methotrexate (meth-o-ter-ax)

Onco, Rheumatin, Trexall

Classification
Therapeutic: antineoplastics, antirheumatics (DMARDs), immunosuppressants
Pharmacologic: antimetabolites

Pregnancy Category X

Indications
Alone or with other treatment modalities in the treatment of: Trophoblastic neoplasms (choriocarcinoma, choriocarcinoma decidua, endodermal sinus tumor), Lymphoma, Breast carcinoma, Head carcinoma, Neck carcinoma, Lung carcinoma, Severe psoriasis, Rheumatoid arthritis, and polyarticular juvenile idiopathic arthritis responsive to conventional therapy. Treatment of mycosis fungoides (cutaneous T-cell lymphoma).

Dosage: Oral, Intramuscular, Intravenous 4–7 days 7–14 days 21 days

ROUTE ONSET PEAK DURATION

Half-life: Low dose—

Metabolism and Excretion: Actively transported across cell membranes, widely distributed.

Distribution: Small doses are well absorbed from the GI tract. Larger doses incompletely absorbed.

Pharmacokinetics
Therapeutic Effects:
Death of rapidly replicating cells, particularly malignant ones, and immunosuppression.

Action
Inhibits folic acid metabolism. Result is inhibition of DNA synthesis and cell reproduction (cell-cycle S-phase–specific). Also has immunosuppressive activity.

Therapeutic Effects:
Death of rapidly replicating cells, particularly malignant ones, and immunosuppression.

Interactions
Drug-Drug: The following drugs may interfere with methotrexate’s antineoplastic action:

- Antibiotics: Quinolones, aminoglycosides
- Chemotherapies: Cyclophosphamide, ifosfamide
- Corticosteroids
- Echinacea
- Herbals: Guarana
-live-virus vaccines (live virus metastatic tumors with other antineoplastics or radiation therapy. Radiation therapy has risk of soft tissue necrosis and osteonecrosis. May also interfere with immunosuppression. Cell lesions may be treated with methotrexate, similar to treatment with other antineoplastics.

Route/Dosage

Trophoblastic Neoplasms
PO, IM (Adults): 15–50 mg/day for 5 days, repeat after 1 or more weeks for 3–5 courses.

Contraindications/Precautions
Contraindicated in: Hypersensitivity, liver disease or hepatic impairment, Immunosuppression, IIV, bone marrow reserve. OR, Carcinoma; Pregnancy or lactation; Pedi: Product containing benzyl alcohol should not be used in neonates.

Use Cautionally in: Renal impairment (CCr must be >60 ml/min prior to therapy). Patients with cholestatic potential, Active infections. Ger: May be more sensitive to toxicity and adverse events.

Adverse Reactions/Side Effects
CNS: Stupor, somnolence, ataxia, myoclonus, encephalopathy, seizures
Respiratory: Asthma, bronchospasm, arachnoiditis, bronchoconstriction
Gastrointestinal: Anorexia, nausea, vomiting
Skin: Alopecia, photoallergic dermatitis, pruritus, rash, xerosis, Stevens-Johnson syndrome, toxic epidermal necrolysis, stomatitis, herpes zoster
Renal: Acute renal failure, nephrotoxicity
Metabolic: Hyperuricemia, hyperkalemia
Other: Fever, chills, nausea, vomiting, soft tissue necrosis

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Breast Cancer

IV (Adults): 40 mg/m² on days 1 and 8 (with other agents; many regimens are used).

Leukemia

PO (Adults): Maintenance—3–5 mg/m²/day, usually with prednisone.

PO, IM (Adults): Maintenance—20–30 mg/m²/week weekly.

IT (Adults): 12 mg/m² or 30 mg.

IT (Children 1yr): 8 mg.

IT (Children <1yr): 6 mg.

Nursing Implications

Assessment:

Monitor vital signs periodically during administration. Report significant changes.

Monitor for abdominal pain, diarrhea, or stomatitis; therapy may need to be discontinued.

Monitor for bone marrow depression. Assess for bleeding (shaking hands, bruising, petechiae, guaiac stools, urine, and emesis) and avoid IM injections and taking rectal temperatures if platelet count is low. Apply pressure to venipuncture sites for 10 min. Assess for signs of infection during neutropenia. Incontinence may occur. Monitor for increased appetite, thirst, and nocturnal polyuria.

Monitor intake and output ratios and daily weights. Report significant changes in totals.

Monitor for symptoms of pulmonary toxicity, which may manifest early as a dry, nonproductive cough.

Polyarticular Juvenile Idiopathic Arthritis

PO (Children): 10–25 mg/weekly (not to exceed 30 mg/wk); Otrexup may be used when dose is 10–25 mg/week.

Polyarticular Juvenile Idiopathic Arthritis

PO (Children): 5–50 mg/m² once-weekly, if response is poor, dose may be increased to 10–30 mg/m² once-weekly.

