

# WHY ISN'T PD THE FIRST CHOICE FOR YOUR PATIENTS ?

BC NEPHROLOGY DAYS  
VANCOUVER  
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# Peritoneal Dialysis



INTERNATIONAL



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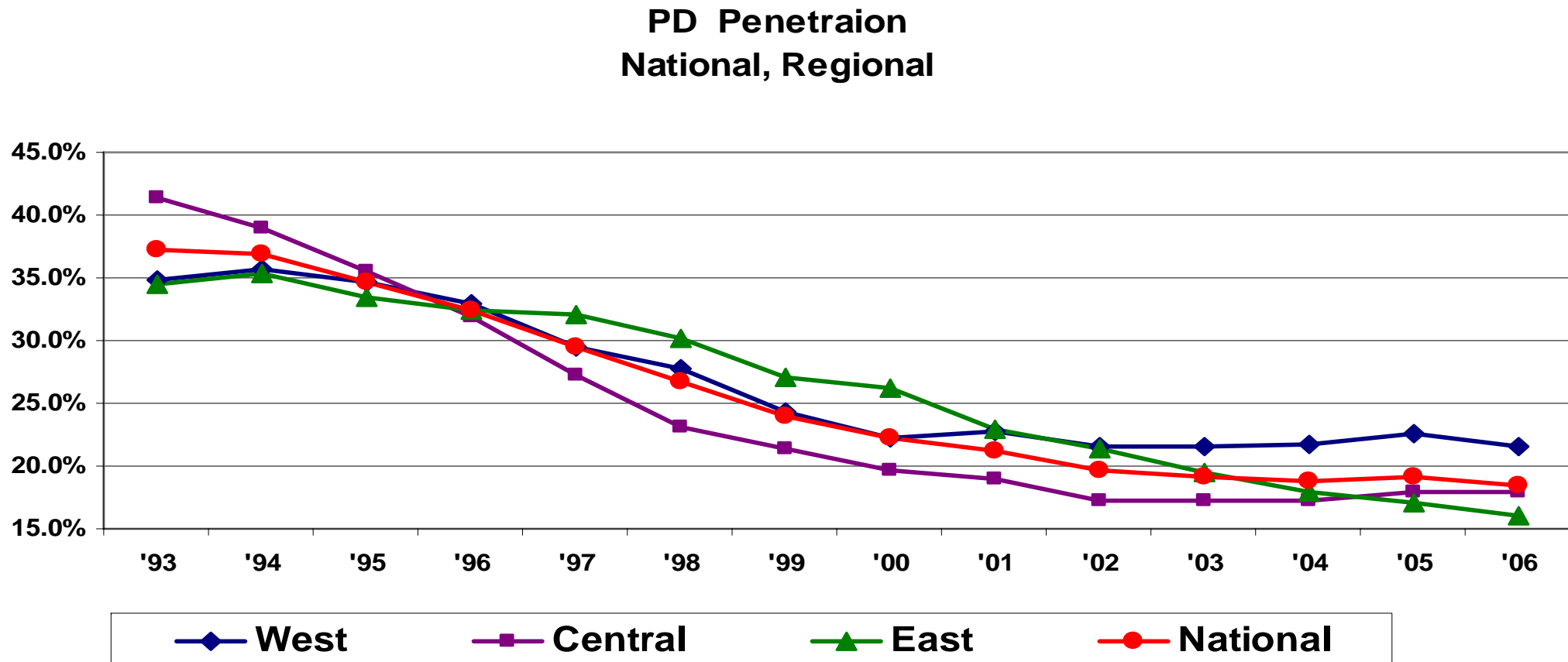
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# TOPICS TO COVER

- What proportion of patients should do PD ?
- Which patients should do PD ?
- What are the obstacles to getting patients to do PD ?
- How do we grow PD ?

# FALL IN PD UTILIZATION CANADA 1993 - 2006



# CAUSES OF DECLINE IN PD USE

- Proliferation of HD units
- Increased patient age and co-morbidity with inability or reluctance to do PD
- Physician concerns about efficacy of therapy



# CAUSES OF DECLINE IN PD USE

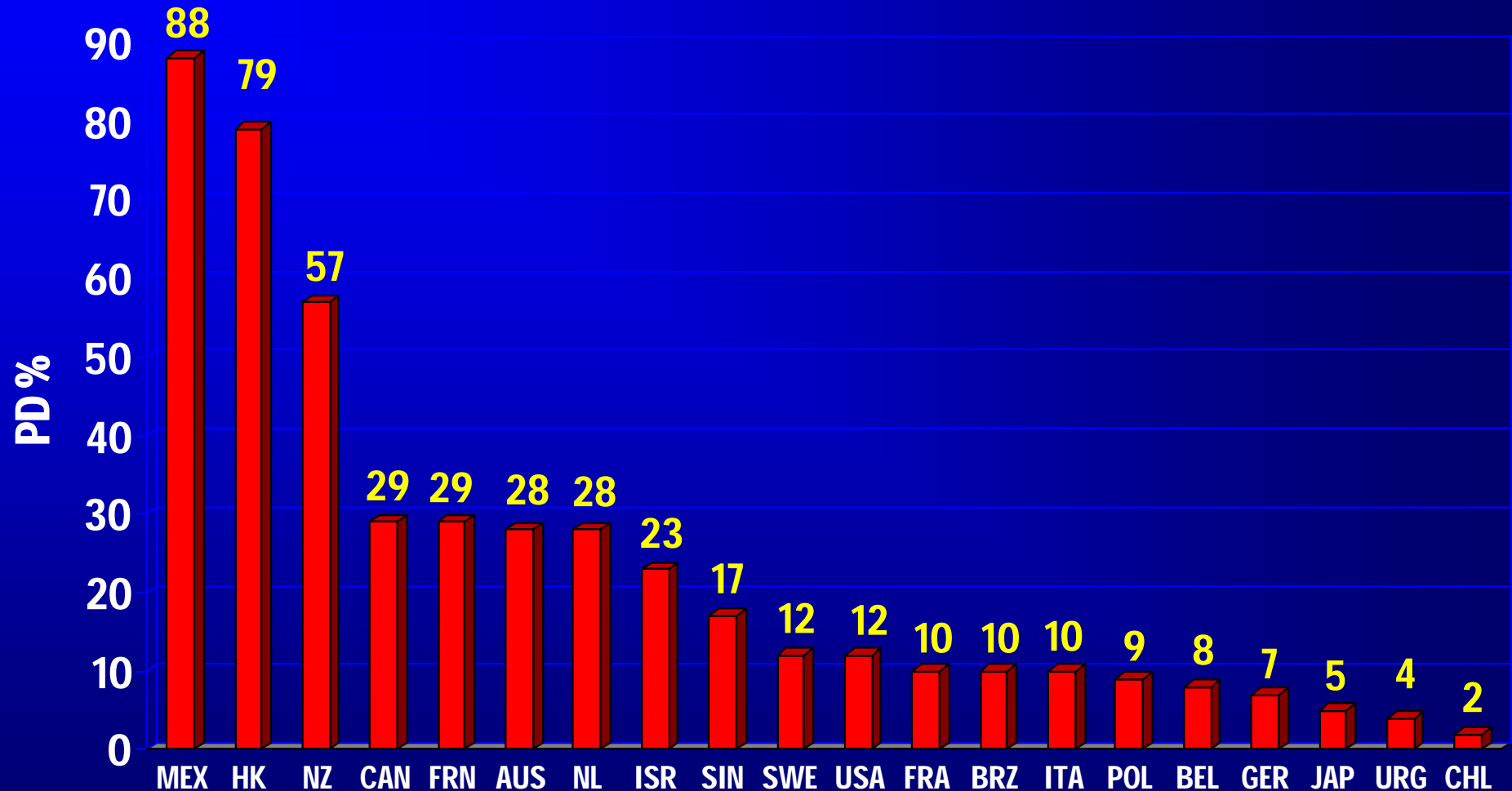
## OTHER POSSIBILITIES

- U.S. studies suggesting higher mortality on PD
- Poor training of fellows in PD ?
- PD catheter insertion problems

# WHAT PROPORTION OF PATIENTS SHOULD DO PD ?

- Huge variation internationally and nationally
- Driven largely by non-medical factors
- Ontario PD Initiative targets 30% PD
- Any evidence ?

