You can sleep while I dialyze…

Nocturnal Peritoneal Dialysis

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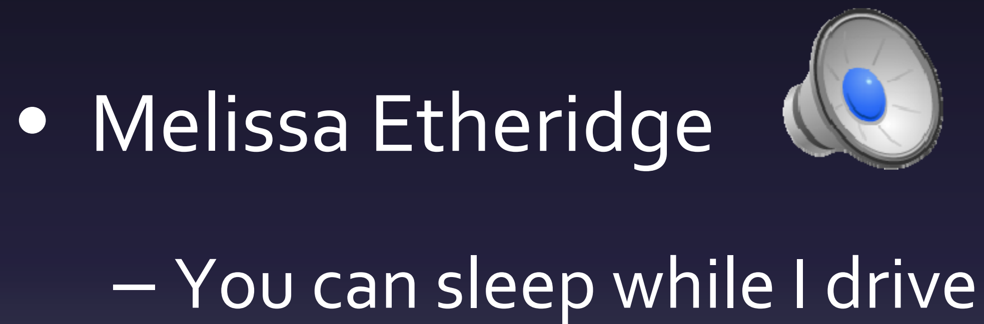
Acknowledgements

- Melissa Etheridge 
  - You can sleep while I drive

Objectives

- Q&A
  - How widely used is Nocturnal PD (aka cycler)
  - What are the advantages/disadvantages compared to ambulatory PD (CAPD)
  - Is cycler better than CAPD for:
    - Quality of life
    - Technique survival
    - Morbidity—hypertension, volume control, peritonitis
    - Mortality
  - Residual renal function

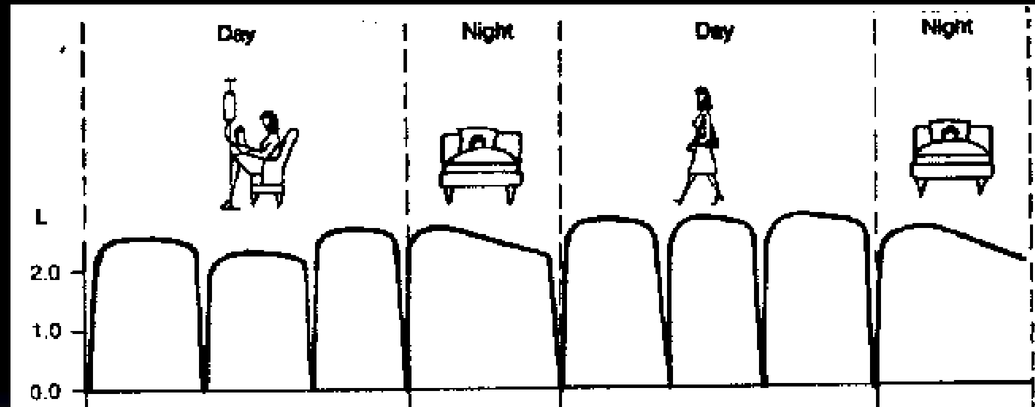
What is cycler PD?

- Automated Peritoneal dialysis
  - CCPD—dialysis 24 hours
  - NIPD—"dry day"
  - Tidal PD—constant dialysate presence

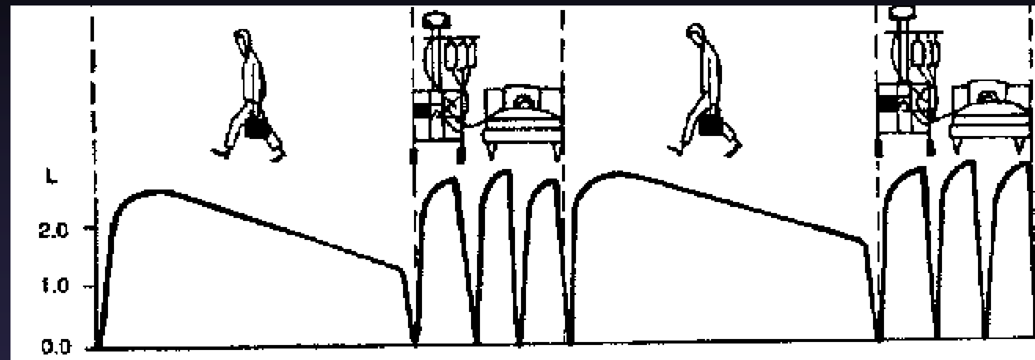
Physiological differences

- CAPD
  - Evenly spaced, long dwells
  - Great small mw removal
  - Ultrafiltration dependent on trp status
  - Better large molecule removal
- APD
  - Focused over 8 hours
    - Short dwells
    - One long dwell
    - Great small mW removal except low trp
    - Great UF
    - ?larger molecule
      - phosphate

