zoledronic acid (zo-led-dron-ic acid)

- Aclasta, Reclast, Zometa

**Classification**

- Therapeutic: bone resorption inhibitors, electrolyte modifiers, hypocalcemics
- Pharmacologic: biphosphonates

**Pregnancy Category C**

**Indications**

- Hypercalcemia of malignancy (Zometa only)
- Multiple myeloma and metastatic bone lesions from solid tumors (Zometa only)
- Paget's disease (Reclast only)
- Treatment and prevention of glucocorticoid-induced osteoporosis in patients expected to be on glucocorticoids for at least 6 mos (Reclast only)

**Action**

- Inhibits bone resorption.
- Inhibits increased osteoclast activity and skeletal calcium release induced by tumors.

**Therapeutic Effects:**

- Decreased serum calcium.
- Decreased serum alkaline phosphatase.
- Decreased fractures, radiation/surgery to bone, or spinal cord compression in patients with multiple myeloma or metastatic bone lesions.
- Decreased hip, vertebral, or non-vertebral osteoporosis-related fractures in postmenopausal women.
- Increased bone mass in men, postmenopausal women, and patients on prolonged corticosteroid therapy.

**Pharmacokinetics**

- **Absorption:** IV administration results in complete bioavailability.
- **Distribution:** Unknown.
- **Metabolism and Excretion:** Mostly excreted unchanged by the kidneys.
- **Half-life:** 167 hr.

**TIME/ACTION PROFILE (effect on serum calcium)**

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<thead>
<tr>
<th>ROUTE</th>
<th>ONSET</th>
<th>PEAK</th>
<th>DURATION</th>
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<td>IV</td>
<td>within 4 days</td>
<td>4-7 days</td>
<td>30 days</td>
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**Contraindications/Precautions**

**Contraindicated in:**

- Hypersensitivity to zoledronic acid or other bisphosphonates
- Severe renal impairment (CCr < 35 mL/min) or acute renal failure

**Use Cautiously in:**

- History of aspirin-induced asthma
- Chronic renal impairment
- Concurrent use of diuretics or nephrotoxic drugs, or dehydration (risk of renal impairment; correct deficits prior to use)
- Concurrent use of nephrotoxic drugs
- Invasive dental procedures, cancer, receiving chemotherapy or corticosteroids, poor oral hygiene, periodontal disease, dental disease, anemia, coagulopathy, infection, or poorly-fitting dentures (may risk of jaw osteonecrosis)
- Geri: risk of renal impairment

**Adverse Reactions/Side Effects**

**CNS:** agitation, anxiety, confusion, insomnia

**EENT:** conjunctivitis

**CV:** hypotension, chest pain, leg edema

**GI:** abdominal pain, constipation, diarrhea, nausea, vomiting, dysphagia

**GU:** renal impairment/failure

**Derm:** pruritus, rash

**F and E:** hypophosphatemia, hypocalcemia, hypokalemia, hypomagnesemia

**Hemat:** anemia

**MS:** musculoskeletal pain, femur fractures, osteonecrosis (primarily of jaw)

**Resp:** pulmonary insufficiency, Malignant: flu-like syndrome

**Interactions**

- **Drug-Drug:** Concurrent use of loop diuretics or aminoglycosides (risk of hypocalcemia). Concurrent use of NSAIDs may risk of nephrotoxicity

**Route/Dosage**

- **Reclast**
  - IV (Adults): Paget's disease – 5 mg as a single dose (information regarding retreatment unknown); treatment of osteoporosis in men or postmenopausal women, treatment/prevention of glucocorticoid-induced osteoporosis—5 mg once early; prevention of osteoporosis in postmenopausal women—5 mg every 2 yr

- **Zometa**
  - IV (Adults): Hypercalcemia of malignancy—4 mg may be repeated after 7 days; multiple myeloma and bone metastases from solid tumors—4 mg every 3-4 wk (use bone scan after up to 1 yr)

**NURSING IMPLICATIONS**

- Monitor intake and output. Initiate a vigorous saline hydration promptly and maintain a urine output of 2 L/day during therapy. Patients should be adequately hydrated before therapy

**Assessment**

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Risk for injury (Indications)

Potential Nursing Diagnoses

Paget's Disease:

Monitor CBC with differential and hemoglobin and hematocrit closely during therapy.

Paget's Disease:

Assess serum calcium, phosphate, and magnesium before and periodically during therapy. If hypercalcaemia is noted, adequate rehydration is required prior to administration. Do not administer solution that is discolored or contains particulate matter.

Paget's Disease:

Monitor serum alkaline phosphatase prior to and periodically during therapy.

Paget's Disease:

Assess symptoms of Paget’s disease (bone pain, headache, decreased visual and auditory acuity, increased skull size) periodically during therapy.

Paget's Disease:

Observe for evidence of hypocalcemia (paresthesia, muscle twitching, laryngospasm, Chvostek’s or Trousseau’s sign).