# ***PD Share Distribution Around the Globe***



# WHAT PROPORTION OF PATIENTS SHOULD DO PD ?

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- Any evidence ?

# WHAT PROPORTION OF PATIENTS SHOULD DO PD ?

- Survival data
- Economic perspective
- Patient views
- Nephrologist views

# SURVIVAL ON PD VERSUS HD

- Has been controversial for years
- No randomized trials
- Results depend on methodology
- Results in U.S. tend to differ from those elsewhere

# CANADIAN SURVIVAL DATA

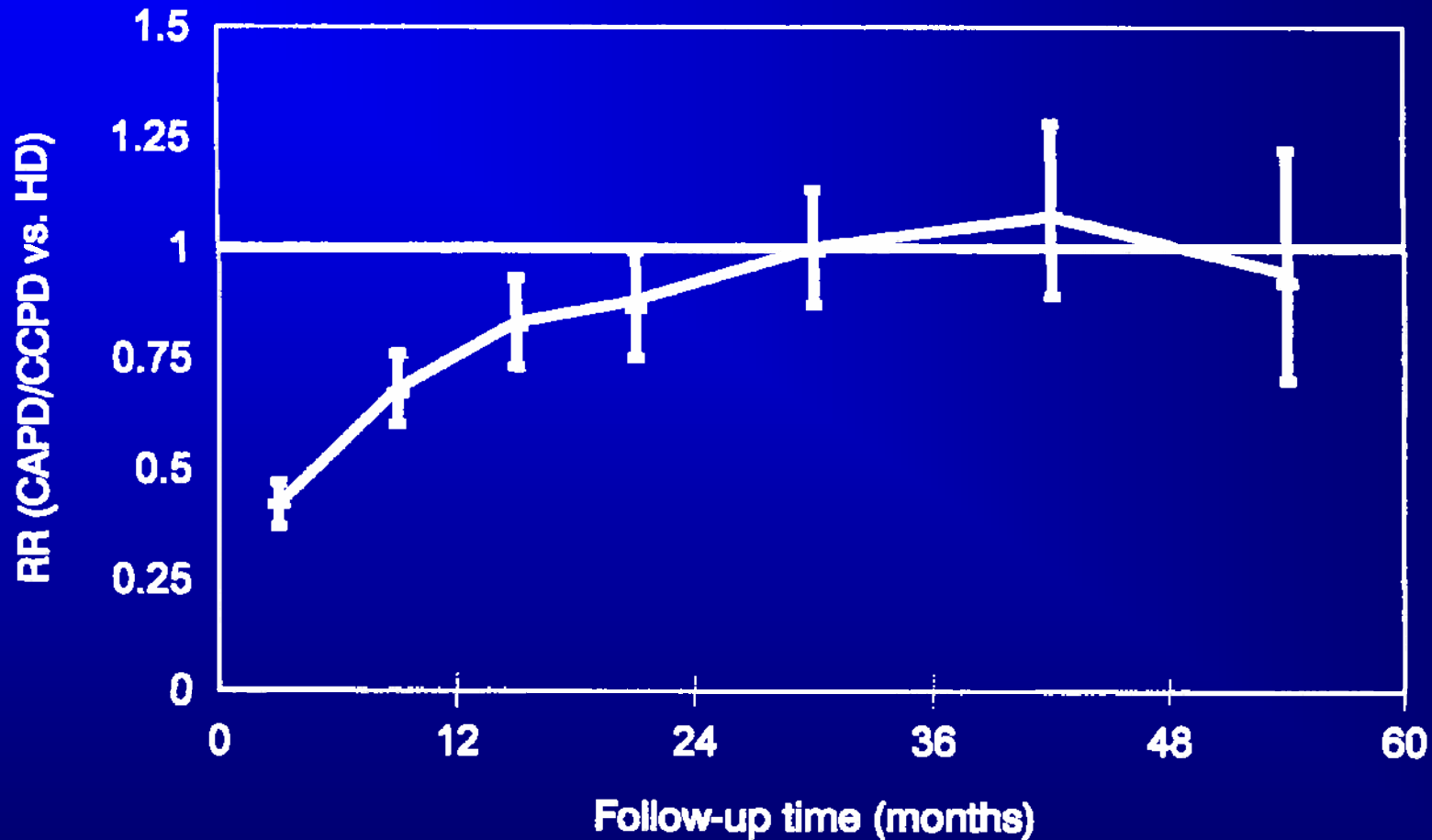
## Fenton et al (PDI 1998)

### Relative risks for PD vs HD

	AT	ITT
All	0.73*	0.93*
Non DM < 65	0.53*	0.84
DM > 65	0.75*	0.95
Non DM 65 +	0.76*	0.90
DM 65+	0.88	1.04

\*95% CI < 1.0

# Mortality Rate Ratios for PD Relative to HD



Schaubel et al 1998



# U.S. DATA - COLLINS HCFA STUDY

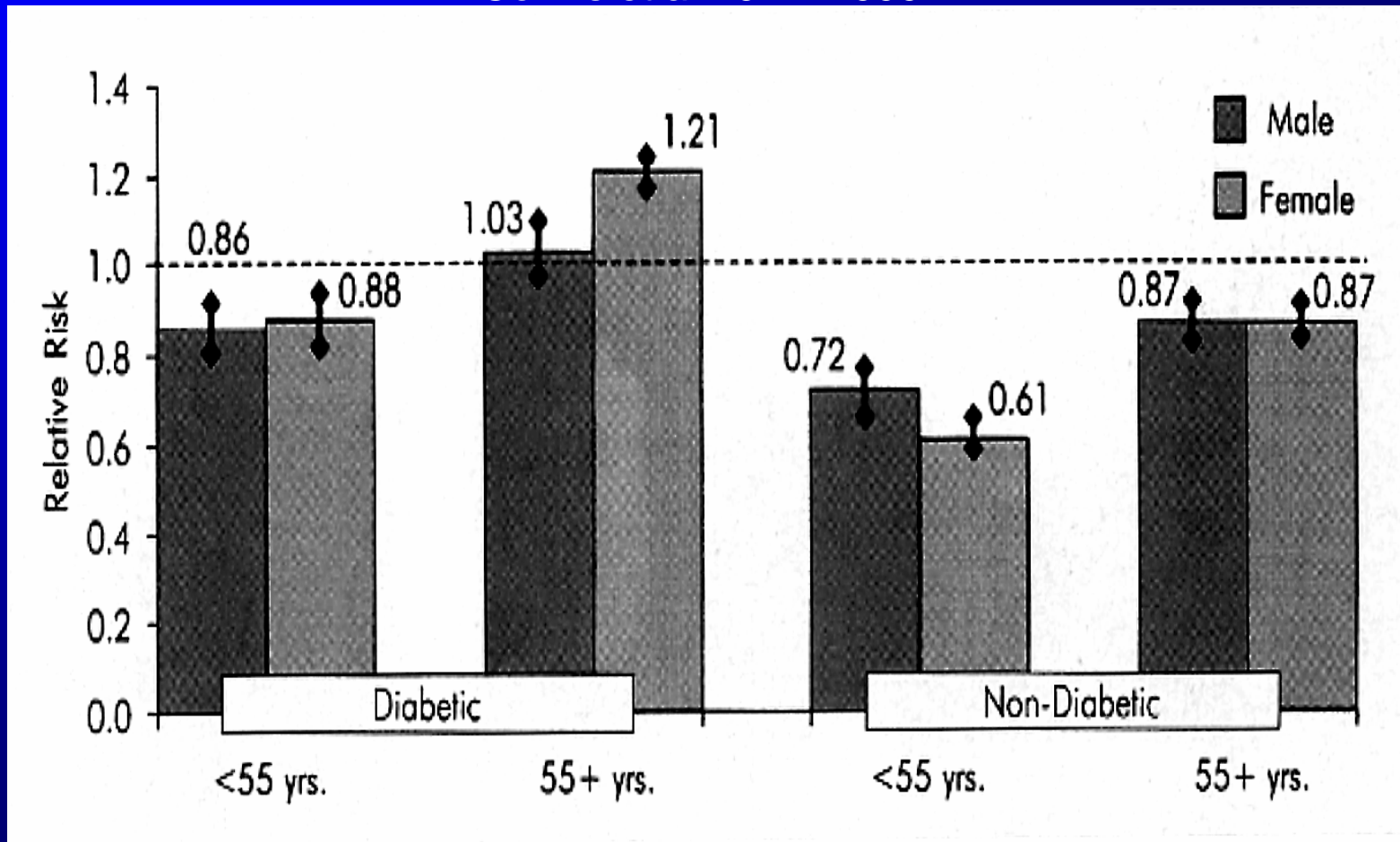
## AJKD 1999

- ITT based on modality at 90 days with censoring 60 days post switches and 2 year follow up
- 106,000 incident patients 1994-1998, correction for age and race, diabetics and non diabetic separately

