

CITRATE Only CVVHDF set up record & Protocol



Step 1- Check and Initial filter set up:

Maintain IPC & ANTT. Gather the following:

Citrate CRRT Prescription	1 x 5L bag of PRISMOCITRATE 18/0	1 x 50ml BD syringe
1 x Prismaflex ST150 filter	1 x 5L PRISMOCAL B22	1 ampoule of Calcium Chloride (30mmol in 50ml)
1 x Baxter CA250 Calcium infusion line	1 x 5L PHOXILLIUM	21g safety needles for sampling
1 x Y connector	2 x 1L 0.9% sodium chloride	500ml 0.9% NaCl to return blood

1. Baseline Bloods: ABG, FBC, U&E, Mg, Phosphate and Total Calcium & Ionised Calcium checked----- **INITIAL**
2. Prepare in the 50 ml BD syringe: Calcium Chloride **30mmol** in total volume of **50 ml**-----
3. Follow onscreen setup instructions: **Always** select **NEW PATIENT** & when asked select **CVVHDF** ---
4. Choose "Citrate-Calcium via Prismaflex® Syringe Pump"-----
5. It is **very important** to Install the fluids correctly (**2 Nurse check required**):

Fluid	Install to	Circuit Location	Signatures
PRISMOCITRATE 18/0	The WHITE scale	Pre-Blood Pump (PBP)	Nurse 1 / Nurse 2
PRISMOCAL B22	The GREEN scale	Dialysate	Nurse 1 / Nurse 2
PHOXILLIUM	The PURPLE scale	Replacement	Nurse 1 / Nurse 2

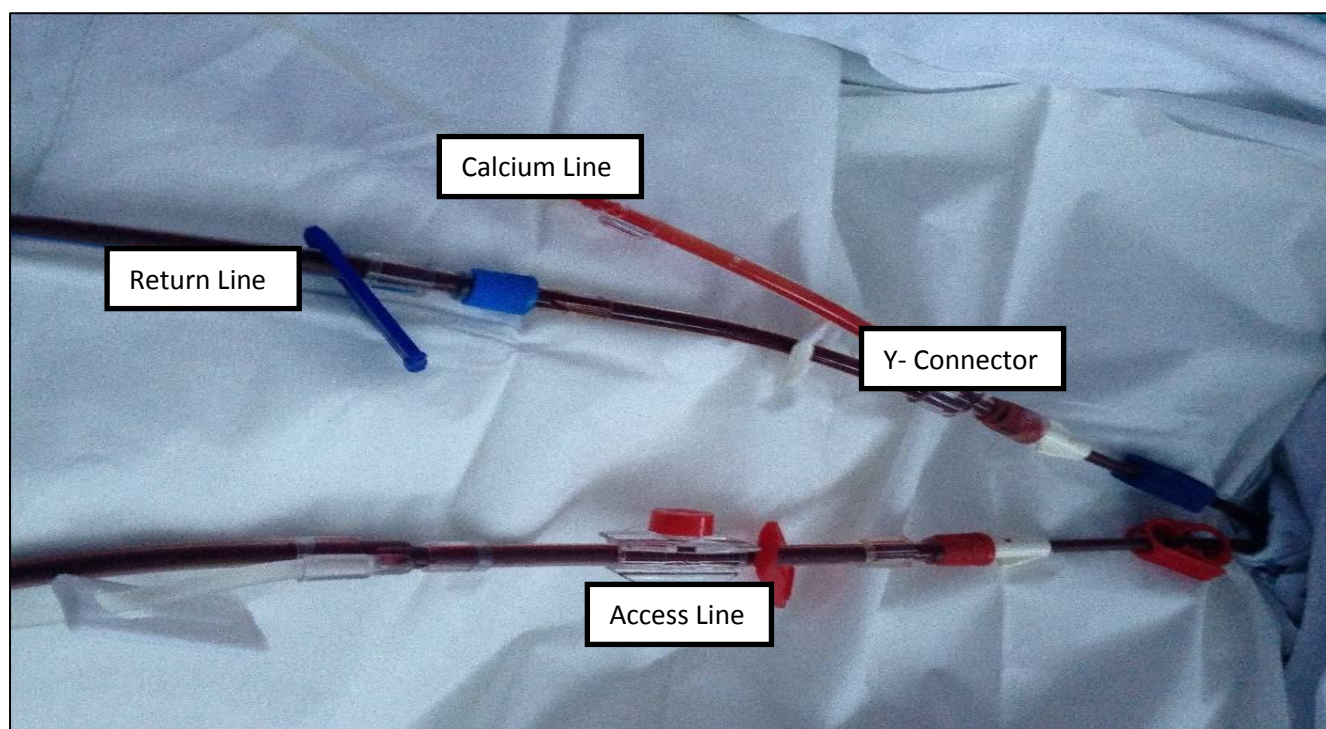
6. Once prime complete **leave filter on Prime Test Pass screen** until the Vascath has been assessed.
 - Use 5ml syringe to **remove heparin and / or clots & safely dispose.**
 - Withdraw 20ml blood and then replace (**<6 seconds for each**) this equates to 200ml/min flow --
7. **ADJUST FLUID CHAMBER** to mark shown in on screen instructions -----
8. **Re-prime if filter remains static** for longer than 30 mins (500ml NaCl 0.9% Manual prime) -----
9. Follow programming instructions: Refer to prescription (& Programming section on Page 3) -----
10. **Two Nurse check** of prescription: Flow rates, Citrate dose & Calcium Compensation ----

