolone therapy now or within past 12 mos.

phenytoin

***phen**-ih-toyn*

(Dilantin, Phenytek)

Do not confuse Dilantin with Dilaudid or diltiazem, or phenytoin with phenelzine.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Hydantoin.

CLINICAL: Anticonvulsant, antiarrhythmic (see p. 35C).

ACTION

Anticonvulsant: Stabilizes neuronal membranes in motor cortex.

Therapeutic Effect: Limits spread of seizure activity. Stabilizes threshold against hyperexcitability. Decreases post-tetanic potentiation, repetitive discharge.

PHARMACOKINETICS

Slowly, variably absorbed after PO administration. Protein binding: 90%–95%. Widely distributed. Metabolized in liver. Primarily excreted in urine. Not removed by hemodialysis. Half-life: 7–42 hrs.

USES

Management of generalized tonic-clonic seizures (grand mal), complex partial seizures (psychomotor), cortical focal seizures, status epilepticus.

OFF-LABEL: Adjunctive treatment of tricyclic antidepressant toxicity; treatment of muscle hyperirritability, digoxin-induced arrhythmias, trigeminal neuralgia.

PRECAUTIONS

CONTRAINDICATIONS: Hypersensitivity to hydantoins, seizures due to hypoglycemia.
IV: Adam-Stokes syndrome, second- and third-degree AV block, sinoatrial block, sinus bradycardia.

EXTREME CAUTION: **IV Route Only:** Respiratory depression, MI, CHF, damaged myocardium.

CAUTIONS: Hepatic/renal impairment, severe myocardial insufficiency, hypotension, hyperglycemia.

LIFESPAN CONSIDERATIONS

Pregnancy/Lactation: Crosses placenta; distributed in small amount in breast milk. Fetal hydantoin syndrome (craniofacial abnormalities, nail/digital hypoplasia, prenatal growth deficiency) has been reported. Increased frequency of seizures in pregnant women due to altered absorption of metabolism of phenytoin. May increase risk of hemorrhage in neonate, maternal bleeding during delivery. **Pregnancy Category D.**

Children: More susceptible to gingival hyperplasia, coarsening of facial hair; excess body hair.

Elderly: No age-related precautions noted but lower dosages recommended.

INTERACTIONS

DRUG: Alcohol, other CNS depressants may increase CNS depression. Amiodarone, anticoagulants, cimetidine, disulfiram, fluoxetine, isoniazid, sulfonamides may increase concentration, effects, risk of toxicity. Antacids may decrease absorption. Fluconazole, ketoconazole, miconazole may increase concentration. May decrease effects of glucocorticoids. Lidocaine, propranolol may increase cardiac depressant effects. Valproic acid may decrease

metabolism, increase concentration. May increase metabolism of xanthines.
HERBAL: Evening primrose may decrease seizure threshold. Gotu kola, kava kava, St. John's wort, valerian may increase CNS depression.
FOOD: None known.
LAB VALUES: May increase serum glucose, GGT, alkaline phosphatase. Therapeutic serum level: 10–20 mcg/ml; toxic serum level: greater than 20 mcg/ml.

AVAILABILITY (Rx)

CAPSULES, EXTENDED-RELEASE: (DILANTIN): 30 mg, 100 mg. **(PHENYTEK):** 200 mg, 300 mg.
CAPSULES, PROMPT-RELEASE: (DILANTIN): 100 mg.
INJECTION, SOLUTION: (DILANTIN): 50 mg/ml.
SUSPENSION, ORAL: (DILANTIN): 100 mg/4 ml, 125 mg/5 ml.
TABLETS, CHEWABLE: (DILANTIN): 50 mg.

ADMINISTRATION/HANDLING

IV
ALERT Give by IV push. IV push very painful (chemical irritation of vein due to alkalinity of solution). To minimize effect, flush vein with sterile saline solution through same IV needle and catheter after each IV push.
Reconstitution
- May give undiluted or may dilute with 0.9% NaCl.

