

# Ipotensione arteriosa e stunning cardiovascolare in emodialisi.

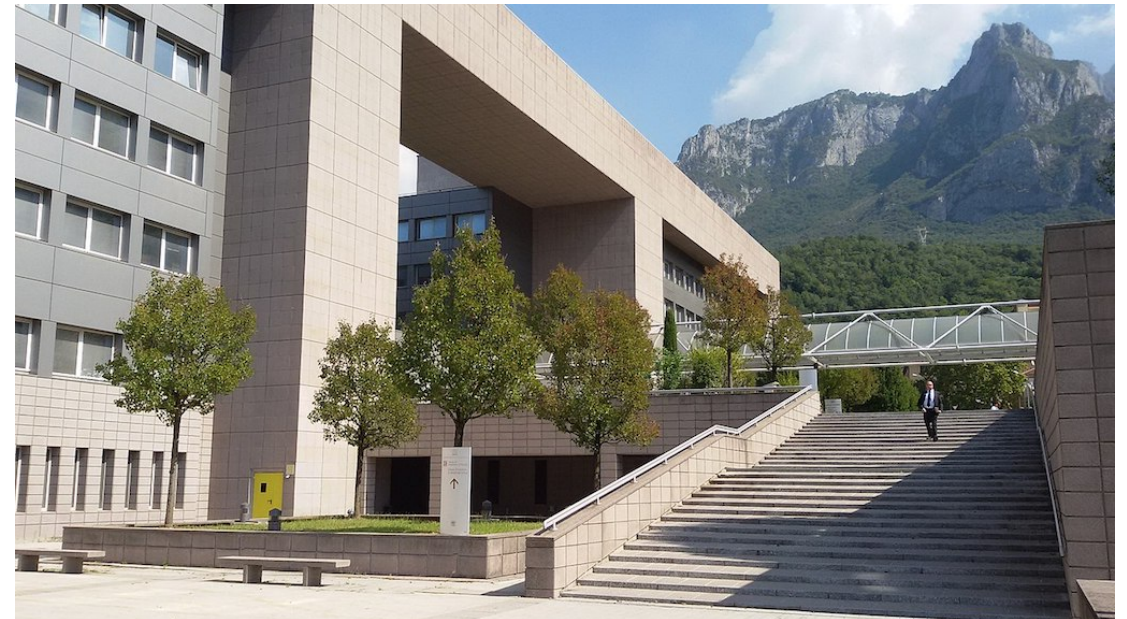
## Utilità della misura della variazione del volume plasmatico durante il trattamento emodialitico

19 Ottobre 2023

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*Seminars in Dialysis*

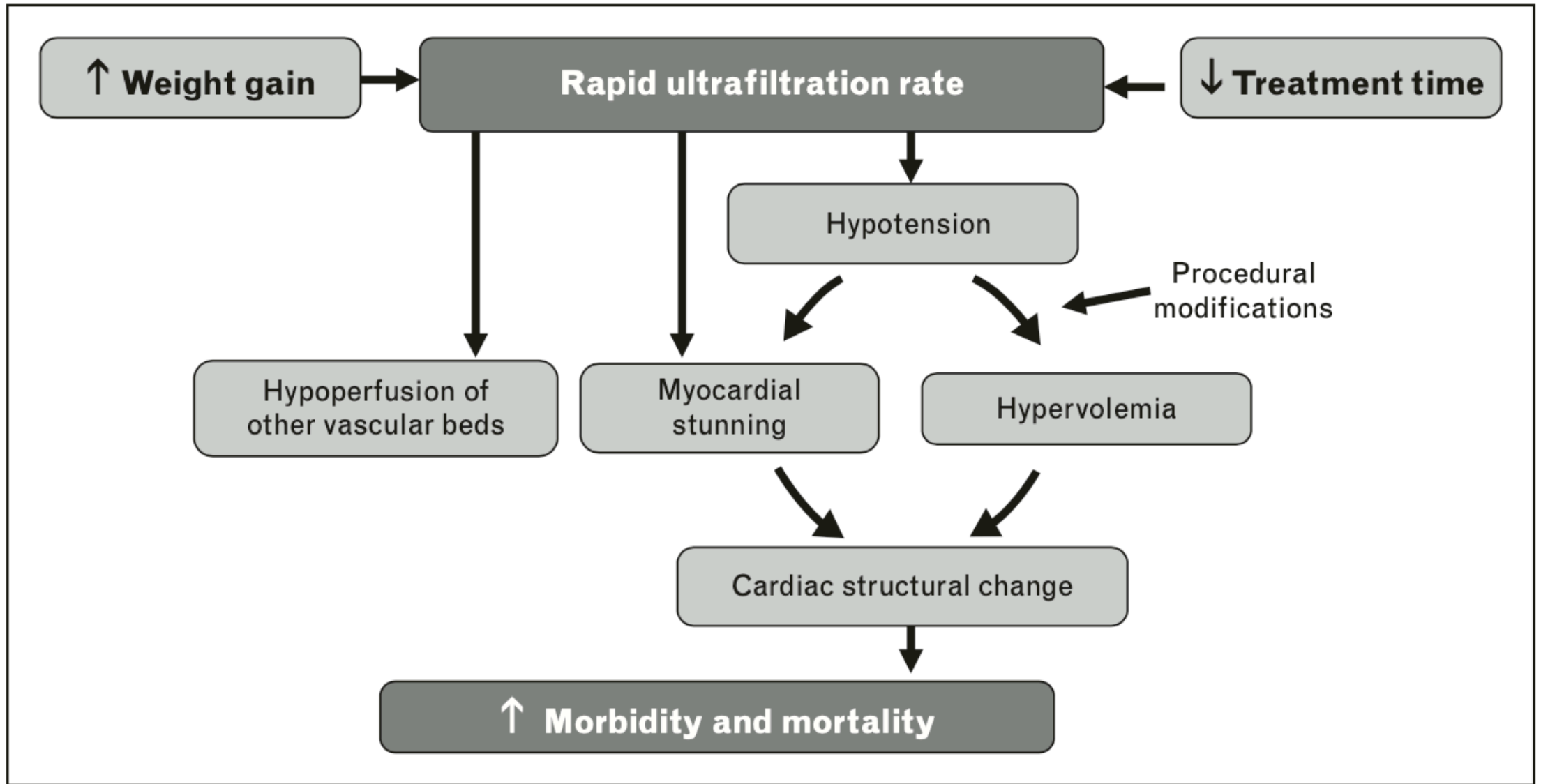
*Editorials*

Seminars in Dialysis

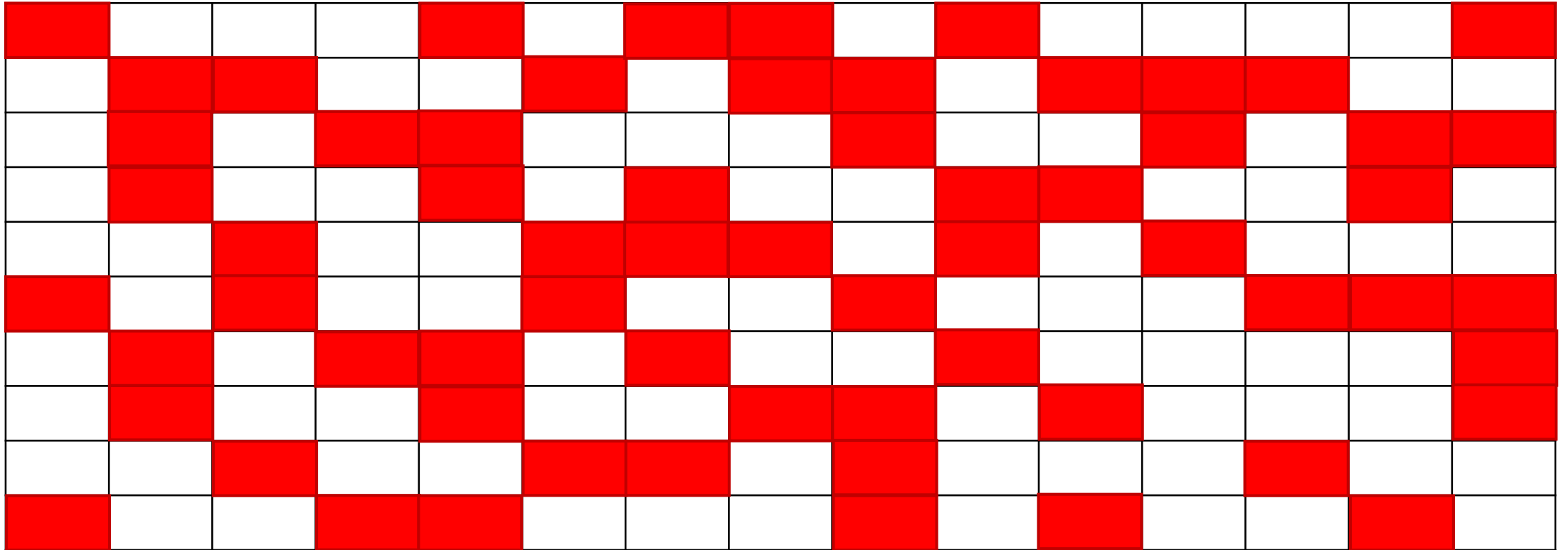
Editorials

## Euvolemia in Hemodialysis Patients: A Potentially Dangerous Goal?

Shih-Han S. Huang,\* † ‡ Guido Filler,\* ‡ Robert Lindsay,\* † and Chris W. McIntyre\* † §

