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Les hyper/hypotensions quand la volémie n'est pas en cause

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INSERM U1034 : Biologie des maladies cardiovasculaires

AFPCN décembre 2025

Liens d'intérêts

L'auteur déclare avoir participé à des interventions ponctuelles (essais cliniques, travaux scientifiques, activités de conseil, conférences, colloques) pour les entreprises *Alexion, AstraZeneca, Fresenius, Lilly, Novartis, Servier, Vantive*

www.transparence-sante.gouv.fr

Hypertension

Prévalence HTA en dialyse

Hémodialyse : 80-90%
Dialyse Péritonéale : 90%

Author	Year	N	Definition of hypertension	Prevalence of hypertension (%)	BP treatment among hypertensives (%)	BP control among hypertensives (%)
Salem [55]	1995	649	Pre-haemodialysis MAP ≥ 114 mmHg or use of antihypertensive agents	71.9	81.5	48.6
Rahman <i>et al.</i> [60]	1999	489	Pre-haemodialysis SBP ≥ 140 mmHg and/or DBP ≥ 90 mm	87.7	93.2	71.1
Agarwal <i>et al.</i> [1]	2003	2535	1-week average pre-haemodialysis SBP > 150 mmHg and/or DBP > 85 mmHg, or use of antihypertensive agents	85.8	88.4	30.3
Agarwal [56]	2011	369	44-h interdialytic ambulatory SBP ≥ 135 mmHg and/or DBP ≥ 85 mmHg or use of antihypertensive medications	82	89	38

BP, MAP, blood pressure; MAP, mean arterial pressure; SBP, diastolic blood pressure; DBP, systolic blood pressure.

La cardiopathie hypertensive et l'hypertrophie ventriculaire gauche

Molecular factors

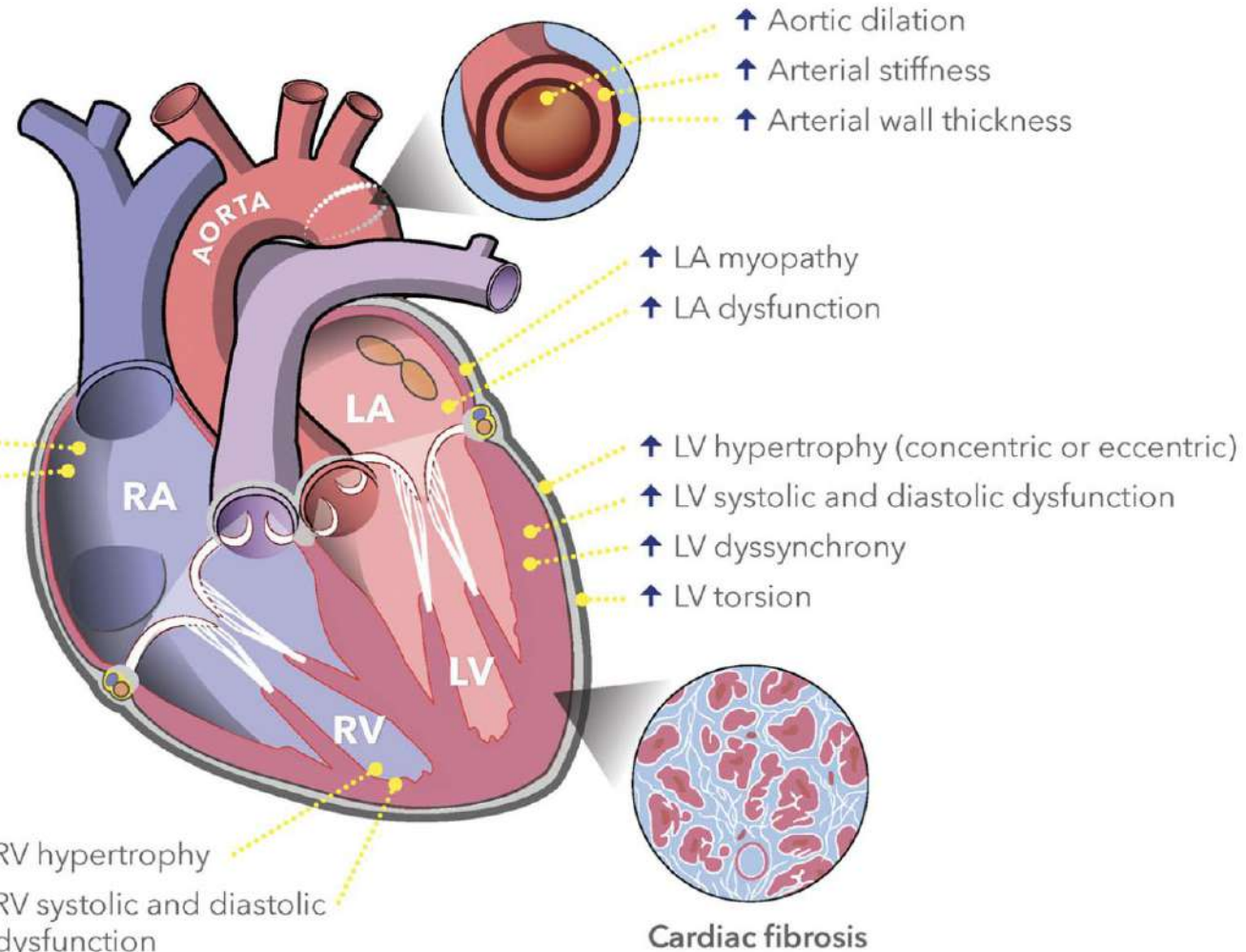
- Neurohormonal activation
- Growth factors
- Cytokines
- Mitochondrial dysfunction/ROS
- Endothelial dysfunction
- Abberant Ca²⁺ handling

- ↑ RA enlargement
- ↑ RA dysfunction

Cellular factors

- Activation of myofibroblasts and ECM remodeling
- Cardiomyocyte hypertrophy remodeling
- T helper type 2 cell differentiation

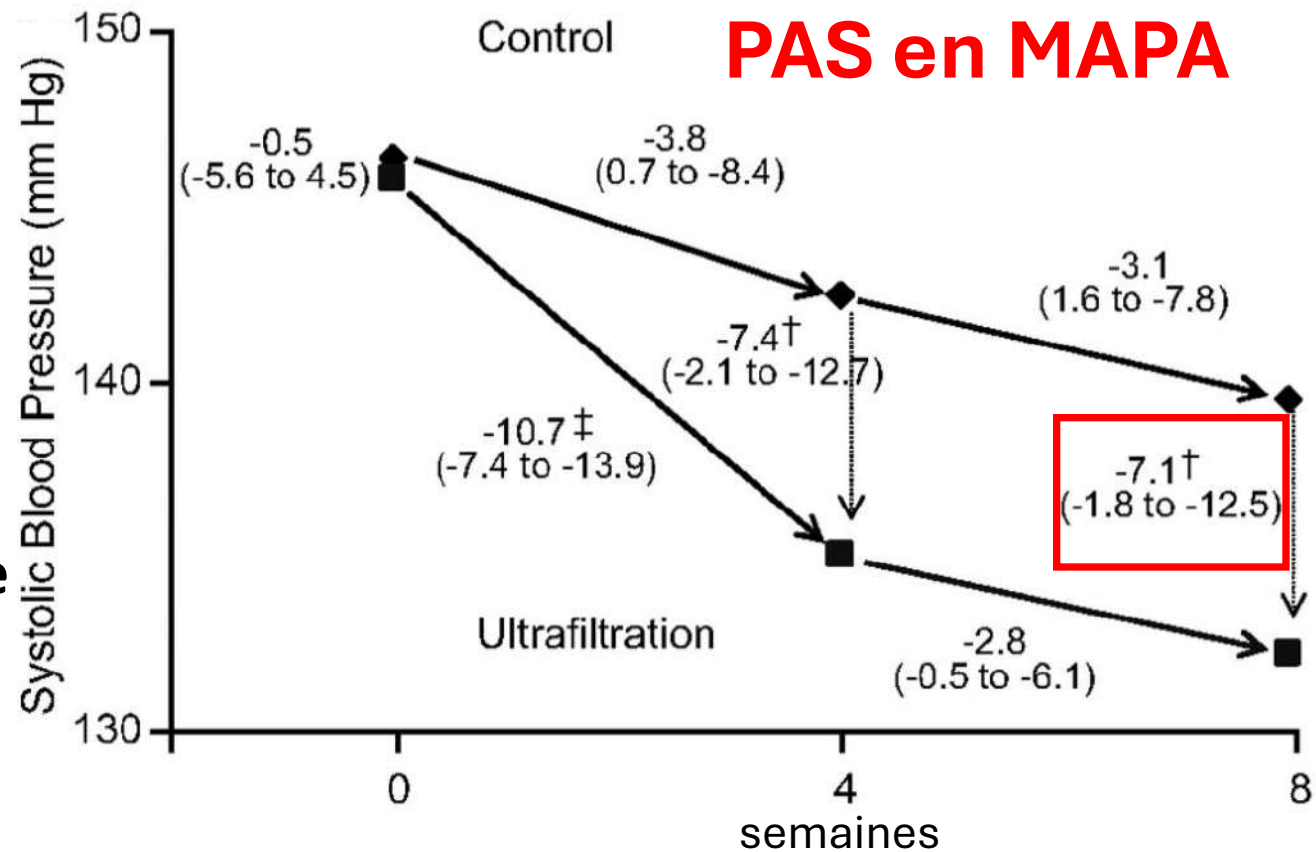
- ↑ RV hypertrophy
- ↑ RV systolic and diastolic dysfunction



Effet de la volémie : ex. de la baisse du poids Sec

Essai randomisé
baisse « forcée du PS » vs. groupe contrôle
À 8 semaines
-1.0 kg (95% CI: -1.6 to -0.5kg; $P < 0.001$)

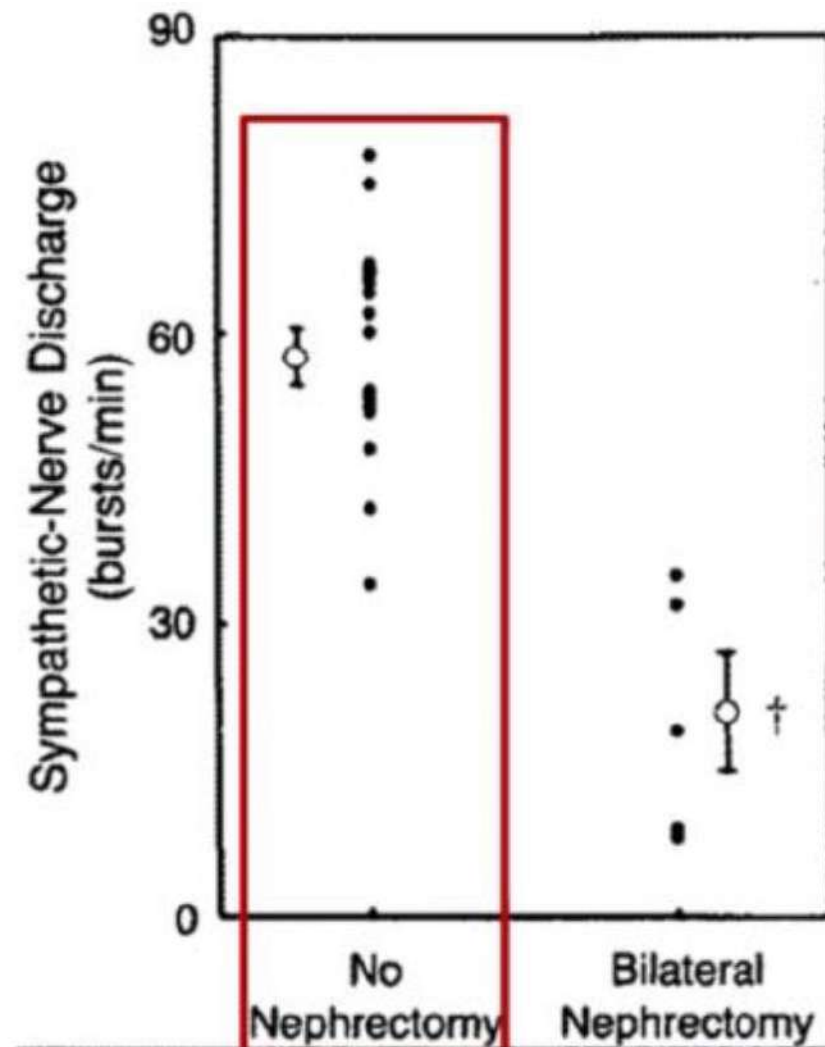
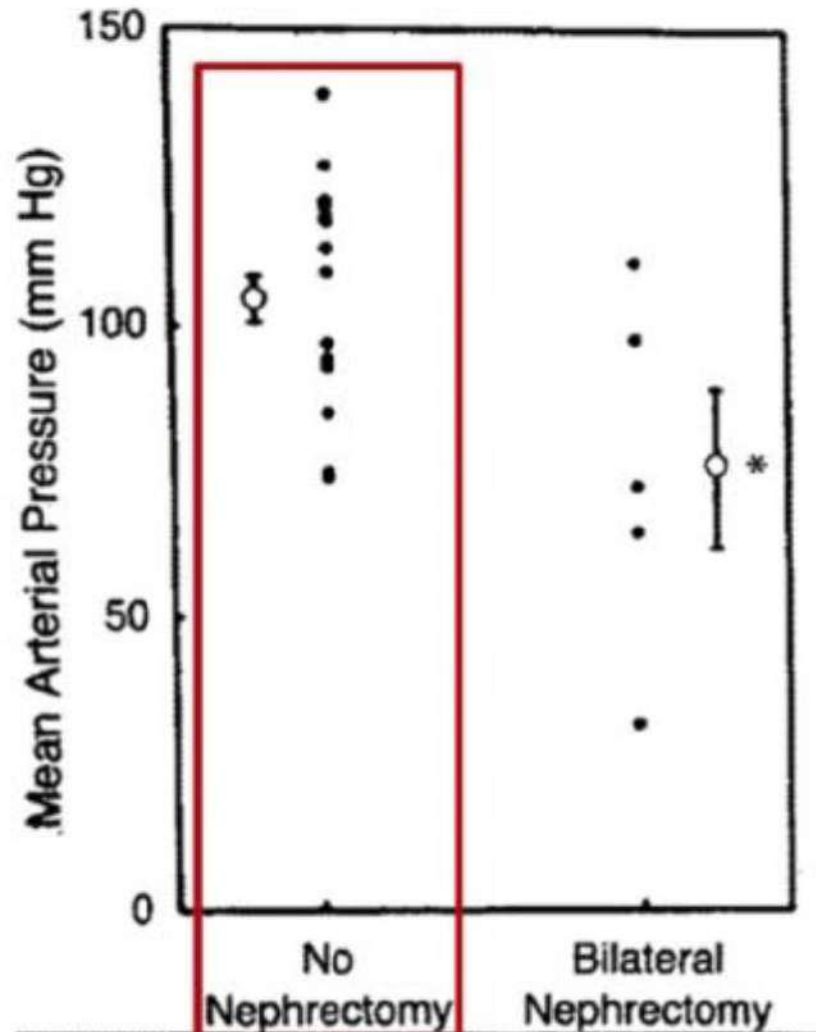
Augmentation des hypotensions en séance



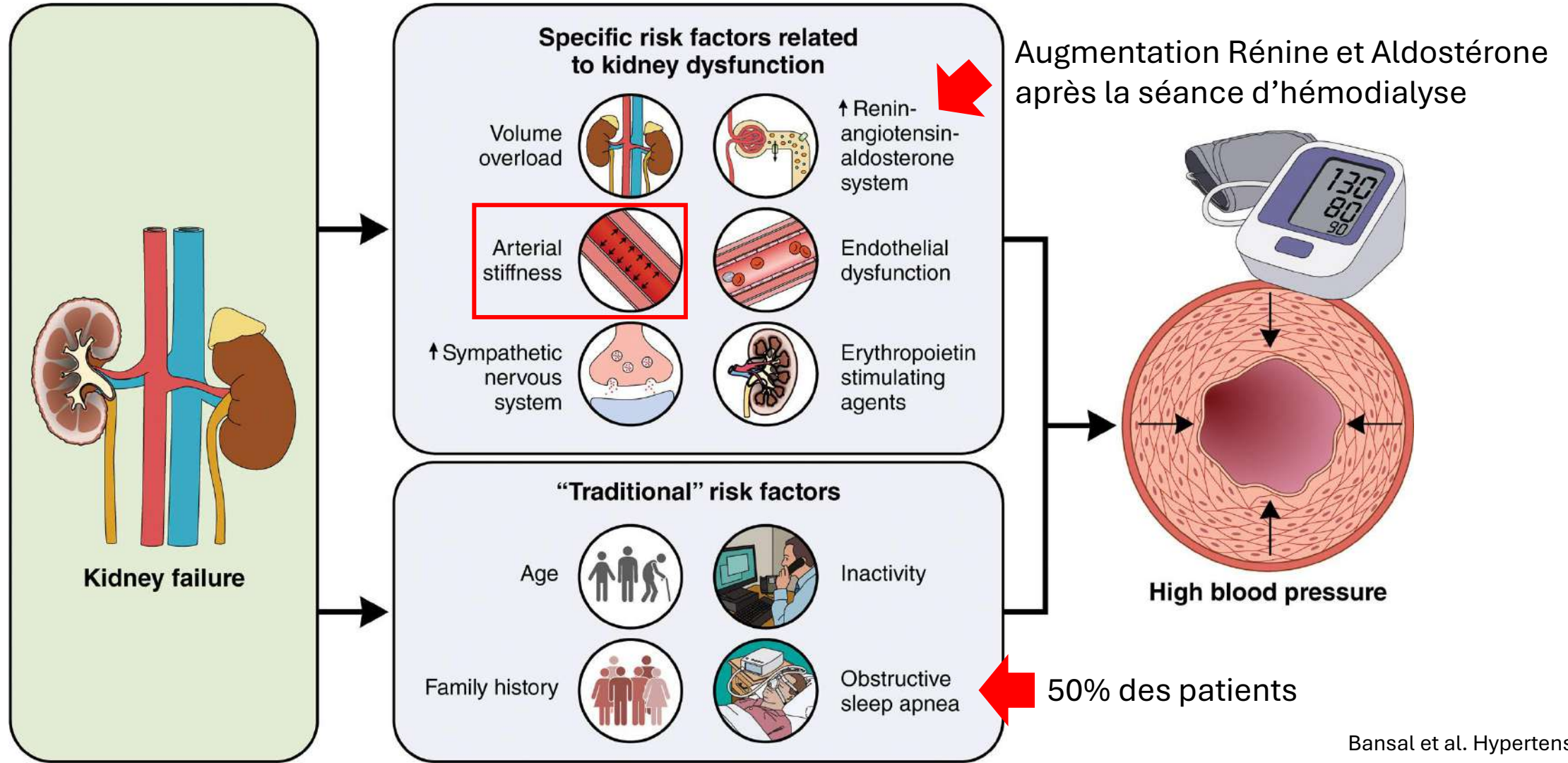
Préserver la fonction rénale résiduelle ne doit pas se faire au prix d'une surcharge hydrosodée