# Relative Mortality Risk PD vs HD

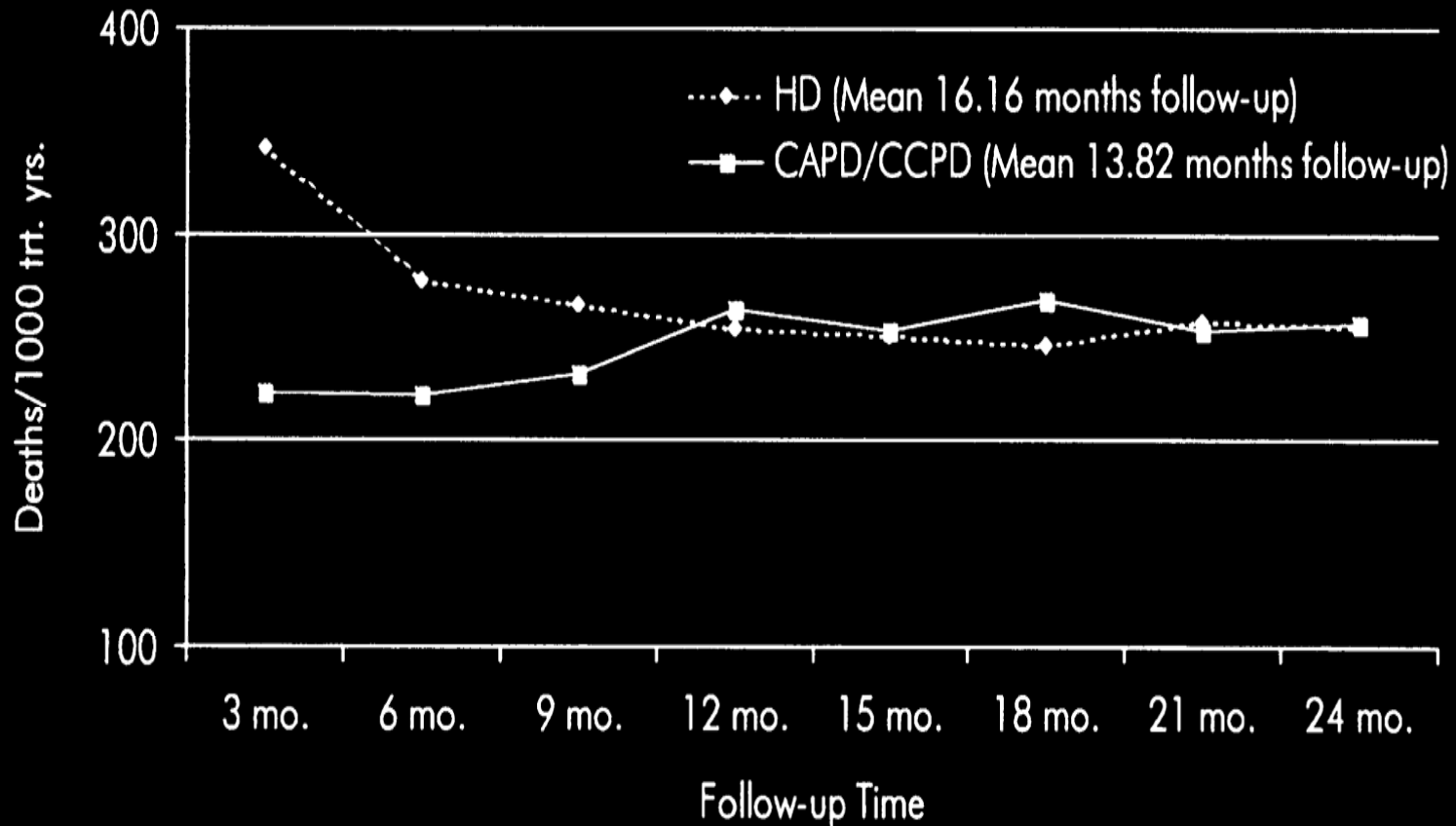
## All Patients by Age, Sex and Diabetes

Collins et al AJKD 1999



# Unadjusted Mortality Rates PD and HD

Collins et al AJKD 1999



# COMPARATIVE SURVIVAL PD AND HD

- More recently, Ganesh et al (JASN 2003) and Stack et al (KI 2003) used incident data from USRDS to show that patients with CHF and with CAD had worse survival on PD, especially if diabetic

# RELATIVE RISK OF MORTALITY (PD/HD) IN INCIDENT ESRD WITH CORONARY DISEASE

	RR (unadj)	RR (adj)	
DM	1.07 NS	1.23 P < 0.001	
Non DM	1.01 NS	1.20 P < 0.001	

# RELATIVE RISK OF MORTALITY (PD/HD) IN INCIDENT ESRD WITHOUT CORONARY DISEASE

	RR (unadj)	RR (adj)	
DM	0.92 P < 0.05	1.17 P < 0.001	
Non DM	0.69 P < 0.001	0.99 NS	

# COMPARATIVE SURVIVAL HD v PD

## (Vonesh et al KI 2004)

- USRDS 1995-2000, N = 400,000, incident study
- Stratification by age, diabetes and co-morbidity is required
- 55% had comorbidity, 45% had DM and median age was 65
- RR of mortality expressed as HD:PD

# HD v PD by Age, DM and Co-morbidity

Vonesh et al KI 2004

	No co-morbidity	Co-morbidity
	RR	RR
No DM 18-44	1.24 (1.07-1.44)	1.19 (0.94-1.50)
45-64	1.13 (1.02-1.25)	1.01 (0.92-1.11)
65+	1.13 (1.05-1.21)	0.96 (0.91-1.01)
DM 18-44	1.22 (1.05-1.42)	1.10 (0.92-1.32)
45-64	0.92 (0.85-1.00)	0.82 (0.77-0.87)
65+	0.86 (0.79-0.93)	0.80 (0.76-0.85) <sub>24</sub>



# **CHOICE STUDY**

## **Jaar et al Ann Intern Med 2005**

- National prospective cohort study in U.S.
- NIH/NIDDK funded
- 1041 incident dialysis patients 1995-98
- 81 dialysis centers with oversampling of PD to allow statistical comparison
- Mean follow up 2.4 years (up to 7 years)

