XIV National Russian Dialysis Society Conference
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How to preserve and optimize fluid balance in PD patients ?

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Potential conflicts of interest
(in regard to this presentation)

Speaker's name: Monika Lichodziejewska-Niemierko

I have the following potential conflicts of interest to report:

- ***Speaker's fee:***

Fresenius Medical Care, Baxter

- ***Research contracts:***

Center Principal Investigator in GSK Ascend ND Study
Investigator in Balance Low Sodium Study
Member of DSMB in PDOne Study

Hydration status in PD patients in BCM study

	n	%
Overhydration Class		
<10th Percentile	43	6.7
Normal (10th - 90th Percentile)	255	39.9
> 90th Percentile	341	53.4
Total	639	100.0

	Av.	+/-	25 Centl	75 Centl
Overhydration	1.67L	2.34	0.2	2.9

(normal: -1 do +1 L)

PLoS One. 2011 Feb 24;6(2):e17148

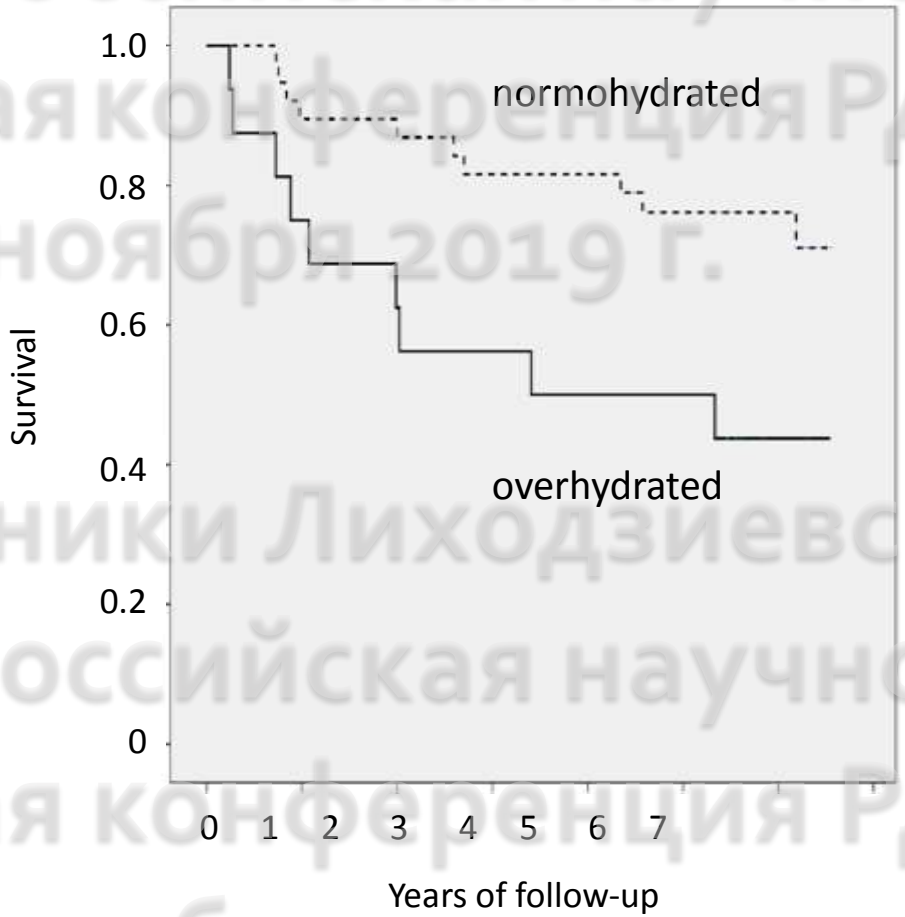
Overhydrated PD patients live shorter

Single centre, cross sectional, observational study.

54 PD patients followed-up to 6.5 years.

Overhydration(OH) measured by BCM

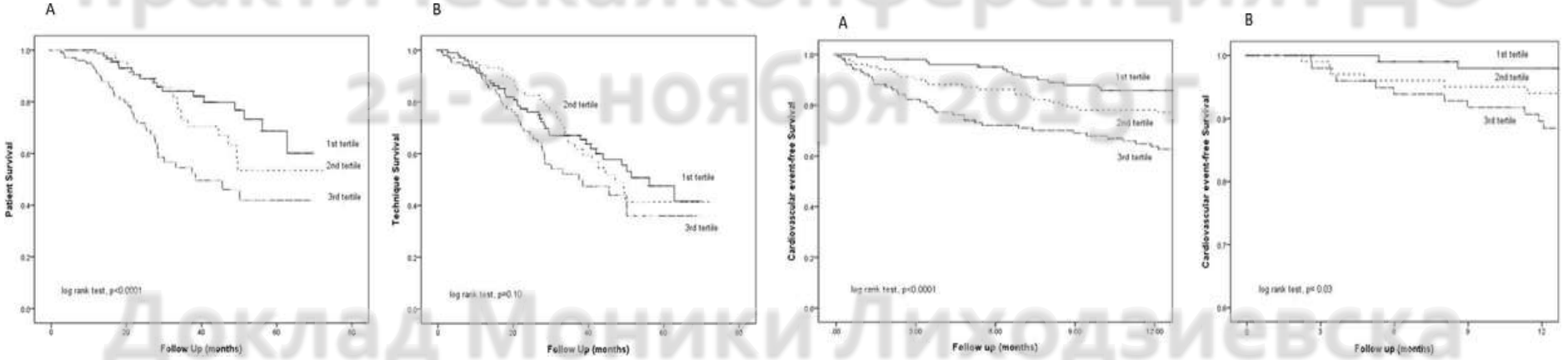
FO(Fluid Overload) / ECW(Extracellular water) ≥15% = Overhydration



p=0.002

Jotterand-Drepper V et al. PLoS ONE 2016;11(7):e0158741

Even asymptomatic fluid overload worsens survival and increases cardiovascular events in incident Chinese peritoneal dialysis patients



Kaplan-Meier plot of (A) patient survival; and (B) technique survival. Patients were divided into tertiles according to their baseline E:I ratio (1st tertile: ≤0.91; 2nd tertile >0.91–1.07; 3rd tertile >1.07). Data were compared by the log rank test.

Kaplan-Meier plot of cardiovascular event-free survival with hospital admission for congestive heart failure (A) included; and (B) excluded. Patients were divided into tertiles according to their baseline E:I ratio (1st tertile: ≤0.91; 2nd tertile >0.91–1.07; 3rd tertile >1.07). Data were compared by the log rank test.

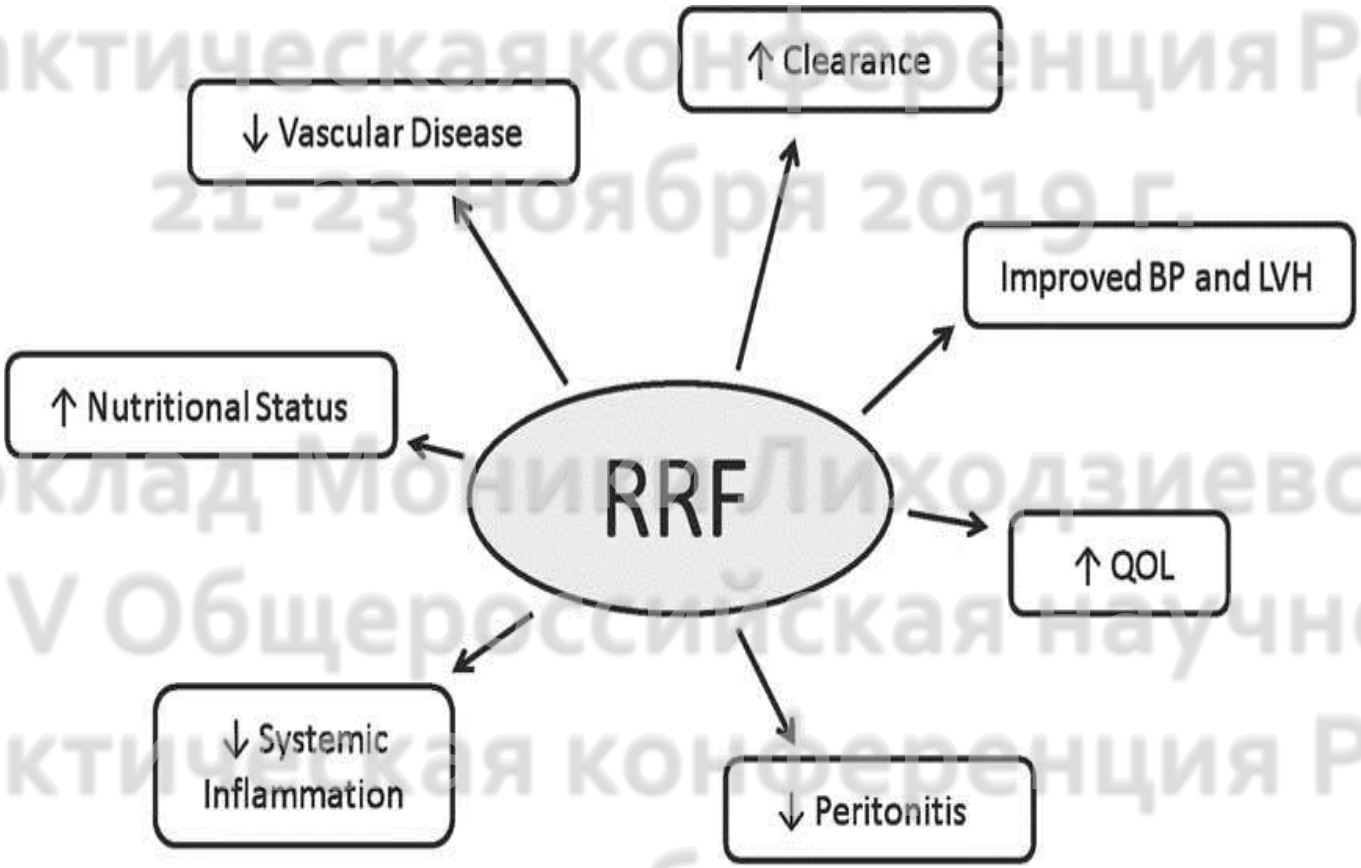
Ng JKC et al. (2018). PLOS ONE 13(8): e0202203.

1

Preserving fluid balance in PD

- Residual renal function
- Peritoneal membrane integrity and function

Residual renal function is important in patients on PD

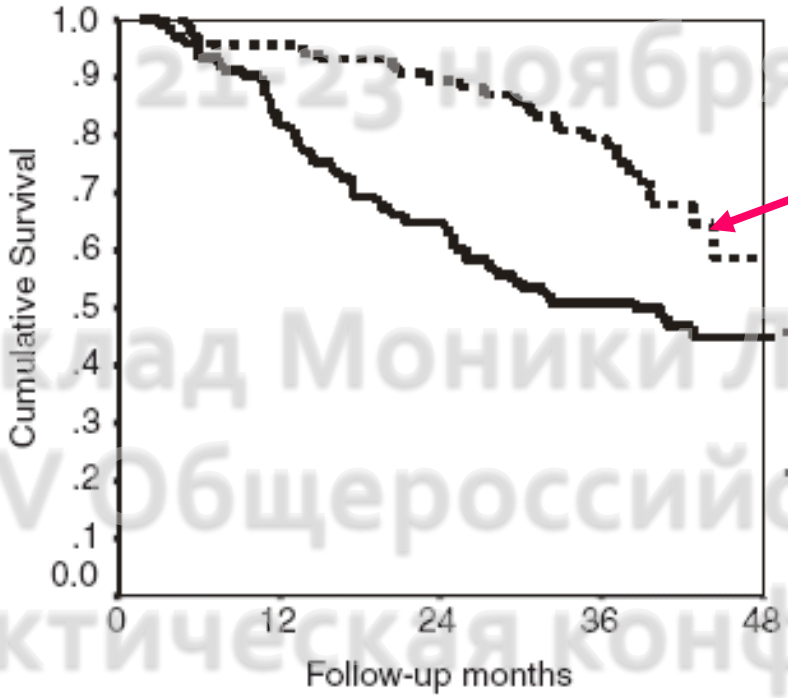


Dialysis & Transplantation 2011, 40, 8: 349-355

Residual renal function as a predictor of outcome in CAPD patients

In a re-analysis of CANUSA study data, every 250 ml of urine output was associated with a 36% reduction in mortality

Bargmann J et al, JASN 2001



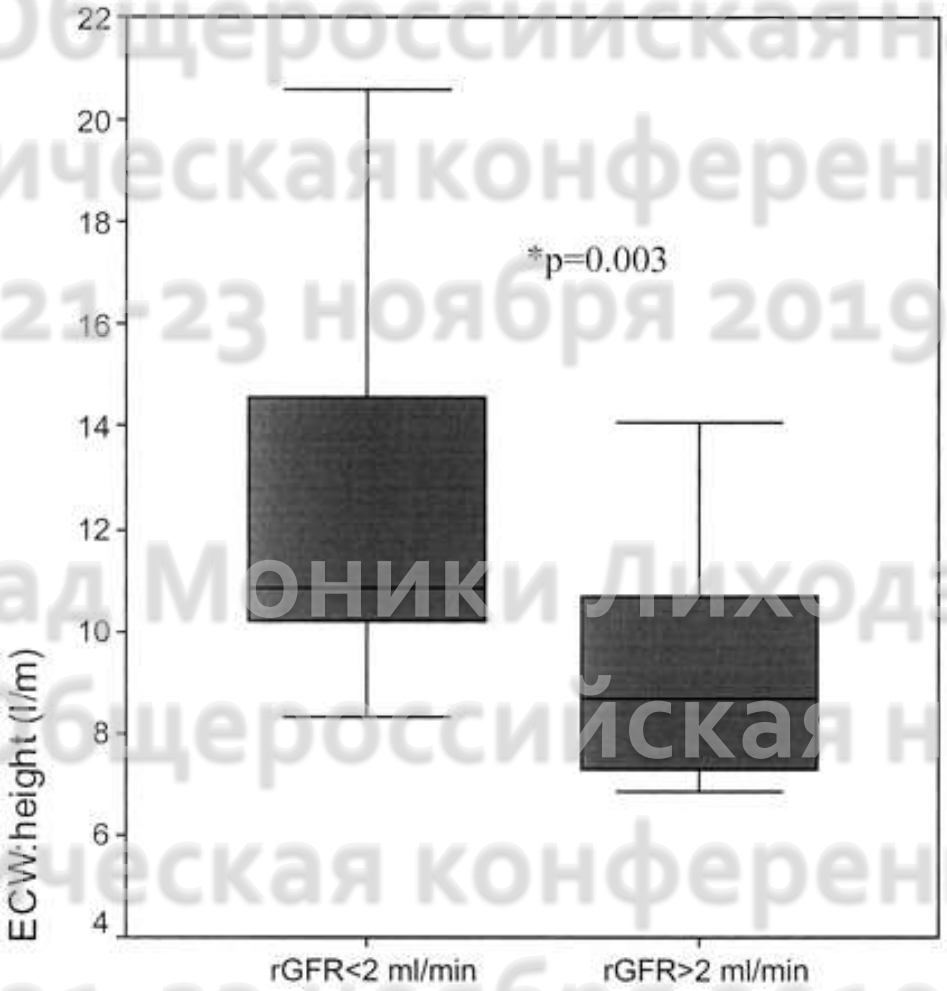
93 pts with RRF (GFR≥ 1ml/min)