	Baseline	Drug treatment	Volume control	P<
Weight (kg)	61 ± 6	60 ± 5	55 ± 8	0.0001
Systolic BP (mmHg)	175 ± 15	138 ± 11	125 ± 9	0.0001
Diastolic BP (mmHg)	99 ± 11	77 ± 10	71 ± 8	0.0001
Urine volume (ml/day)	1 575 ± 281	1 393 ± 275	40 ± 47	0.0001
Cardiothoracic Index (%)	0.57 ± 0.05	0.55 ± 0.06	0.46 ± 0.03	0.0001
LVMI (gr/m ²)	265 ± 63	251 ± 59	161 ± 25	0.0001
Ejection fraction (%)	56 ± 6	59 ± 6.5	67 ± 4	0.0001

Effet de l'activité sympathique : ex. de la binéphrectomie



Chez le patient hémodialysé, tout est réuni pour développer une hypertension artérielle



HTA en dialyse que disent les recommandations ?



Guidelines 2025

Rien



Guidelines 2021

« *in CKD patients not
receiving dialysis* »

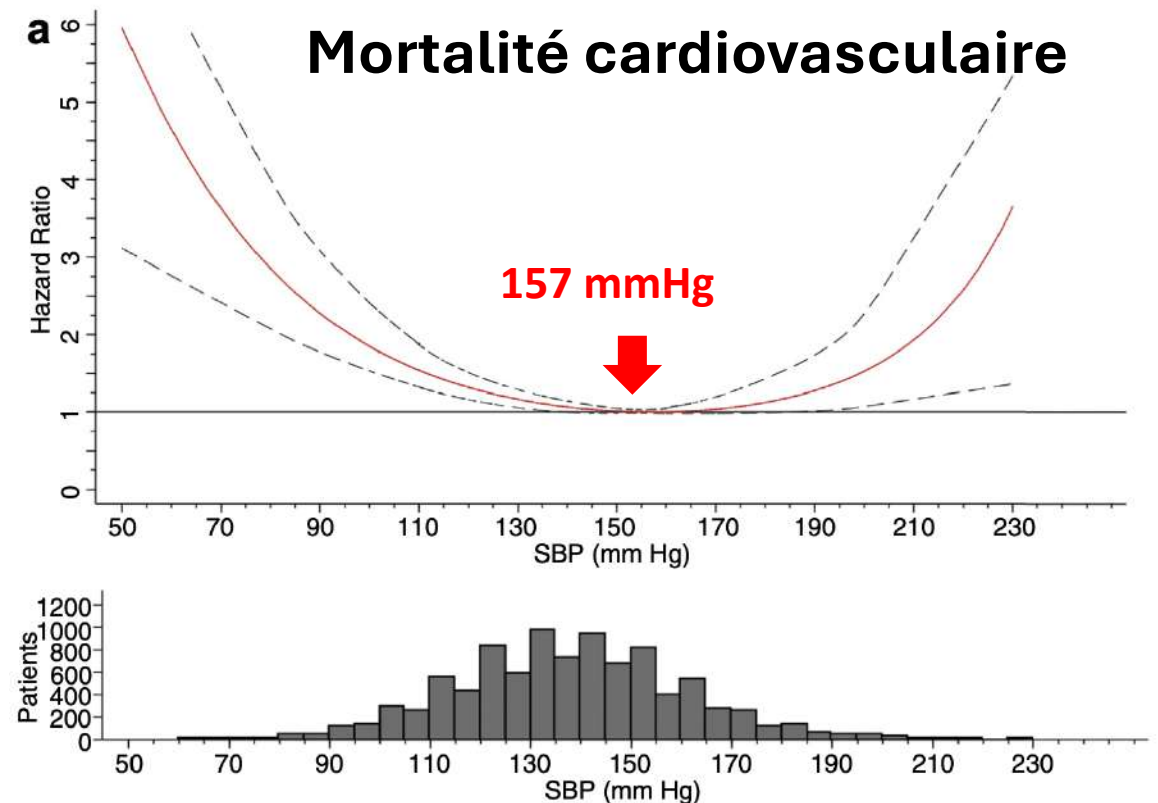
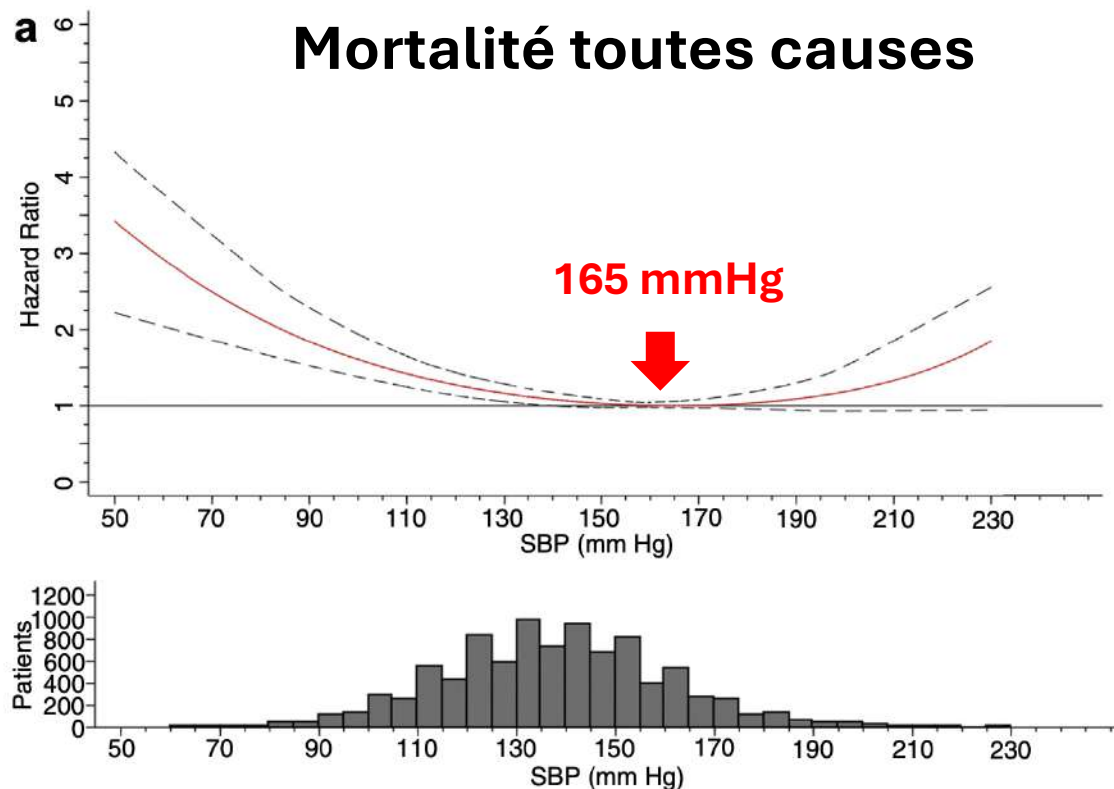


Guidelines 2023

Rien

PA avant la séance en HD et risque de mortalité

9333 patients



PA Systolique avant séance

Un patient hypertendu ?

TA: 172/88 ^{FC} 66 T° 35°7		Autres équipements:						
Sat: (aurobas) <input type="checkbox"/> scopé		1 cathéter IS						
Douleur:								
heure	TA POULS	Débit Sang	P.A.	PV	PTM	K KT/V	VSR/ VDS	Taux UF
10h	160/84 59 (aurobas)	350-185	120	55	—	—	—	438
10h40	152/80 (S3 (aurobas))	350-200	120	25	243	96,5	—	438
10h	155/96 55 (aurobas)	350-200	115	20	248	93,7	—	438
10h45	155/96 (S5 (aurobas))	350-200	120	30	234	92,7	—	438
		Crampes → ↓UF						
K final	231	KT/V final	1,69	VP final	90,8%	VI	0	
REBRANCHEMENT		Equipe		BROUS		LUVIER		

HTA à l'arrivée en séance

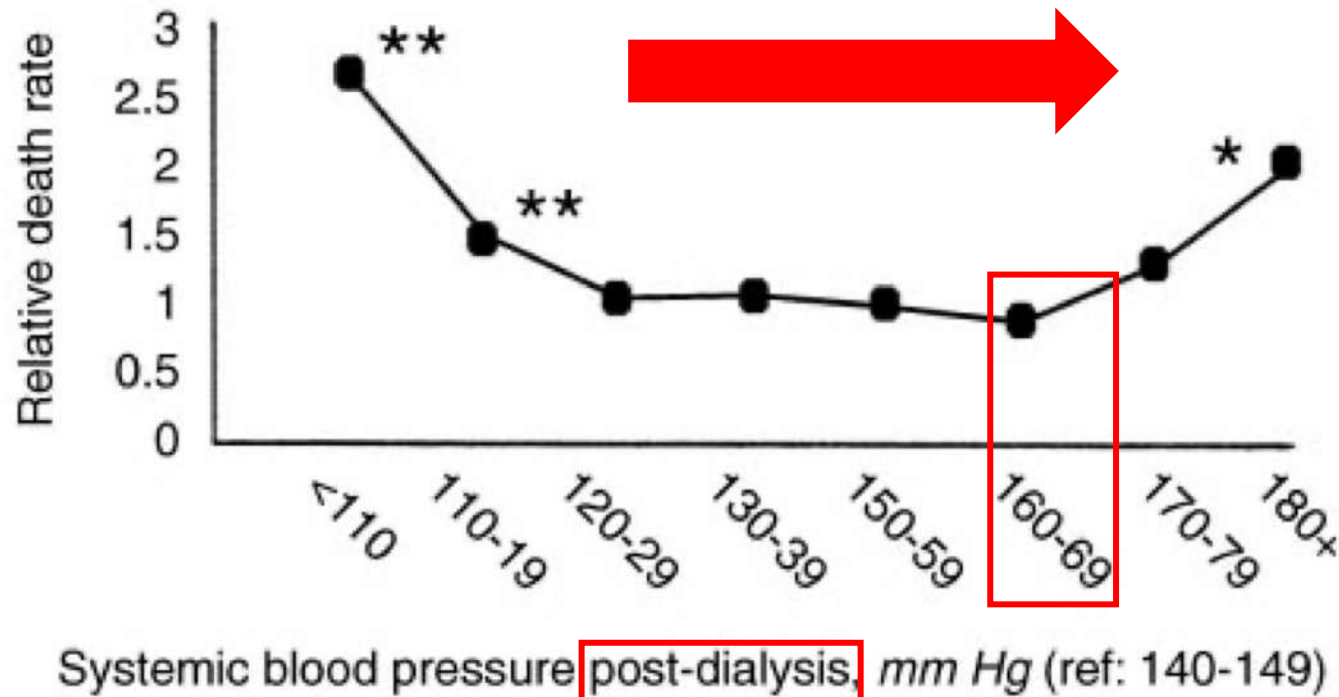
HTA pendant toute la séance

Crampes

Quelle est la PA normale d'un patient HD ?

Mesures pendant la séance

Risque de décès

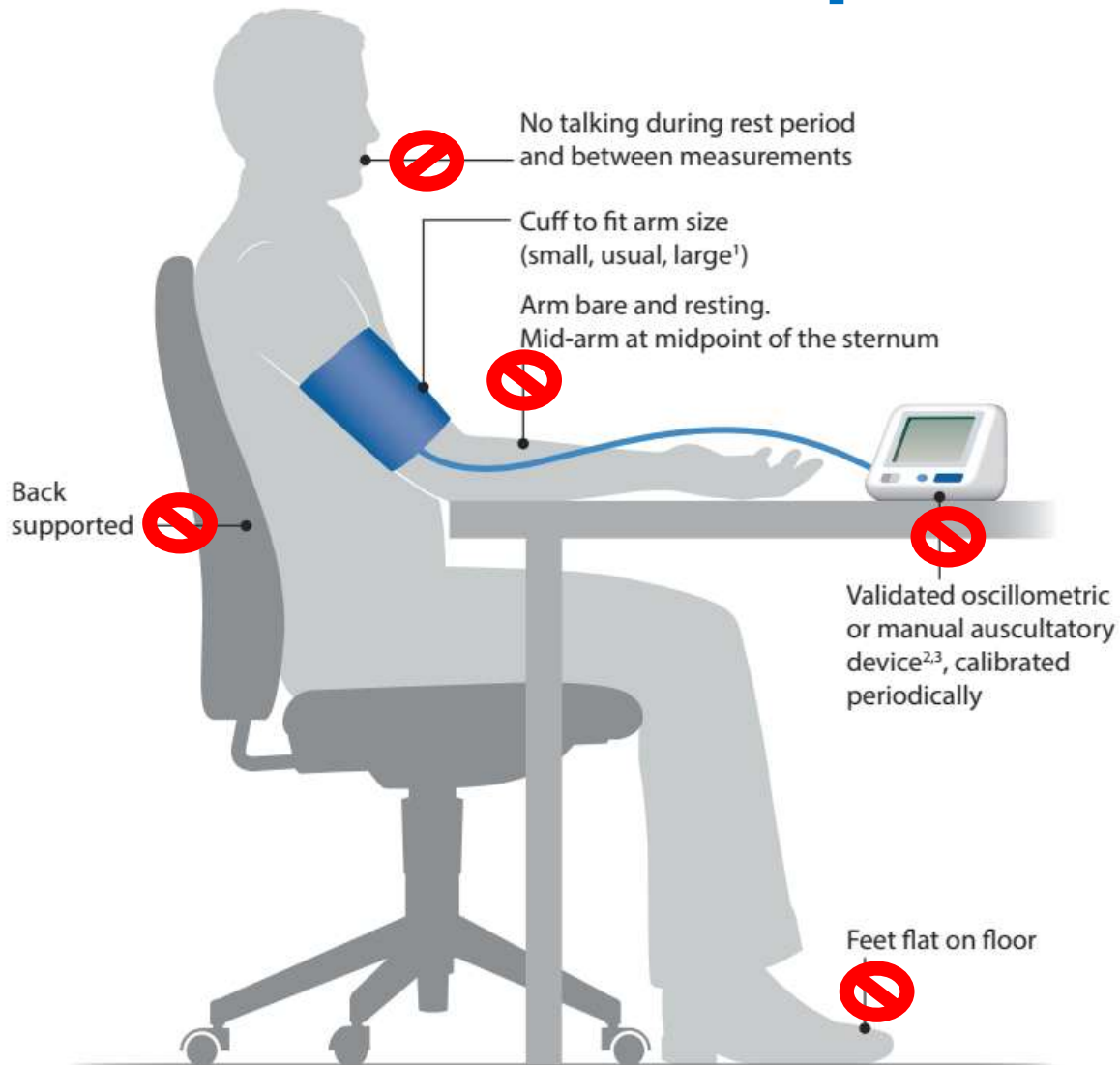


Risque de décès ajusté

Variables	RR	95% CI
Gender (female vs. male)	0.95	(0.88–1.04)
Ethnicity (black vs. white/Hispanic)	0.62 ^f	(0.57–0.67)
Years on dialysis prior to study start (per 10 years)	0.99	(0.97–1.00)
Primary cause of ESRD ^a		
Diabetes	1.22 ^g	(1.11–1.35)
Hypertension	0.87 ^g	(0.78–0.96)
Antihypertensive medication (yes)	0.72 ^f	(0.67–0.79)
BP baseline ^p pre-dialysis (per 10 mm Hg increase)		
Systolic BP	0.93 ^f	(0.91–0.95)
Diastolic BP	0.84 ^f	(0.80–0.89)
MAP	0.86 ^f	(0.82–0.90)
BP baseline post-dialysis (per 10 mm Hg increase)		
Systolic BP	0.97 ^h	(0.95–1.00)
Diastolic BP	0.85 ^f	(0.80–0.90)
MAP	0.90 ^f	(0.86–0.95)
Albumin ^{u,d} g/dl		
<3.0	6.70 ^f	(5.86–7.66)
3.0–3.4	2.38 ^f	(2.15–2.63)
3.5–3.9	1.00	—
4.0 or >	0.61 ^f	(0.54–0.70)
Missing	2.35 ^f	(1.96–2.81)
Kt/V ^{c,e}		
<1.10	1.36 ^f	(1.20–1.55)
1.10–1.31	1.07	(0.95–1.21)
1.32–1.49	0.96	(0.84–1.09)
Missing	1.58 ^f	(1.34–1.86)

5 433 patients HD

La dialyse est probablement l'un des pires endroits sur la planète pour mesurer une PA



- Quiet room (no talking by patient or observer)
- No smoking, caffeine, or exercise for ≥ 30 min before measurement
- Empty bladder
- Note the time of most recent BP medication taken before measurements
- Relax for > 5 min
- At first visit, record BP in both arms. Use the arm that gives the higher reading for subsequent readings
- Separate repeated measurements by 1–2 minutes
- Use an average of ≥ 2 readings obtained on ≥ 2 occasions
- Provide patients with the SBP/DBP readings verbally and in writing

¹Use the correct cuff size, such that the bladder encircles 80% of the arm, and note if a larger- or smaller-than-normal cuff size is used

²See validated electronic devices lists at www.stridebp.org

³For auscultatory readings, either the stethoscope diaphragm or bell may be used. Use a palpated radial pulse obliteration pressure to estimate SBP, then inflate the cuff 20–30 mm Hg above this level for auscultatory determination of BP level. Deflate the cuff pressure 2 mm Hg per second, and listen for Korotkoff sounds



Oublions la mesure de PA en dialyse ..