Rate of administration
- Administer 50 mg over 2–3 min for elderly. In neonates, administer at rate not exceeding 1–3 mg/kg/min.
- Severe hypotension, cardiovascular collapse occurs if rate of IV injection exceeds 50 mg/min for adults.
- IV toxicity characterized by CNS depression, cardiovascular collapse.

Storage
- Precipitate may form if parenteral form is refrigerated (will dissolve at room temperature).
- Slight yellow discoloration of parenteral form does not affect potency, but do not use if solution is cloudy or precipitate forms.

PO
- Give with food if GI distress occurs.
- Tablets may be chewed.
- Shake oral suspension well before using.

IV INCOMPATIBILITIES

Diltiazem (Cardizem), dobutamine (Dobutrex), enalapril (Vasotec), heparin, hydromorphone (Dilaudid), insulin, lidocaine, morphine, nitroglycerin, norepinephrine (Levophed), potassium chloride, propofol (Diprivan).

INDICATIONS/ROUTES/DOSAGE

STATUS EPILEPTICUS

IV:
ADULTS, ELDERLY, CHILDREN: Loading dose: 15–18 mg/kg. Maintenance dose: 300 mg/day or 4–6 mg/kg/day in 2–3 divided doses for adults and elderly; 6–7 mg/kg/day for children 10–16 yrs; 7–8 mg/kg/day for children 7–9 yrs; 7.5–9 mg/kg/day for children 4–6 yrs; 8–10 mg/kg/day for children 6 mos–3 yrs.
NEONATES: Loading dose: 15–20 mg/kg. Maintenance dose: 5–8 mg/kg/day.

SEIZURE CONTROL

PO:
ADULTS, ELDERLY, CHILDREN: Loading dose: 15–20 mg/kg in 3 divided doses 2–4 hrs apart. Maintenance dose: Same as for status epilepticus.

SIDE EFFECTS

FREQUENT: Drowsiness, lethargy, confusion, slurred speech, irritability, gingival hyperplasia, hypersensitivity reaction (fever, rash, lymphadenopathy), constipation, dizziness, nausea.
OCCASIONAL: Headache, hirsutism, coarsening of facial features, insomnia, muscle twitching.

ADVERSE EFFECTS/TOXIC REACTIONS

Abrupt withdrawal may precipitate status epilepticus. Blood dyscrasias, lymphadenopathy, osteomalacia (due to interference of vitamin D metabolism) may occur. Toxic phenytoin blood concentration (25 mcg/ml or more) may produce ataxia (muscular incoordination), nystagmus (rhythmic oscillation of eyes), diplopia. As level increases, extreme lethargy to comatose state occurs.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Anticonvulsant: Review history of seizure disorder (intensity, frequency, duration, LOC). Initiate seizure precautions. Hepatic function tests, CBC, platelet count should be performed before beginning therapy and periodically during therapy. Repeat CBC, platelet count 2 wks following initiation of therapy and 2 wks following administration of maintenance dose.

INTERVENTION/EVALUATION

Observe frequently for recurrence of seizure activity. Assess for clinical improvement (decrease in intensity/frequency of seizures). Monitor CBC with differential, hepatic/renal function tests, B/P (with IV use). Assist with ambulation if drowsiness, lethargy occurs. Monitor for therapeutic serum level (10–20 mcg/ml). Therapeutic serum level: 10–20 mcg/ml; toxic serum level: greater than 20 mcg/ml.