95 pts no RRF

P=0,0012

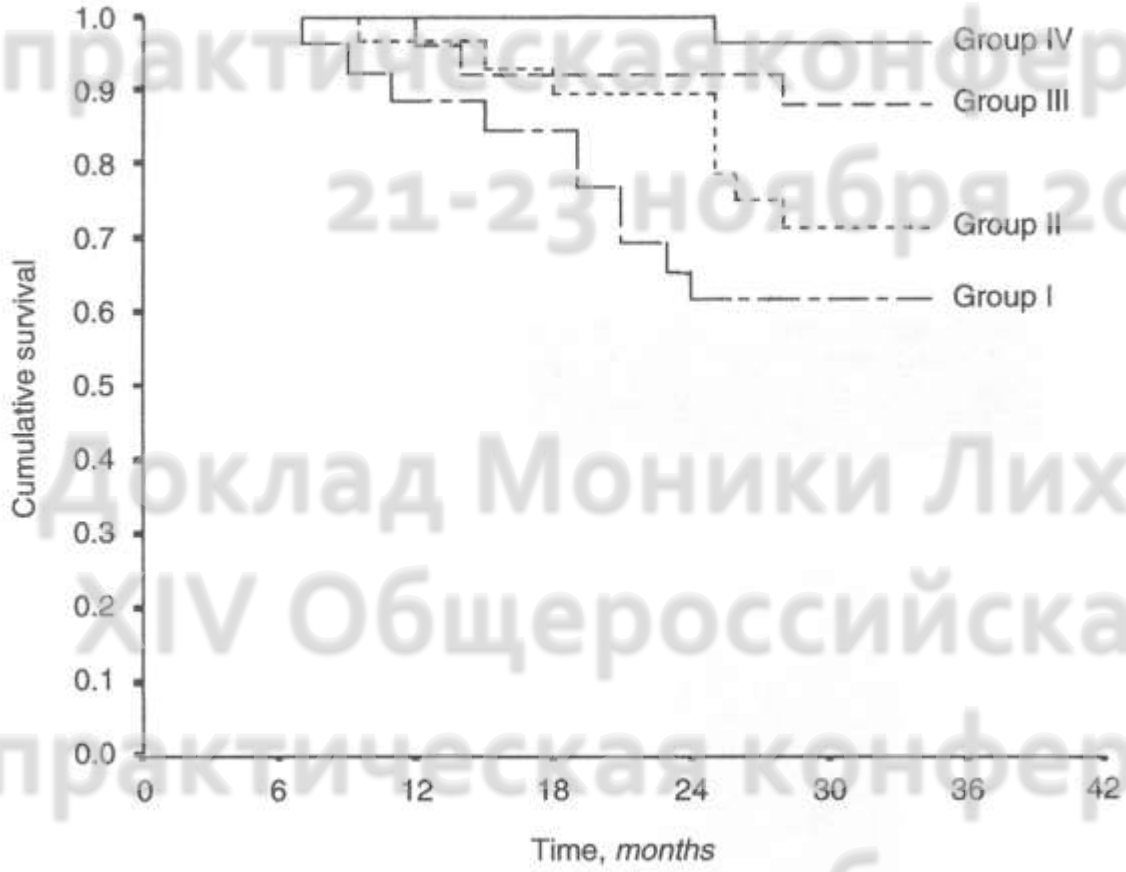
Wang et al. Nephrol Dial Int 2005,20:396-403

Loss of residual renal function correlates with overhydration



Konings et al.. NDT 2003;18:797-803

Effect of fluid removal on mortality of 125 PD patients



I :<1265ml/d/1,73m^2
II:1265-1570ml/d/1,73m^2
III:1570-2035ml//d/1,73m^2
IV:>2035ml/d/1,73m^2

Ates et al..Kidney Int 2001,60:767-776

Preserve RRF:

- Use RAA blockade
- Use diuretics
- Avoid dehydration and hypotension
- Avoid nephrotoxic medications and contrast
- Provide good control for diabetes, calcaemia,
- Hypertension and heart failure
- Treat malnutrition and inflammation
- **Use more biocompatible solutions**

Preserving fluid balance in PD

- Residual renal function
- Peritoneal membrane integrity and function

  preserve ultrafiltration

  Use more biocompatible solutions

Widely used PD solutions are bio-incompatible

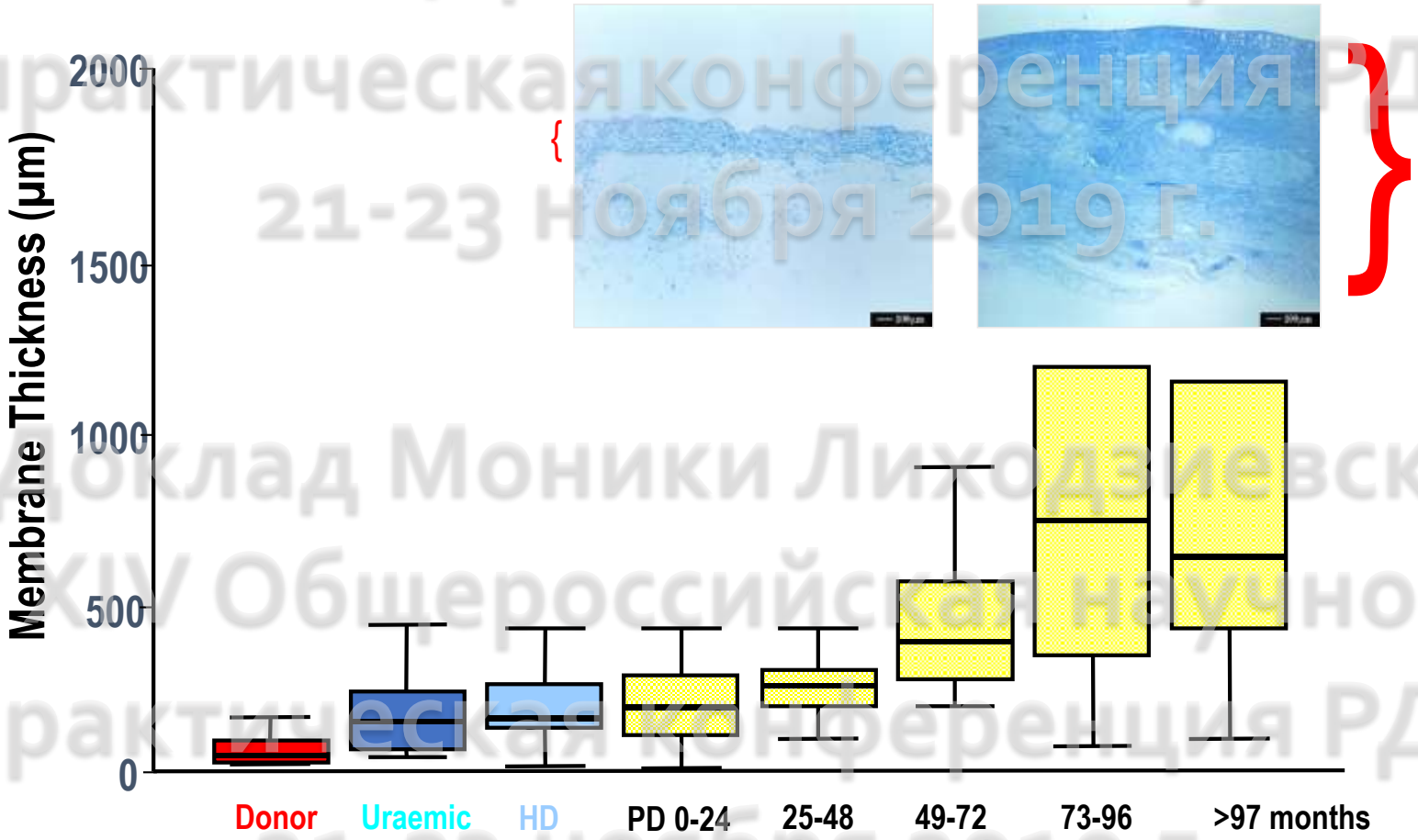
- Unphysiological composition:
  - acidic pH (pH 5.2 - 5.5)
  - high glucose concentration(13.6-42.5 g/L)
  - hiperosmolarity (~360 - 511 mOs/kg)
  - lactate as a buffer

Acute toxicity

- **Heat sterilisation of glucose gives rise to glucose degradation products (GDPs)**
  - GDPs lead to increased AGE formation
  - GDPs promote EMT in mesothelium

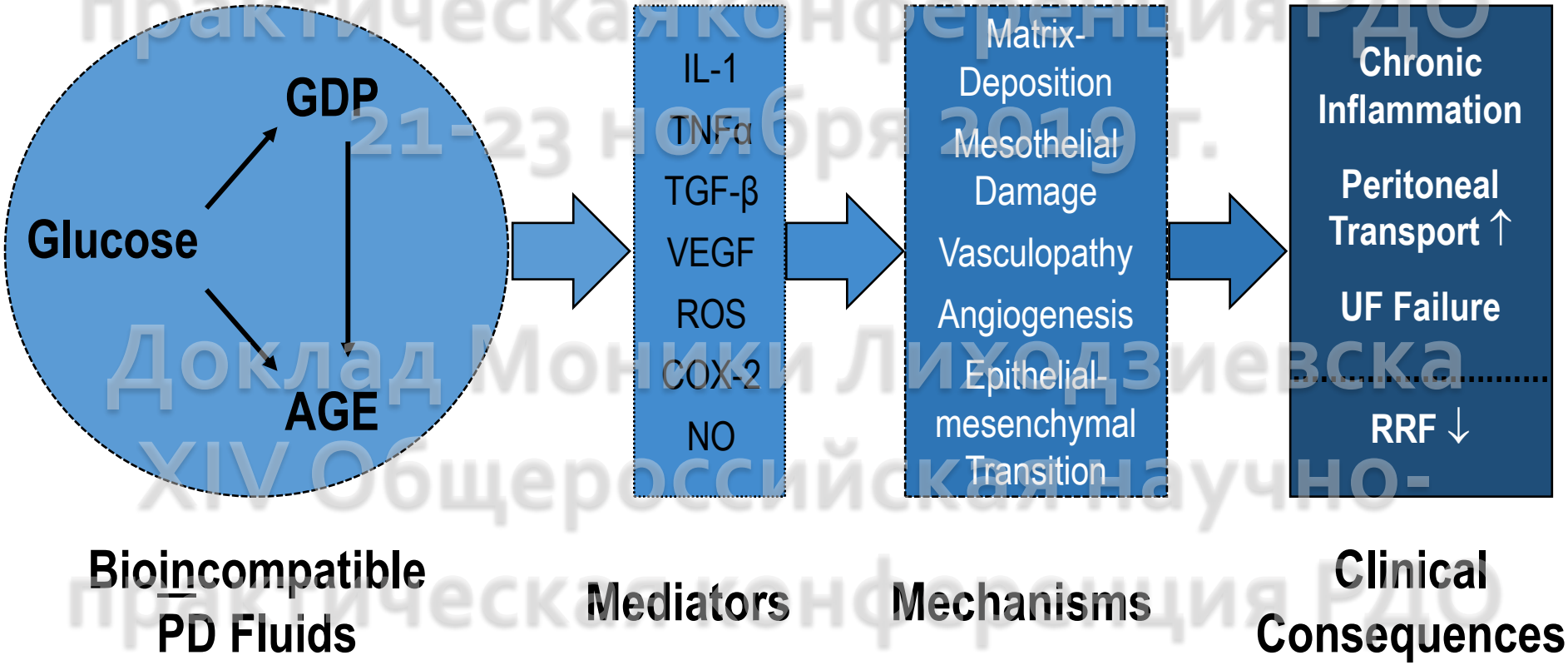
Chronic toxicity

Peritoneal membrane morphology undergoes changes during long-term PD



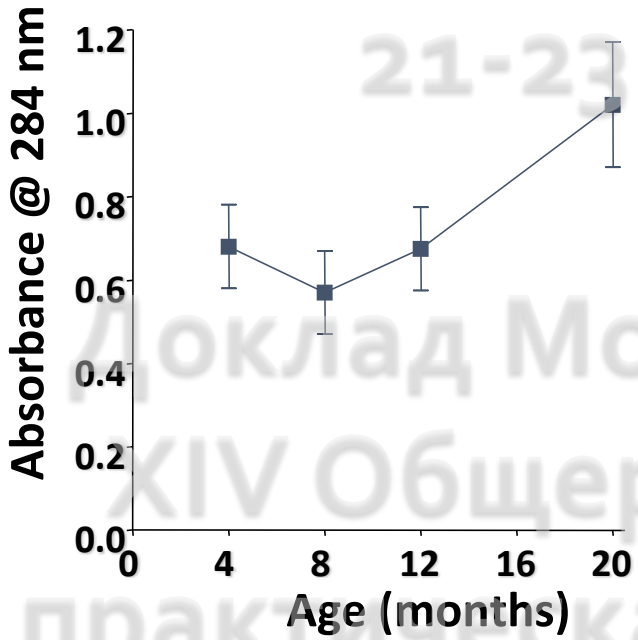
Williams JD, J Am Soc Nephrol 2002; 13: 470-479

Bioincompatibility of dialysis solutions: mechanisms and consequences



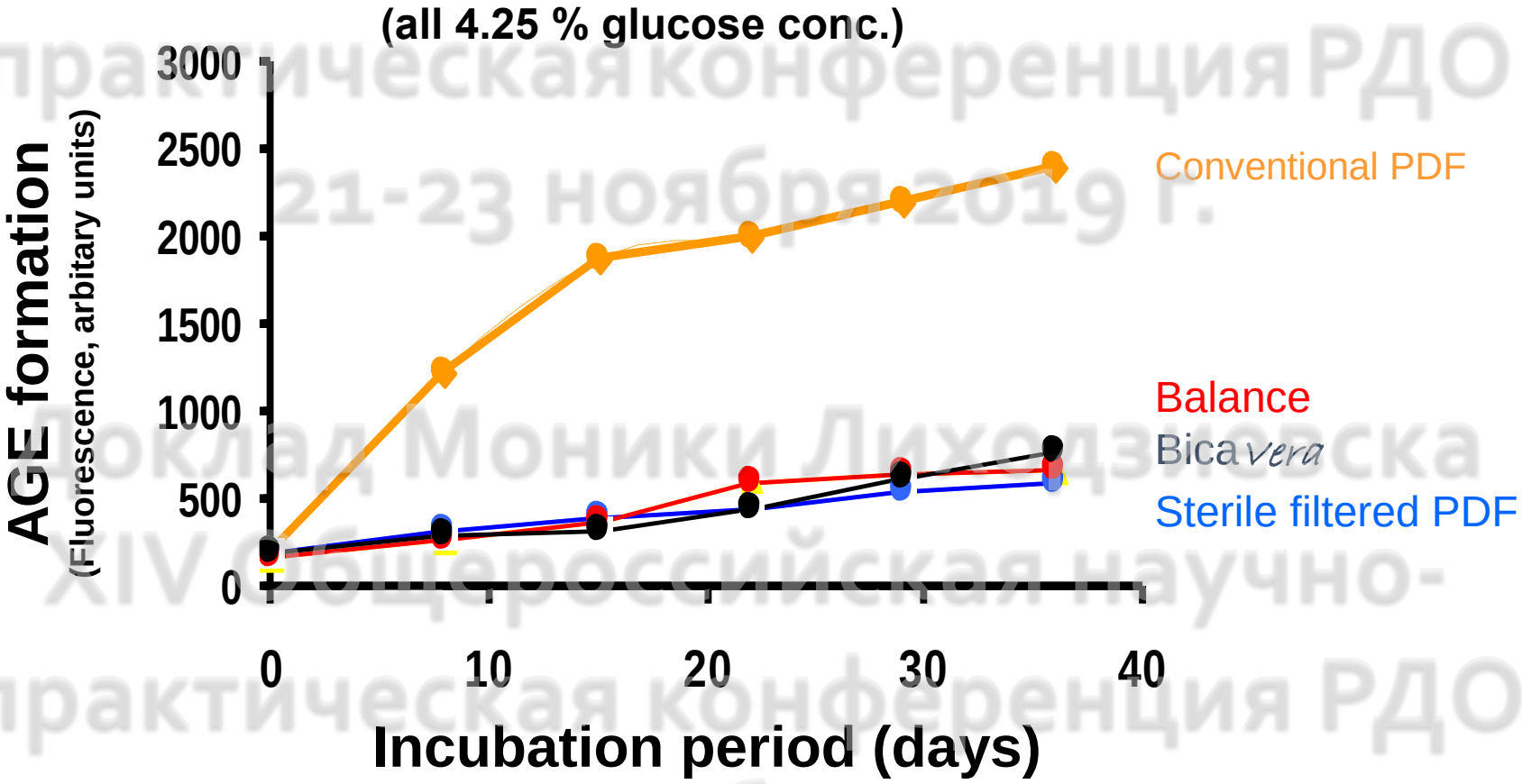
From Achim Joerres

GDP result from spontaneous glucose degradation during storage and heat sterilization of PD fluids



