


Phosphate removal with peritoneal dialysis

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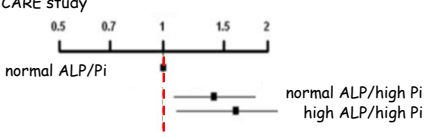
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Why bother ?

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CARE study



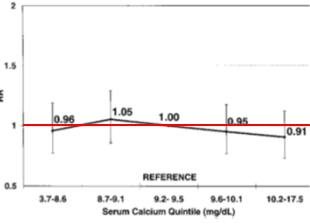
Category	Hazard Ratio (approx.)
normal ALP/Pi	0.7
normal ALP/high Pi	1.2
high ALP/high Pi	1.5

Tonelli et al *Circulation* 2009

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Why bother ?

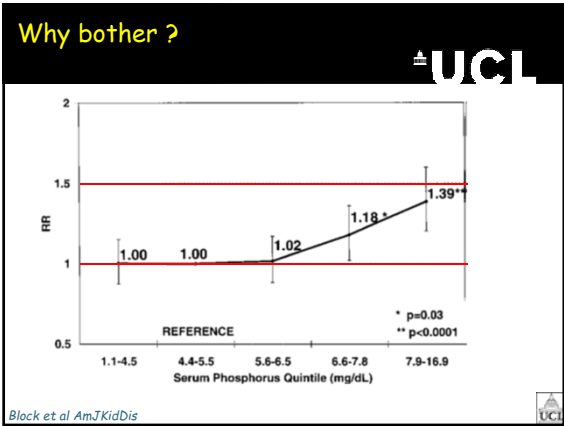
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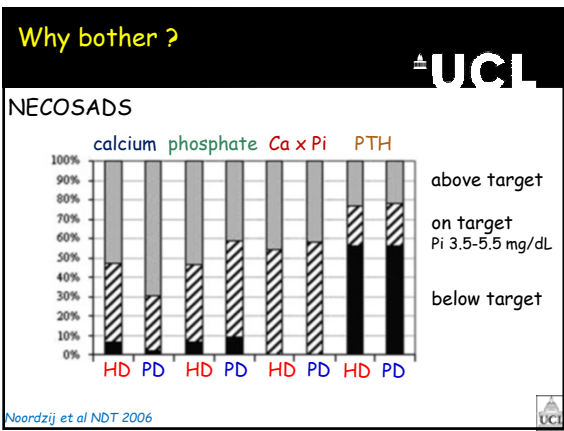


Serum Calcium Quintile (mg/dL)	RR
3.7-4.6	0.96
4.7-5.1	1.05
5.2-5.5	1.00
5.6-6.0	0.95
6.1-7.5	0.91

Block et al *AmJKidDis* 2008

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Why bother

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NECOSADS


- o serum Pi > KDOQI guideline 5.5 mg/dL
 - ❖ all cause mortality
 - HD increased by 40%
 - PD increased by 60%

Noordzij et al NDT 2006

Phosphate control in PD patients 

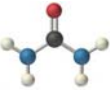
- o Dietary intake
 - o restrict phosphate intake
 - o maintain protein intake
 - protein losses
 - peritoneal
 - urinary
 - o hunger profile of PD patients
 - glucose absorption
 - o gastrointestinal effects of PD
 - reflux oesophagitis
 - intra-abdominal pressure
 - satiety hormones
 - acyl ghrelin/PYY 35/leptin





Creatinine or urea clearance target ? 


Canada

- o Total weekly Kt/Vurea
 - ❖ 1.7
 - ✓ CAPD
 - ✓ APD cyclor

NC(=O)N


CN1C=NC(=O)N1


Blake et al PDI 2011 

Phosphate balance 

Dietary intake

- o US recommendations 700 mg /day

Dialysis patient


- 70 kg eating protein 1.2 g/kg/day
- 12 g Pi/g protein
 - 1008 mg/day
 - 605 mg + 100 mg other sources
- 9 g Pi/g protein
 - 756 mg/day
 - 455 mg + 100 mg other sources