# THE FIRST PROSPECTIVE COHORT COMPARATIVE HD PD STUDY KI 2000 57: 1720-26

*Kidney International, Vol. 57 (2000), pp. 1720–1726*

## Comparative mortality of hemodialysis and peritoneal dialysis in Canada

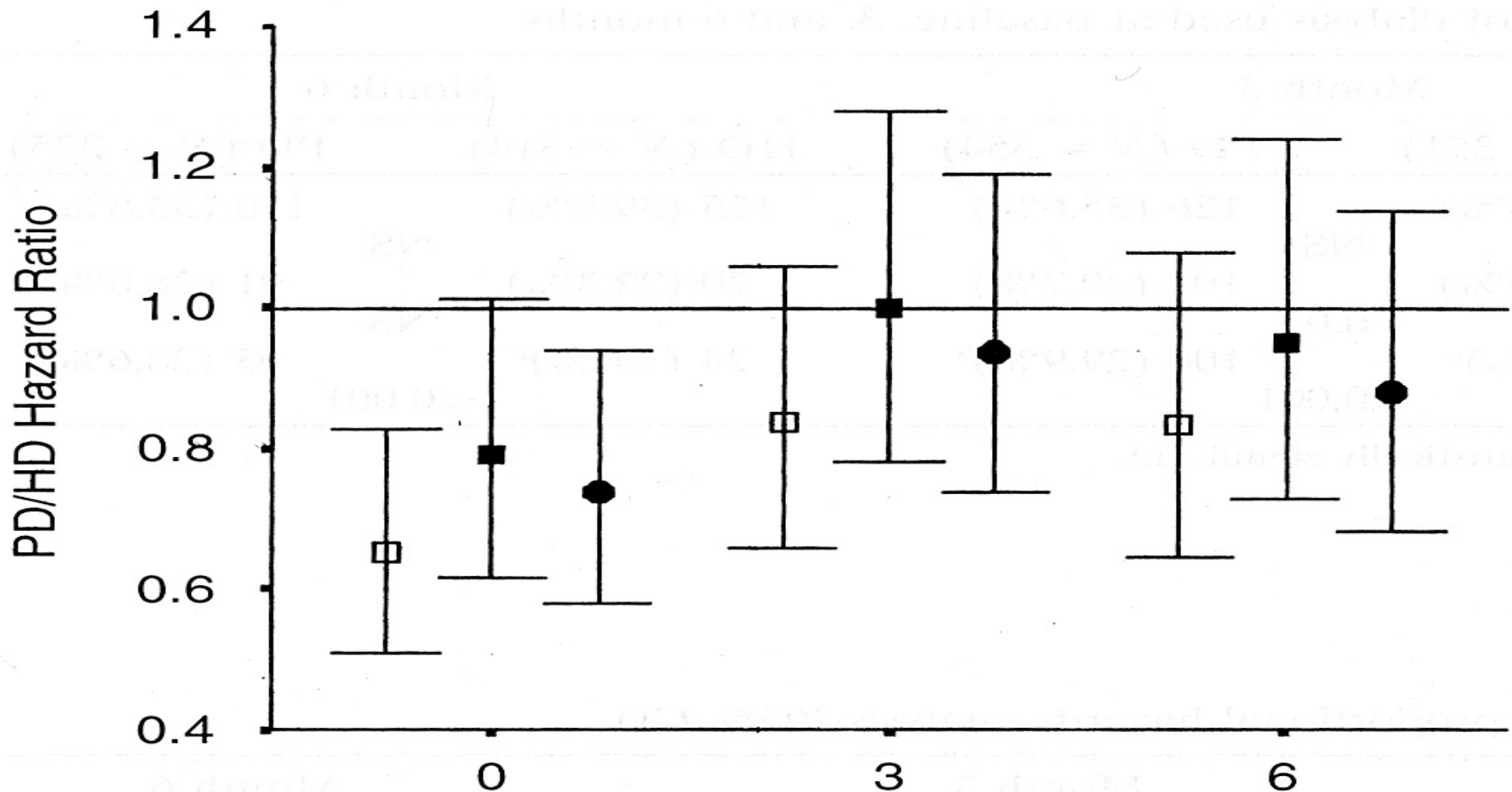
**SEAN W. MURPHY, ROBERT N. FOLEY, BRENDAN J. BARRETT, GLORIA M. KENT,  
JANET MORGAN, PAUL BARRÉ, PATRICIA CAMPBELL, ADRIAN FINE, MARC B. GOLDSTEIN,  
S. PAUL HANDA, KAILASH K. JINDAL, ADEERA LEVIN, HENRY MANDIN, NORMAN MUIRHEAD,  
ROBERT M.A. RICHARDSON, and PATRICK S. PARFREY**

# THE FIRST PROSPECTIVE COHORT COMPARATIVE HD PD STUDY

Murphy et al (KI 2000 57: 1720-26)

- 822 consecutive incident patients at 11 Canadian centres 1993-1994
- Extensive assessment of status and co-morbidity **prior** to starting dialysis
- Adjustment for demographics and co-morbidity score based on presence and severity of co-morbid conditions
- Mean follow up 24 months (up to 56 months)

# PD/HD HAZARD RATIOS FOR MORTALITY UNADJUSTED AND ADJUSTED BY COMORBIDITY AT 0, 3 AND 6 MONTHS (Murphy KI 2000)



# COMPARISON OF THE TWO PROSPECTIVE COHORT STUDIES

	CHOICE	Murphy et al
N	1041	822
No of centres	81	11
Enrolment	10 weeks	0 weeks
Mean follow up	2.4 y	2.0 y
Mean age (yrs)	54 (P), 59 (H)	56 (P), 59 (H)
% PD	26	34, 50, 51
% DM	47	36
% white	66	80

# PD vs HD DANISH REGISTRY

## Heaf et al NDT 2002

- Almost 5000 patients treated 1990-1999 – 35% on PD
- Correction for demographics and recorded co-morbidity
- Intent to treat and treatment received analyses
- Survival benefit for PD in first 2 years – no difference subsequently

# PD versus HD

(Heaf et al NDT 2002)

	Intent to treat	As treated
All	0.86 (.57-.74)	0.65 (.59-.72)
Non-DM	0.84 (.75-.94)	0.61 (.54-.70)
DM	0.93 (.76-1.14)	0.69 (.57-.85)
Age > 55	0.85 (.76-.94)	0.66 (.58-.74)
DM > 55	1.04 (.75-1.43)	0.75 (.57-.99)

# SURVIVAL STUDIES

- HD and PD may have modest survival advantages in particular subgroups but these are unproven
- Advantages, if any, are small relative to larger issues
- Broadly speaking, the 2 modalities have equal survival overall



# COSTING STUDIES

- Every comparative study in the developed world shows that PD costs substantially less than HD
- The difference in Canada is c 40%
- Cost is not the only factor and we treat individual patients but if all else is equal.....

# COMPARATIVE DIALYSIS COSTS BY MODALITY IN CANADA (Goeree et al 1995)

	Centre HD	Self-care HD	Home HD	CAPD
Salaries	\$19,676	\$16,100	\$6,780	\$6,670
Supplies	\$10,779	\$8,236	\$9,013	\$13,836
Medicines	\$6,226	\$4,032	\$2,115	\$3,547
Others	\$24,474	\$7,865	\$8,141	\$7,865
Total	\$54,929	\$43,313	\$26,048	\$31,918

# PATIENT VIEWS

- Prichard et al (PDI 1996) – 150 new starts in Montreal
- 31 directed to HD and 14 to PD
- 31 diabetics encouraged to do PD – 17 did
- The remaining 74 could do either and got free choice – split was 50:50

# NEPHROLOGIST VIEWS

- Jung et al (PDI 1999) surveyed all CSN members – 66% replied and recommended HD PD Split was 66:34
- Mendelssohn et al (AJKD 2001) surveyed US nephrologists and recommended split was 71:29
- Jassal et al (NDT 2002) studied UK nephrologists and suggested split was 62:38

# WHAT PROPORTION SHOULD DO PD ?

- Survival is broadly similar
- PD costs less
- Half of patients choose PD if given informed choice ?
- Nephrologists think about one third should do PD
- So what is the problem !?

# WHAT PROPORTION OF PATIENTS CAN DO PD ?

- Oliver et al (KI 2007) studied 134 incident patients in Toronto
- 81% had at least 1 potential PD barrier
- With home care support 80% could do PD versus 65% without

# Oliver et al (KI 2007)

- Of eligible patients, in areas with home care 59% chose PD versus 58% in areas without home care
- However, the actual utilization of PD was 47% in the home care areas versus 37% in areas without home care

# WHICH PATIENTS ?

- About 20-30% have a strong contraindication
- Another 20-30% have significant barriers that can be addressed
- The rest are good PD candidates



# MAJOR CONTRAINDICATIONS

- Previous major abdominal surgeries
- Ostomies
- Morbid obesity
- Unable to do procedures and no one else to help
- Unwilling to do it

# RELATIVE CONTRAINDICATIONS

- Major medical co-morbidity
- Psychiatric illness
- Impaired vision or dexterity
- Poor living conditions
- Unsupportive relatives

- So, what is the problem ?
- Why is PD so hard to grow ?

# OBSTACLES TO PD GROWTH

- Late referrals and 'parachutes'
- Poorly structured pre dialysis care and education
- Patient procrastination and denial re modality education and selection
- Patient fear and lack of confidence

# OBSTACLES TO PD GROWTH

- Physician biases
- Patient body image issues
- Long wait lists for catheters
- High catheter failure rates
- High technique failure

# SOLUTIONS TO BARRIERS

- Well organized pre dialysis education
- Insistence on patient and family participation
- Tours of PD unit and meetings with PD nurses and patients for all suitable patients
- Avoid biases or 'damning by faint praise' !