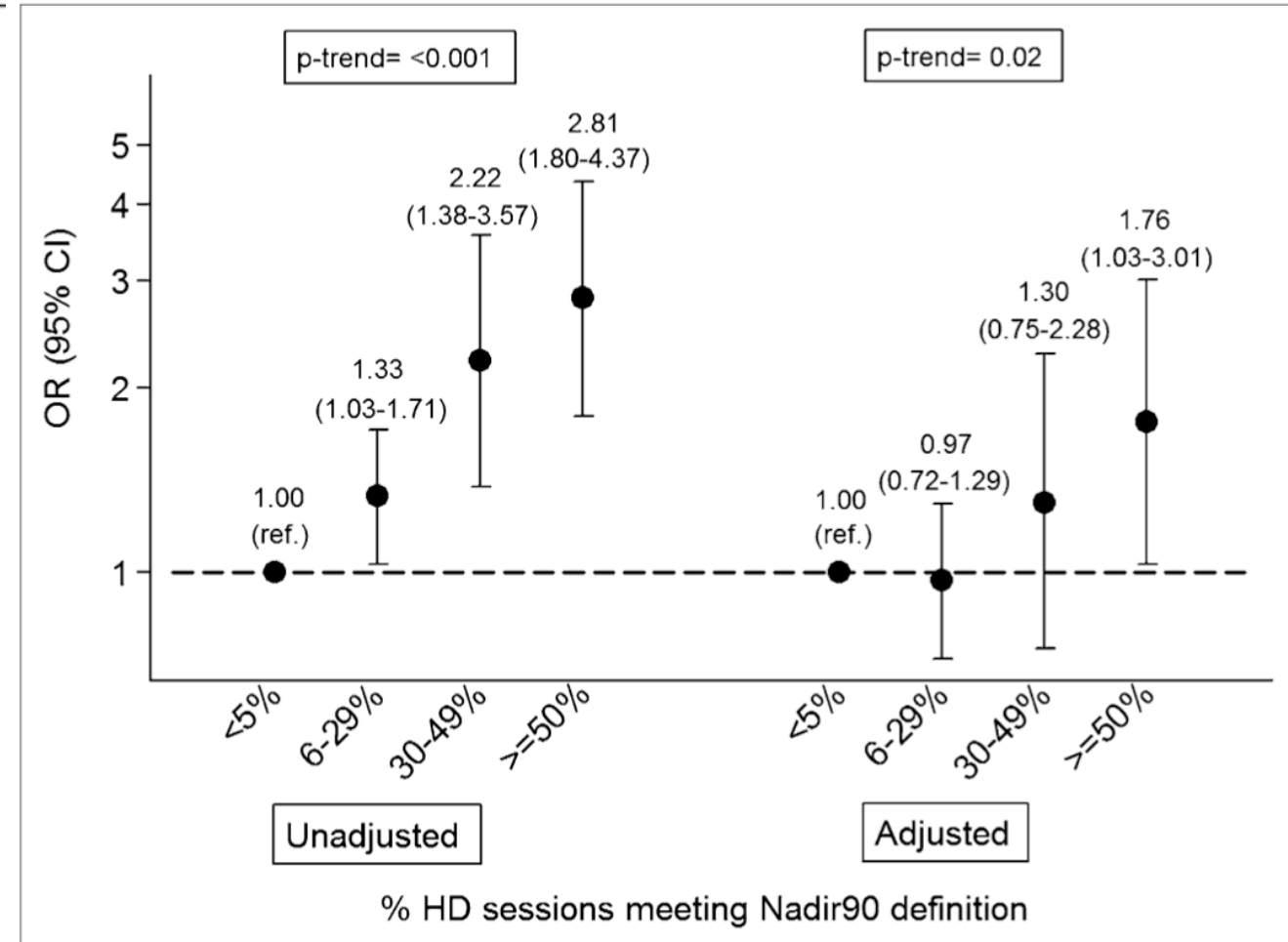
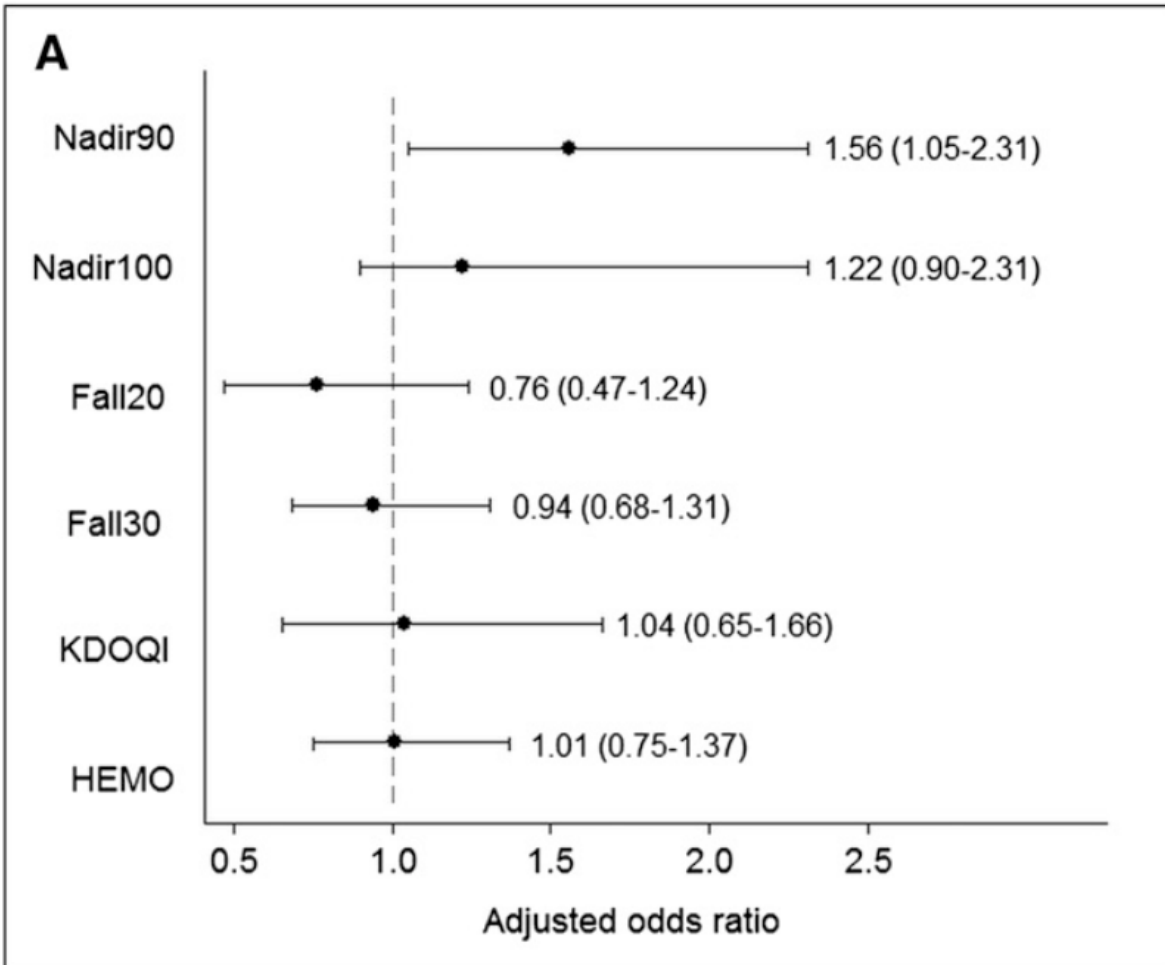


# Il danno ripetitivo in emodialisi

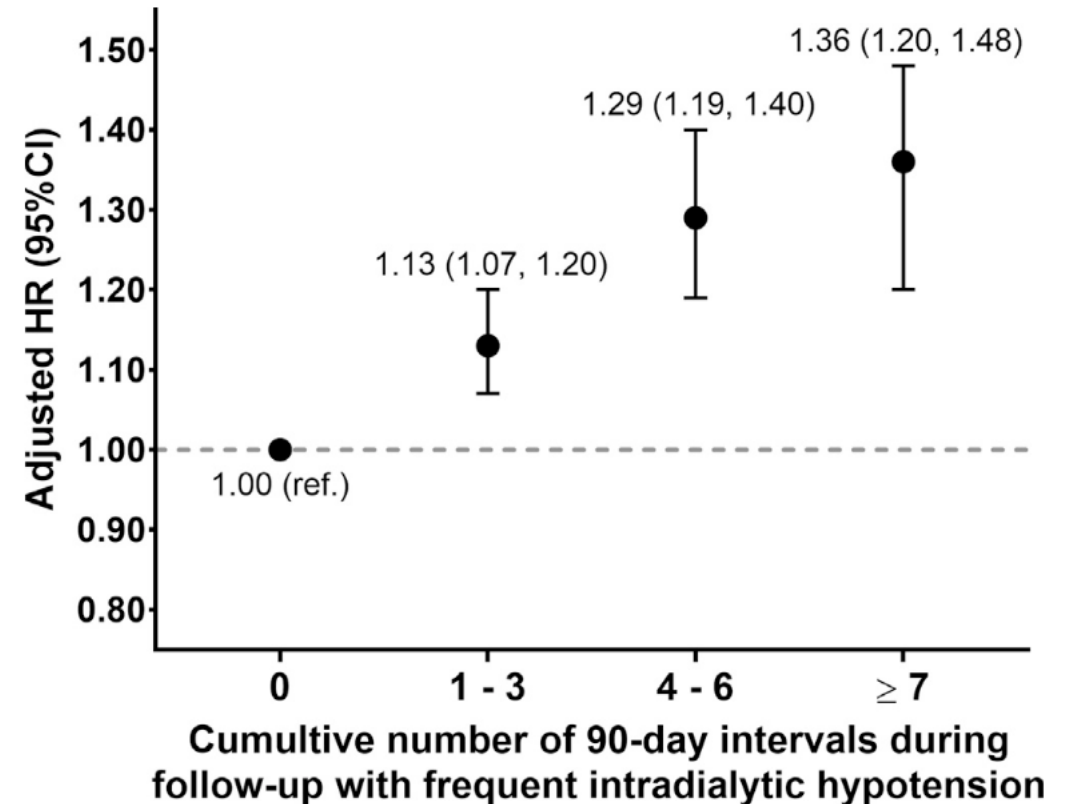


# Association of Mortality Risk with Various Definitions of Intradialytic Hypotension

Jennifer E. Flythe,<sup>\*†‡</sup> Hui Xue,<sup>§</sup> Katherine E. Lynch,<sup>\*†</sup> Gary C. Curhan,<sup>\*†||</sup> and Steven M. Brunelli<sup>\*||</sup>



