

CALCIUM CHLORIDE TITRATION PROTOCOL

Administer calcium chloride 7 gm in 500 ml via a central line (do not use the return side of the dialysis catheter). Maintain **UNCORRECTED** systemic ionized calcium of 1.0 – 1.2 mmol/L during citrate administration. Normalize the systemic ionized calcium and start calcium chloride infusion 15 minutes before citrate initiation. Always consider hypocalcemia as potential cause for sudden/profound hypotension or bradycardia. Monitor systemic total calcium:ionized systemic calcium ratio. Total calcium is measured in chemistry. A ratio greater than 2.5 or increased citrate and calcium chloride infusion requirements in a previously stable patient may indicate citrate toxicity. Citrate toxicity risk is increased with liver dysfunction.

The patient requires an arterial line for systemic **IONIZED** calcium monitoring (do not measure from a central line that is being used for calcium chloride administration). Measure the systemic **IONIZED** calcium on the GEM 1 hour after initiation, then Q3H until 2 consecutive ionized calcium levels within target, then Q6H. Adjust the calcium chloride infusion as follows:

<u>SYSTEMIC (ARTERIAL) Uncorrected IONIZED Ca++</u>	<u>CALCIUM CHLORIDE INFUSION ADJUSTMENT</u>
Less than 0.80 mmol/L	<ul style="list-style-type: none"> Administer 1 gm bolus of calcium chloride (see order set) Increase infusion by 20 ml/hour Repeat ionized calcium in one hour*
0.81 – 0.95 mmol/L	<ul style="list-style-type: none"> Administer 500 mg bolus of calcium chloride (see order set) Increase infusion by 10 ml/hour Repeat ionized calcium in one hour*
0.95 – less than 1.0 mmol/L	Increase infusion by 10 ml/hr (no bolus required)
1.0 – 1.2 mmol/L	No change
Greater than 1.2 mmol/L	Decrease infusion by 10 ml/hr

Administer calcium chloride bolus as per Citrate Order set. *Notify CCTC and CRRT Provider if second bolus of calcium chloride is required.

CITRATE TITRATION PROTOCOL

Pre-filter Citrate binds with ionized calcium to make it unavailable for clot formation. Low pre-filter ionized calcium levels provide regional anticoagulation of the filter. The citrate must be immediately reversed systemically by a calcium chloride infusion to prevent systemic hypocalcemia.

Titrate citrate infusion to post-filter **IONIZED** calcium (from blue sampling port) and measured on the GEM. Titrate to **UNCORRECTED** ionized calcium

Measure the systemic ionized calcium on the GEM 1 hour after initiation, then Q3H until 2 consecutive ionized calcium levels are within ordered target (usually 0.35-0.45), then Q6H. Measure liver function tests daily.

Initiate citrate **AFTER** ensuring baseline systemic ionized calcium has been normalized.

Post-Filter Uncorrected Ionized Ca++	Citrate Infusion Adjustment
Less than target range	Decrease by 10 ml/hour.
Target	NO CHANGE
Above target range	Increase by 10 ml/hour

Notify CCTC and CRRT provider if Citrate infusion greater than 350 ml/hour. Assess for citrate toxicity and consider higher target range for post filter ionized calcium.

Avoid over correction of citrate and calcium for a single ionized calcium that is very close to range.

HEPARIN TITRATION PROTOCOL

Give initial bolus directly into the LIMB BEING USED TO ACCESS BLOOD, immediately prior to starting the blood pump. Administer subsequent boluses directly into the preblood pump sampling port (RED).

Measure systemic PTT daily and post-filter PTT Q6H (blue sampling port). Consider the patient fully anticoagulated regardless of systemic PTT value (e.g. hold heparin and administer dialysate solution PBP to maintain filter patency for line insertion). If patient is receiving heparin via CRRT circuit, continue with daily prophylactic anticoagulation as per order.

Post-Filter PTT	Pre-Filter Heparin Bolus	Preblood Pump Heparin Dose 5,000 heparin/1 L NaCl = 5 units per mL A dose change by 200 units per hour = 40 ml/hr
Greater than 150 seconds	None	<ul style="list-style-type: none"> • Stop infusion for one hour • Decrease infusion by 200 units/hour (40 ml/hr) • Repeat PTT in 6 hours • If repeat PTT > 150, notify provider
Greater than 100 seconds	None	<ul style="list-style-type: none"> • Stop infusion for one hour • Decrease infusion by 200 units/hour (40 ml/hr) • Repeat PTT in 6 hours
80 to 100 seconds	None	Decrease infusion by 200 units/hour (40 ml/hr)
60 to 79 seconds	None	No change
50 to 59 seconds	None	Increase infusion by 200 units/hour (40 ml/hr)
40 to 49 seconds*	1000 units	Increase infusion by 200 units/hours (40 ml/hr)
30 to 39 seconds	2000 units	Increase infusion by 400 units/hour (80 ml/hr)
Less than 30 seconds	5000 units	<ul style="list-style-type: none"> • Increase infusion by 400 units/hour (80 ml/hr) • If repeat PTT < 30, notify provider

Perform independent double check for all heparin administration/rate adjustments (PBP). Administer heparin infusion via the PBP pump with a solution of 5,000 units per 1 L normal saline. This provides a 5 unit per mL solution (200 units = 40 ml).

POTASSIUM TITRATION PROTOCOL

Add KCl to dialysate and all replacement fluids according to the following protocol. PrismaSOL 0 and Prism0CAL contain zero potassium and zero glucose.

PrimsaSOL4 contains 4 mmol/KCl/L and 6.1 mmol/L of glucose. Monitor glucose and insulin doses carefully when switching between solutions.

Serum Potassium	Final KCl Concentration
less than 3.0 mmol/L	<ul style="list-style-type: none"> • KCl to equal 6 mmol/L • Give KCl bolus IV as per Crit Care Electrolyte order set • Correct Magnesium by IV bolus if < 1.0 • Notify CCTC and CRRT provider if repeat K remains less than 3.0 mmol/L
3.0-3.4 mmol/L	KCl to equal 5 mmol/L
3.5-4.5 mmol/L	KCl to equal 4 mmol/L
4.6-5.0 mmol/L	KCl to equal 3 mmol/L
5.1-6.0 mmol/L**	KCl to equal 2 mmol/L
If greater than 6.0 mmol/L**	KCl to equal 2 mmol/L

**If the serum potassium remains above 5 mmol/L (not trending down) despite a final concentration of 2 mmol/L, notify CCTC and CRRT provider to review other possible causes for persistent hyperkalemia. (e.g. CK, lactate, DKA, ischemia).