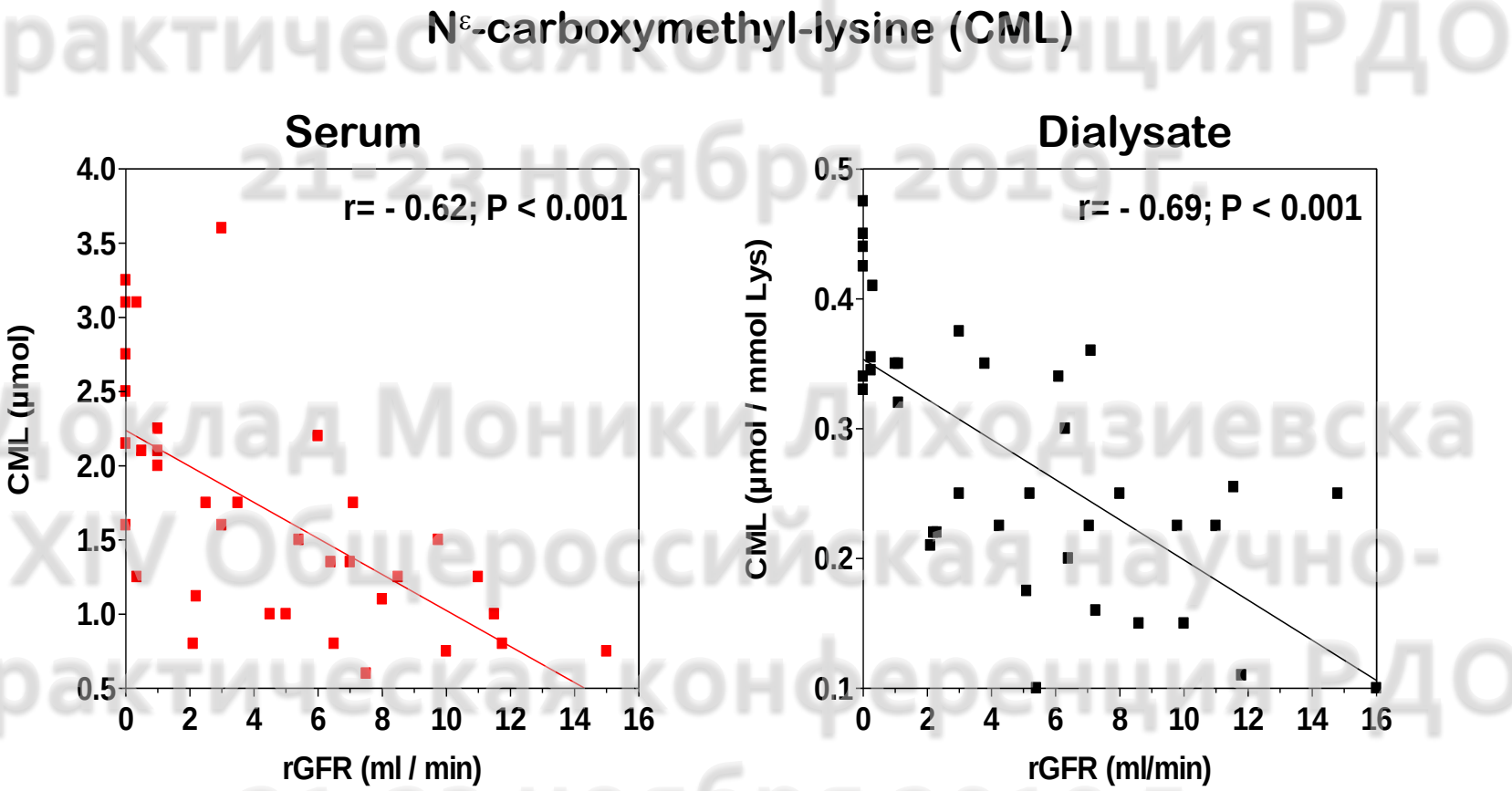
Nilsson-Thorell et al, PDI 1993; 13: 208-213

AGE formation following exposure to PD fluids is primarily caused by GDP, not glucose



Tauer et al, Biochem Biophys Res Commun 2001, 280(5): 1408-1414

AGE levels correlate with loss of residual renal function in PD patients



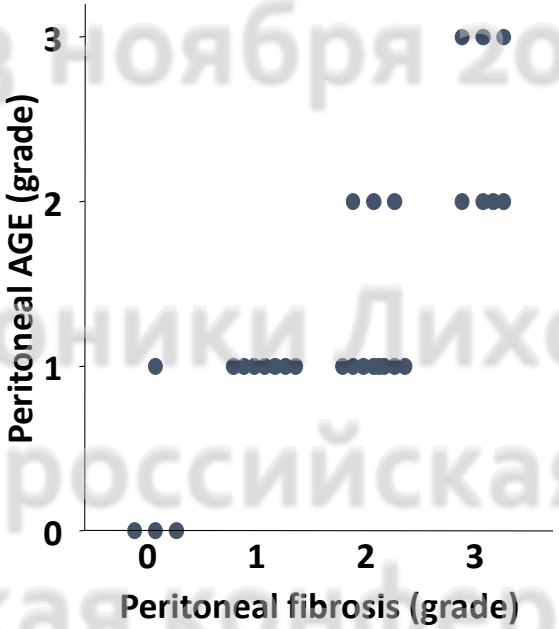
van de Kerkhof et al, NDT 2004; 19: 910

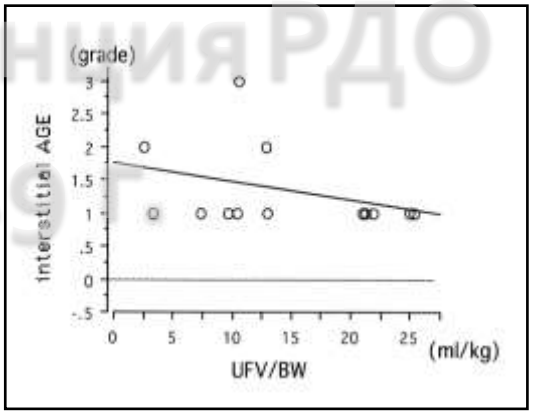
Peritoneal AGE accumulation correlates with peritoneal fibrosis and lower UF volume

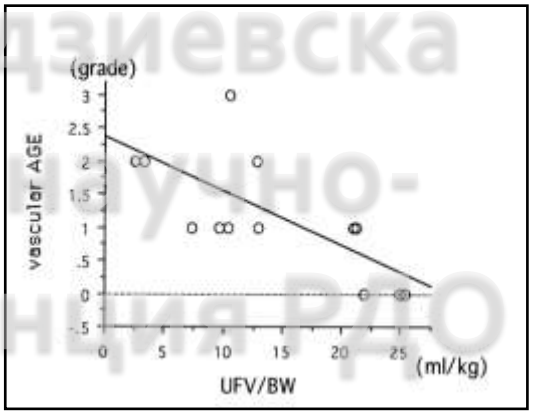
Group 1

Group 2

Group 3







Nakayama et al, Kidney Int. 1997; 51: 182-186 *Honda et al, NDT 1999; 14: 1541-1549*

How to reduce GDP formation in PD fluids?

Multi-chamber bags

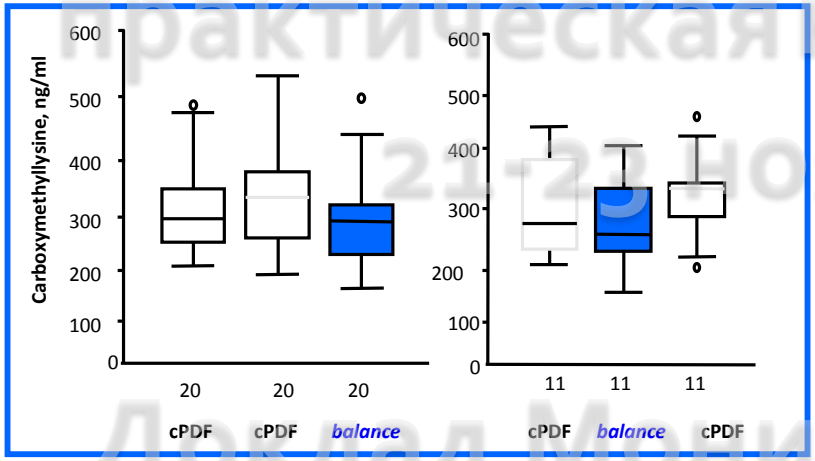
A – glucose, electrolites pH 2,8-3,1
B – lactate pH 8,0-8,6

pH of the solution after mixing: neutral
glucose concentration: 1,5%, 2,3%, 4,25%
calcium: 1,25mmol/l, 1,75 mmol/l

Advantages:
-biocompatibility ↑ :
-GDP↓↓, AGE ↓↓ ,
-neutral pH
-inflow pain↓

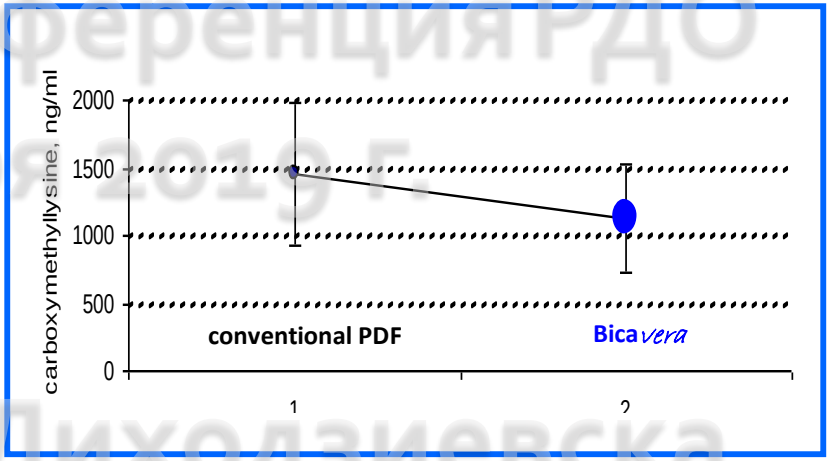
Treatment with low-GDP PD fluids results in reduced systemic AGE levels

Decrease of plasma CML after 3 months with Balance (p<0.01)

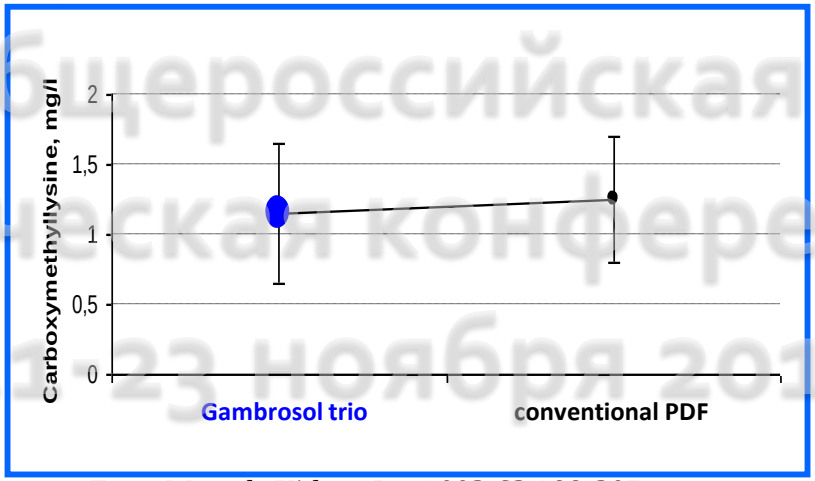


Williams JD et al, *Kidney Int.* 2004; 66: 408-418

Decrease of plasma CML after 3 months with Bicavera (p<0.05)



Schmitt CP et al, *NDT* 2003;18(Suppl 4): 210



Decrease of plasma CML after 2 months with Gambrosol trio (p<0.05)

Zeier M et al, *Kidney Int.* 2003;63:298-305

Peritoneal Dialysis International

Effect of balance Solution on the Peritoneal Membrane in Automated Peritoneal Dialysis

This prospective, open-label, multicentre, randomized, controlled, cross-over phase IV study compared the in vivo biocompatibility of a neutral-pH, low-GDP peritoneal dialysis (PD) solution (balance) with a cPDF in automated PD (APD) patients. Our study revealed a significantly **increased appearance rate and concentration of CA125** in the peritoneal effluent of APD patients treated with the neutral-pH, low-GDP solution balance versus a conventional PD solution.