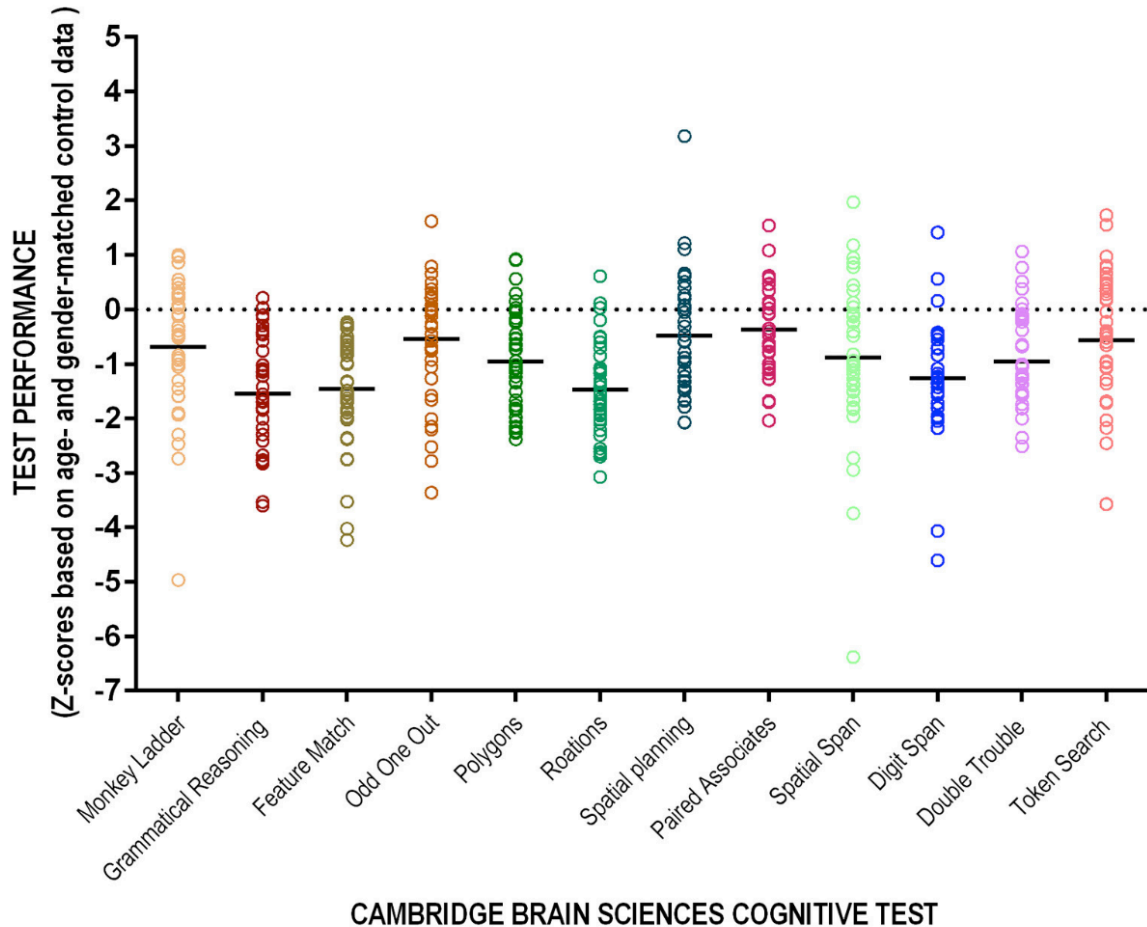
# Cumulative Exposure to Frequent Intradialytic Hypotension Associates With New-Onset Dementia Among Elderly Hemodialysis Patients



«Frequent» intradialytic hypotension: nadir PA sistolica intradialitica < 90 mmHg durante almeno 30% delle sedute emodialitiche in un periodo di 90 giorni

# Cognitive Impairment Early After Initiating Maintenance Hemodialysis: A Cross Sectional Study




Melissa Schorr<sup>1,2</sup>, Mariah Zalitch<sup>3</sup>, Cindy House<sup>3</sup>, Janice Gomes<sup>3,4</sup>, Conor J. Wild<sup>5</sup>, Fabio R. Salerno<sup>3,6</sup> and Christopher McIntyre<sup>1,3,6\*</sup>

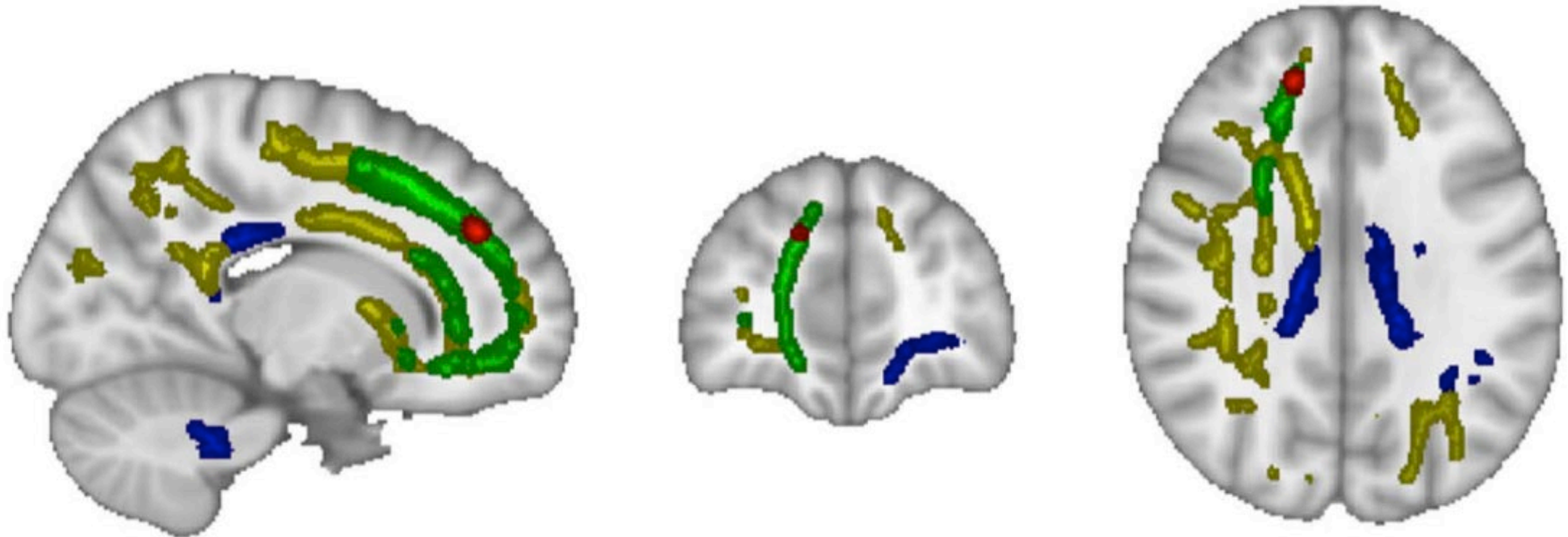


**TABLE 3** | Participants with scores consistent with cognitive impairment in each domain and total number of domains.

<i>N</i> (%) with scores consistent with cognitive impairment	
Reasoning skills	22 (45%)
Short-term memory	10 (20%)
Verbal processing	27 (55%)
Cognitive impairment across domains	
<i>N</i> (%)	None 9 (18%)
	One domain 23 (47%)
	Two domains 15 (31%)
	Three domains 2 (4%)

# Hemodialysis-Related Acute Brain Injury Demonstrated by Application of Intradialytic Magnetic Resonance Imaging and Spectroscopy

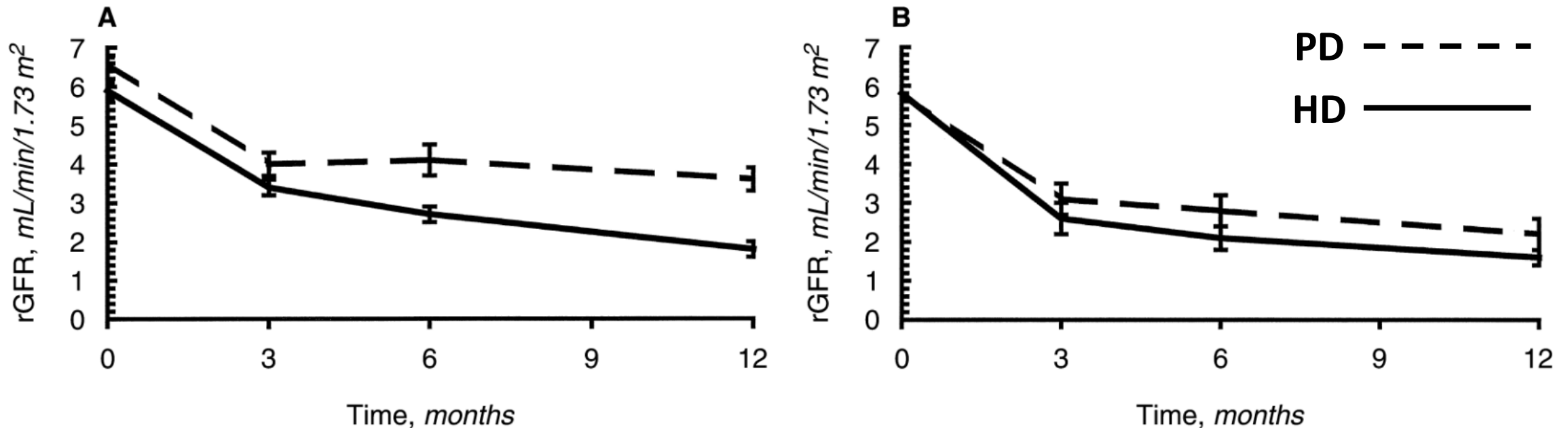
Udunna C. Anazodo,<sup>1,2</sup> Dickson Y. Wong ,<sup>3</sup> Jean Théberge,<sup>1,2,4</sup> Madeleine Dacey,<sup>2</sup>  
Janice Gomes,<sup>5,6</sup> Jarrin D. Penny,<sup>2,6</sup> Michael van Ginkel ,<sup>3</sup> Stefan E. Poirier,<sup>1,2</sup>  
and Christopher W. McIntyre <sup>1,2,3,6</sup>

