Calcium Chloride

<table>
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<th>Brand names</th>
<th>Generics</th>
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<td>Medication error potential</td>
<td>Look-alike, sound-alike drug names</td>
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<td>USP reports that calcium chloride has been confused with calcium gluconate. Patient harm resulted.</td>
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**Contraindications and warnings**

**Contraindications:** Calcium chloride should not be used during CPR when ventricular fibrillation is present or in patients with the risk of existing digitalis toxicity.\(^{(2)}\)

Neonates receiving ceftriaxone should not be given calcium-containing fluids (e.g., Ringer’s solution, Hartmann’s solution, and PN formulations that contain calcium) because of the risk for precipitation of ceftriaxone–calcium salt.\(^{(3)}\)

Cases of fatal reactions with ceftriaxone–calcium precipitates in lungs and kidneys in neonates have been described.\(^{(3,4)}\) In some cases the infusion lines and the times of administration of ceftriaxone and calcium-containing solutions differed.\(^{(3,4)}\) Ceftriaxone and products that contain calcium may be administered sequentially to patients outside the neonatal period, as long as the infusion lines are thoroughly flushed between infusions with a compatible fluid.\(^{(3)}\) Ceftriaxone should not be administered simultaneously with any calcium-containing solution via Y-site in any patient.\(^{(3)}\)

**Warnings:** Several different salt forms of calcium are available. Attention must be paid to the salt during product ordering, selection, and administration.

**Infusion-related cautions**

Small veins (scalp, small hand, or foot) should not be used for infusion.\(^{(2)}\)

The infusion should be stopped if the patient complains of discomfort. Extravasation may cause tissue sloughing and necrosis.\(^{(6-9)}\) If extravasation occurs, local infiltration of the affected area with 1% procaine hydrochloride, with or without hyaluronidase, may reduce venospasm and will dilute the calcium in the tissues. Local application of heat may be helpful.\(^{(2)}\) (See Appendix E for management of extravasation.)

**Dosage**

10% (100 mg/mL) calcium chloride (CaCl\(_2\)) solution provides approximately 1.36 mEq/mL or 27.3 mg/mL of elemental calcium.\(^{(2,17)}\) 1 mEq is equivalent to 20 mg elemental calcium.

Dosing recommendations are expressed as mg or mg/kg of calcium chloride, or as mEq or mEq/kg of calcium.

**Hypocalcemia in critically ill infants and children:** 10–20 mg/kg of calcium chloride q 4–6 hr.\(^{(2,10,17)}\) Ionized calcium measurements may be helpful in determining subsequent doses.\(^{(2)}\)

**Hypocalcemia secondary to infusion of blood products**

- **Neonatal exchange transfusion with citrated blood:** 0.45 mEq (0.33 mL of 10% CaCl\(_2\)) after each 100 mL blood exchanged.\(^{(11)}\)
- **Citrated blood transfusion in adults:** 1.35 mEq (1 mL of 10% CaCl\(_2\)) per 100 mL blood transfused, administered concurrently with transfusion.\(^{(11)}\)
- CaCl\(_2\) infusion (5 mg/kg of calcium chloride) during fresh frozen plasma administration decreased citrate-induced hypocalcemia in children with thermal injury.\(^{(12)}\)

**Cardiac arrest with documented hypocalcemia, hypermagnesemia, hyperkalemia, or calcium channel blocker overdose:** (Routine administration during CPR is no longer recommended. Infusion through a central line is preferred.)\(^{(13)}\)

- **Pediatric patients:** 20 mg/kg of calcium chloride (0.2 mL/kg of 10% CaCl\(_2\); 0.272 mEq/kg) not to exceed 2000 mg/dose of calcium chloride.\(^{(2,13,14)}\) If beneficial, a continuous infusion of 20–50 mg/kg/hr of calcium chloride may be infused. Titrate infusion according to hemodynamic parameters; avoid hypercalcemia.\(^{(13)}\)

- **Adults:** ACLS Guidelines recommend against routine administration during CPR and suggest consideration of calcium administration for adults with cardiac arrest in the following scenarios\(^{(15)};\):
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### Dosage (cont.)

| Hyperkalemia or hypermagnesemia: | 500–1000 mg of calcium chloride infused over 2–5 minutes.

| Beta-blocker overdose or shock refractory to other measures: | 20 mg/kg of calcium chloride over 5–10 minutes followed by a continuous infusion of 20 mg/kg/hr. Titrate infusion according to hemodynamic parameters; avoid severe hypercalcemia (ionized calcium greater than twice the upper limit or normal).

### Dosage adjustment in organ dysfunction

Urinary excretion accounts for 20% of calcium elimination. Calcium concentrations should be monitored closely in patients with renal dysfunction who require calcium.

### Maximum dosage

1000 mg of calcium chloride/dose in adults. 2000 mg of calcium chloride/dose for children and adolescents in cardiac arrest.

### Additives

Aluminum is present as a contaminant.

### Suitable diluents

Most standard dextrose- and/or saline-containing IV fluids

### Maximum concentration

Undiluted, 100 mg/mL of calcium chloride

### Preparation and delivery

**Compatibility:** Often incompatible with bicarbonate, sulfate- or phosphate-containing fluids; consult a detailed reference and consider other additives’ impact on solubility. Calcium-containing fluids should not be co-infused with ceftriaxone. Calcium-containing fluids should not be co-infused with PN because of the risk for precipitation with the phosphate component. If no other IV access is available and the two must be co-infused, consult a detailed compatibility reference that considers the parenteral protein formulation and concentrations of PN additives.

### IV push

Slow, over 3–5 minutes; not to exceed 100 mg/min of calcium chloride.

### Intermittent infusion

Dilute to a final concentration of 20 mg calcium chloride/mL.

### Continuous infusion

20 mg calcium chloride/mL

### Other routes of administration

IM or sub-Q administration should not be used. IO administration may be used during CPR.

### Comments

**Drug interactions:** IV calcium should be used cautiously in patients receiving cardiac glycosides because of the potential for development of arrhythmias.

**Osmolarity:** 10% calcium chloride solution is 2.04 mOsmol/mL (2040–2050 mOsmol/L).

### REFERENCES

2. Calcium chloride [prescribing information]. Lake Forest, IL: Hospira Inc; November 2009.
3. Rocephin (ceftriaxone sodium) [prescribing information]. South San Francisco, CA: Genentech USA Inc; June 2015.