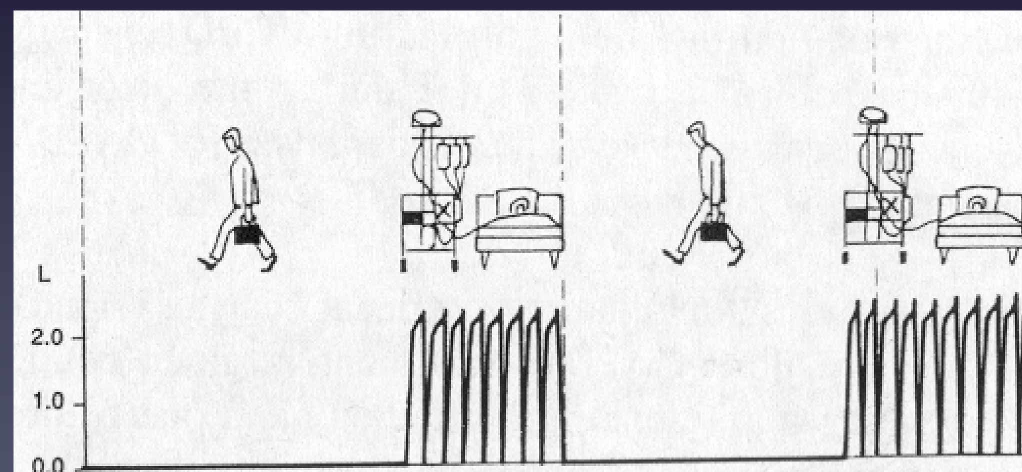
CAPD



CCPD



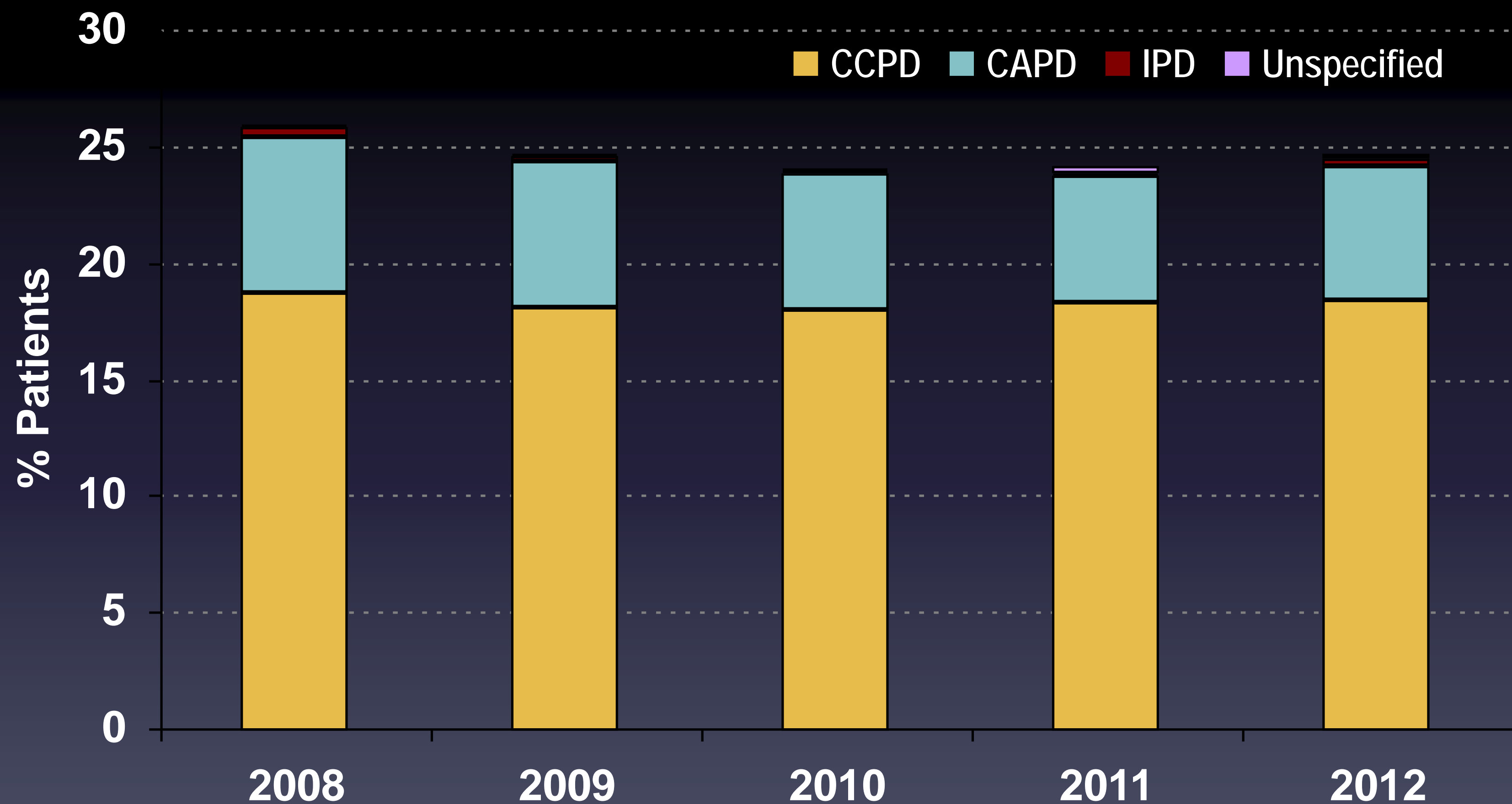
NPD



DISCONNECT YOURSELF
GO
STOP
ENTER

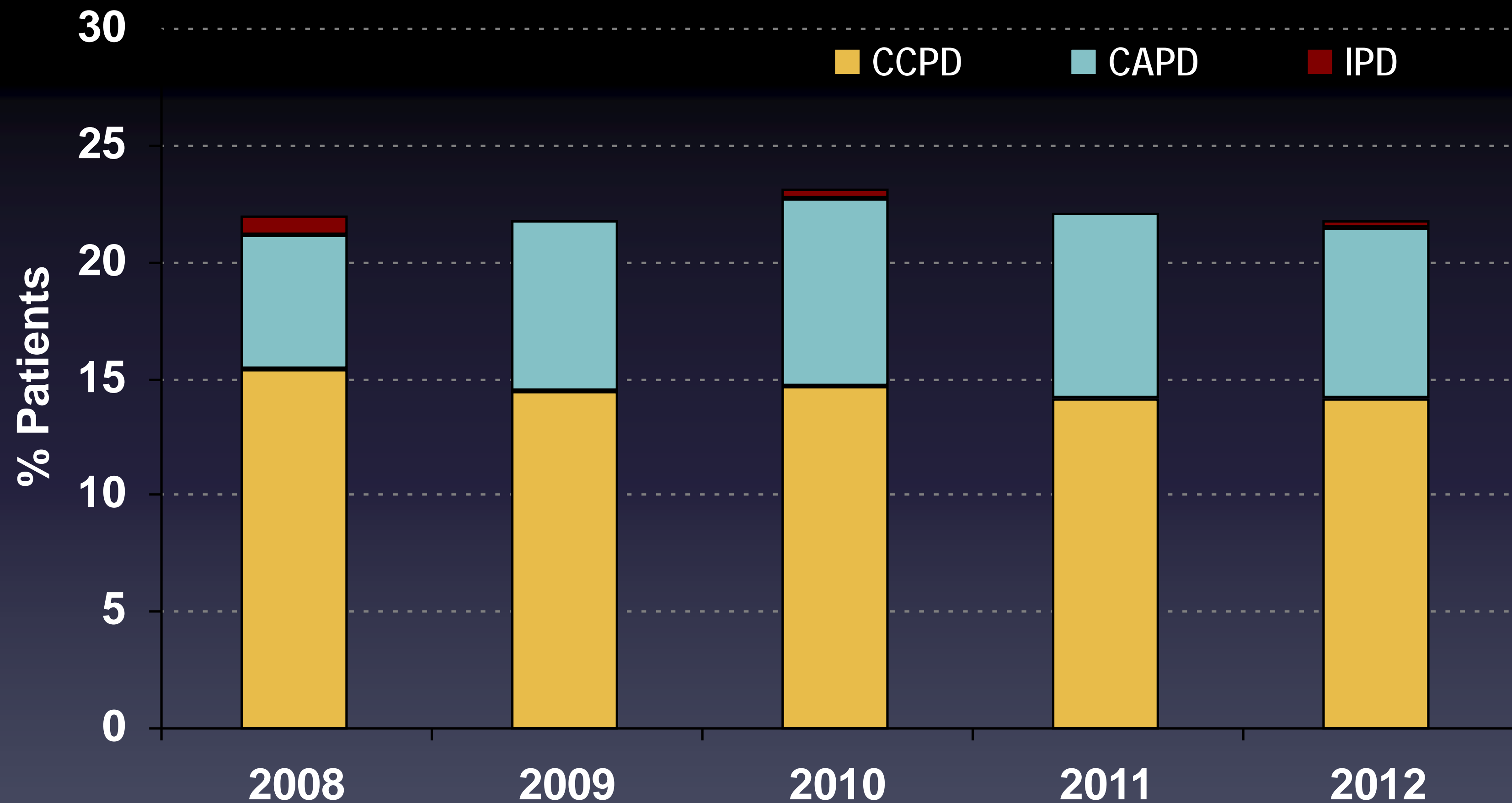
Who is doing it?

Prevalent Rate for PD (BC Overall)



