Biocompatibele oplossingen voor PD. Waar staan we in 2013?

B. Bammens

May 23th 2032

UZ LEUVEN BELGIUM

PD solutions and biocompatibility

- Definition of ‘a good solution’: part I
- Very first and first PD solutions
- Definition of ‘a good solution’: part II
- The concept of biocompatibility
- Alternative osmotic agents

Definition of ‘a good solution’: part I

A good PD solution should enable…

- Blood purification
- Acid-base control
- Electrolyte correction
- Removal of fluid excess

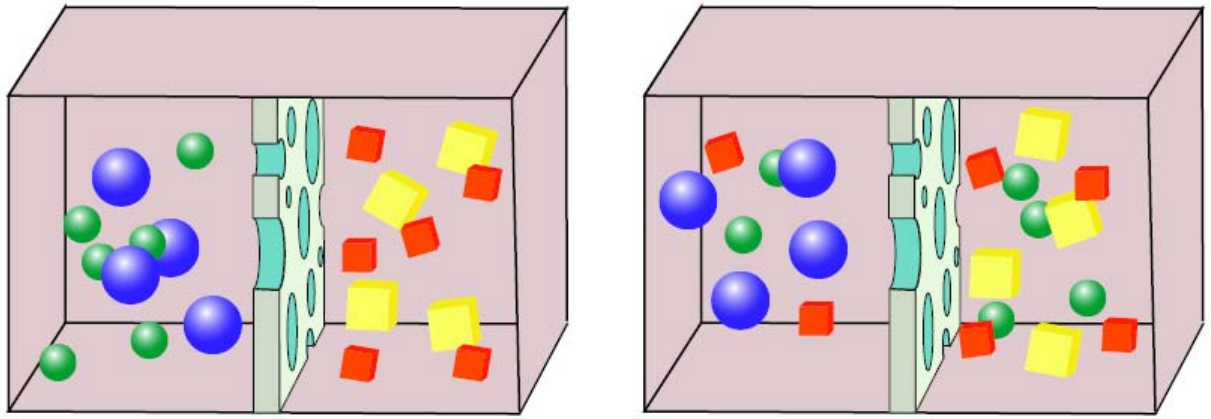
Definition of ‘a good solution’: part I

Diffusion

movement of solutes along their concentration gradient

Fick’s first law of diffusion:

$$J_s = \frac{D_f}{\Delta x} A.\Delta C$$



Definition of ‘a good solution’: part I

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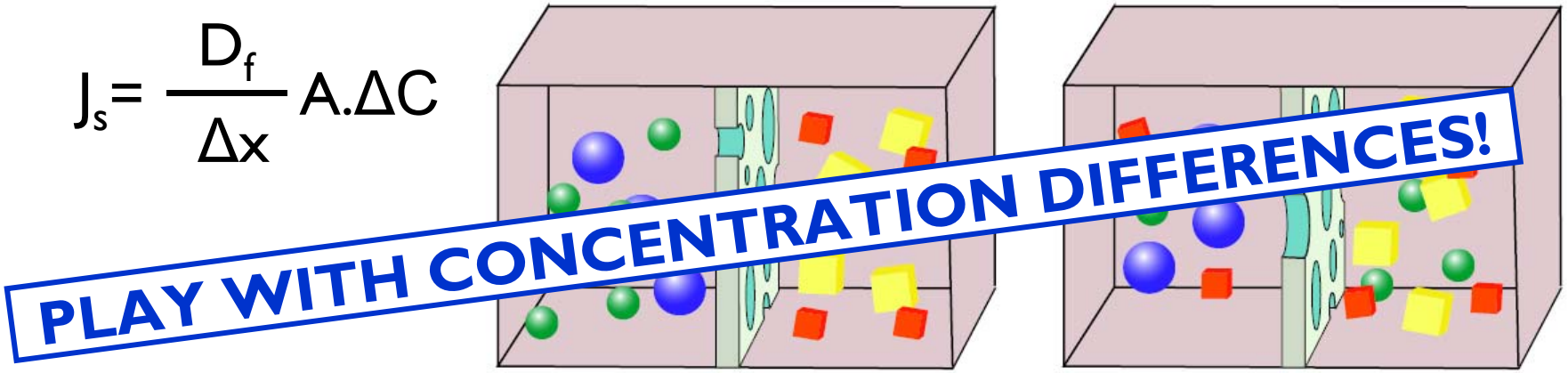
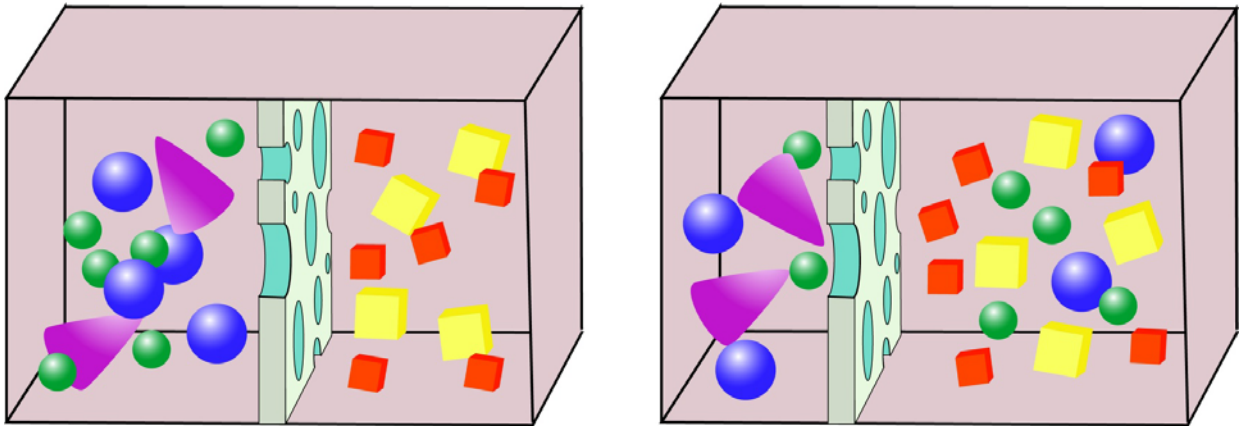


Definition of ‘a good solution’: part I

Convection

movement of solutes along with fluid as it moves across the membrane (solvent drag)

$J_s = J_v.\overline{C}.(1-\sigma)$



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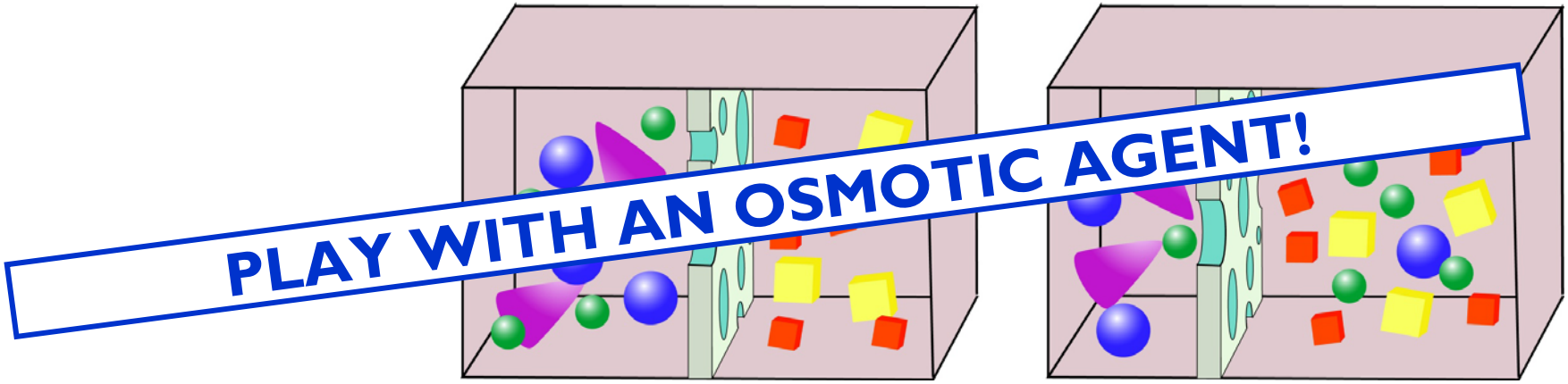

Very first and first PD solutions

	Very first solution	Plasma reference (adult)
Electrolytes (mmol/L)		
Sodium	135	136-145
Calcium	1.5	1.12-1.32
Magnesium	0.75	0.65-1.05
Chloride	107.5	98-107
Potassium	0	3.50-5.10
Buffer (mmol/L)		
Acetate	35	±0
Osmotic agent (g/dL) (osmolality)		
Glucose	2.0 (and higher) 380 (and higher)	0.05-0.10 280-300

Boen. History of peritoneal dialysis. In: Nolph ed, Peritoneal dialysis. Dordrecht: Kluwer, 1989, p.1

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ΔCONCENTRATION!

OSMOTIC AGENT!

Boen. History of peritoneal dialysis. In: Nolph ed, Peritoneal dialysis. Dordrecht: Kluwer, 1989, p.1

Very first and first PD solutions

	Very first solution	Dianeal PD1 (Baxter)	Dianeal PD4 (Baxter)	Plasma reference (adult)
Electrolytes (mmol/L)				
Sodium	135	132	132	136-145
Calcium	1.5	1.75	1.25	1.12-1.32
Magnesium	0.75	0.75	0.25	0.65-1.05
Chloride	107.5	102	95	98-107
Potassium	0	0	0	3.50-5.10
Buffer (mmol/L)				
Acetate	35			±0
Lactate		35	40	0.5-2.2 v ; 0.5-1.6 a
pH		**5.5**	**5.5**	**7.4**
Osmotic agent (g/dL) (osmolality)				
Glucose	2.0 (and higher) 380 (and higher)	1.36/2.27/3.86 347/398/486	1.36/2.27/3.86 344/395/483	0.05-0.10 280-300

Very first and CONVENTIONAL PD SOLUTIONS

	Very first solution	Dianeal PD1 (Baxter)	Dianeal PD4 (Baxter)	Plasma reference (adult)
Electrolytes (mmol/L)				
Sodium	135	132	132	136-145
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Problems with conventional solutions

GLUCOSE	GLUCOSE DEGRADATION PRODUCTS
caloric load hyperinsulinemia lipid profile diabetes	toxic cross-link with proteins and form advanced glycation end products

ADVANCED GLYCATION ENDPRODUCTS (AGEs)

irreversible cross-linking of proteins, diabetic neuropathy

changes in peritoneal membrane ("diabetiform")
incriminated in late ultrafiltration problems

Problems with conventional solutions

Low pH

infusion pain
membrane damage
worse peritoneal defense

GLUCOSE

rapid dissipation of osmotic gradient
worse ultrafiltration (long dwell / fast transporter status)

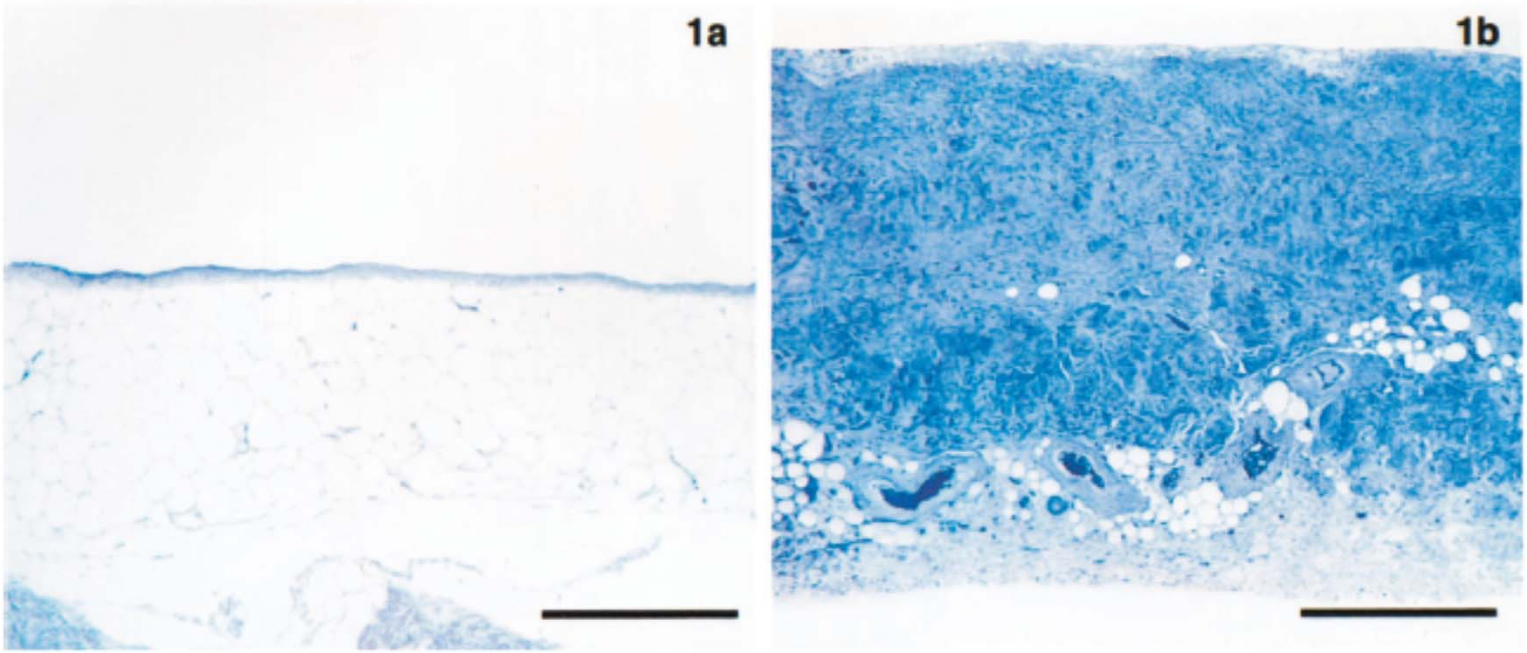
GLUCOSE DEGRADATION PRODUCTS

nk with proteins and form
ed glycation end products

changes in peritoneal membrane ("diabetiform")
incriminated in late ultrafiltration problems

Problems with conventional solutions

Morphological changes in peritoneal membrane
THICKNESS OF SUBMESOTHELIAL COMPACT ZONE



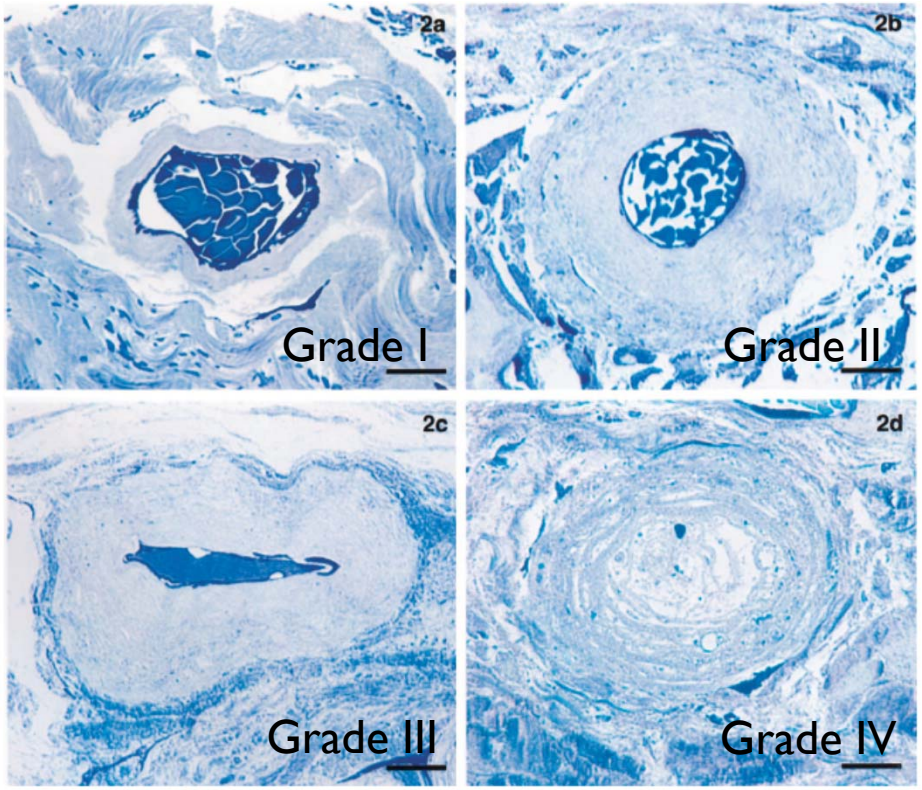
Normal

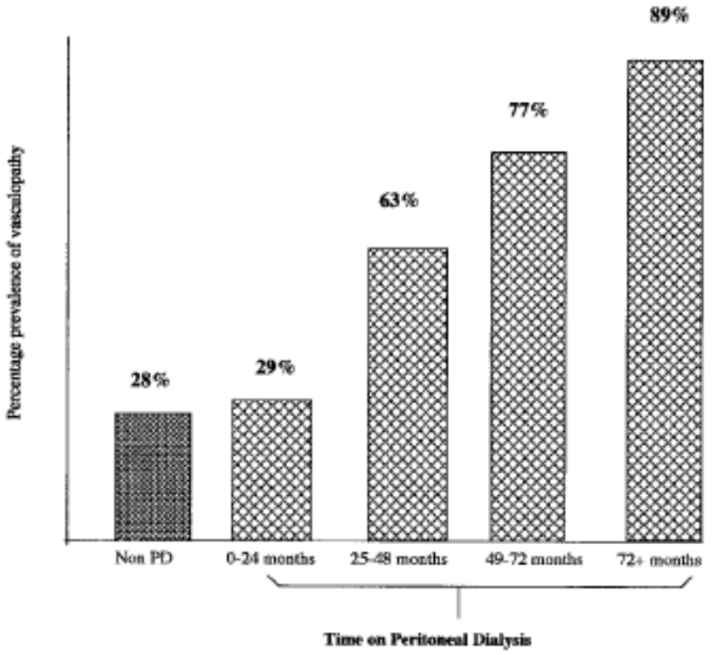
After 9 years of PD

Williams et al. J Am Soc Nephrol 13: 470-479, 2002

Problems with conventional solutions

Morphological changes in peritoneal membrane
PERITONEAL VASCULOPATHY





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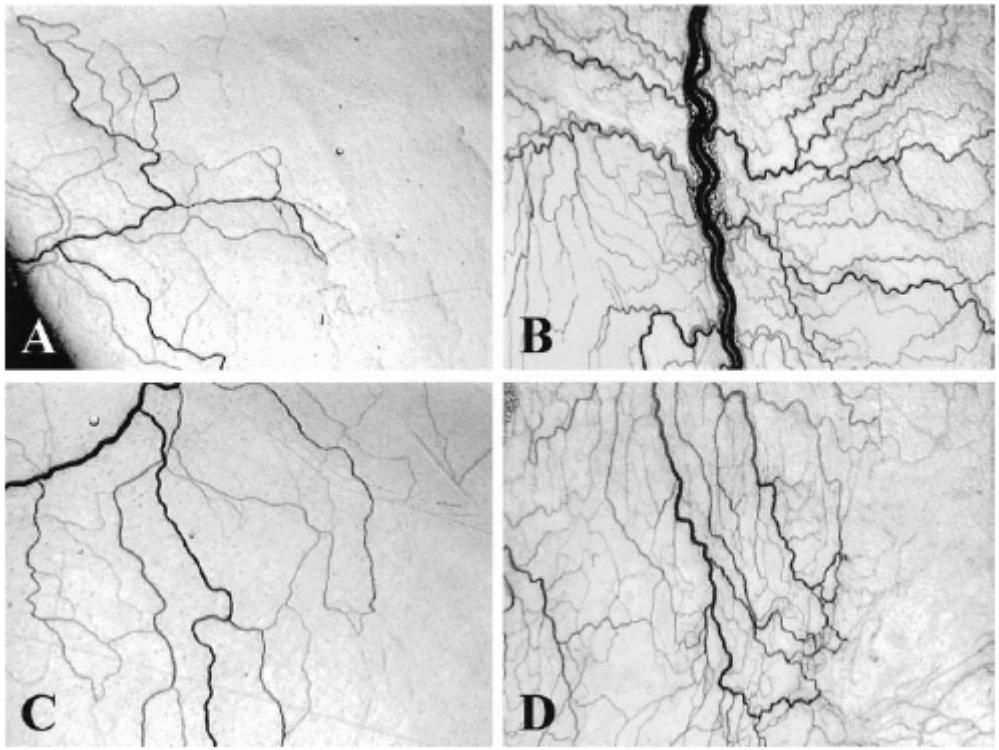
Problems with conventional solutions

