Calcium carbonate (kal-sium kar-bo-nate)

Actions
Essential for nervous, muscular, and skeletal systems. Maintain cell membranes 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. Control of hyperphosphatemia in end-stage renal disease without promoting aluminum absorption.

Uses
Treatment and prevention of hypocalcemia. Adjunct in the prevention of postmenopausal osteoporosis. Relief of acid indigestion or heartburn. Treatment of hyperphosphatemia in end-stage renal disease.

Pharmacokinetics
Absorption: Absorption from the GI tract requires vitamin D.
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>
</tr>
</thead>
<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>
</tr>
</tbody>
</table>

Contraindications/Precautions
Contraindicated in: Hypercalcemia; Renal calculi; Ventricular fibrillation.
Use Cautionally in: Patients receiving digoxin, thiazides, parenteral nutrition in intolerances; Renal disease; Cardiac disease.

Adverse Reactions/Side Effects
CNS: Headache, tingling.
CV: Arrhythmias, bradycardia.
GI: Constipation, nausea, vomiting.
GU: Calculi, hypercalciuria.

Interactions
Drug-Drug: Hypercalcemia increases the risk of digitalis toxicity. Chronic use with antacids in renal insufficiency may lead to milk-alkali syndrome. Inhibition by monosaccharides decreases the absorption of orally administered tetracyclines, fluoroquinolones, phenytoin, and iron salts. Excessive amounts may decrease the effects of calcium channel blockers. Decreases absorption of estradiol and estrogens (do not take within 3 hr of calcium supplements). May decrease the effectiveness of amiodarone. Concurrent use with diuretics (thiazide) may result in hypercalcemia. May decrease the ability of sodium polystyrene sulfonate to decrease serum potassium.
Drug-Food: Cereals, spinach, or rhubarb may decrease the absorption of calcium supplements. Calcium acetate should not be given concurrently with other calcium supplements.

Route/Dosage

<table>
<thead>
<tr>
<th>Route</th>
<th>Indication</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO</td>
<td>Prevention of hypocalcemia, treatment of deficiency, osteoporosis—1–2 g daily in 3–4 divided doses.</td>
<td>1–2 g/day</td>
</tr>
<tr>
<td>PO</td>
<td>Prevention of hypocalcemia, treatment of deficiency, osteoporosis, renal insufficiency—0.5–1.5 g as needed.</td>
<td>0.5–1.5 g as needed</td>
</tr>
<tr>
<td>PO</td>
<td>Prevention of hypocalcemia, treatment of deficiency, osteoporosis, renal insufficiency—1 g with each meal, increase to 4–7 g as needed.</td>
<td>1 g/day</td>
</tr>
<tr>
<td>PO</td>
<td>Children—Supplementation—0.5–5.5 mg/kg/day in divided doses.</td>
<td>0.5–5 mg/kg/day</td>
</tr>
<tr>
<td>PO</td>
<td>Infants—Severe bone demineralization—50–150 mg/kg/day in 4–6 divided doses (more than once daily).</td>
<td>50–150 mg/kg/day</td>
</tr>
</tbody>
</table>

NURSING IMPLICATIONS

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

 Pharmacokinetics

<table>
<thead>
<tr>
<th>Route</th>
<th>Onset</th>
<th>Peak</th>
<th>Duration</th>
</tr>
</thead>
<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>
</tr>
</tbody>
</table>

OOPK indicates 10-document solutions indicate most frequent. Discontinued.
rhythmias, Chvostek's or Trousseau's sign). Notify physician or other health care professional if these occur. Protect symptomatic patients by elevating and padding siderails and keeping bed in low position.

- Monitor patient on digitalis glycosides for signs of toxicity.

- Antacid: When used as an antacid, assess for heartburn, indigestion, and abdominal pain; expect abdominal, immediate bowel sounds.

- 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 in treating hyperphosphatemia in renal failure patients, monitor phosphate levels.

- Toxicity and Overdose: Seizes patient for nausea, vomiting, anorexia, thirst, severe constipation, paralytic ileus, and bradycardia. Contact physician or other health care professional immediately if these signs of hypercalcemia occur.

Potential Nursing Diagnoses

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

Implementation

- PO: Administer calcium carbonate 1–1.5 hr after meals and at bedtime. Chewable tablets should be well chewed before swallowing. Dissolve effervescent tablets in glass of water. Follow oral doses with a full glass of water, except when using calcium carbonate as an phosphate binder in renal dialysis. Administer on an empty stomach before meals to optimize effectiveness in patients with hyperphosphatemia.

Patient/Family Teaching

- Instruct patient not to take enteric-coated tablets within 1 hr of calcium carbonate; this will result in premature dissolution of the tablets.
- Do not administer concurrently with foods containing large amounts of calcium (spinach, cruciferous vegetables, cereals, or phosphorus (milk or dairy products). Administration with milk products may lead to milk-alkali syndrome (nausea, vomiting, confusion, headaches). Do not take within 1–2 hr of other medications if possible.

- Instruct patients on a regular schedule to take missed doses as soon as possible, then go back to regular schedule.
- Advise patient that calcium carbonate may cause constipation. Review methods of preventing constipation (increasing fluids in diet, increasing fluid intake, increasing mobility and using laxatives). Severe constipation may indicate toxicity.
- Advise patient to avoid excessive use of tobacco or beverages containing alcohol or caffeine.
- Calcium Supplement: Encourage patients to maintain a diet adequate in vitamin D.
- Osteoporosis: Advise patients that exercise has been found to arrest and reverse bone loss. Patient should discuss any exercise limitations with health care professional before beginning program.

Evaluation/Desired Outcomes

- Decrease in serum calcium levels.
- Decrease in the signs and symptoms of hypocalcemia.
- Resolution of indigestion.
- Control of hyperphosphatemia in patients with renal failure.

Why was this drug prescribed for your patient?