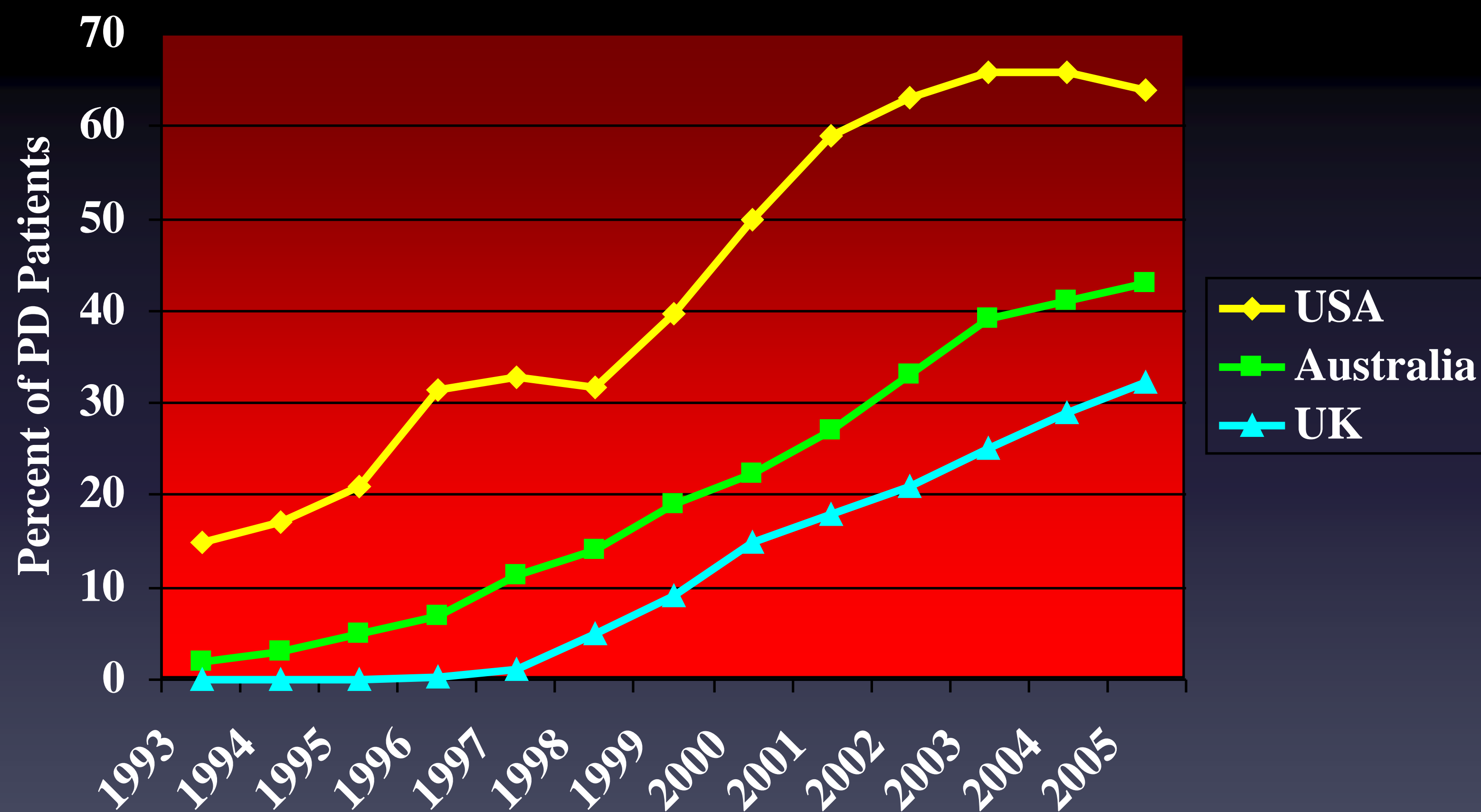
Prevalent rates were based on dialysis patients active on July 1 of the year

Prevalent Rate for PD (VGH)

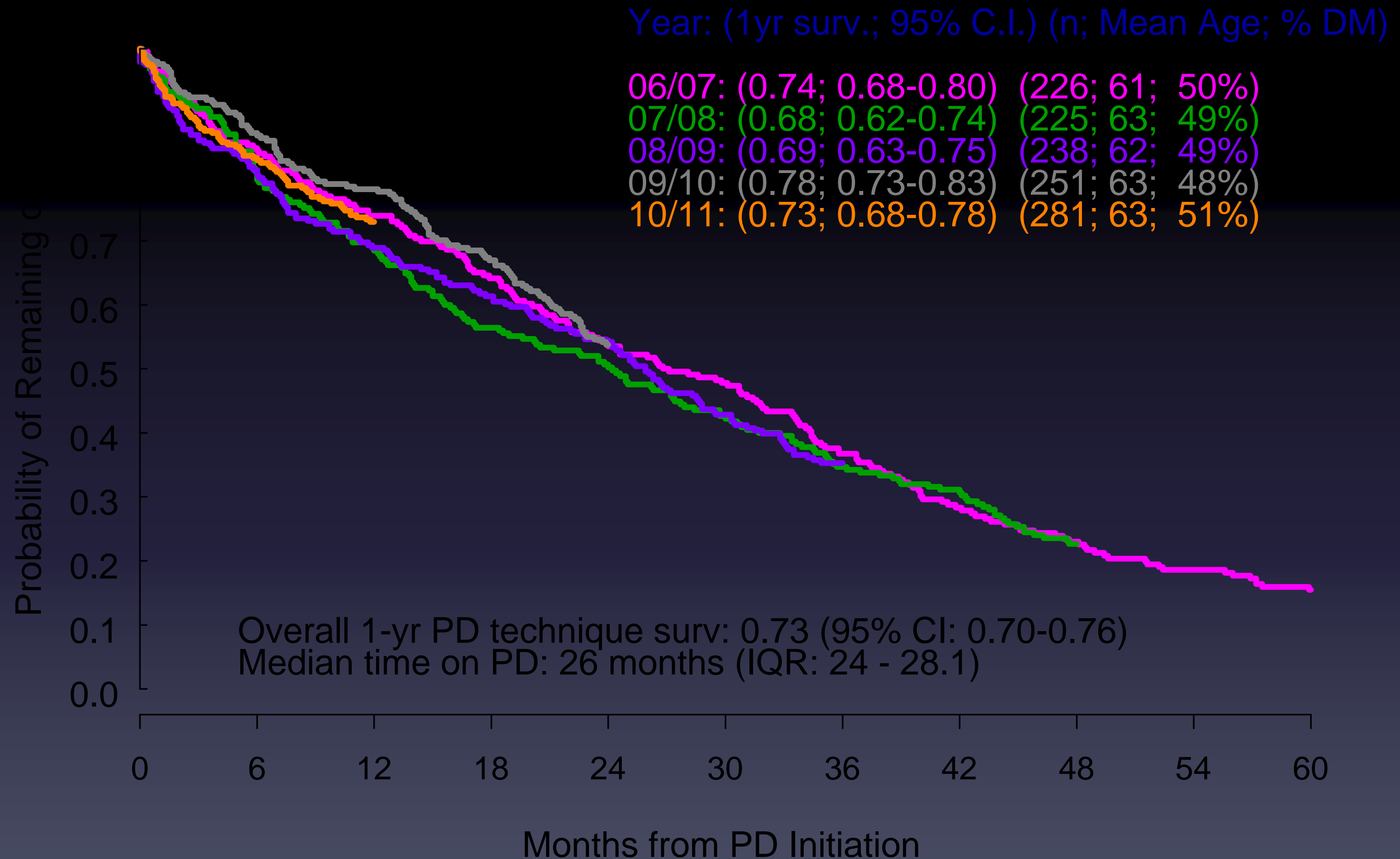


Prevalent rates were based on dialysis patients active on July 1 of the year

APD Use: USA vs Aust vs UK



PD Technique Survival (BC Overall)



Test for adjusted HR* for Year of PD Initiation: Chi-sq=1.1085, p=0.8929

*Adjusted for age, gender, diabetes, PD as initial or transferred modality, HA at PD initiation

Why the fuss?