Morphological changes in peritoneal membrane
NEO-ANGIOGENESIS of PERITONEAL MICROCIRCULATION



De Vriese et al. J Am Soc Nephrol 12: 1734-1741, 2001

Problems with conventional solutions

Morphological changes in peritoneal membrane
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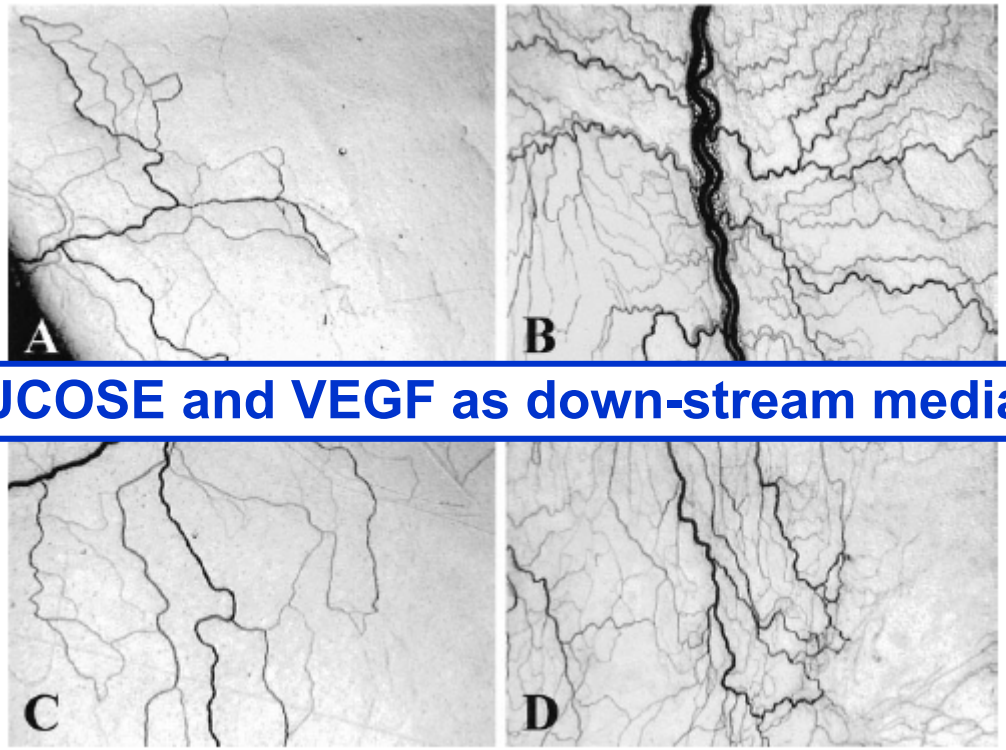
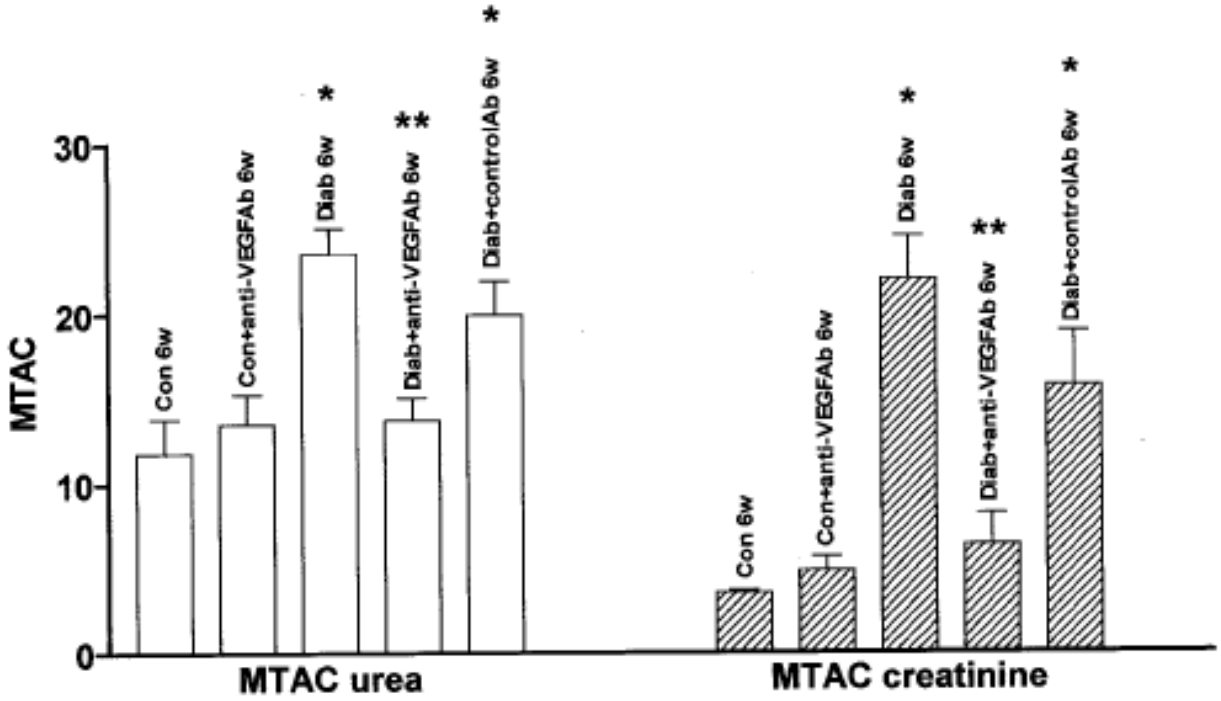


GLUCOSE and VEGF as down-stream mediator

De Vriese et al. J Am Soc Nephrol 12: 1734-1741, 2001

Problems with conventional solutions

Functional changes in peritoneal membrane
INCREASED TRANSPORT of SMALL SOLUTES



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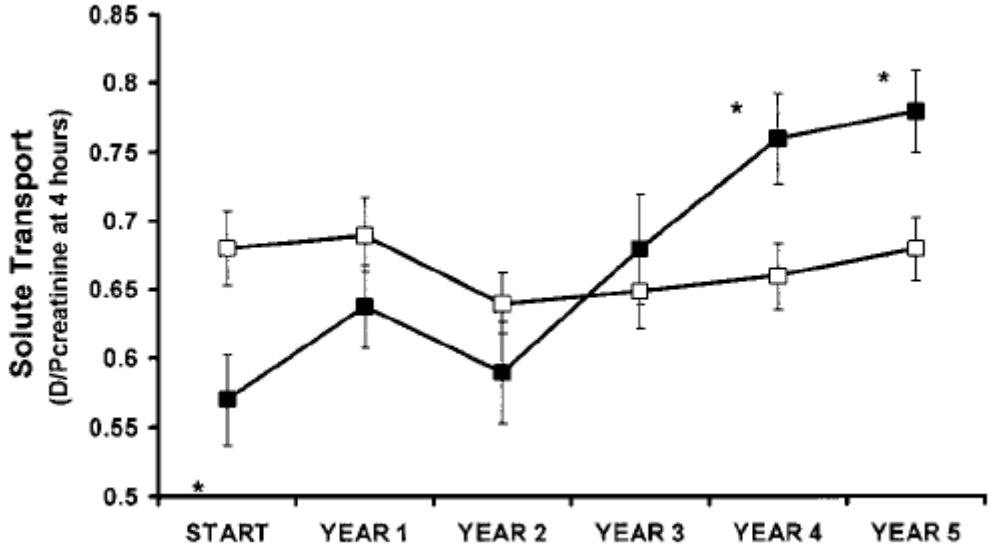
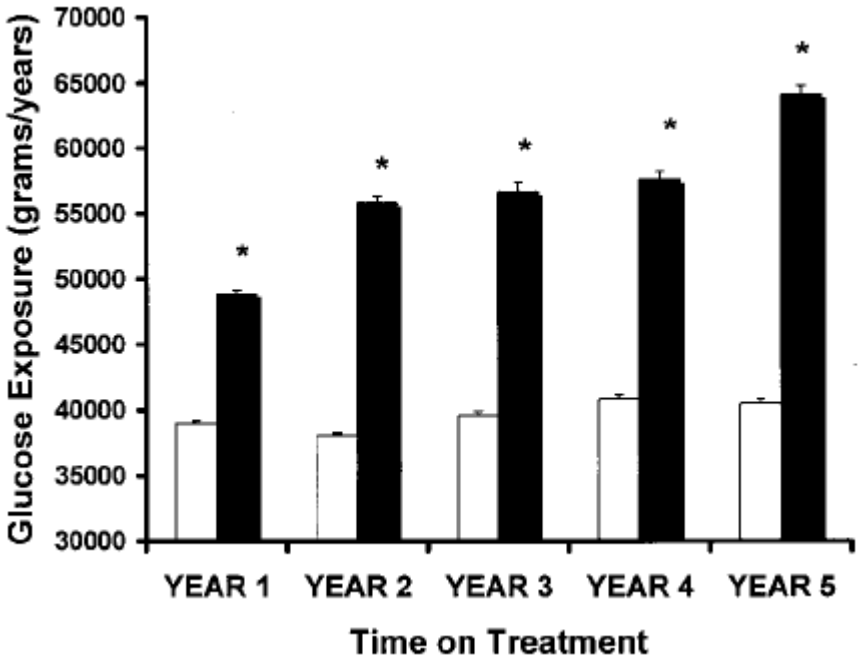
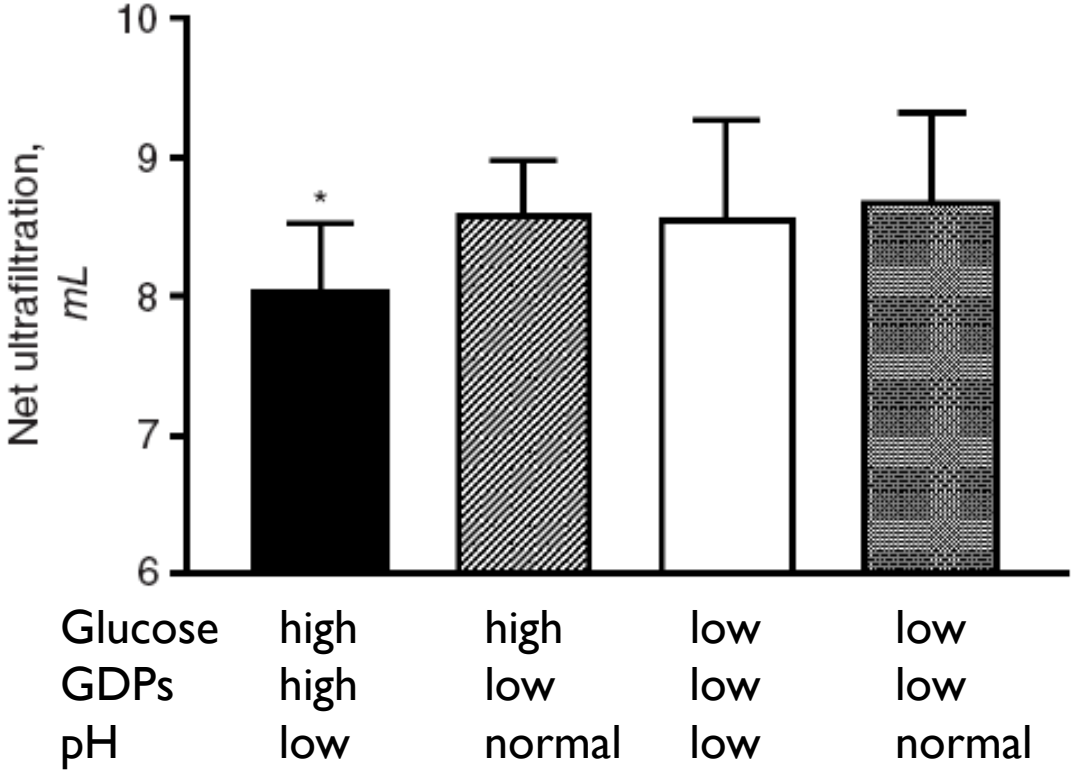




Davies et al. J Am Soc Nephrol 12: 1046-1051, 2001

Problems with conventional solutions

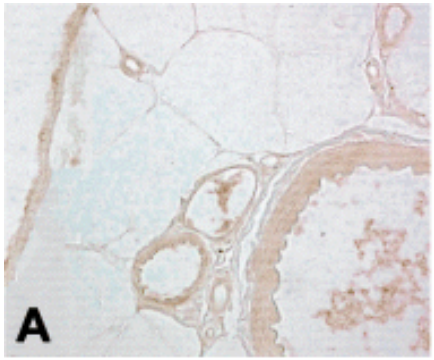
Functional changes in peritoneal membrane
LOSS of ULTRAFILTRATION CAPACITY

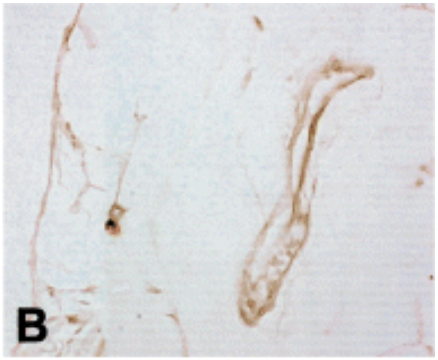


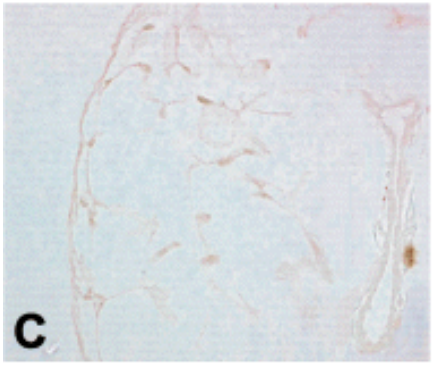
Mortier et al. Kidney Int 66: 1257-1265, 2004

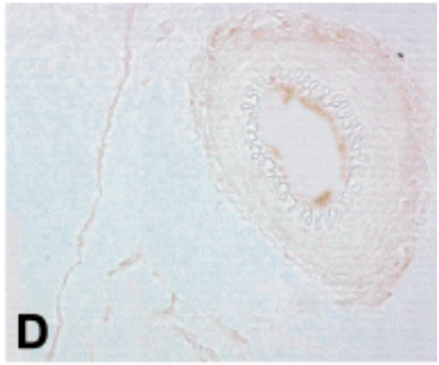
Problems with conventional solutions

Morphological changes in peritoneal membrane
IMMUNOSTAINING for METHYLGLYOXAL (GDP)







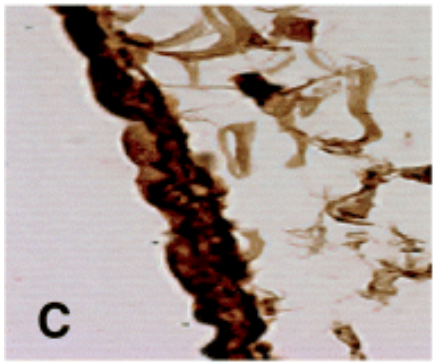


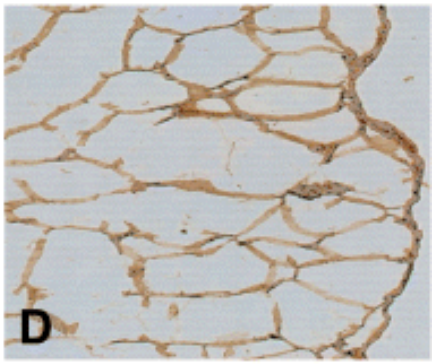
Glucose	high	high	low	low
GDPs	high	low	low	low
pH	low	normal	low	normal

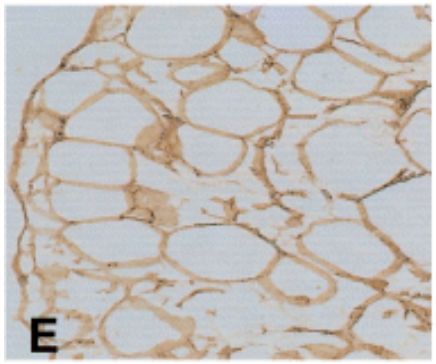
Mortier et al. Kidney Int 66: 1257-1265, 2004