PD patients



- Weight 73.4±16.3 kg, nPNA 0.91±0.25 g/kg/day

Phosphate removal

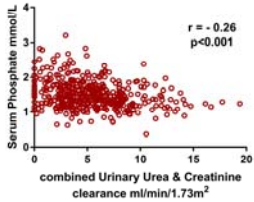

- median 413 (248-488) mg/day
- 65.7% prescribed phosphate binders

Sherman & Mehta AmJ KidDis 2009 


Residual renal function UCL



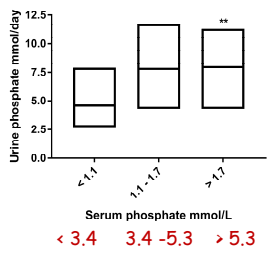
Residual renal function UCL




Statistical values: $r = -0.26$, $p < 0.001$

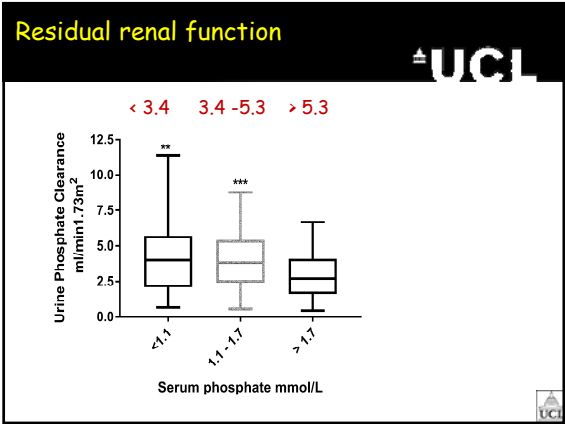


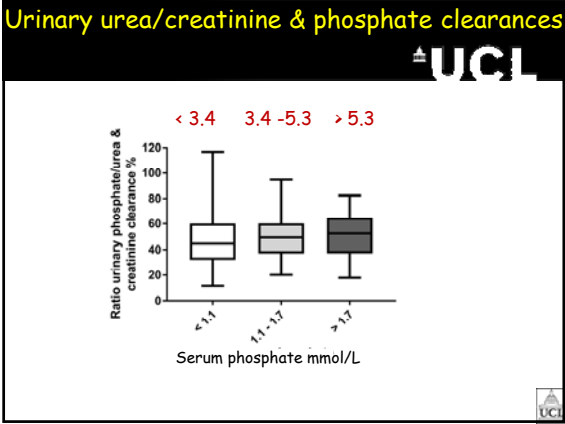
Residual renal function UCL

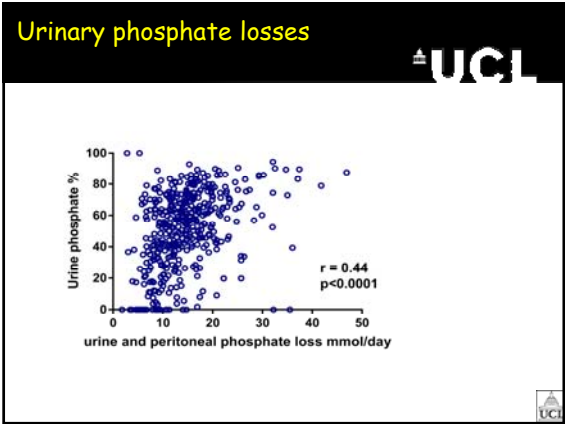