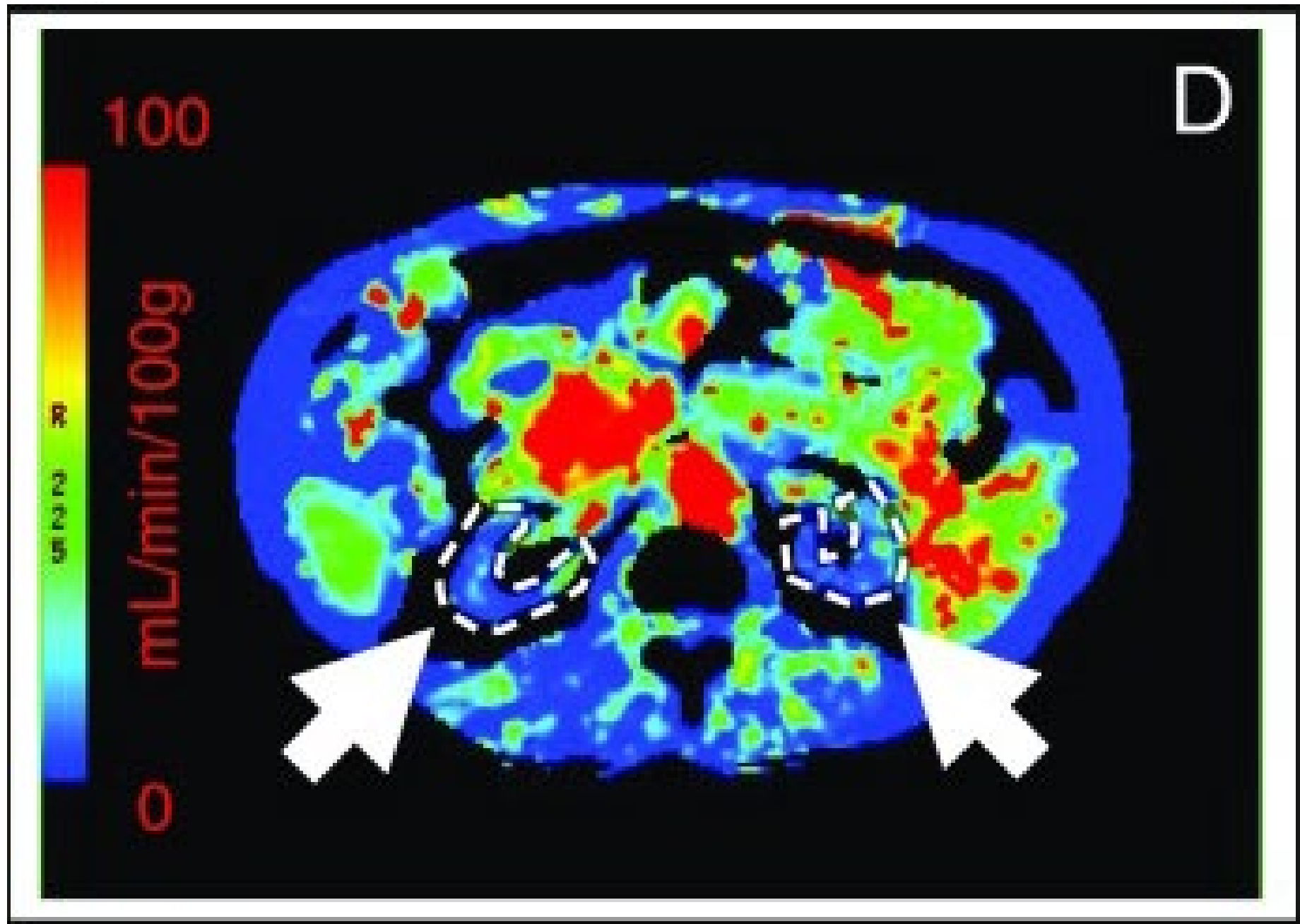




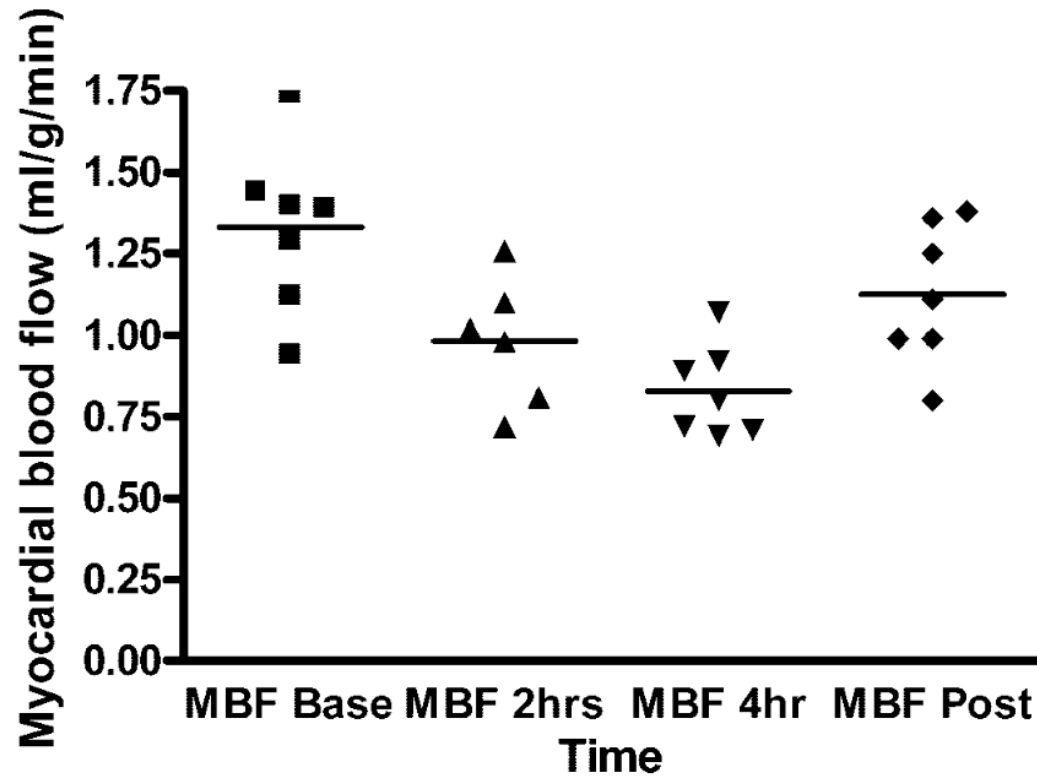
# Predictors of the rate of decline of residual renal function in incident dialysis patients

**MAARTEN A.M. JANSEN, AUGUSTINUS A.M. HART, JOHANNA C. KOREVAAR, FRIEDO W. DEKKER, ELISABETH W. BOESCHOTEN, and RAYMOND T. KREDIET, for the NECOSAD STUDY GROUP<sup>1</sup>**

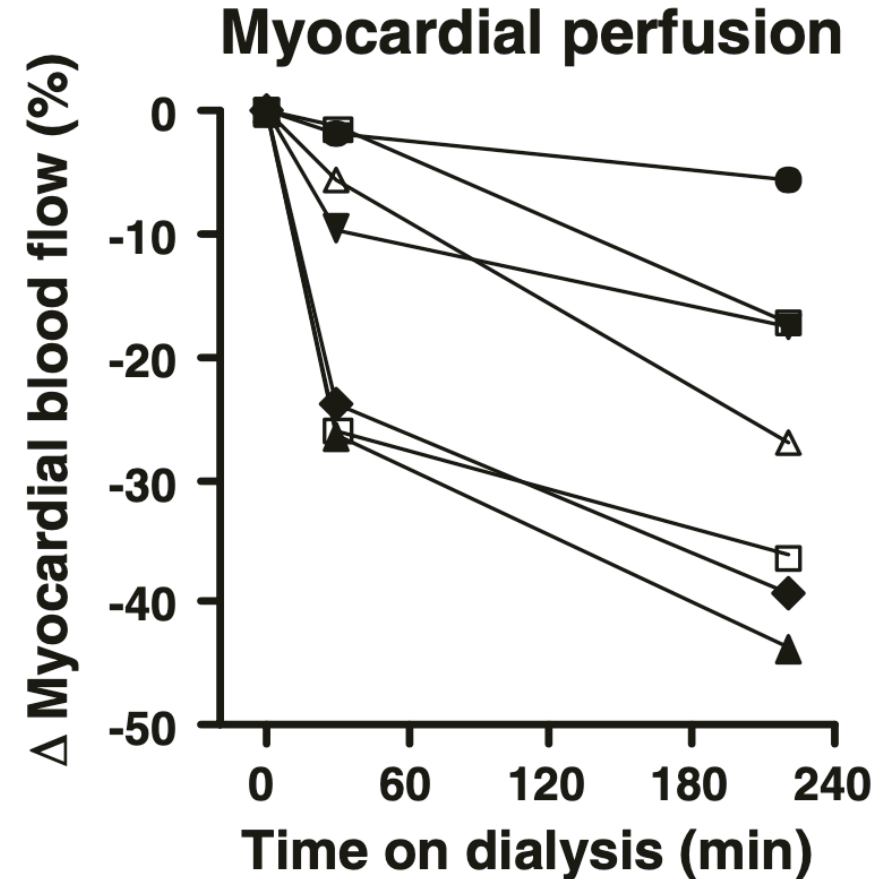




# Perfusione miocardica intradialitica

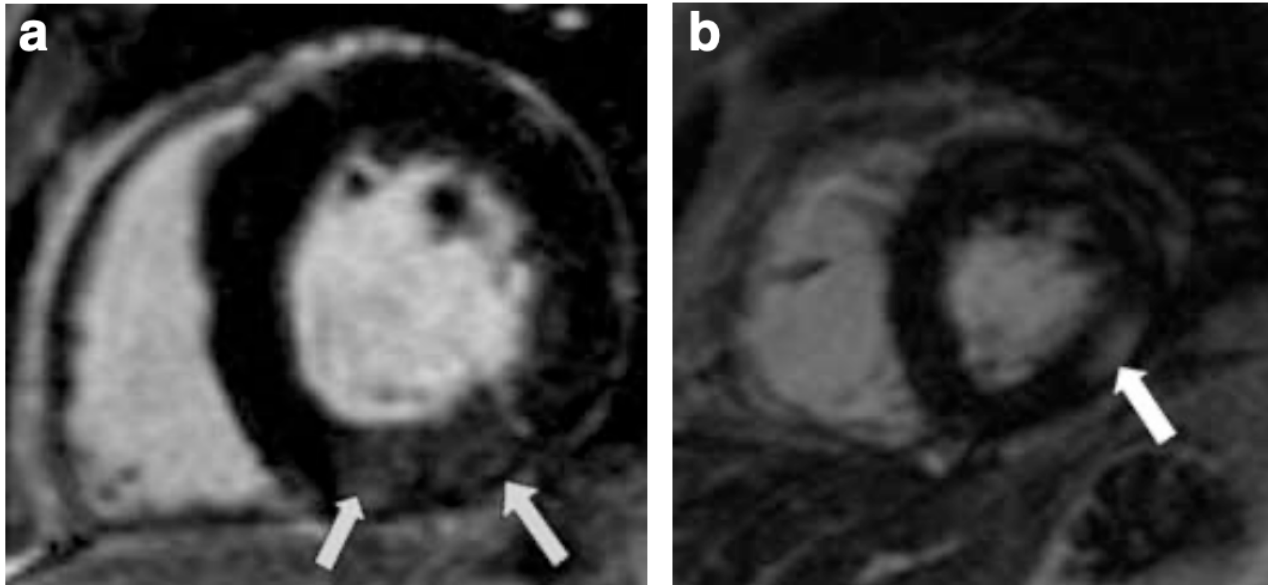


McIntyre CW et al, CJASN, 2008.