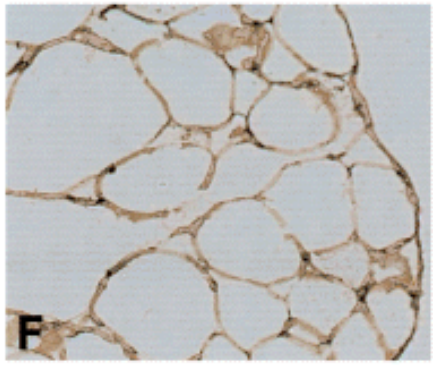
Problems with conventional solutions

Morphological changes in peritoneal membrane
IMMUNOSTAINING for AGEs









Glucose	high	high	low	low
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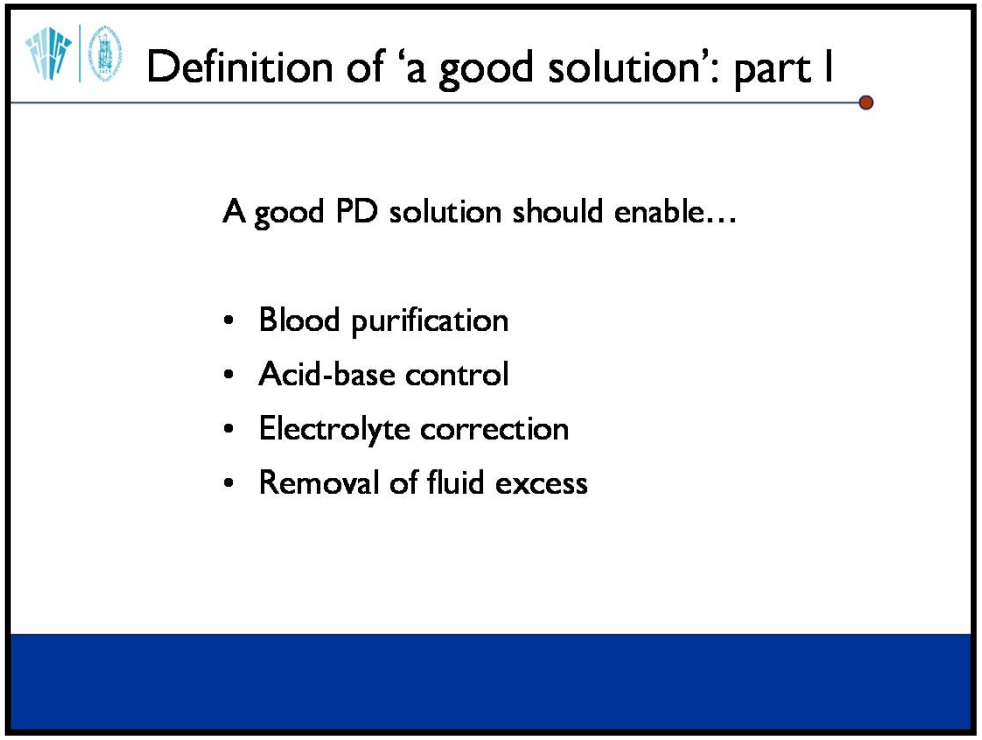
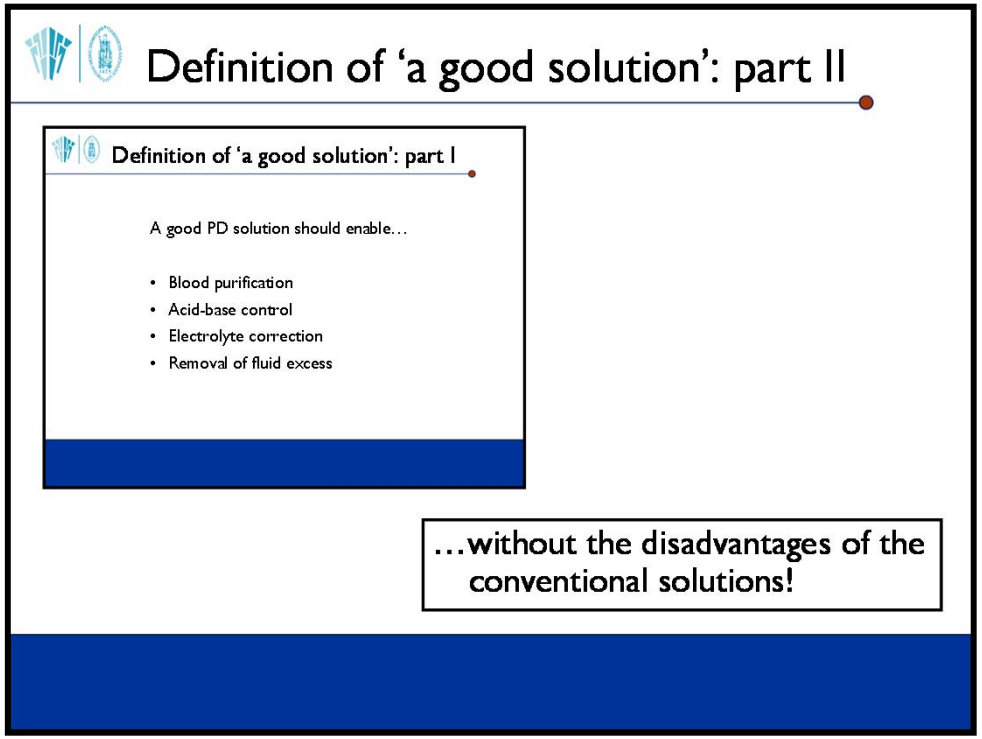
Definition of ‘a good solution’: part II



…without the disadvantages of the conventional solutions!

Definition of ‘a good solution’: part II



near-normal pH

and/or

low GDPs

(biocompatible strictu sensu)

low or no glucose

(alternative osmotic agent)

The concept of biocompatibility

CONVENTIONAL SOLUTIONS

low pH (± 5) to slow production of GDPs

not low enough to stop production

lower is not possible (pain, damage)

BIOCOMPATIBLE SOLUTIONS

two compartments:
1 glucose with very low pH, 1 buffer and electrolytes

when mixed, final pH is physiologic

buffer can be bicarbonate instead of lactate

The concept of biocompatibility

	Physioneal 35 (Baxter)	Physioneal 40 (Baxter)	Balance (FMC)	BicaVera (FMC)	Gambrosol trio 40 (Gambro)	Plasma reference (adult)
Electrolytes (mmol/L)						
Sodium	132	132	134	134	133/132/131	136-145
Calcium	1.75	1.25	1.25	1.75	1.38/1.35/1.31	1.12-1.32
Magnesium	0.25	0.25	0.50	0.50	0.26/0.25/0.24	0.65-1.05
Chloride	101	95	100.5	104.5	95.4/95.2/95.2	98-107
Potassium	0	0	0	0	0	3.50-5.10
Buffer (mmol/L)						
Acetate						±0
Lactate	10	15	35		41/40/39	0.5-2.2 v ; 0.5-1.6 a
Bicarbonate	25	25		34		22-29 v ; 21-28 a
pH	**7.4**	**7.4**	**7.0**	**7.4**	**6.2**	**7.4**
Osmotic agent (g/dL) (osmolality)						
Glucose	1.36/2.27/3.86 345/396/484	1.36/2.27/3.86 344/395/483	1.5/2.3/4.25 356/399/509	1.5/2.3/4.25 358/399/509	1.5/2.5/3.9	0.05-0.10 280-300

Alternative osmotic agents

	Dianeal PD1 (Baxter)	Dianeal PD4 (Baxter)		Extraneal (Baxter)		Nutrineal (Baxter)	Plasma reference (adult)
Electrolytes (mmol/L)							
Sodium	132	132		133		132	136-145
Calcium	1.75	1.25		1.75		1.25	1.12-1.32
Magnesium	0.75	0.25		0.25		0.25	0.65-1.05
Chloride	102	95		96		105	98-107
Potassium	0	0		0		0	3.50-5.10
Buffer (mmol/L)							
Acetate							±0
Lactate	35	40		40		40	0.5-2.2 v ; 0.5-1.6 a
Bicarbonate							22-29 v ; 21-28 a
pH	**5.5**	**5.5**		**5.5**		**6.7**	**7.4**
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The concept of biocompatibility

EXPECTED BENEFITS

less damage to peritoneal membrane
less systemic glucose, GDP and AGE damage
neutral pH: less infusion pain, better peritoneal defenses

The concept of biocompatibility

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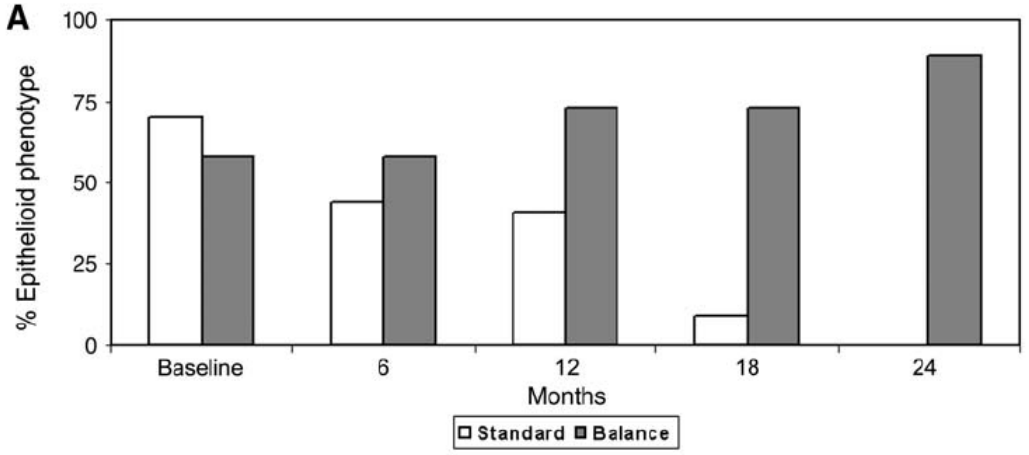
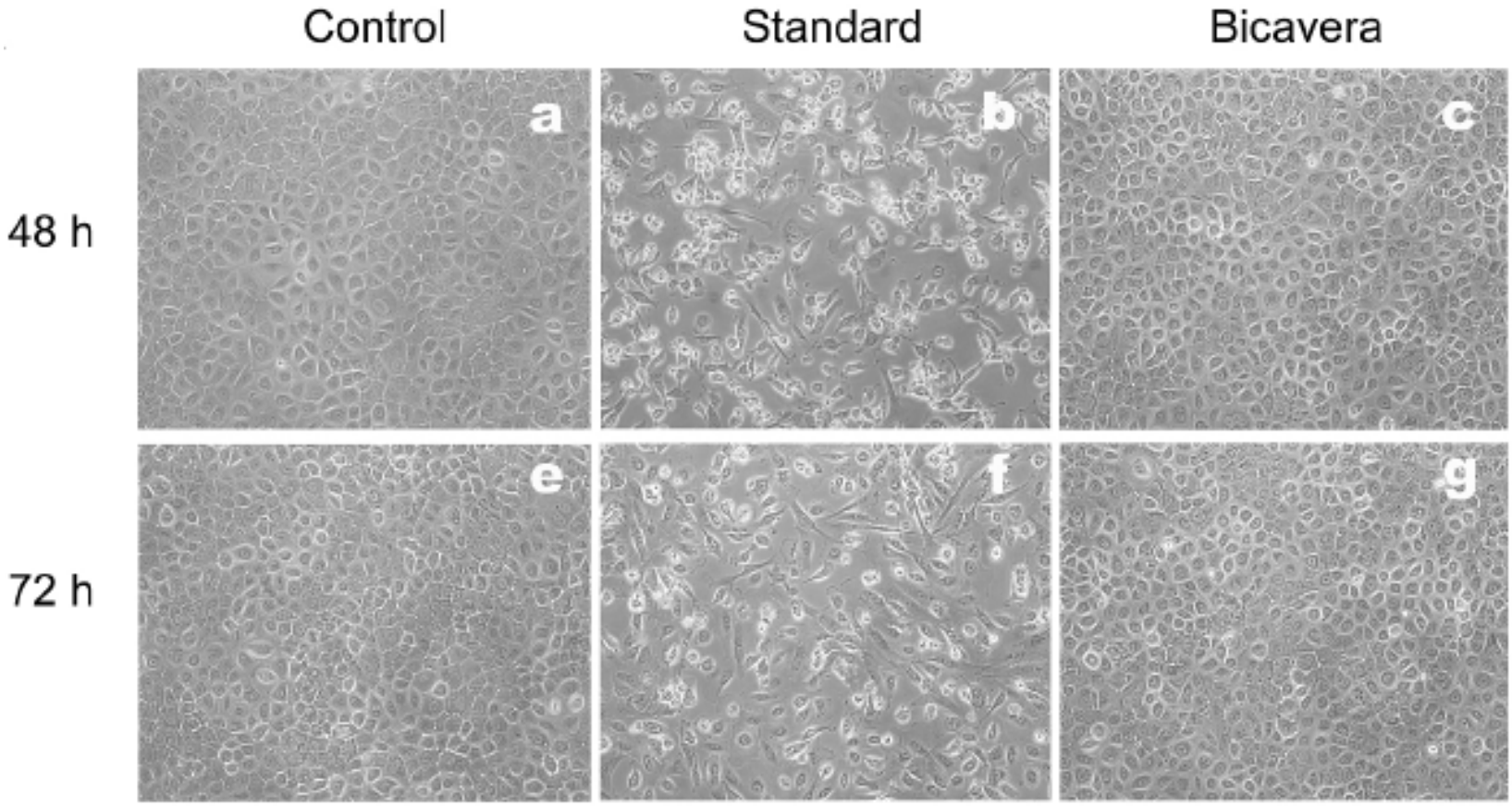


Bajo et al. Nephrol Dial Transplant 26: 282-291,2011

Chaudhary et al. Clin J Am Soc Nephrol 5: 723-732, 2010

The concept of biocompatibility



Fernàndez-Perpèn et al. Perit Dial Transplant 2012 Jan 3 (Epub ahead of print)

The concept of biocompatibility

EXPECTED BENEFITS

less damage to peritoneal membrane
less systemic glucose, GDP and AGE damage
neutral pH: less infusion pain, better peritoneal defenses

Patients were asked, using an open-ended question, to compare the new solution with their old one (Did you notice anything different with the new solution compared with the one you were using during the pre-study period?). Ten of the 11 patients responding to this question reported less pain or discomfort on infusion or drain.

Dratwa et al. Kidney Int 64(S88): S105-S113, 2003
Tranaeus Perit Dial Int 20: 516-523, 2000

The concept of biocompatibility

EXPECTED BENEFITS

less damage to peritoneal membrane
less systemic glucose, GDP and AGE damage
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HARD END-POINTS?

Lower incidence of peritonitis?
Better technique survival? (long-term UF, peritonitis)
Better preservation of RRF?
Better overall survival?

The concept of biocompatibility

The Euro Balance Trial (randomized, cross-over)

Williams et al. Kidney Int 66: 408-418, 2004

The Korean Survival Study (observational)

Lee et al. Perit Dial Int 25: 248-255, 2005

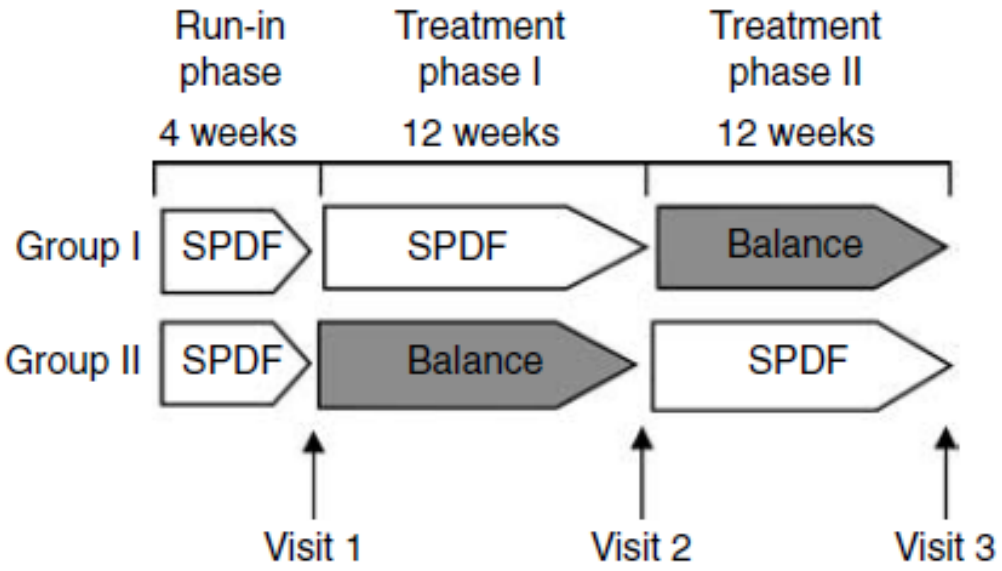
Lee et al. Nephrol Dial Transplant 21: 2893-2899, 2006

The Other Korean Survival Study (observational)