- ... Pour le risque cardiovasculaire

- La PA en dialyse n'a d'intérêt que pour la tolérance hémodynamique de la dialyse

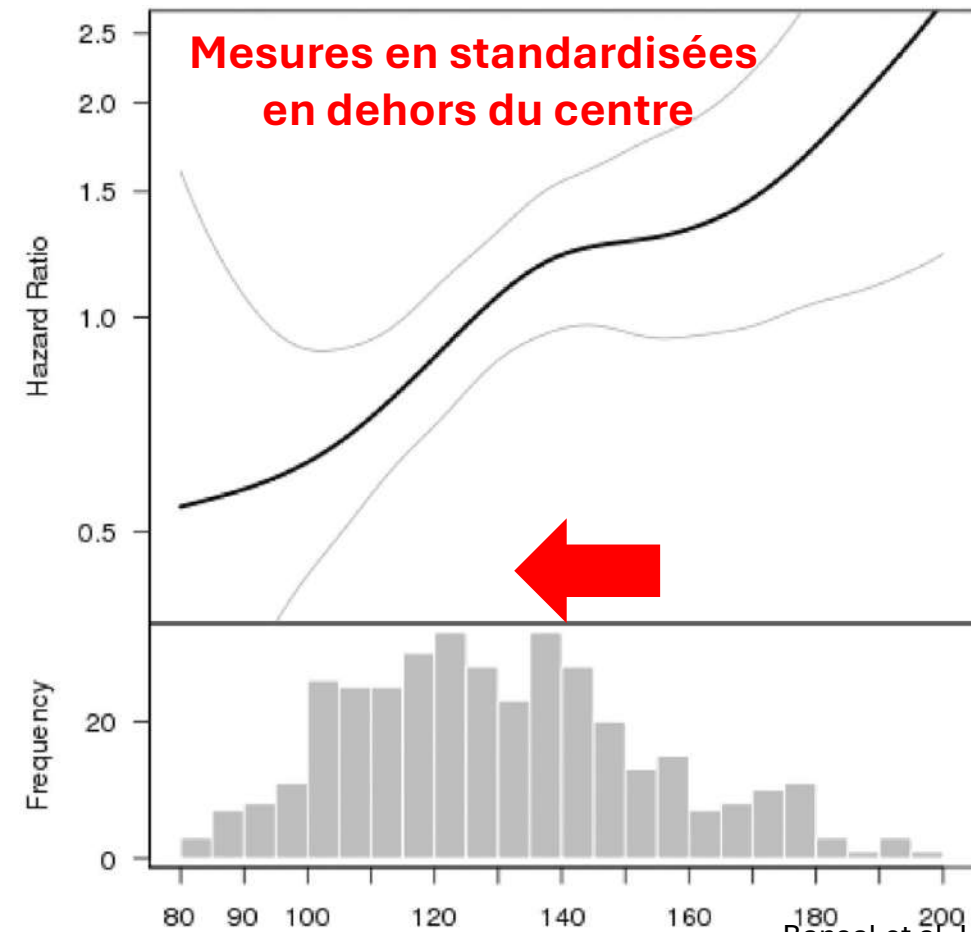
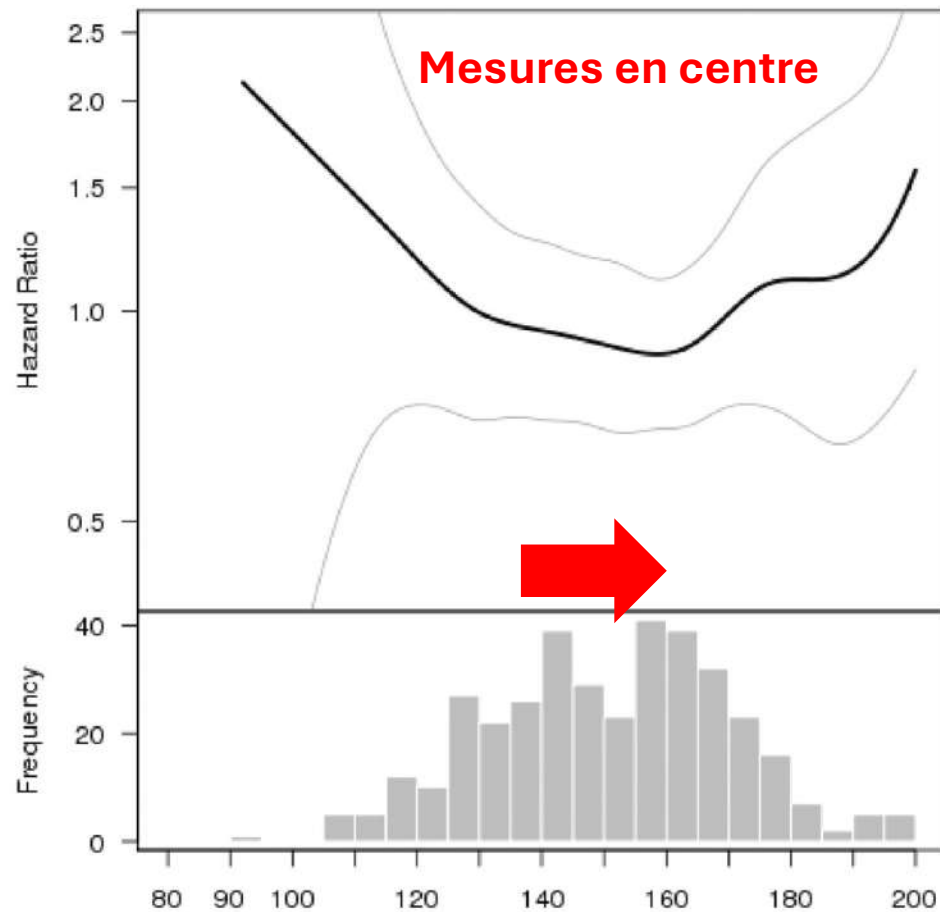
- **Mesurons la PA en AMBULATOIRE**



L'utilisation de la mesure en dehors de la séance « normalise » la situation

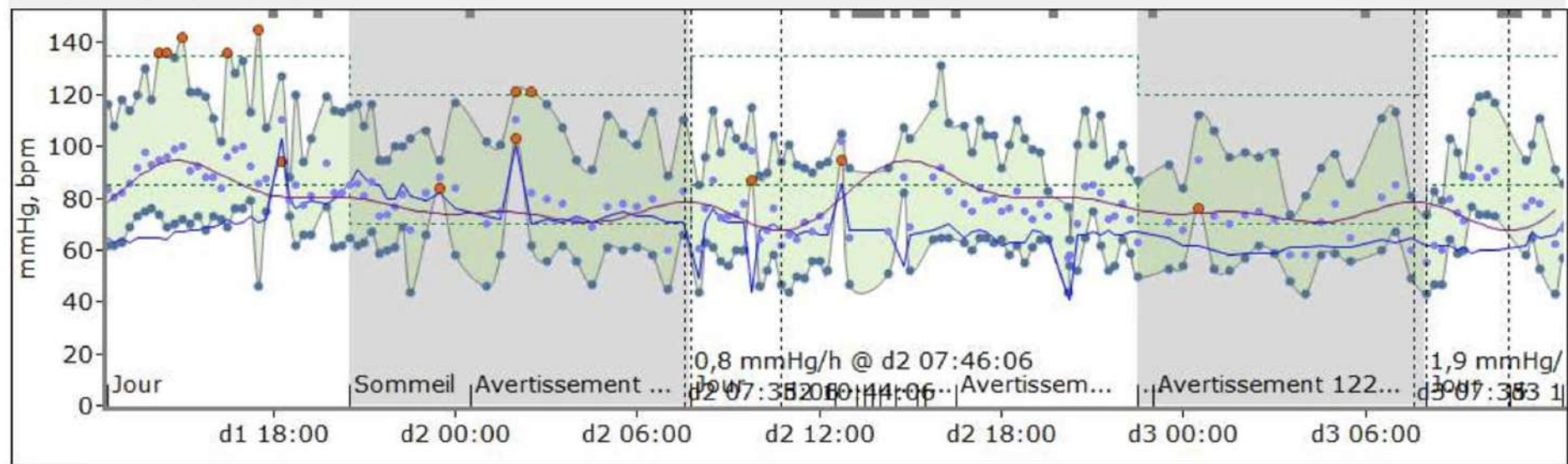
Evènements cardiovasculaires

383 HD patients
CRIC study



Résultat de sa MAPA

Profil tensionnel



Diagnostic

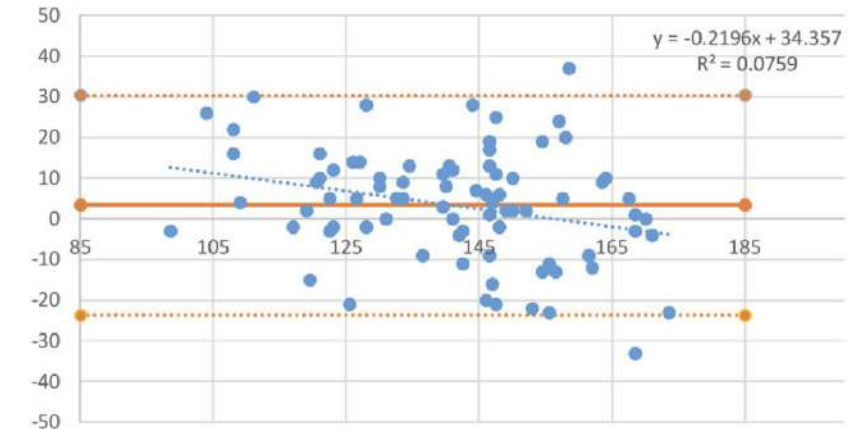
L'enregistrement de la MAPA a débuté le 03/03/2025 12:32:35 pour une durée de 47:57:29 h.

Au total, l'enregistrement compte 155 mesures, 136 mesures identifiées comme valide.

TA moyenne : 103/61 mmHg.FC moyenne : 68 bpm

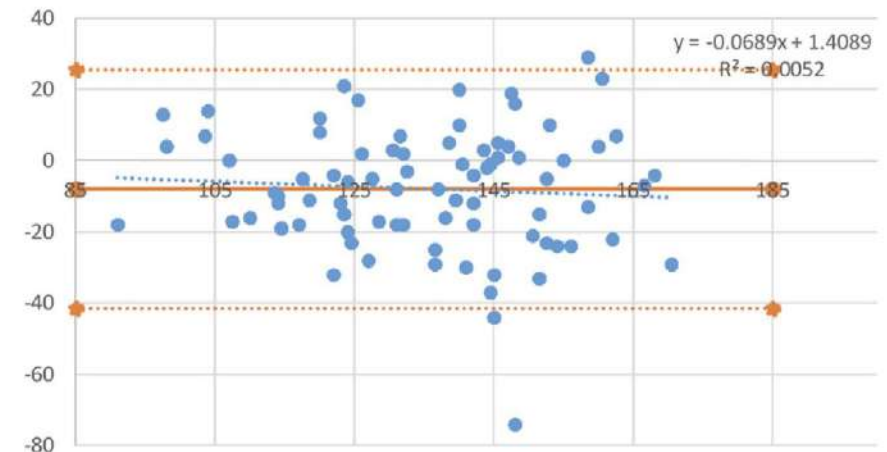
Suivre la PA ambulatoire: c'est possible !

PAS pré-dialyse / AMT



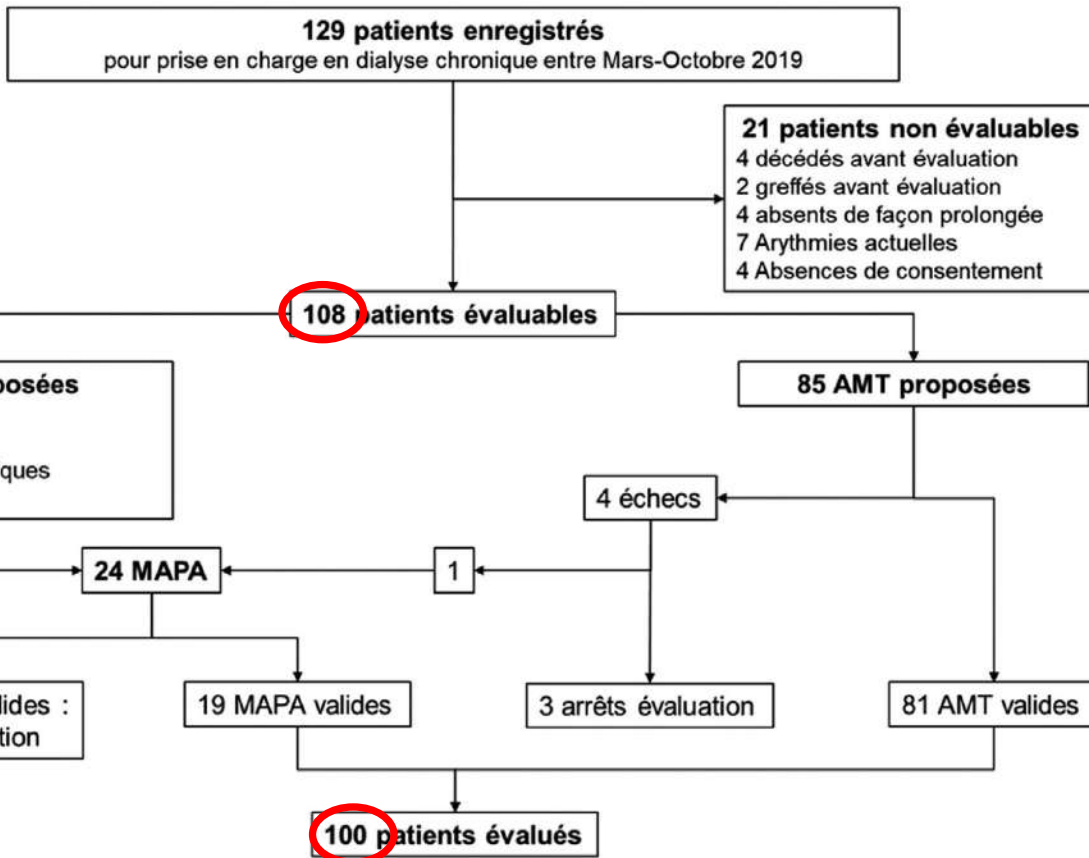
PAS pré-dialyse - PAS AMT = $3,4 \pm 13,8$ mmHg

PAS post dialyse / AMT



PAS post-dialyse - PAS AMT = $-7,9 \pm 17,1$ mmHg

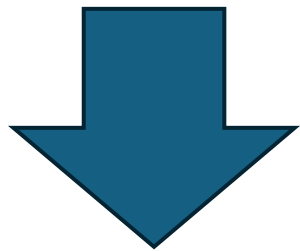
Diawara et al. Néphrologie et Thérapeutique 2022



= 78%

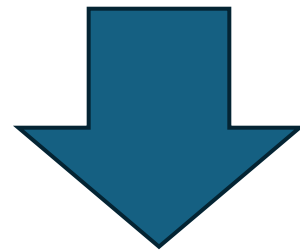
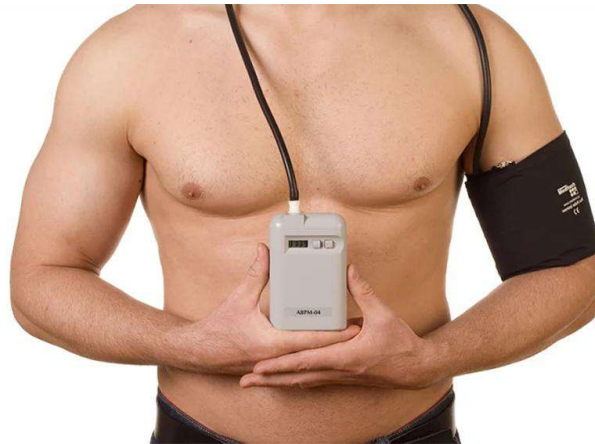
La mesure de la PA en dialyse

Automesure



A proposer à tous les patients

MAPA

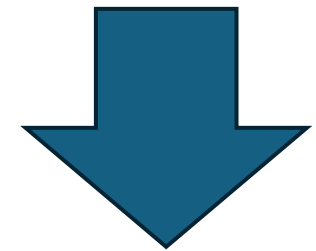


44h chez l'hémodialysé

Bracelets connectés



Non validé



Défi futur de validation chez le dialysé

Comment gérer ?

