Diplôme d'Université des Techniques
d'Epuration Extra-Rénale

Balance hydrosodée en Dialyse Péritonéale

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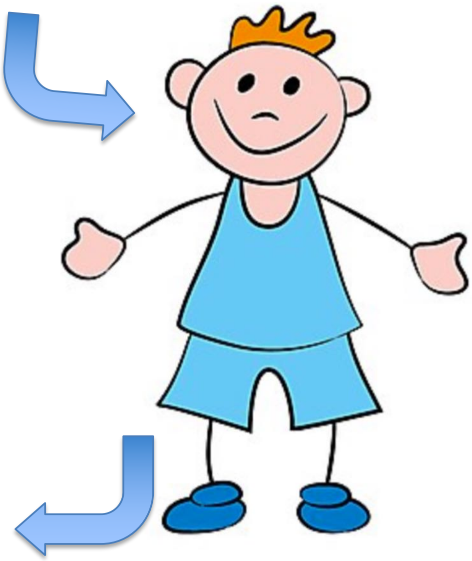
Bilan du sodium entrées = sorties ?

5 g NaCl
85 mmoles



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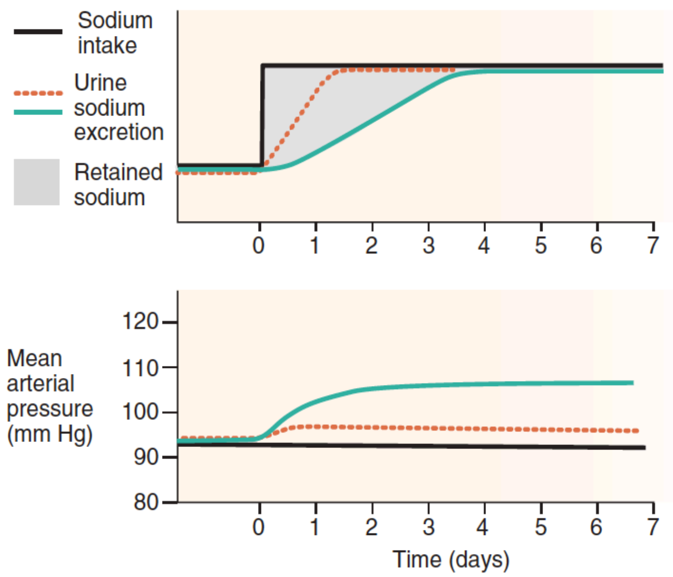
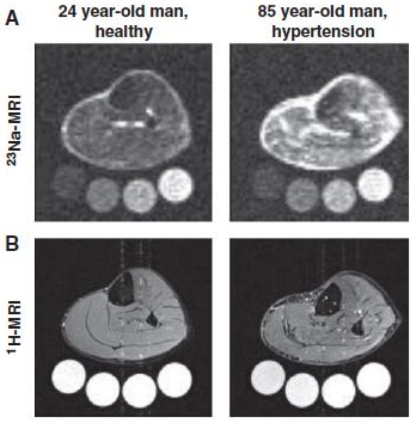
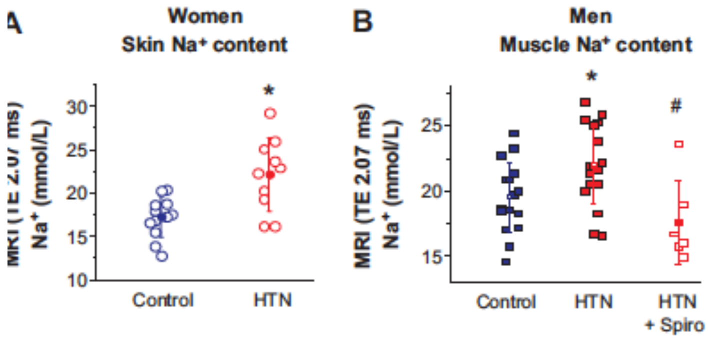


^{23}Na Magnetic Resonance Imaging-Determined Tissue Sodium in Healthy Subjects and Hypertensive Patients

Hypertension
2013(61):635-40)

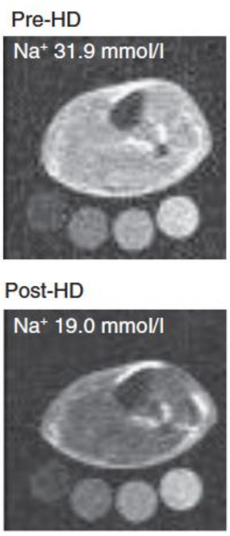
Christoph Kopp, Peter Linz, Anke Dahlmann, Matthias Hammon, Jonathan Jantsch, Dominik N. Müller, Roland E. Schmieder, Alexander Cavallaro, Kai-Uwe Eckardt, Michael Uder, Friedrich C. Luft, Jens Titze

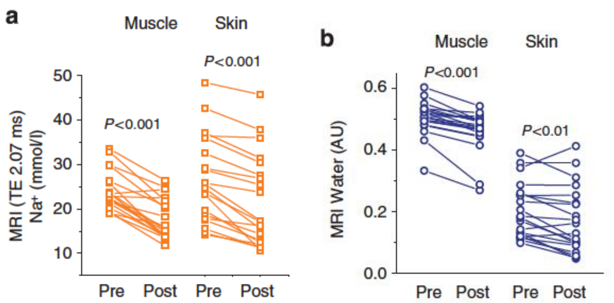


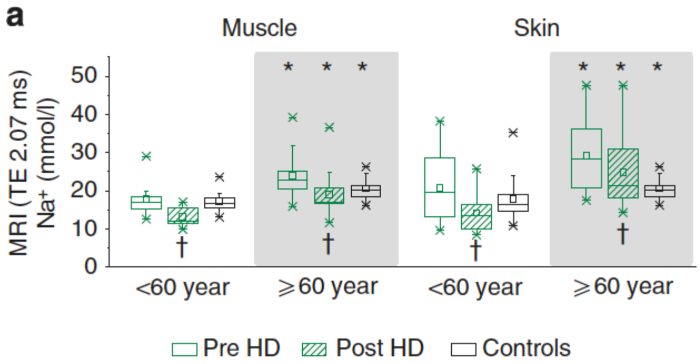


Magnetic resonance–determined sodium removal from tissue stores in hemodialysis patients

Anke Dahlmann[1,2], Kathrin Dörfelt[1], Florian Eicher[1], Peter Linz[1], Christoph Kopp[1,2], Irina Mössinger[1], Stephan Horn[3], Beatrix Büschges-Seraphin[4], Peter Wabel[5], Matthias Hammon[6], Alexander Cavallaro[6], Kai-Uwe Eckardt[2], Peter Kotanko[7], Nathan W. Levin[7], Bernd Johannes[8], Michael Uder[6], Friedrich C. Luft[9,10], Dominik N. Müller[9] and Jens M. Titze[1,10]

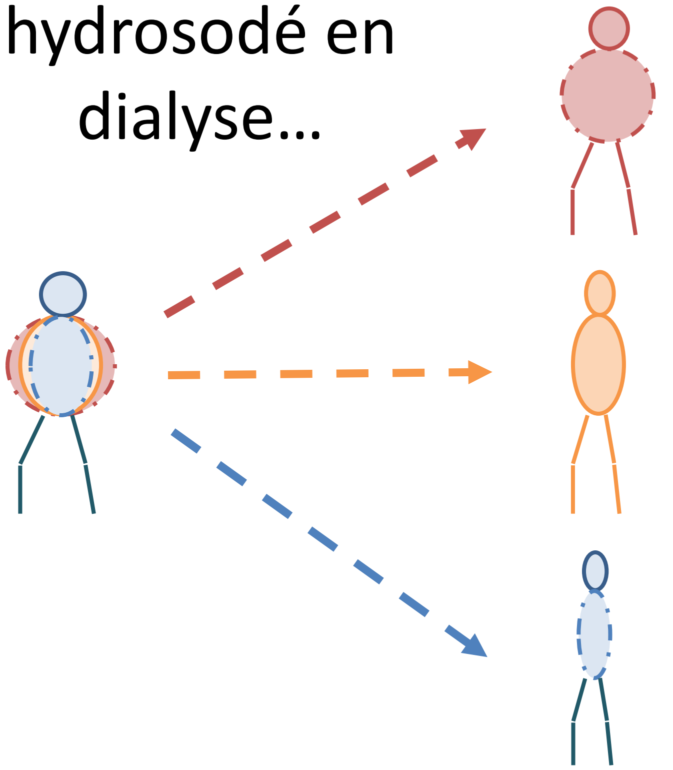






Kidney International (2015) **87**, 434-441;

