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1.0 PRACTICE STANDARD

To provide guidelines to Medical Practitioners regarding the use of Citrasate® dialysate for patients receiving extended duration hemodialysis in an independent, self-directed manner. This applies for patients receiving treatments at home or within an existing healthcare facility.

2.0 DEFINITIONS AND ABBREVIATIONS

Extended Duration Hemodialysis is defined as a hemodialysis treatment exceeding 6 hours in duration

Citrasate® Dialysate refers to a dialysate preparation available commercially containing 2.4 mEq/L citric acid

3.0 EQUIPMENT

- Citrasate® Dialysate

4.0 PROCEDURE

RATIONALE

1.	Consider use of citric acid containing dialysate in patients receiving chronic hemodialysis as a strategy to eliminate heparin exposure for patients with: <ol style="list-style-type: none"> High heparin requirements (>50000 U/week) Documented Heparin-Induced Thrombocytopenia Documented heparin allergy 	Heparin is associated with multiple complications when used in the long term including acute complications (e.g. bleeding, Heparin-Induced Thrombocytopenia) and chronic complications (e.g. osteoporosis)
2.	Does this patient have significant hepatic disease? If so, Citrasate® dialysate should be reconsidered	Citric acid is converted to bicarbonate by the liver. Patients with significant hepatic dysfunction may not adequately metabolize the citric acid
3.	Does this patient have baseline hypocalcemia (total adjusted serum calcium \leq 2.1 mmol/L) despite management per "Calcium for Quotidian Dialysis Guideline"? If so, Citrasate® dialysate should be reconsidered	The anti-coagulating properties of citric acid are via localized chelation with calcium. Pre-existing hypocalcemia may be worsened by the addition of citric acid.

4.	Does this patient have baseline pre-dialysis metabolic alkalosis (pre-dialysis bicarbonate level ≥ 25 mmol/L)? If so, Citrasate® dialysate should be reconsidered	Citric acid is converted to bicarbonate by the liver. In the setting of pre-existing metabolic alkalosis, this may be worsened by citric acid exposure.
5.	Does this patient use a potassium bath other than 1 mmol/L? If so, Citrasate® is contraindicated for the independent patients.	Citrasate® is currently available only in a 1 mmol/L potassium bath. Other potassium concentrations are available only via 'spiking' the dialysate jug with KCl. Given the potential of a life-threatening error with potassium spiking the Provincial Medical Advisory Board has previously stated that only commercially available potassium baths should be used and that potassium spiking is not permitted at home. Therefore, until a commercially prepared solution of variable potassium is available, Citrasate® use cannot be endorsed for potassium baths 2, 3 and 4 mmol/L.
6.	If no contraindications identified and patient meets inclusion criteria, proceed with Citrasate® Dialysate	
7.	Following implementation of Citrasate® Dialysate, bloodwork should be obtained at 1 week and then with routine lab testing to reassess calcium and bicarbonate levels. Patients should also be counseling regarding the symptoms of hypocalcemia (perioral tingling or numbness; muscle cramps or spasms)	Opinion-based

5.0 DOCUMENTATION CONSIDERATIONS

1. Document contraindication for heparin (absolute or relative) over time
2. Document lack of contraindication for the use of Citrasate® at home
3. Document that patient is stable and maintained persistently on a K1 bath

6.0 SPECIAL CONSIDERATIONS

Anticoagulation plays an important role in the management of a patient receiving chronic hemodialysis. Thrombosis within the extracorporeal circuit and consequent loss of 'Fibre Bundle Volume' within the dialyzer is associated with a reduction of the effective dose of dialysis delivered.

Heparin is the standard medication used to minimize thrombosis within the extracorporeal circuit. For some individuals it is necessary or desirable to eliminate the use of heparin. This can be due to a documented reaction to the heparin (e.g., Heparin-Induced Thrombocytopenia, Heparin allergy) or to minimize long term side effects of heparin exposure (e.g. osteoporosis).

Citrasate® Dialysate is a commercial preparation containing 2.4 mEq/L citric acid. It exerts a localized anti-coagulant effect via chelation of free calcium, a necessary factor in the coagulation cascade.

Experience has shown that due to the low concentration of citric acid in this preparation there is a low risk of biochemical complications (systemic hypocalcemia; metabolic alkalosis), even with prolonged exposure (SLED therapy). However, due to the fact that this guideline focus on patients receiving their dialysis independently (ie, patient self-managed), individuals identified to be at a heightened risk

of these metabolic consequences (pre-existing hypocalcemia, pre-existing metabolic alkalosis; advanced liver disease) should not use Citrasate™ Dialysate.

Additionally, as of October 20, 2010 Citrasate® was available only as a 1 mmol/L potassium concentration. Other concentrations of potassium involved 'spiking' the dialysate with additional potassium to alter the concentration. The BC Renal Agency Medical Advisory Committee has previously stated that due to the potentially life-threatening nature of an error with potassium spiking of dialysis preparations by patients, potassium spiking should not be performed at home. As such, until different potassium concentrations of Citrasate® Dialysate are commercially prepared and available, only patients chronically and stably dialyzing on a 1 mmol/L potassium dialysate can use Citrasate® Dialysate.

7.0 REFERENCES

"Citrasate® dialysis concentrate: *in vitro* tests and results of the Citrasate® concentrate use in *in vivo* bicarbonate haemodialysis and on-line haemodiafiltration" Vladimir Polakovic et al.

"Dialysate made from dry chemicals using citric acid increases dialysis dose" Blagg C et al, American Journal of Kidney Diseases, 35(3), 2000:pp493-499

"Guidelines for Use of Citrate Dialysate (Citrasate®)" Dial Medical Supply (Manufacturer's website <http://www.dialmedsupply.com/citrasate/PDF/CitrasateGuidelines.pdf>)

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BCPRA Provincial Medical Advisory Committee (October 2010)