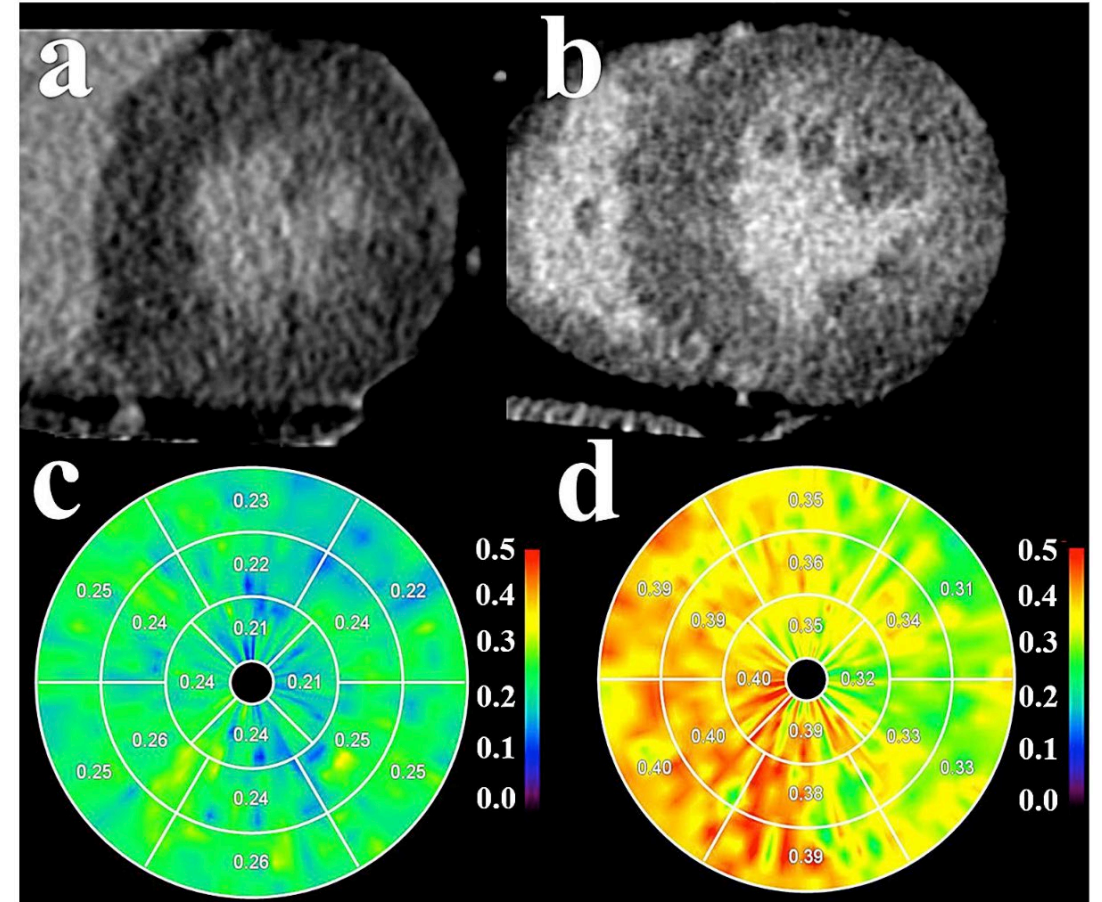


Dasselaar JJ et al, NDT, 2009.

# Fibrosi del miocardio



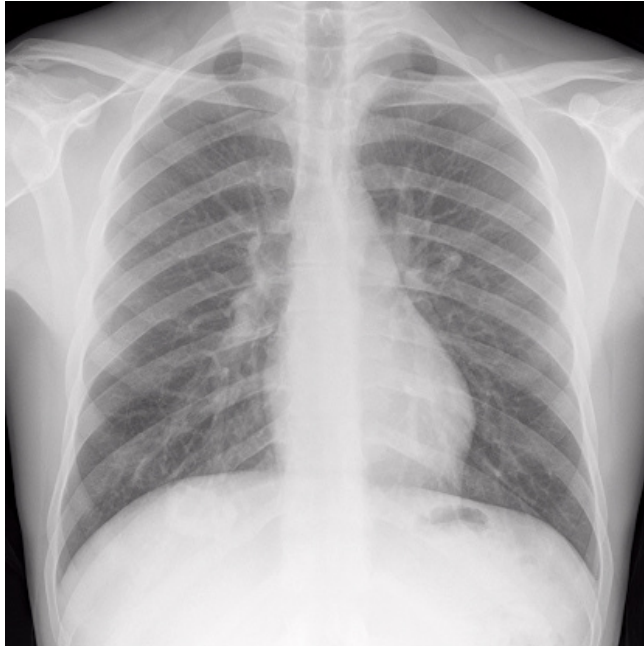
Mark PB et al, Kidn Int, 2006.

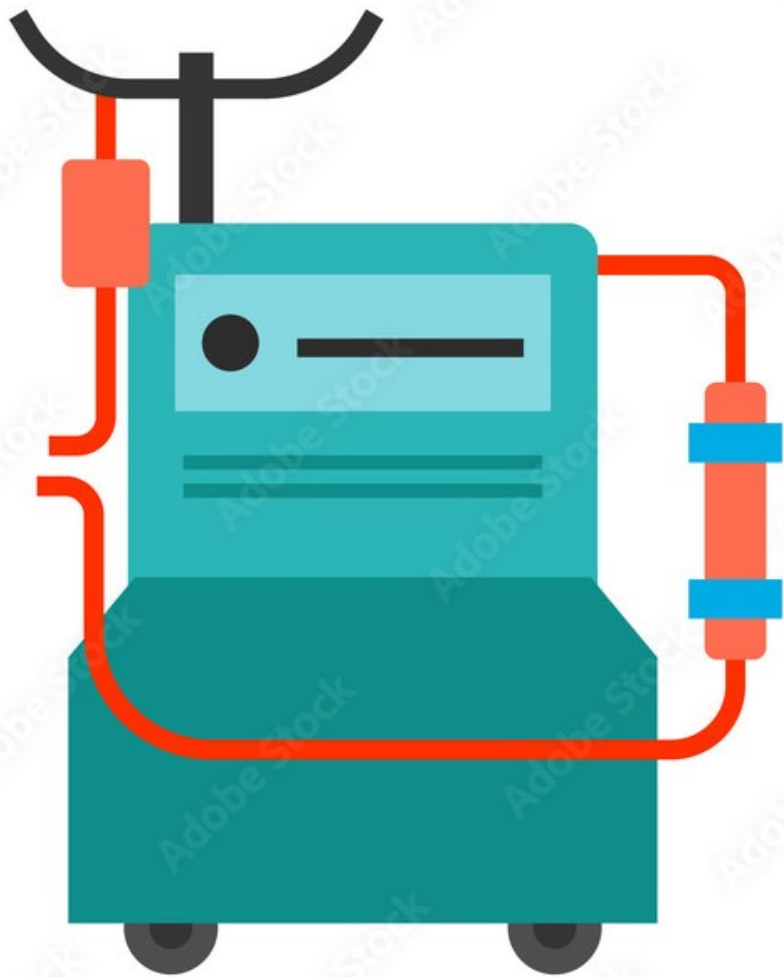


Yamada A et al, Sci Rep, 2020.

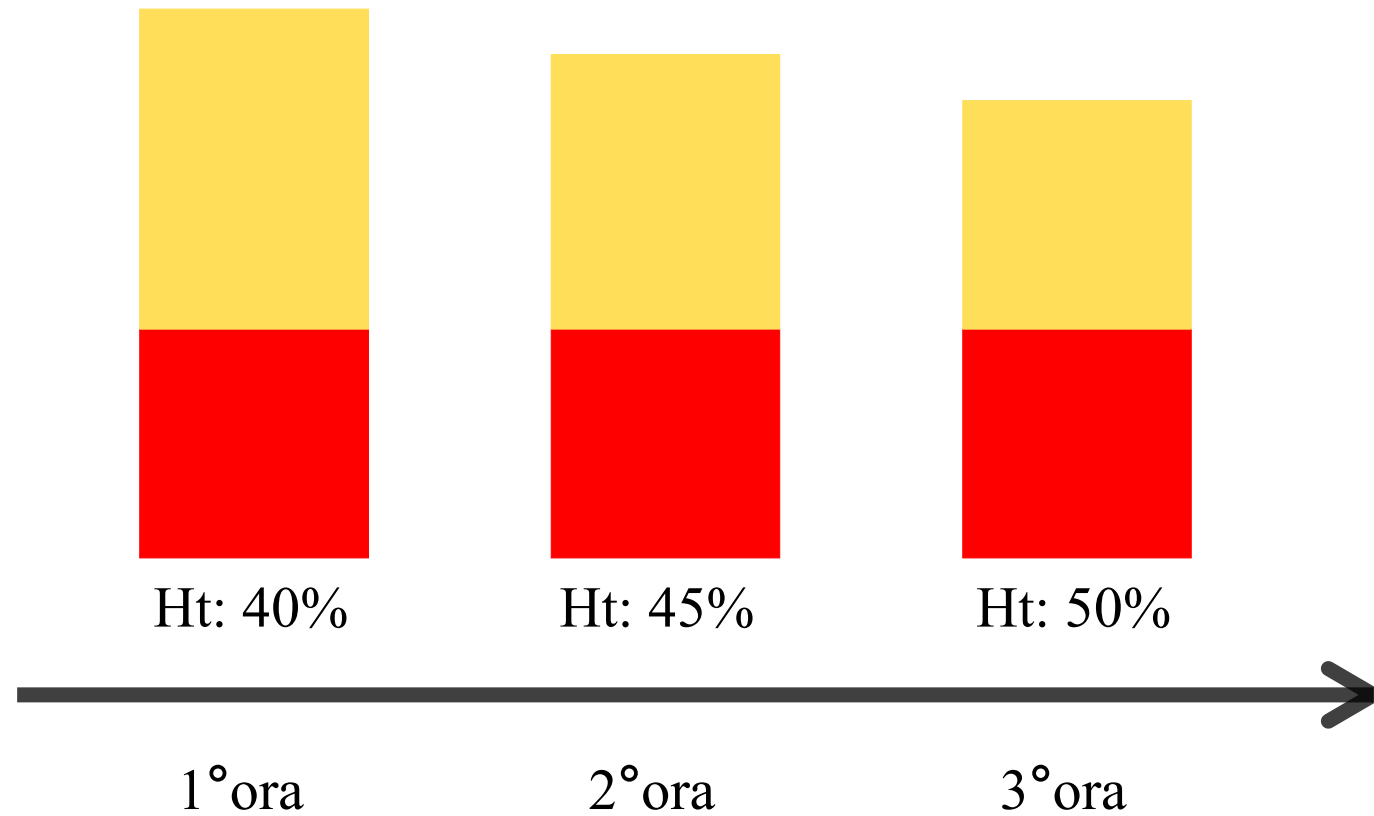


Che soluzioni abbiamo a nostra  
disposizione?