Impact du statut hydrosodé en dialyse…



- OAP, HTA, Ins. Card
- Perte de FRR
- Dénutrition

↗ **Mortalité totale et CV**

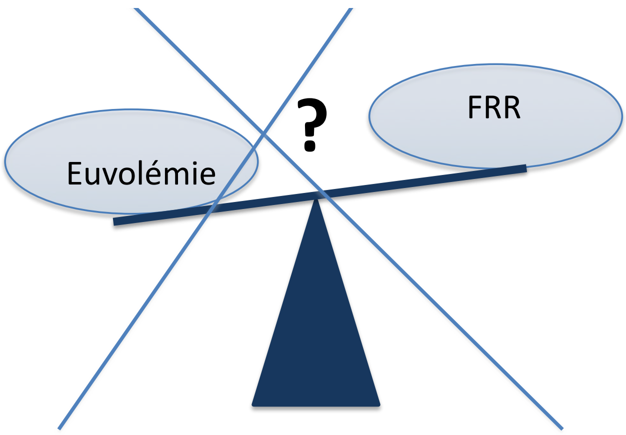
Dialyse Adéquate

- Perte FRR
- Baisse de perfusion cérébrale
- Baisse de QOL

↗ **Mortalité totale et CV**

Rétention hydrosodée et fonction rénale résiduelle

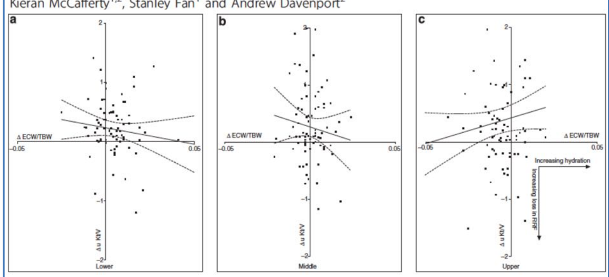
Le prix à payer pour la protection de la FRR ?



http://www.kidney-international.org clinical investigation

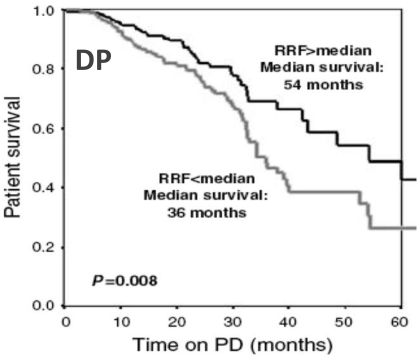
Extracellular volume expansion, measured by multifrequency bioimpedance, does not help preserve residual renal function in peritoneal dialysis patients

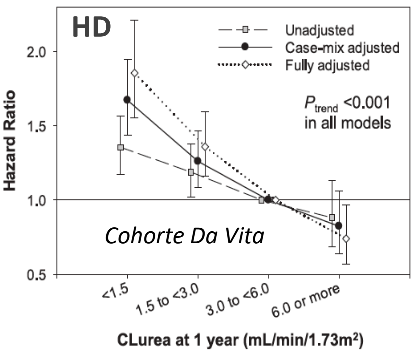
Kieran McCafferty[1,2], Stanley Fan[1] and Andrew Davenport[2]

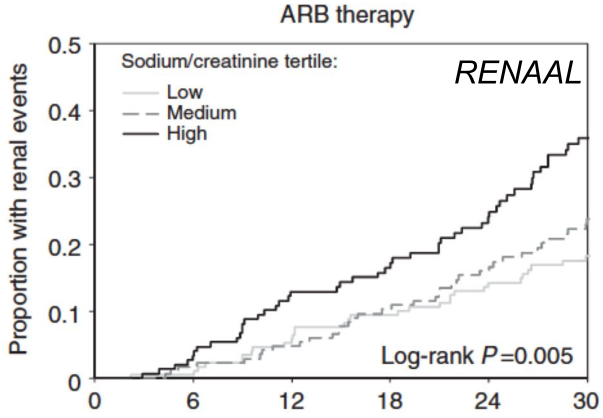


(McCafferty K, KI 2014(85):151-7)

Rétention hydrosodée et fonction rénale résiduelle







(Obi Y, JASN (27), 2016)

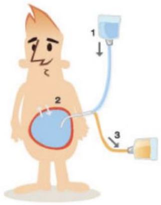
(Lambers Heerspink HJ, KI (2012)82:330-7)

THE EFFECT OF FLUID OVERLOAD ON CLINICAL OUTCOME IN SOUTHERN CHINESE PATIENTS UNDERGOING CONTINUOUS AMBULATORY PERITONEAL DIALYSIS

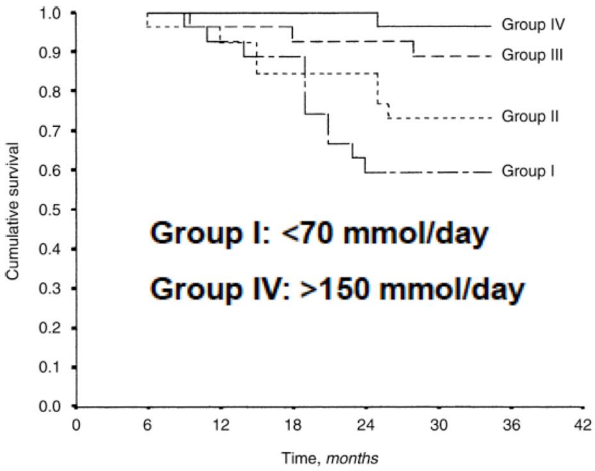
Qunying Guo,* Jianxiong Lin,* Jianying Li, Chunyan Yi, Haiping Mao, Xiao Yang, and Xueqing Yu

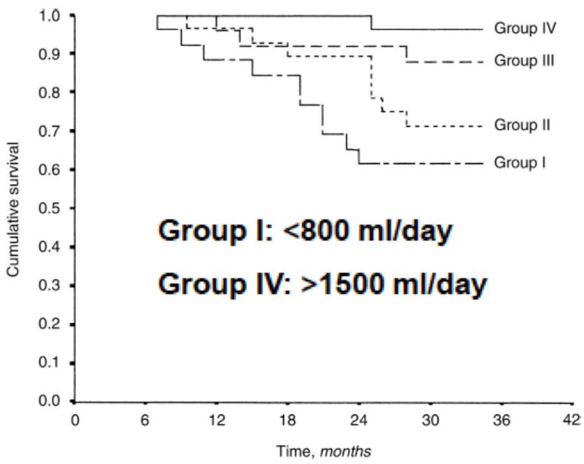
Clinical outcome	Total population (n=307)	Fluid status ECW/TBW≥0.4 (n=205)	Fluid status ECW/TBW<0.4 (n=102)	P value
Peritonitis (episodes/month exposure)	148 (0.014)	111 (0.016)	37 (0.011)	0.018*
Non-peritonitis infection (events/100 patient years)	90 (10.3)	65 (11.1)	25 (8.7)	0.19
Cardiac and cerebrovascular events (events/100 patient years)	74 (8.5)	59 (10.1)	15 (5.2)	0.019*
Cardiac events (events/100 patient years)	48 (5.5)	36 (6.1)	12 (4.2)	0.18
Cerebrovascular events (events/100 patient years)	26 (3.0)	23 (3.9)	3 (1.0)	0.024*
Ischemic cerebrovascular events (events/100 patient years)	18 (2.1)	16 (2.7)	2 (0.7)	0.057
Haemorrhagic cerebrovascular events (events/100 patient years)	8 (0.9)	7 (1.2)	1 (0.3)	0.227
All-cause mortality (events/100 patient years)	52 (5.9)	43 (7.3)	9 (3.1)	0.018*
CVD mortality (events/100 patient years)	37 (4.2)	30 (5.1)	7 (2.4)	0.089
Cardiac diseases mortality (events/100 patient years)	28 (3.2)	22 (3.7)	6 (2.1)	0.242
Stroke mortality (events/100 patient years)	9 (1.0)	8 (1.4)	1 (0.3)	0.168
Peripheral vascular diseases mortality (events/100 patient years)	0 (0)	0 (0)	0 (0)	—
Infectious diseases mortality (events/100 patient years)	10 (1.1)	9 (1.5)	1 (0.3)	0.129
Other diseases mortality (events/100 patient years)	5 (0.6)	4 (0.7)	1 (0.3)	0.406

