**Calcium Chloride**

**Classification**
Therapeutic: mineral and electrolyte replacements/supplements

**Pregnancy Category C**

**Indications**
- Treatment and prevention of hypocalcemia. Emergency treatment of hyperkalemia and hypermagnesemia and adjunct in cardiac arrest or calcium channel blocking agent toxicity.

**Action**
- Essential for nervous, muscular, and skeletal systems. Maintain cell membrane and capillary permeability. Act as an activator in the transmission of nerve impulses and contraction of cardiac, skeletal, and smooth muscle. Essential for bone formation and blood coagulation.

**Therapeutic Effects:** Replacement of calcium in deficiency states.

**Pharmacokinetics**
- **Absorption:** Absorption from the GI tract requires vitamin D. IV administration results in complete bioavailability.
- **Distribution:** Readily enters extracellular fluid. Crosses the placenta and enters breast milk.
- **Metabolism and Excretion:** Excreted mostly in the feces; 20% eliminated by the kidneys.
- **Half-life:** Unknown.

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

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>ONSET</th>
<th>PEAK</th>
<th>DURATION</th>
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<tbody>
<tr>
<td>PO</td>
<td>unknown</td>
<td>unknown</td>
<td>unknown</td>
</tr>
<tr>
<td>IV</td>
<td>immediate</td>
<td>immediate</td>
<td>0.5–2 hr</td>
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</tbody>
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**Contraindications/Precautions**
- **Contraindicated in:**
  - Hypocalcemia, Renal calcium, Ventricular fibrillation.
- **Use Cautiously in:**
  - Patients receiving digitalis glycosides, Severe respiratory insufficiency, Renal disease, Cardiac disease.

**Adverse Reactions/Side Effects**
- **CNS:** headache, tingling.
- **CV:** syncope, cardiac arrest, arrhythmias, bradycardia.

**Interactions**
- **Drug-Drug:**
  - Hypercalcemia increases the risk of digoxin toxicity. Chronic use with antacids in renal insufficiency may lead to mild alkalotic conditions. Hypocalcemia by itself decreases the absorption of orally administered tetracyclines, fluoroquinolones, phenytoin, and iron salts. Excess calcium may decrease the effects of calcium channel blockers. Decreases absorption of estradiol and mestranol (do not take within 2 hr of calcium supplements). May decrease the effectiveness of atenolol. Concurrent use with diuretics (thiazide) may result in hypercalcemia. May decrease the ability of sodium polystyrene sulfonate to decrease serum potassium.

**Route/Dosage**

- **Hypocalcemia (dosed as calcium chloride)**
  - IV (Adults): 500–1000 mg/dose q 6 hr.
  - IV (Children): 10–20 mg/kg/dose, repeat q 4–6 hr as needed.

- **Cardiac arrest and calcium antagonist toxicity (dosed as calcium chloride)**
  - IV (Adults): 2–4 mg/kg, may repeat in 10 min if needed.
  - IV (Children, Infants, and Neonates): 20 mg/kg, may repeat in 10 min if needed.

- **Tetany (dosed as calcium chloride)**
  - IV (Adults): 1 g over 10–30 min, may repeat after 6 hr.
  - IV (Children, Infants, and Neonates): 10 mg/kg over 5–10 min, may repeat after 6 hr or continuous infusion up to 200 mg/kg/day.

**NURSING IMPLICATIONS**

**Assessment**
- **Calcium Supplement/Replacement:** Observe patient closely for symptoms of hypocalcemia (paresthesia, muscle twitching, hyporeflexia, colic, cardiac arrest).

**High Alert**

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**NURSING IMPLICATIONS**

**Assessment**
- **Calcium Supplement/Replacement:** Observe patient closely for symptoms of hypocalcemia (paresthesia, muscle twitching, hyporeflexia, colic, cardiac arrest).
Monitor BP, pulse, and ECG frequently throughout parenteral therapy. May cause vasodilation with resulting hypotension, bradycardia, arrhythmias, and cardiac arrest. Transient increases in BP may occur during IV administration, especially in geriatric patients or in patients with hyperkalemia.

- Assess IV site for patency. Extravasation may cause cellulitis, necrosis, and sloughing.
- Monitor patient on digitalis glycosides for signs of toxicity.
- Lab Test Considerations: Monitor serum calcium or ionized calcium, chloride, sodium, potassium, magnesium, albumin, and parathyroid hormone (PTH) concentrations before and periodically during therapy for treatment of hypocalcemia.
- May cause decreased serum phosphate concentrations with excessive and prolonged use. When used to treat hyperphosphatemia in renal failure patients, monitor phosphate levels.

Potential Nursing Diagnoses
- Imbalanced nutrition: less than body requirements (Indications)
- Risk for injury, related to osteoporosis or electrolyte imbalance (Indications)

Implementation
- High Alert: Errors with IV calcium gluconate and chloride have occurred secondary to confusion over which salt is ordered. Clarify incomplete orders. Confusion has occurred with milligram doses of calcium chloride and calcium gluconate, which are not equal. Chloride and gluconate forms are routinely available on most hospital crash carts; physician should specify form of calcium desired. Doses should be expressed in mEq.
- In arrest situations, IV calcium chloride is now limited to patients with hypocalcemia, hyperkalemia, and calcium channel blocker toxicity.
- IM: IM administration of calcium chloride can cause severe necrosis and tissue sloughing. Do not administer IM.

IV Administration
- pH: 5.5–7.5
- IV: IV solution should be warm to body temperature and given through a small-bore needle in a large vein to minimize phlebitis. Do not administer through a scalp vein. May cause continuous burning sensation, peripheral vasodilation, and drop in BP. Patient should remain recumbent for 30–60 min after IV administration.
- If infiltration occurs, discontinue IV. May be treated with application of heat, elevation, topical infiltration of normal saline, 1% procaine HCl, or bromfenac.
- High Alert: Administer slowly. High concentrations may cause cardiac arrest. Rapid administrations may cause tingling, sensation of warmth, and a metallic taste. Halt infusion if these symptoms occur, and resume infusion at a slower rate after consultation.
- Do not administer solutions that are not clear or that contain a precipitate.
- Direct IV: May be administered slowly diluted by IV push. Rate: Administration at a maximum rate of 50–100 mg/min.
- Intermittent/Continuous Infusion: Diluent: D5W, D10W, 0.9% NaCl, D5/0.25% NaCl, D5/0.5% NaCl, D5/0.9% NaCl, or D5/LR. Concentration: 20 mg/mL. Rate: Maximum rate is 45–90 mg/kg over 1 hr; 0.6–1.2 mEq/kg over 1 hr.
- Storage Compatibility: Stable.
- Y-Site Compatibility: amiodarone, dobutamine, doxapram, epinephrine, esmolol, morphine, nitroprusside, paclitaxel.
- Y-Site Incompatibility: amphotericin B cholesteryl sulfate, propofol, sodium bicarbonate.

Patient/Family Teaching
- Calcium Supplement: Encourage patient to maintain a diet adequate in vitamin D.
- Osteoporosis: Advise patient to discuss any exercise limitations with health care professional before beginning program.

Evaluation/Desired Outcomes
- Increase in serum calcium levels.
- Decrease in the signs and symptoms of hypocalcemia.

Why was this drug prescribed for your patient?