Dialyser davantage diminue la pression artérielle et les anti-hypertenseurs

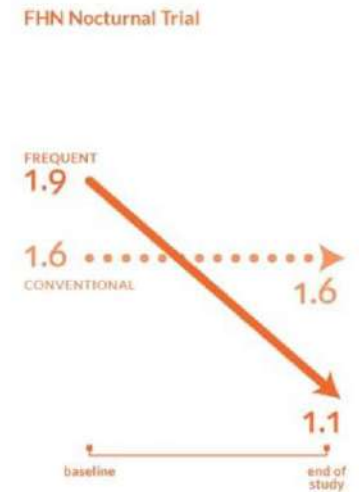
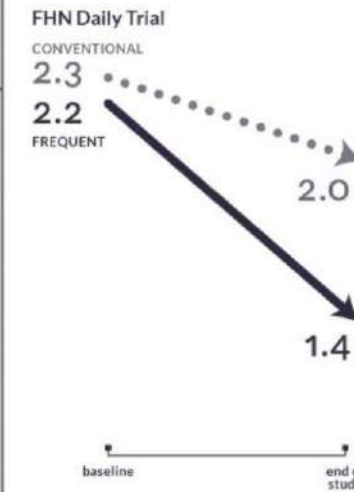
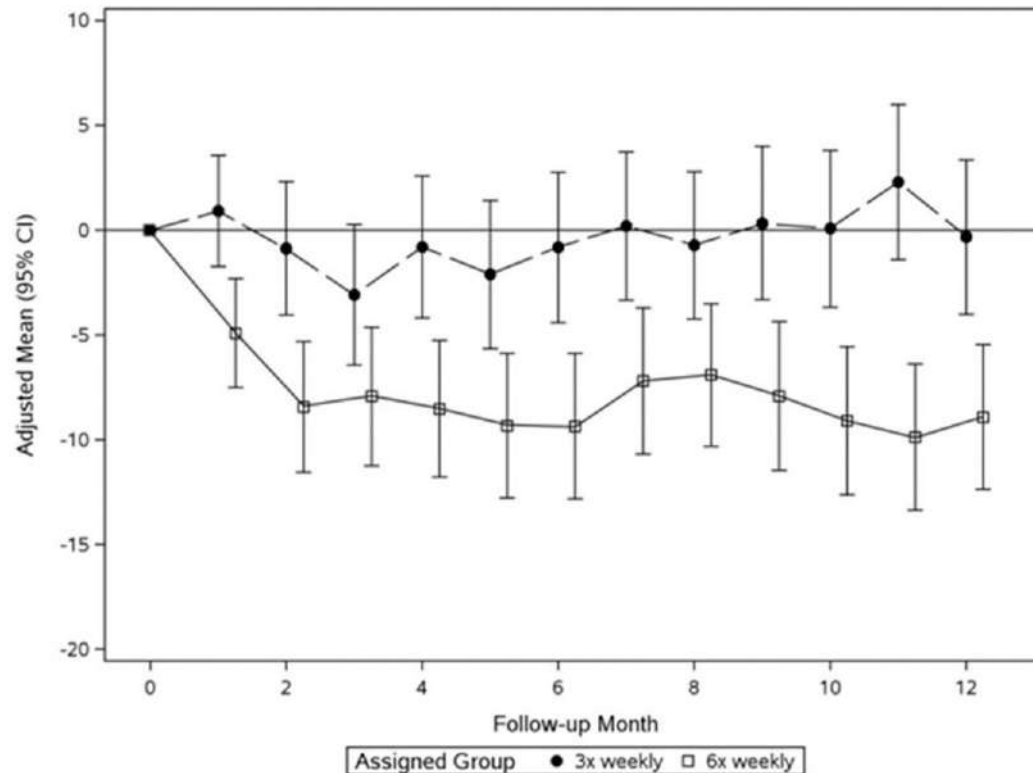
Sans différence de variation de poids sec dans les groupes

6 times per week Hemodialysis

Daily trial :
(6 days per week in-center, target $eKt/V = 0.9/\text{session}$, time 1.5 – 2.75 h)
Nocturnal trial :
(6 nights per week at home, target $\text{std } K_t/V \geq 4.0/\text{week}$, time 6 – 8 h)

3 days per week Hemodialysis

(target $eKt/V \geq 1.1/\text{session}$, time ≤ 2.75 h)
Daily Trial: in-center
Nocturnal Trial: initially specified as in-center, but being changed to home



Baisser la conductivité sodium du dialysat : Gain de PAS (ici avant la dialyse suivante)

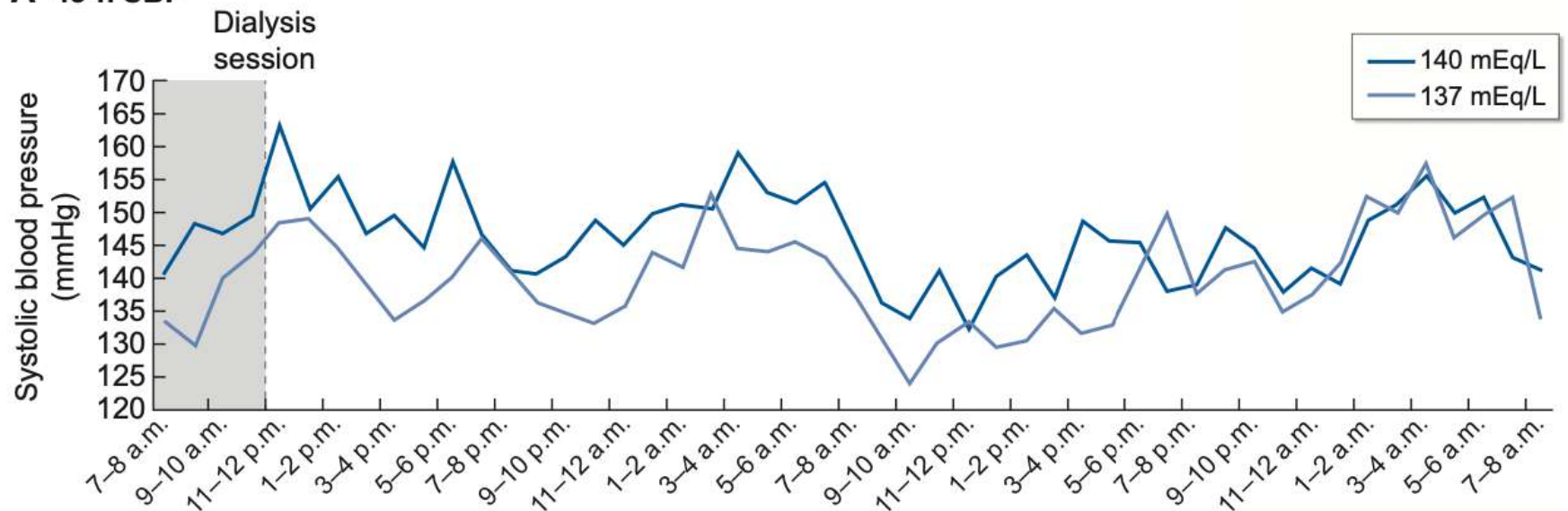
Patients hémodialysés depuis > 3mois, Augmentation de la PAS >10 mmHg)

Patient au poids sec; PAS >130 mmHg fin de séance

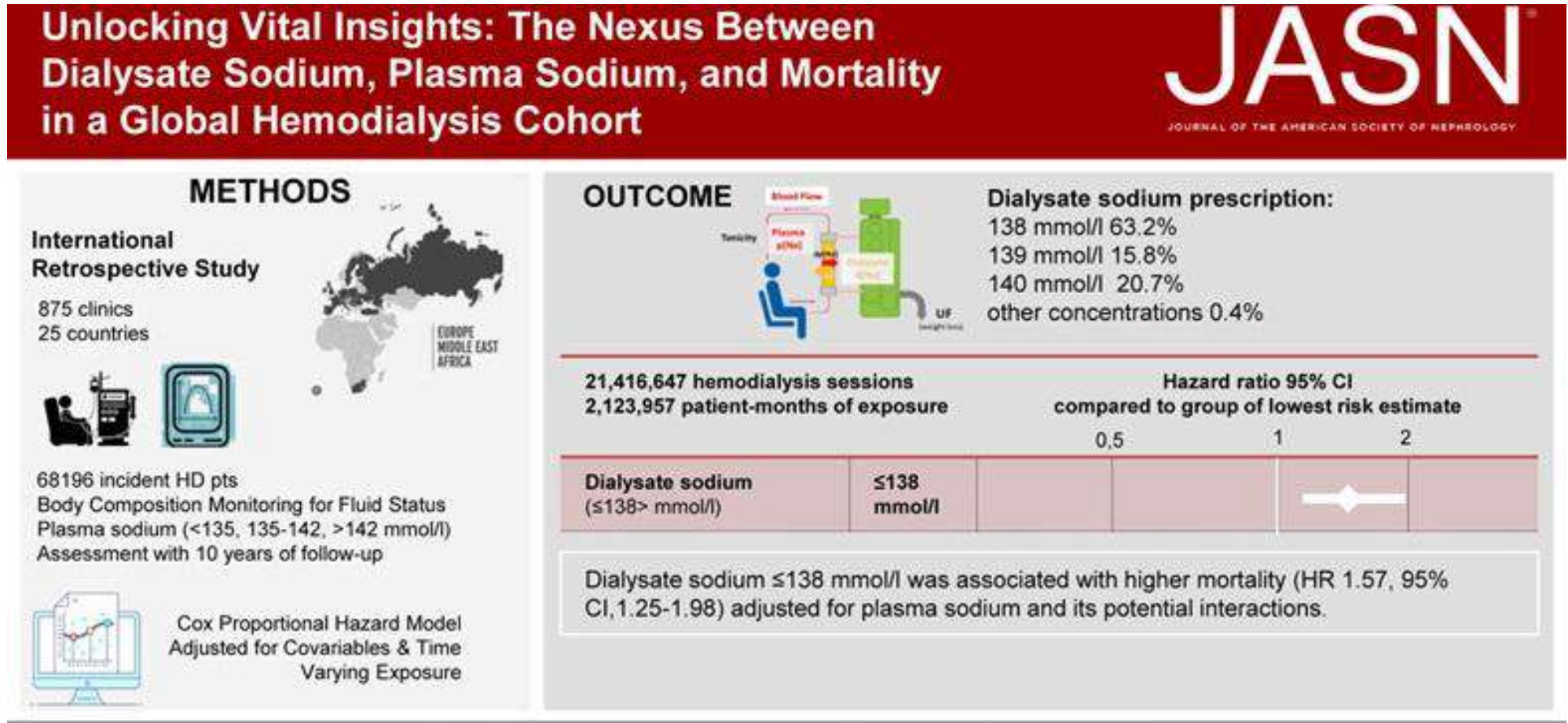
Essai en cross over : Na⁺ 140<->137 mEq/L

- 5 mmHg de PAS en faveur du groupe 137 mEq/L

A 48-h SBP

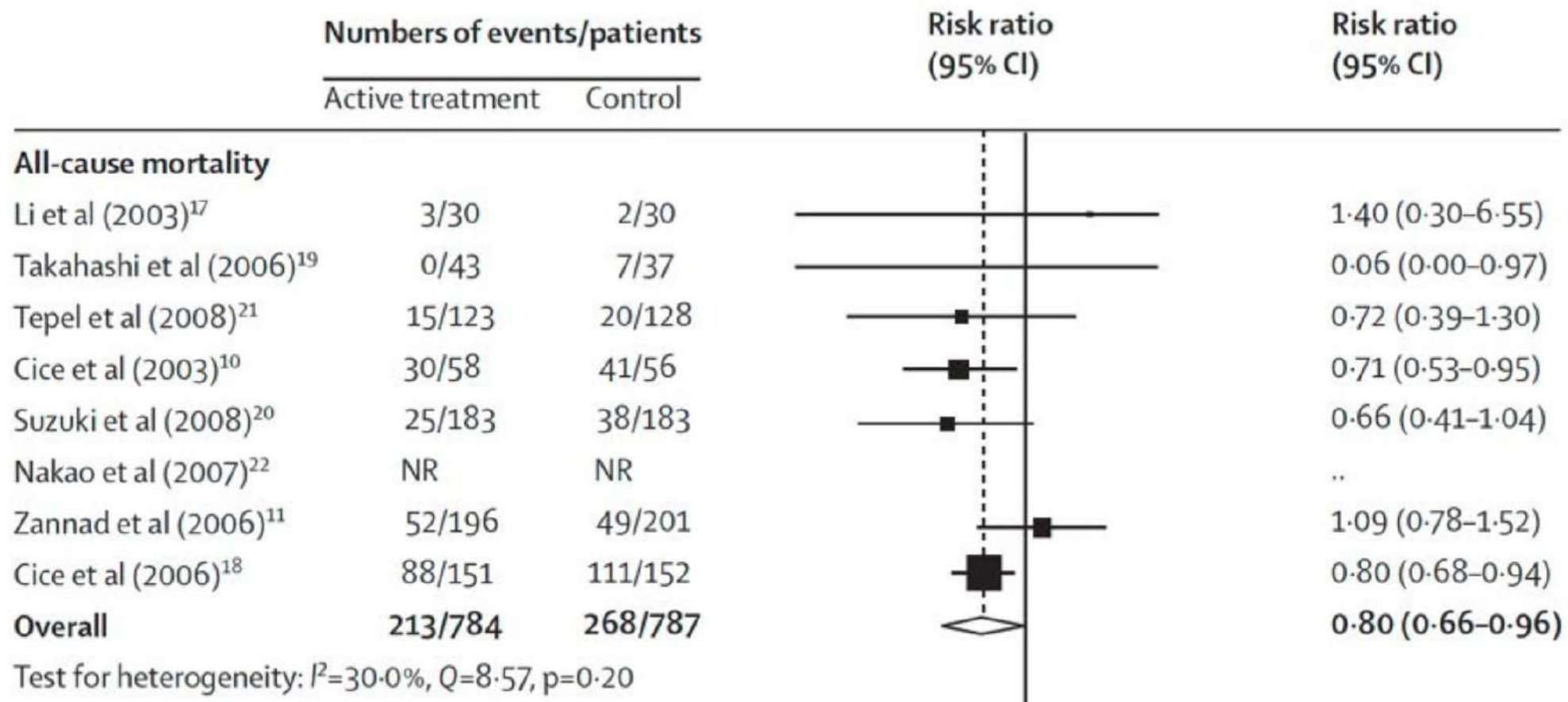


La conductivité sodium : ne pas baisser pour tous et individualiser la prescription



These observational findings stress the need for randomized evidence to reliably define optimal standard dialysate sodium prescribing practices

Prescrire des anti-hypertenseurs chez l'hémodialysé diminue la mortalité



HTA du patient dialysé : quelles molécules ?

	RAAS inhibitors	CCBs	β -Blockers	Other
High dialyzability	Benazepril, captopril, enalapril, lisinopril, ramipril	None	Atenolol, metoprolol, propranolol	Minoxidil
Low dialyzability	Fosinopril, trandolapril, ARBs	Amlodipine , diltiazem, felodipine, verapamil	Carvedilol , labetalol BPCO	α -Blockers, hydralazine, clonidine

Suggestion personnelle 



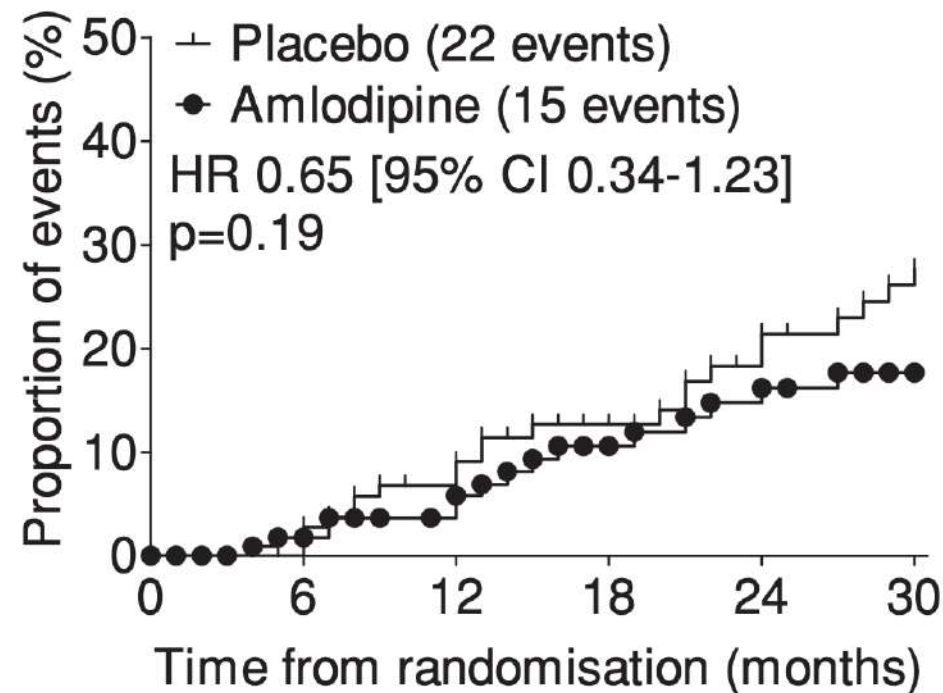
RCT positives

Manque de données

Pourquoi l'amlodipine ?

