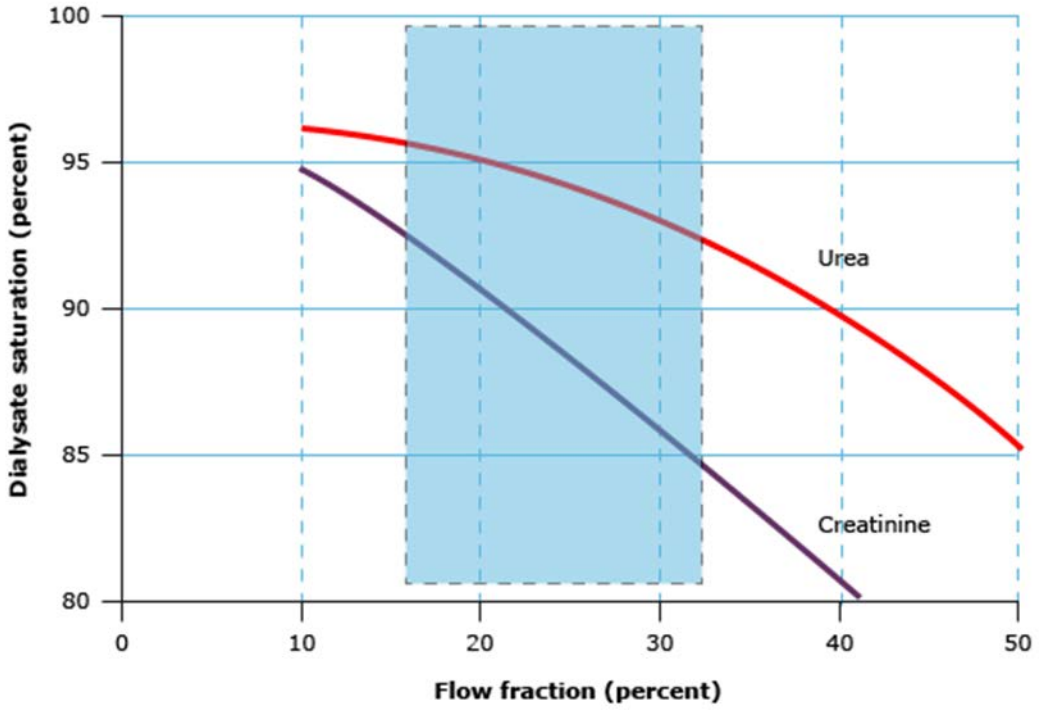
Home hemodialysis

This guide is meant to provide basic knowledge in home hemodialysis to the in training fellows.

- Flow fraction: is QD/QB : the ratio of dialysate flow rate to the blood flow rate, goal is to achieve saturated dialysate for good treatment in short period of time.
  Flow fraction is fixed number that we enter, so if we decrease BF then the QD will decrease (slower dialysis and treatment will take longer time).
- Clearance: remember the volume of distribution of urea (V) is the total body water. KT/V can be improved by
  1. Increasing the dialysate volume
  2. Increasing the dialysate saturation.
- The blood flow rate should be approximately three times greater than dialysate flow rate, resulting in flow fractions of approximately 33 percent.
- A flow fraction of 40 to 50 percent is typically used.

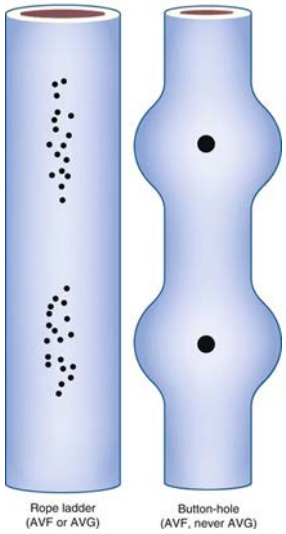


Home HD contraindications:

- Noncompliance.
- Seizure.
- Hypoglycemia.
- Hemodynamic instability and intra dialytic hypotension.
- Suitable home environment (electricity, water, cleanliness, storage).

Cannulation methods:

- Buttonhole: re-cannulation of the same previous site with blunt needle.
  Complication: increase risk of staph infection.
- Rope- ladder: rotating the site of cannulation.