Tatiana De los Ríos, Juan Pérez-Martínez, Jose Portoles, Monika Lichodziejewska-Niemierko, Maite Rivera, Michał Nowicki, Andrzej Książek[5], Ana María Tato, Christine Bohnhorst[7], Mariano Feriani. Perit Dial Int 2016; 36(5):569–572

Treatment with low-GDP PD fluids results in less peritoneal thickening and fibrosis

Biocompatible PD Fluid Conventional PD Fluid

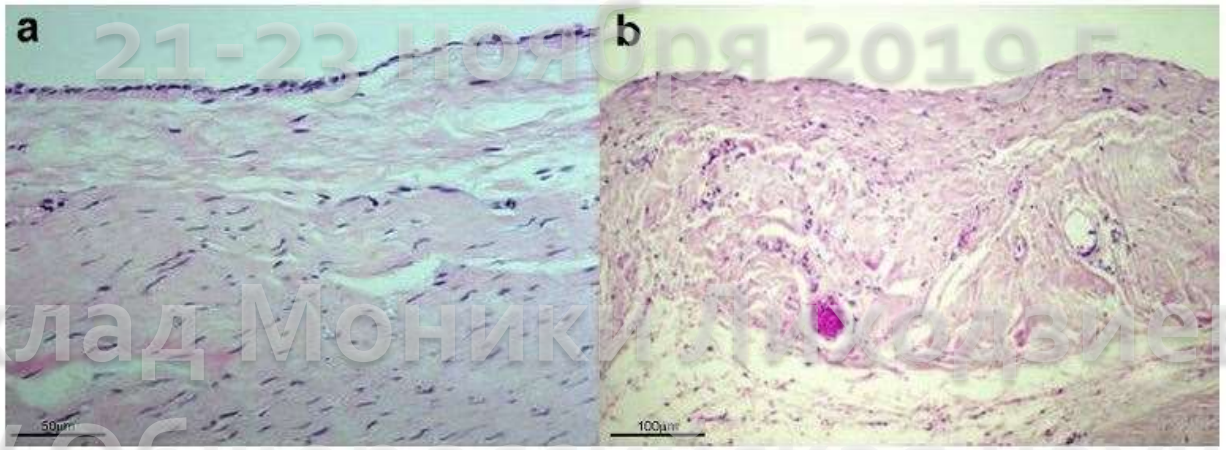


Figure 2 | Original image showing a nonfibrotic peritoneum treated with a less bioincompatible PD solution (a) in contrast with fibrotic peritoneum as a consequence of bioincompatible solutions (b), matched for PD time and complications. The maintenance of the mesothelial cell layer, the lesser thickening of the submesothelial compact zone, the lower density of this tissue, and the absence of angiogenesis are remarkable features of a protected peritoneum in less bioincompatible PD, at medium term (hematoxylin and eosin: a, original magnification ×400; b, original magnification ×200). PD, peritoneal dialysis.

Zhou Q. et al., Kidney Int. 2016; 90: 515-24

Effects of Biocompatible versus Standard Fluid on Peritoneal Dialysis Outcomes

balANZ Trial Investigators

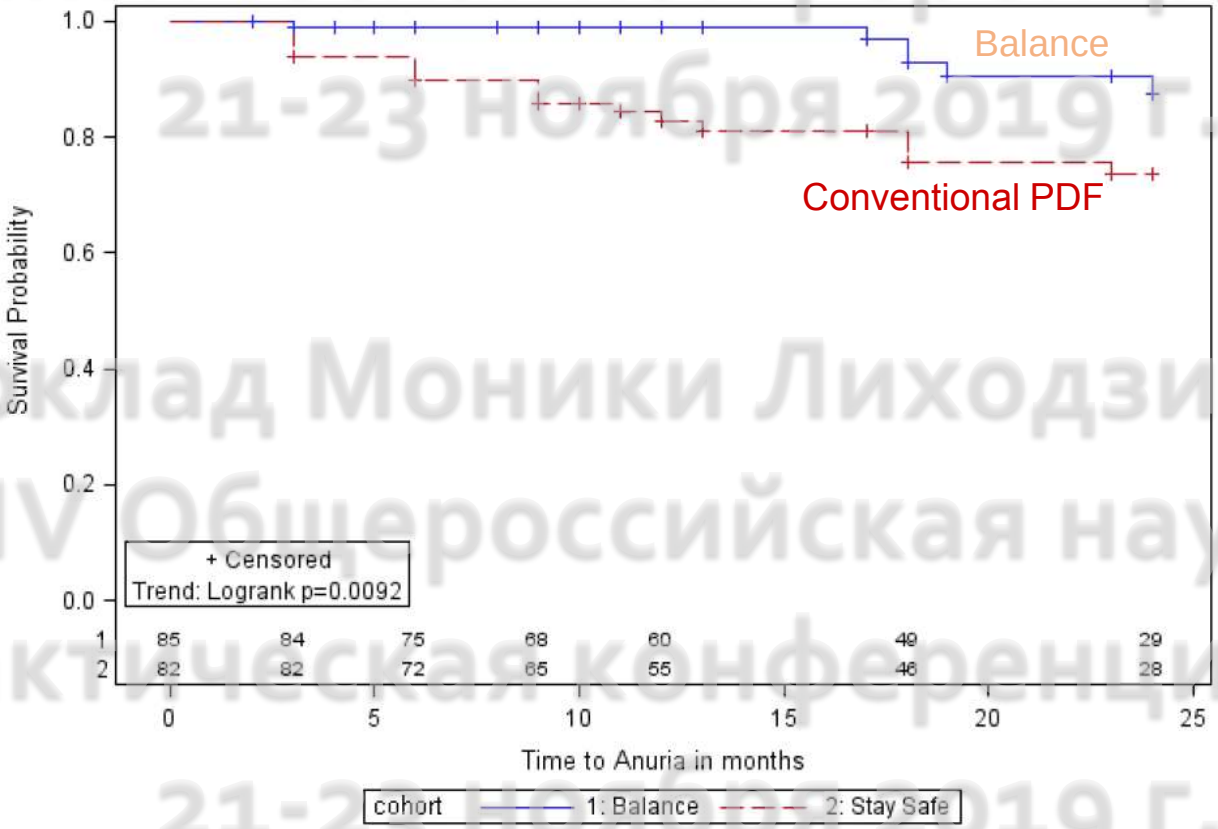
- A multicentre, randomised, controlled trial to determine whether peritoneal dialysis treatment with a low GDP, neutral pH peritoneal dialysis (PD) solution (balance) compared to standard PD solution is associated with superior preservation of residual renal function
- Primary outcome measure: slope of RRF decline (mean of renal urea and creatinine clearances) over 24 months
- 185 incident adult PD patients studied

Johnson DW et al, JASN 2012; 23(6):1097-107

Effects of Biocompatible versus Standard Fluid on Peritoneal Dialysis Outcomes

balANZ Trial Investigators

Time to Anuria



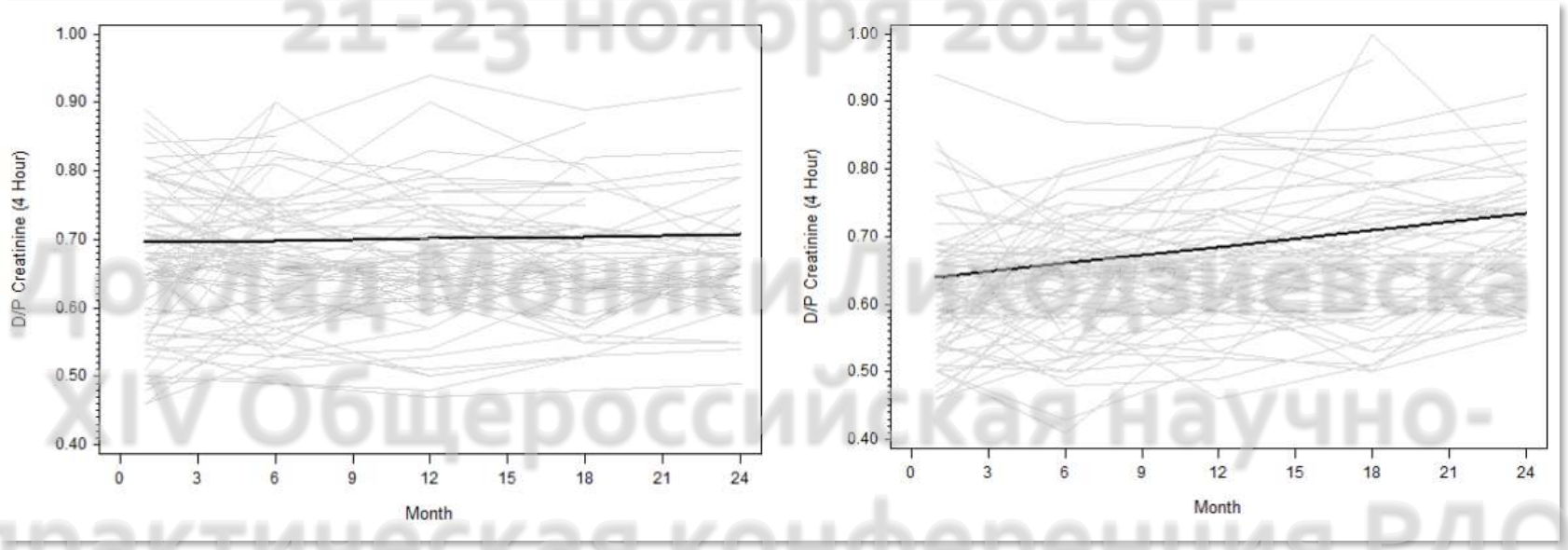
Johnson DW et al, JASN 2012; 23(6):1097-107

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

balANZ Trial Investigators

PET D/P Creatinine

Balance **stay.safe/sleep.safe standard**



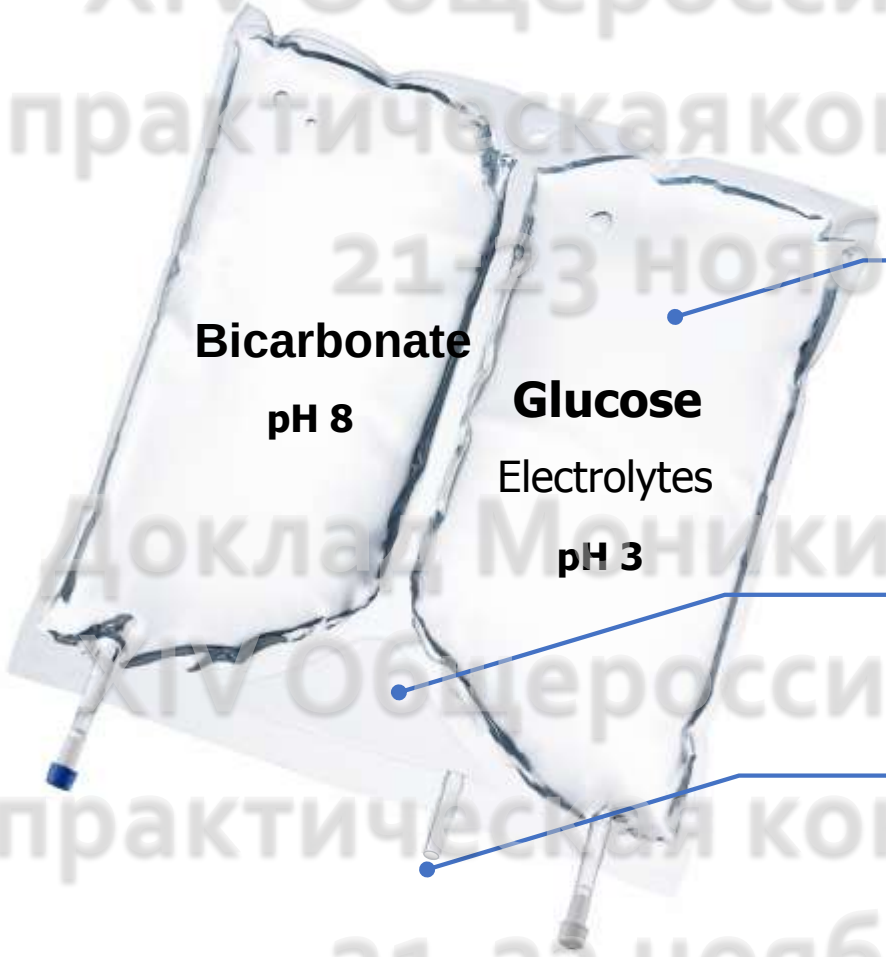
0.001 per month
(95% CI -0.001 to 0.002)

P<0.001

0.004 per month
(95% CI 0.003 to 0.005)

Johnson DW et al, NDT 2012; 27(12): 4445–53

Replacing lactate with bicarbonate for better biocompatibility



UltraLow GDPs

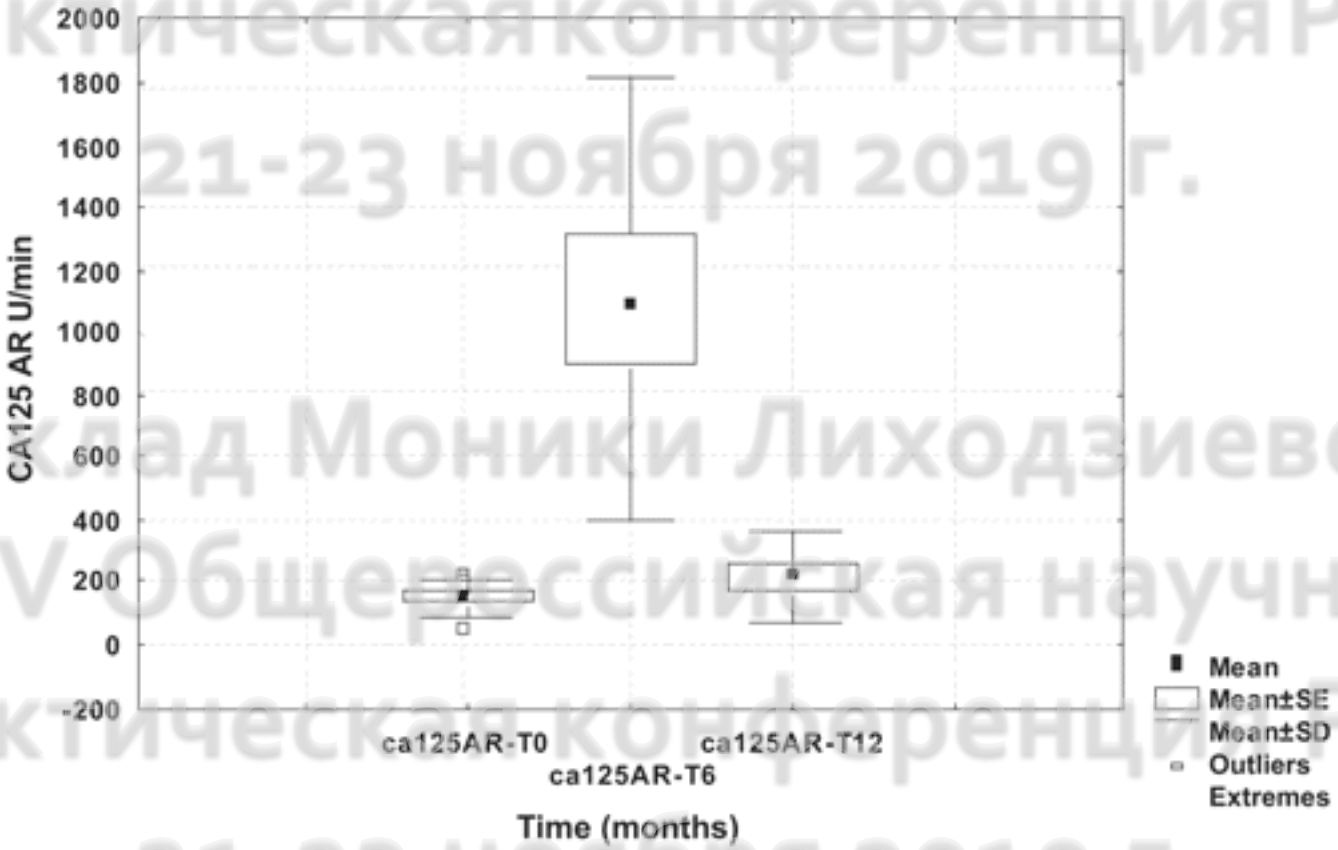
Safety chamber

After mixing –
pH neutral PD fluid

Alterations of Dialysate Markers in Chronic Peritoneal Dialysis 12 patients treated with the New Less Bioincompatible Bicarbonate Solutions