Statistical significance: **









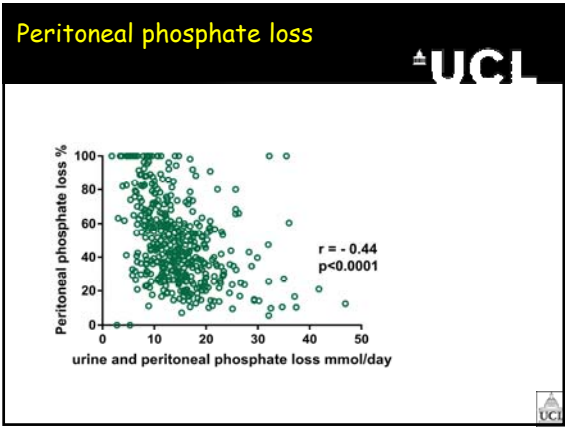
Urinary phosphate clearance

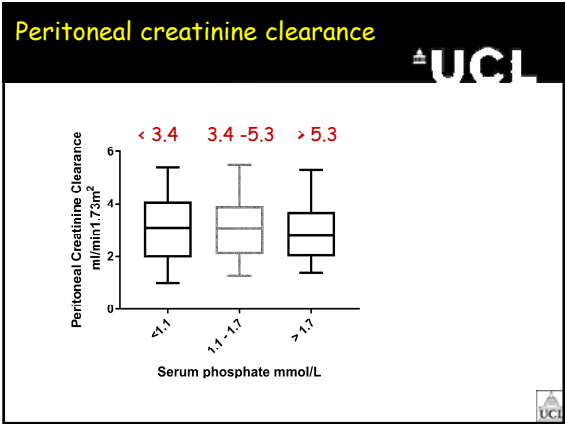
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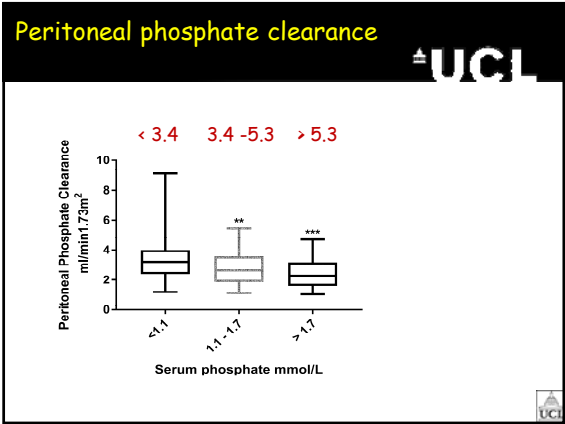
Peritoneal Dialysis

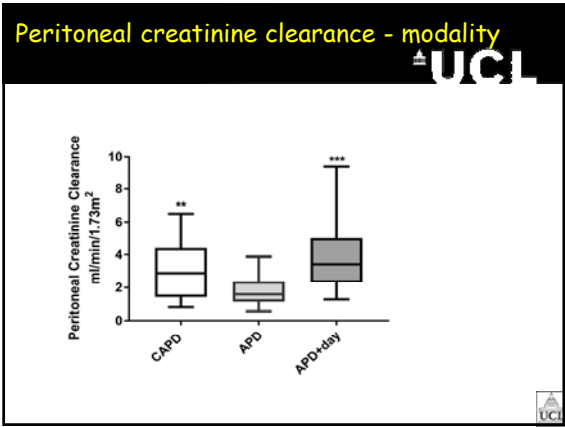
- o urinary phosphate losses important
 - ❖ Phosphate clearance
 - GFR
 - tubular secretion

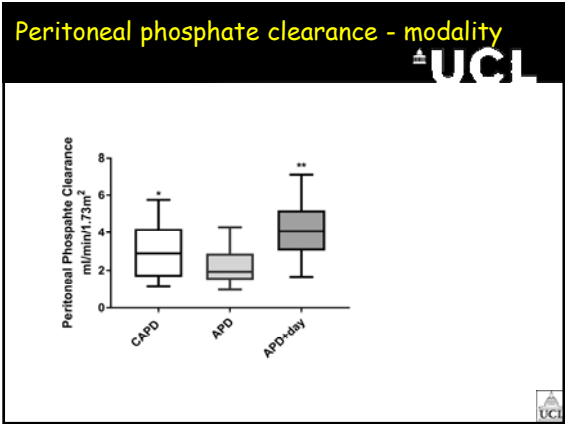
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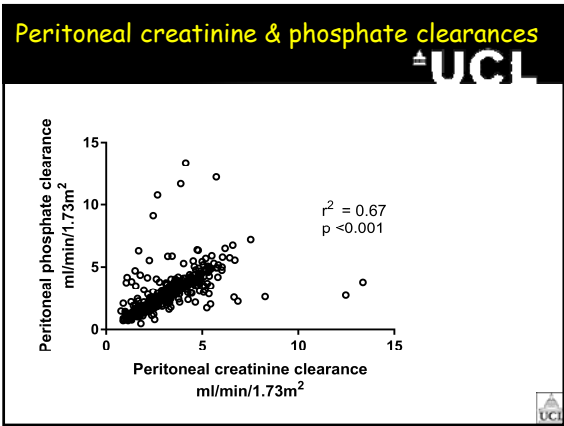