# SOLUTIONS TO BARRIERS

- Constant encouragement to do PD – neutral approach is not enough !
- Follow up post PD selection until dialysis needed
- Apply modality education process to all late referrals, parachutes etc
- Use information technology to do ongoing CQI on the modality selection process

# SOLUTIONS TO BARRIERS

- PD catheters
- PD patient retention



# PD CATHETERS



# PD CATHETERS

- Need for a 'champion' – physician, surgeon or radiologist
- Ideal person and technique will vary with centre

# PD PATIENT RETENTION

- Peritonitis – CQI initiative needed
- Catheters – likewise
- Patient and Family 'Burnout'



# ONTARIO PD INITIATIVE

- Initiative by Ministry of Health to reverse decline in PD
- Headed by Dimitrios Oreopoulos and Sandra Coleman
- See PDI Sept/Oct 2007
- Article by Oreopoulos and Coleman and Commentary by Jindal

# ONTARIO PD INITIATIVE RECOMMENDATIONS

- Increase PD use to 30 % over 2-3 years – target based on physician and patient surveys and cost issues
- For home HD centers total home dialysis should be 40%

# ONTARIO PD INITIATIVE COMPONENTS

- Early referral
- Pre dialysis education
- Prompt expert catheter placement
- Data management

# ONTARIO PD INITIATIVE

## IMPROVE PD RETENTION

- CCAC home visits to support PD
- Nursing homes able to deliver PD – one per regional kidney centre



# ONTARIO PD INITIATIVE

## THE RESPONSE

- Variable response from nephrologists and renal programs
- Concerns re unrealistic targets and time frames
- Concerns re penalties for centres not meeting targets
- Concerns re costs

# PD PRESCRIPTION

- If we want to keep patients on PD we need to prescribe it intelligently
- Previous high Kt/V approach was often not lifestyle friendly built is no longer required
- Aiming for Kt/V 1.7 per week is not difficulty

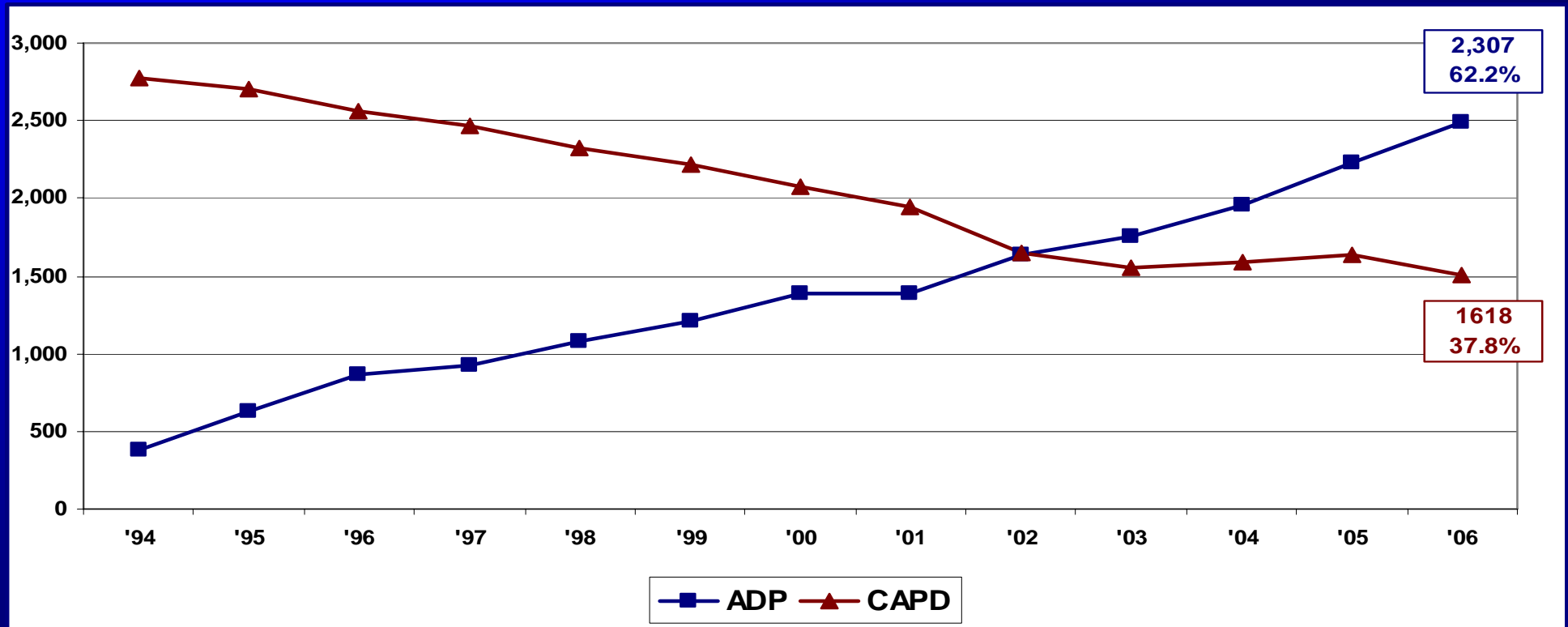
# PD PRESCRIPTION

- However, we need to pay attention to volume control in patients
- We also need to be aware of the toxicity of hypertonic glucose
- In particular, think of patient and caregiver lifestyle