(Perit Dial Int 2015(35):691-702)



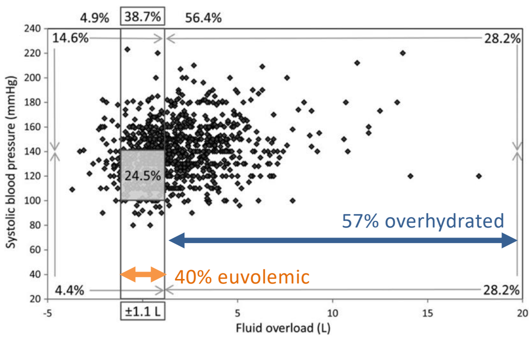
Rétention hydrosodée et survie en Dialyse Péritonéale

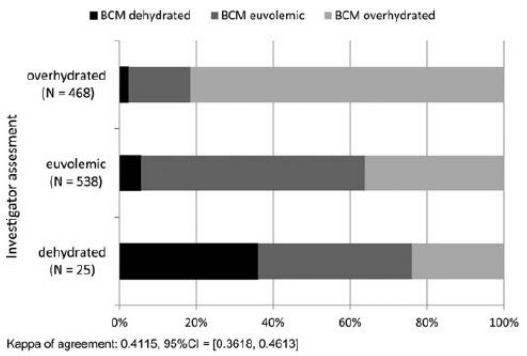




(Ates K, Kidney Int (2001)60:767-76)

Baseline hydration status in incident peritoneal dialysis patients: the initiative of patient outcomes in dialysis (IPOD-PD study)†





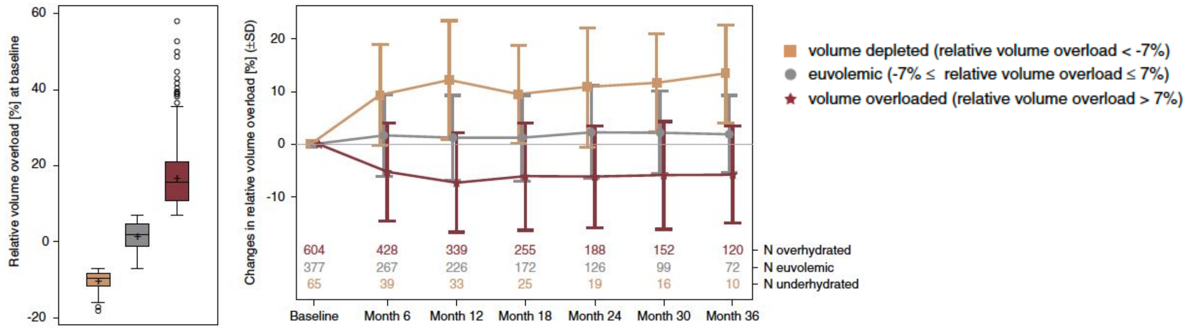
- Fluid overload higher in
  - Fast transporters
  - Males vs females
  - Diabetics

- 80% of pts with clinical overhydration are BCM-overhydrated
- >1/3 of clinically euvolemic pts are BCM-overhydrated

(Ronco C, NDT 2015(30):849-58)

Evolution Over Time of Volume Status and PD-Related Practice Patterns in an Incident Peritoneal Dialysis Cohort

Relative volume overload at baseline and mean change of relative volume overload of participants in the FO categories

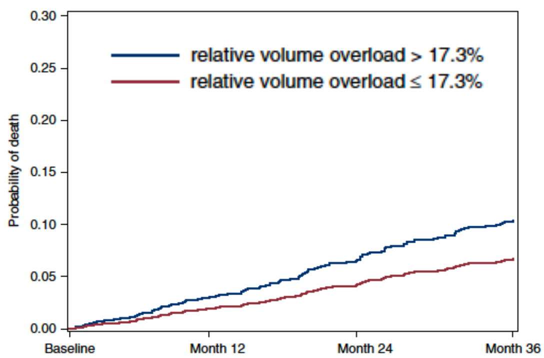


	Mean FO	Rel FO (%)
Baseline	1.9 ± 2.3 L	9.7 ± 11.1
1-year	1.2±1.8 L	6.6 ± 9.5
2-year	1.4 ± 1.8 L	7.4 ± 9.6
3-year	1.4 ± 1.7 L	7.7 ± 8.9

(Van Biesen W. CJASN 14: 882–893, 2019)

Evolution Over Time of Volume Status and PD-Related Practice Patterns in an Incident Peritoneal Dialysis Cohort

Time to death adjusted for competing risks of transfer to HD and transplantation



Cumulative drop-out at 3-year : 74%
- transfer to HD 23%
- transplantation 22%

Competing risk analysis for death

Parameter		Subdistribution Hazard Ratio	Lower 95% CI	Upper 95% CI	P Value
Relative volume overload	Relative volume overload >17.3%	1.59	1.08	2.33	0.02
Age	per 1 year	1.06	1.04	1.07	<0.001
Cardiovascular disease	Yes	1.86	1.29	2.68	<0.001
Liver disease	Yes	2.11	1.14	3.90	0.02
Diabetes	Yes	1.49	1.04	2.15	0.03

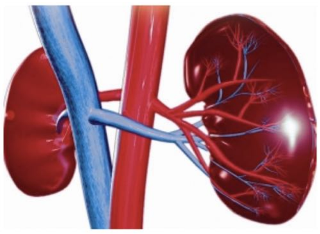
Participants with dropout before month 1 (n=44) were excluded from this analysis. Volume overload is defined as relative volume overload > 17.3% (75th percentile of the cohort).

(Van Biesen W. CJASN 14: 882–893, 2019)

Summary

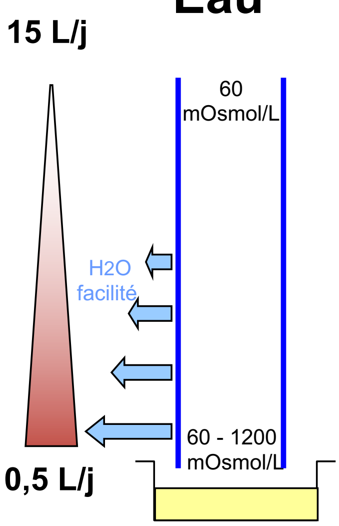
- Fluid overload is present before onset of dialysis
- Overhydration tends to improve and stabilize over time on PD
- Fluid overload at 1 month is correlated with 3-Year mortality

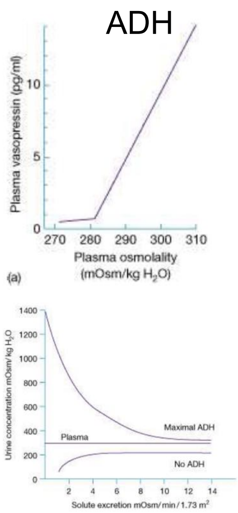
Physiologie: Bilan de l'eau – Bilan du sel