Han et al. Am J Kidney Dis 54: 711-720, 2009

The Euro Balance Trial

86 patients randomized,
71 in final analysis

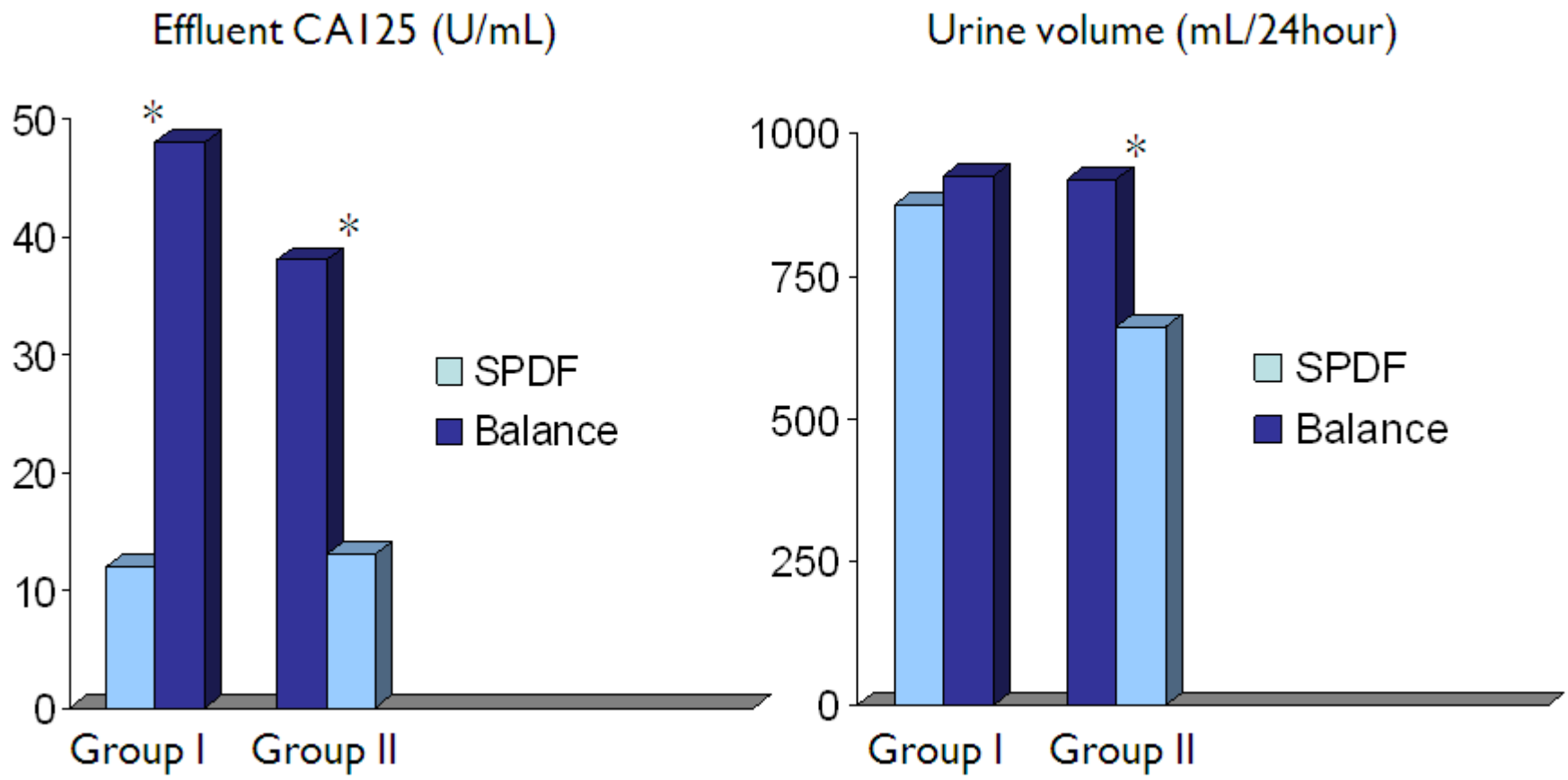


Primary endpoint:
- CA125 in dialysis effluent

Secondary endpoints:
- HA, TNFα, VEGF, PICP in dialysis effluent
- CML, imidazolone in serum and dialysis effluent
- clinical e.g. ultrafiltration, urine volume…

Williams et al. Kidney Int 66: 408-418, 2004

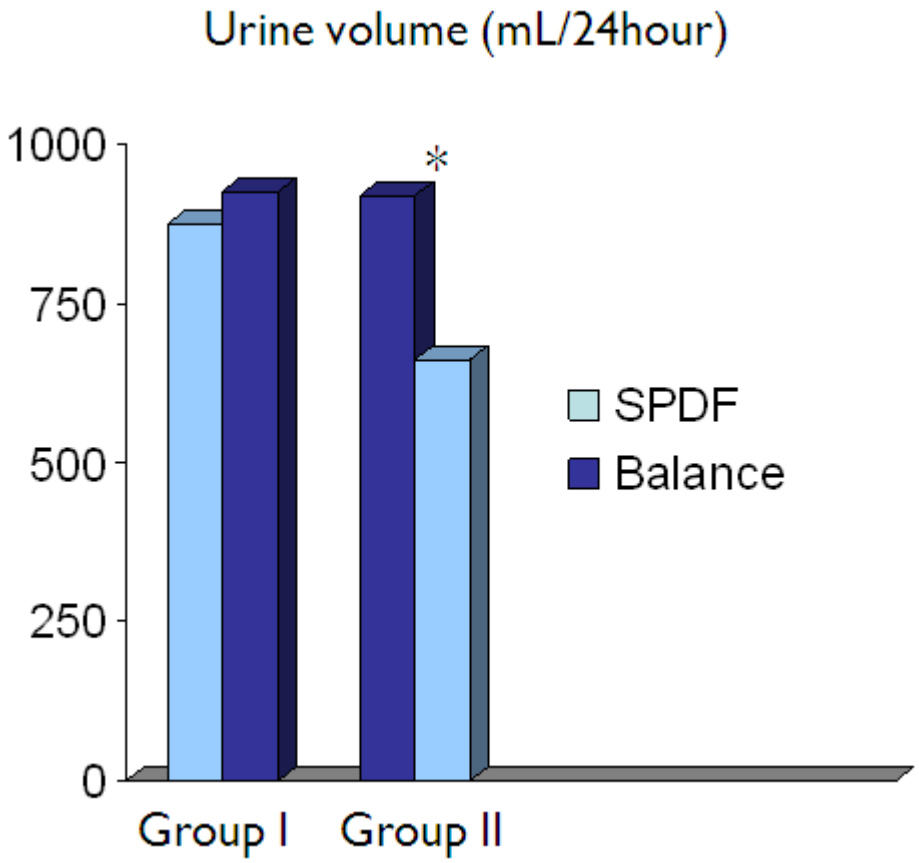
The Euro Balance Trial



Williams et al. Kidney Int 66: 408-418, 2004

The Euro Balance Trial

Does this mean that the biocompatible solution preserves kidney function?



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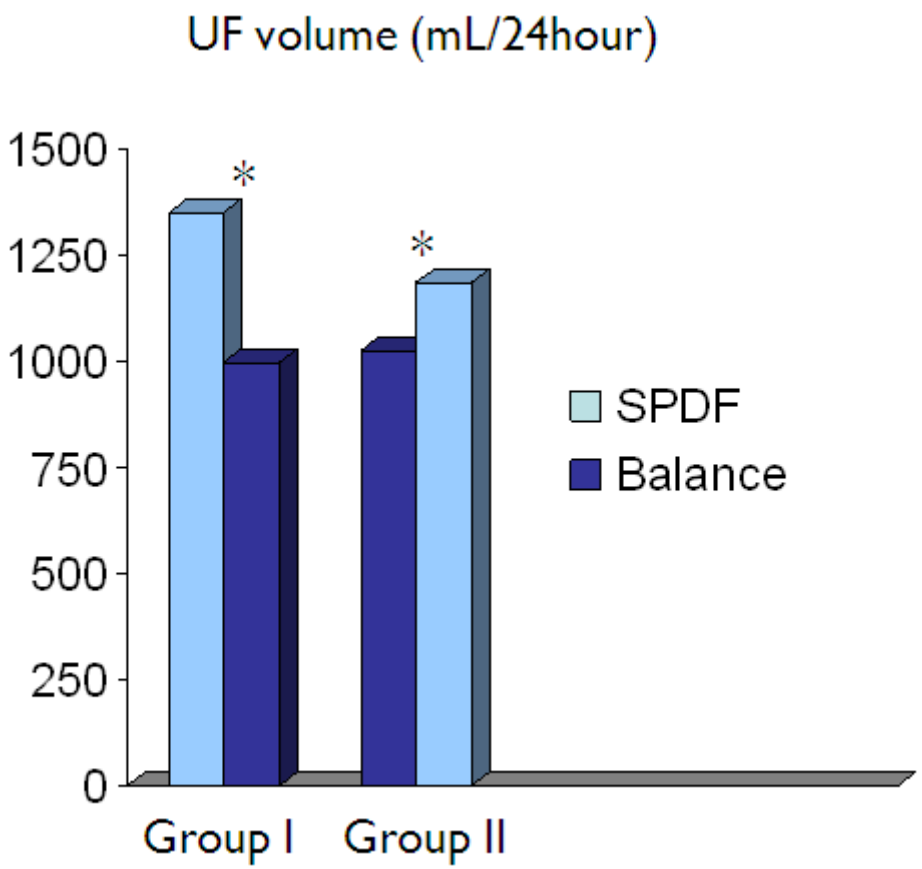
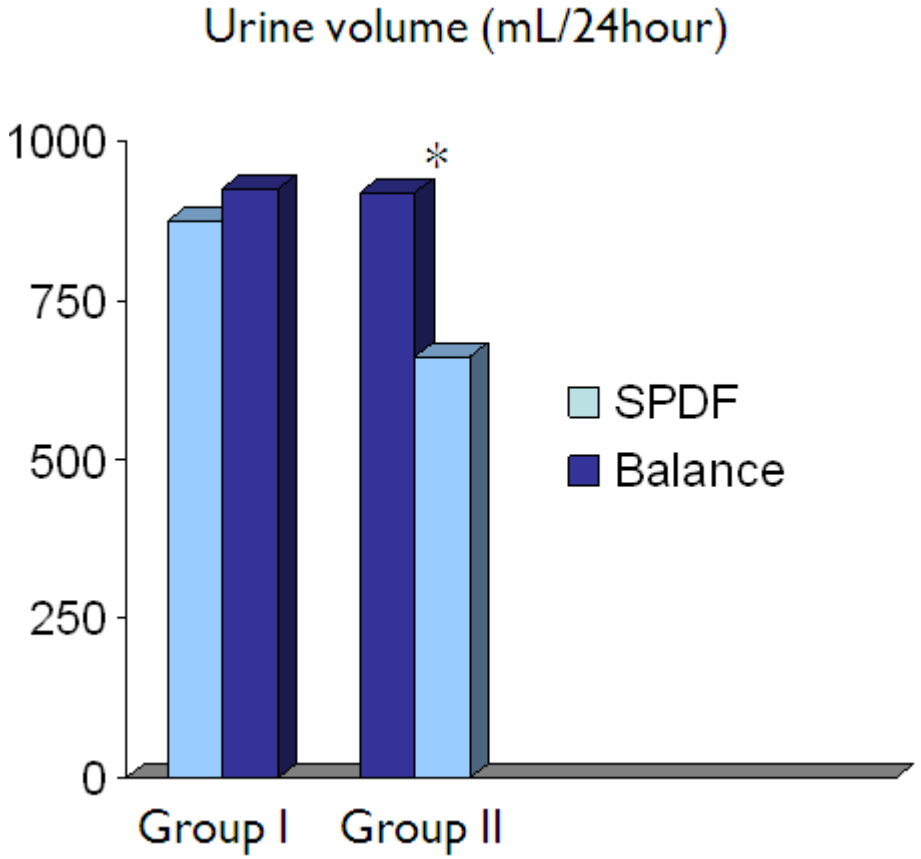
The Euro Balance Trial





Williams et al. Kidney Int 66: 408-418, 2004

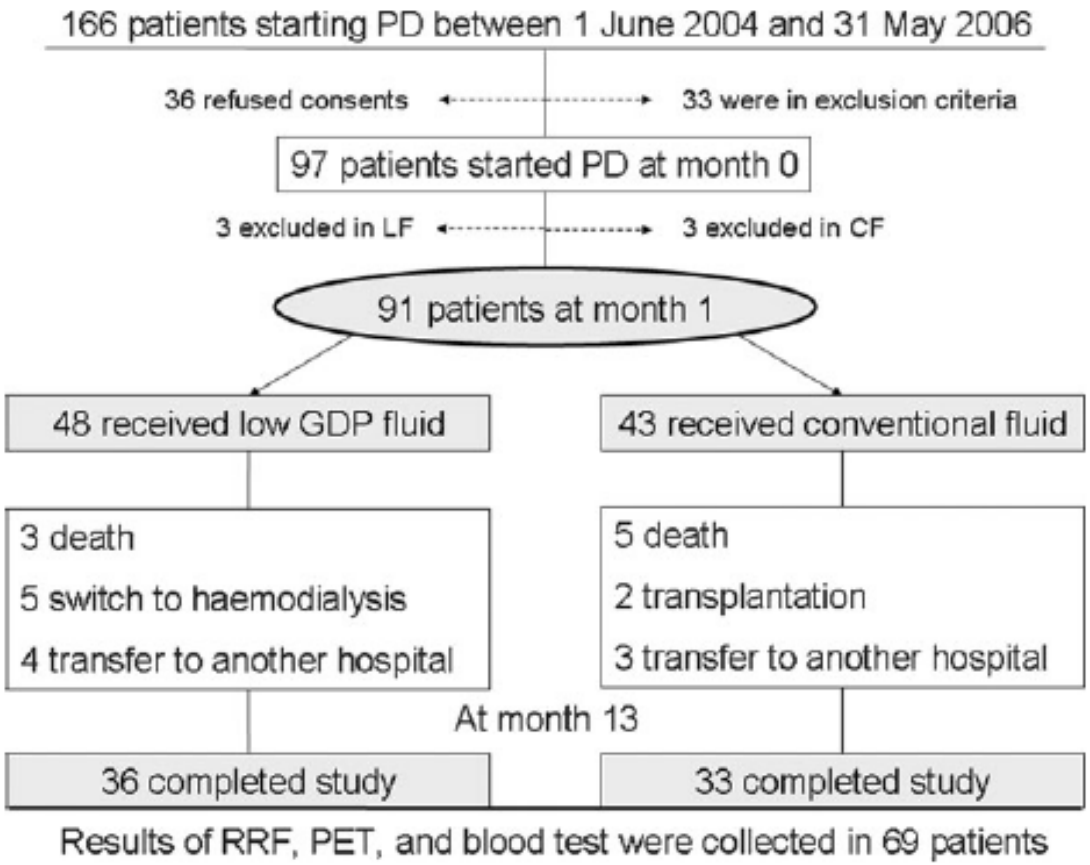
The Euro Balance Trial

standard → biocompatible	biocompatible → standard
increased D/P creatinine	*decreased* D/P creatinine
more rapid transport status	slower transport status
decreased ultrafiltration	*increased* ultrafiltration
increased urine volume	decreased urine volume

Does this mean that the biocompatible solution preserves kidney function?

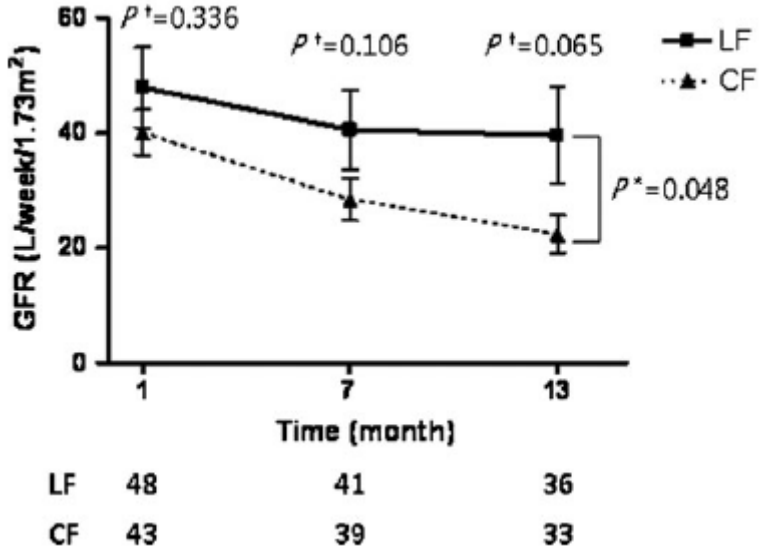
Williams et al. Kidney Int 66: 408-418, 2004

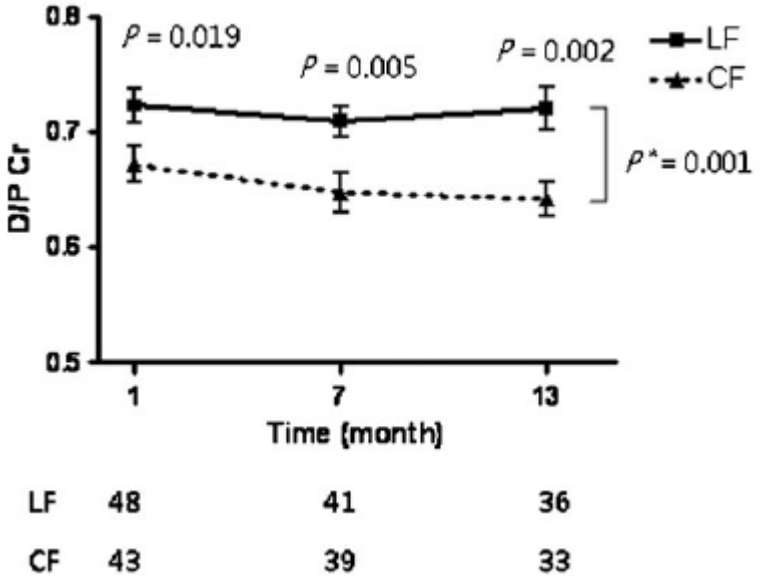
Recent study shows the same…



Kim et al. Nephrol Dial Int 24: 2899-2908, 2009

Recent study shows the same…





Does this mean that the biocompatible solution preserves kidney function?

Kim et al. Nephrol Dial Transplant 24: 2899-2908, 2009
Davies Nephrol Dial Transplant 24: 2620-2622, 2009

The Korean Survival Study

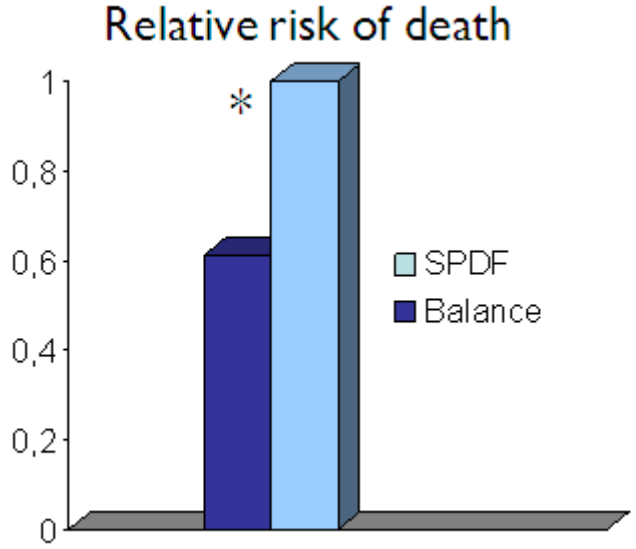
Retrospective, observational data-base analysis of survival of Korean PD patients treated with either biocompatible (N = 1395) or conventional (N = 819) PD solution

No difference in technique survival or peritonitis rates

Lee et al. Nephrol Dial Transplant 21: 2893-2899, 2006

The Korean Survival Study

Retrospective, observational data-base analysis of survival of Korean PD patients treated with either biocompatible (N = 1395) or conventional (N = 819) PD solution



39% reduced risk of death in patients on biocompatible PD solution

Lee et al. Nephrol Dial Transplant 21: 2893-2899, 2006

The Korean Survival Study

Patients who received the biocompatible solution were younger than those who got the standard solution!