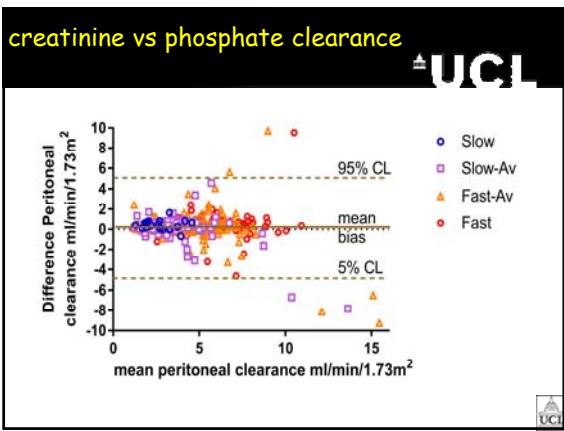


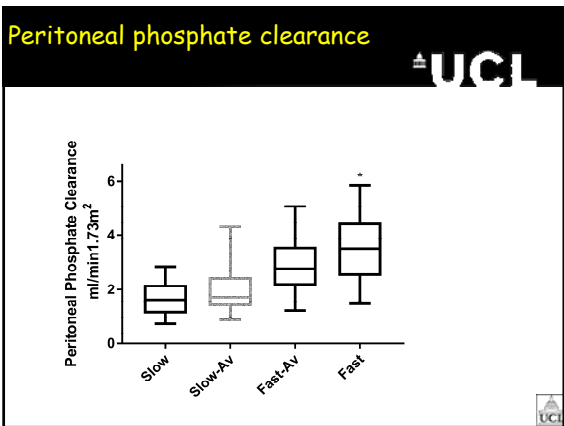


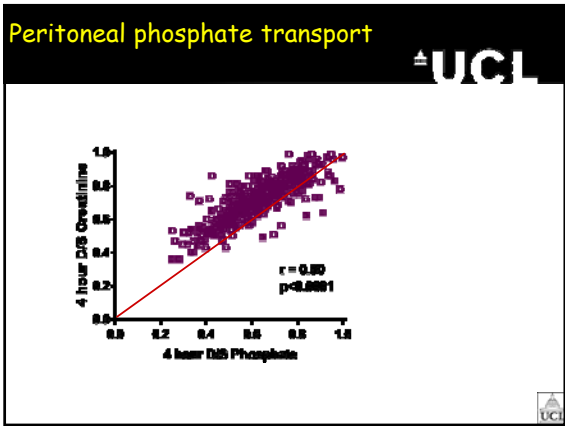


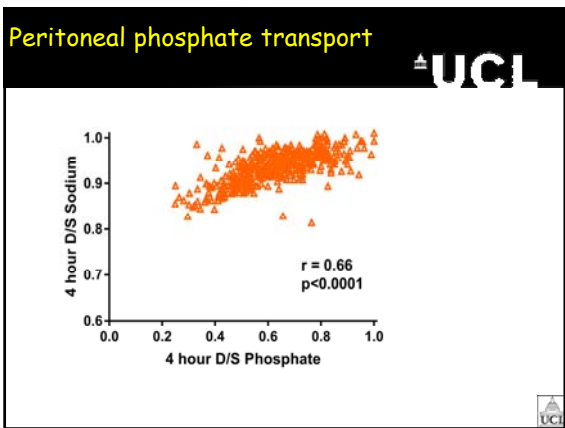


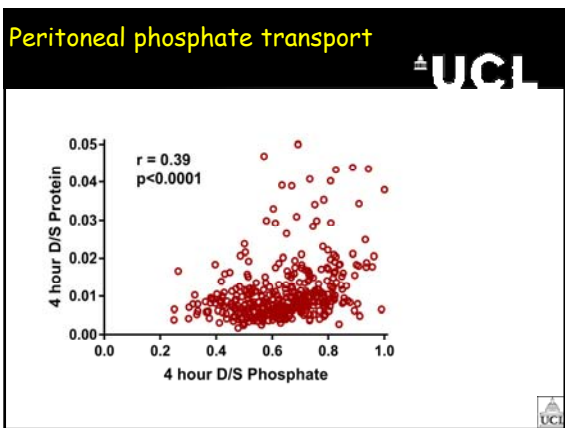












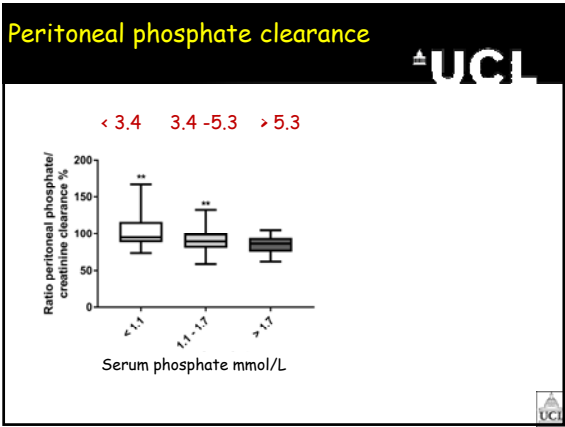
Peritoneal phosphate clearance

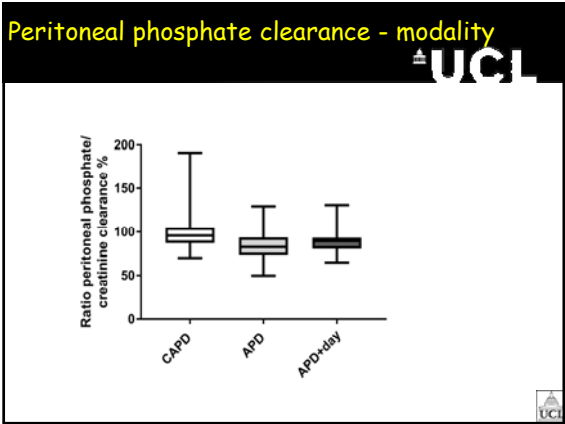
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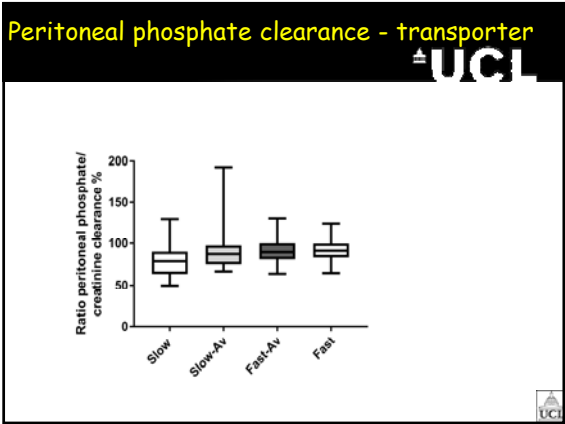
Peritoneal Dialysis

- o phosphate clearance
 - modality
 - APD cyclers < CAPD or APD cyclers with day-time exchange
 - transporter status
 - fast > slow

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Phosphate balance in PD patients

- Dietary advice
 - limit phosphate intake
 - ❖ phosphate binders
- Phosphate clearance
 - urinary losses
 - ❖ GFR
 - ❖ renal tubular secretion
 - peritoneal losses
 - ❖ PD mode
 - ❖ dwell time

Phosphate clearance in PD patients

- What do we need to do ?
 - dietary advice
 - ❖ education
- Urinary clearance
 - preservation residual renal function
 - ❖ avoid nephrotoxins
 - ❖ avoid acute kidney injury
- Peritoneal clearance
 - transporter status
 - dwell time