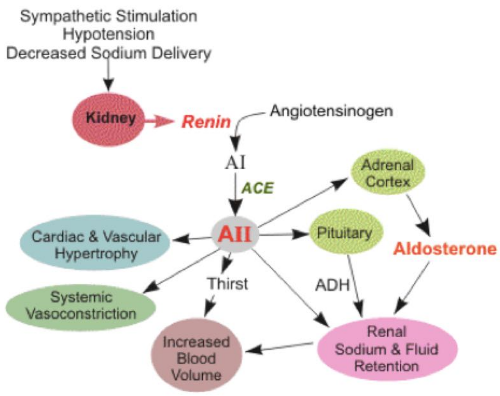




Eau

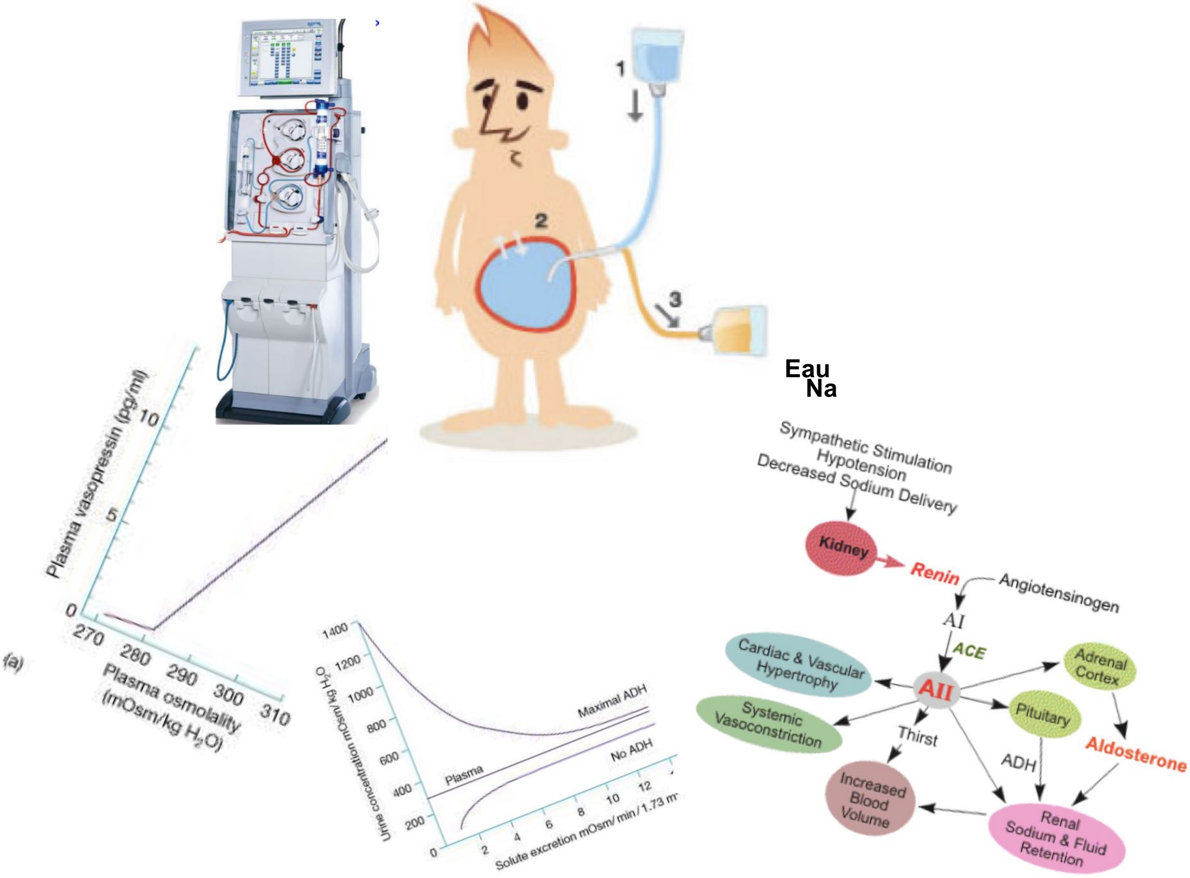
Na

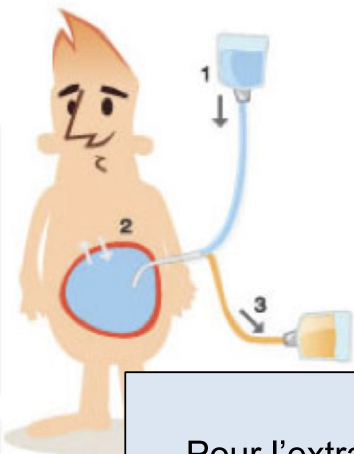






U_{Na} = de < 5 à > 300 mmol/j





- G 1,36% à 3,86%
  Icodextrine
- Na 132 mM

<u>UF totale</u>

- diurèse résiduelle
- DP: > 1 L/j

<u>Extraction Na</u>
(par 100 ml d'UF)

- DPCA: 10 mmol
- DPA: 8 mmol
- Icodextrine: 13 mmol
- FRR: 20-40 mmol/j

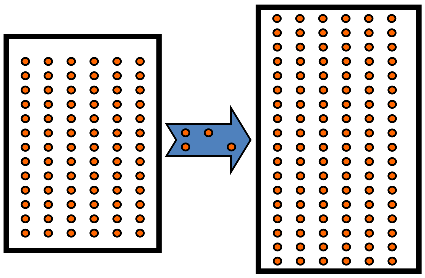
<u>Pour l'extraction de 160 mmol Na:</u>

- si diurèse = 1 litre: 20-50 mmol Na
  nécessité d'une UF > 1200 ml
- si anurie:
  nécessité d'une UF > 1600 ml…

Diffusion et Convection

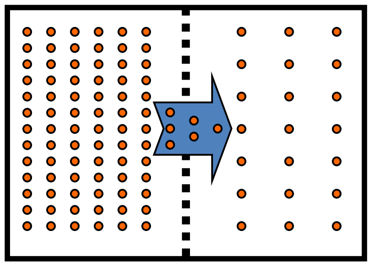
Transport <u>convectif</u> « solvent drag »

- Dépend du gradient osmotique
- Mis en jeu par les échanges hypertoniques ou d'icodextrine
- soustraction simultanée d'eau et Na



Transport <u>diffusif</u>

- Dépend du gradient sang/dialysat
- Limité par la concentration de Na du dialysat



Diffusion et Convection

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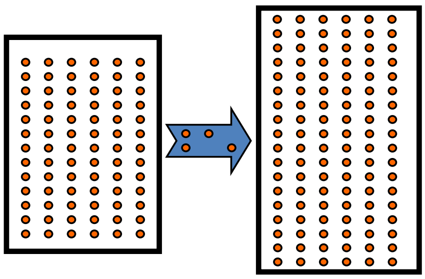

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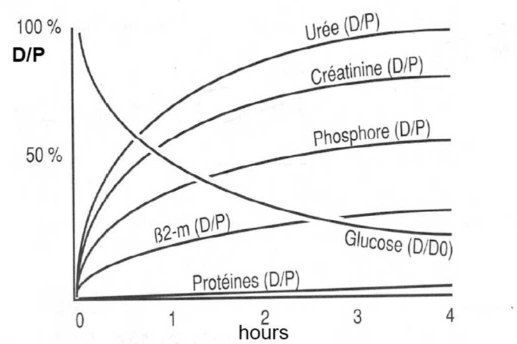
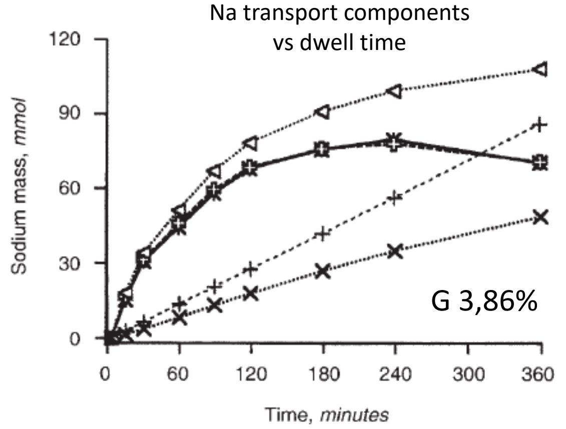


A quantitative analysis of sodium transport and removal during peritoneal dialysis

