

methylPREDNISolone (meth-ill-pred-niss-oh-lone)

A-Methapred, Depo-Medrol, Medrol, Solu-MEDROL

Classification

Therapeutic: anti-inflammatories (steroidal), immunosuppressants

Pharmacologic: corticosteroids

Pregnancy Category C

Indications

Used systemically and locally in a wide variety of chronic diseases including: Inflammatory, Allergic, Hematologic, Neoplastic, Autoimmune disorders, Immunosuppressant. May be suitable for alternate-day dosing in the management of chronic illness. Replacement therapy in adrenal insufficiency. **Unlabeled Use:** Adjunctive therapy of hypercalcemia. Management of acute spinal cord injury. Adjunctive management of nausea and vomiting from chemotherapy.

Action

Suppresses inflammation and the normal immune response. Has numerous intense metabolic effects (see Adverse Reactions and Side Effects). Suppresses adrenal function at chronic doses of 4 mg/day. Has negligible mineralocorticoid activity. **Therapeutic Effects:** Suppression of inflammation and modification of the normal immune response. Replacement therapy in adrenal insufficiency.

Pharmacokinetics

Absorption: Well absorbed after oral administration. Succinate salt is rapidly absorbed after IM administration. Acetate salt is slowly but completely absorbed after IM administration. Absorption from local sites (intra-articular, intralesional) is slow but complete.

Distribution: Widely distributed, crosses the placenta, and probably enters breast milk.

Metabolism and Excretion: Metabolized mostly by the liver.

Half-life: >3.5 hr (plasma), 18–36 hr (tissue); adrenal suppression lasts 1.25–1.5 days.

✱ = Canadian drug name.

⚡ = Genetic Implication.

CAPITALS indicate life-threatening, underscores indicate most frequent.

~~Strikethrough~~ = Discontinued.

TIME/ACTION PROFILE (anti-inflammatory activity)

ROUTE	ONSET	PEAK	DURATION
PO	unknown	1–2 hr	1.25–1.5 days
IM (acetate)	6–48 hr	4–8 days	1–4 wk
IM, IV (succinate)	rapid	unknown	unknown

Contraindications/Precautions

Contraindicated in: Active untreated infections (may be used in patients being treated for tuberculous meningitis); **Lactation:** Avoid chronic use; Known alcohol, bisulfite, or tartrazine hypersensitivity or intolerance (some products contain these and should be avoided in susceptible patients); Administration of live virus vaccines.

Use Cautiously in: Chronic treatment (will lead to adrenal suppression; use lowest possible dose for shortest period of time); **Pedi:** Chronic use will result in ↓ growth; use lowest possible dose for shortest period of time; Stress (surgery, infections); supplemental doses may be needed; Potential infections may mask signs (fever, inflammation); **OB:** Safety not established; **Pedi:** Neonates (avoid use of benzyl alcohol containing injectable preparations, use preservative-free formulations).

Adverse Reactions/Side Effects

Adverse reactions/side effects are much more common with high-dose/long-term therapy **CNS:** depression, euphoria, headache, ↑ intracranial pressure (children only), personality changes, psychoses, restlessness. **EENT:** cataracts, ↑ intraocular pressure. **CV:** hypertension. **GI:** PEPTIC ULCERATION, anorexia, nausea, vomiting. **Derm:** acne, ↓ wound healing, ecchymoses, fragility, hirsutism, petechiae **Endo:** adrenal suppression, hyperglycemia. **F and E:** fluid retention (long-term high doses), hypokalemia, hypokalemic alkalosis. **Hemat:** THROMBOEMBOLISM, thrombophlebitis. **Metab:** weight gain, weight loss. **MS:** muscle wasting, osteoporosis, avascular necrosis of joints, muscle pain. **Misc:** cushingoid appearance (moon face, buffalo hump), ↑ susceptibility to infection.

Interactions

Drug-Drug: Additive hypokalemia with thiazide and loop diuretics, amphotericin B, piperacillin, or ticarcillin. Hypokalemia may ↑ the risk of digoxin toxicity. May ↑ requirement for insulins or oral hypoglycemic agents. Phenytoin, phenobarbital, and rifampin stimulate metabolism; may ↓ effectiveness. Oral contraceptives may ↓ metabolism. ↑ risk of adverse GI effects with NSAIDs (including aspirin). At chronic doses that suppress adrenal function, may ↓ the antibody

response to and ↑ the risk of adverse reactions from **live-virus vaccines**. May ↑ serum concentrations of **cyclosporine** and **tacrolimus**. May ↑ the risk of tendon rupture from **fluoroquinolones**.

Route/Dosage

PO (Adults): *Multiple sclerosis*—160 mg/day for 7 days, then 64 mg every other day for 1 mo. *Other uses*—2–60 mg/day as a single dose or in 2–4 divided doses. *Asthma exacerbations*—120–180 mg/day in divided doses 3–4 times/day for 48 hr, then 60–80 mg/day divided twice daily.