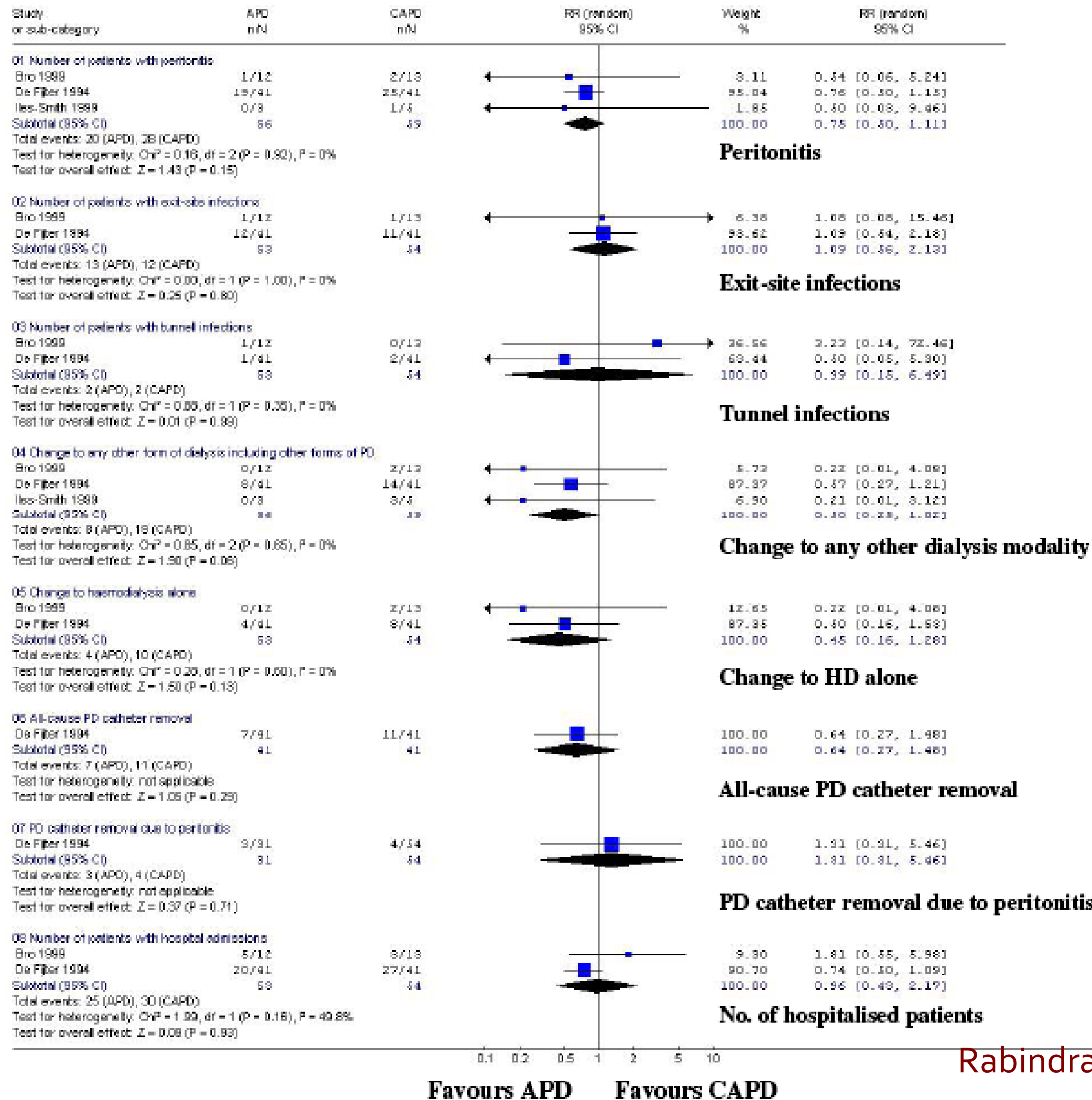
Indications for APD

- Medical
  - Enhance small solute clearance
  - Enhance ultrafiltration
  - Reduce intraperitoneal pressure
  - Drain problems--tidal
- Social
  - Maximize use of waking hours
  - Privacy
  - Assisted PD

Proposed theoretical advantages of APD

- Increase technique survival
- Decreased peritonitis rates
- Decreased glucose exposure

N=139



Rabindranath NDT 2007

Cochrane Review 2008

- Peritoneal dialysis (PD) can be performed either manually as in continuous ambulatory peritoneal dialysis (CAPD) or using mechanical devices as in automated PD (APD). The aim of this review was to compare the effectiveness of CAPD and APD. Only three small randomised controlled trials (RCTs) (139 patients) were identified after an extensive literature search, and we found no difference between CAPD and APD for clinically important outcomes. APD may however be considered advantageous in select group of patients such as in the younger PD population and those in employment or education due to its psychosocial advantages. These outcomes were only reported in one trial. Large, long-term RCTs are needed in this area.

Things that matter

How much of my life does it take away?

QOL: APD vs CAPD

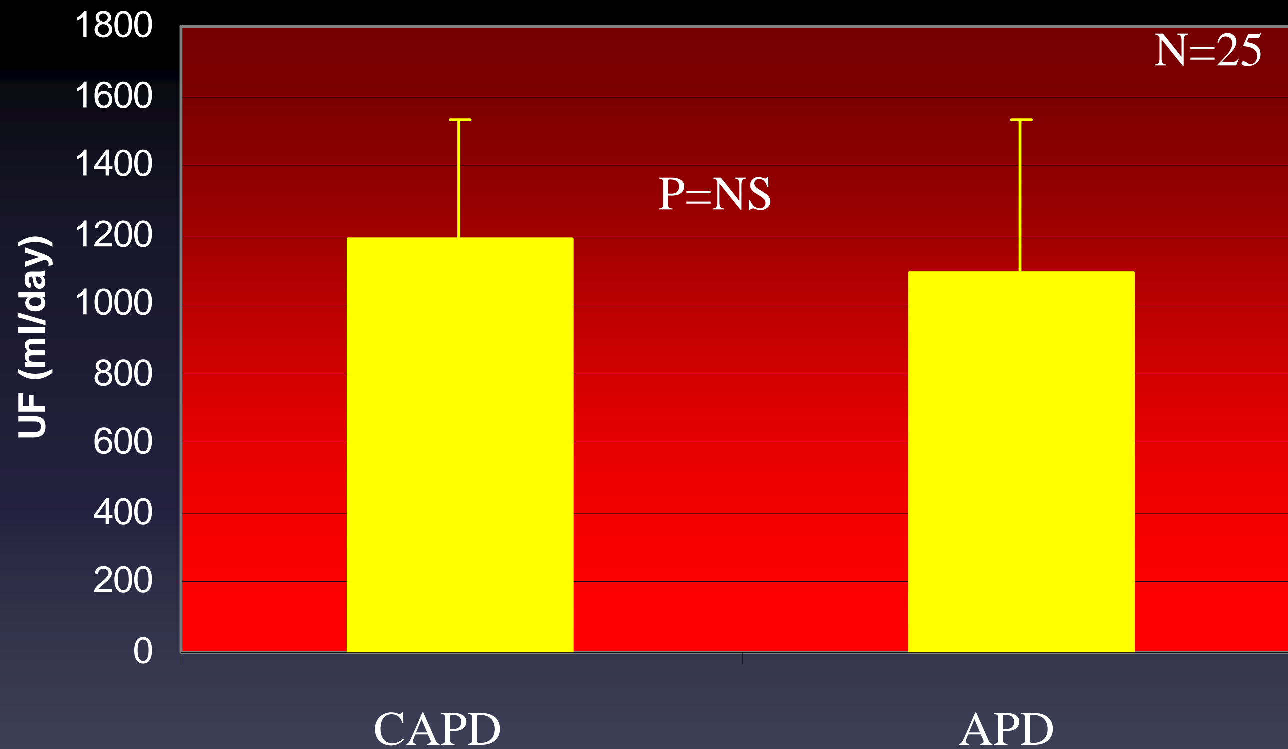
Parameter	*Scale Scores*		*P Value*
	APD (n=12)	CAPD (n=13)	
Social Time	3.2±1.2	1.2±0.5	0.0005
Physical discomfort	1.9±1.0	2.2±1.3	NS
Emotional discomfort	1.8±1.0	2.2±1.4	NS
Anorexia	2.8±1.3	2.9±0.6	NS
Sleep Problems	2.3±0.9	1.8±1.3	NS

Bro et al Perit Dial Int 19:526-33,1999

	HD	CAPD	APD
Daytime dedicated to Tx/wk	12 hrs 3 X 4hrs	21 hrs 28 X 45min	3½ hrs
% waking hours dedicated to Tx	14%	19%	3%
Transportation time per week	3 X **60min**+	0	0
Unexpected delays	+ + +	0	0
Estimated waiting-room time	3 X 20 min	0	0
Quality of time post Tx	Washed out feeling	OK	OK
Elimination of toxins	Intermittent	Continuous	Continuous/ intermittent
Estimated total time dedicated to Tx	16 hrs ++	21 hrs or less	3½hrs

Can I drink more?