DM (Adults): 50 mg once-weekly or 25 mg twice-weekly.

Mycosis Fungoides

PO, IM, Subcut (Adults): 5–50 mg once-weekly, if response is poor, dose may be increased to 10–30 mg/m² once-weekly.

PO, IM, Subcut (Adults): 10–25 mg/weekly (not to exceed 30 mg/wk); Otrexup may be used when dose is 10–25 mg/week.

Rheumatoid Arthritis

PO, Subcut (Adults): 20 mg/m² once-weekly, if response is slower, may be increased up to 30 mg/m² once-weekly.

Polyarticular Juvenile Idiopathic Arthritis

PO (Children): 10 mg/m² once-weekly, initially may be top up 20–50 mg/m². However, response may be better if doses >20 mg/m² are given IM or subcut. Otrexup may be used when dose is 10–25 mg/m².

Mycosis Fungoides

PO, IM, Subcut (Adults): 5–50 mg once-weekly, if response is poor, dose may be increased to 10–30 mg/m² once-weekly.

DM (Adults): 50 mg once-weekly or 25 mg twice-weekly.

Nursing Implications

Assessment:

Monitor vital signs periodically during administration. Report significant changes.

Monitor for abdominal pain, diarrhea, or stomatitis; therapy may need to be discontinued.

Monitor for bone marrow depression. Assess for bleeding (shaking hands, bruising, petechiae, guaiac stools, urine, and emesis) and avoid IM injections and taking rectal temperatures if platelet count is low. Apply pressure to venipuncture sites for 10 min. Assess for signs of infection during neutropenia. Incontinence may occur. Monitor for increased appetite, thirst, and nocturnal polyuria.

Monitor intake and output ratios and daily weights. Report significant changes in totals.

Monitor for symptoms of pulmonary toxicity, which may manifest early as a dry, nonproductive cough.

Monitor for symptoms of joint pain, stiffness, or contractures. Encourage patient to limit at least 2 of daily activities. Avoid prolonged and elevated temperatures, which may cause Stevens-Johnson syndrome. Discontinue therapy if severe or if accompanied with fever, general malaise, fatigue, muscle or joint aches, blisters, oral lesions, conjunctivitis, hepatitis and/or eosinophilia.

Monitor nutritional status. Administering an antibiotic prior to and periodically during therapy and adjusting diet as tolerated may help maintain fluid and electrolyte balance and nutritional status.

Assess for rash periodically during therapy. May cause Stevens-Johnson syndrome. Discontinue therapy if severe or if accompanied with fever, general malaise, fatigue, muscle or joint aches, blisters, oral lesions, conjunctivitis, hepatitis and/or eosinophilia.

Rheumatoid Arthritis:

PO: 75 mg weekly (not exceed 30 mg/wk); IM: 25 mg once-weekly (not exceed 20 mg/m²).

Polyarticular Juvenile Idiopathic Arthritis

PO (Children): 10 mg/m² once-weekly, initially may be increased to 15–30 mg/m² once-weekly.

Mycosis Fungoides

PO, IM, Subcut (Adults): 5–50 mg once-weekly, if response is poor, dose may be increased to 10–30 mg/m² once-weekly. Otrexup may be used when dose is 10–25 mg/m².

Rheumatoid Arthritis:

PO: 75 mg weekly (not exceed 30 mg/wk); IM: 25 mg once-weekly (not exceed 20 mg/m²).

Lab Test Considerations:

Monitor CBC and differential prior to and frequently during therapy. The nadir of leukopenia and thrombocytopenia occurs in 7–14 days. Leukocyte and thrombocyte counts usually recover 7–14 days after the nadir. Notify health care professionals if any sudden drop in values.

Monitor renal (BUN and creatinine) and hepatic function (AST, ALT, bilirubin, and LDH) prior to and every 1–2 months during therapy. Liver plug should be
methylotrexate

Potential Nursing Diagnoses

Implementation

Potential Nursing Diagnoses

Implementation

methylotrexate

Potential Nursing Diagnoses

Implementation
Methotrexate is indicated in the treatment of patients with the following conditions:  

- Leukemia  
- Acute lymphocytic leukemia  
- Acute myelocytic leukemia  
- Hematologic malignancies other than leukemia  
- Non-Hodgkin’s lymphoma  
- Hodgkin’s disease  
- Severe psoriasis  
- Mycosis fungoides  
- Rheumatoid arthritis  

**Contraindications**:  
- Known hypersensitivity to any of the ingredients  
- Active peptic ulcer disease  
- Recent GI bleeding  
- Pregnancy (category C for oral, category D for parenteral)  

**Warnings**:  
- Meticulous attention must be paid to the details of dosage and schedule.  
- Patients with hepatic dysfunction should be monitored closely.  
- Patients with renal dysfunction should be monitored closely.  
- Patients with severe bone marrow depression should be monitored closely.  

