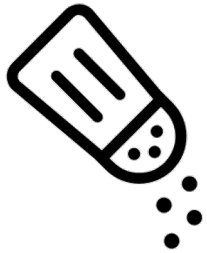
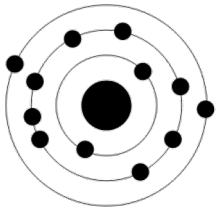
Watch Out for Theses Electrolyte & Acid-Base Disturbances Associated with Citrate Anticoagulation



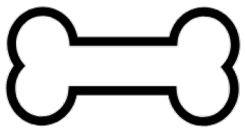
Hypernatremia (HyperNa)

- **Citrate solutions may have ↑ sodium content** and should be paired with a lower sodium dialysate/replacement fluid



Hypomagnesemia (HypoMg)

- **Citrate binds Mg**: this complex is removed via CKRT from circulation → ↓ Mg



Hypocalcemia (HypoCa)

- Citrate can bind free, ionized Ca (iCa)
- **If the [Total Ca: iCa] Ratio is > 2.5: think citrate toxicity**
- Remember to convert the units: Multiply the Total Ca (mg/dL) by 0.25 to convert to mmol/L

Anion-Gap Metabolic Acidosis

- **Citrate is a weak, "unmeasured" anion**
- Liver dysfunction or low mean arterial pressure may increase citrate accumulation by impairing citrate metabolism

Metabolic alkalosis

- Bicarbonate may accumulate as:
  - **1 $Citrate^{3-}$ → 3 $HCO3^{-}$**

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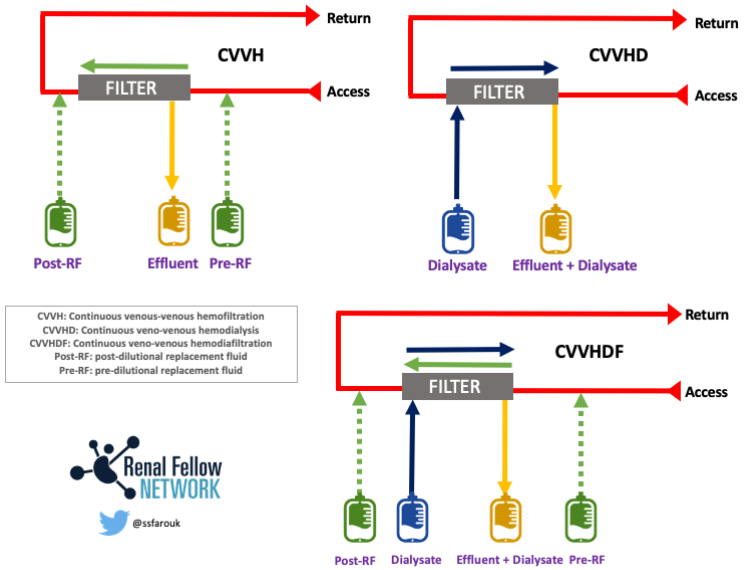
How-to Calculate the Filtration Fraction (FF) in CKRT

FILTER

$$FF = \frac{Fluid\ removed\ from\ the\ filter}{Fluid\ entering\ the\ filter}$$

FILTER



$$= \frac{Ultrafiltration\ \left(\frac{ml}{hr}\right)}{Pre\text{-}Filter\ RF + Plasma\ Flow\ Rate\ \left(\frac{ml}{hr}\right)}$$

$$= \frac{Pre\text{-}Filter\ AC + Pre\text{-}Filter\ RF + Post\text{-}Filter\ RF\ \left(\frac{ml}{hr}\right) + Net\ Ultrafiltration\ \left(\frac{ml}{hr}\right)}{Pre\text{-}Filter\ (RF+AC) + \left[60\frac{min}{hr} * Blood\ flow\ rate\ \left(\frac{ml}{min}\right)\right] * (1 - Hematocrit)}$$

$$\text{e.g.} = \frac{2000\ \frac{ml}{hr} + 0\ \frac{mL}{hr}}{2000\frac{mL}{hr} + \left[60\frac{min}{hr} * 250\ \frac{mL}{min}\right] * (1 - 0.28)} * 100\ \% = \mathbf{16\%*}$$

- **The FF is the ratio of fluid being REMOVED from the filter to the fluid ENTERING the filter**
  - ***The target FF to reduce the risk of filter clotting is < 20 – 25%**
    - **<u>Dialysate (in CVVHD or CVVHDF) does NOT affect the FF</u>**

CKRT: Continuous kidney replacement therapy; Replacement Fluid (RF); Anticoagulation (AC)

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