**n = 251 pts HD hypertendus
vs placebo, double insu
Amoldipine 10 mg/j vs placebo**

	Amlodipine group (n = 123)	Placebo group (n = 128)
Age (years)	60 (45–68)	62 (48–68)
Male n (%)	78 (63%)	81 (63%)
Body mass index (kg/m ²)	25.4 (22.6–28.9)	26.1 (23.4–28.7)
Renal disease n (%)		
Diabetic nephropathy	19 (15%)	26 (20%)
Nephrosclerosis	17 (14%)	26 (20%)
Chronic glomerulonephritis	39 (32%)	38 (30%)
Polycystic kidney disease and interstitial nephritis	30 (24%)	20 (16%)
Other/unknown	18 (15%)	18 (14%)
Months of haemodialysis	28 (12–48)	23 (13–43)
Systolic blood pressure (mmHg)	140 (128–160)	141 (130–160)
Diastolic blood pressure (mmHg)	80 (70–80)	80 (70–83)
Present smoker n (%)	24 (20%)	27 (21%)
Disease prevalence at baseline n (%)		
Diabetes mellitus	33 (27%)	40 (31%)
Cardiovascular disease	38 (31%)	44 (34%)
Haemoglobin (g/dL)	11.9 (11.0–12.7)	11.6 (10.7–12.4)
Serum creatinine (mg/dL)	10.0 (7.5–11.3)	9.0 (7.0–11.3)
Blood urea (mg/dL)	137 (113–174)	142 (110–166)
Total protein (g/dL)	6.7 (6.3–7.1)	6.8 (6.3–7.1)
Serum calcium (mmol/L)	2.3 (2.2–2.5)	2.3 (2.2–2.5)
Serum phosphate (mmol/L)	2.0 (1.7–2.6)	2.0 (1.6–2.4)
Parathyroid hormone (pg/mL)	188 (88–336)	216 (99–320)
Serum triglycerides (mg/dL)	175 (128–243)	158 (114–264)
Serum cholesterol (mg/dL)	171 (148–201)	176 (150–216)
Medications n (%)		
Angiotensin-converting enzyme inhibitors	79 (64%)	81 (63%)
β-blockers	67 (54%)	79 (62%)
Erythropoietin	108 (88%)	108 (84%)
Lipid-lowering agents	53 (43%)	50 (39%)

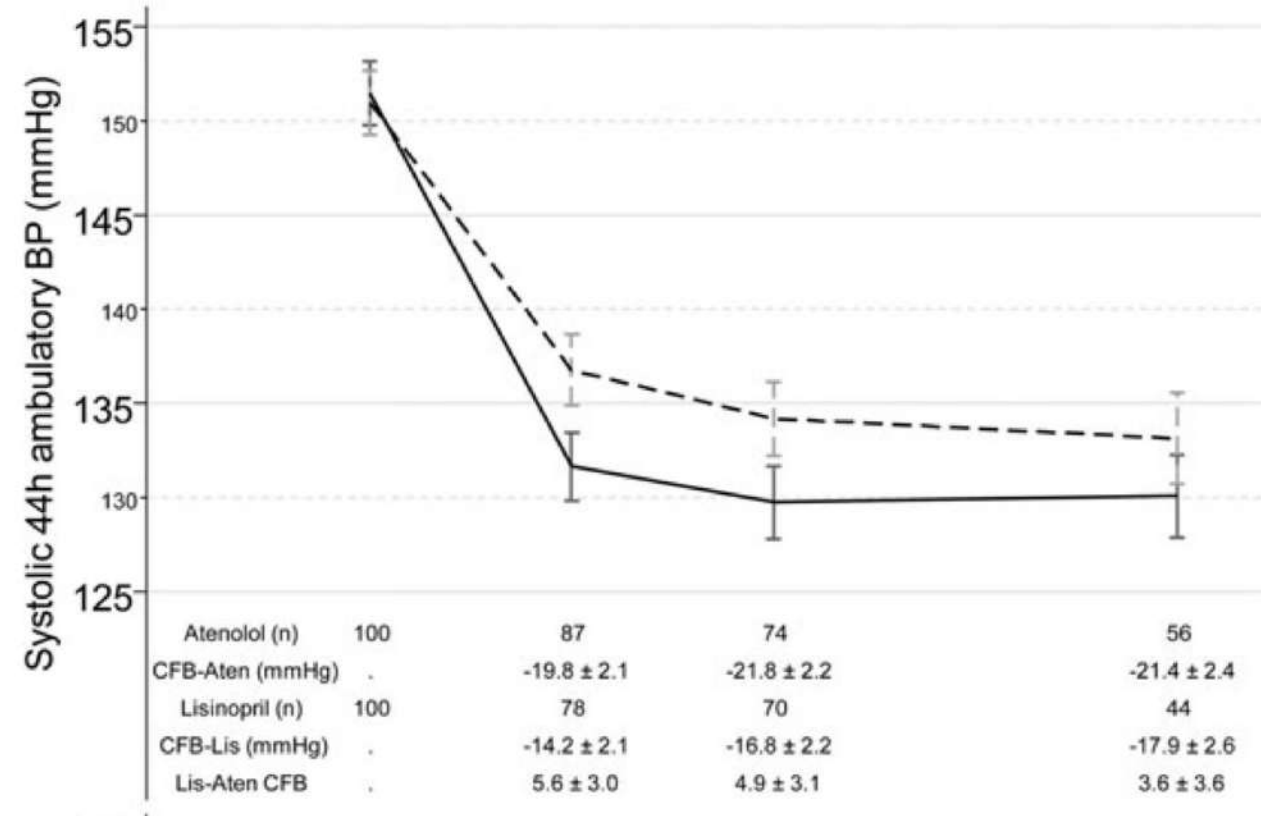


Subjects at risk	0	6	12	18	24	30
Placebo	128	106	81	65	53	45
Amlodipine	123	107	88	69	60	45

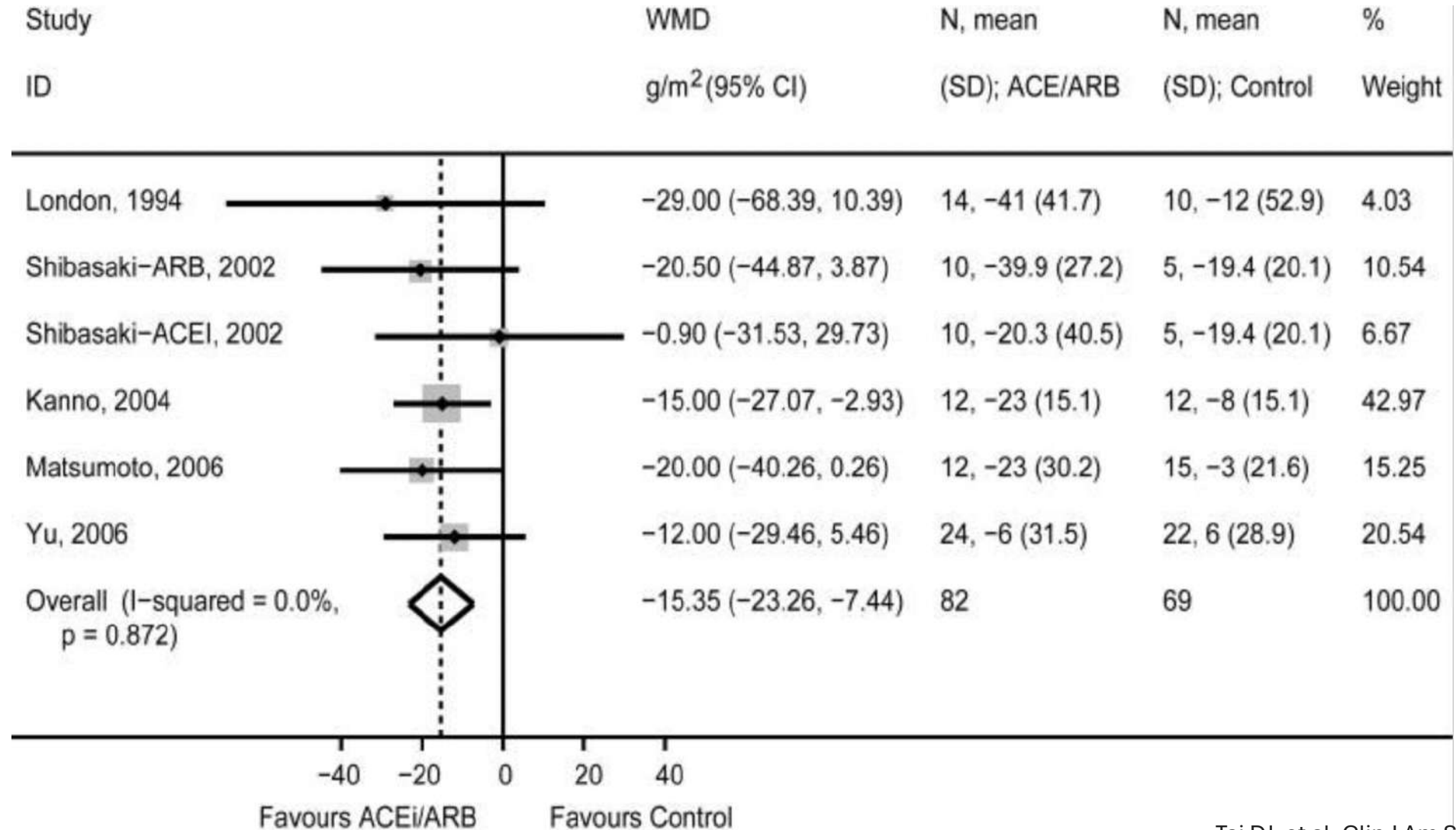
BB vs. IEC en dialyse : la victoire du Béta-bloquant ?

- N = 200 pts HD hypertendus avec HVG (86% de sujets afro-américains)
- Randomisation lisinopril 10-40 mg x 3/sem vs atenolol 25-100 mg x 3/sem
- Durée 12 mois
- Pas de différence sur l'IMVG (écho)
- Composite (IDM, AVC, ICC) : RR = 2,29 [p < 0,021]

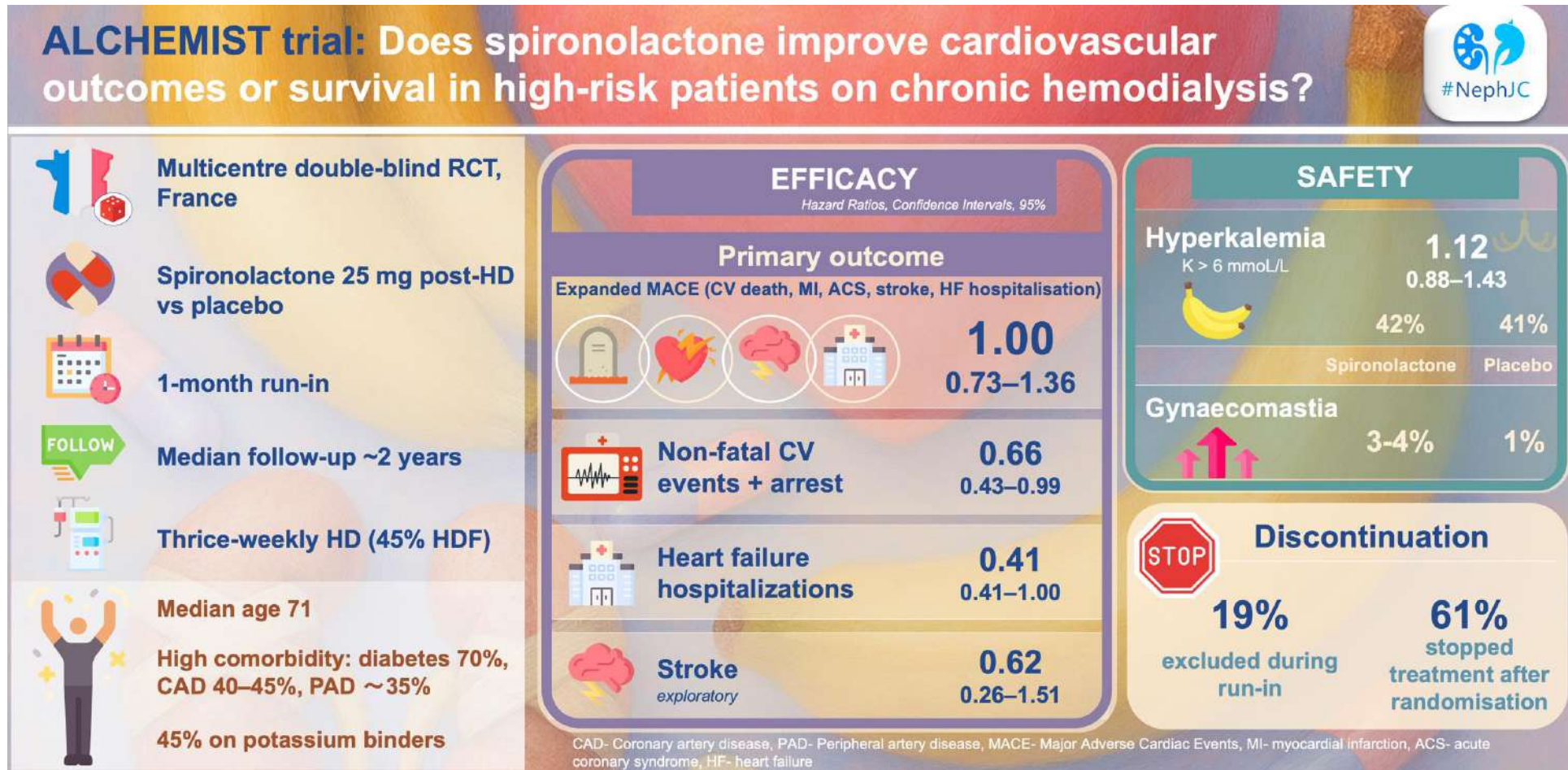
Limites majeures :
Patients afro américains
Patients hypervolémiques



IEC/ARA2 : masse ventriculaire gauche



Etudes négatives chez l'hémodialysé avec la spironolactone : ALCHEMIST









Rossignol P, et al. *Spironolactone in patients on chronic haemodialysis at high risk of adverse cardiovascular outcomes (ALCHEMIST): a multicentre, double-blind, randomised, placebo-controlled trial and updated meta-analysis.* Lancet. 2025


Etudes négatives chez l'hémodialysé avec la spironolactone : ACHIEVE

Does spironolactone lower the risk of heart failure hospitalization and cardiovascular death in patients on maintenance dialysis?



-  Parallel group RCT
-  143 dialysis programs
12 countries
-  Patients on Maintenance dialysis for ≥ 3 months
-  Age ≥ 45 yrs (or)
Diabetics aged ≥ 18 yrs
-  Median follow-up
1.8 years

 **INTERVENTION**
(N=1260)
Spironolactone
25 mg daily oral

 **CONTROL**
(N=1278)
Matching Placebo



PRIMARY OUTCOME

Composite of CV death & HF hospitalization

N = 258

(10.4 events per 100 PY)



HR 0.92 (0.78-1.09)



N = 276

(11.3 events per 100 PY)



OTHER OUTCOMES



All-cause mortality

HR 0.95 (0.83–1.09)



All-cause hospitalization

HR 0.96 (0.87–1.06)

NOTE: The trial was stopped early for *futility* after a planned interim analysis of 75% of the expected primary outcome events.

Conclusion: Among patients receiving maintenance dialysis, spironolactone 25 mg daily orally did not reduce the composite outcome of cardiovascular mortality and heart failure hospitalization compared with placebo.

Spironolactone versus placebo in patients undergoing maintenance dialysis (ACHIEVE): an international, parallel group, randomised controlled trial.

M Walsh et al., *Lancet* 2025

VA by Akshaya Jayachandran, MD DM



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La prise en charge de l'HTA du patient hémodialysé repose (avis personnel)

1. Une mesure en ambulatoire (ne pas se fier à celle de la séance pour les stratégies thérapeutiques)
2. Une cible
 - PAS <135 mmHg chez la majorité des patients
 - PAS <130 mmHg chez le sujet jeune inscrit sur liste
3. Une gestion de la volémie
 - Un dialysat isodiffusif, voire légèrement hypodiffusif
 - Une baisse progressive du PS : s'aider des outils modernes
4. Des traitements médicamenteux
 - Privilégier ceux qui ont démontré des effets sur la mortalité : BB, Amlodipine, BSRA
 - Longue demi-vie et non dialysable le plus souvent
 - Vérification de l'observance
5. Une augmentation de la dose de dialyse (fréquence, durée)

Hypotension

Fréquence des IDH dans la littérature

How Frequent is Intradialytic Hypotension (IDH)?