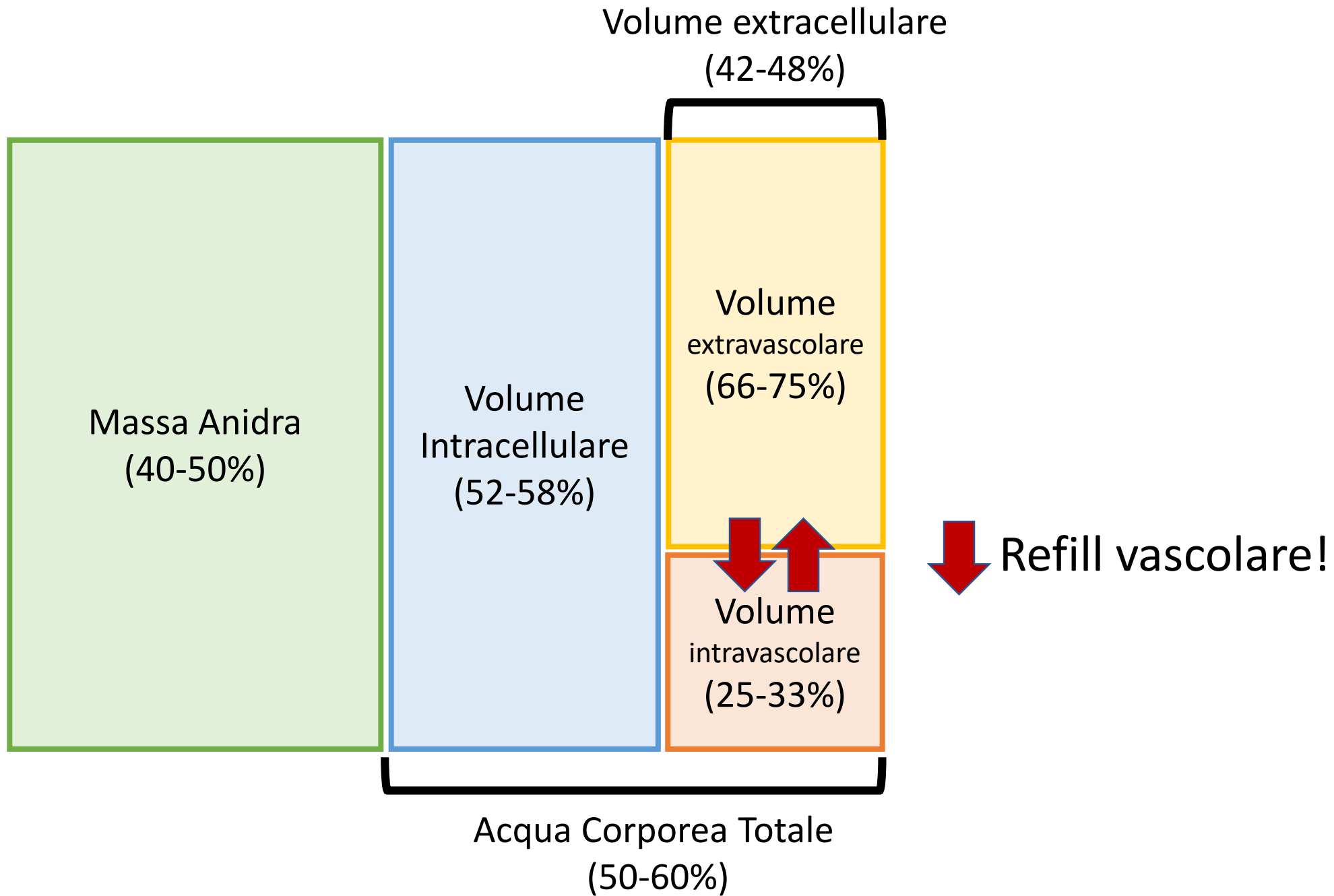




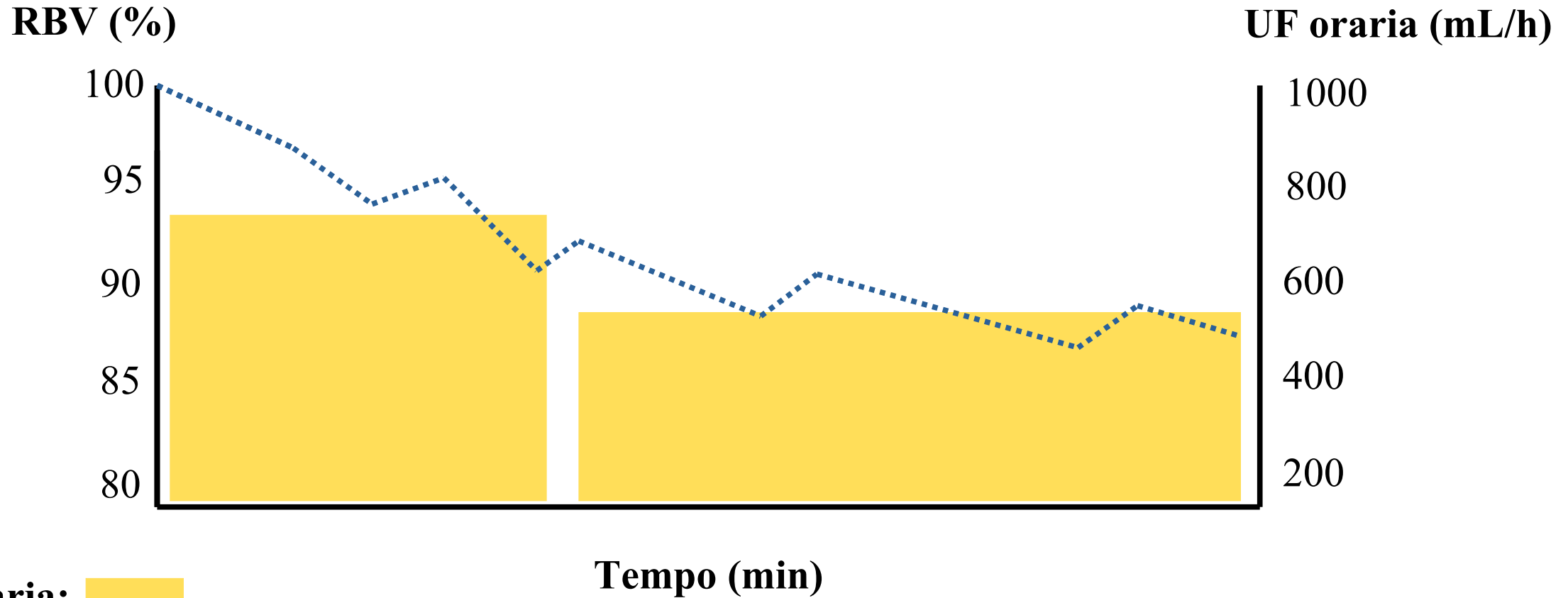
# Relative Blood Volume (RBV)







# Monitoraggio Relative Blood Volume (RBV)



UF oraria: 

RBV: 

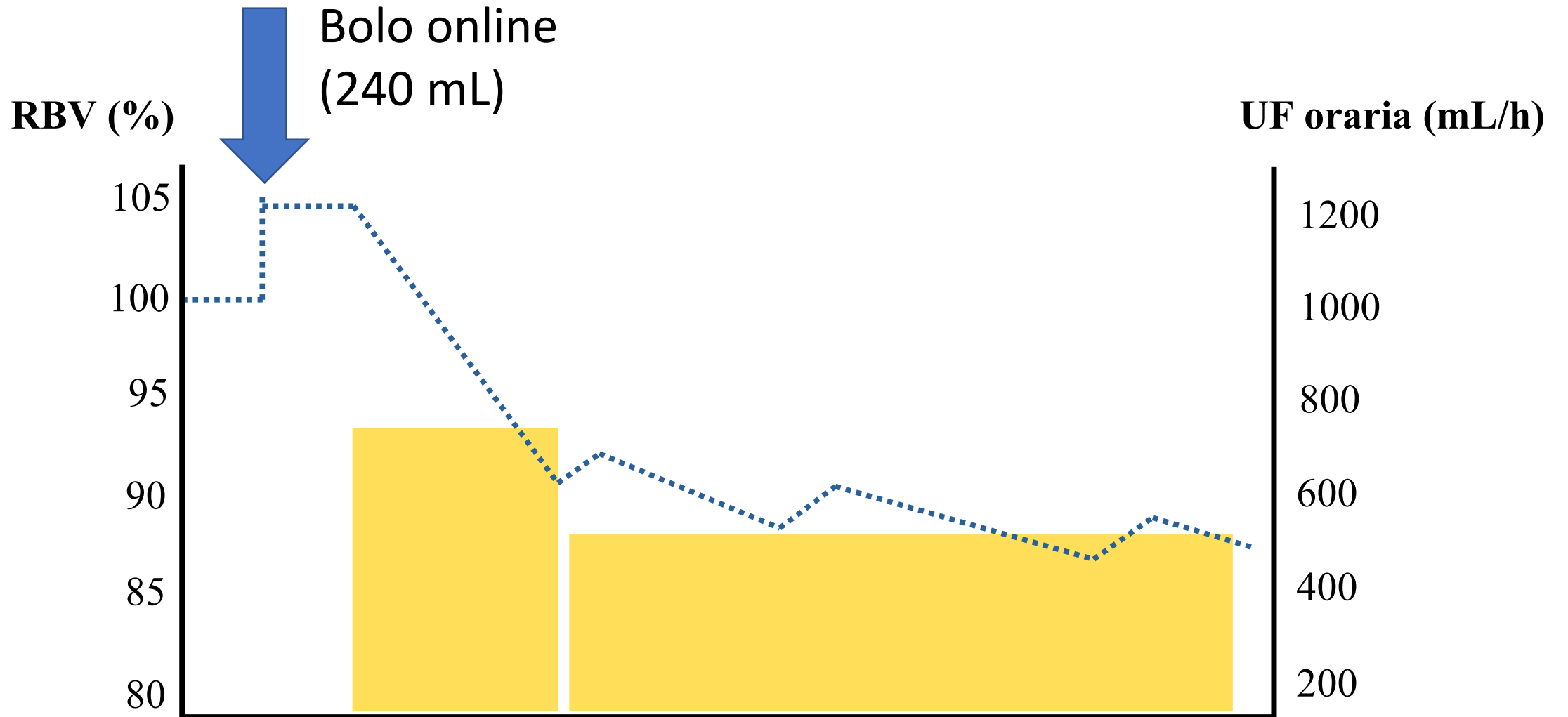
# Volume Intravascolare Assoluto

- È possibile generare una perturbazione predeterminata del volume intravascolare per calcolare il volume intravascolare assoluto?