PO (Children): *Anti-inflammatory/Immunosuppressive*—0.5–1.7 mg/kg/day or 5–25 mg/m²/day in divided doses q 6–12 hr. *Asthma exacerbations*—1 mg/kg q 6 hr for 48 hr, then 1–2 mg/kg/day (maximum: 60 mg/day) divided twice daily.

IM, IV (Adults): *Most uses: methylprednisolone sodium succinate*—40–250 mg q 4–6 hr. *High-dose “pulse” therapy: methylprednisolone sodium succinate*—30 mg/kg IV q 4–6 hr for up to 72 hr. *Multiple sclerosis: methylprednisolone sodium succinate*—160 mg/day for 7 days, then 64 mg every other day for 1 mo. *Adjunctive therapy of Pneumocystis jirovecii pneumonia in AIDS patients: methylprednisolone sodium succinate*—30 mg twice daily for 5 days, then 30 mg once daily for 5 days, 15 mg once daily for 10 days. *Acute spinal cord injury: methylprednisolone sodium succinate*—30 mg/kg over 15 min initially, followed 45 min later with 5.4 mg/kg/hr for 23 hr (unlabeled).

IM, IV (Children): *Anti-inflammatory/Immunosuppressive*—0.5–1.7 mg/kg/day or 5–25 mg/m²/day in divided doses q 6–12 hr. *Acute spinal cord injury: methylprednisolone sodium succinate*—30 mg/kg over 15 min initially, then 45 min later initiate continuous infusion of 5.4 mg/kg/hr for 23 hr (unlabeled). *Status asthmaticus*—2 mg/kg/dose, then 0.5–1 mg/kg/dose q 6 hr. *Lupus nephritis*—30 mg/kg IV every other day for 6 doses.

IM (Adults): *Methylprednisolone acetate*—40–120 mg daily, weekly, or every 2 wk.

NURSING IMPLICATIONS

Assessment

- Indicated for many conditions. Assess involved systems before and periodically during therapy.
- Assess patient for signs of adrenal insufficiency (hypotension, weight loss, weakness, nausea, vomiting, anorexia, lethargy, confusion, restlessness) before and periodically during therapy.

- Monitor intake and output ratios and daily weights. Observe patient for peripheral edema, steady weight gain, rales/crackles, or dyspnea. Notify health care professional if these occur.
- Children should have periodic evaluations of growth.
- **Lab Test Considerations:** Monitor serum electrolytes and glucose. May cause hyperglycemia, especially in persons with diabetes. May cause hypokalemia. Patients on prolonged therapy should routinely have hematologic values, serum electrolytes, and serum and urine glucose evaluated. May ↓ WBC counts. May ↓ serum potassium and calcium and increase serum sodium concentrations.
- **Guaic test stools. Promptly report presence of guaiac-positive stools.**
- May ↑ serum cholesterol and lipid values. May ↓ uptake of thyroid ¹²⁵I or ¹³¹I.
- Suppresses reactions to allergy skin tests.
- Periodic adrenal function tests may be ordered to assess degree of hypothalamic-pituitary-adrenal axis suppression in systemic and chronic topical therapy.

Potential Nursing Diagnoses

Risk for infection (Side Effects)

Disturbed body image (Side Effects)

Deficient knowledge, related to medication regimen (Patient/Family Teaching)

Implementation

- **Do not confuse Solu-Medrol (methylprednisolone) with Solu-Cortef (hydrocortisone) or Depo-Medrol (methylprednisolone).**
- If dose is ordered daily or every other day, administer in the morning to coincide with the body's normal secretion of cortisol.
- Periods of stress, such as surgery, may require supplemental systemic corticosteroids.
- **PO:** Administer with meals to minimize GI irritation, do not administer with grapefruit juice.
- Tablets may be crushed and administered with food or fluids for patients with difficulty swallowing.
- **IM:** Shake suspension well before drawing up. IM doses should not be administered when rapid effect is desirable. Do not dilute with other solution or admix. Do not administer acetate suspensions IV.

IV Administration

- **pH:** 3.5–7.0.
- **Direct IV:** Reconstitute with provided solution (Act-O-Vials, Univials, ADD-Vantage vials) or 2 mL of bacteriostatic water (with benzyl alcohol) for injection. Use

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preservative-free diluent for use in neonates. **Concentration:** Maximum of 125 mg/mL. **Rate:** Low dose (≤ 1.8 mg/kg or ≤ 125 mg/dose): May be administered direct IV push over 3–15 min.