American Journal of
Nephrology



26
studies
on IDH

European best practice guideline 1,694 patients



Drop in SBP of ≥ 20 mm Hg,
clinical event, and intervention

10.1%
of HD sessions
complicated by IDH

Nadir less than 90 13,189 patients



SBP of ≤ 90 mm Hg

11.6%
of HD sessions
complicated by IDH

Risk factors for IDH



Diabetes



Interdialytic
weight gain



Female
gender



Lower body
weight

Conclusion The systematic meta-analysis suggests that the prevalence of IDH is lower than 12% for both the European best practice guideline and a nadir < 90 definition. This is much lower than stated in most reviews.

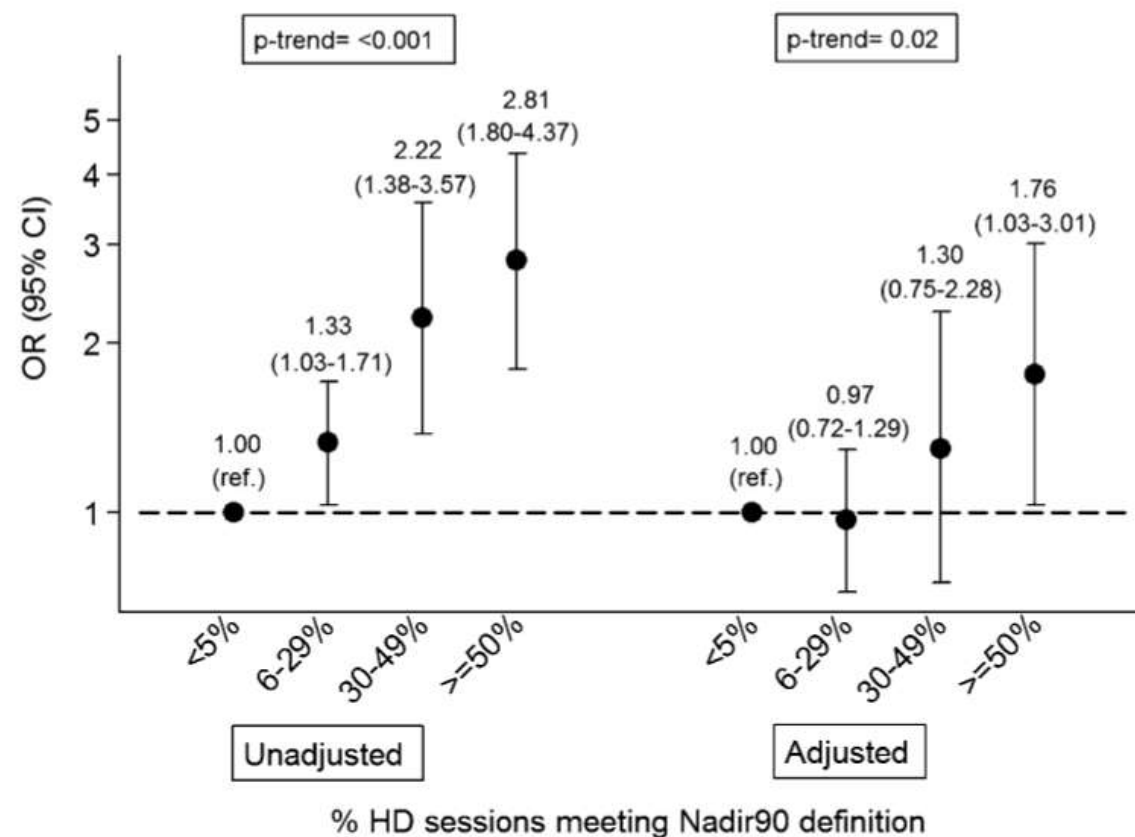
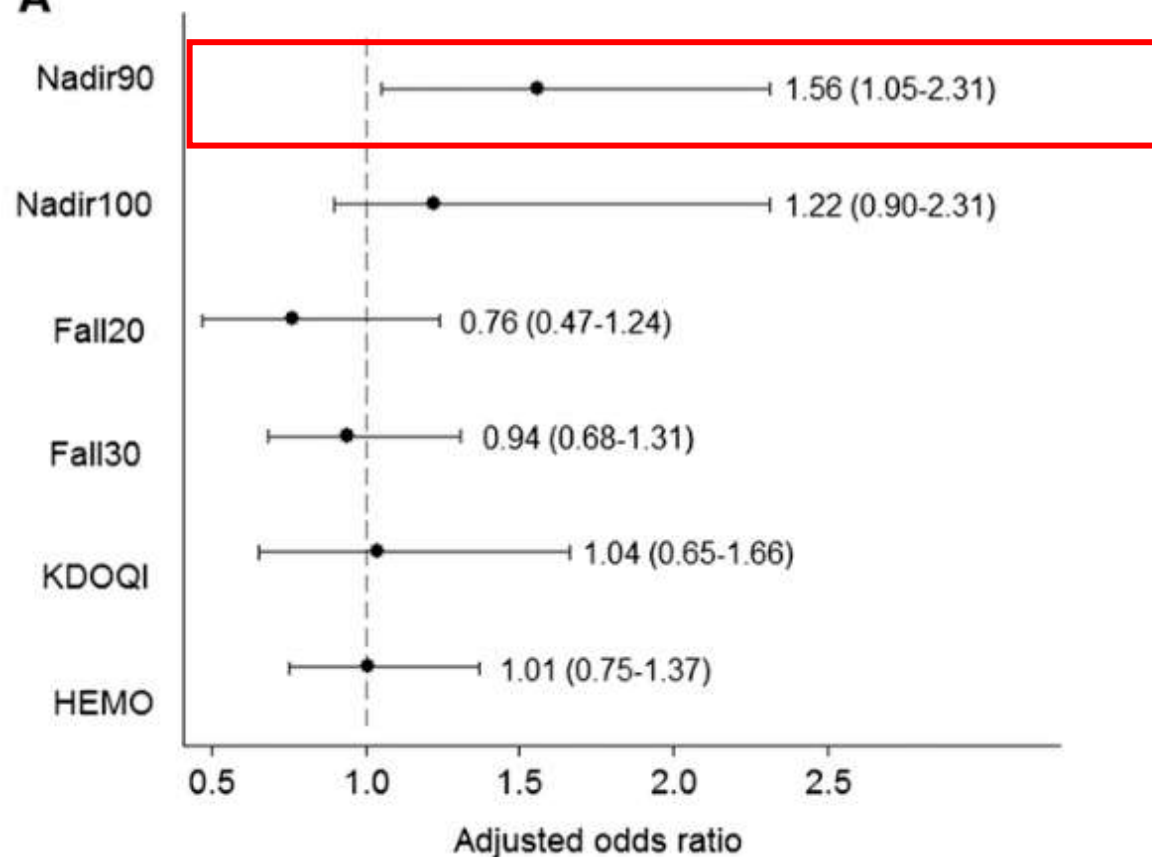
Kuipers J, Verboom LM, Ipema KJR, Paans W, Krijnen WP, Gaillard CAJM, Westerhuis R, Franssen CFM. The Prevalence of Intradialytic Hypotension in Patients on Conventional Hemodialysis: A Systematic Review with Meta-Analysis Am J Nephrol 2019;49:497–506

Visual Abstract by Joel Topf [@kidney_boy](#)

Hypotension intradialytique (IDH) et mortalité

Risque de mortalité HEMO Cohorte

A



Prise en charge de l'IDH

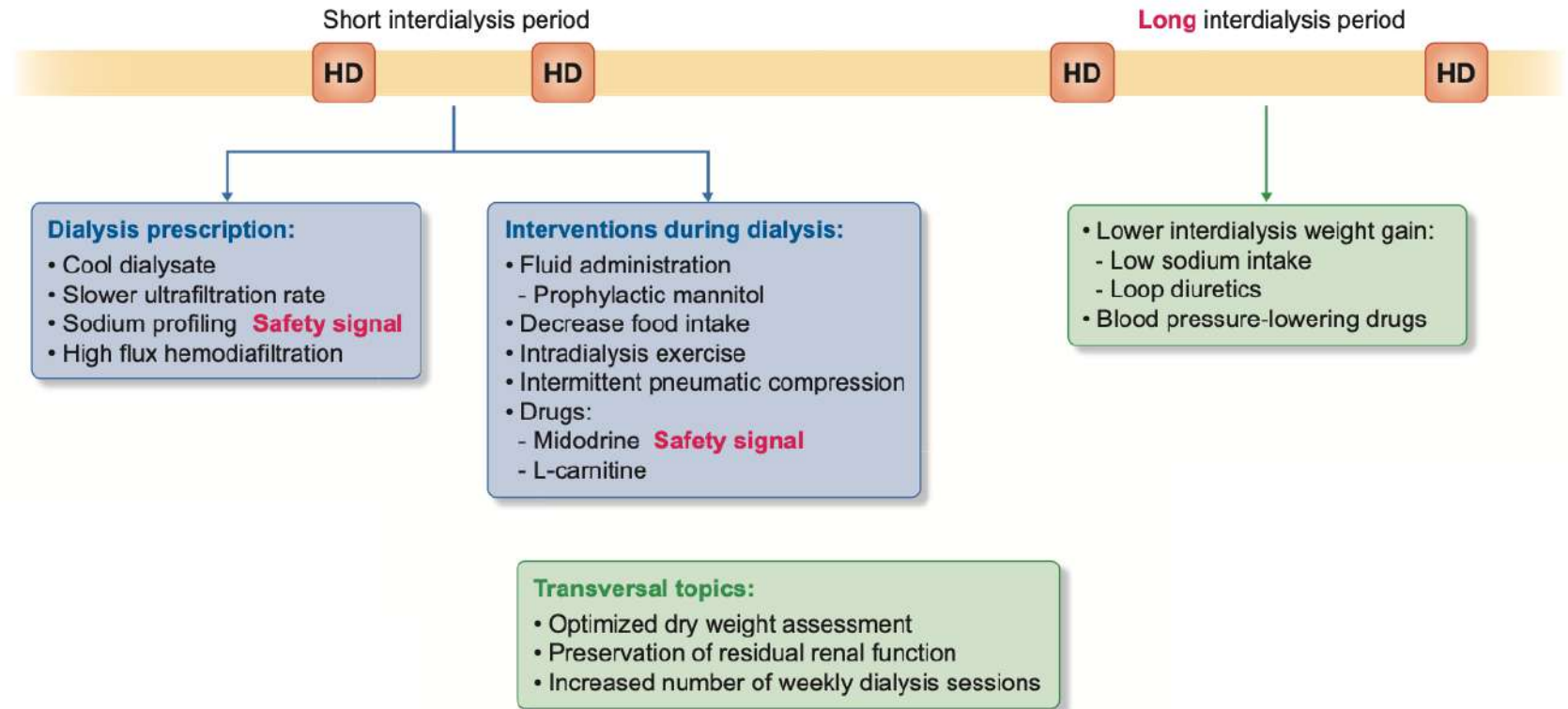
Table 2. EBPGs on haemodynamic instability 2007 [8]: key messages

Prevention of IDH

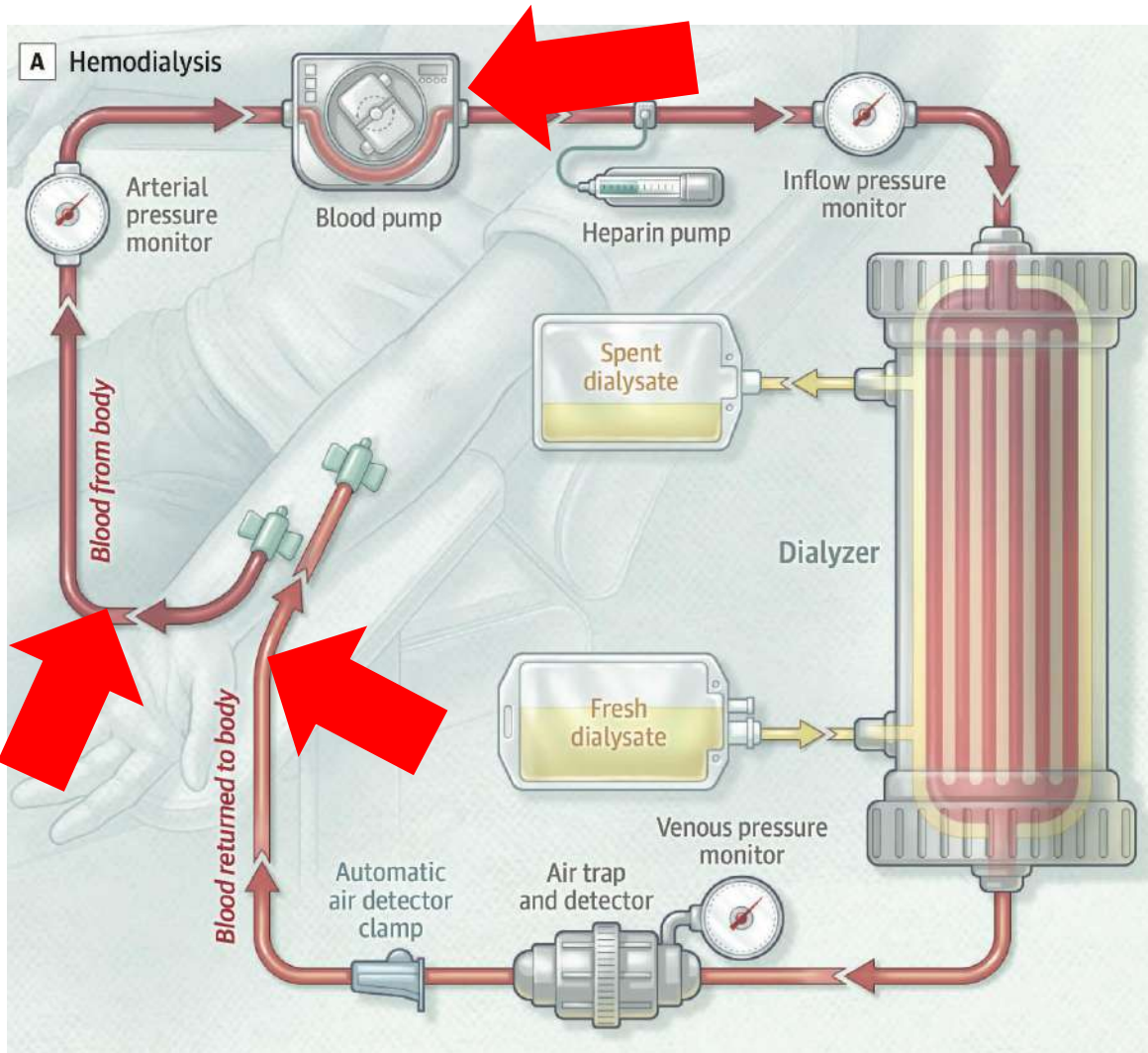
1. Evaluate patients for hydration status (prior to the session), frequently for BP and heart frequency rate (during the session) and, if frequent IDH episodes, for cardiovascular disease
2. Lifestyle interventions:
 - a. Decrease salt intake
 - b. Avoid food intake during or just before dialysis if frequent episodes of IDH, except if patient is malnourished
3. Dialysis technique
 - a. Optimize ultrafiltration
 - b. Avoid routine sodium profiling with supraphysiological dialysate sodium concentrations
 - c. Bicarbonate dialysis should be used
 - d. The use of a dialysate calcium concentration of 1.50 mmol/L should be considered and low-magnesium (0.25 mmol/L) dialysate should be avoided, especially in combination with low-calcium dialysate in patients with frequent episodes of IDH
 - e. Cool dialysate temperature dialysis (35–36° C) or isothermic treatments by blood temperature-controlled feedback should be prescribed in patients with frequent episodes of IDH
 - f. Haemo(dia)filtration techniques should not be considered a first-line option for the prevention of IDH, but as a possible alternative to cool dialysis
 - g. A prolongation in dialysis time or an increase in dialysis frequency should be considered in patients with frequent episodes of IDH
4. In patients with frequent episodes of IDH, antihypertensive agents should be given with caution prior to dialysis depending on pharmacodynamics, but should not be routinely withheld on the day of HD treatment
5. If other treatment options have failed, then consider switching to PD or midodrine or L-carnitine supplementation

Treatment of IDH

1. Trendelenburg position should be considered
2. Ultrafiltration should be stopped during an episode of IDH
3. Isotonic saline should be infused in patients unresponsive to stopping ultrafiltration and Trendelenburg position during an episode of IDH
4. Infusion of colloid solutions should be considered in patients who remain unresponsive to saline infusion