Step 2 - Connecting Prismaflex to Patient & Starting Treatment

1. Attach to CRRT circuit as follows.
 - a) Connect the **RED access** line to the patient
 - b) **Turn the Blood warmer on**, aim for **42 - 43°C**
 - c) Detach the **BLUE return** line and place red bung to end to protect this.
 - d) Feed the **BLUE line** through the blood warmer, leaving approx 3-4 inches and the clamp at the patient end.
 - e) Connect the **BLUE return** line to the vacated port on the **Y connector**
 - f) Connect the **Yellow line** to the effluent bag
 - g) Connect the **Calcium line** to the available port on the **Y connector**
 - h) Tape the **Calcium line** and the **BLUE line** together
 - i) Disconnect **Y connector** from priming bag spike and attach to the patient
 - j) Unclamp all lines

INITIAL

2. **Two Nurse Check** that **Access, Return** and **Calcium** lines set up as shown below:



3. Target blood flow rate will have been prescribed.
4. Once **TARGET** blood flow is established fluid removal can be commenced as prescribed.
5. **ADJUST FLUID CHAMBER** by following on screen instructions.

All stages of set up have been completed to protocol: Sign..... Date.....Time.....

Programming the Initial Settings and managing coagulation

- The initial fluid settings: The following table is used to initially prescribe the fluid flow rates. It is shown here as a reference should you want to check a prescription.

Weight Kg	Blood Flow ml/min	Dialysate ml/hr	Replacement Post-filter ml/hr	Treatment dose obtained
50	100	1000	200	37mls/kg/hr
60	110	1100	400	37mls/kg/hr
70	120	1200	500	35mls/kg/hr
80	130	1300	500	33mls/kg/hr
90	140	1400	500	31mls/kg/hr
100	150	1500	600	31mls/kg/hr
110	160	1600	700	30mls/kg/hr
120	170	1700	800	30mls/kg/hr
130	180	1800	1000	30mls/kg/hr

- The Citrate dose will default to **3 mmol/L** blood.

- SETTING CALCIUM COMPENSATION:**

Take an ABG sample from the patients' arterial line **prior to treatment** to measure the **uncorrected ionised calcium** level, use this to set Calcium Compensation.

Patients Pre-CRRT ionised Calcium	Action
<0.8 mmol/L	<ul style="list-style-type: none"> Contact Senior Doctor. They will consider prescribing 10ml 10% Calcium Gluconate. Start Calcium compensation at 110%
0.8 - 0.99 mmol/L	<ul style="list-style-type: none"> Start calcium compensation at 110%
1.0 - 1.3 mmol/L	<ul style="list-style-type: none"> Start calcium compensation at 100%
>1.3 mmol/L	<ul style="list-style-type: none"> Start calcium compensation at 90%