Ultrafiltration: APD vs CAPD



Bro et al Perit Dial Int 19:526-33,1999

Can I eat more?

- Peritoneal Dialysis International, Vol. 22, pp. 705–713
- **SODIUM REMOVAL IN PATIENTS UNDERGOING CAPD AND AUTOMATED PERITONEAL DIALYSIS**
  - **Rodrigues and Fontan**

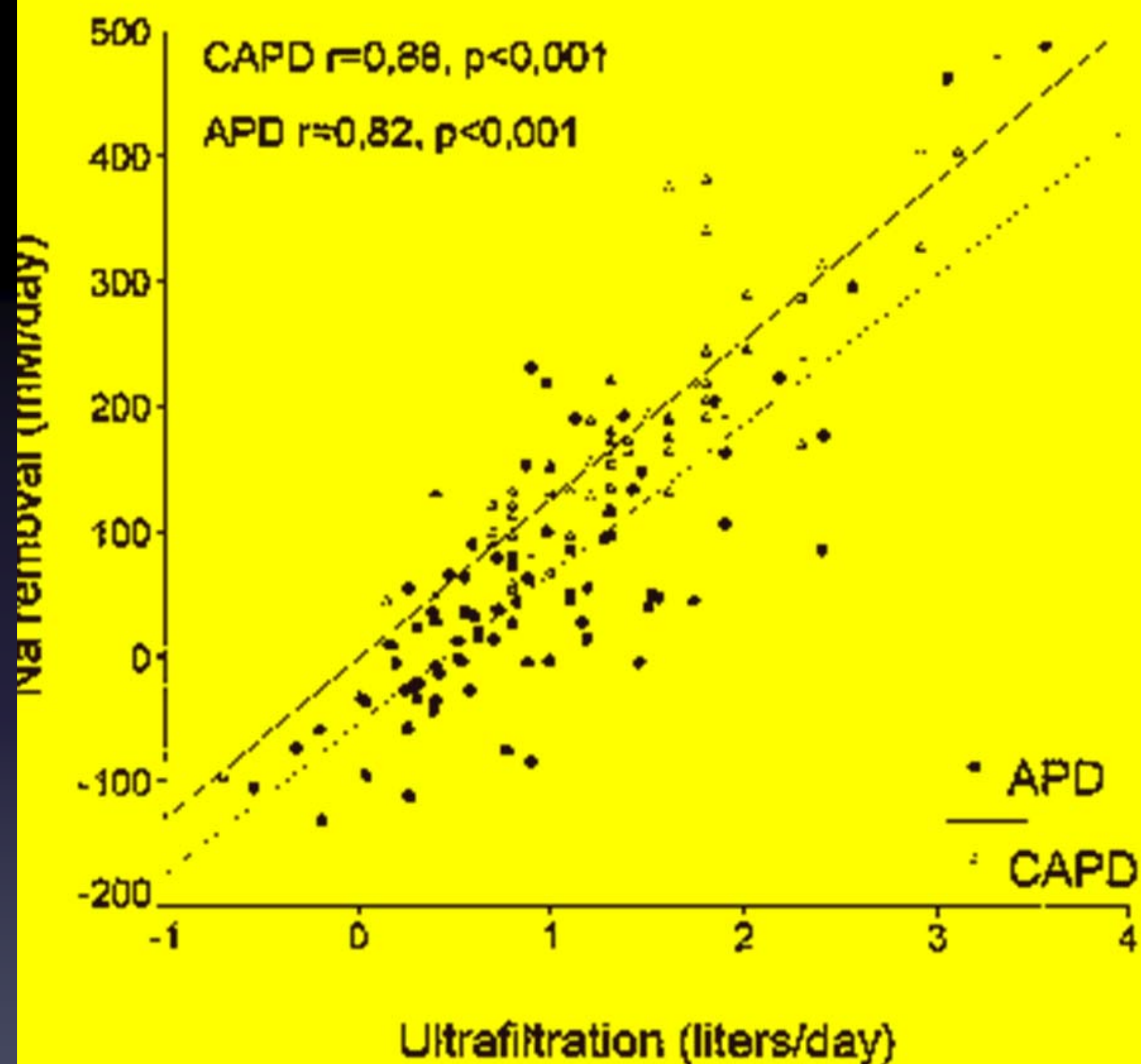
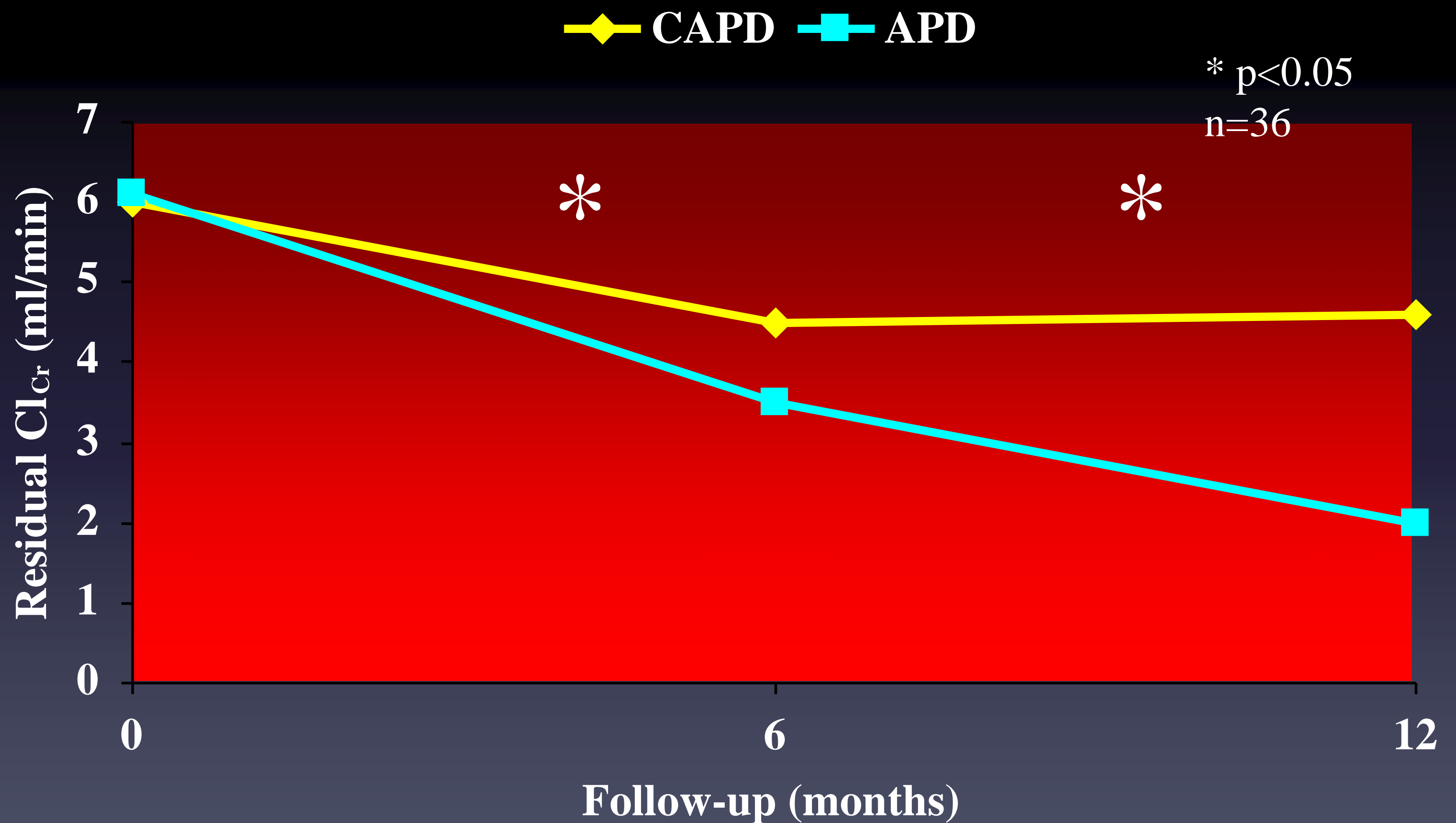


Figure 1 – Correlation between peritoneal sodium removal and ultrafiltration in patients undergoing CAPD and automated peritoneal dialysis (APD).