# APD



# SWITCH FROM CAPD TO APD CANADA 1994 - 2006



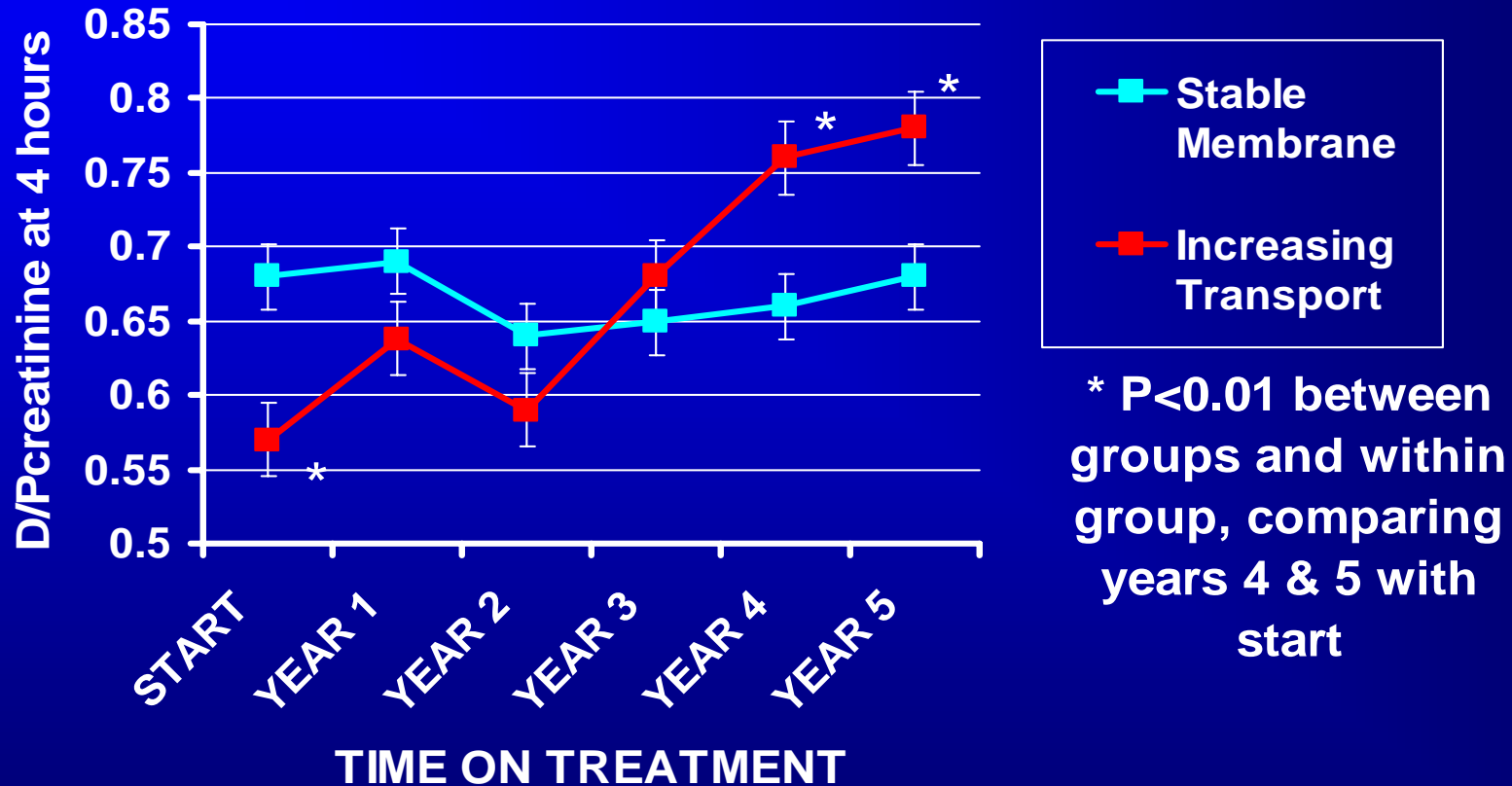
# SWITCH FROM CAPD TO APD

- Mainly driven by convenience and lifestyle factors – for patients and caregivers
- To a lesser extent for medical reasons
  - clearance and volume reasons or for high transporters
- Cost issues are also a factor

# GLUCOSE SPARING STRATEGIES

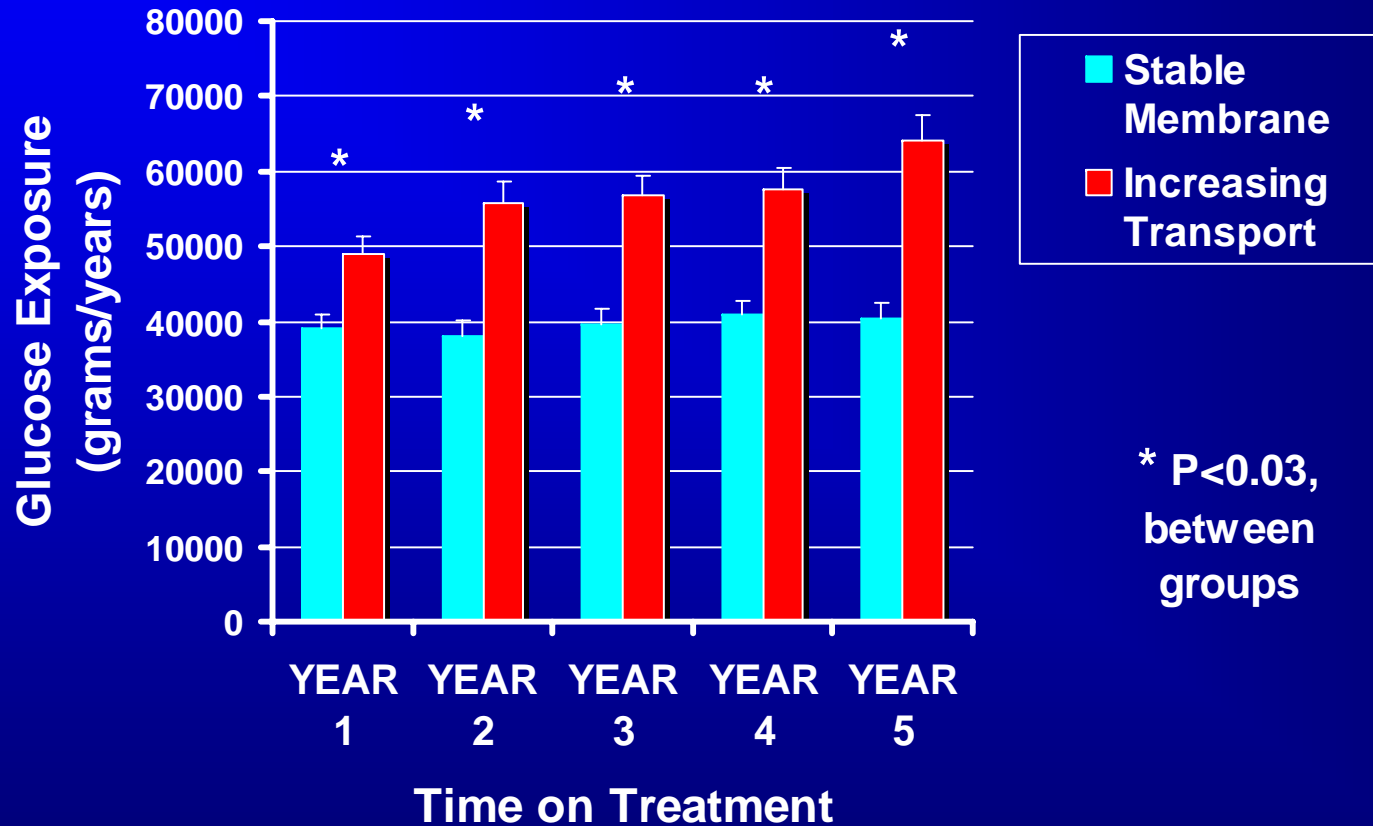
- Increasing body of evidence that hypertonic glucose is toxic to the peritoneal membrane and may lead to type I membrane failure
- Concerns about effects of glucose absorption on the cardiovascular risk profile