Step 3 - Monitoring and Management

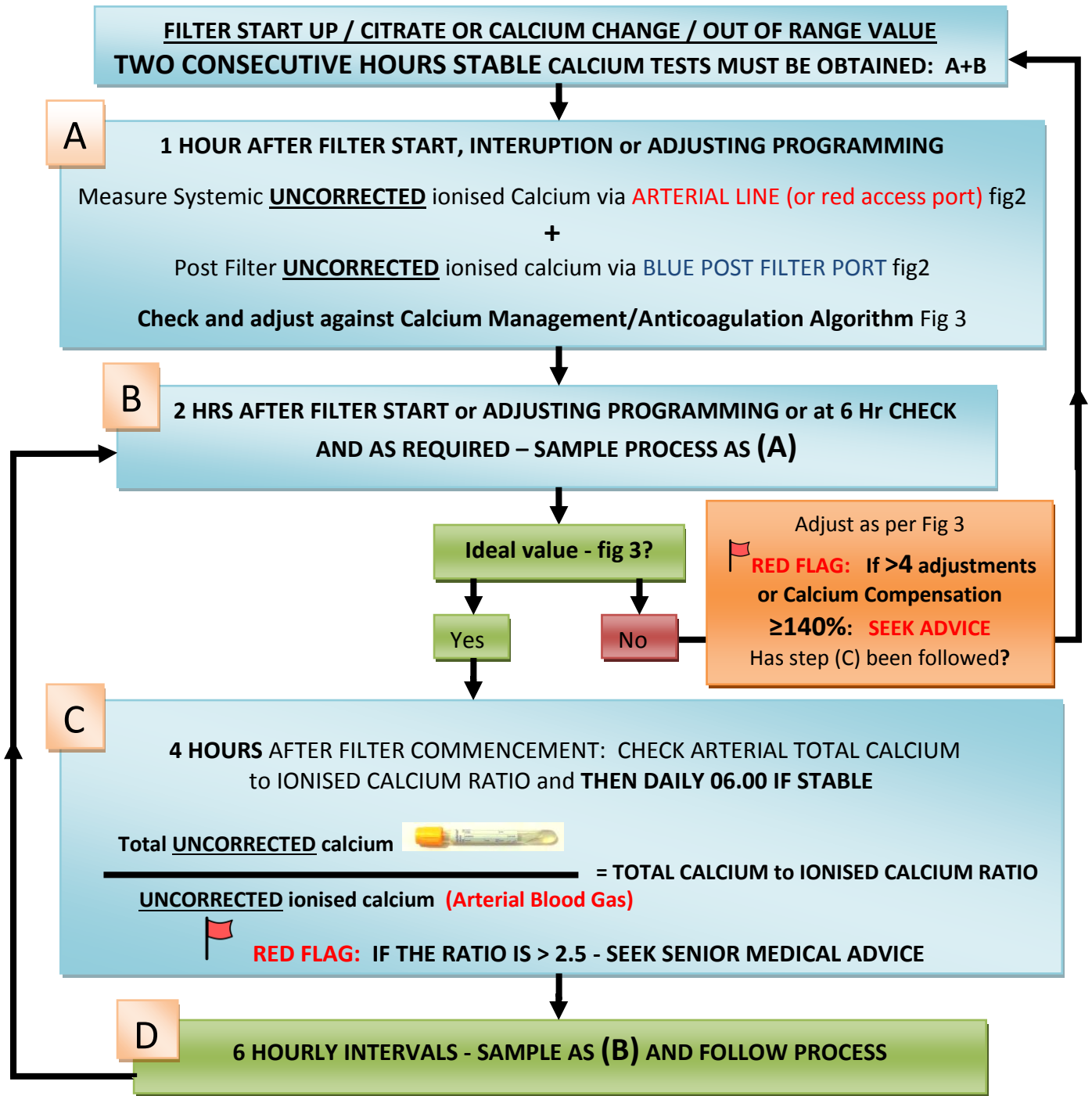


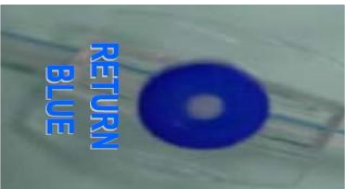


Fig 2 Sample sites and uncorrected calcium identification:

Patient Systemic or Pre filter Sample	Uncorrected calcium value	Post filter sample												
														
