**Denosumab (de-no-su-mab)**

**Prodia, Xgeva**

**Classification**
Therapeutic: Bone resorption inhibitors
Pharmacologic: Monoclonal antibodies

**Pregnancy Category X**

**Indications**

**Prodia**
- Treatment of osteoporosis in postmenopausal women who are at high risk for fracture or those who have failed or intolerant of conventional osteoporosis therapy. To increase bone mass in men with osteoporosis who are at high risk for fracture or those who have failed or intolerant of conventional osteoporosis therapy. To increase bone mass in men receiving androgen deprivation therapy for non-metastatic prostate cancer who are at high risk for fracture.
- Prevention of skeletal-related events in patients with bone metastases from solid tumors. Giant cell tumor of bone that is unresectable or where surgical resection is likely to result in severe morbidity.

**Xgeva**
- Prevention of skeletal-related events in patients with bone metastases from solid tumors.
- Giant cell tumor of bone that is unresectable or where surgical resection is likely to result in severe morbidity.

**Action**
A monoclonal antibody that binds specifically to the human receptor activator of nuclear factor kappa-B ligand (RANKL), which is required for formation, function, and survival of osteoclasts. Binding inhibits osteoclast formation, function, and survival.

**Therapeutic Effects:**
- Bone resorption with a decrease in the occurrence of fractures (vertebral, nonvertebral, hip) or other skeletal-related events (e.g., radiation therapy to bone, surgery to bone, spinal cord compression).
- Bone mass.

**Pharmacokinetics**

| Absorption: | Well absorbed following subcutaneous administration. |
| Distribution: | Unknown. |
| Metabolism and Excretion: | Unknown. |
| Half-Life: | 25-4 days. |

**Time/Action Profile (effects on bone resorption)**

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>ONSET</th>
<th>PEAK</th>
<th>DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subcut</td>
<td>1 mo†</td>
<td>12 mo‡</td>
<td>unknown†</td>
</tr>
</tbody>
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†Maximum peak in serum calcium occurs at 10 days following discontinuation.
‡Following discontinuation.

**Contraindications/Precautions**

- Contraindicated in:
  - Hypersensitivity
  - Hypocalcemia (correct before administering)
  - Adequate supplemental calcium and vitamin D required
  - OB: May cause fetal harm
  - Lactation: Avoid use
  - Reduction in mammary gland development and lactation.

- Use Cautiously in:
  - Conditions associated with hypocalcemia including hypoparathyroidism, previous thyroid/parathyroid surgery, malabsorption syndromes, history of small intestinal excision, renal impairment/chronic hemodialysis (EGR < 30 mL/min); monitoring of calcium and other minerals recommended
  - Concurrent use of immunosuppressants or diseases resulting in immunosuppression (risk of infection)
  - Geri: May be more sensitive to drug effects

**Adverse Reactions/Side Effects**

- **CNS:** Headache.
- **GI:** Diarrhea, nausea.
- **GU:** Cystitis.
- **Derm:** Dermatitis, eczema, rashes.
- **F and E:** Hypocalcemia, hypophosphatemia.
- **Metab:** Hypercholesterolemia.
- **MS:** Back pain, extremity pain, musculoskeletal pain, atypical femoral fracture, osteonecrosis of the jaw, suppression of bone turnover.
- **Resp:** Dyspnea, cough.
- **Misc:** Hypersensitivity reactions including anaphylaxis, infection.

**Interactions**

- **Drug-Drug:** Concurrent use of immunosuppressants (risk of infection)

**Route/Dosage**

**Prodia**
- **Subcut (Adults):** 60 mg every 6 mo.

**Xgeva**
- **Subcut (Adults):**
  - Bone metastasis from solid tumors: 120 mg every 4 weeks
  - Giant cell tumor of bone: 120 mg every 4 weeks, with additional doses of 120 mg given on Days 8 and 15 of first month of therapy.
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NURSING IMPLICATIONS

Assessment

- Assess patients via bone density study for low bone mass before and periodically during therapy.
- Perform a routine oral exam prior to initiation of therapy. Dental exam with appropriate preventive dentistry should be considered prior to therapy.
- Monitor for signs and symptoms of hypersensitivity reactions (hypotension, dyspnea, upper airway edema, lip swelling, rash, pruritis, urticaria). Treat symptomatically and discontinue medication if symptoms occur.
- Lab Test Considerations: Assess serum calcium, phosphorous and magnesium levels before and periodically during therapy. Hypocalcemia and vitamin D deficiency should be treated before initiating therapy. May cause mild, transient q of calcium and phosphate. Administer calcium, magnesium, and vitamin D as needed.
- May cause anemia.
- May cause hypercholesterolemia.

Potential Nursing Diagnoses

Risk for injury (indications)

Implementation

- Grey needle cap on single-use pre-filled syringe should not be handled by people sensitive to latex.
- Subcut: Remove from refrigerator and bring to room temperature by standing in original container for 15–30 min prior to administration; do not warm in any other way. Do not shake. Administer in the upper arm, upper thigh, or abdomen. Solution is clear and colorless to pale yellow, and may contain trace amounts of translucent to white proteinaceous particles. Do not use if solution is discolored or contains many particles. Manually activate the green safety guard after the injection is given, not before.
- Patients should receive calcium 1000 mg and 400 IU vitamin D daily.

Patient/Family Teaching

- Explain the purpose of denosumab to patient. If a dose is missed, administer injection as soon as possible.
- Advise patients to eat a balanced diet and consult health care professional about the need for supplemental calcium and vitamin D.
- Advise patient to notify health care professional if any of the following symptoms occur: hypocalcemia (spasms, cramps in muscles, numbness or tingling in fingers, toes, or around mouth), infection (fever, chills, skin that is red, swollen, hot, or tender to touch, severe abdominal pain, frequent or urgent need to urinate or burning during urination), or other reactions (reducing, itching, red, dry or hard feeling, chills that come on or become worse, swelling) occur.
- Encourage patient to participate in regular exercise and to modify behaviors that place the body in a static position for long periods of time.
- Advise patient to take good care of teeth and gums (brush and floss regularly) and to inform health care professional if any of the following symptoms occur: dry mouth, loose or crooked teeth, mouth sores, or mouth ulcers.
- Advise female patients to notify health care professional if pregnancy is planned or suspected or if breast feeding. Instruct female patient to use highly effective contraception during and for at least 5 months after therapy is completed. Encourage women who become pregnant during Xgeva treatment to enroll in Amgen’s Pregnancy Surveillance Program. Patients or their health care professional should call 1-800-77-AMGEN (1-800-772-6436) to enroll.

Evaluation/Desired Outcomes

- Reversal of the progression of osteoporosis with p fractures and other sequelae.
- q bone mass.
- Decreased growth of giant cell tumors.

Why was this drug prescribed for your patient?