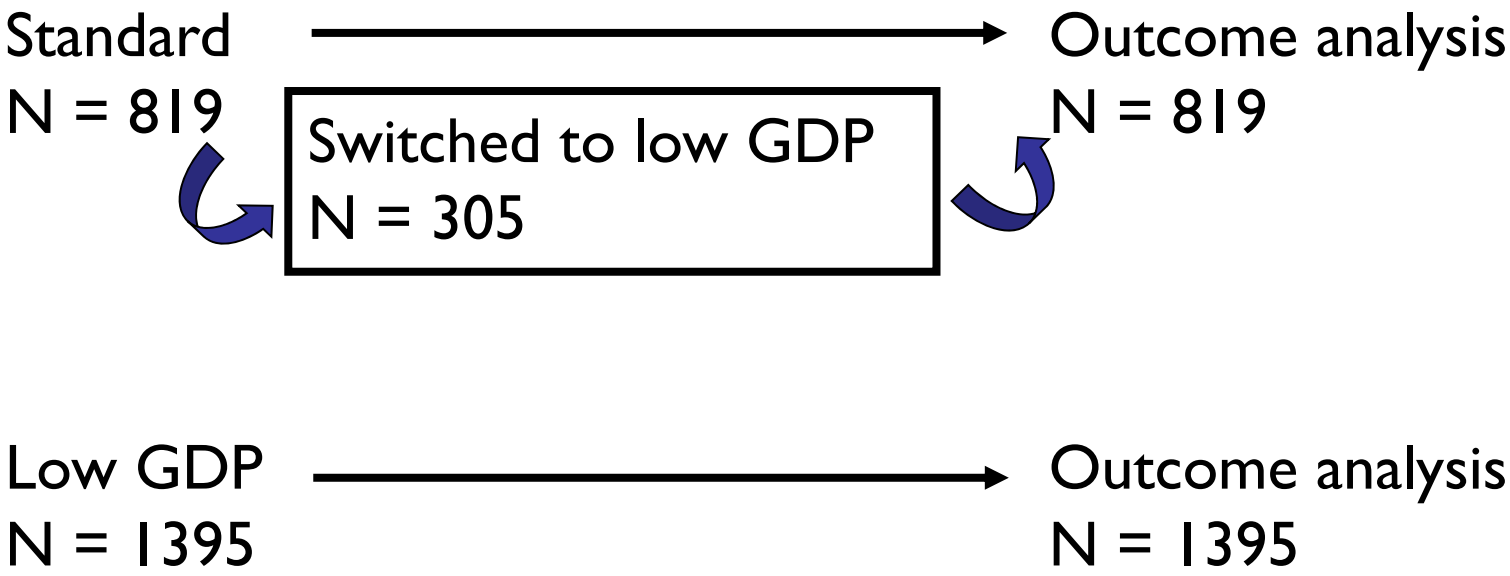
The age difference alone accounted for almost half of the survival difference!

AND there was another problem…

Lee et al. Nephrol Dial Transplant 21: 2893-2899, 2006

The Korean Survival Study

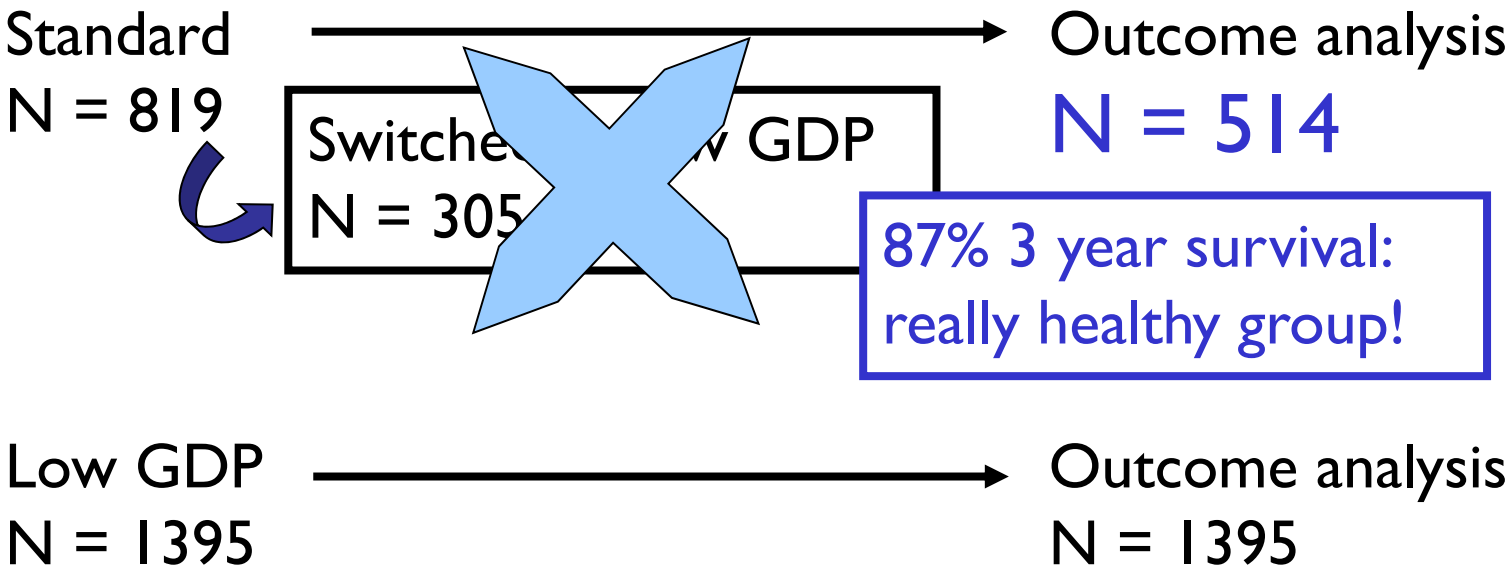
HOW IT SHOULD BE DONE: INTENT-TO-TREAT



Lee et al. Nephrol Dial Transplant 21: 2893-2899, 2006

The Korean Survival Study

HOW IT WAS DONE: EXCLUSION



Lee et al. Nephrol Dial Transplant 21: 2893-2899, 2006

The Korean Survival Study

If you want your team to win a beauty contest,
eliminate all the beautiful contestants from the other team!

The Other Korean Survival Study

Retrospective, observational data-base analysis of survival of Korean PD patients treated with either biocompatible (N = 542) or conventional (N = 1621) PD solution

Han et al. Am J Kidney Dis 54: 711-720, 2009

The Other Korean Survival Study

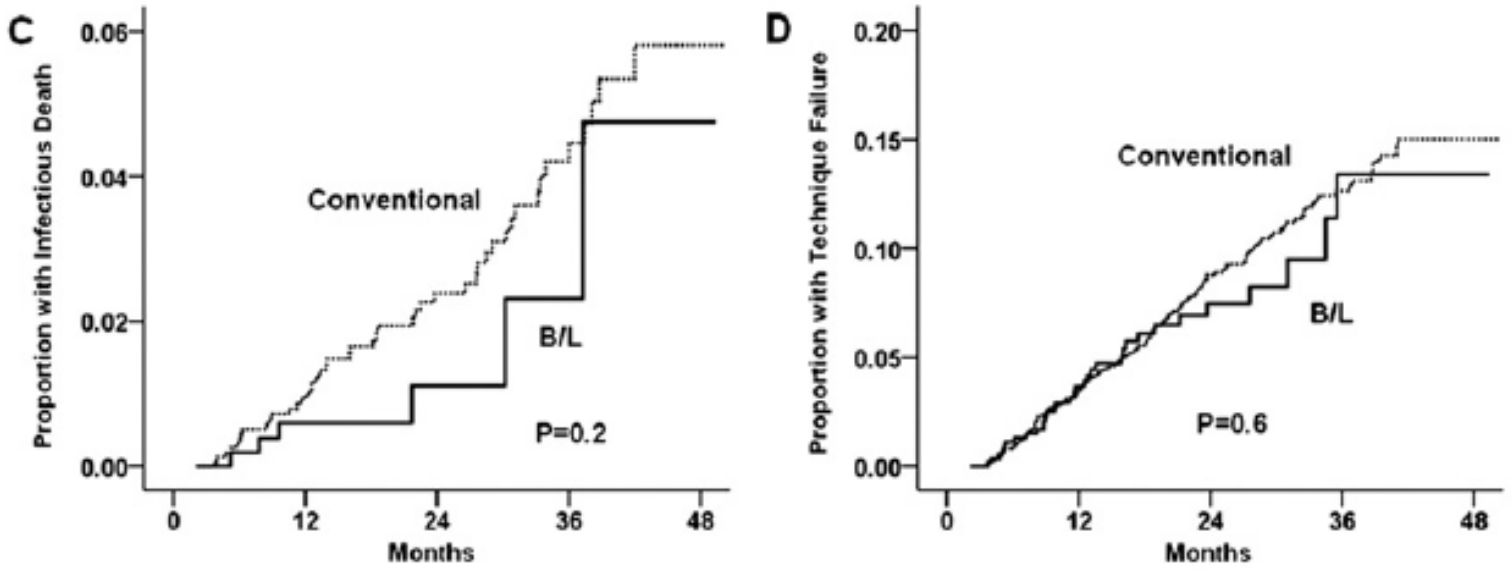
Retrospective, observational data-base analysis of survival of Korean PD patients treated with either biocompatible (N = 542) or conventional (N = 1621) PD solution

The Korean Survival Study	The Other Korean Survival Study
incident patients	incident patients
1/2002 – 5/2005	7/2003-12/2006
LOW icodextrin use	HIGH icodextrin use
(1.5%)	(36.5%)

Han et al. Am J Kidney Dis 54: 711-720, 2009
Lee et al. Nephrol Dial Transplant 21: 2893-2899, 2006

The Other Korean Survival Study

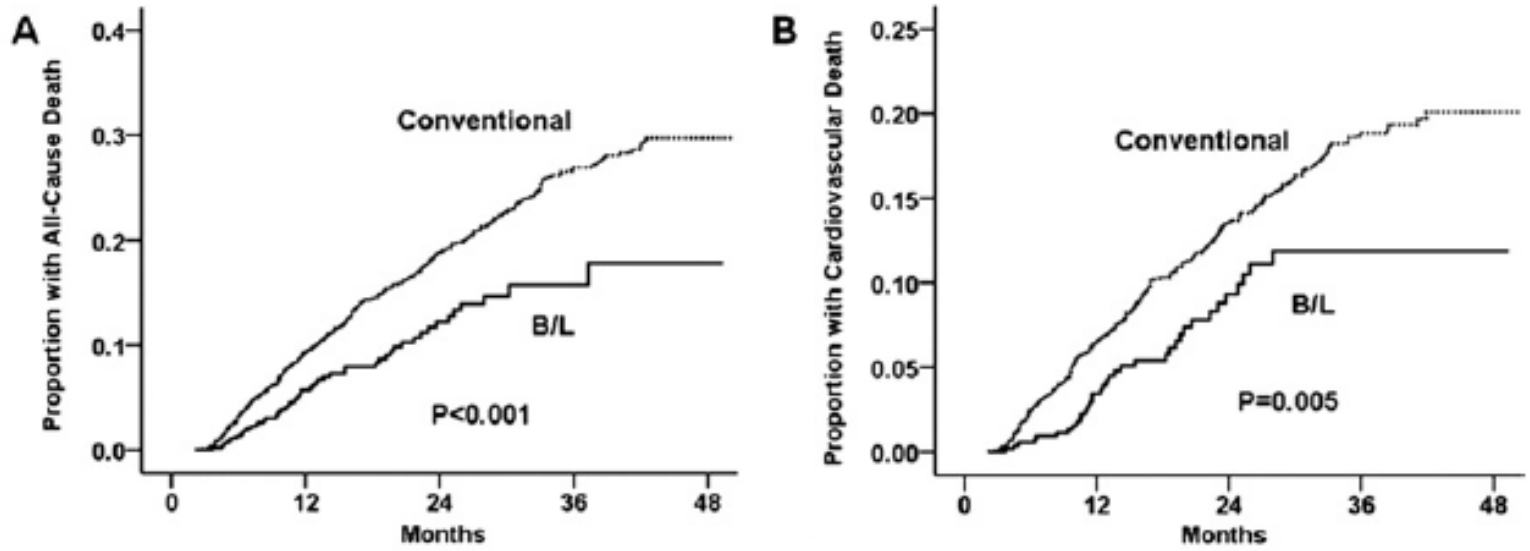
No difference in technique survival or infectious death



Han et al. Am J Kidney Dis 54: 711-720, 2009

The Other Korean Survival Study

LOWER all-cause and cardiovascular mortality in patients on biocompatible PD solution



Han et al. Am J Kidney Dis 54: 711-720, 2009

The Other Korean Survival Study

Patients who received the biocompatible solution…

- were younger (*P* 0.06)
- were less likely to be male (*P* 0.01)
- were less likely to have diabetes (*P* 0.08)
- were more likely to use icodextrin (*P* 0.01)

… than those who got the standard solution.

POTENTIAL SELECTION BIAS!

Han et al. Am J Kidney Dis 54: 711-720, 2009

The Other Korean Survival Study

EFFORTS TO CORRECT FOR THIS POTENTIAL BIAS

Han et al. Am J Kidney Dis 54: 711-720, 2009

The Other Korean Survival Study

EFFORTS TO CORRECT FOR THIS POTENTIAL BIAS

Multivariate Cox Proportional Hazards Model

	Unmatched Cohort	
	Hazard Ratio (95% confidence interval)	*P*
B/L (*v* conventional)	0.69 (0.52-0.93)	0.02
Sex (women *v* men)	1.16 (0.95-1.42)	0.2
Age (/1-y increase)	1.07 (1.06-1.08)	<0.001
Diabetes (*v* no diabetes)	[illegible]	[illegible]
Cardiovascular [illegible]	[illegible]	0.02
Low [illegible]	1.16 (0.91-1.46)	0.2
Cent[illegible] (*v* less experienced)	0.83 (0.62-1.12)	0.2
Icodextrin (*v* no use)	0.43 (0.34-0.55)	<0.001

RESIDUAL CONFOUNDING?

Han et al. Am J Kidney Dis 54: 711-720, 2009

The Other Korean Survival Study

EFFORTS TO CORRECT FOR THIS POTENTIAL BIAS

Comparison of matched cohort using Propensity Scoring

Baseline Characteristics of Propensity-Matched Patients

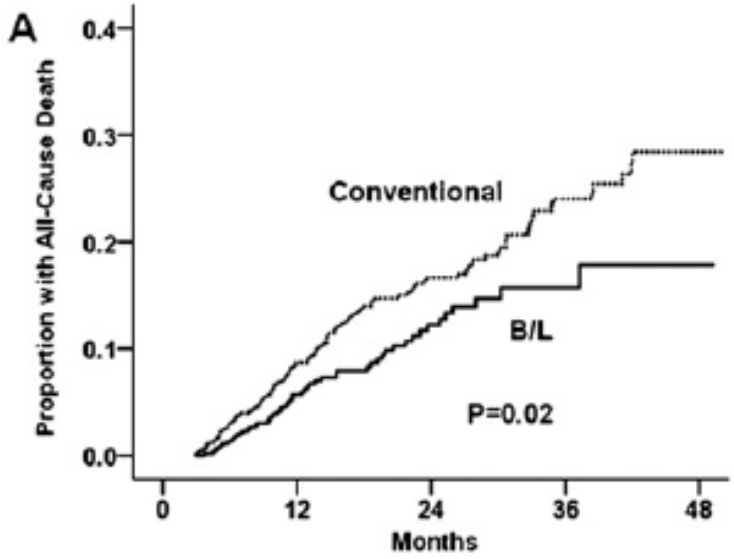
	All (N = 1,084)	B/L (n = 542)	Conventional (n = 542)	*P*
Age (y)	54.9 ± 13.6	53.9 ± 13.9	54.6 ± 13.4	0.4
Men	526 (48.5)	263 (48.5)	263 (48.5)	0.9
Primary renal disease				
Diabetic nephropathy	540 (49.8)	270 (49.8)	270 (49.8)	0.9
Hypertensive nephrosclerosis	257 (23.7)	131 (24.2)	126 (23.2)	0.7
Chronic glomerulonephritis	113 (10.0)	61 (11.3)	52 (9.6)	0.4
Others	60 (6.0)	23 (4.2)	37 (6.8)	0.08
Unknown	114 (10.5)	57 (10.5)	57 (10.5)	0.9
Cardiovascular comorbidity	123 (11.3)	69 (12.7)	54 (10.0)	0.2
Icodextrin use	448 (41.3)	224 (41.3)	224 (41.3)	0.9
Socioeconomic status				
High	789 (72.8)	394 (72.7)	395 (72.9)	0.9
Low	295 (27.2)	148 (27.3)	147 (27.1)	
Patients treated in less experienced center	88 (8.1)	47 (8.7)	41 (7.6)	0.6

Han et al. Am J Kidney Dis 54: 711-720, 2009

The Other Korean Survival Study

EFFORTS TO CORRECT FOR THIS POTENTIAL BIAS

Comparison of matched cohort using Propensity Scoring



all-cause mortality

Han et al. Am J Kidney Dis 54: 711-720, 2009

The Other Korean Survival Study

EFFORTS TO CORRECT FOR THIS POTENTIAL BIAS

Comparison of matched cohort using Propensity Scoring

	Matched Cohort	
	Hazard Ratio (95% confidence interval)	*P*
B/L (*v* conventional)	0.70 (0.50-0.98)	0.04
Sex (women *v* men)	1.05 (0.76-1.45)	0.8
Age (/1-y increase)	1.07 (1.05-1.09)	<0.001
Diabetes (*v* no diabetes)	1.91 (1.35-2.70)	<0.001
Cardiovascular comorbidity (*v* no)	1.31 (0.87-1.98)	0.2
Low socioeconomic status (*v* high)	1.35 (0.95-1.92)	0.1
Center (*v* less experienced)	0.49 (0.32-0.76)	0.001
Icodextrin (*v* no use)	0.40 (0.28-0.58)	<0.001

Han et al. Am J Kidney Dis 54: 711-720, 2009

The concept of biocompatibility

(MY) CONCLUSIONS FROM OBSERVATIONAL TRIALS

HARD END-POINTS?