Maintenance of the integrity and longevity of peritoneal mesothelial cell mass

CA 125

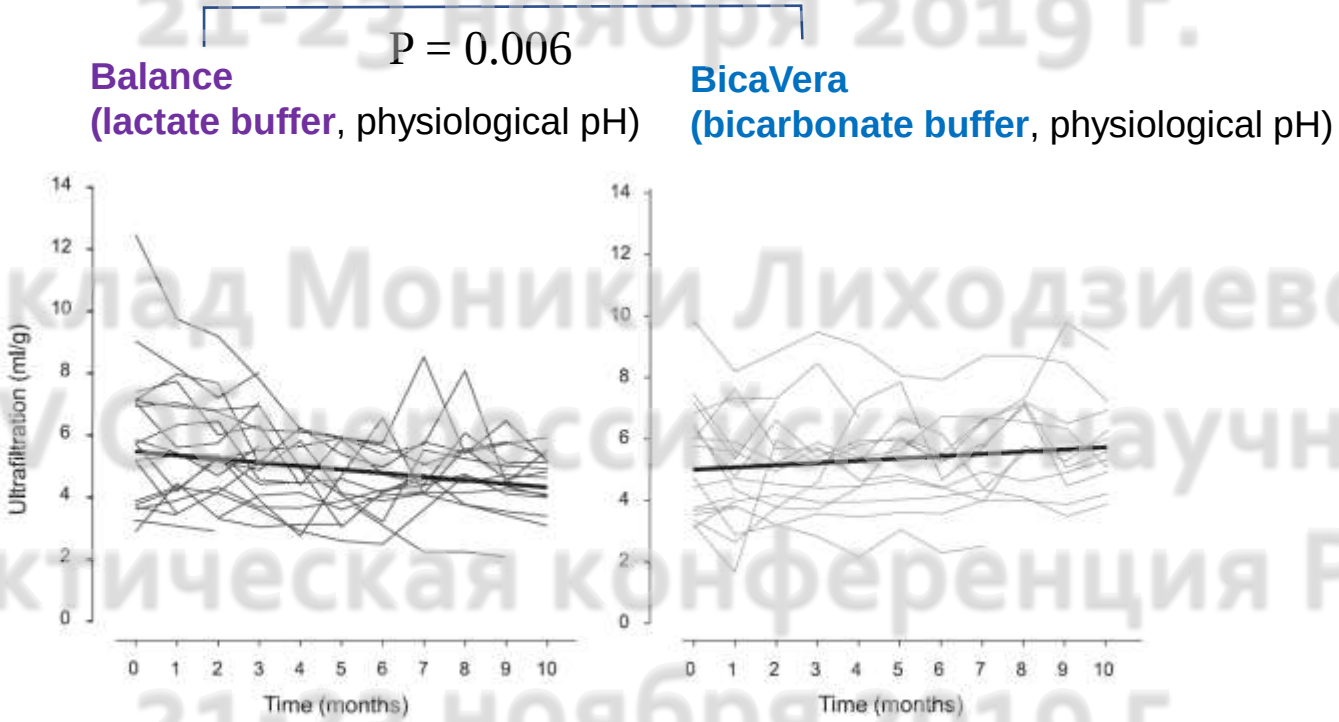


Theodoridis et al..Perit Dial Int 2011. 31, 2 196-199

Bicarbonate: better preservation of ultrafiltration capacity

37 children on automated PD

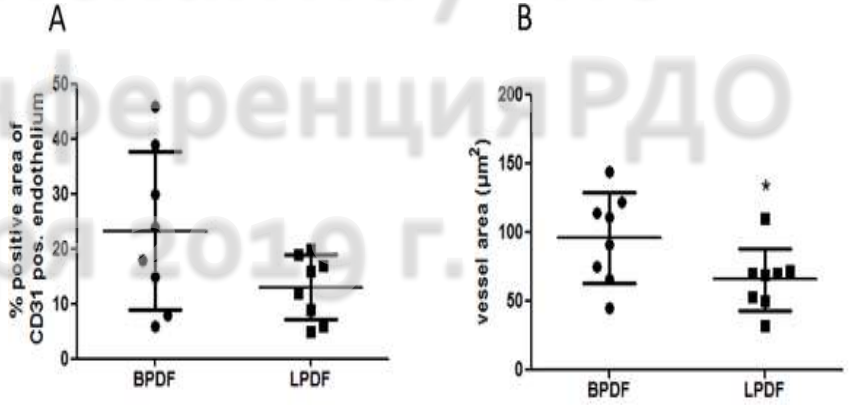
Buffer-dependent changes in peritoneal solute and water transport over time suggest **better long-term preservation** of peritoneal membrane function with **bicarbonate** compared with **lactate-based low-GDP** PD fluid.



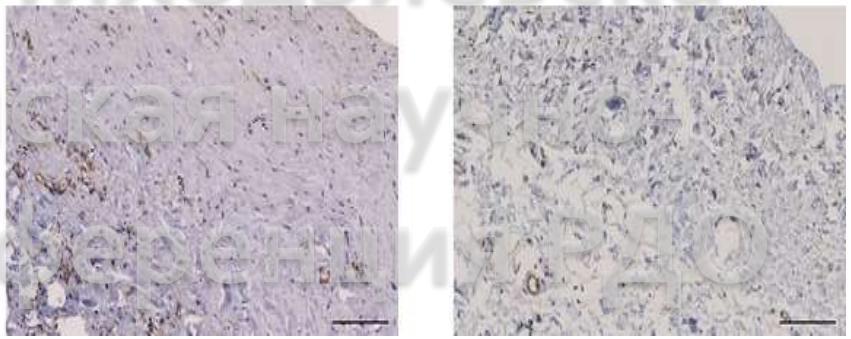
Schmitt et al. Clin J Am Soc Nephrol 8: 108–115, 2013.

Bicarbonate compared to lactate buffered PD fluid increases endothelial angiopoietin1 synthesis and the angiopoietin-1/-2 ratio, promotes receptor tyrosine kinase translocation to cell-cell contacts and thus **shifts the balance from blood vessel formation towards vessel maturation.**

Vessel morphology and angiopoietin-1 abundance in peritoneal biopsies.



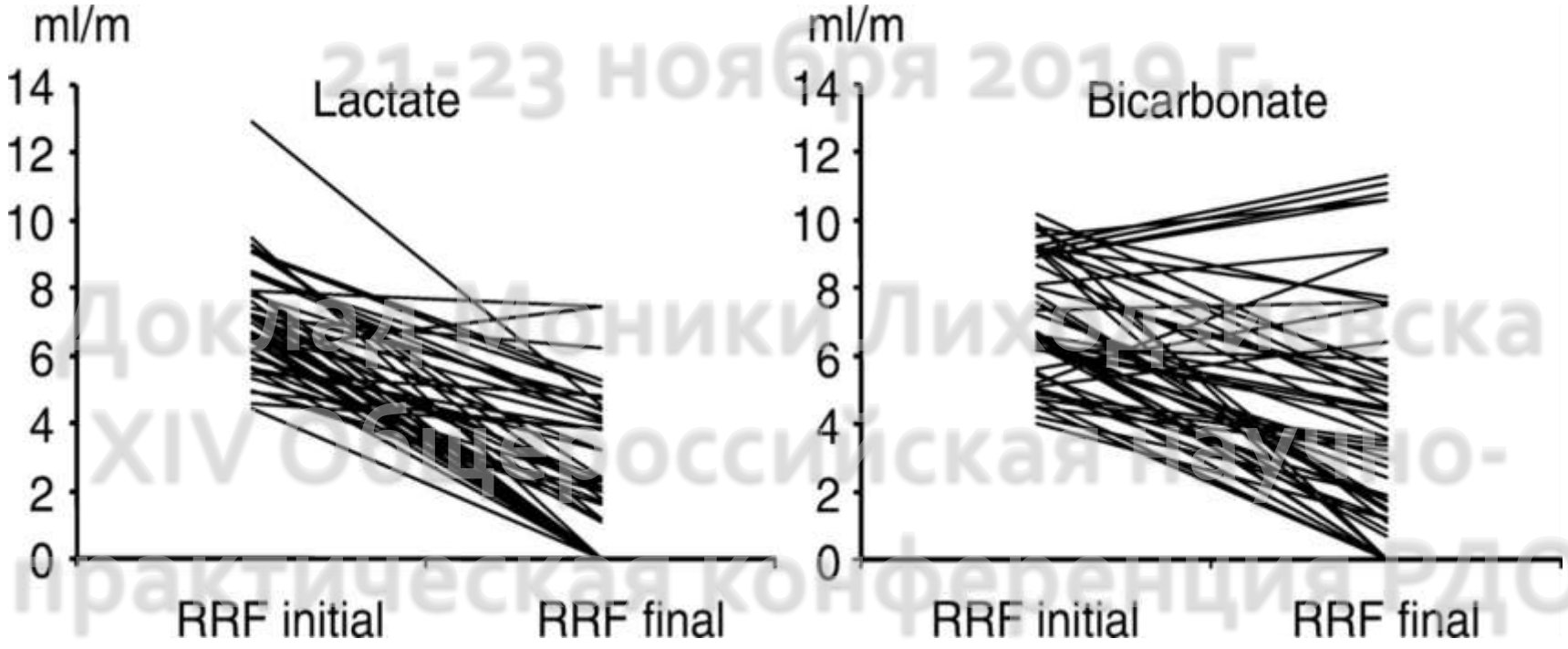
Potential molecular mechanism for the observed better preservation of ultrafiltration capacity in children treated with BPDF as compared to LPDF



PLOS ONE 2017 12(12): e0189903. https://doi.org/10.1371/journal.pone.0189903

Open, non-randomized, prospective, observational study,
100 CAPD pts, Spain: 50 lactate, 50 bicarbonate, 3 years

Initial and final **RRF** of study,
better preserved in BicaVera group ($P = 0.004$)



Montenegro et al. Nephrol Dial Transplant. 2007;22(6):1703-1708

Pediatr Nephrol (2011) 26:1137–1147
DOI 10.1007/s00467-011-1863-4

ORIGINAL ARTICLE

Solutions for peritoneal dialysis in children: recommendations by the European Pediatric Dialysis Working Group

Claus Peter Schmitt · Sevcan A. Bakkaloglu · Günter Klaus · Cornelis Schröder · Michel Fischbach

- "Conventional, single-chamber PD solutions should be replaced by **PD solutions with reduced GDP content** (1B)"
- „**Bicarbonate-based PD fluids are recommended in children with AKI especially when liver function is severely compromised** (1C). **Bicarbonate-based PD solutions should generally be preferred to single chamber lactate-based PD solutions in children** (1B). Recommendations with regard to the buffer composition of reduced GDP fluids cannot be given at present. "

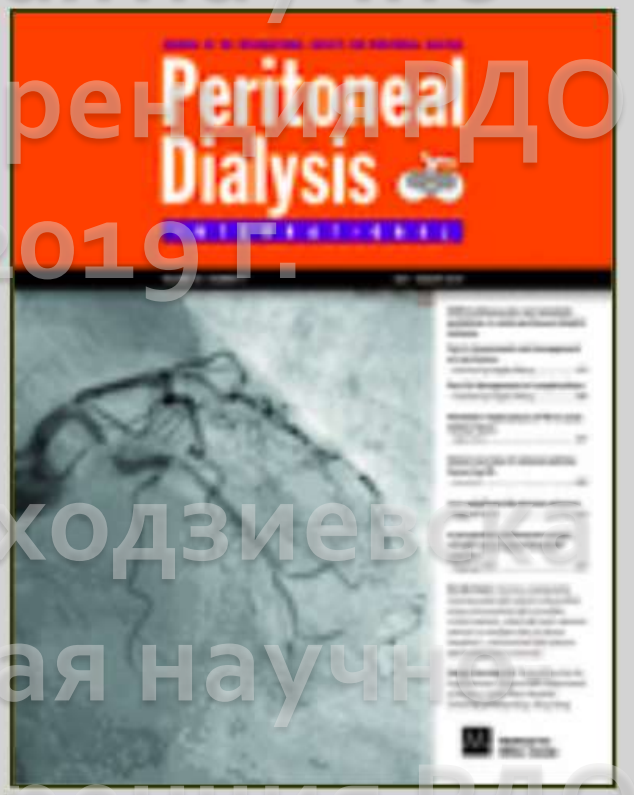
Schmitt et al
Pediatr Nephrol (2011) 26:1137–1147

ISPD CARDIOVASCULAR AND METABOLIC GUIDELINES IN ADULT PERITONEAL DIALYSIS PATIENTS PART I – ASSESSMENT AND MANAGEMENT OF VARIOUS CARDIOVASCULAR RISK FACTORS

Angela Yee Moon Wang,[1] K. Scott Brimble,[2] Gillian Brunier,[3] Stephen G. Holt,[4] Vivekanand Jha,[5] David W. Johnson,[6,7] Shin-Wook Kang,[8] Jeroen P. Kooman,[9] Mark Lambie,[10] Chris McIntyre,[11] Rajnish Mehrotra,[12] and Roberto Pecoits-Filho[13]

2.1.4 We suggest neutral pH, low glucose degradation product peritoneal dialysis solutions may be considered for better preservation of residual renal function if used for periods of 12 months or more. (2B)

RATIONALE: There are conflicting data on the impact of neutral pH, low glucose degradation product (GDP) PD solutions on RRF. The single largest randomized controlled trial did not find a positive effect of these solutions on RRF but demonstrated a significant delay in the time to anuria with neutral pH, low GDP PD solution (26). However, a systematic review of generally lower quality studies did suggest an improved preservation of RRF and greater 24-hour urine volume with the use of low GDP PD solutions when used for more than 12 months (27). Recognizing the limitations of the studies to date and the potential cost implications of using these more expensive solutions, neutral pH, low GDP PD solutions may be considered to preserve RRF when used for more than 12 months.



Wang AYM et al, Perit Dial Int 2015; 35(4):379–387

Woodrow et al. BMC Nephrology (2017) 18:333
DOI 10.1186/s12882-017-0687-2

BMC Nephrology

CORRESPONDENCE Open Access

Renal Association Clinical Practice Guideline on peritoneal dialysis in adults and children

Graham Woodrow[1*], Stanley L. Fan[2], Christopher Reid[3], Jeannette Denning[4] and Andrew Neil Pyrah[5]

Woodrow et al. BMC Nephrology (2017) 18:333

Benefit of biocompatible solutions on residual renal function, especially when used for more than 12 months

Cho Y, Johnson DW, Craig JC, Strippoli GFM, Badve SV, Wiggins KJ. Biocompatible dialysis fluids for peritoneal dialysis. Cochrane Database Syst 2014

Systematic review on low GDP, lactate/bicarb solutions and icodextrin

Compared with peritoneal dialysis patients treated with conventional peritoneal dialysis solutions, those treated with biocompatible solutions experience important benefits including better preservation of their own kidney function and urine volume with neutral pH, low glucose breakdown product peritoneal dialysis solutions and more effective prevention of fluid overload due to increased dialysis-related fluid removal with icodextrin. Whether these benefits help patients to stay on peritoneal dialysis longer or live longer are uncertain and require further study.