Will my own kidneys work longer?

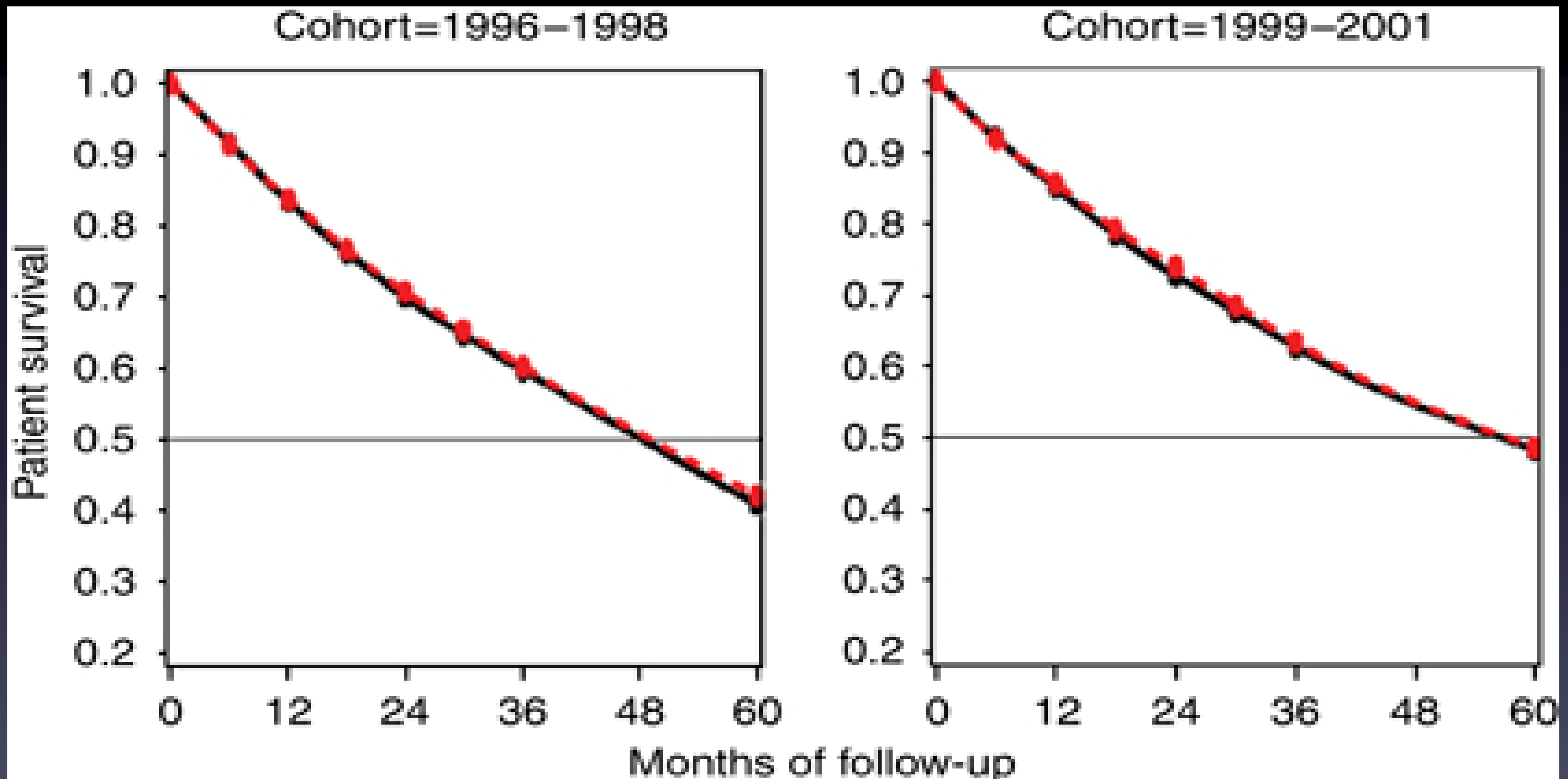
RRF Loss: APD vs CAPD



Hufnagel et al Nephrol Dial Transplant 14:1224-8, 1999

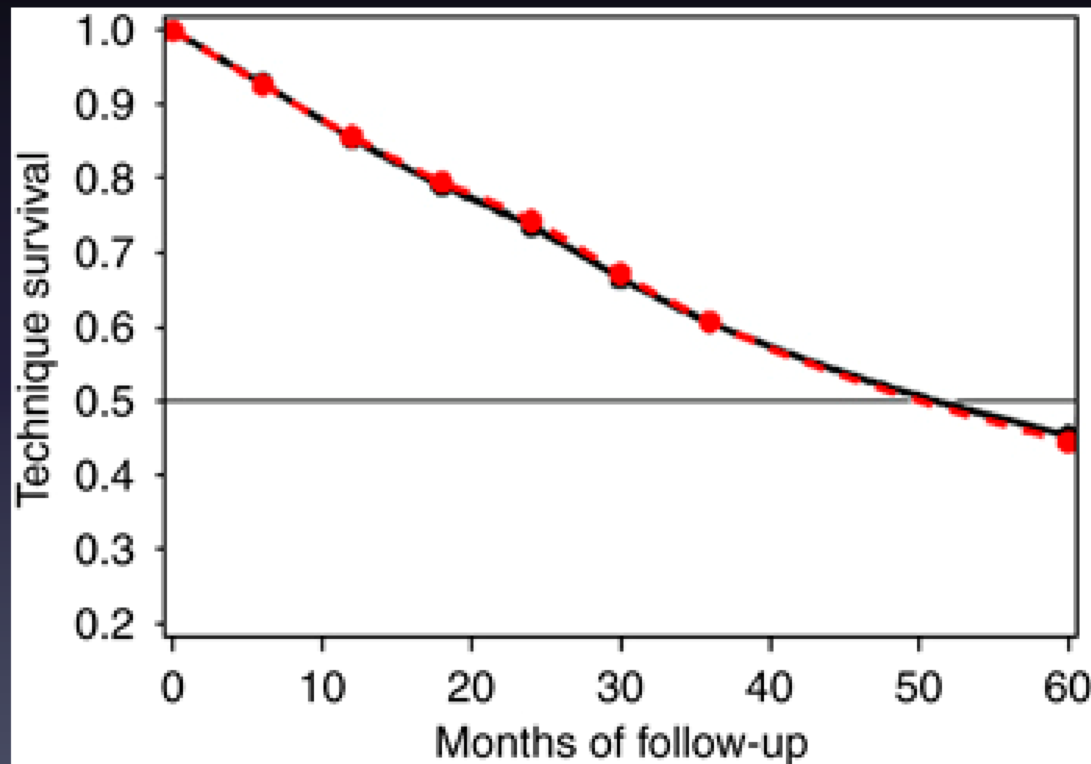
Will I live longer or last on PD longer?