Lower incidence of peritonitis?

NO

Better technique survival? (long-term UF, peritonitis)

NO

Better preservation of RRF?

Probably NOT **(UF/volume related)**

Better overall survival?

Maybe YES **(role of icodextrin?)**

The concept of biocompatibility

DO WE HAVE RCT's?

The DIUREST Study (randomized)

Haag-Weber et al. Nephrol Dial Transplant 25: 2288-2296, 2010

The London Peritonitis Study (randomized)

Srivastava et al. Kidney Int 80: 986-991, 2011

The balANZ Trial (randomized)

Johnson et al. J Am Soc Nephrol 23: 1097-1107, 2012

The DIUREST Study

Randomized open-label study of German, Austrian and French patients treated with either biocompatible (N = 43) or conventional (N = 37) PD solution

69 patients in final analysis (N = 42 vs. N = 26)

Primary endpoint:
- slope of decline of RRF and urinary volume

Secondary endpoints:
- effluent CA125
- peritonitis, fluid balance
- phosphate, calcium, albumin, CRP

Haag-Weber et al. Nephrol Dial Transplant 25: 2288-2296, 2010

The DIUREST Study

Randomized open-label study of German, Austrian and French patients treated with either biocompatible (N = 43) or conventional (N = 37) PD solution

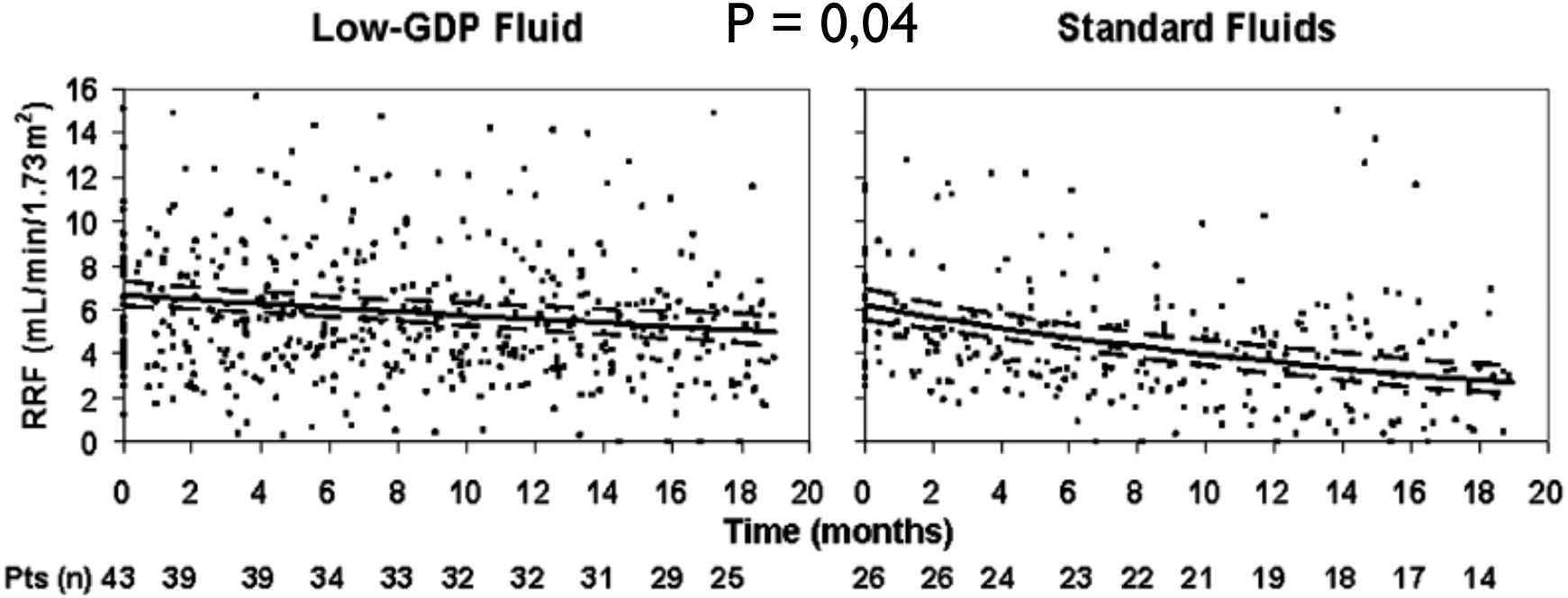
69 patients in final analysis (N = 42 vs. N = 26)

No differences in drop-out between the groups (2,4%/month)
No difference in peritonitis rates between the groups

Haag-Weber et al. Nephrol Dial Transplant 25: 2288-2296, 2010

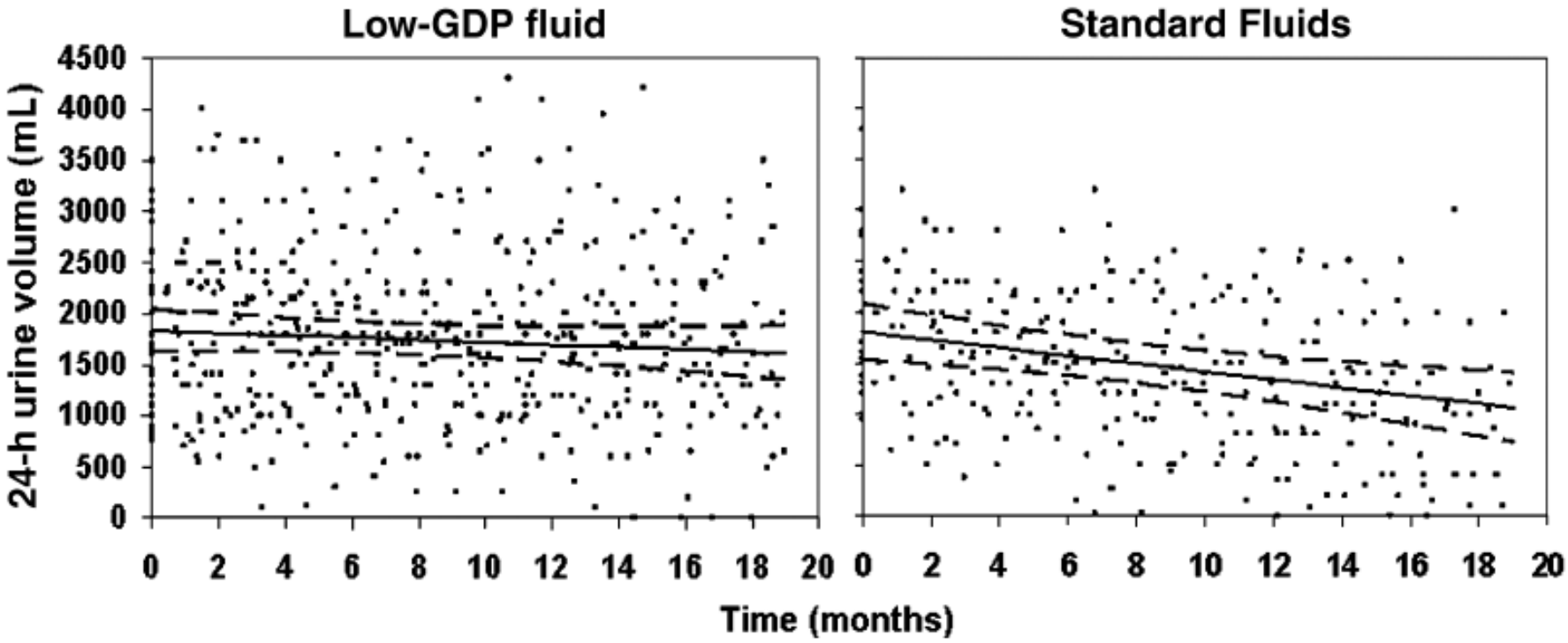
The DIUREST Study

Slower decline of RRF in biocompatible group, corrected for use of ACE-i/ARB.



Haag-Weber et al. Nephrol Dial Transplant 25: 2288-2296, 2010

The DIUREST Study



Haag-Weber et al. Nephrol Dial Transplant 25: 2288-2296, 2010

The DIUREST Study

Randomized open-label study of German, Austrian and French patients treated with either biocompatible (N = 43) or conventional (N = 37) PD solution

69 patients in final analysis (N = 42 vs. N = 26)

CAVE mix of incident & prevalent patients
small numbers
early drop-outs!
no UF data
two-fold higher ACE-i prescription in biocompatible group

Haag-Weber et al. Nephrol Dial Transplant 25: 2288-2296, 2010

The DIURES

Randomized open-label
patients treated with eit
conventional (N = 37) P

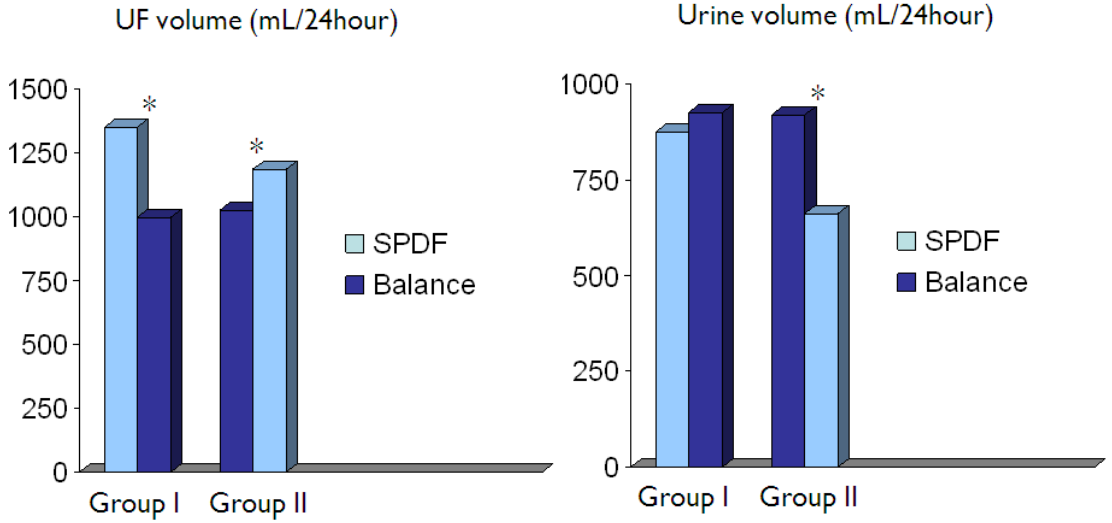
69 patients in final analys

CAVE mix incident &
sm numbers
ear drop-outs!

no UF data

two-fold higher ACE-i prescription in biocompatible group

The Euro Balance Trial



Williams et al. Kidney Int 66: 408-418, 2004

Haag-Weber et al. Nephrol Dial Transplant 25: 2288-2296, 2010

The balANZ Trial

Randomized open-label study of incident Australian and New Zealand patients treated with either biocompatible (N = 92) or conventional (N = 93) PD solution

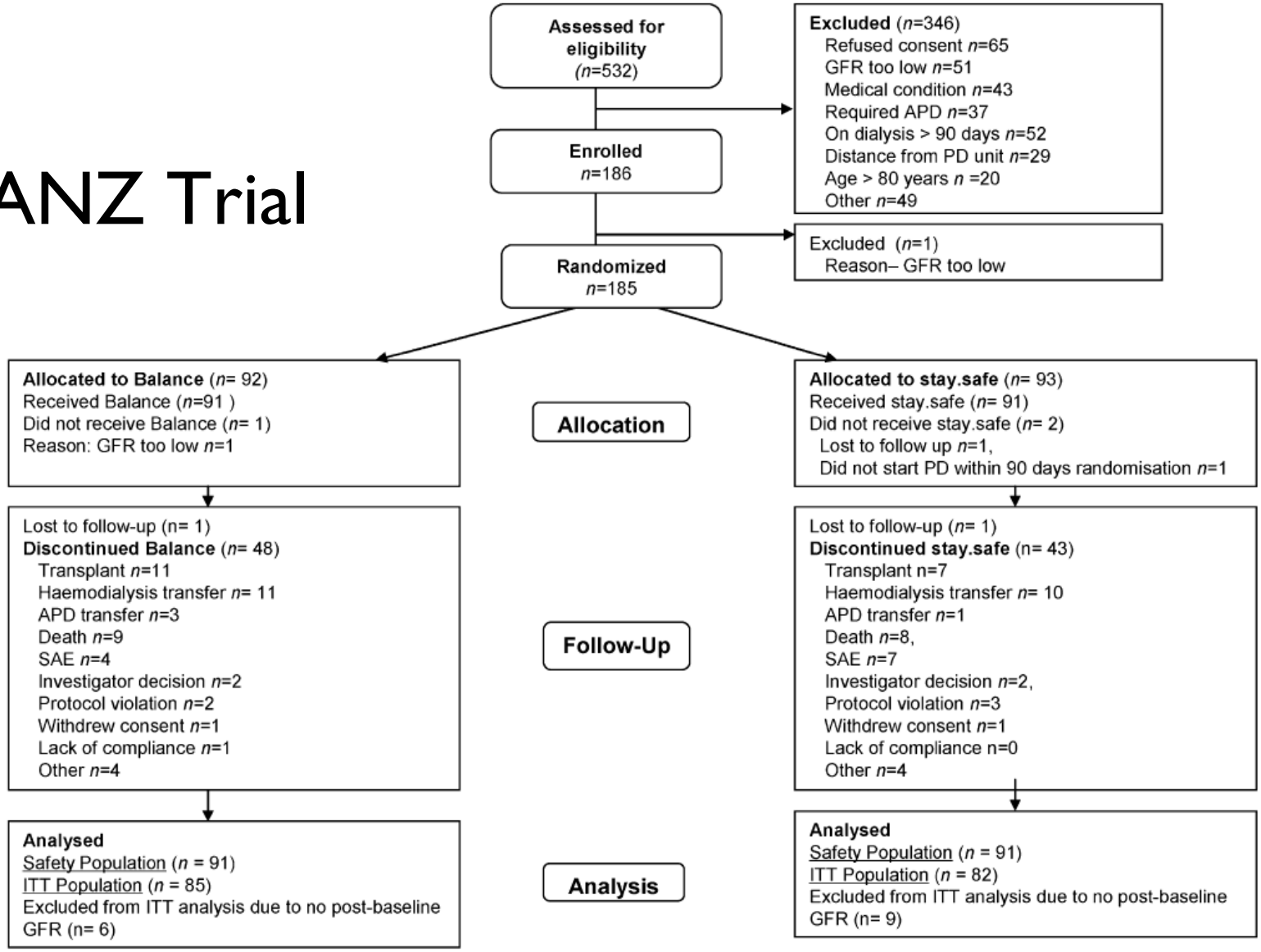
167 patients in final analysis (N = 85 vs. N = 82)

Primary endpoint:
- slope of decline of RRF

Secondary endpoints:
- time to anuria
- fluid balance
- peritonitis-free survival
- technique survival
- patient survival
- adverse events