Tao Wang, Jacek Waniewski, Olof Heimbürger, Andrzej Werynski, and Bengt Lindholm

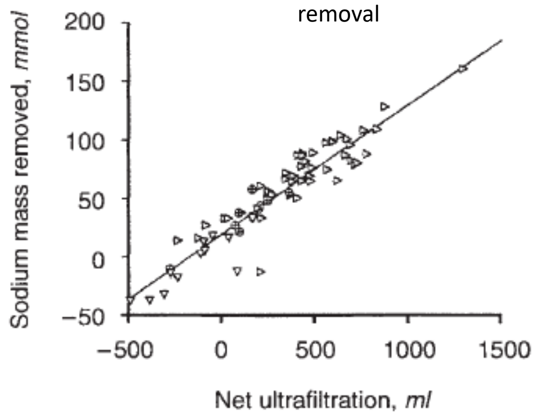
Kidney International, Vol. 52 (1997), pp. 1609–1616

Na transport components vs dwell time



x Na mass removed by diffusion;
◁ Na mass removed from blood to dialysate by convection;
+ absorbed Na mass;
( ) net mass of Na removed estimated using the BRF model;
✣ Na mass removed calculated using direct measurement

net Na removal and net fluid removal



Optimiser l'extraction sodée

diffusion et « solvent drag »

- Transport diffusif du Na (Loi de Fick)

$$J_{Na} = (Df/\Delta x)\ A\ .\ \Delta C$$

Concentration de Na dialysat

→ Gradient de concentration

Volume infusé

Surface (vasculaire) d'échange

Coefficient de diffusion de la substance
par la distance à parcourir

État du péritoine

- Transport convectif du Na

$$J_{Na} = J_V\ .\ C\ (1-\sigma)$$

→ Coefficient de tamisage

Concentration de Na du dialysat

Concentration moyenne = (D+P)/2

Flux d'eau

Gradient osmotique

Optimiser l'extraction sodée
diffusion et « solvent drag »

- <u>Transport diffusif du Na</u> (Loi de Fick)

$$J_S = (Df/\Delta x)\ A\ .\ \Delta C$$

Concentration de Na dialysat

Gradient de concentration

Solution bas-sodium (DPA-A)

Volume infusé

Surface (vasculaire) d'échange

DPA-A

Coefficient de diffusion de la substance par la distance à parcourir

Biocompatibilité ?
Prévention fibrose et angiogénèse

- <u>Transport convectif du Na</u>

$$J_S = J_V\ .\ C\ (1- \sigma)$$

Coefficient de tamisage

Concentration de Na du dialysat

Concentration moyenne

Solution bas-sodium

Flux d'eau

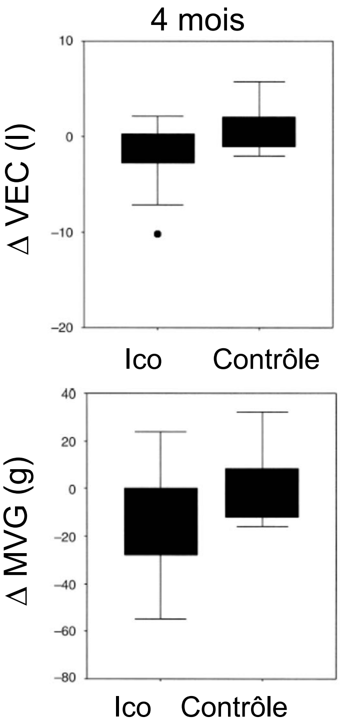
Gradient osmotique

Solution hypertonique
Osmose bimodale
DPA-A (cycle court)

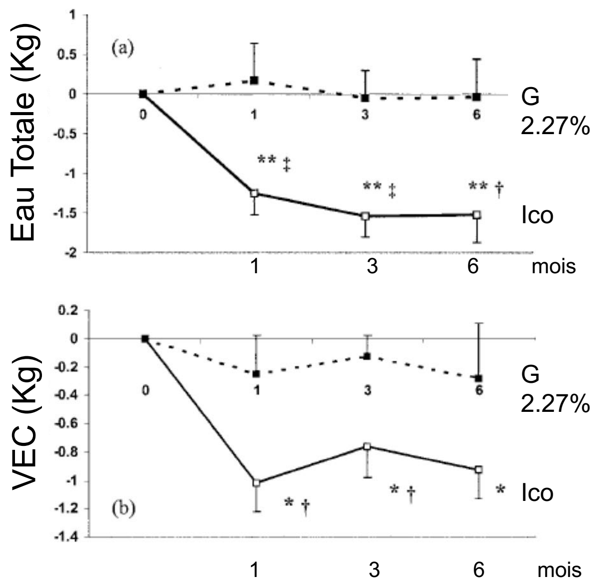
Optimiser l'extraction sodée
diffusion et « solvent drag »

- Utilisation de l'icodextrine
- Solution bas-sodium
- DPA-adaptée, DPA et DPCA
  - temps et volumes d'échanges

Optimiser l'extraction sodée
L'apport de l'icodextrine



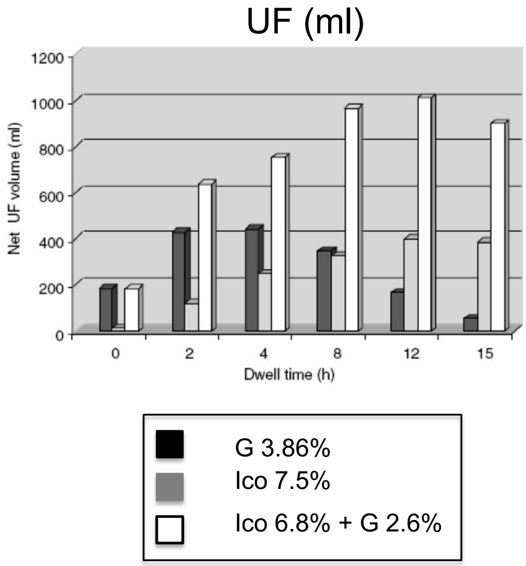
Konings
KI 63(2003)

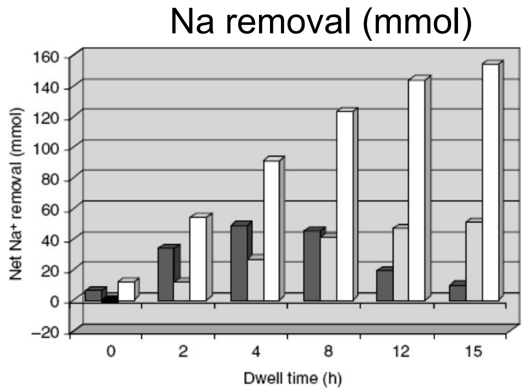


Davies JASN 14(2003)

Optimiser l'extraction sodée
Icodextrine et Ultrafiltration bimodale

Solution G 2.77% / Ico 6.8% / Na 121mM





(P Frieda, Kidney Int 2008 (73) S102-111)

Optimiser l'extraction sodée
Les solutions bas-sodium

	$Na_{Dialysat}$	Nbre éch.	PNa	PNa < 130	PA
Nakayama (1994)	120	4/j	132 vs 137		↘
Freida (2000)	126	DPA	132,8 vs 136,4		↘
Nakayama (1996)	98	1/j	id		↘
Davies (2009)	102-115	1/j	id		
Nakayama (2009)	133-126-118	4/j		↗	
Rutkowski (2015)	124	4/j	138,3 vs 140,2	6/40	↘

Optimiser l'extraction sodée
Les solutions bas-sodium

- Charge glucosée et gradient osmotique

    1.36% vs 1.86%, ou 1.55% vs 2%

    - 15 mM [NaCl] ⇔ + 0,5 % glucose

- Moindre osmolalité, donc moindre ultrafiltration

    Est-elle nécessaire ?