USRDS
Mehotra et al. KI 2009



Patient survival

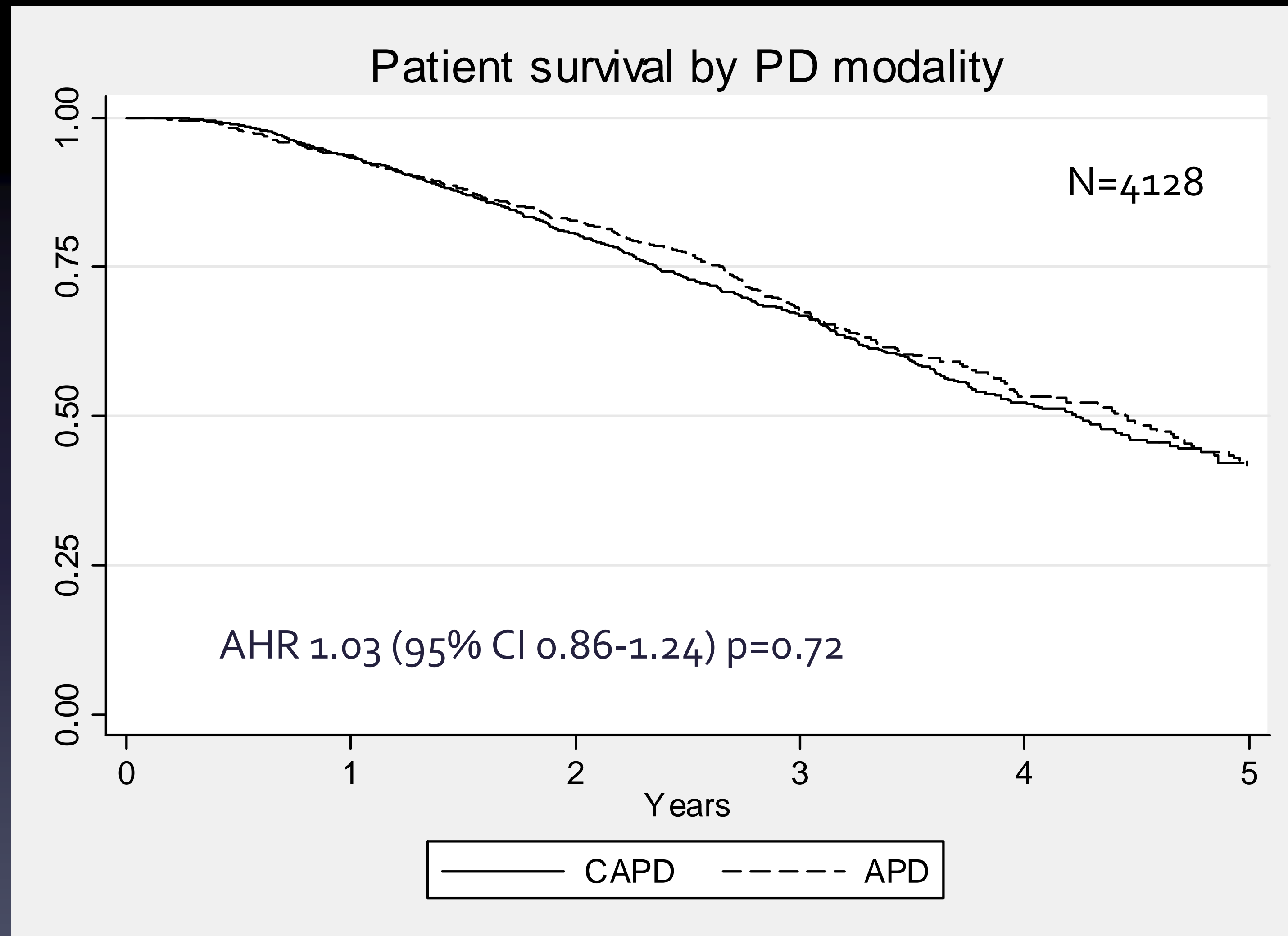
Technique survival



No, we are not going to accept the data from the US…

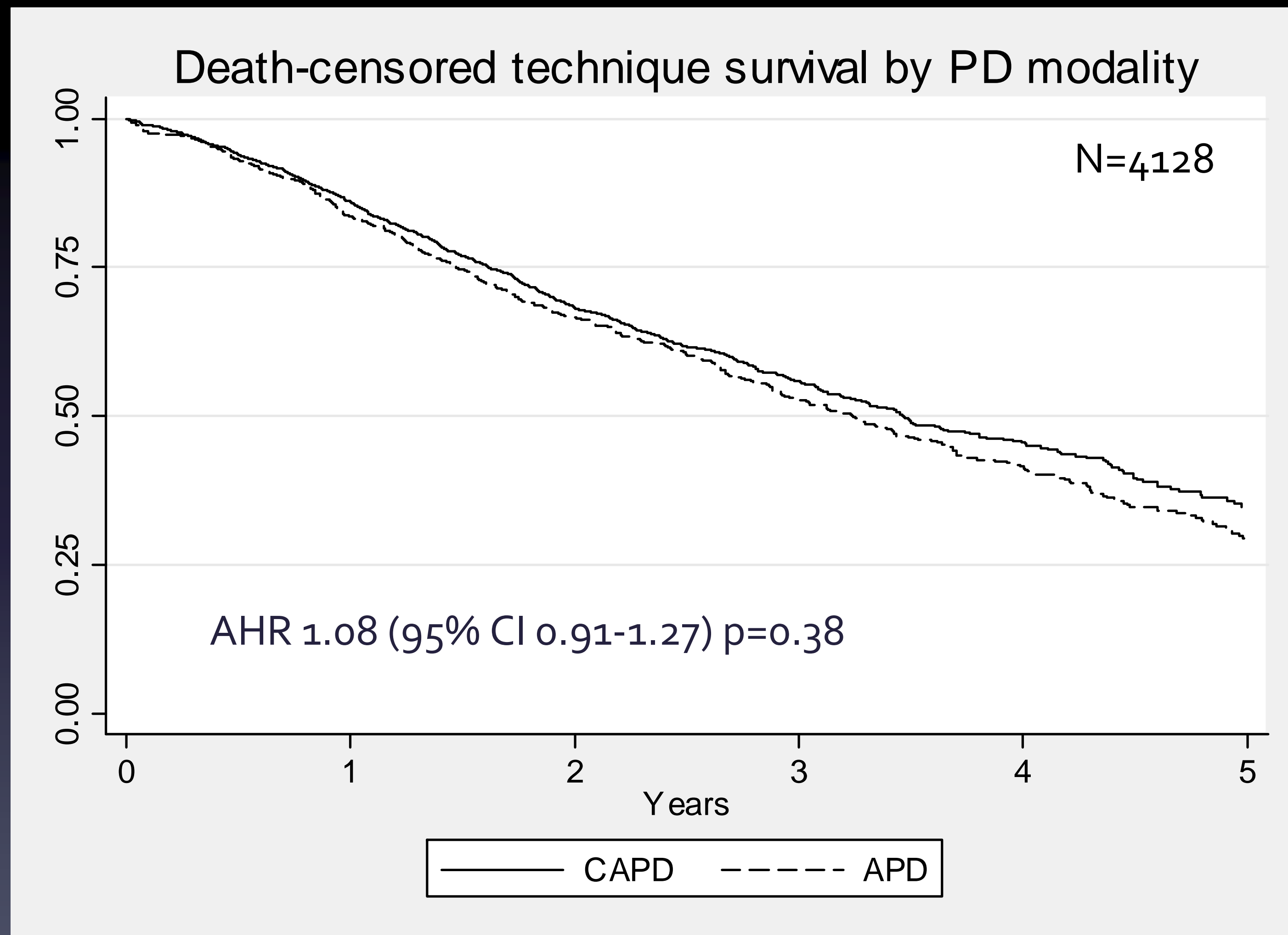
- Australia/NZ—Badve, KI 2008
- Europeans--Michels et al. CJASN 2009