Intensive HHD (5-6 treatments per week):

- Solute removal advantage of increased weekly dialysis time. Like PO4 clearance. Intradialytic concentration of PO4 does not change much during dialysis so the main factor that improves PO4 removal is the total weekly dialysis time.
- Solute removal advantage of increased frequency. The blood urea concentration continue to fall during dialysis so increasing dialysis session to longer than 4 hour has a limited benefit, while frequent sessions during the week is beneficial.
- UF advantage of intensive weekly dialysis: slow the rate per treatment, less hemodynamic changes.

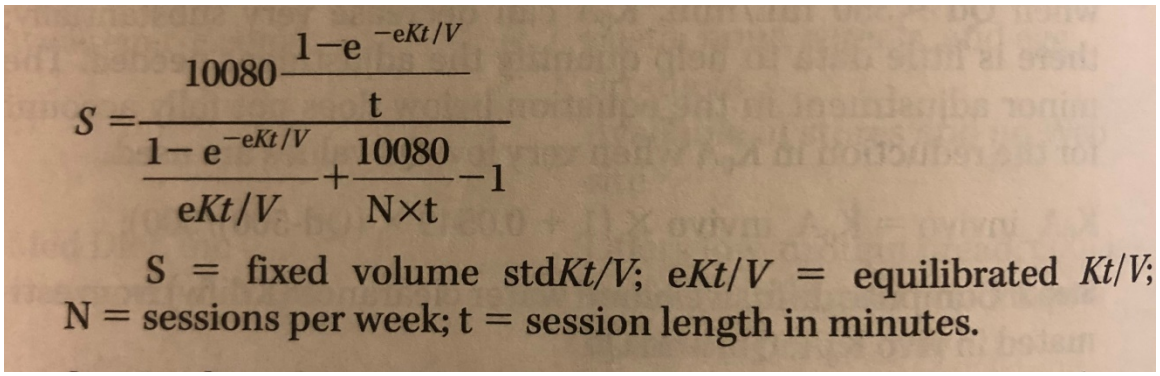
Adequacy and urea clearance:

For in-center HD, providing 3 dialysis sessions per week each is 3.5 hours, with spKT/V of 1.2 → stdKt/V of 2.15 (by using FHN or Daugirdas equation) as will be explained below. Increasing spKt/V >1.2 will have modest effect on increasing standard Kt/V.

For home hemodialysis performing 6 treatments per week for example, goal spKt/V is about 0.5 (can do for example short session: 1.5-3 hours) to achieve the stdKt/V of 2.15.

Be familiar with the following:

- spKt/V: using Daugirdas Kt/V equation that translate URR to Kt/V by adjusting for the session length:
  $Kt/V = -\ln(R - 0.008 \times t) + (4 - 3.5 \times R) \times 0.55\ UF/W$.
  ln: natural log, r: ratio of pre to post dialysis BUN, t: treatment length in hours, V: volume of distribution.
- eKt/V: Urea diffuses back from tissues to blood about 30 min after dialysis causing post dialysis rebound. using modified Tattersall equation:
  $eKt/V = spKt/V \times Td(Td+30.7)$
  Td: dialysis session length. 30.7 is a constant derived from HEMO study.
- stdKt/V : calculated by using fixed- volume standard Kt/V (S) as below, Use Leypoldt equation to get a fixed- volume standard Kt/V:



$$S = \frac{10080 \dfrac{1 - e^{-eKt/V}}{t}}{\dfrac{1 - e^{-eKt/V}}{eKt/V} + \dfrac{10080}{N \times t} - 1}$$

S = fixed volume stdKt/V; eKt/V = equilibrated Kt/V; N = sessions per week; t = session length in minutes.

stdKt/V= S/[1-(0.74/f)xUF_wk/V]

F is freq of dialysis per wk
UF_wk is the fluid gain between dialysis sessions per week
V is volume distribution of urea (body water).

Resources:

https://www.uptodate.com/contents/search

Hand book of dialysis, J. Daugirdas, fifth edition

https://link.springer.com/chapter/10.1007/978-1-4471-5547-8_59

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