## Longitudinal Membrane Transport

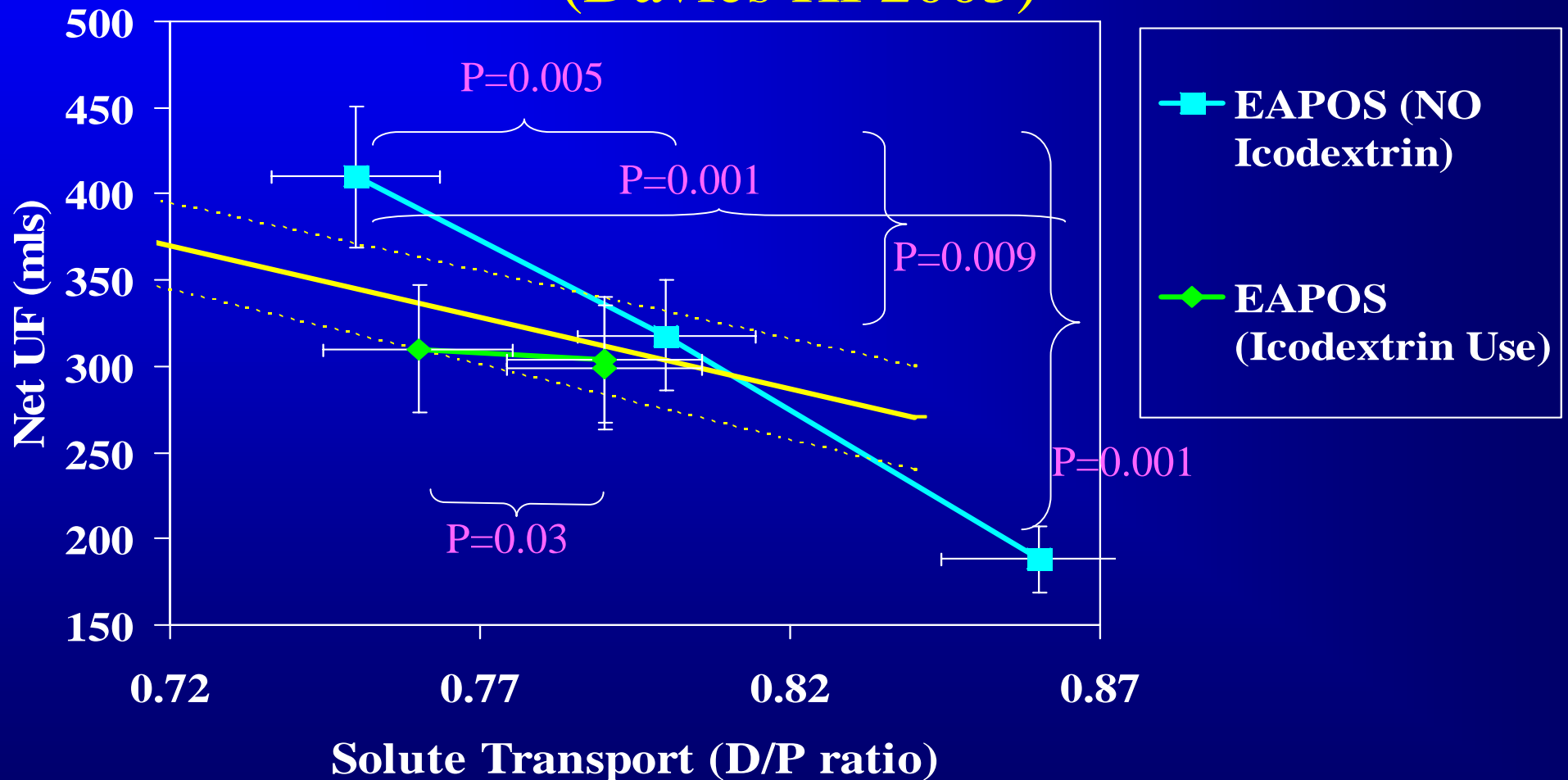




## Yearly Peritoneal Glucose Exposure



# EAPOS: Influence of Icodextrin on evolution of solute transport and UF capacity (paired data) (Davies KI 2005)



# SYSTEMIC EFFECTS OF GLUCOSE ABSORPTION



# SYSTEMIC TOXICITY OF GLUCOSE IN PD PATIENTS

- Exacerbation or induction of diabetes
- Hyperinsulinemia
- Promotion of obesity
- Decreased appetite
- Increases in hyperlipidemia (LDL and TGs)
- Increase in cardiovascular risk

# GLUCOSE SPARING STRATEGIES

## THE PARADOX

- These are based on minimizing hypertonic glucose exposure
- But volume control often requires greater hypertonic glucose exposure
- There is an apparent contradiction here needing resolution

# GLUCOSE SPARING STRATEGIES

- APD can be viewed as a glucose sparing strategy – less glucose exposure per volume of fluid removed
- Icodextrin and i/p amino acids are also glucose sparing
- Salt and water restriction decrease the need for hypertonic glucose

# GLUCOSE SPARING STRATEGIES

- Strategies that preserve residual renal function decrease need for hypertonic glucose
- A number of these have become apparent from recent studies

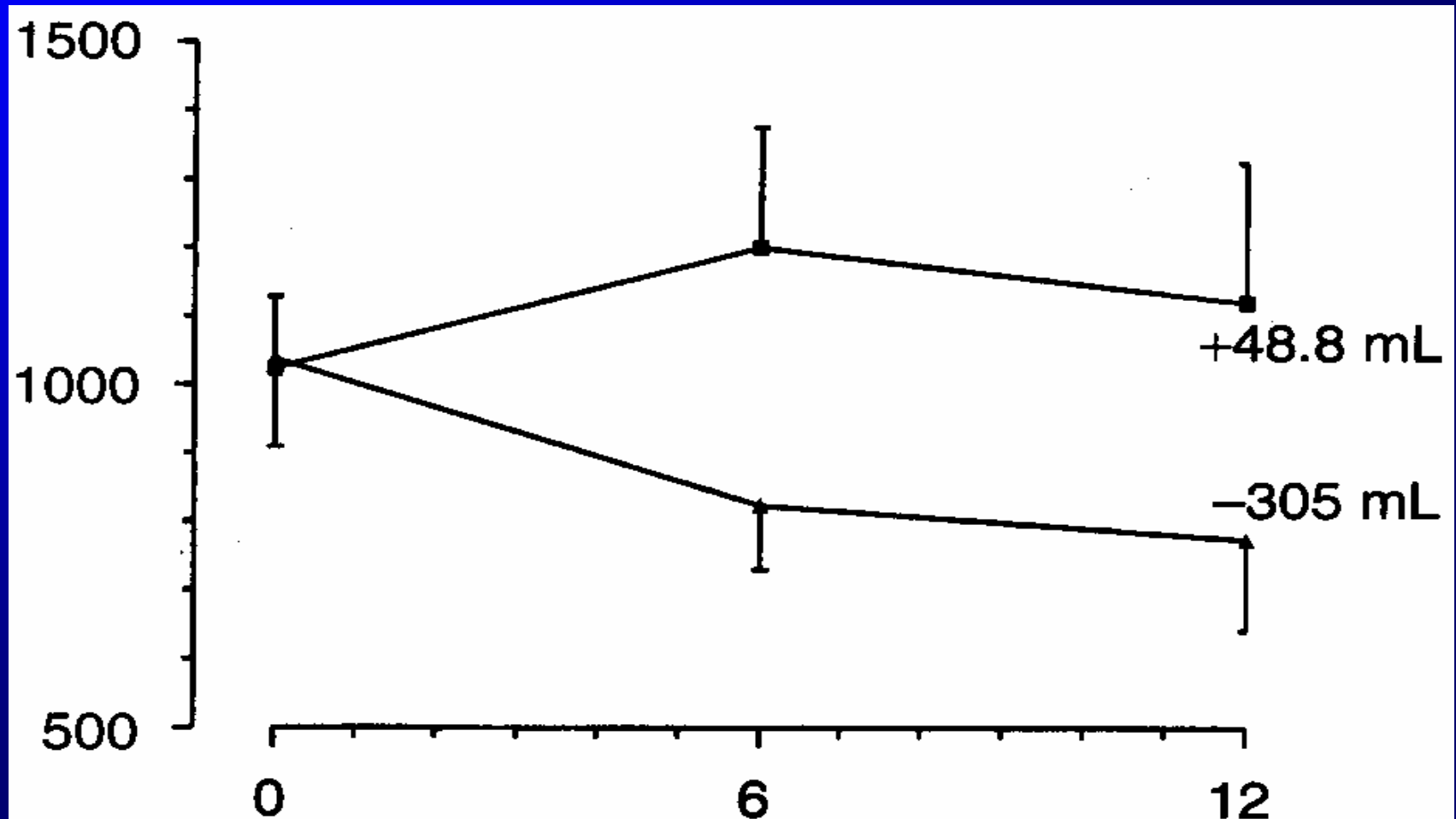
# Medcalf et al KI 2001

- Open label RCT of 61 incident PD patients at a single centre randomized to Furosemide 250 od or to control group
- Urine volume maintained in F group but fell in controls ( $p < .05$ )
- Urine Na excretion greater in F group ( $p .04$ )
- % body water stable in F group but rose in controls (52 vs 64%,  $p 0.1$ )