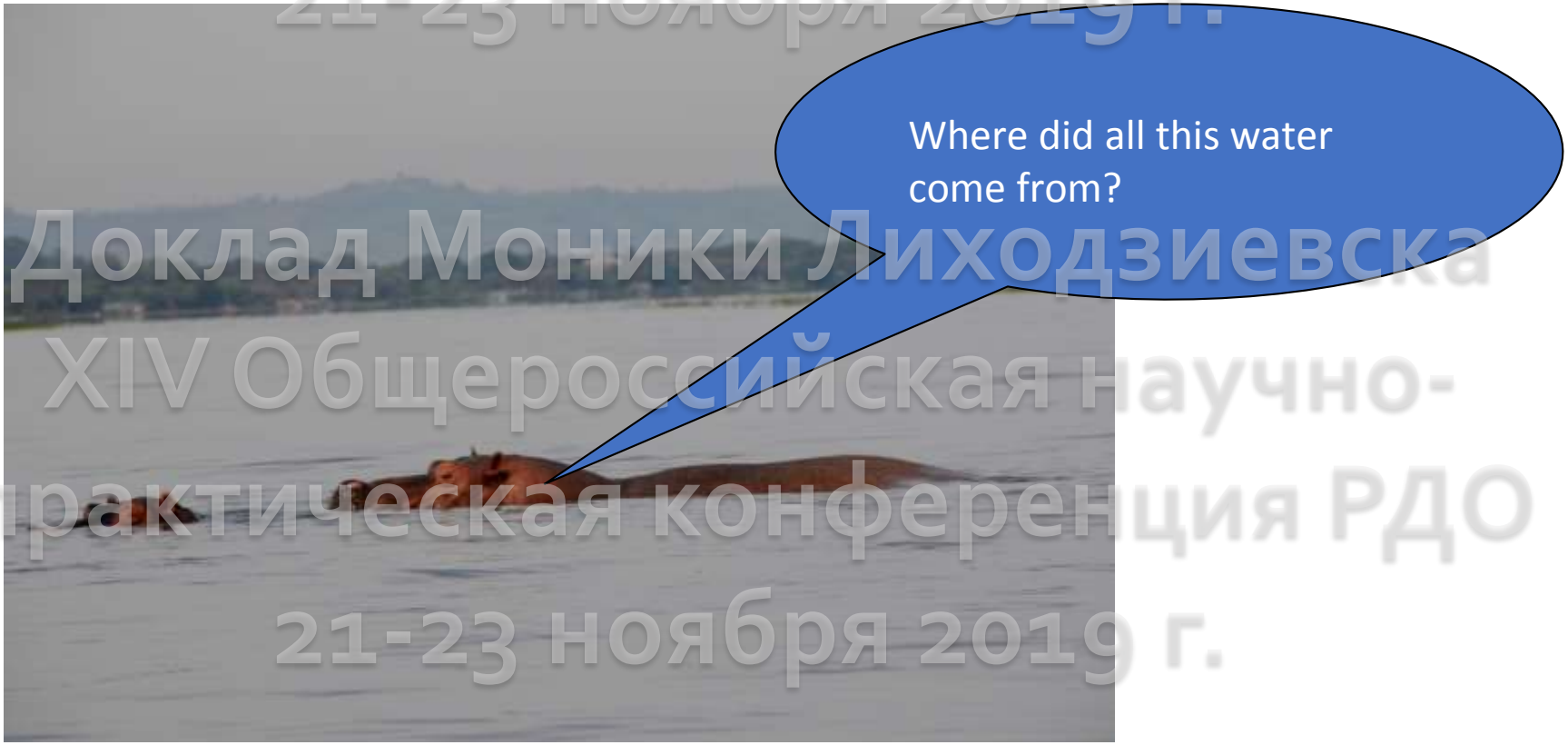
Cochrane Database of Systematic Reviews ***2018****, Issue 10. Art. No.: CD007554.DOI: 10.1002/14651858.CD007554.pub3*.

2

Techniques to optimize fluid balance

Доклад Моники Лиходзиевска
XIV Общероссийская научно-практическая конференция РДО
21-23 ноября 2019 г.

Reduce intake of both water and sodium

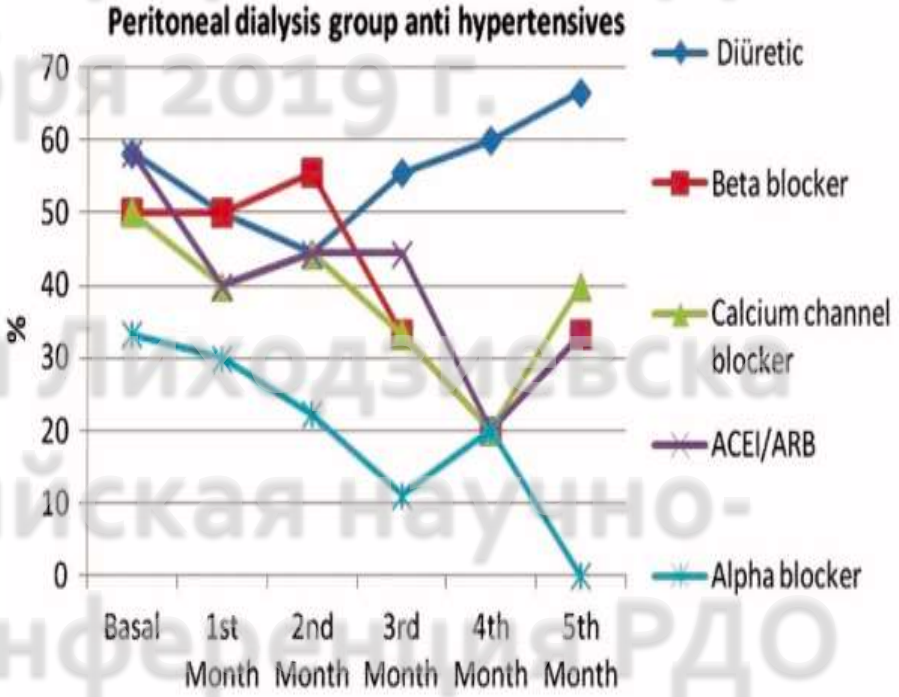


Strict salt control in ESRD patients after assessment of hydration status with either using BCM or echocardiography provides better management of volume control

Results of 20 PD patients of 47 in total treated with salt restriction alone

	Before Treatment	After Treatment	*P*
Body Weight (kg)	64.1 ± 9.3	62.2 ± 8.5	<0.001
Systolic BP (mmHg)	152.4 ± 10.7	120.5 ± 17.5	<0.001
Diastolic BP (mmHg)	91.5 ± 8.2	77.3 ± 43.6	<0.001
Cardio-Thoracic Index (%)	47.1 ± 4.3	43.6 ± 4.6	<0.001
Hematocrit (%)	28.9 ± 2.8	30.3 ± 3.4	NS
Albumin (g/dL)	3.8 ± 0.4	4.0 ± 0.5	NS
Urine Production (mL/day)	558.3 ± 511.7	211.1 ± 313.0	0.02

BP, blood pressure; NS, not significant.



Am J Kidney Dis 2001, 37: 588-593

Renal Failure, 2013, 35:10, 1344-1347

Low-sodium diet may be difficult to stick to....

Review Article

Achieving Salt Restriction in Chronic Kidney Disease

Emma J. McMahon,[1,2] Katrina L. Campbell,[1,2] David W. Mudge,[1,2,3] and Judith D. Bauer[2]

Study country	Population	Barriers to sodium-restricted diet
Welch et al. (2006) [20] USA	229 *hemodialysis* pts, aged 55 ± 14 years. 58% male, 79% African American	(i) Taste (58%) (ii) Difficulty when eating out (30%) (iii) Cost (23%) (iv) Difficult to understand (21%) (v) Too time-consuming (17%)
De Brito-Ashurst et al. (2011) [72] UK	20 female *CKD pts*, 1st generation immigrants from Bangladesh to the UK, aged 60 ± 8 years; unemployed	(i) Lack of family acceptance (50%, $n = 10/20$) (ii) Fear that friends will gossip/think the family has no money (40%, 8/20) (iii) No perceived benefit (25%, $n = 5/20$)
Gordon et al. (2009) [77] USA	82 *transplant recipients* aged 47 ± 57 years. 57% male, 56% white	(i) Preferences for salty foods and enjoying taste of salt ($n = 9$) (ii) Lack of available low-salt dishes at restaurants ($n = 10$) or low-salt foods in markets ($n = 3$) and when other people cook using salt ($n = 3$) (iii) Lifestyle factors ($n = 5$) for example, having no time to cook
Ireland et al. (2010) [65] Australia	43 *healthy pts* from volunteer database. 23% male, aged 55 ± 11 in "tick group" 57 ± 13 y in "FSANZ group"	(i) Limited variety of appropriate foods (ii) Difficulty eating out (iii) Increased time for shopping

International Journal of Nephrology 2012, Article ID 720429

Increase water and sodium removal

- High glucose
- Icodextrin
- Adapted APD

Proposed approaches for enhancement of sodium extraction in PD

Icodextrin use rather than glucose-based solutions
Continuous ambulatory peritoneal dialysis rather than automated peritoneal dialysis
Addition of mid-day exchange
Increase in dialysate volume
Optimization of dwell time (sodium sieving vs. back diffusion)
Increase in ultrafiltrate volume (e.g., use of higher concentrations of glucose)
Supine position
Consideration of tidal volume
Low-sodium dialysate
Bimodal dialysate
Consideration of twice-daily icodextrin
Adapted automated peritoneal dialysis

Adapted from Cardiorenal Med 2019;9:117–124

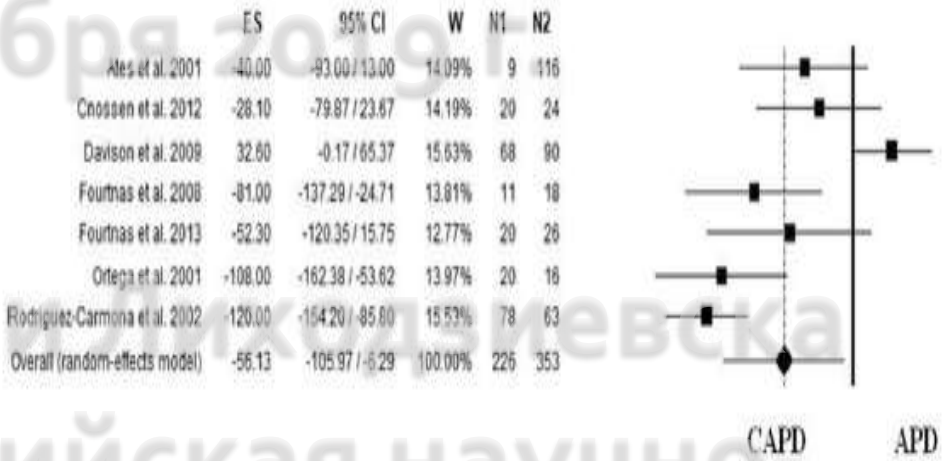
CAPD better....

Comparison of Na removal, clearance and blood pressure in APD, CAPD patients

Category	APD	CAPD	*P*
Daily peritoneal **sodium**, mmol	87	195	0.0001
Plasma sodium, mmol/l	139	139	0.7
Daily urinary sodium, mmol	53.6	53.0	0.97
Volume instilled, L	11.9	6.7	0.0001
Weekly peritoneal Kt/V	1.7	1.5	0.28
Weekly peritoneal Crea-Clear., L	40.1	40.2	0.9
4-hour D/P crea-ratio	0.64	0.61	0.5
Hypertonic solution, %	54	40.5	0.18
Net ultrafiltration, mL	1047	1538	0.005
Blood pressure, mmHg			
Systolic	133.5	122.4	0.015
Diastolic	79.8	77.8	0.52
Patients with antihypertensives, %	70	26	0.0015

Am J Nephrol 2001,21: 189-193

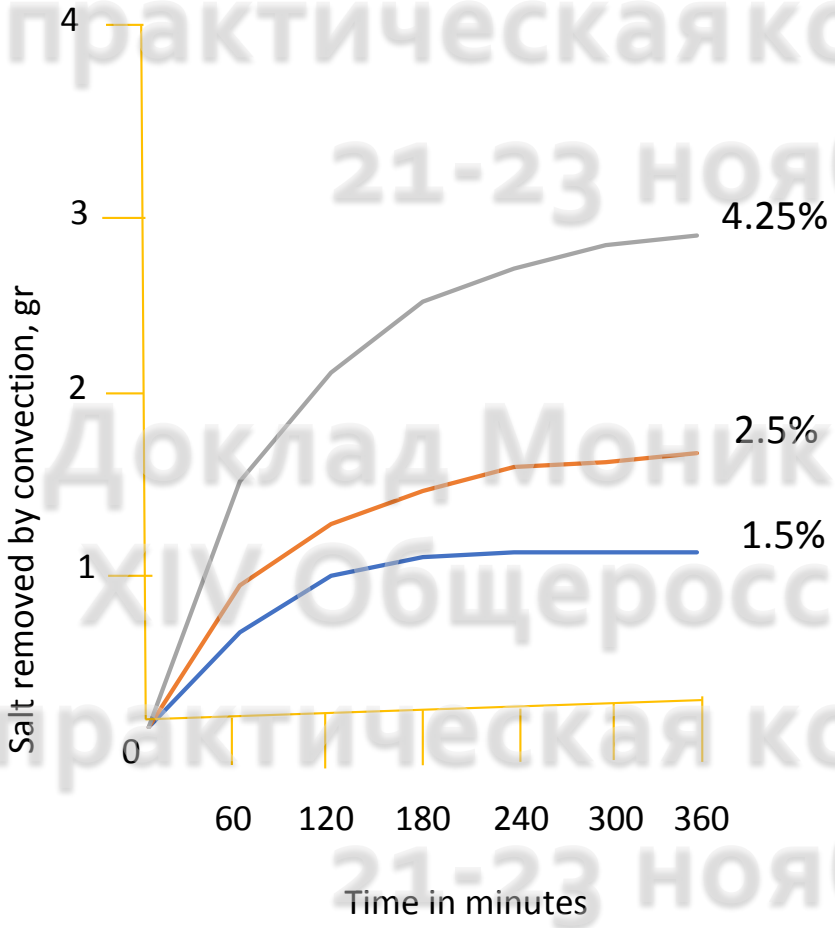
Sodium removal by peritoneal dialysis:
a systematic review and metaanalysis

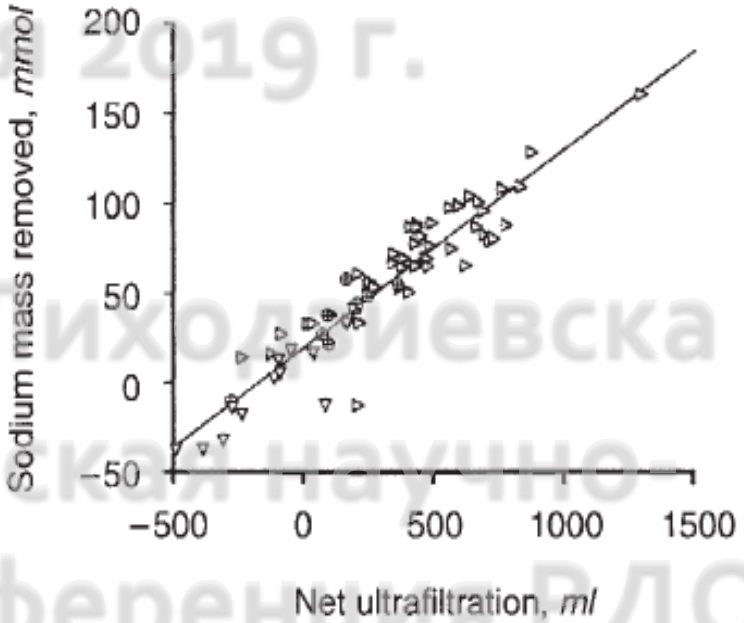


J Nephrol. 2019 Apr;32(2):231-239.