- Solution standard (Na 132 mM):

    Transport d'eau libre ++

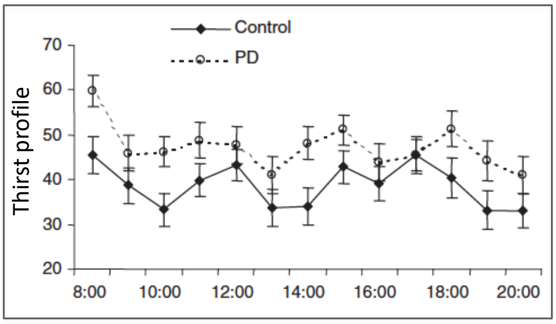
    ⇒ effet de tamisage du Na

    ⇒ soustraction H_2O > extraction Na

    ⇒ hypernatrémie

    ⇒ soif

- *Sol. Bas-Na: risque d'hyponatrémie ?*

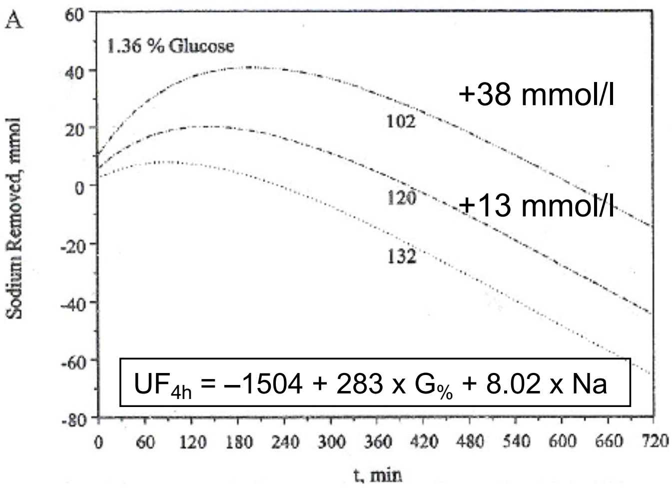


(Wright M, NDT (2004)19:1581-6)

Solution bas sodium et extraction sodée

Simulation

Kidney International, Vol. 52 (1997), pp. 1609–1616



$UF_{4h} = -1504 + 283 \times G_{\%} + 8.02 \times Na$

Na removal for 1.36% glucose solution (Na 132 mM) and when Na is reduced to 120 mM and 102 mM in glucose compensated solutions.

Glucose	UF (ml/mn)	Na Extrait (mmol)
1,36 %	1,1±0,4	-1,8±26
2,27 %	1,9±0,3	36±21
3,86 %	3,4±0,7	70,5±31

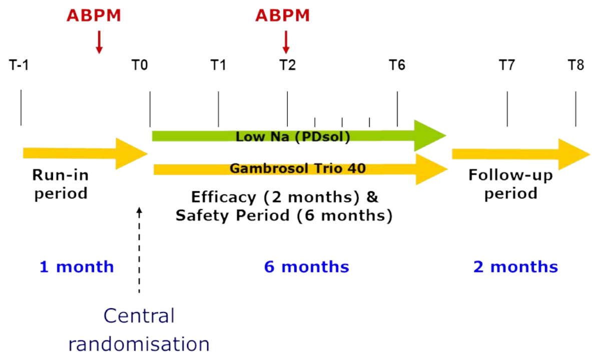
(Wang T, KI (1997)52:1609-16)
(Rippe, PDI 2008; 28(S3):S131–S136)

Single-dwell treatment with a low-sodium solution in hypertensive peritoneal dialysis patients

PERITONEAL DIALYSIS INTERNATIONAL
2020, Vol. 40(5) 446–454

Simon Davies[1], Börje Haraldsson[2], François Vrtovsnik[3], Vedat Schwenger[4], Stanley Fan[5], Alexandre Klein[6], Saynab Atiye[7] and Adelheid Gauly[7]

- **Study Title:** Multicentric, parallel, controlled, randomized, single-blind clinical evaluation of a new low sodium peritoneal dialysis solution on patients with hypertension treated with CAPD
- **Treatment:** PDsol to be used once/day (112 mmol/l Na) or Gambrosol trio 40/ Selutrio 40 (133 mmol/l Na)
- **Study Objective:** Assessment of the superiority of a new isotonic low sodium solution in comparison with standard isotonic solution



Single-dwell treatment with a low-sodium solution in hypertensive peritoneal dialysis patients

PERITONEAL DIALYSIS INTERNATIONAL
2020, Vol. 40(5) 446–454

Simon Davies[1], Börje Haraldsson[2], François Vrtovsnik[3], Vedat Schwenger[4], Stanley Fan[5], Alexandre Klein[6], Saynab Atiye[7] and Adelheid Gauly[7]

- **Study Title:** Multicentric, parallel, controlled, randomized, single-blind clinical evaluation of a new low sodium peritoneal dialysis solution on patients with hypertension treated with CAPD
- **Treatment:** PDsol to be used once/day (112 mmol/l Na) or Gambrosol trio 40/ Selutrio 40 (133 mmol/l Na)
- **Study Objective:** Assessment of the superiority of a new isotonic low sodium solution in comparison with standard isotonic solution

- Superiority of low-Na PD solution over standard-Na solution for control of BP could not be shown.
- The once daily use of a low-Na PD solution was associated with more hypotensive episodes,

Single-dwell treatment with a low-sodium solution in hypertensive peritoneal dialysis patients

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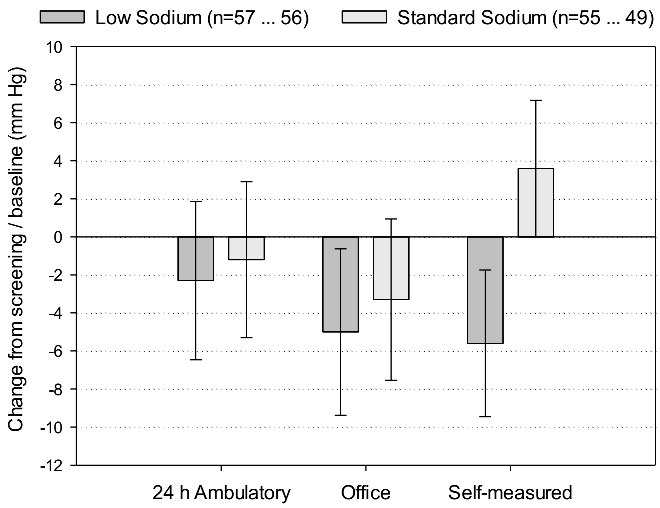
Results for different blood pressure measurements (Baseline to 2 month treatment):



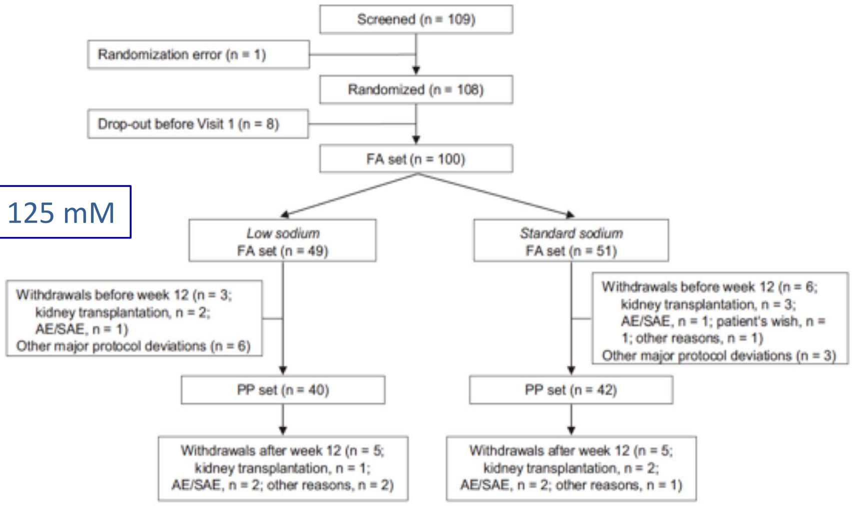
- Small reductions in 24h, office, and self-measured BP were observed,
- more marked with low-Na than with standard-Na solution
- Only the between-group difference for self-measured Systolic and diastolic BP was significant

AJKD
Original Investigation

Low-Sodium Versus Standard-Sodium Peritoneal Dialysis Solution in Hypertensive Patients: A Randomized Controlled Trial

*Bolesław Rutkowski, MD, PhD,[1] Paul Tam, MD,[2] Frank M. van der Sande, MD, PhD,[3] Andreas Vychytil, MD,[4] Vedat Schwenger, MD,[5] Rainer Himmele, MD,[6] and Adelheid Gauly, PhD,[7] on behalf of the Low Sodium Balance Study Group**