Patient Survival

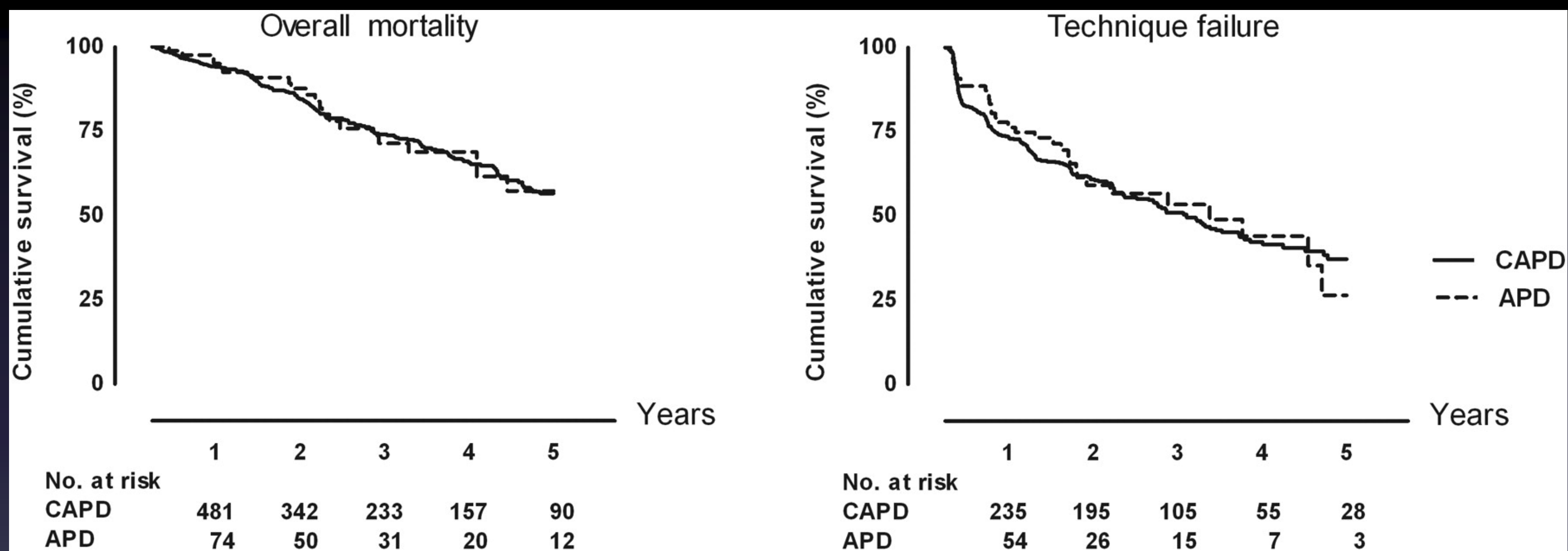


Badve et al Kidney Int

Death-Censored Technique Survival



Badve et al Kidney Int



Michels W M et al. CJASN 2009;4:943-949

CJASN

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Caveats

- No randomized studies
- Patients on APD went there for a reason--selection

So why is there no difference?

Causes of death

- Infection
- Cardiovascular
- malignancy

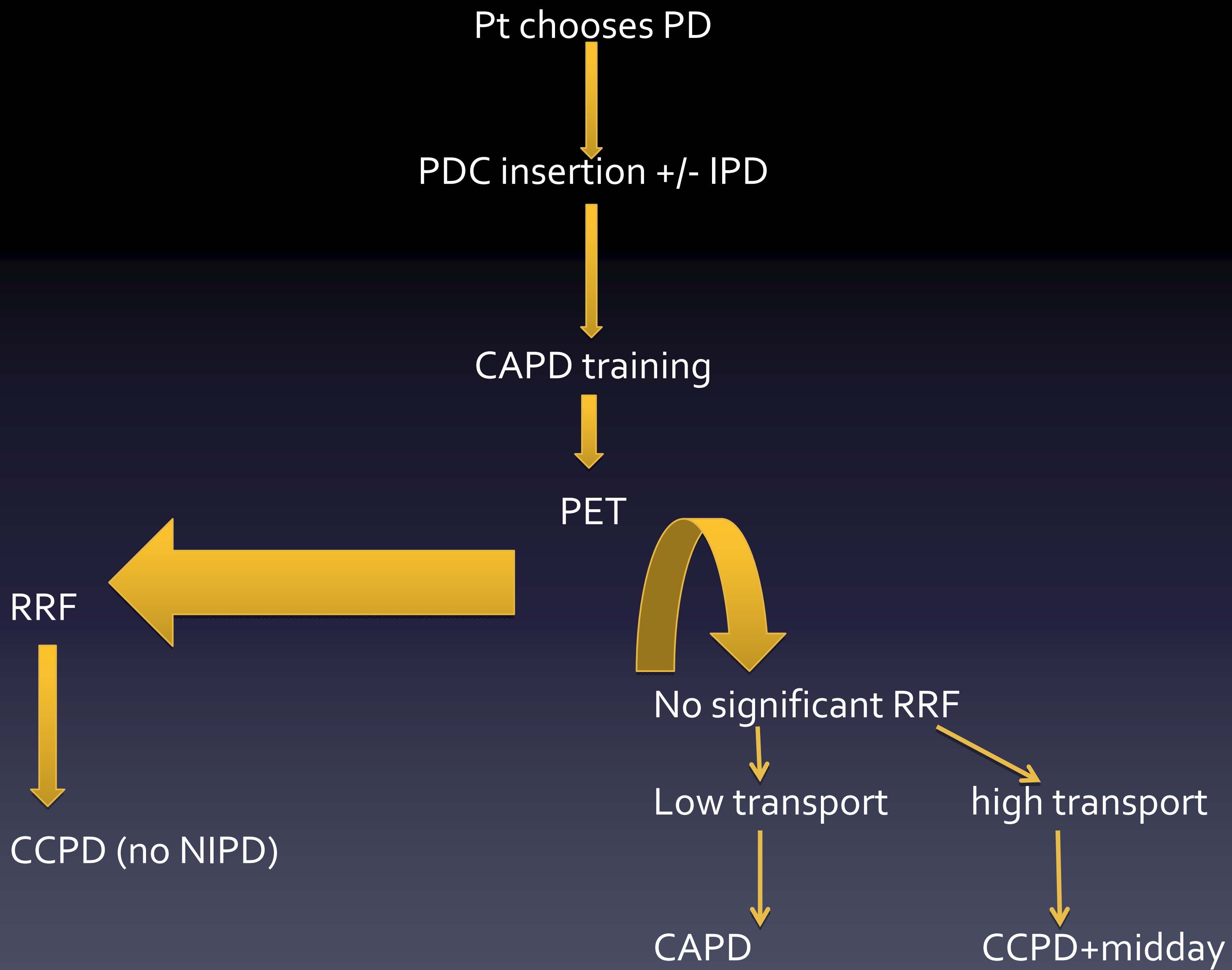
- Technique failure
  - Ultrafiltration
  - Burnout
  - Comorbidities
  - peritonitis

So should I do cycler or not?

- There is currently no strong clinical evidence, except for lifestyle considerations, for favouring APD over CAPD

So when do I use the cycler?

- Patient choice—in the absence of contraindications
- Assisted PD
- PD complications—leaks, hernia, periop
- Residual renal function



Pt chooses PD
PDC insertion +/- IPD
CAPD training
PET
RRF
CCPD (no NIPD)
No significant RRF
Low transport
high transport
CAPD
CCPD+midday

My bias

- Absolutely no “dry day” except in palliative PD
- Length of exchange matters—yet to be proven

Until data is there…

- APD
  - No outcome differences despite theoretical physiological disadvantages
  - Encourages the use of home dialysis
  - Makes RRT “doable” for many patients

Future of APD

- Increased facility based treatments
  - Independent or dependent
- “Smart cyclers” --biofeedback