	<table border="1"> <tr><td>↓ cNa⁺</td><td>133</td><td>mmol/L</td></tr> <tr><td>cCa²⁺</td><td>0.38</td><td>mmol/L</td></tr> <tr><td>↓ cCa²⁺(7.4)_c</td><td>0.37</td><td>mmol/L</td></tr> <tr><td>cCl⁻</td><td>104</td><td>mmol/L</td></tr> </table>	↓ cNa ⁺	133	mmol/L	cCa ²⁺	0.38	mmol/L	↓ cCa ²⁺ (7.4) _c	0.37	mmol/L	cCl ⁻	104	mmol/L	
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Additional DAILY Monitoring - U&E, Hb / Haematocrit, Mg and PO₄ level


Fig 3: Calcium Management

	Post Filter Ca <0.25*	Post Filter Ca 0.25 – 0.5	Post Filter Ca >0.5
Patient Ca < 1.0	Decrease citrate dose by 0.5mmol/L blood	Increase Calcium compensation by 10%	Increase Citrate Dose by 0.5mmol/L blood + Increase Calcium compensation by 10%
Patient Ca 1.0 – 1.3	Decrease citrate dose by 0.5mmol/L blood	No Change (Ideal values)	Increase citrate dose by 0.5mmol/L blood
Patient Ca > 1.3	Decrease citrate dose by 0.5mmol/L blood + Decrease calcium compensation by 10%	Decrease calcium compensation by 10%	Decrease Calcium compensation by 10%

Interpreting Total Calcium to Ionised Calcium Ratio:

Ratio	Action
<2.5	Repeat in 24 hours
>2.5	<p>RED FLAG: Discuss with Advanced Trainee/Consultant</p> <p>Step 1: Aim for a post filter ionised calcium (uncorrected) of 0.4-0.5mmol/L by reducing the citrate dose in 0.2mmol increments. Check post-filter ionised Calcium in 30 minute intervals until 0.4-0.5 mmol/L target achieved.</p> <p>Step 2: Once achieved measure Total Calcium to Ionised Calcium Ratio. If >2.5 despite post filter calcium of 0.4-0.5mmol/L consider:</p> <ul style="list-style-type: none"> a) Double baseline dialysate flow (to increase citrate removal). b) Reduce blood pump speed (reduce citrate dose administered). c) Stop citrate and use alternative anticoagulant/no anticoagulant.

Trouble shooting

-  **RED FLAG: INCREASING CALCIUM COMPENSATION MAY INDICATE CITRATE ACCUMULATION OR INCORRECT CONNECTION/PROGRAMMING: THE CALCIUM RATIO SHOULD BE CHECKED.**
- If the protocol **decreases** the citrate dose the pre-blood pump rate and therefore effluent dose will fall. The replacement fluid rate can be increased until required dose is achieved.
- Metabolic acidosis** (pH < 7.35, BE <-4) may be as a result of poor citrate metabolism and may indicate liver dysfunction – report to a senior doctor – check total calcium to ionised calcium ratio
- Metabolic alkalosis** (pH>7.45, BE >+4) possibly from an excessive citrate load: **Consider**
 - Increasing dialysate flow by double baseline rate (less citrate will reach patient).
 - Reducing blood pump flow (delivers less citrate and reduced bicarbonate)

These changes may affect clearance / filter life discuss with an experienced user.

Citrate CRRT Handover Guide: Incoming & Outgoing Nurse to confirm.

FILTER PRESCRIPTION

INITIALS ON HANDOVER

Correct Protocol & Prescription -----

DAY 1		DAY 2		DAY 3	
D	N	D	N	D	N
/	/	/	/	/	/

Correct **Blood Flow Rate, Dialysate Rate, Replacement Rate, Body Weight** -

/	/	/	/	/	/
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Calcium Compensation (with any changes discussed with reference to **Ionised Calcium values** obtained) -----

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Total Calcium : Ionised Calcium **Ratio** checked after **4 & 24 hours** -----

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Fluid Removal Rate and **Balance aim** -----

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CORRECT FLUIDS

PrismoCitrate 18/0 (Pre-Blood Pump scale Δ),

Prism0Cal B22 (Dialysate scale ■)

Phoxillium (Replacement scale ●) -----

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CORRECT CONNECTION OF LINES

Access, Return and Calcium Lines all connected correctly -----

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(**Calcium** and **Return** lines should be taped together and connected via **Y-Connector**)

