

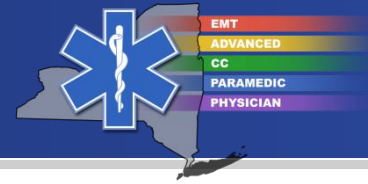
Calcium Chloride

Christopher J. Fullagar, MD, EMT-P, FACEP

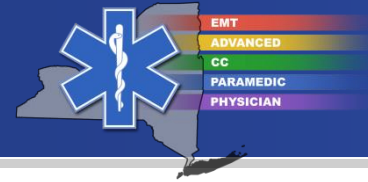
Daniel J. Hind, Pharm. D.

Daniela Tierson, Pharm. D.

Author credits / conflict declaration



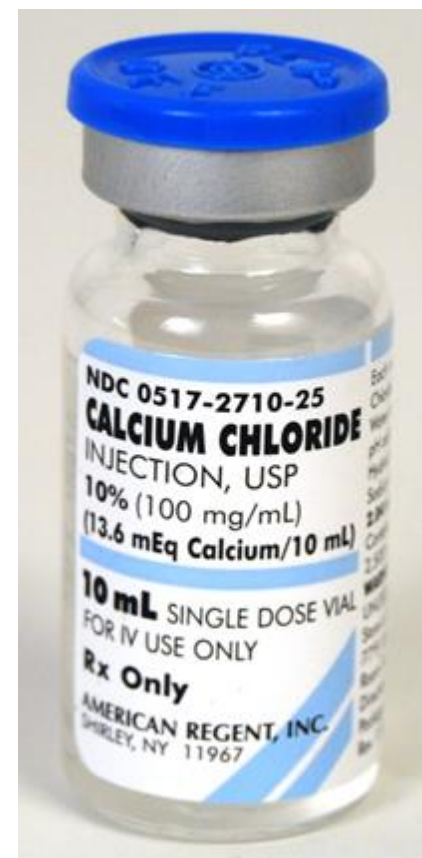
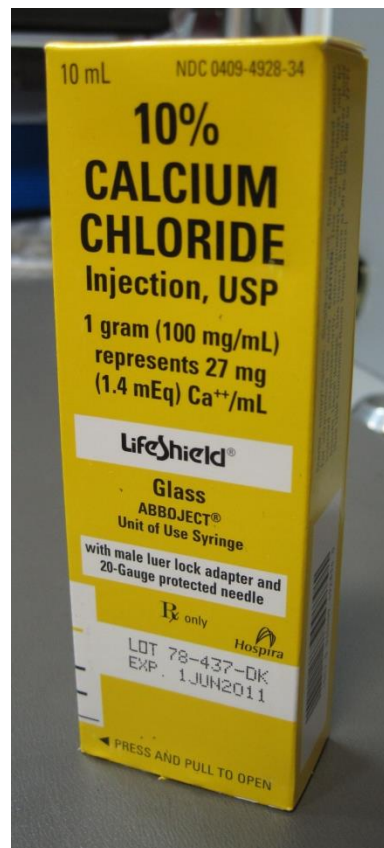
- No financial conflicts of interest

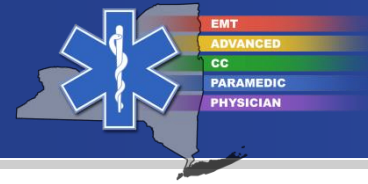


- Medication class
- Indications
- Actions
- Warnings
- Summary

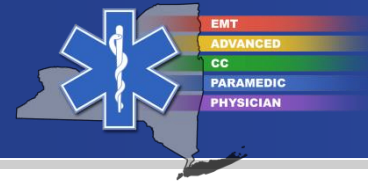


- Calcium is a mineral; an electrolyte
- Calcium chloride is a calcium salt
- In the collaborative EMS formulary, calcium is available as a 10% solution of calcium chloride





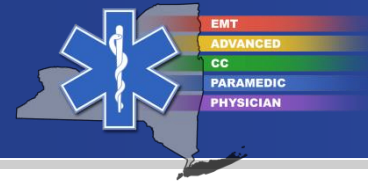
- The *ONLY* standing order indications for calcium chloride administration are cardiac arrest or rhythm changes during rapid sequence intubation (RSI) (paramedics only)
- *All* other indications require a medical control order:
 - Other causes of hyperkalemia
 - Calcium channel blocker overdose



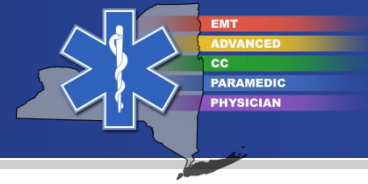
- Consider hyperkalemia in at-risk patients with:
 - Prolonged QTc > 500 milliseconds
 - Widened QRS > 150 milliseconds
- Patients at-risk for hyperkalemia:
 - Dialysis patients
 - Digitalis overdose
 - Massive crush injury
 - Cardiac arrest or cardiac rhythm changes after succinylcholine administration



- The use of calcium chloride in hyperkalemia does not decrease the serum potassium level; instead it helps to “stabilize the myocardial cell membrane” against undesirable depolarization from the high levels of potassium (see notes for more)
- Calcium is often reserved for patients that have *cardiac effects* of hyperkalemia as manifested by the aforementioned QTc and QRS abnormalities



- In calcium channel blocker (CCB) overdose, calcium chloride may help to overcome the effect of the CCB
 - Variably effective, but may be considered in severe cases
 - Usually requires additional interventions in the hospital
- Not much evidence favoring the use of calcium chloride in beta blocker overdose

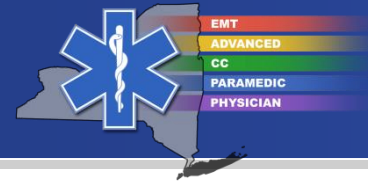


- Calcium chloride will form a precipitate if it combines with sodium bicarbonate
 - The precipitate is calcium carbonate, the same component that is in chalk
 - If you must give calcium chloride and sodium bicarbonate via the same intravenous line, flush with at least 50 cc of normal saline between the bolus of calcium chloride and sodium bicarbonate

- Calcium chloride that extravasates into the tissue can cause tissue necrosis
 - Calcium chloride should only be administered via a *large, proximal, easily flowing IV*
 - Administer slowly and stop if there is any concern of extravasation
 - Immediately report all instances of suspected extravasation of calcium chloride to hospital staff



Tissue necrosis secondary to extravasation injuries



- Calcium chloride can be given by paramedics on standing order *only* for cardiac arrest or rhythm changes after administration of succinylcholine during RSI
- Calcium chloride is otherwise reserved for use by online medical control order for hyperkalemia with resultant ECG abnormalities and severe calcium channel blocker overdose
- Only administer calcium chloride slowly via a large, proximal, easily flowing line to decrease the risk of tissue necrosis from extravasation of the drug into the soft tissue
- If giving calcium chloride and sodium bicarbonate via the same IV line, flush with at least 50 cc of normal saline between boluses