## I potenziali scopi:

1. Prevenzione eventi avversi durante emodialisi
2. Guida nella prescrizione del peso secco
3. Studio dei fattori associate al refill vascolare

# Diluizione di un indicatore



# La risposta in una proporzione...

- RBV iniziale = 100%
- Bolo di dialisato online = 240 mL
- Variazione di RBV dopo il bolo = 5%
- ABV = Volume ematico assoluto

$$\mathbf{100 : ABV = 5 : 240}$$

- Volume ematico assoluto (ABV) = 4800 mL

# Volume intravascolare specifico ( $V_s$ )

- Il volume intravascolare assoluto viene indicizzato per il peso secco in mL/kg , per ottenere il volume intravascolare specific ( $V_s$ )
- Questo consentirebbe di paragonare soggetti di masse corporee differenti
- Altre modalità di indicizzazione (per es. BSA), non sono state studiate

**Table 2.** Intradialytic morbid events in 8 patients with specific blood volume ( $V_s$ ) below 65 ml/kg at treatment end

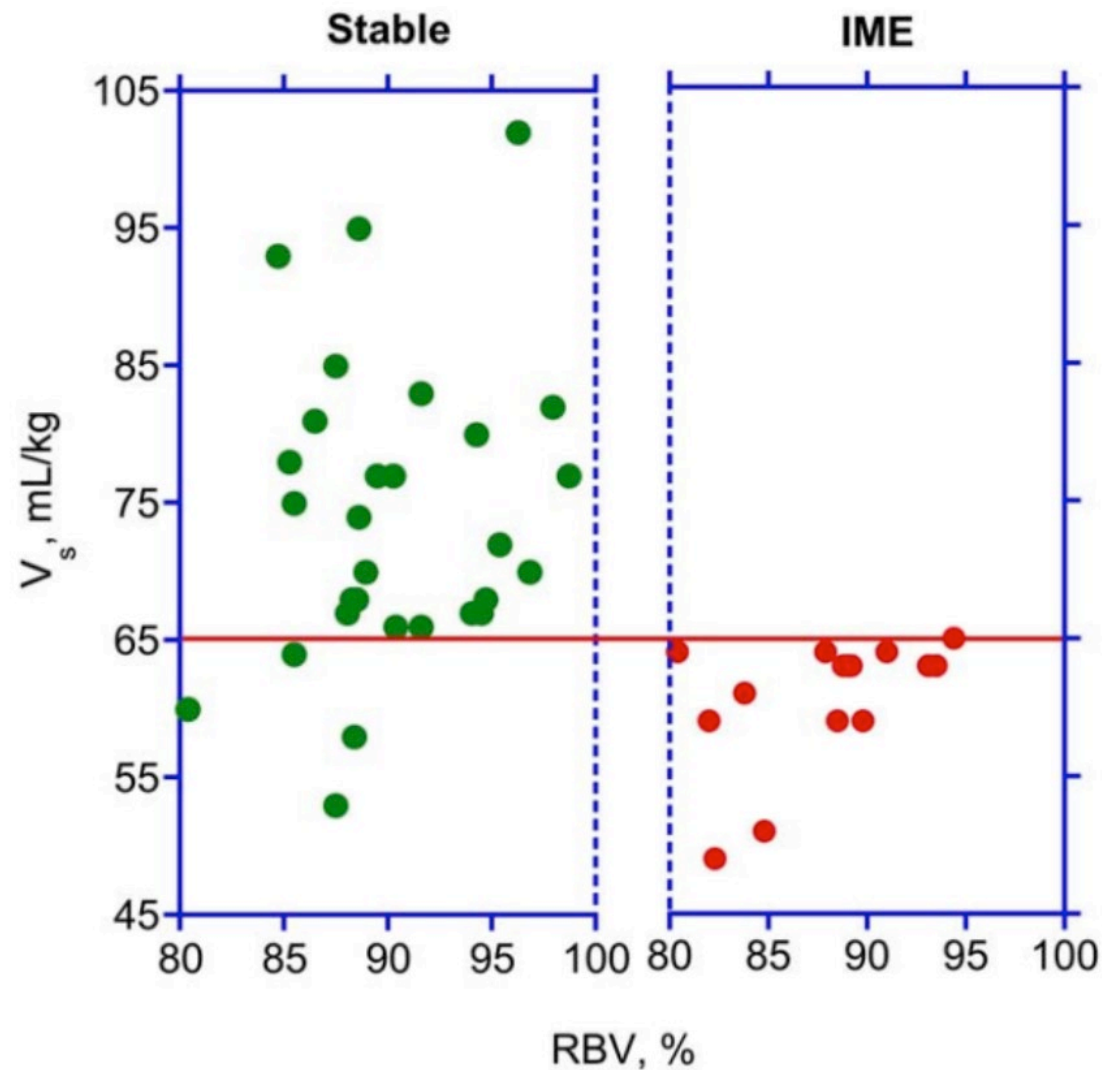
Patient	Symptoms	$V_s$ , ml/kg
1	None	64
2	Nausea	63
3	Mild cramps	63
4	None	60
5	Cramps, nausea	59
6	Mild cramps	59
7	None	53
8	Loss of voice	49

**Table 2** Specific blood volume at the onset of symptoms

Patient gender	Symptoms	$V_s$ at IME (mL/kg)	Additional therapy
1 f	Symptomatic hypotension, severe cramps	64	240 mL infusion
2 f	Symptomatic hypotension	63	UF stop
3 f	Symptomatic hypotension, severe cramps	61	Untimely termination of dialysis session
4 m	Loss of voice	56	
5 f	Cramps	59	UF stop
6 m	Cramps	63	
7 f	Symptomatic hypotension	63	UF stop
8 f	Cramps	64	120 mL infusion
9 f	Symptomatic hypotension	65	240 mL infusion
10 m	Severe cramps	64	120 mL infusion
11 m	None (symptomatic hypotension in every dialysis in the last 2 weeks)	58*	
12 f	None	78*	

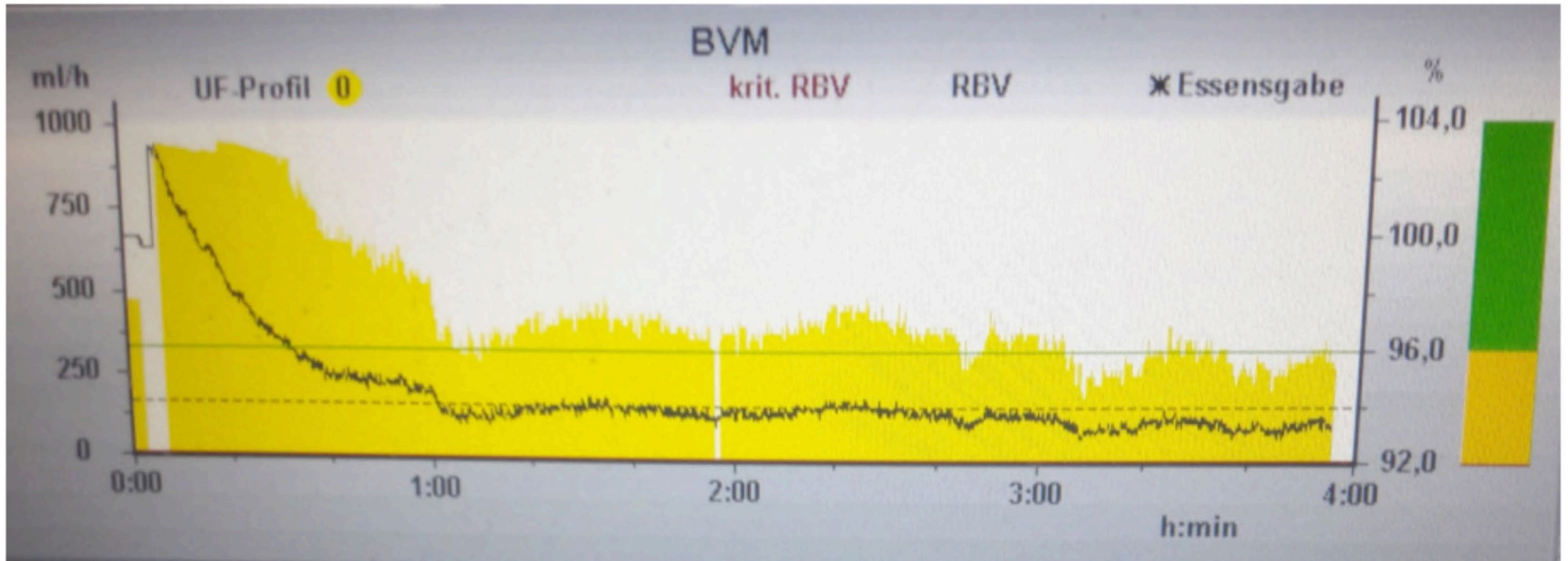
Infusion as online postdilution infusate bolus; \*values obtained at dialysis end; IME = intradialytic morbid event;  $V_s$  = specific blood volume.