Johnson et al. J Am Soc Nephrol 23: 1097-1107, 2012

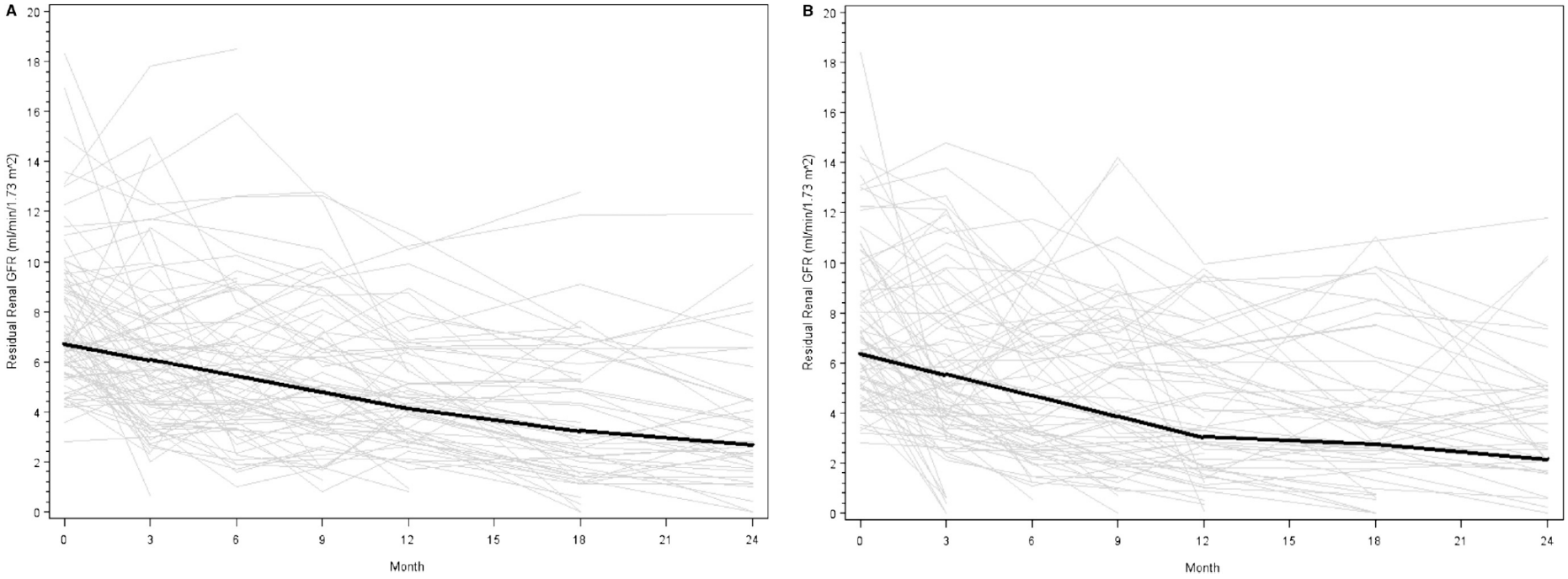
The balANZ Trial



Johnson et al. J Am Soc Nephrol 23: 1097-1107, 2012

The balANZ Trial

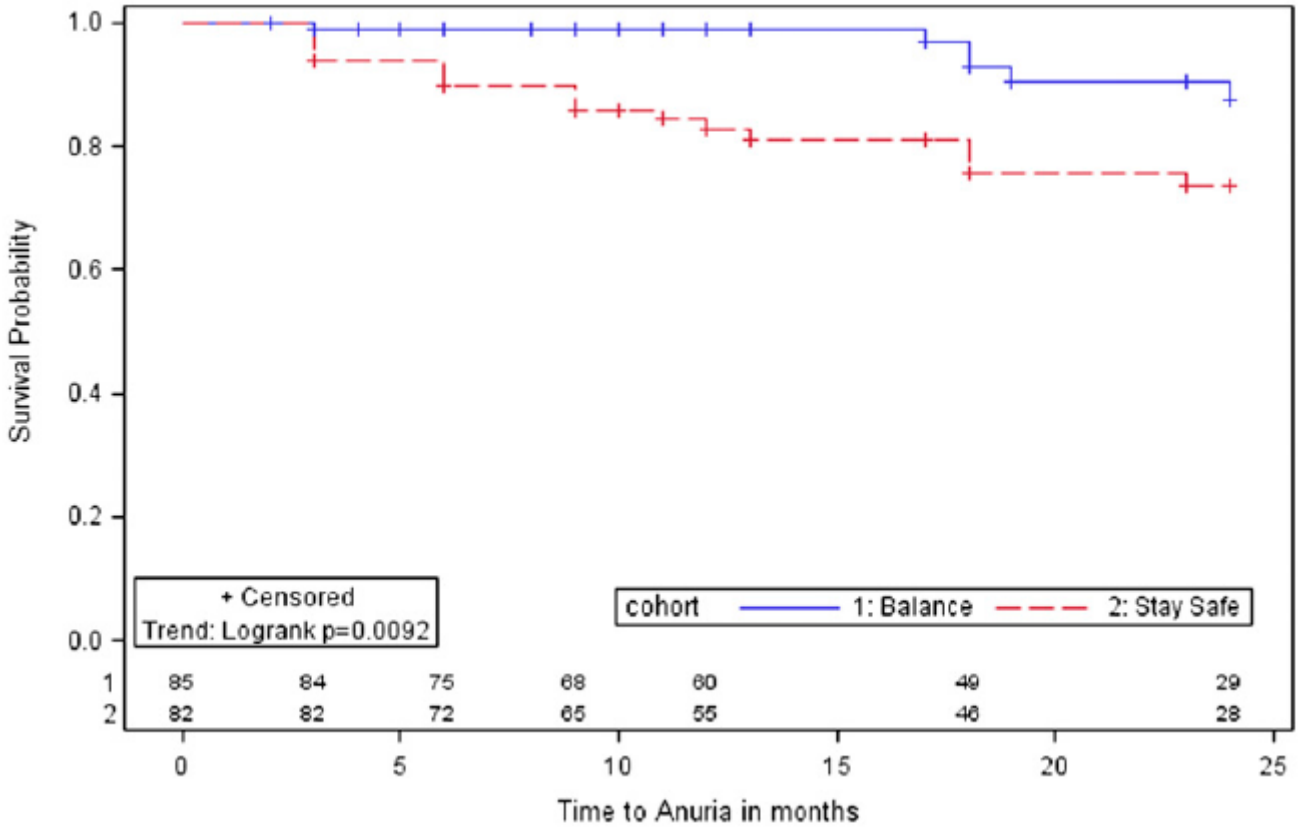
No significant difference in decline of RRF, no difference in use of ACE-i/ARB.



Johnson et al. J Am Soc Nephrol 23: 1097-1107, 2012

The balANZ Trial

Longer time to anuria in biocompatible group



Johnson et al. J Am Soc Nephrol 23: 1097-1107, 2012

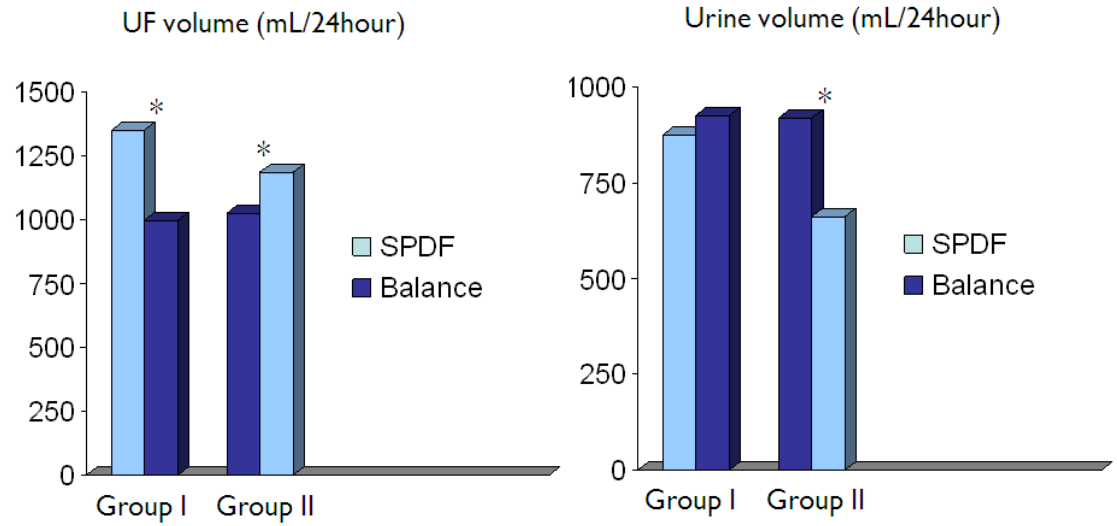
The balANZ Trial

BUT

Lower UF, higher urine volume in biocompatible group at 3 and 6 months!

No difference in blood pressure, weight, serum sodium, serum albumin, hemoglobin.

The Euro Balance Trial



Williams et al. Kidney Int 66: 408-418, 2004

The balANZ Trial

The effect of low glucose degradation product, neutral pH versus standard peritoneal dialysis solutions on peritoneal membrane function: the balANZ trial

'Biocompatible' vs. 'conventional':

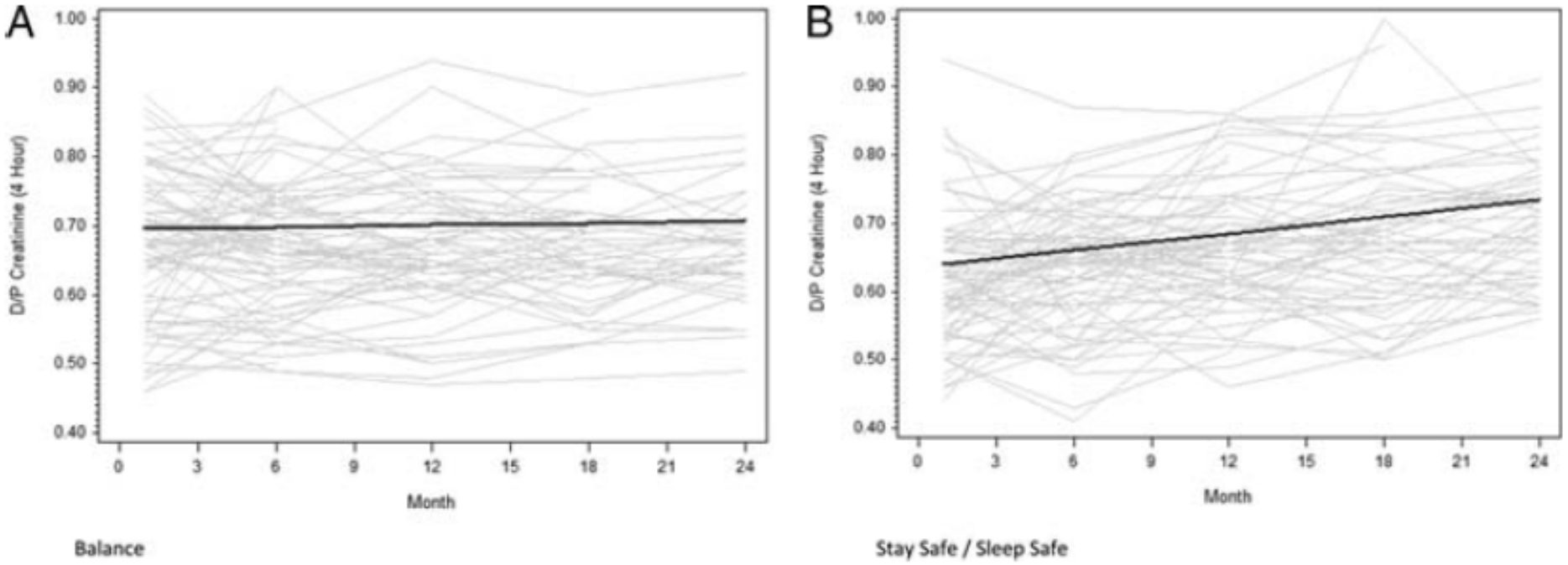
Increased small solute transport and lower UF in the short term.

HOWEVER
Preserved small solute transport and higher UF in the long term.

Johnson et al. Nephrol Dial Transplant 27: 4445-4453, 2012

The balANZ Trial

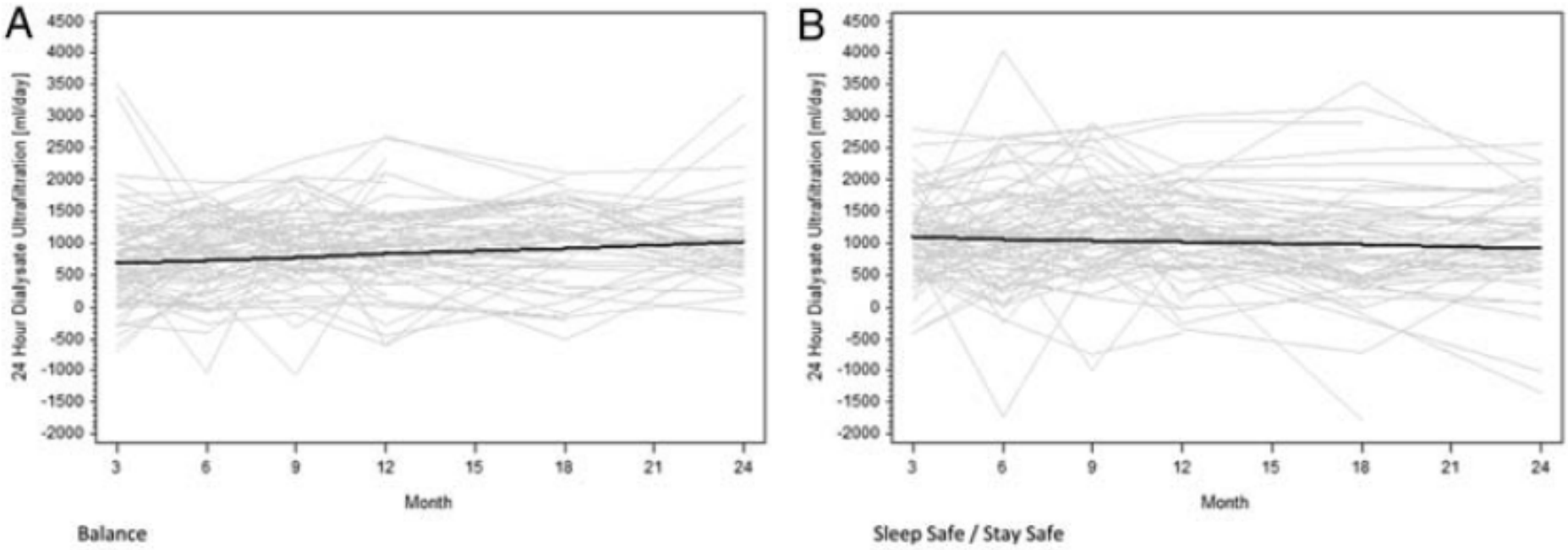
Change of D/P creatinine over 2 years



Johnson et al. Nephrol Dial Transplant 27: 4445-4453, 2012

The balANZ Trial

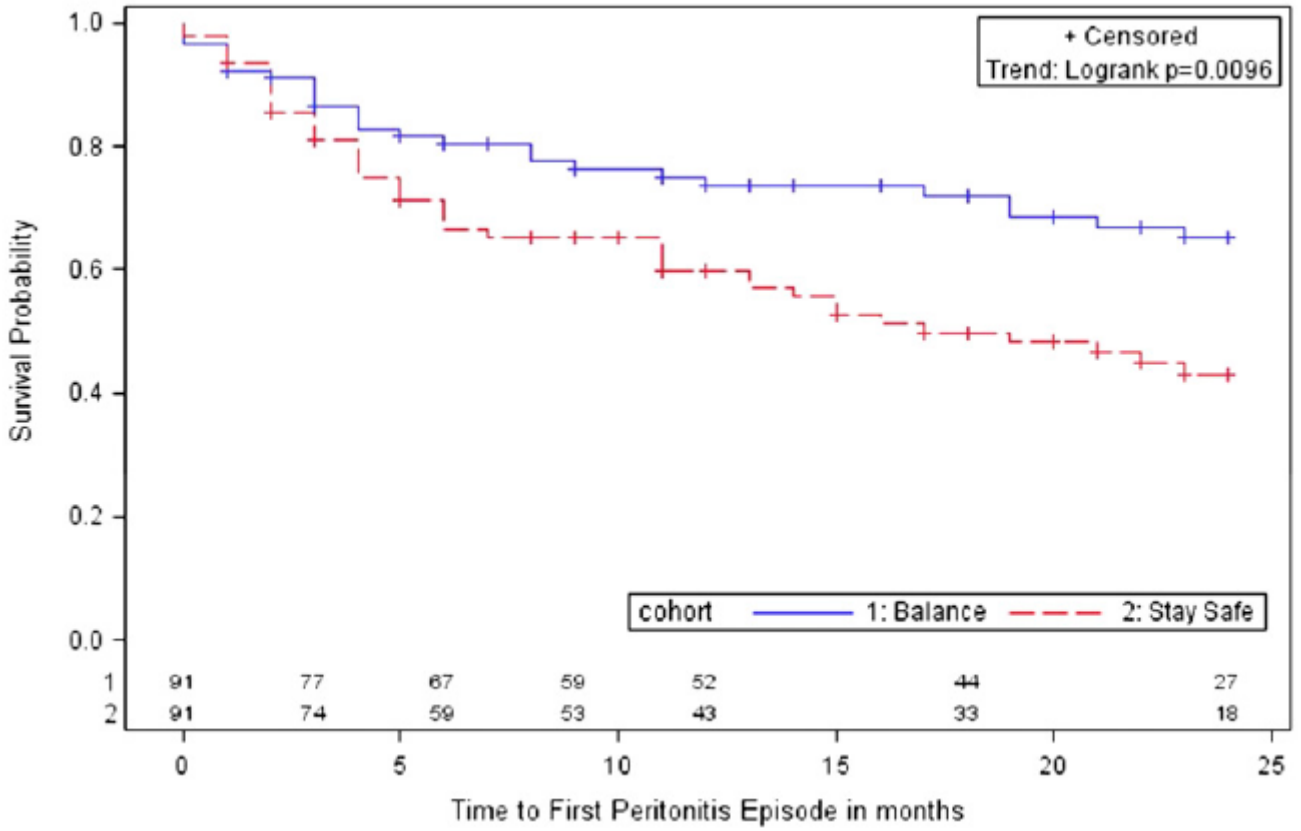
Change of peritoneal UF over 2 years



Johnson et al. Nephrol Dial Transplant 27: 4445-4453, 2012

The balANZ Trial

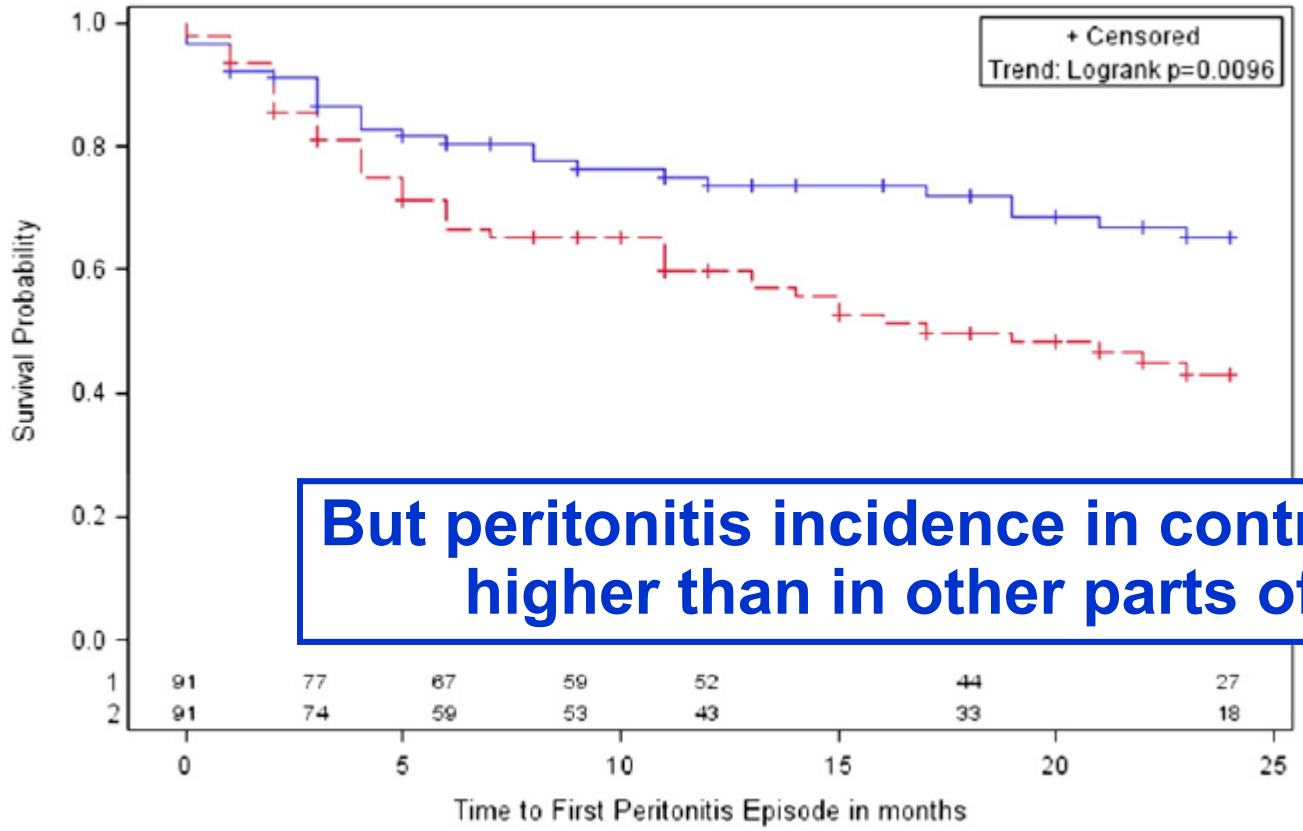
Longer time to first peritonitis in biocompatible group