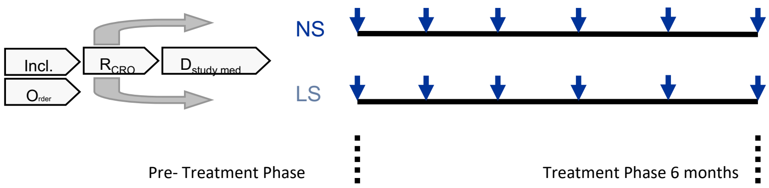
Low Na = 125 mM



The balance Low Sodium Trial

- Study design
  - Prospective, controlled, randomized, double-blind, multicentre, multinational, parallel-group trial

V_{inc}		Study visits		V_1	V_2	V_3	V_4	V_5	V_6
		Week		0	2	6	12	18 ±1	25 ±1

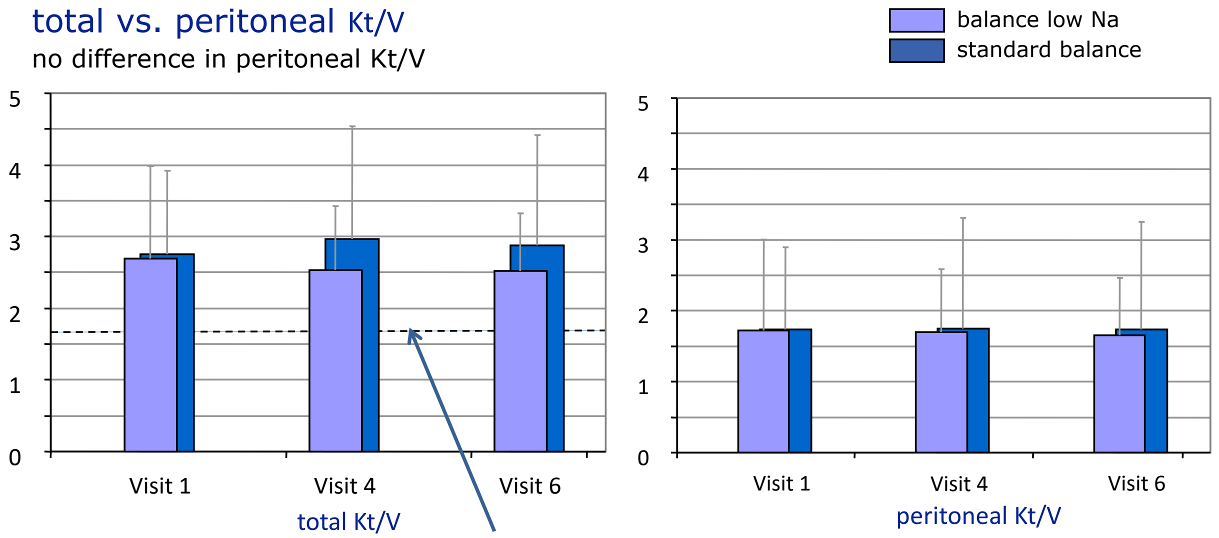


- Primary objective:
  - Non-inferiority of total Kt/V at week 12 (visit 4)
- Secondary objectives:
  - Cardiovascular effects (changes of the blood pressure, antihypertensive medication); sodium & water balance; safety

Primary efficacy objective: non-inferiority of clearances (Kt/V)

total vs. peritoneal Kt/V

no difference in peritoneal Kt/V



Non-inferiority of:
- ☹ Total Kt/V
- ✓ Peritoneal Kt/V
- ✓ Total Kt/V (baseline GFR ≤ 6 ml/min)

Rutkowski et al. Am J Kidney Dis 2015

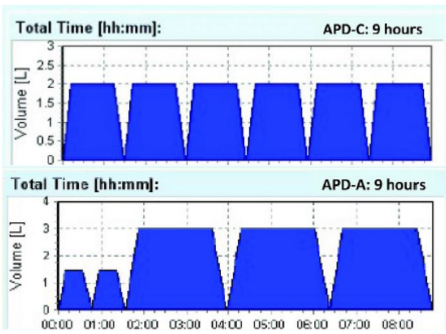
	Low-Sodium Solution			Standard-Sodium Solution		
	Baseline	Wk 12	Wk 25	Baseline	Wk 12	Wk 25
No. of patients	40	40	35	42	42	37
Systolic BP, mm Hg	152 ± 24	141 ± 22	143 ± 23	148 ± 21	147 ± 23	144 ± 23
Diastolic BP, mm Hg	91 ± 14	86 ± 11	85 ± 13	90 ± 14	90 ± 13	88 ± 15
Antihypertensive medication, DDD						
Mean ± SD	5.3 ± 5.2	5.7 ± 5.4	6.0 ± 5.4	5.6 ± 3.9	6.6 ± 3.8	6.3 ± 3.7
Median [IQR]	3.7 [2.3-6.7]	4.5 [2.1-7.6]	4.7 [2.2-8.3]	5.3 [2.0-7.5]	6.1 [3.5-8.0]	6.0 [3.0-7.8]
Mean glucose applied, %	1.74 ± 0.27	1.75 ± 0.31	1.69 ± 0.26	1.67 ± 0.29	1.70 ± 0.30	1.67 ± 0.25
Peritoneal ultrafiltration, mL/24 h	657 ± 569	602 ± 707	621 ± 520	698 ± 548	741 ± 664	640 ± 676
Urine volume, mL/24 h						
Mean ± SD	915 ± 594	868 ± 660	1,022 ± 700	977 ± 858	1,081 ± 808	1,015 ± 791
Median [IQR]	902 [541-1,303]	893 [416-1,313]	890 [513-1,537]	835 [455-1,463]	1,000 [522-1,600]	930 [588-1,300]
GFR, mL/min/1.73 m^2						
Mean ± SD	5.46 ± 6.75	4.45 ± 4.69	4.67 ± 4.12	6.01 ± 6.39	6.48 ± 8.32	6.02 ± 9.36
Median [IQR]	3.79 [1.20-6.34]	3.91 [0.70-6.44]	4.05 [1.71-6.72]	4.47 [2.01-7.31]	4.64 [2.52-7.85]	3.57 [2.55-6.11]
Sodium removal urine, g/d	1.86 ± 1.35	1.79 ± 1.96	1.99 ± 1.88	2.22 ± 3.50	2.04 ± 2.10	2.09 ± 2.38
Sodium removal dialysate, g/d	3.10 ± 1.92	2.71 ± 2.13	2.67 ± 1.66	1.68 ± 1.65	1.75 ± 2.05	1.32 ± 2.02
Serum sodium, mEq/L	140.2 ± 3.03	137.8 ± 3.59	138.3 ± 3.95	139.6 ± 3.53	139.4 ± 2.83	138.4 ± 3.30
Thirst, mm on VAS	46.7 ± 22.8	30.4 ± 25.4	32.2 ± 23.4	50.3 ± 23.7	41.4 ± 28.0	39.8 ± 28.9
Desire for salt, mm on VAS	27.1 ± 19.4	23.6 ± 25.3	22.2 ± 21.5	26.2 ± 19.3	26.8 ± 20.9	24.2 ± 19.4
No. of patients	23	28	29	27	32	30
Dietary water intake, mL/d	1,400 ± 751	1,167 ± 515	995 ± 463	1,138 ± 503	1,123 ± 499	1,052 ± 554
Dietary salt intake, g/d	2.41 ± 1.40	2.64 ± 1.69	2.77 ± 1.17	2.36 ± 0.98	2.37 ± 1.14	2.24 ± 1.27