PATIENT/FAMILY TEACHING

- Pain may occur with IV injection.
- To prevent gingival hyperplasia (bleeding, tenderness, swelling of gums), maintain good oral hygiene, gum massage, regular dental visits.
- CBC should be performed every mo for 1 yr after maintenance dose is established and q3mo thereafter.
- Report sore throat, fever, glandular swelling, skin reaction (hematologic toxicity).
- Drowsiness usually diminishes with continued therapy.
- Avoid tasks that require alertness, motor skills until response to drug is established.
- Do not abruptly withdraw medication after long-term use (may precipitate seizures).
- Strict maintenance of drug therapy is essential for seizure control, arrhythmias.
- Avoid alcohol.

dopamine

***dope**-a-meen*

(Intropin)

BLACK BOX ALERT If extravasation occurs, infiltrate area with phentolamine (5–10 ml 0.9% NaCl) as soon as possible, no later than 12 hrs after extravasation.

Do not confuse dopamine with dobutamine or Dopram, or Intropin with Isoptin.

CLASSIFICATION

PHARMACOTHERAPEUTIC: Sympathomimetic (adrenergic agonist).

CLINICAL: Cardiac stimulant, vasopressor (see p. 156C).

ACTION

Stimulates adrenergic receptors. Effects are dose dependent. Lower dosage stimulates dopaminergic receptors, causing renal vasodilation. Higher doses stimulate both dopaminergic and $beta_1$-adrenergic receptors, causing cardiac stimulation and renal vasodilation.

Therapeutic Effect: Low dosage (1–3 mcg/kg/min): Increases renal blood flow, urinary flow, sodium excretion. Low to moderate dosage (4–10 mcg/kg/min): Increase myocardial contractility, stroke volume, cardiac output. High dosage (greater than 10 mcg/kg/min): Increases peripheral resistance, renal vasoconstriction, B/P.

PHARMACOKINETICS

Route	Onset	Peak	Duration
IV	1-2 min	N/A	Less than10 min

Widely distributed. Does not cross blood-brain barrier. Metabolized in liver, kidney, plasma. Primarily excreted in urine. Not removed by hemodialysis. Half-life: 2 min.

USES

Prophylaxis/treatment of acute hypotension, shock (associated with MI, trauma, renal failure, cardiac decompensation, open heart surgery), treatment of low cardiac output, congestive heart failure (CHF).

OFF-LABEL: Symptomatic bradycardia or heart block unresponsive to atropine or cardiac pacing.

PRECAUTIONS

CONTRAINDICATIONS: Pheochromocytoma, sulfite sensitivity, uncorrected tachyarrhythmias, ventricular fibrillation.

CAUTIONS: Ischemic heart disease, occlusive vascular disease, hypovolemia, recent use of MAOIs, ventricular arrhythmias.

LIFESPAN CONSIDERATIONS

Pregnancy/Lactation: Unknown if drug crosses placenta or is distributed in breast milk. **Pregnancy Category C.**
Children: Recommended close hemodynamic monitoring (gangrene due to extravasation reported).
Elderly: No age-related precautions noted.

INTERACTIONS

DRUG: MAOIs, alpha- and beta-blockers, phenytoin, tricyclic antidepressants may prolong/intensify effects of dopamine.

AVAILABILITY (Rx)

INJECTION SOLUTION: 40 mg/ml, 80 mg/ml, 160 mg/ml.
INJECTION (PREMIX WITH DEXTROSE): 0.8 mg/ml, 1.6 mg/ml, 3.2 mg/ml.

ADMINISTRATION/HANDLING

ALERT Blood volume depletion must be corrected before administering dopamine (may be used concurrently with fluid replacement).
IV
Reconstitution

- Available prediluted in 250 or 500 ml D_5W or dilute each 5-ml (200-mg) ampule in 250–500 ml 0.9% NaCl, D_5W/0.45:)% NaCl, D_5W/0.45% NaCl, D_5W/lactated Ringer's, or lactated Ringer's (concentration is dependent on dosage and fluid requirement of pt); 250 ml solution yields 800 mcg/ml; 500 ml solution yields 400 mcg/ml. Maximum concentration: 3.2 g/250 ml (12.8 mg/ml).

Rate of administration

- Administer into large vein (antecubital fossa, central line preferred) to prevent extravasation.
- Use infusion pump to control flow rate.
- Titrate drug to desired hemodynamic, renal response (optimum urinary flow determines dosage).

