Acute Therapy Systems

Ci-Ca® CVVHD with Ultraflux® EMiC®2

Improved removal of middle molecules with Ci-Ca® therapy

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MEDICAL CARE

Ci-Ca® CVVHD with Ultraflux® EMiC®2

Ci-Ca® CVVHD with Ultraflux® EMiC®2 is an advanced CRRT therapy combining the advantages of citrate anticoagulated CVVHD with improved removal of middle molecules

- **E**nhanced **Mi**ddle Molecule **C**learance – comparable to CVVH
- Substantially stable albumin levels
- Reliable citrate anticoagulation
- High efficacy with low blood flows
- multi**Filtrate** Ci-Ca®: integrated citrate and calcium management

Intended use of the combined Ci-Ca® EMiC®2 therapy:

Patients with elevated concentrations of middle molecules

- High concentration of myoglobin due to rhabdomyolysis
- Cytokines, interleukins and other factors in septic patients (studies still have to demonstrate a better outcome)

Middle Molecule	Molecular Weight
β2 microglobulin (β2m)	12 kDa
Cystatin C	13 kDa
Myoglobin	17 kDa
Interleukin-1β (IL-1β)	18 kDa
Interleukin-6 (IL-6)	21 kDa
Interleukin-10 (IL-10)	37 kDa

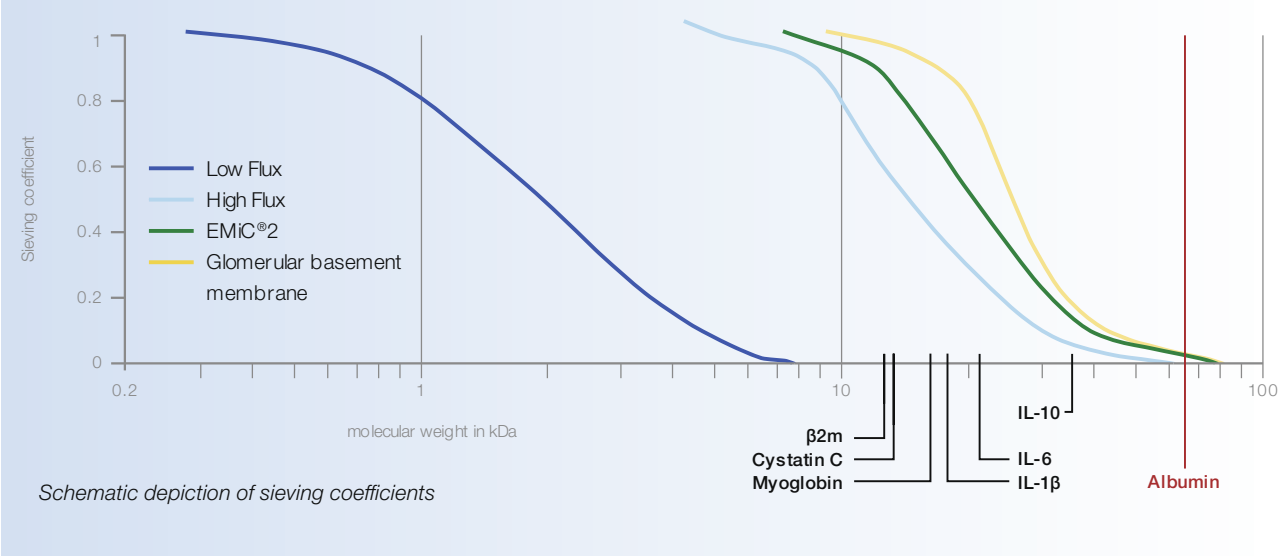
Patients with high bleeding risk and HIT

- Acute bleeding or high bleeding risk due to haemorrhage, trauma or surgery
- Heparin-induced thrombocytopaenia (HIT II) where citrate is used in combination with the required systemic anticoagulation

Ultraflux® EMiC®2 benefits from modern membrane technology thanks to the higher permeability of its membrane and adjusted cut-off

Advantages of Ultraflux® EMiC®2

- **E**nhanced **Mi**ddle Molecule **C**learance
- Cut-off at ~ 40 kDa
- Advanced hollow fibre ondulation technology ensures high efficacy by homogeneous dialysate flow around the fibres
- The steep sieving coefficient curve closely mimics the glomerular basement membrane
- Narrows the gap to physiological renal function



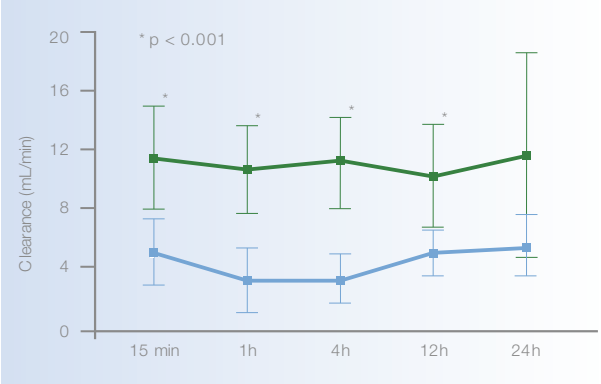
Schematic depiction of sieving coefficients