PDOne Study vs Balance Low Sodium Study

	PDOne Study	**Balance Low Sodium Study**
Treatment for 6 months	Na: 112 mmol/L **BOLUS** application: 1x/d compensated low-sodium solution	Na: 125 mmol/L **CONTINUOUS** application: all bags/d uncompensated low-sodium removal
Study Population	**APD/CAPD** patients with Office SBP ≥ 140 and/ or DBP ≥ 90 mmHg or hypertensive patients receiving anti-hypertensive medication incl. diuretics, disregarded BP values	**CAPD** patients with ≥ 1 antihypertensive drug (incl. diuretic) or Office SBP >130 mmHg
Endpoints	• Decrease of **≥ 6 mmHg mean 24h SBP** without modifaction of antihypertensives or occurrence of hypotension requiring a medical action at week 8 • Effect on BP, overhydration and safety	• Non-inferiority of total **Kt/V** at week 12 • Cardiovascular effects (changes of the **blood pressure (BP)**, antihypertensive medication); sodium & water balance; safety
	Bolus ➔ Risk of Hypotension episodes	**Continuous ➔ Constant reduction of BP**

La DPA – Adaptée

- Alternance de cycles courts/longs et faibles/grands volumes (3 litres)
- UF et clairances optimisées:



Variable	APD-C (*n*=19)	APD-A (*n*=19)	*p* Value
Urea			
Plasma [P (mmol/L)]	22.34±5.35	21.99±4.69	NS
Dialysate [D (mmol/L)	10.92±2.47	12.65±2.35	<0.05
D/P	0.526±0.118	0.570±0.135	<0.01
Creatinine			
Plasma [P (µmol/L)]	666.9±184.3	658.8±173.1	NS
Dialysate [D (µmol/L)]	202.0±53.5	215.9±65.8	<0.05
D/P	0.230±0.059	0.327±0.049	<0.05
Dialysate sodium (mmol/L)	126.4±1.4	127.5±1.3	<0.05
Dialysate phosphate (mmol/L)	0.384±0.076	0.425±0.053	<0.05
Drained dialysate per session (L)	15.675±1.497	16.237±1.375	<0.05
Daily ultrafiltration (mL)	656±275.3	743±358.3	<0.01

(Fischbach M, PDI 2011(31):450-8)

Increasing sodium removal on peritoneal dialysis: applying dialysis mechanics to the peritoneal dialysis prescription

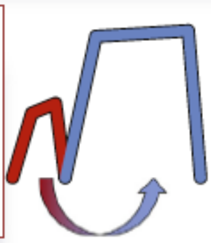
Michel Fischbach[1], Claus Peter Schmitt[2], Rukshana Shroff[3], Ariane Zaloszyc[1] and Bradley A. Warady[4]

Kidney International (2016) **89,** 761–766;

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

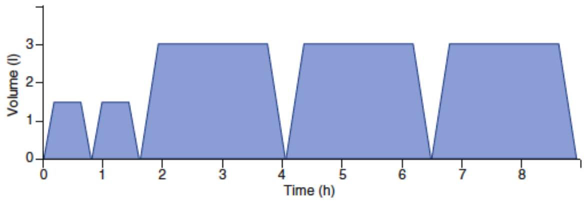
Exchange favoring UF

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)



Increasing sodium removal on peritoneal dialysis: applying dialysis mechanics to the peritoneal dialysis prescription

www.kidney-international.org

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)

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

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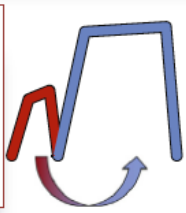


Exchange favoring dialytic Na removal

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

(Fischbach M, KI(2016) 89:761-6)

Equilibrer la balance sodée

- Réduire les apports

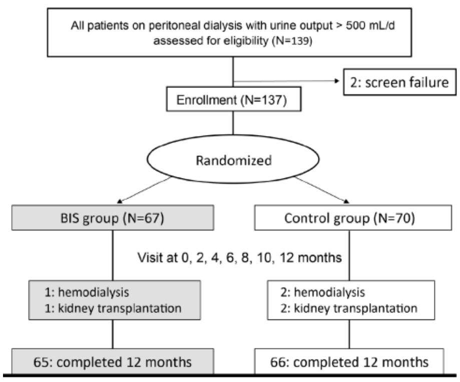
Recommended minimum protein, energy, and mineral intakes for chronic kidney disease (CKD) and maintenance dialysis patients

	Nondialysis CKD	Hemodialysis	Peritoneal dialysis
Protein	0.6–0.8 g/kg/day Illness 1.0 g/kg	> 1.2 g/kg/day	> 1.2 g/kg/day Peritonitis > 1.5 g/kg
Energy	30–35[a] kcal/kg/day	30–35[a] kcal/kg/day	30–35[a] kcal/kg/day including kcal from dialysate
Sodium	80–100 mmol/day	80–100 mmol/day	80–100 mmol/day
Potassium	< 1 mmol/kg if elevated	< 1 mmol/kg if elevated	Not usually an issue
Phosphorus	800–1000 mg and binders if elevated	800–1000 mg and binders if elevated	800–1000 mg and binders if elevated

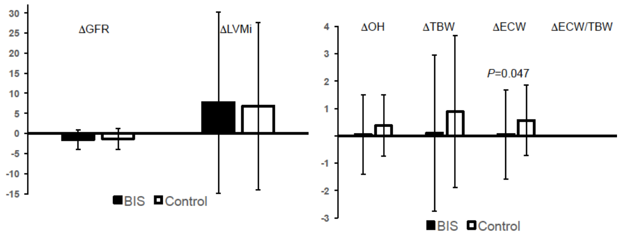
(Ikizler TA, Kidney Int (2013) 84, 1096–1107)

- Diurétique..
- Améliorer l'extraction de sodium

DOES ROUTINE BIOIMPEDANCE-GUIDED FLUID MANAGEMENT PROVIDE ADDITIONAL BENEFIT TO NON-ANURIC PERITONEAL DIALYSIS PATIENTS? RESULTS FROM COMPASS CLINICAL TRIAL



ΔGFR: -1.5 ± 2.4 vs -1.3 ± 2.6 mL/min/1.73 m^2
p = ns



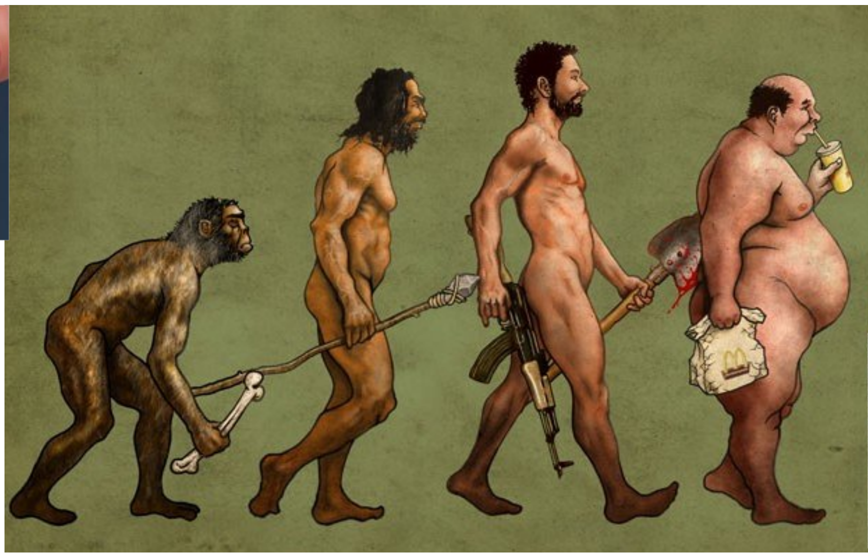
	At baseline			At 12 months		
	BIS group	Control	*P*	BIS group	Control	*P*
Body weight	62.0±11.9	62.1±13.4	0.969	62.2±11.9	61.9±12.7	0.888
Systolic BP	124.5±14.7	131.7±11.5	0.002	130.8±19.7	137.1±23.7	0.104
Diastolic BP	76.2±10.8	79.7±8.4	0.033	78.2±12.3	82.9±12.4	0.031

Oh K-H. PDI, 2018 Vol. 38 (131–8)

Conclusion

- Contrôler (réduire !!) les apports de sel en dialyse
  (< 5 g NaCl/j)
  + préserver la fonction rénale résiduelle

- Optimiser le protocole:
  – volume d'UF
  – Volume et durée des échanges



Homo Erectus
- 1.850.000 à - 40.000
1g NaCl

Homo „Sapiens"
- 100.000 à - 1977
4g NaCl

2007

< 100 mg/j

> 10 g/j