The higher the glucose concentration of the solution, the higher the convective sodium removal

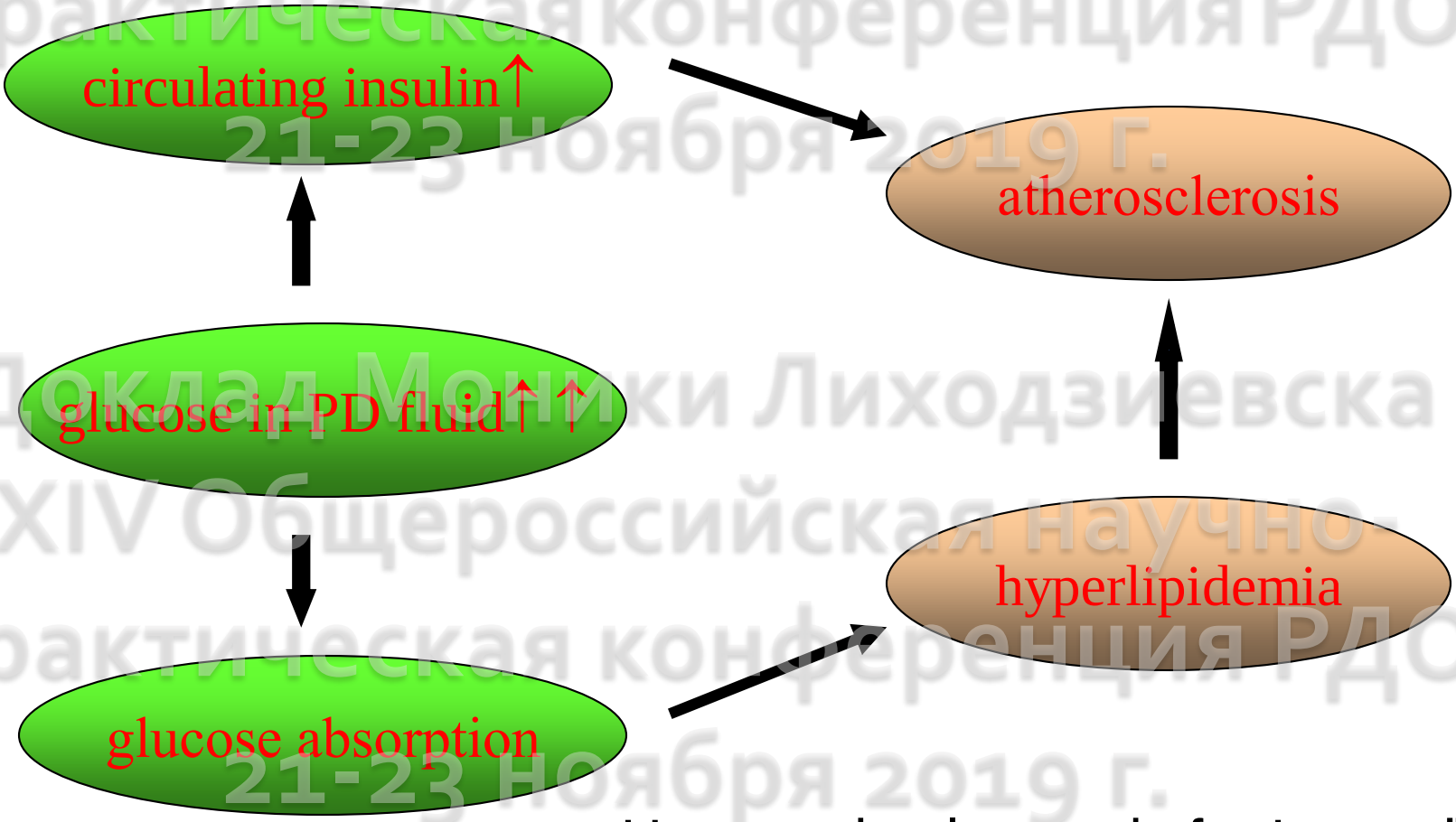
Sodium and water removal are related





Wang T et al. Kidney Int 1997;52:1609-1616

Metabolic effects of high glucose concentration in PD solutions



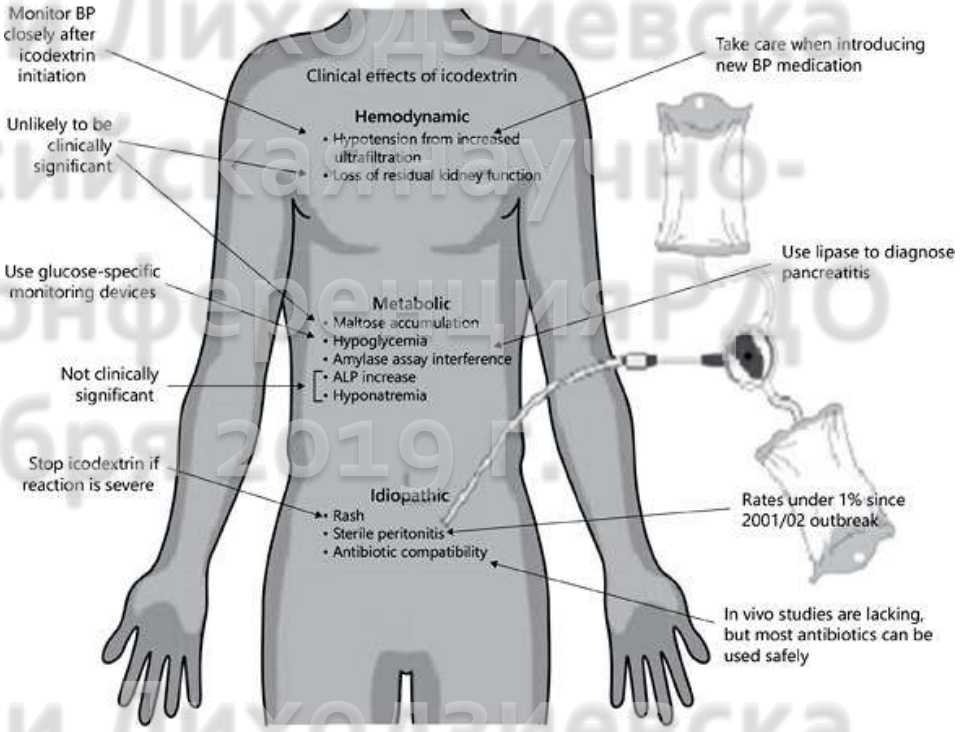
„Hypertonic glucose is for Losers”

Icodextrin

- Improves sodium removal
- Colloid osmotic gradient
- through small pores
- Maximal convective sodium removal

But

- Compromised biocompatibility
- More SAE and deaths in glucose sparing group in IMPENDIA & EDEN trials



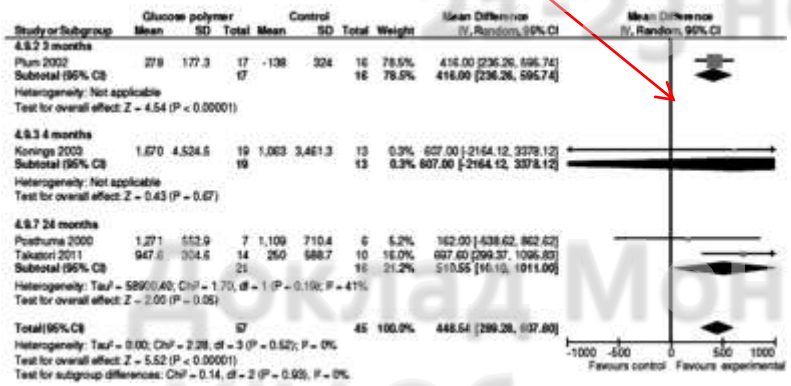
Am J Nephrol 2014;39:515-527

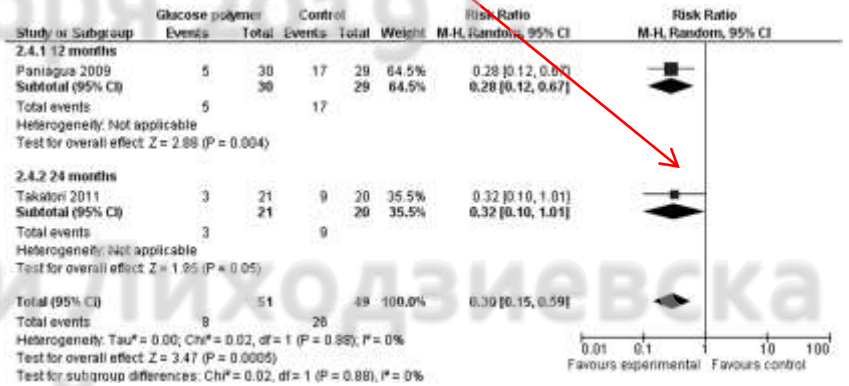
J Am Soc Nephrol 2013; 24: 1889-1900 Nephron 2015;129:233-240

Icodextrin -Systematic review

Increased peritoneal ultrafiltration volumes

Lower risk of uncontrolled fluid overload





No effects of icodextrin on technique or patient survival, meta-analysis lacked statistical power to adequately evaluate patient-level outcomes, >60% studies with follow-up of ≤6months.

Yeoungjee Cho et al. Nephrol. Dial. Transplant. 2013;28:1899-1907

Systematic review on low GDP, lactate/bicarb solutions and icodextrin

Compared with peritoneal dialysis patients treated with conventional peritoneal dialysis solutions, those treated with biocompatible solutions experience important benefits including better preservation of their own kidney function and urine volume with neutral pH, low glucose breakdown product peritoneal dialysis solutions and **more effective prevention of fluid overload due to increased dialysis-related fluid removal with icodextrin.** Whether these benefits help patients to stay on peritoneal dialysis longer or live longer are uncertain and require further study.

Cochrane Database of Systematic Reviews ***2018****, Issue 10. Art. No.: CD007554.DOI: 10.1002/14651858.CD007554.pub3.*

Adapted APD

The concept of adapted APD small/short exchange followed by large/long exchange to optimize dialytic sodium removal

Exchange favoring UF

Short/small cycle
(Free water transfer via AQP-1)
- Hemoconcentration
- Incomplete drainage (low IPP)
- Low NaD

Exchange favoring dialytic Na removal

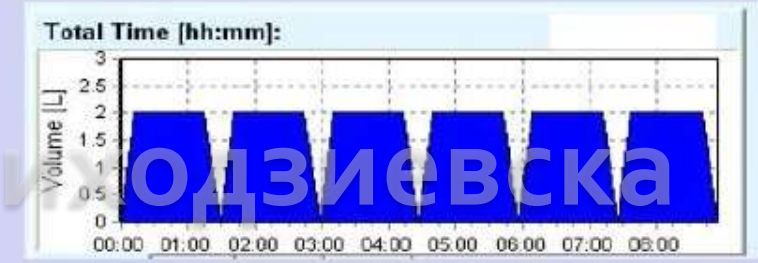
Long/large cycle
(Small pore recruitment)
- Na-coupled water transport
- Long diffusion time
- High diffusion gradient (NaPl/NaD)

Kidney International 2016 ,89, 761-766

Study design:

- same total amount of dialysate balance/lactate: 12000mL, only isotonic 1.5% glucose, same costs (economically, metabolic)
- same duration of dialysis session (9 hours)
- dry cavity during the day (a « need » for the study)

APD-C (conventional) : 9 hours
6 times same fill (2000mL),
same dwell, (cycle 90min)



APD-A (adapted/profiled) : 9 hours
2 times low fill(1500mL)-short dwell(45min),
3 times large fill(3000mL)-long dwell(150min)

Perit Dial Int 2011

Water and sodium transport across the peritoneal membrane

Ultrafiltration
(AQP-1 and small pores)

1. AQP-1 (40% to 50%), solute-free water transport, by osmotic gradient
2. Small pores (50% to 60%), solute-coupled water transport, by osmotic and hydrostatic pressure gradient

Sodium transport
(Small pores)

1. Convective mass transport (coupled water)
2. Diffusive mass transport (determined by diffusion gradient, volume, and time)
3. Peritoneal absorption (fluid and solutes absorbed to interstitial tissue and lymphatics)

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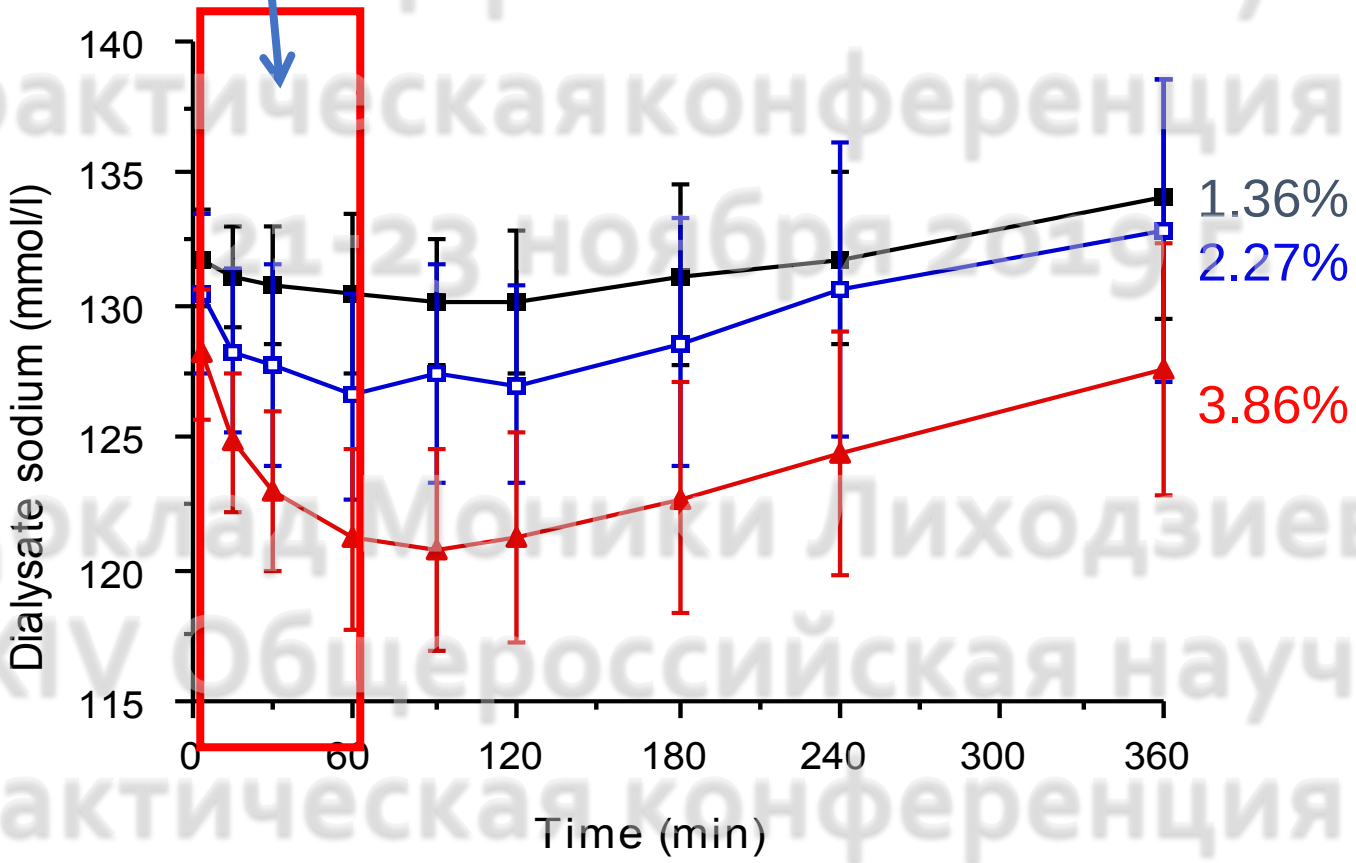
Fischbach et al.Increasing sodium removal on peritoneal dialysis: applying dialysis mechanics to the peritoneal dialysis prescription
Kidney International 2016 ,89, 761-766