Flux thermique pendant une séance d'HD



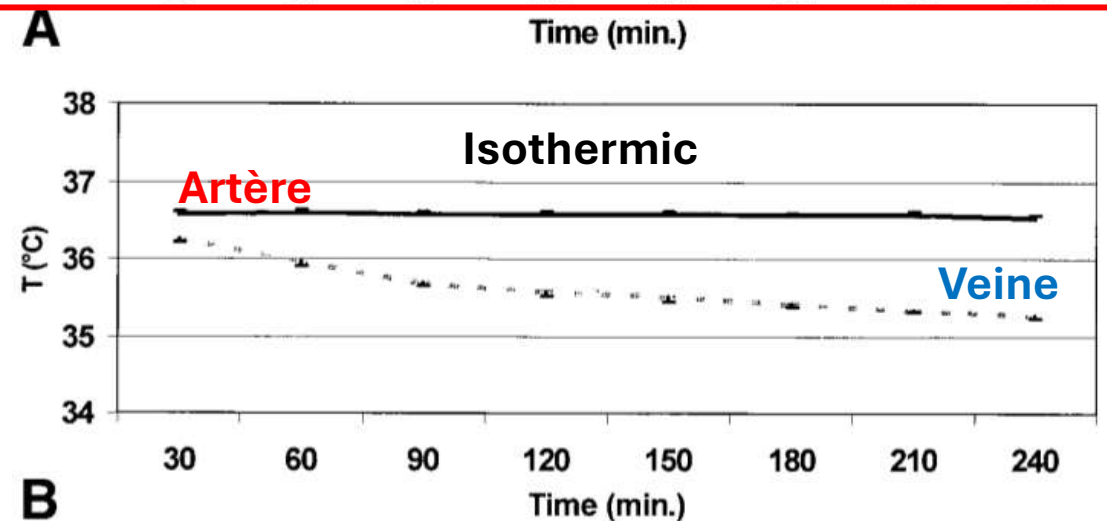
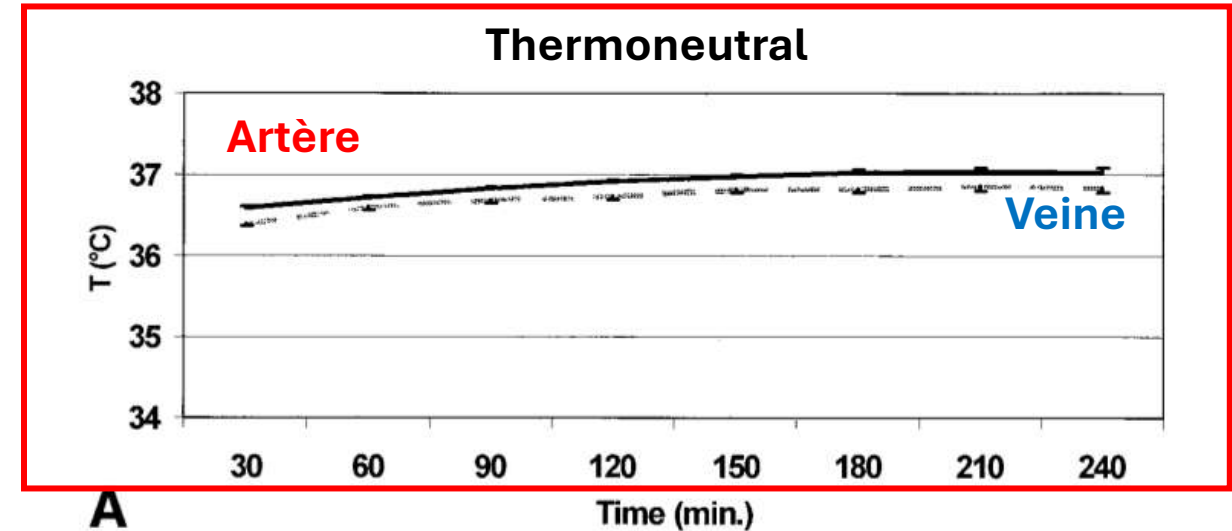
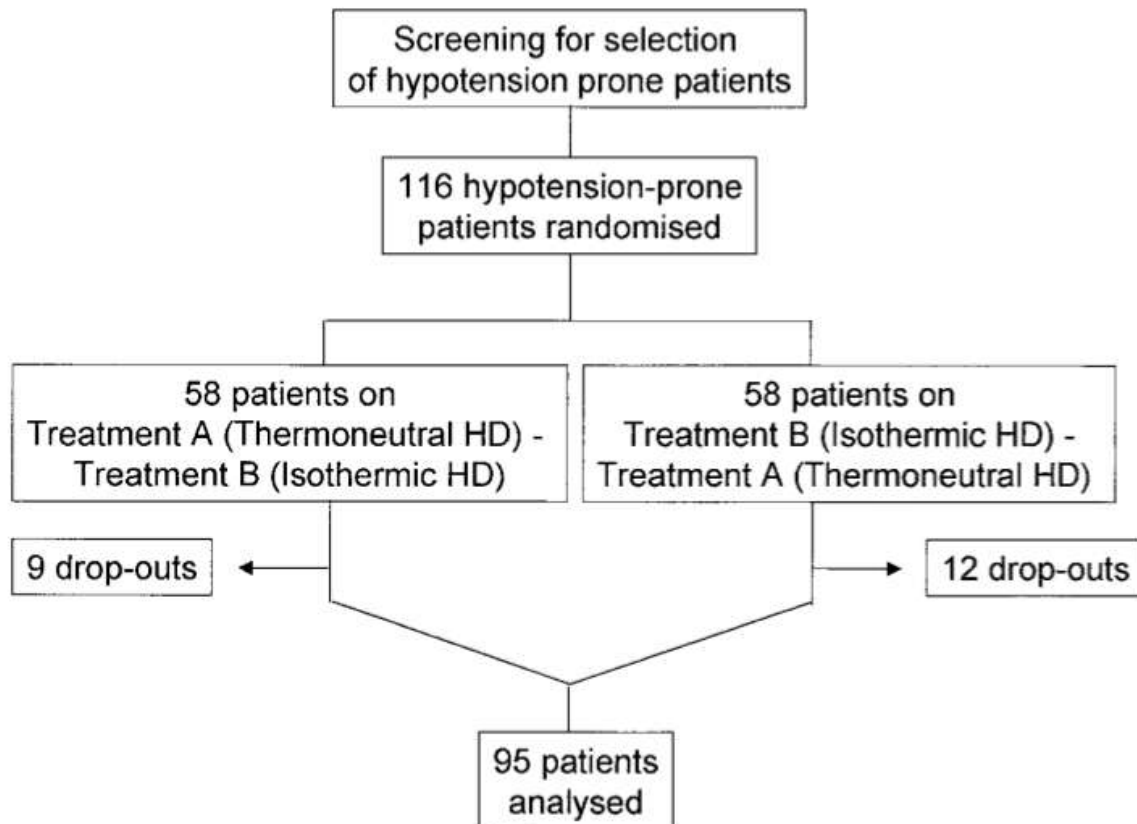
Flux thermique = transfert de chaleur

$$\dot{E} = c * \rho * (T_{\text{ven}} - T_{\text{art}}) * Qb$$

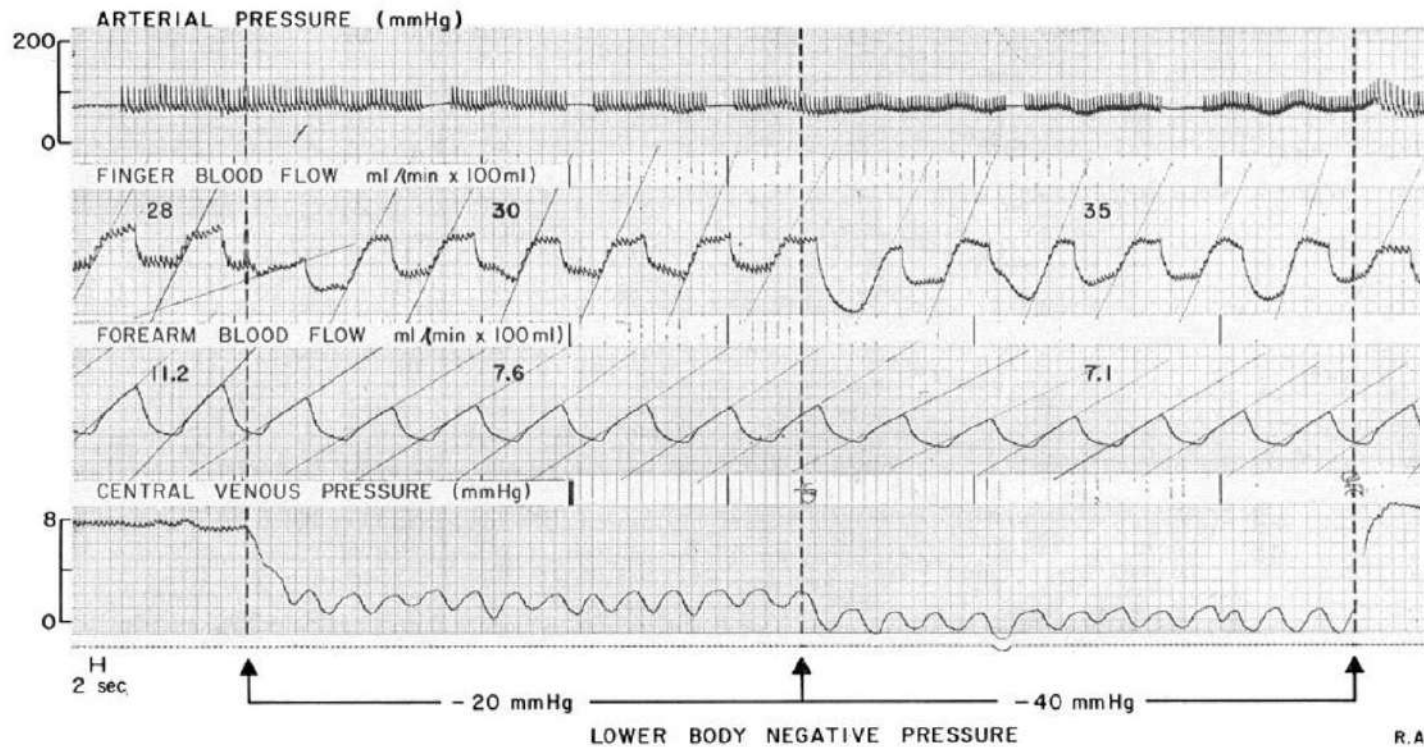
capacité calorifique
spécifique du sang (\approx
3,6 kJ/kg·°C)

densité du sang

Effet d'un flux thermique nul et contrôlé en cours d'une séance d'HD (ex. Module BTM)



En physiologie, l'euthermie est prioritaire sur l'euvolémie

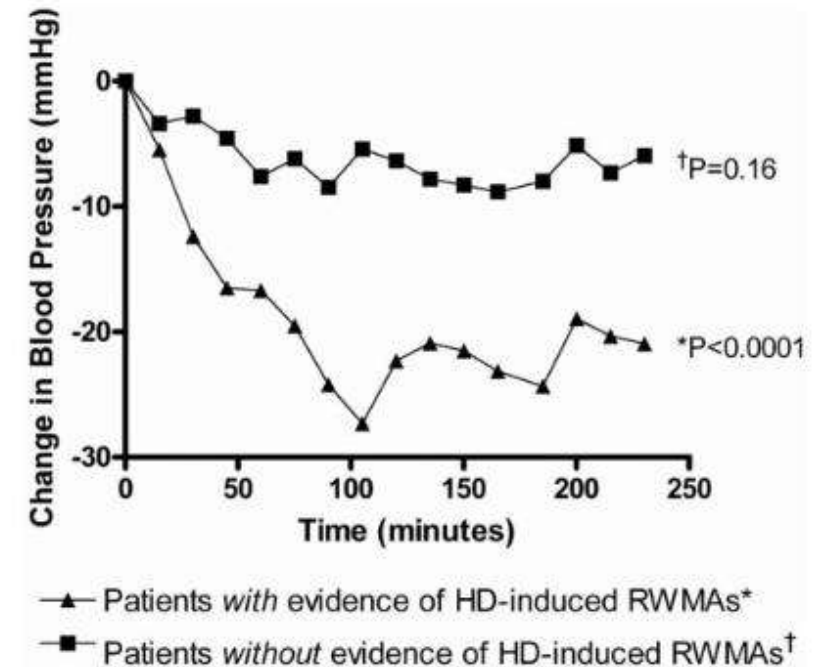
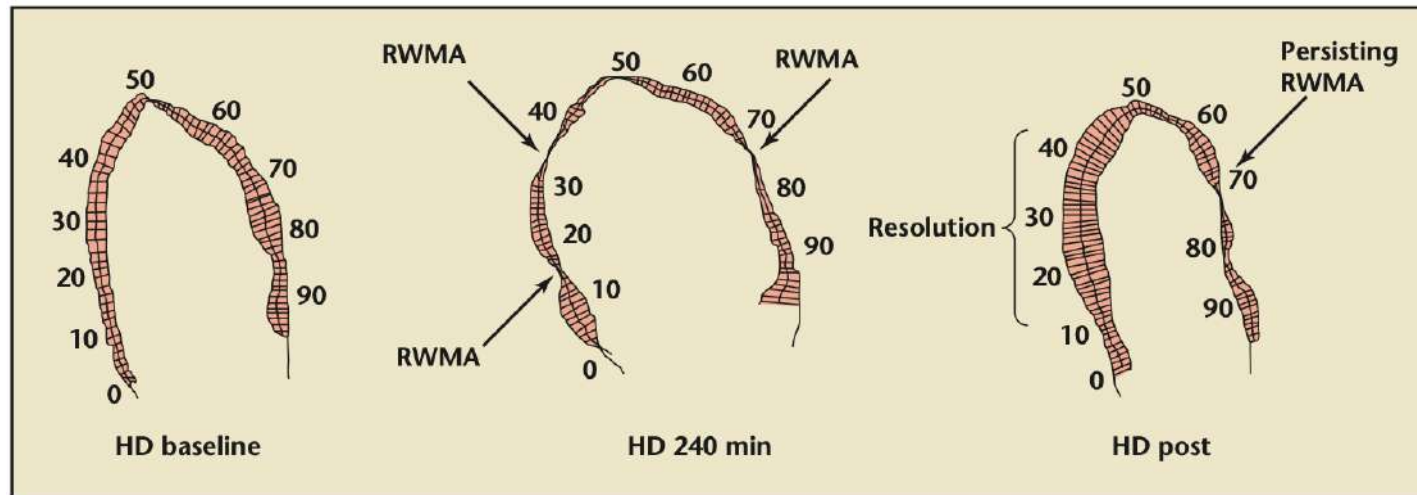


Finger vascular resistance, mm Hg/ml per min per 100 ml

	Resting	Responses to LBNP	
		-20	-40
Hot (5)	3.5	+1.1	+0.3
Warm (13)	± 1.1	± 0.7	± 0.1
	4.4*	+3.1	+2.4
Cold (13)	± 0.5	± 0.9	± 0.5
	5.5	+6.1	+5.8
	± 0.8	± 1.6	± 1.0

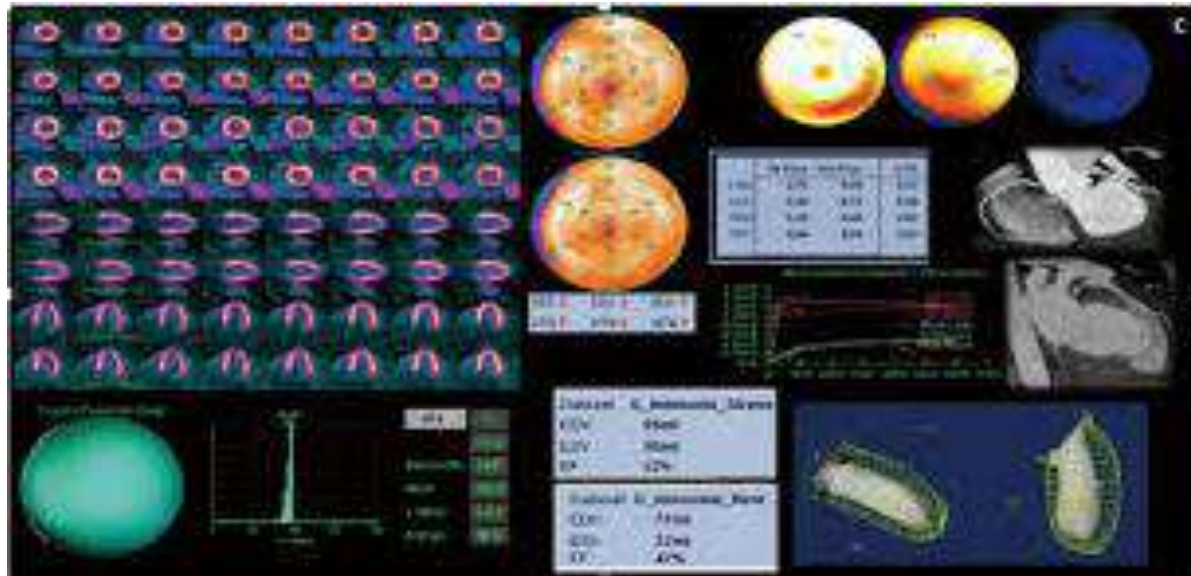
**Capacités adaptatives cardiaque
diminuées lors d'une séance HD**