- **Intermittent/Continuous Infusion:** **Diluent:** May be diluted further in D5W, 0.9% NaCl, or D5/0.9% NaCl. **Concentration:** 2.5–20 mg/mL. **Rate:** Moderate dose (≥ 2 mg/kg or 250 mg/dose): give over 15–30 min; High dose (15 mg/kg or ≥ 500 mg/dose): give over 30 min; Doses > 15 mg/kg or ≥ 1 g: give over 1 hour.
- **Y-Site Compatibility:** acyclovir, alfentanil, alprostadil, amifostine, amikacin, aminocaproic acid, aminophylline, amiodarone, amphotericin B cholesteryl, amphotericin B lipid complex, amphotericin B liposome, anidulafungin, argatroban, ascorbic acid, atracurium, atropine, aztreonam, benzotropine, bivalirudin, bleomycin, bumetanide, buprenorphine, butorphanol, carboplatin, carmustine, cefazolin, cefepime, cefoperazone, cefotetan, ceftazidime, ceftazidime, ceftriaxone, cefuroxime, chloramphenicol, chlorpromazine, cisplatin, cladribine, clindamycin, cyanocobalamin, cyclophosphamide, cyclosporine, cytarabine, dactinomycin, daptomycin, dexamethasone, dexmedetomidine, digoxin, dobutamine, dopamine, doripenem, doxorubicin, doxorubicin liposome, enalaprilat, ephedrine, epinephrine, epoetin alfa, epifibatid, ertapenem, erythromycin, etoposide, famotidine, fentanyl, fluconazole, fludarabine, fluorouracil, folic acid, fosaprepitant, furosemide, gentamicin, glycopyrrolate, granisetron, hetastarch, hydromorphone, ifosfamide, imipenem/cilastatin, insulin, isoproterenol, ketorolac, labetalol, levofloxacin, lidocaine, linezolid, lorazepam, mannitol, mechlorethamine, melphalan, metaraminol, methotrexate, methoxamine, methylodopate, metoclopramide, metoprolol, metronidazole, milrinone, morphine, multivitamin, nafcillin, naloxone, nesiritide, nicardipine, nitroglycerin, nitroprusside, norepinephrine, octreotide, oxaliplatin, oxytocin, pamidronate, pancuronium, papaverine, pemetrexed, penicillin G, pentobarbital, phenobarbital, phenylephrine, piperacillin/tazobactam, potassium acetate, procaïnamide, prochlorperazine, propranolol, ranitidine, remifentanyl, rituximab, sodium acetate, sodium bicarbonate, streptokinase, succinylcholine, sufentanil, tacrolimus, teniposide, theophylline,

thioteпа, ticarcillin/clavulanate, tirofiban, tobramycin, tolazoline, topotecan, trazumab, vancomycin, vasopressin, verapamil, vincristine, voriconazole, zoledronic acid.

- **Y-Site Incompatibility:** alemtuzumab, allopurinol, amphotericin B colloidal, ampicillin/sulbactam, amsacrine, calcium chloride, calcium gluconate, caspofungin, cefotaxime, cefoxitin, ciprofloxacin, dantrolene, diazepam, diazoxide, diphenhydramine, docetaxel, doxycycline, epirubicin, etoposide phosphate, fenoldopam, filgrastim, ganciclovir, gemcitabine, haloperidol, hydralazine, idarubicin, irinotecan, magnesium sulfate, mitoxantrone, nalbuphine, paclitaxel, palonosetron, pantoprazole, papaverine, pentamidine, pentazocine, phenytoin, promethazine, propofol, protamine, pyridoxine, quinapristin/dalfopristin, rocuronium, sargramostim, thiamine, trimethoprim/sulfamethoxazole, vecuronium, vinorelbine.

Patient/Family Teaching

- Instruct patient on correct technique of medication administration. Advise patient to take medication as directed. Take missed doses as soon as remembered unless almost time for next dose. Do not double doses. **Stopping the medication suddenly may result in adrenal insufficiency (anorexia, nausea, weakness, fatigue, dyspnea, hypotension, hypoglycemia).** If these signs appear, notify health care professional immediately. This can be life-threatening.
- Glucocorticoids cause immunosuppression and may mask symptoms of infection. Instruct patient to avoid people with known contagious illnesses and to report possible infections immediately.
- Caution patient to avoid vaccinations without first consulting health care professional.
- **Review side effects with patient. Instruct patient to inform health care professional promptly if severe abdominal pain or tarry stools occur. Patient should also report unusual swelling, weight gain, tiredness, bone pain, bruising, nonhealing sores, visual disturbances, or behavior changes.**
- Advise patient to notify health care professional of medication regimen before treatment or surgery.
- Discuss possible effects on body image. Explore coping mechanisms.
- Instruct patient to inform health care professional if symptoms of underlying disease return or worsen.
- Advise patient to carry identification describing disease process and medication regimen in the event of emergency in which patient cannot relate medical history.

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- Explain need for continued medical follow-up to assess effectiveness and possible side effects of medication. Periodic lab tests and eye exams may be needed.
- **Long-term Therapy:** Encourage patient to eat a diet high in protein, calcium, and potassium, and low in sodium and carbohydrates. Alcohol should be avoided during therapy.

Evaluation/Desired Outcomes

- Decrease in presenting symptoms with minimal systemic side effects.
- Suppression of the inflammatory and immune responses in autoimmune disorders, allergic reactions, and neoplasms.
- Management of symptoms in adrenal insufficiency.

Why was this drug prescribed for your patient?