Johnson et al. J Am Soc Nephrol 23: 1097-1107, 2012

The balANZ Trial

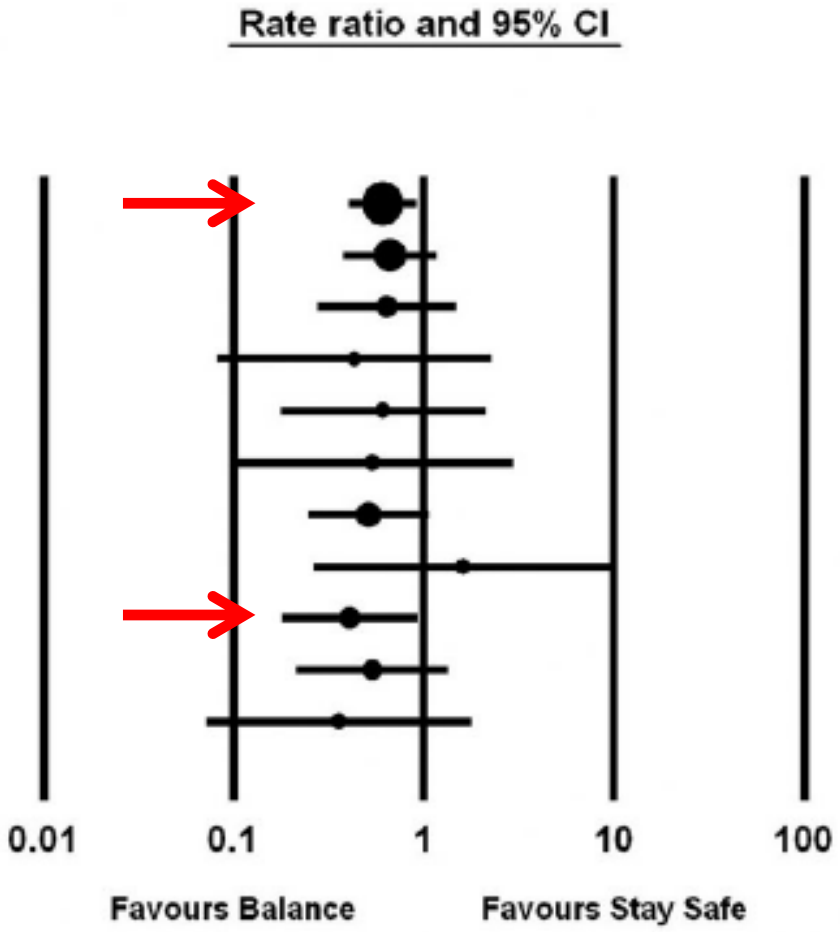
Longer time to first peritonitis in biocompatible group



But peritonitis incidence in control group was higher than in other parts of the world!

Johnson et al. J Am Soc Nephrol 23: 1097-1107, 2012

The balANZ Trial

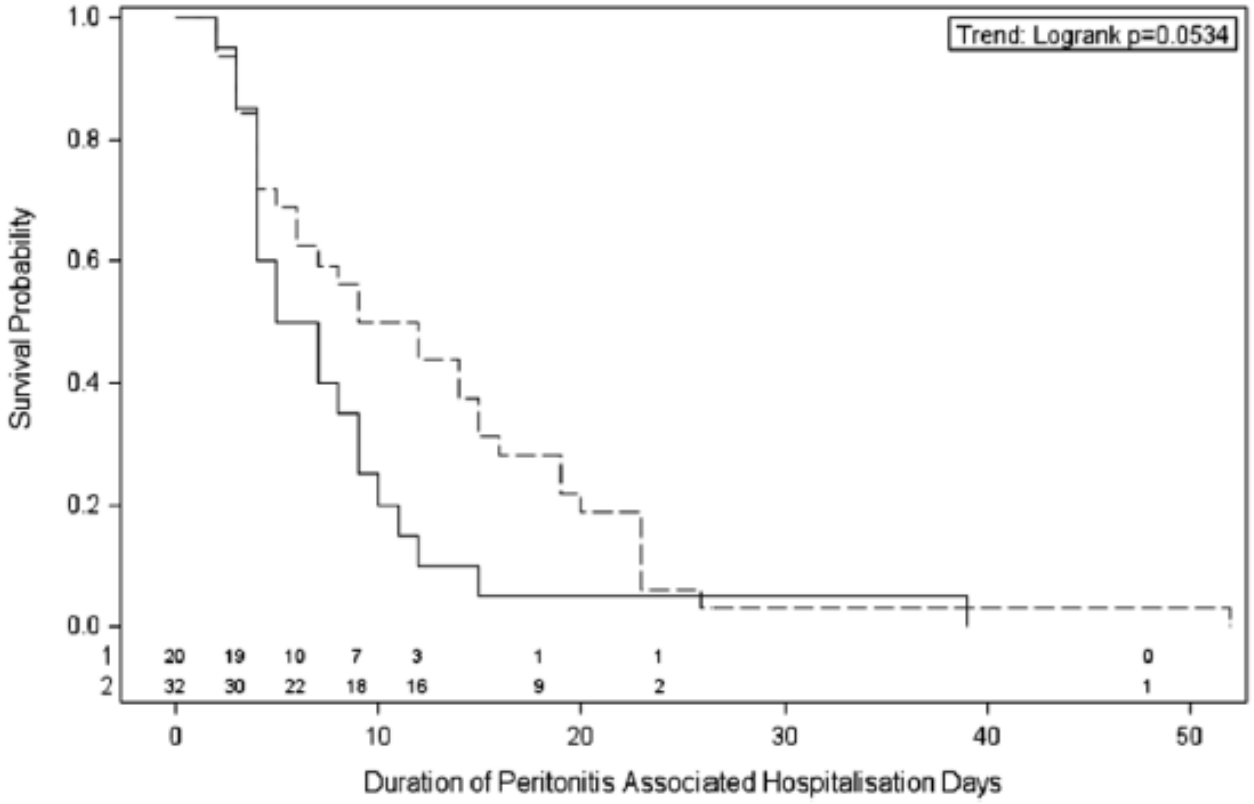


Rate ratio	
0.608	All peritonitis
0.662	Gram Positive: All
0.643	Gram Positive: CNS
0.429	Gram Positive: S.Aureus
0.612	Gram Positive: Streptococcus
0.536	Gram Positive: Other
0.512	Gram Negative: All
1.607	Gram Negative: Pseudomonas
0.408	Gram Negative: Non-psuedomonas
0.536	Culture negative
0.357	Polymicrobial

Johnson et al. Perit Dial Int 32: 497-506, 2012

The balANZ Trial

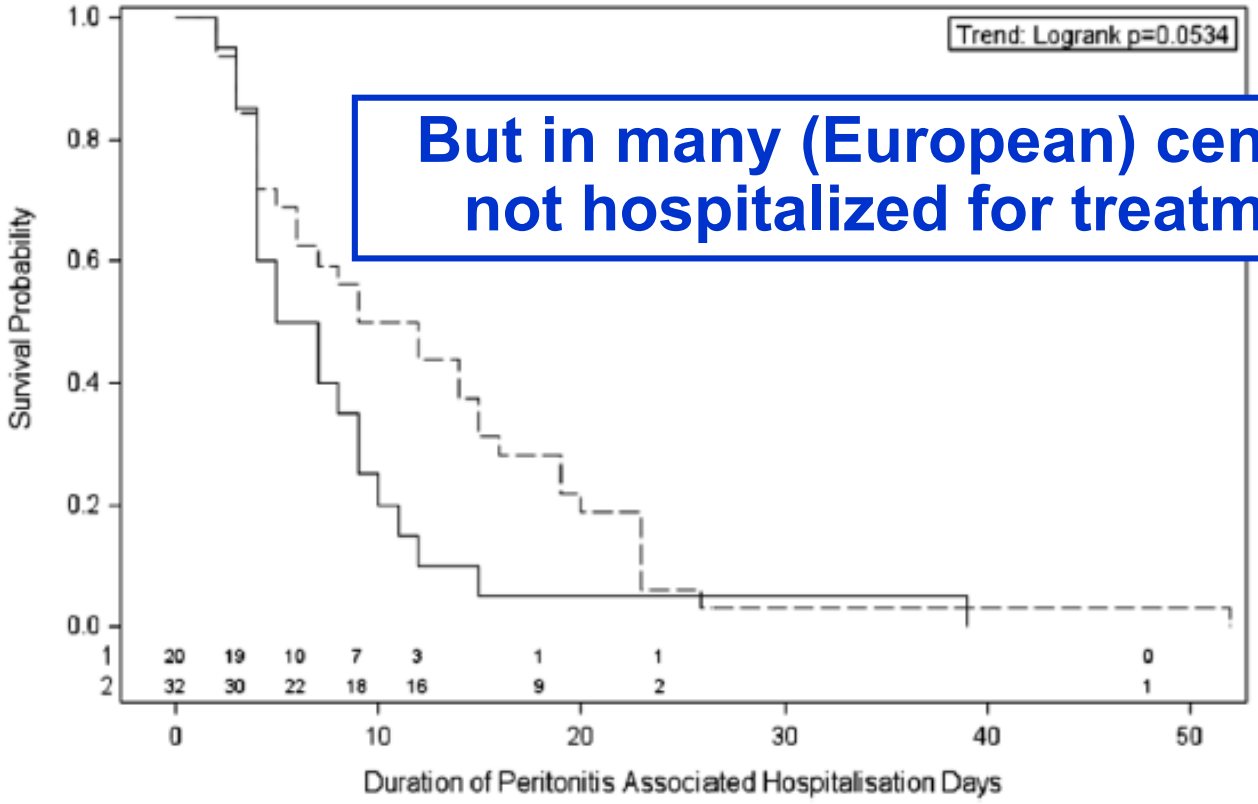
Shorter duration of peritonitis-associated hospitalization



Johnson et al. Perit Dial Int 32: 497-506, 2012

The balANZ Trial

Shorter duration of peritonitis-associated hospitalization



But in many (European) centers patients are not hospitalized for treatment of peritonitis.

Johnson et al. Perit Dial Int 32: 497-506, 2012

The balANZ Trial

No differences in technique or patient survival

Kaplan–Meier analysis showed that technique survival was not significantly different between the two groups (P=0.85). This finding was not altered by including death as a technique failure (P=0.79).

Kaplan–Meier analysis showed that patient survival was not significantly different between the two groups (P=0.20).

Johnson et al. J Am Soc Nephrol 23: 1097-1107, 2012

The London Peritonitis Study

Randomized open-label study of incident London patients treated with either biocompatible (N = 139) or conventional (N = 128) PD solution

All patients in ITT analysis

Endpoints:
- Peritonitis free survival
- Technique survival (w/o censoring for death)

Srivastava et al. Kidney Int 80: 986-991, 2011

The London Peritonitis Study

No difference in technique survival

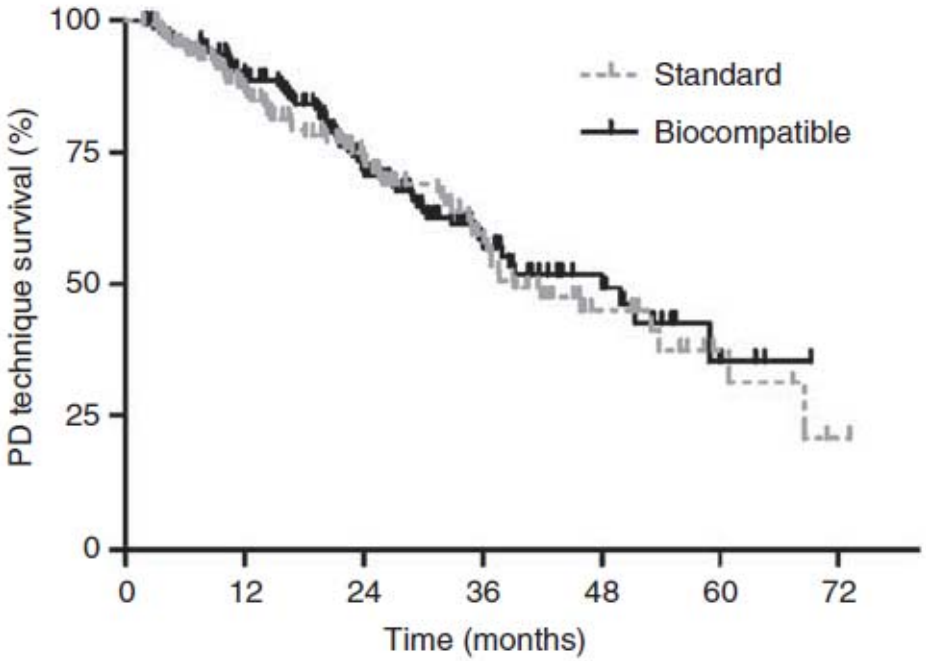


Figure 1 | Peritoneal dialysis (PD) technique survival (censored for transplantation and transfer out of unit).

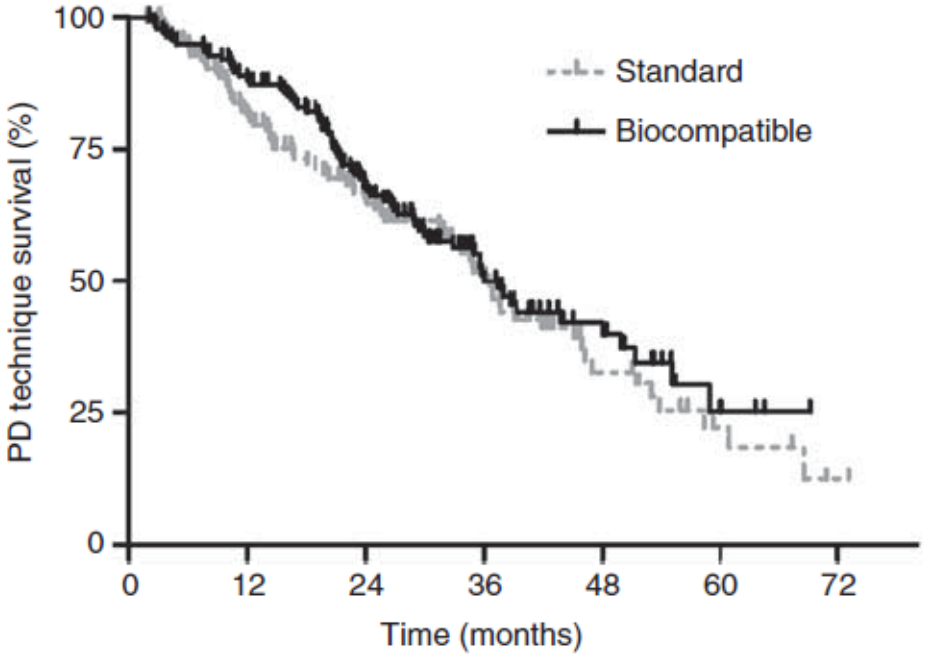
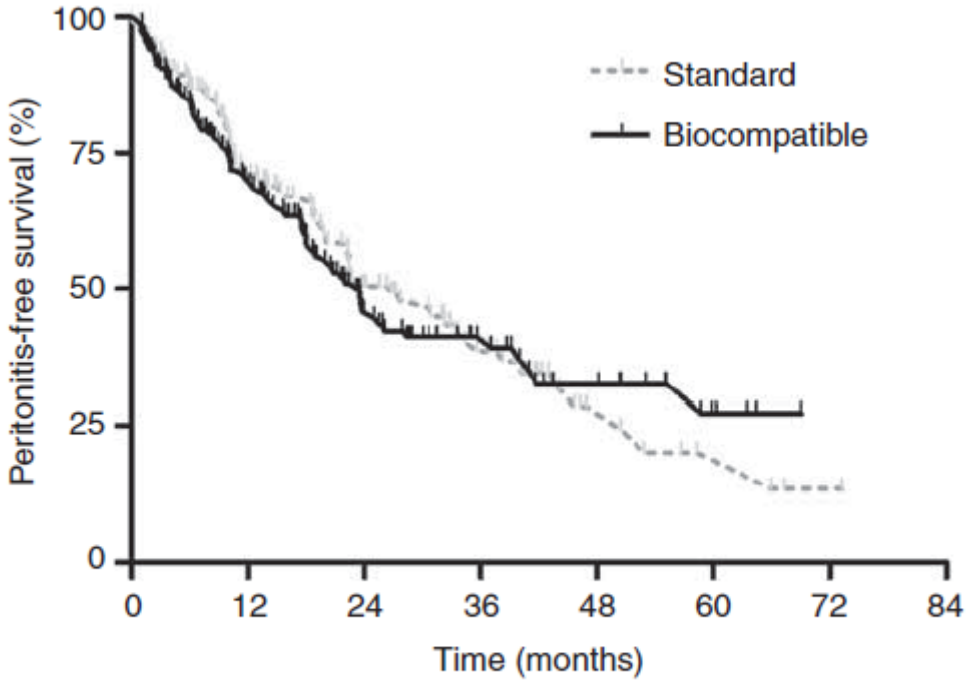


Figure 2 | Peritoneal dialysis (PD) technique survival (censored for death, transplantation, and transfer out of unit).

Srivastava et al. Kidney Int 80: 986-991, 2011

The London Peritonitis Study

No difference in peritonitis-free survival



alysis (PD) peritonitis-free survival of PD.

Differences between trials explained by different GDP content of biocompatible solutions?

Srivastava et al. Kidney Int 80: 986-991, 2011

The concept of biocompatibility

(MY) CONCLUSIONS FROM RCT's

HARD END-POINTS?

Lower incidence of peritonitis?

Maybe YES (but not if low peritonitis incidence)

Better technique survival? (long-term UF, peritonitis)

NO

Better preservation of RRF?

Maybe YES

Better overall survival?

NO

Biocompatibele oplossingen voor PD. Waar staan we in 2013?

B. Bammens

May 23th 2032

UZ LEUVEN BELGIUM