**Preparation**:  
- Reconstitute preservative-free methotrexate with preservative-free 0.9% NaCl, Elliot’s B solution, or patient's CSF to a concentration not greater than 2 mg/mL.  
- May be administered via lumbar puncture or Ommaya reservoir. To prevent bacterial contamination, use immediately.  

**Y-Site Incompatibility**:  
- amiodarone, amphotericin B colloidal, captopril, cefepime, ceftriaxone, ciprofloxacin, clarithromycin, cyclophosphamide, dexamethasone, desferrioxamine, doxorubicin, doxyrubicin, dexamethasone, diltiazem, duretamine, dopamine, dexmedetomidine, fenoldopam, fludarabine, fludarabine phosphate, furosemide, ganciclovir, gentamicin, glycopyrrolate, haloperidol, indomethacin, imipramine, insulin, isosorbide dinitrate, ketorolac, leucovorin, levofloxacin, lidocaine, linezolid, lorazepam, magnesium sulfate, mannitol, melphalan, meperidine, meropenem, mesna, methohexital, methylprednisolone sodium succinate, metoclopramide, metoprolol, metronidazole, milrinone, mitomycin, mitoxantrone, morphine, moxifloxacin, naloxone, nesiritide, nitroglycerin, norepinephrine, octreotide, ondansetron, oxacillin, paclitaxel, palonosetron, pamidronate, pancuronium, pentobarbital, phenobarbital, phenylephrine, piperacillin/tazobactam, potassium acetate, potassium chloride, potassium phosphates, procainamide, prochlorperazine, propranolol, quinupristin/dalfopristin, ranitidine, remifentanil, rituximab, rocuronium, sargramostim, sodium acetate, sodium bicarbonate, sodium phosphates, succinylchloride, sufentanil, tacrolimus, temazepam, ticarcillin/clavulanate, tirofiban, tobramycin, trastuzumab, trimethoprim/sulfamethoxazole, vasopressin, vecuronium, verapamil, vinblastine, vincristine, vinorelbine, voriconazole, zidovudine, zolendronic acid.  

**IT**:  
- Reconstitute preservative-free methotrexate with preservative-free 0.9% NaCl.  
- Effect is NOT a concentration not greater than 2 mg/mL.  
- May be administered via Y-site injection.  
- To prevent bacterial contamination, use immediately.  

**Patient/Family Teaching**:  
- Instruct patient to take medication as directed. If a dose is missed, it should be omitted. Consult health care professional if vomiting occurs shortly after a dose is taken.  
- Instruct patient to notify health care professional promptly if rash, fever; chills; cough; headache; sore throat; signs of infection; lower back or side pain; purulent or difficult urination; bleeding gums; bruising; petechiae; blood in stools, urine, or emesis; increased fatigue; dyspnea; or orthostatic hypotension occurs. Caution patient to avoid crowds and persons with known infections. Instruct patient to use soft toothbrush and electric razor and to avoid falls. Caution patient not to drink alcoholic beverages or to take medications containing aspirin or other NSAIDs; may precipitate gastric bleeding.  
- Instruct patient to inspect oral mucosa for erythema and ulceration. If ulceration occurs, advise patient to use sponge brush and to rinse mouth with water after eating and drinking. Topical therapy may be used if mild pain is relieved with using.  
- Stomatitis pain may require treatment with opioid analgesics.  
- Advise patient to tell health care professional what medications they are taking and to avoid taking new Rx, OTC, vitamins, or herbal products without consulting health care professional.  
- Caution patient to use sunscreen and protective clothing to prevent photosensitivity reactions.  
- Advise patient that this medication may have teratogenic effects.  
- Instruct patient to use method of contraception that they are comfortable with during therapy and for 3 mo after completion of therapy.  
- Caution patient to use method of contraception that they are comfortable with during therapy and for 1 ovulatory cycle after completion of therapy.  
- Caution patient to avoid receiving any vaccinations without advice of health care professional.  
- Emphasize the need for periodic lab tests to monitor for side effects.  

**Evaluation/Desired Outcomes**:  
- Improvement of hematopoietic values in leukemia.  
- Decrease in symptoms of meningeal involvement in leukemia.  
- Decrease in size and spread of non-Hodgkin’s lymphomas and other solid cancers.  
- Resolution of skin lesions in severe psoriasis.  
- Decreased mobility in patients with rheumatoid arthritis.  
- Regression of lesions in mycosis fungoides.  

**Why was this drug prescribed for your patient?**

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**Note**: This document appears to be a page from a medical textbook or a similar resource, discussing the use of methotrexate in various medical conditions, its preparation, and related precautions. It includes detailed information on contraindications, warnings, preparation, patient teaching, and evaluation outcomes, along with instructions on how to use the medication safely and effectively. The text is dense with medical terms and is typical of educational material for healthcare professionals. The mention of specific patient education points, such as avoiding certain medications, checking lab tests, and understanding side effects, indicates a comprehensive approach to patient care.