Hypercalcemia:

Monitor patients with hypercalcemia (nausea, vomiting, anorexia, thirst, cardiac arrhythmias) periodically during therapy. If hypocalcemia, hypophosphatemia, or hypomagnesemia occur, temporary supplementation may be required. Hypocalcemia and vitamin D deficiency should be treated before initiating zoledronic acid.

Hypercalcemia:

Assess for acute-phase reaction (fever, myalgia, flu-like symptoms, headache, arthralgia). Usually occurs within 3 days of dose and resolves within 3 days of onset, but may take 7–14 days to resolve. Incidence decreases with repeat dosing.

Hypercalcemia:

Monitor serum creatinine, calculated based on actual body weight using the Cockcroft-Gault formula, prior to each treatment. Patients on long-term therapy should have 1200 mg of oral calcium and 800–1000 units of Vitamin D daily.

Hypercalcemia:

Patients treated for Paget's disease should receive 1500 mg elemental calcium and 800 IU of vitamin D daily, particularly during the 2 wk after dosing. Patients with osteoporosis should take 1200 mg of calcium and 800–1000 IU of Vitamin D daily.

Hypercalcemia:

Administration of aminophylline or theophylline following administration may reduce the incidence of acute-phase reaction symptoms.

IV Administration

Intermittent Infusion: Diluent: Reconstitute Zometa by adding 50 mL of sterile water for injection to each vial for a solution containing 4 mg of zoledronic acid. Medication must be completely dissolved prior to withdrawal of solution. Dilute 4 mg dose further with 100 mL of 0.9% NaCl or D5W. If not used immediately, may be refrigerated for up to 24 hr.ucked comes ready to use in 5 mg in 250-mL solution. If refrigerated, allow solution to reach room temperature prior to administration. Do not administer solution that is discolored or contains particulate matter. Rate: Administer as a single infusion over at least 15 min. Rapid infusions increase risk of renal deterioration and renal failure.

Y-Site Compatibility: acyclovir, allopurinol, allopurinol, amifostine, antimicrobial, amphotericin B liposome, ampicillin, ampicillin/sulbactam, amikacin, argatroban, artemether, aztreonam, aztreonam, aztreonam, bevacizumab, bleomycin, bleomycin, bivalirudin, buprenorphine, busulfan, butorphanol, carboplatin, carmustine, cisplatin, clindamycin, cyclophosphamide, cyclosporine, cytoxan, dacarbazine, dactinomycin, daptomycin, daunorubicin, dobutamine, doxorubicin liposomal, doxycycline, droperidol, enalaprilat, ephedrine, epinephrine, epirubicin, eptifibatide, ertapenem, erythromycin, esmolol, etoposide, etoposide phosphate, famotidine, fenoldopam, fentanyl, fluconazole, furosemide, ganciclovir, gemcitabine, gemcitabine, ge-

Implementation

Aggressive fluid hydration alone may be sufficient to treat mild, asymptomatic hypercalcemia. Adequate rehydration is required prior to administration.

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zoledronic acid

- CONTINUED

Canadian drug name.

Genetic Implication. CAPI TALS indicate life-threatening, underline indicate most frequent. Strikethrough Discontinued.

Y-Site Incompatibility: aluminumcontaining solutions, dextrose, dopamine, diazepam, phenytoinManufacturer recommends administration as a single infusion in a line separate from all other drugs.

Additive Incompatibility: Do not mix with solutions containing calcium, such as Lactated Ringer's solution.

Patient/Family Teaching

- Explain the purpose of zole dronic acid to patient. Advise patient to read medication guide prior to administration.
- Advise patients of the importance of adequate hydration. Patient should be instructed to drink at least two glasses of water prior to receiving dose.
- Advise patient in mouth care, routine oral hygiene, vitamins, or herbal products. Do not use in routine oral hygiene. Do not use in routine oral hygiene.
- Advise patient to take a balanced diet and consult health care professional about the need for supplemental calcium and vitamin D.
- Inform patient that severe musculoskeletal pain may occur within days, months, or years after starting zole dronic acid. Symptoms may resolve completely after discontinuation or slow or incomplete resolution may occur. Notify health care professional if severe pain occurs.
- Encourage patient to participate in regular exercise and to modify behaviors that increase the risk of osteoporosis (stop smoking, reduce alcohol consumption).
- Advise patient to inform health care professional of zole dronic acid therapy prior to dental surgery.
- Advise patient to notify health care professional if pregnancy is planned or suspected or if breast feeding.
- Emphasize the importance of follow-up to monitor progress.

Evaluation/Desired Outcomes

- Decrease in serum calcium.
- Decrease in serum alkaline phosphatase and the progression of Paget's disease.
- Reversal of the progression of osteoporosis with decreased fractures and other sequelae. Discontinuation after 3–5 years should be considered for postmenopausal women with low risk for fractures.

Why was this drug prescribed for your patient?