Removal of middle molecules – retaining albumin

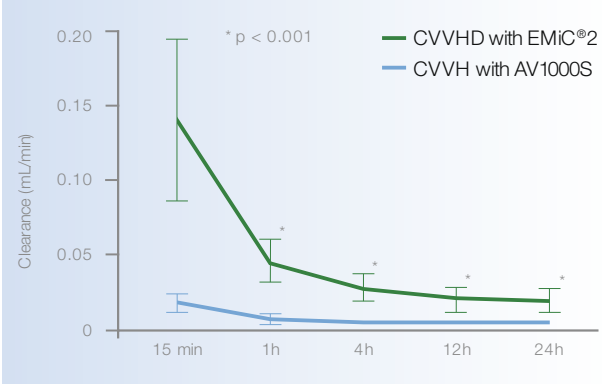
EMiC®2 CVVHD

- Significant increase in middle molecule clearance [1]
- Albumin serum levels: CVVHD EMiC®2 comparable to CVVH with standard filters [1]
- Haemodynamic and respiratory tolerance similar between both treatment modalities [2]

Middle molecule clearance*



Albumin clearance



*FLC kappa (25 kDa)

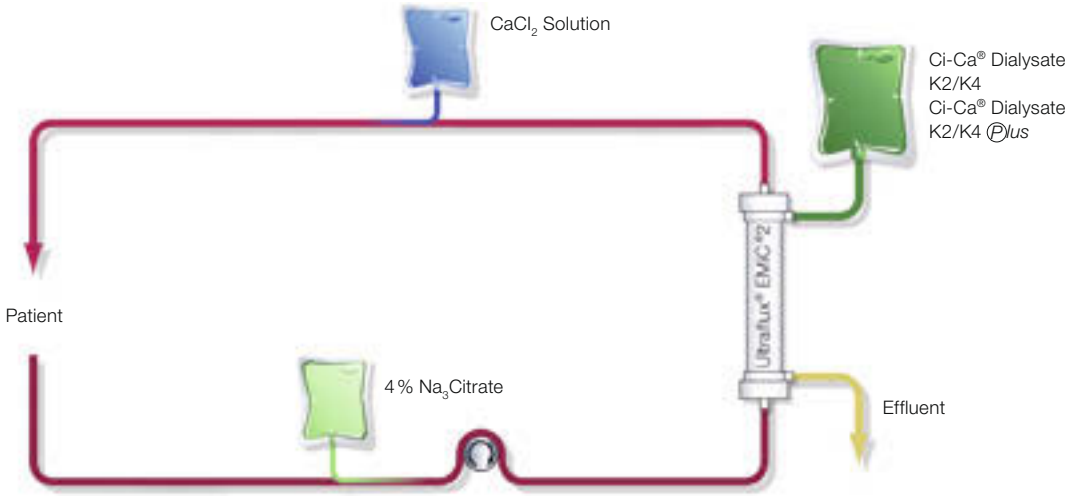
Ci-Ca® EMiC®2 builds on the advantages of multiFiltrate Ci-Ca®:

Advantages of citrate anticoagulation

- Reliable anticoagulation, restricted to the extracor-poreal circuit[3]
- Reduced risk of bleeding compared to systemic anticoagulation such as with heparin[4]
- Minimised clotting events and fewer treatment interruptions[5]

Advantages of the CVVHD treatment modality

- High efficacy, even with low blood flows
- Low blood flow: reduced demand of citrate
- Use of smaller, less invasive catheters possible
- Longer filter running times compared to convective modalities[6]



Order information

multiFiltrate Kit containing components for Ci-Ca® CVVHD EMiC®2

multiFiltrate Kit Ci-Ca® CVVHD EMiC®2	Art. No. F00001172
Type	**Description**
Ultraflux® EMiC®2	Ultraflux® dialyser, steam-sterilised, 1.8 m^2 surface area, Fresenius Polysulfone® membrane, blood filling volume 130 mL
multiFiltrate Ci-Ca® Cassette	multiFiltrate cassette with arterial and venous blood tubing system, filtrate system and integrated citrate and calcium lines
Dialysate system multiFiltrate	Dialysate system for multiFiltrate with integrated heater bag

Performance data/Technical data	Ultraflux® EMiC®2
Effective surface area (m^2)	1.8
Wall thickness/inner lumen (µm)	35/220
Blood filling volume (mL)	130
Blood flow range (mL/min)	100 – 350
Max. dialysate flow (mL/min)	1000
Max. filtrate flow (mL/min)	10 % of blood flow
Total amount of ultrafiltrate generated in 24 h (incl. anticoagulation)	max. 12000 mL
Membrane material	Fresenius Polysulfone®
Housing material	Polycarbonate
Potting material	Polyurethane
Sterilisation method	INLINE steam

Literature

1. Mathieu Page, Charles-Eric Ber, Davy Hayi-Slayman, Bernard Allaouchiche, Thomas Rimmelé, Removal of Middle-Molecular Weight Molecules with High Cut-Off Continuous Hemodialysis; ASA Annual Meeting, 17.-21. October 2009, New Orleans
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3. Stanislao Morgera, Michael Schneider, Torsten Slowinski, Ortrud Vargas-Hein, Heidrun Zuckermann-Becker, Harm Peters, Detlef Kindgen-Milles, Hans-Hellmut Neumayer, A Safe Citrate Anticoagulation Protocol with Variable Treatment Efficacy and Excellent Control of the Acid-Base Status; Crit Care Med 2009; 37 (6): 2018-2024
4. Heleen M. Oudemans-van Straaten, Citrate Anticoagulation for Continuous Renal Replacement Therapy in the Critically Ill; Blood Purif 2010, 29: 191-196
5. Stanislao Morgera, Cornelia Scholle, Gitana Voss, Michael Haase, Ortrud Vargas-Hein, Dietmar Krausch, Christoph Melzer, Simone Rosseau, Heidrun Zuckermann-Becker, Hans-H. Neumayer, Metabolic Complications during Regional Citrate Anticoagulation in Continuous Venovenous Hemodialysis: Single-Center Experience; Nephron Clin Pract 2004, 97: c131-c136
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