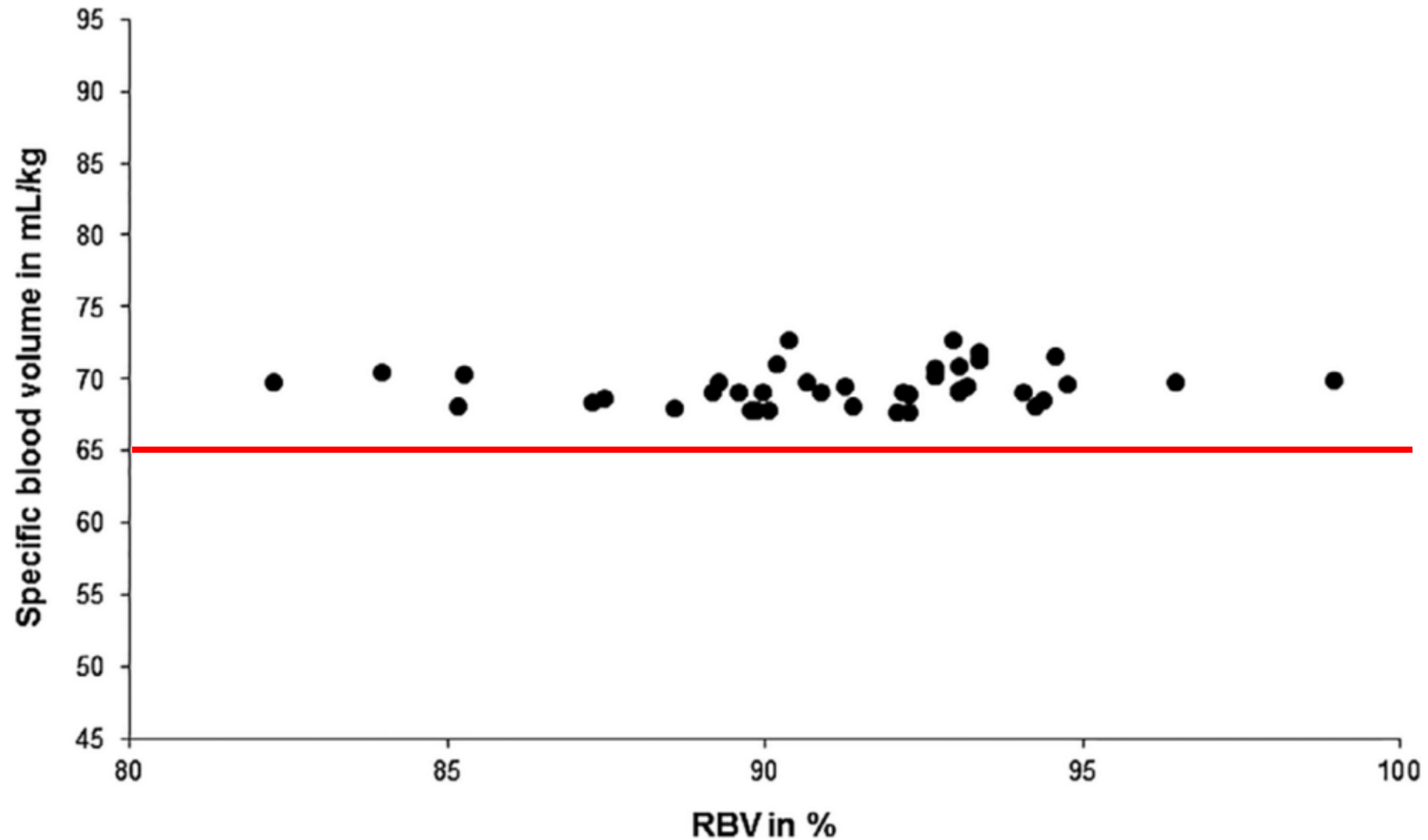




Distribuzione del volume intravascolare specifico ( $V_s$ ) e RBV in pazienti stabili e con eventi morbili intradialitici (IME)

# Volemia assoluta + RBV critico + UF Control

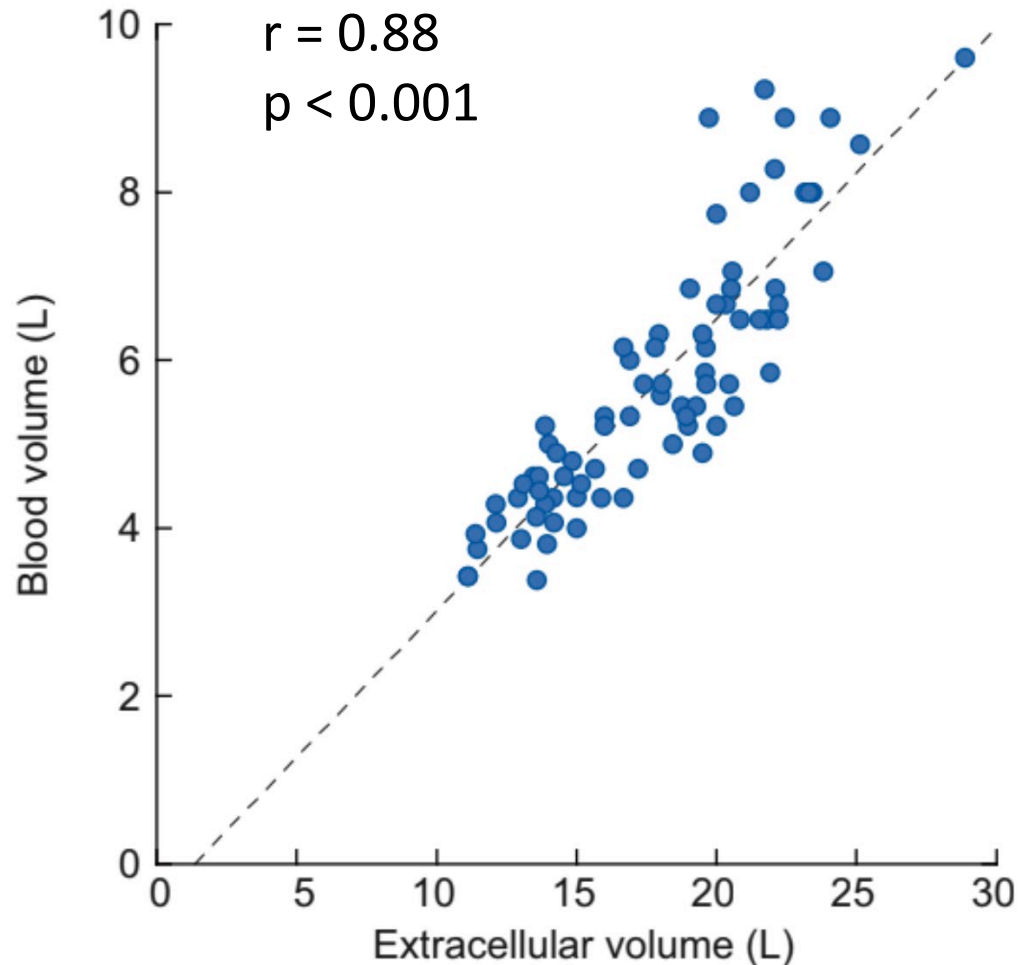




Volume intravascolare specifico ( $V_s$ ) a fine dialisi usando la funzione UF control

# The blood to extracellular volume relationship is stable and in the physiologic range in chronic haemodialysis patients

Susanne Kron<sup>1</sup>, Daniel Schneditz <sup>2</sup> and Joachim Kron <sup>3</sup>

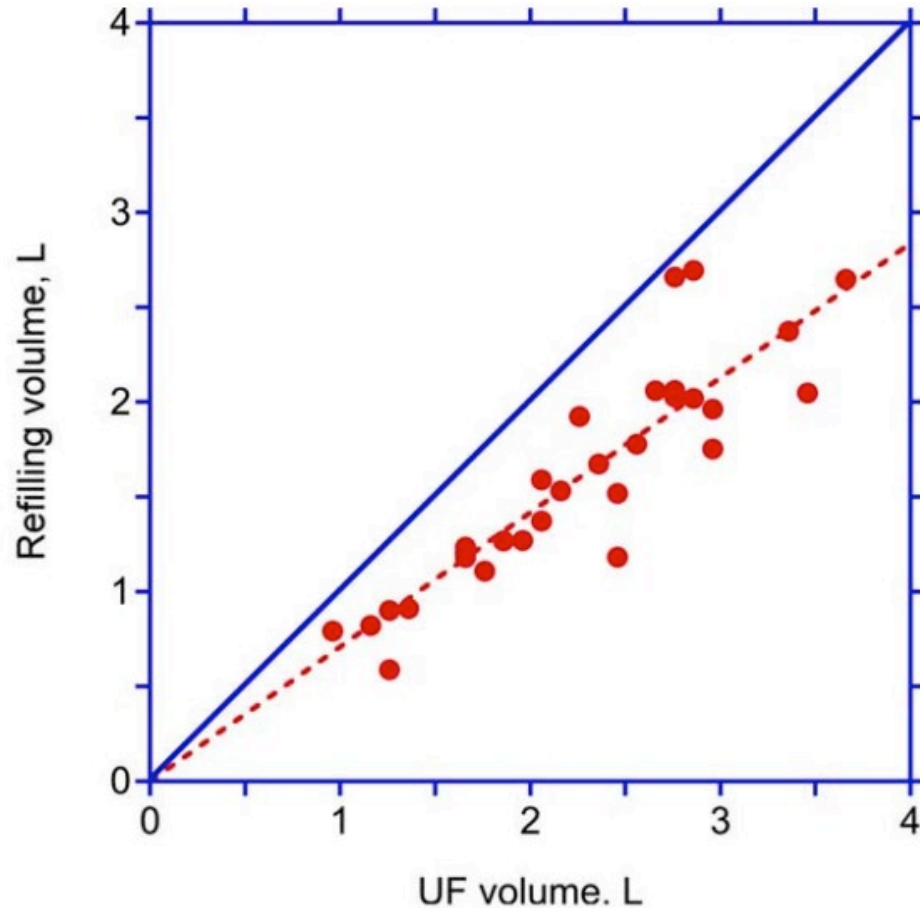


- 79 pazienti emodializzati portatori di FAV
- Modesta espansione del volume extracellulare
- Il rapporto tra volume plasmatico e volume extracellulare era 32.1% +/- 3.9%

# Calcolo del Refill Vascolare

- $V_{REF} = \text{Volume UF} + \text{ABV finale} - \text{ABV iniziale}$
- $F_{REF} = V_{REF} / \text{Volume UF}$

# Refill Vascolare (1)



- Il refill vascolare è fondamentalmente determinato da volume di UF: si attesta circa al 70-80% del volume di UF impostato
- Tende ad essere altamente conservato tra pazienti differenti
- Per ogni L di UF oraria impostata il volume intravascolare tende a ridursi di 200-300 mL

# Refill Vascolare (2)

- Il refill vascolare tende ad aumentare:
  - Utilizzando dialisato più freddo, nei pazienti prone a sviluppare eventi avversi intradialitici
- Il refill vascolare si riduce:
  - Nei pazienti che assumono beta bloccanti

# Conclusioni

- Il danno ripetitivo legato allo stress cardiovascolare intradialitico si ripercuote su tutti gli organi «nobili»: cuore, encefalo, reni...
- L'analisi del volume intravascolare assoluto è una tecnica emergente, semplice da mettere in atto, con molte potenziali applicazioni nella pratica emodialitica:
  - Prevenzione dell'ipotensione intradialitica
  - Prescrizione più accurata del peso secco
  - Studio del refill vascolare