Storage

- Do not use solutions darker than slightly yellow or discolored to yellow, brown, pink to purple (indicates decomposition of drug).
- Stable for 24 hrs after dilution.

IV INCOMPATIBILITIES

Acyclovir (Zovirax), amphotericin B complex (Abelcet, AmBisome, Amphotec), cefepime (Maxipime), furosemide (Lasix), insulin, sodium bicarbonate.

IV COMPATIBILITIES

Amiodarone (Cordarone), calcium chloride, diltiazem (Cardizem), dobutamine (Dobutrex), enalapril (Vasotec), heparin, hydromorphone (Dilaudid), labetalol (Trandate), levofloxacin (Levaquin), lidocaine, lipids, lorazepam (Ativan), methylprednisolone (Solu-Medrol), midazolam (Versed), milrinone (Primacor), morphine, nicardipine (Cardene), nitroglycerin, norepinephrine (Levophed), piperacillin/tazobactam (Zosyn), potassium chloride, propofol (Diprivan), total parenteral nutrition (TPN).

INDICATIONS/ROUTES/DOSAGE

ALERT Effects of dopamine are dose dependent. Titrate to desired response.

ACUTE HYPOTENSION, SHOCK

IV INFUSION:
ADULTS, ELDERLY: Initially, 1–5 mcg/kg/min. Increase in 5–10 mcg/kg/min increments.
Maximum: 50 mcg/kg/min.
CHILDREN: Initially, 1–5 mcg/kg/min. Increase in 5–10 mcg/kg/min increments.
Maximum: 50 mcg/kg/min.

CHF

IV INFUSION:
ADULTS, ELDERLY: Initially, 1–5 mcg/kg/min. Increase in 5–10 mcg/kg/min increments.
Maximum: 50 mcg/kg/min.
CHILDREN: Initially, 1–5 mcg/kg/min. Increase in 5–10 mcg/kg/min increments.
Maximum: 50 mcg/kg/min.

SIDE EFFECTS

FREQUENT: Headache, arrhythmias, tachycardia, anginal pain, palpitations, vasoconstriction, hypotension, nausea, vomiting, dyspnea.
OCCASIONAL: Piloerection (goose bumps), bradycardia, widening of QRS complex.

ADVERSE EFFECTS/TOXIC REACTIONS

High doses may produce ventricular arrhythmias. Pts with occlusive vascular disease are at high risk for further compromise of circulation to extremities, which may result in gangrene. Tissue necrosis with sloughing may occur with extravasation of IV solution.

NURSING CONSIDERATIONS

BASELINE ASSESSMENT

Check for MAOI therapy within last 2–3 wks (requires dosage reduction). Pt must be on continuous cardiac monitoring. Determine weight (for dosage calculation). Obtain initial B/P, heart rate, respirations.

INTERVENTION/EVALUATION

Continuously monitor for cardiac arrhythmias. Measure urinary output frequently. If extravasation occurs, immediately infiltrate affected tissue with 10–15 ml 0.9% NaCl solution containing 5–10 mg phentolamine mesylate. Monitor B/P, heart rate, respirations q15min during administration (more often if indicated). Assess cardiac output, pulmonary wedge pressure, or central venous pressure (CVP) frequently. Assess peripheral circulation (palpate pulses, note color/temperature of extremities). Immediately notify physician of decreased urinary output, cardiac arrhythmias, significant changes in B/P, heart rate, or failure to respond to increase or decrease in infusion rate, decreased peripheral circulation (cold, pale, mottled extremities). Taper dosage before discontinuing (abrupt cessation of therapy may result in marked hypotension). Be alert to excessive vasoconstriction (decreased urine output, increased heart rate, arrhythmias, disproportionate increase in diastolic B/P, decrease in pulse pressure); slow or temporarily stop infusion, notify physician.