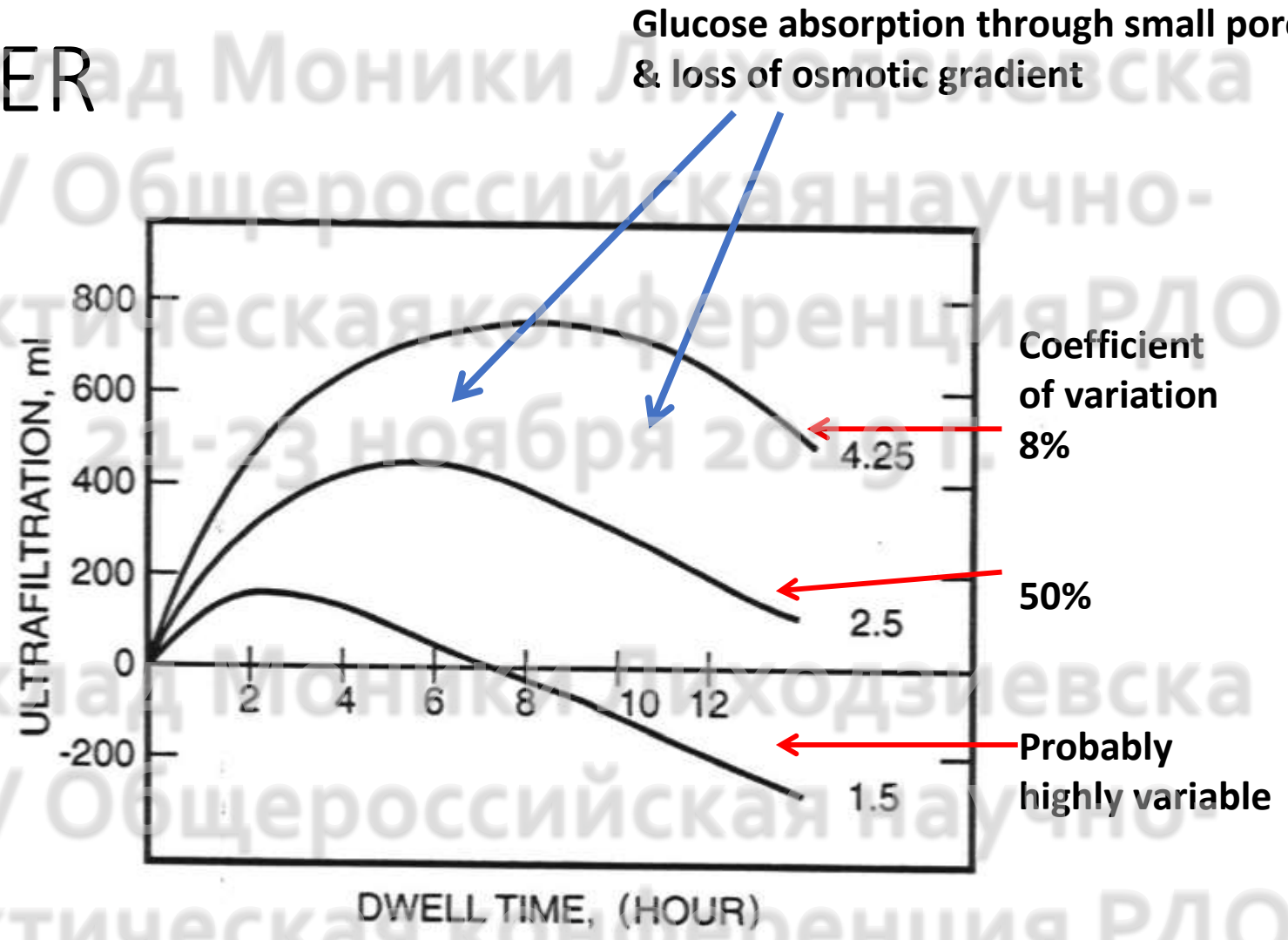
Osmotic conductance drives water transport through aquaporins

WATER



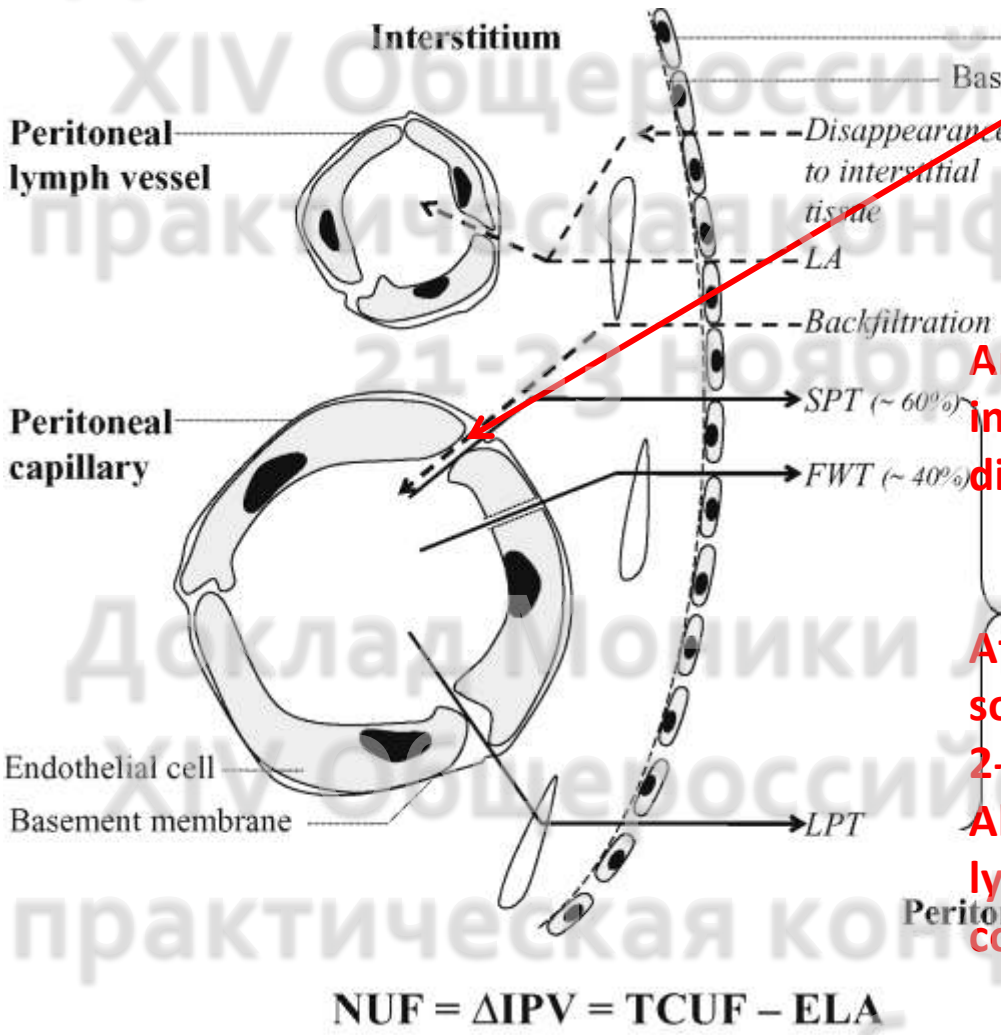
Heimbürger et al. Kidney Int 41: 1320-1332, 1992

WATER



= glucose diffusive process via the small pores affects the ability of AQP-1 channels to produce free water

Sodium



Sodium removed only through small pores

via: convection, absorption and diffusion (less)

Amount of "wetted peritoneal membrane" important in recruiting small pores for dialytic sodium removal

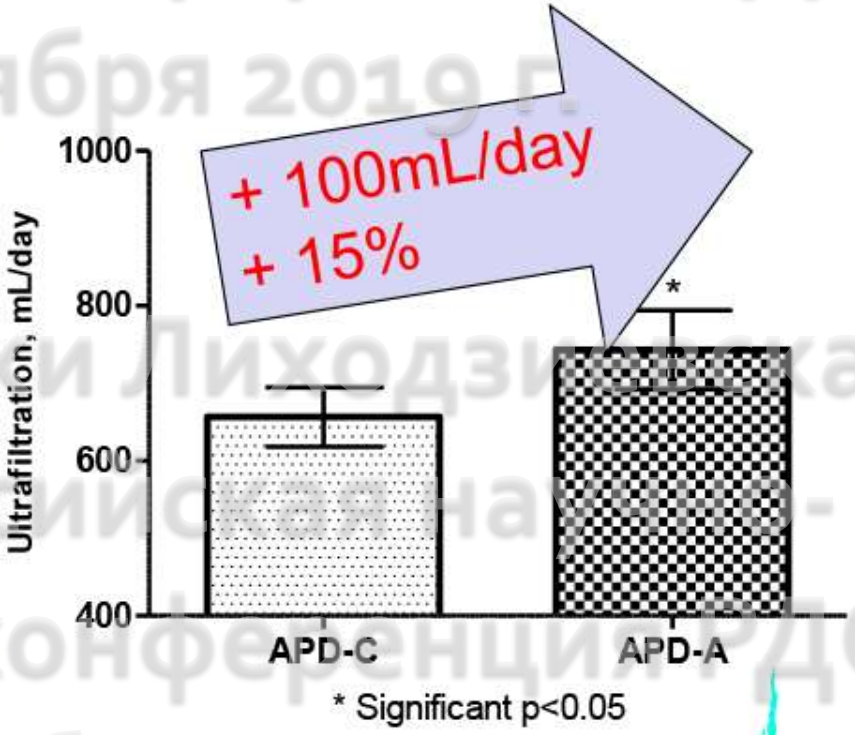
After a 6-hour dwell of 2 l of 1.36% glc, sodium removed via convection 2-fold higher than via diffusion.

Absorption of Na to peritoneal tissue and lymphatics almost equals combined diffusive and convective fractions

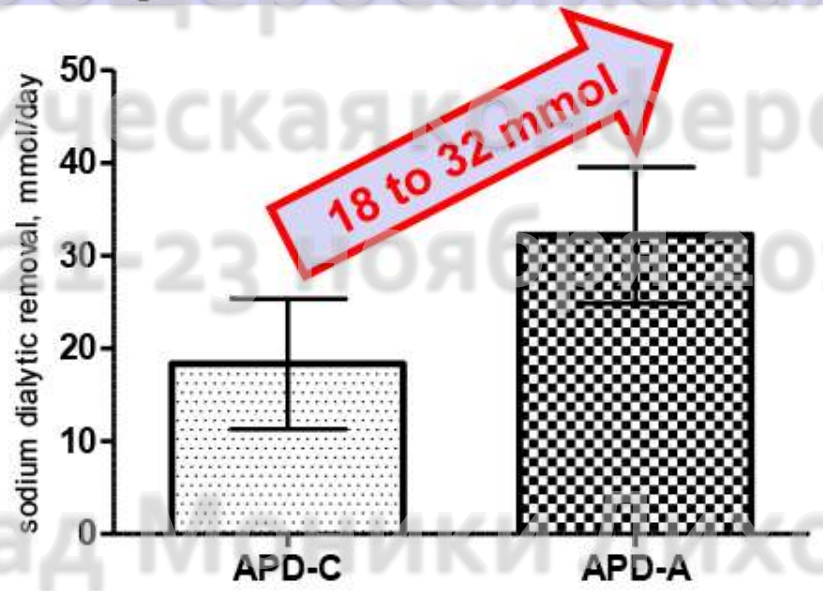
Annemieke M. Coester et al. NDT Plus 2009;2:104-110

Ultrafiltration (UF; mL/day): increased with APD-A, enhanced osmotic conductance

N = 19	APD-C	APD-A
Mean ± SD	656 ± 275.3	743 ± 358.3*
Min – Max	153 - 1199	180 - 1551
Number of pairs	49	
p value	< 0.05 (0.023)	



Dialytic sodium removal (mmol/day): improved with APD-A



+ 90% ! ,?

* Significant p<0.01

N = 19	APD-C	APD-A
Mean ± SD	18.35 ± 48.68	32.23 ± 52.00*
Min / Max	-69.0 / +108.5	-81.7 / +153.2
Number of pairs	47	
p value	< 0.01 (0.01)	

Les Hôpitaux Universitaires de STRASBOURG

Increased sodium removal does not correlate with larger UF

UF & small solute and sodium clearance are unmatched

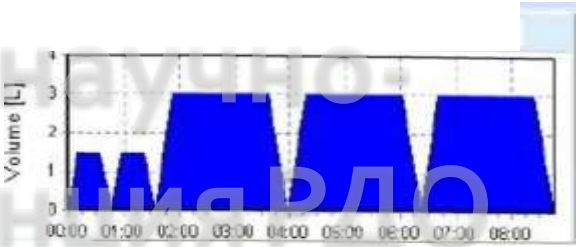
Patophysiology of this phenomenon in unclear

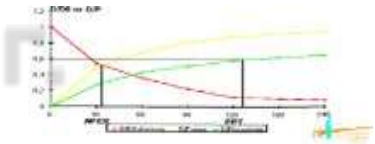
Mechanisms of the speculated enhanced diffusive transport in A-APD remain elusive and are not readily explained by the current 3-pore model

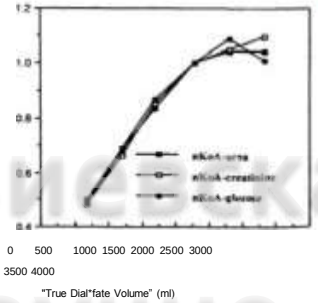
Varying dwell time and dwell volume, as in adapted APD, is a potential new strategy to improve sodium and volume control in cyclers with software that facilitates individualized aAPD regime!

Adapted APD concept
How to prescribe?

- Fill volume adapted « individually », under intraperitoneal pressure control (small 750 mL/m2 and larger 1500 mL/m2); IPP <15-18 cm
- Dwell time adapted « individually », short dwell (APEX time: 30-60 min) and longer dwell (3 to 4 times APEX time: 90-240 min)
- First sequence, UF favored : short dwell, small fill
- Second sequence, toxins removal favored : longer dwell, larger fill
- Evaluation of the patient, to adapt individually the prescription : more UF or more purification?







Fischbach ISPD Melbourne 2016

Conclusion

- Water and sodium balance is vital for PD patients' survival
- Low-GDP, neutral pH, bicarbonate buffered solutions help preserving ultrafiltration and residual renal function
- Applying the principles of dialysis mechanics to the daily PD prescription process may help achieve optimal fluid and sodium removal

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