# Effect of Furosemide on urine output in CAPD (Medcalf et al KI 2001)

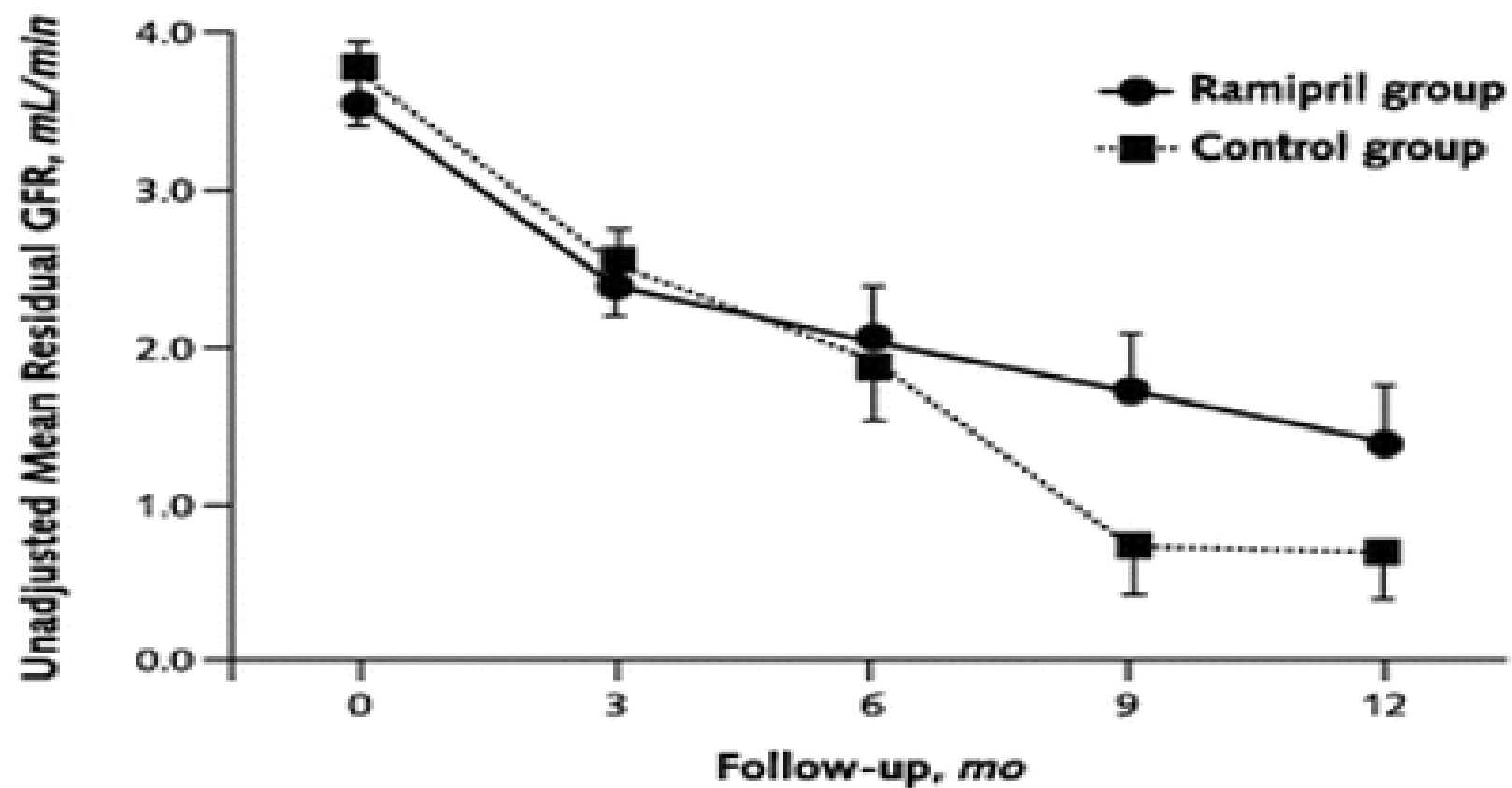
Urine volume, ml/24 hours



Time, months

## Li et al (Ann Int Med 2003)

- Single centre, open label RCT
- 60 prevalent CAPD patients with GFR > 2 ml/min, BP > 120/70, no ACEI or ARB x 6 mths, no CHF etc (72/217 eligible)
- Ramipril 5 od in treatment group, same 135/85 BP target in each group - 12 month follow up
- Repeated measures analysis of covariance



Patients, *n*

Ramipril group	30	30	30	28	26
Control group	30	30	29	28	27

# GLUCOSE SPARING STRATEGIES

## COMMON CLINICAL ERRORS

- It is important to revise target weight up if patients gain body weight on PD
- Otherwise patient may use hypertonic glucose to try and remove body fat
- This may cause volume depletion and promote further obesity

# GLUCOSE SPARING STRATEGIES

## COMMON CLINICAL ERRORS

- All shortness of breath on exertion is not pulmonary edema  
Is it de-conditioning ?
- All ankle swelling is not fluid overload.  
Is it new ? Is there another reason ?

# GLUCOSE SPARING STRATEGIES

## COMMON CLINICAL ERRORS

- It is easy to reduce target weight by writing an order on a chart
- You must tell the patient how to do it - more hypertonics or salt and water restriction or diuretics...?
- Many patients think you are asking them to lose body weight by eating less

# GLUCOSE SPARING vs VOLUME CONTROL

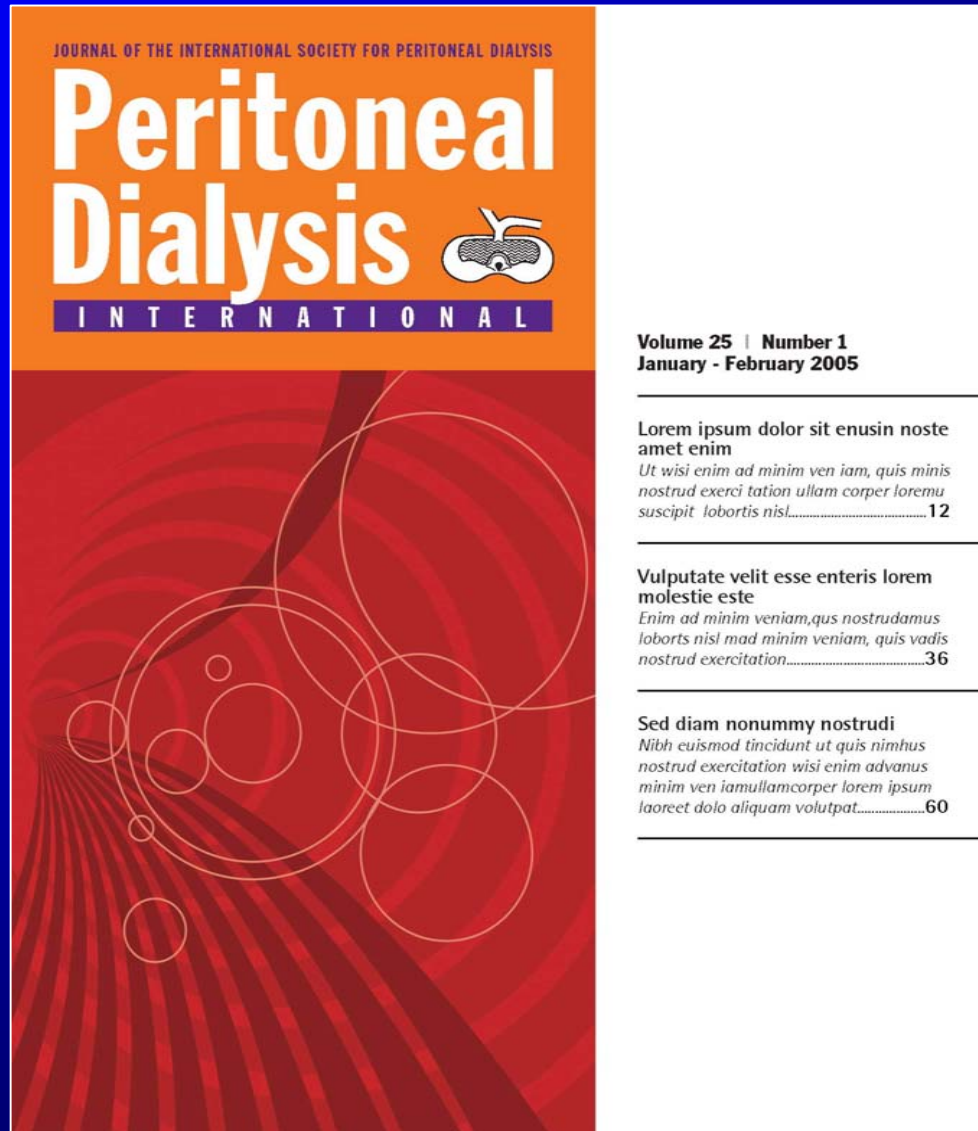
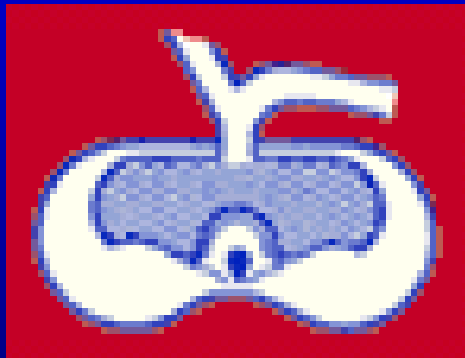
- So, strategies that minimize salt and water intake, preserve residual renal function and make use of icodextrin plus APD are consistent with both glucose sparing and volume control
- However, hypertonic glucose is still often indicated

# CONCLUSION

- Growing PD makes sense but is hard to do
- Needs a multifaceted, multidisciplinary approach
- Need to prescribe PD intelligently thinking of clearance, volume and hypertonic glucose minimization and lifestyle



# ISPD



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