Susceptibilité hémodynamique et cardiaque à l'IDH

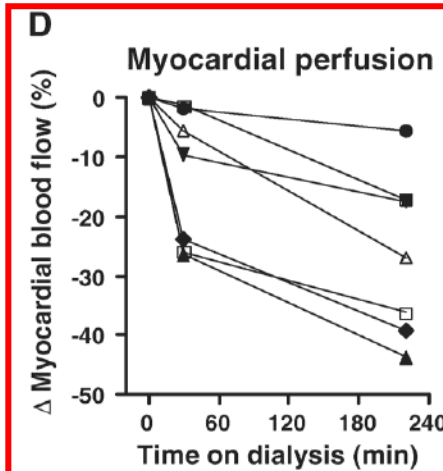
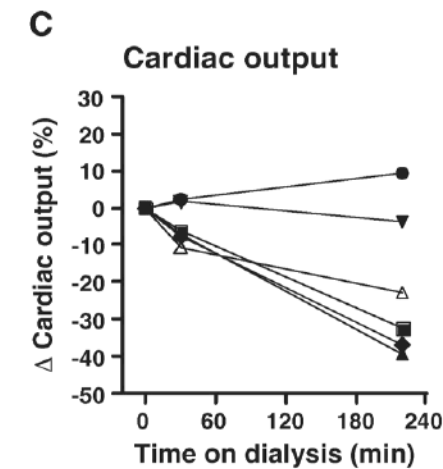
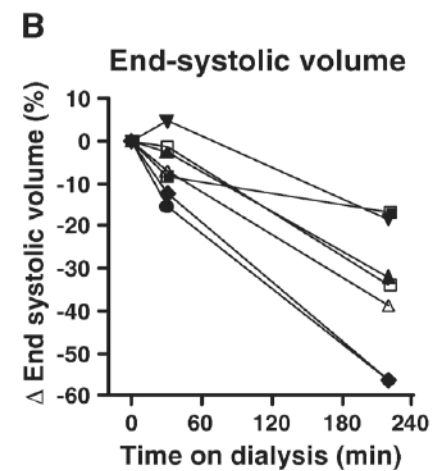
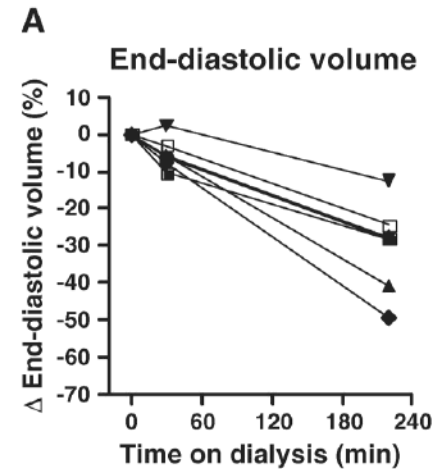


Factor associated with presence of myocardial stunning	Odds Ratio	P value
UF volume during HD of 1L	5.1	0.007
UF volume during HD of 1.5L	11.6	
UF volume during HD of 2L	26.2	
Maximum SBP reduction during HD of 10 mmHg	1.8	0.002
Maximum SBP reduction during HD of 20 mmHg	3.3	
Maximum SBP reduction during HD of 30 mmHg	6.0	

Evolution du débit sanguin cardiaque au cours de l'HD

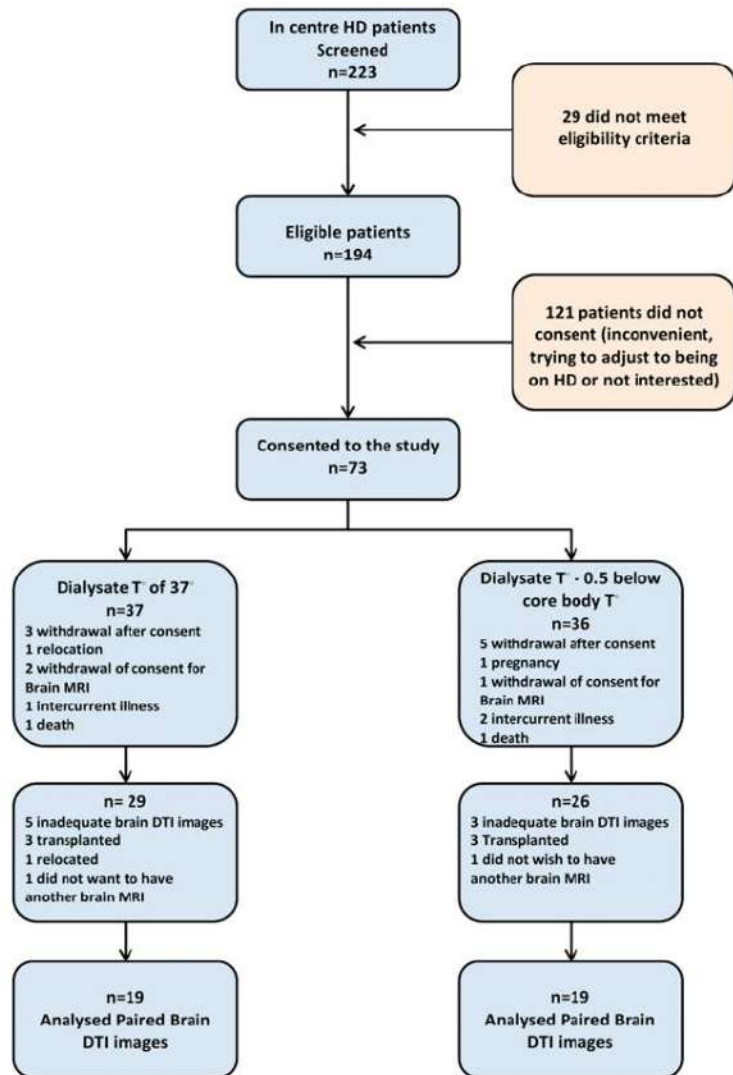


(^{13}N -NH(3) PET



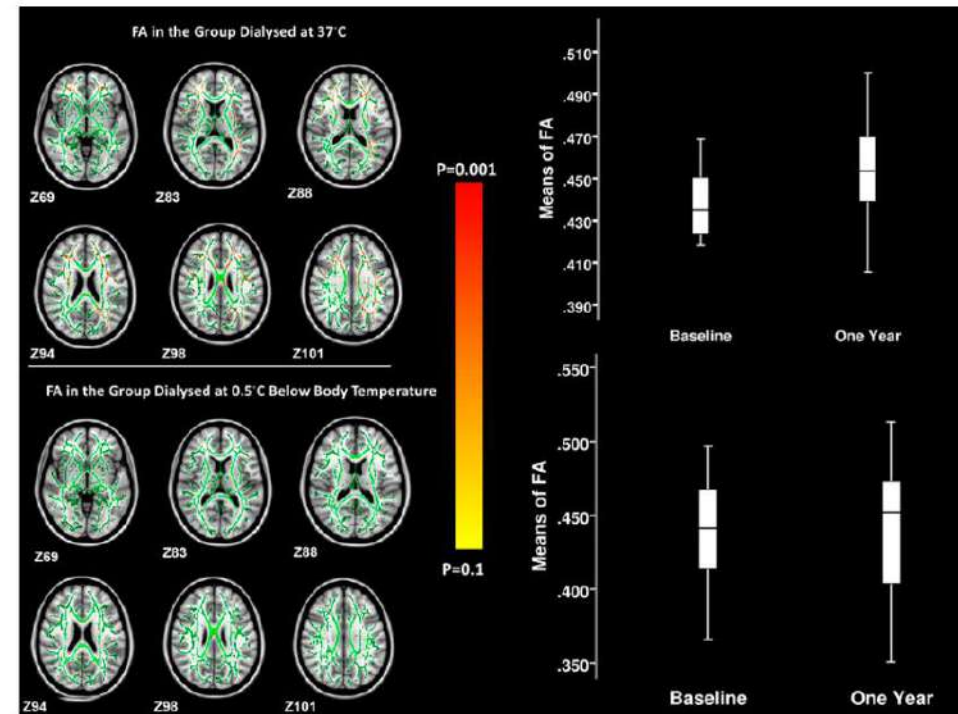
- Patient NR 1
- ▲ Patient NR 2
- ▼ Patient NR 3
- ◆ Patient NR 4
- Patient NR 5
- Patient NR 6
- △ Patient NR 7

Intérêt de la dialyse froide : lésions cérébrales. Etude randomisée



FA (Fractional Anisotropy) → marqueur d'intégrité globale des faisceaux de substance blanche : phénomènes de restriction de diffusion liés à des ischémies cérébrales aiguës

mesurée par IRM de diffusion (DTI)



Intérêt de la dialyse froide (IDH) : étude en crossover

40 patients HD Chronique

Cross over

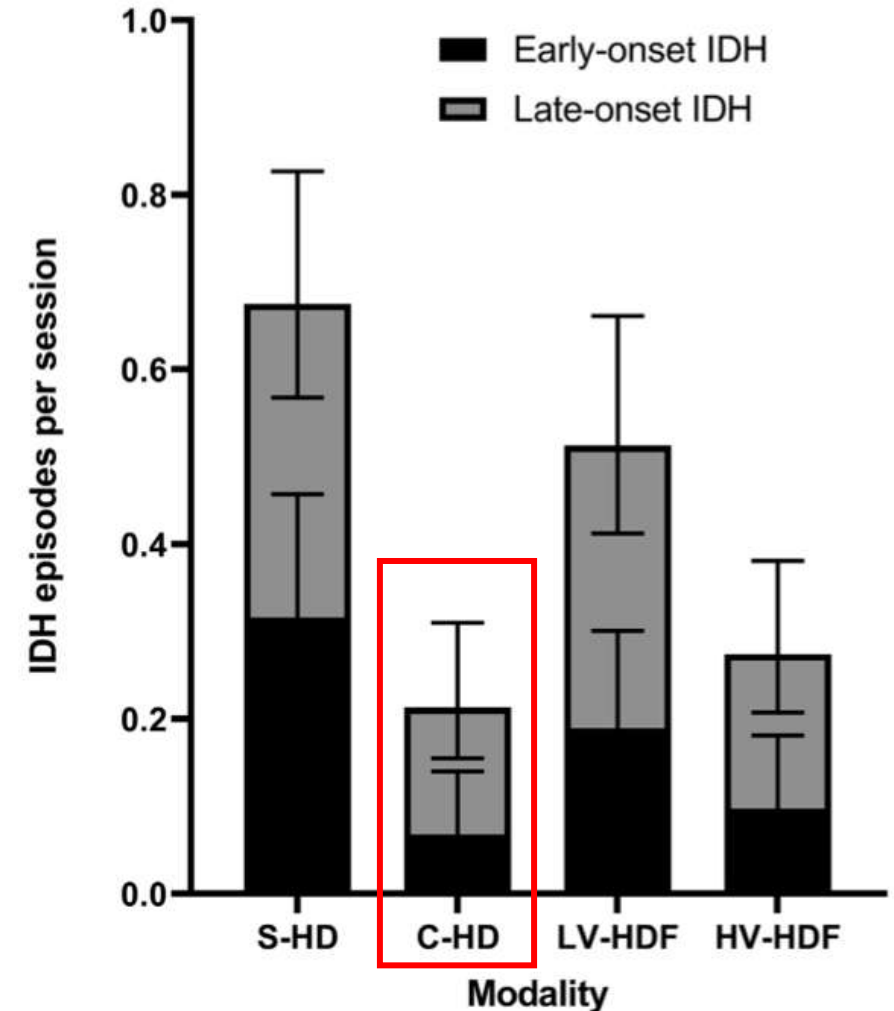
- HD standard : température du dialysat (Td) 36,5 °C
- **HD refroidie (C-HD) : Td 35,5 °C**
- HDF bas volume (LV-HDF) : Td 36,5 °C, volume convectif 15 L/
- HDF haut volume (HV-HDF) : Td 36,5 °C, volume convectif ≥ 23 L/

Table 2. Dialysis characteristics

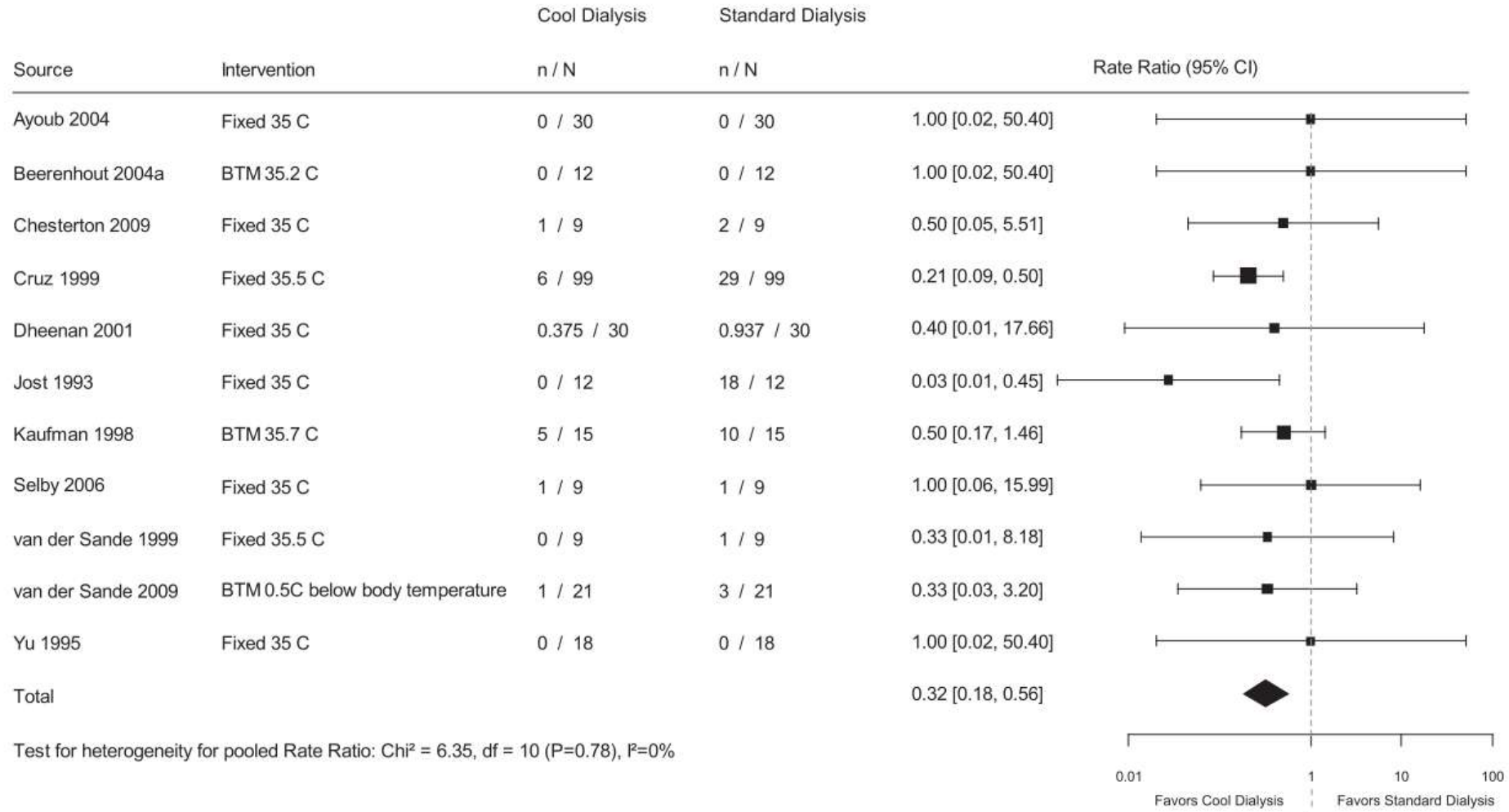
Modality	Blood flow (ml/min)	Dialysate flow (ml/min)	Total UF (l/session)	Total convection volume (l/session)
S-HD	339 ± 33	505 ± 11	2.3 ± 0.7	N/A
C-HD	332 ± 41	505 ± 13	2.4 ± 0.7	N/A
LV-HDF	339 ± 36	590 ± 19	2.3 ± 0.6	15.1 ± 1.3
HV-HDF	347 ± 27	594 ± 18	2.3 ± 0.7	22.6 ± 1.1

C-HD, cool hemodialysis; LV-HDF, low-volume hemodialysis; HV-HDF, high-volume hemodialysis; S-HD, standard hemodialysis; N/A= not applicable; UF, ultrafiltration.

Mean ± SD for blood flow, dialysate flow, total ultrafiltration volume; and total convection volume.



Effet de la dialyse à basse température sur l'hypotension intradialytique



Essai MyTemp : présentation générale

Does cooler dialysate reduce the risk of CVD death or hospital admission compared to standard temperature dialysate?

MyTemp trial



Methods



Pragmatic, open-label, cluster-randomized superiority trial



Ontario, Canada
84 iHD centers



April 3, 2017 –
March 31, 2021



N = 15413 patients

Intervention

Dialysate 0.5 -0.9 °C cooler than pre-dialysis body temperature



Mean = 35.8°C
N = 8000



Mean = 36.4°C
N = 7413

Results



1° outcome



CV related death or admission
1711 (21.4%)

HR 1.00 p=0.93
96% CI 0.89-1.11
Cooler vs. standard



1658 (22.4%)



2° outcome

mean drop in intradialytic systolic BP
26.6 mmHg

mean difference
-0.5 mmHg
p=0.14

27.1 mmHg

Conclusion: Centre-wide delivery of personalised cooler dialysate did not significantly reduce the risk of major cardiovascular events compared with standard temperature dialysate.

Reference: Garg et al. Personalised cooler dialysate for patients receiving maintenance haemodialysis: a pragmatic, cluster-randomised trial. *Lancet*, 2022, Vol.400 (10364), p.1693-1703. doi: 10.1016/S0140-6736(22)01805-0



Visual abstract by @thana_susan

Conclusion : hypotension

- La dialyse « froide »
 - Diminue les hypotensions intradialytiques
 - Semble diminuer les ischémies cérébrales et les atteintes morphologiques et fonctionnelles cardiaques
 - Ne diminue pas la mortalité cardiovasculaire dans les études disponibles
 - Altère le confort ressenti de la séance par les patients
- Absence de bénéfice de la dialyse « froide » systématique à l'échelle d'un centre (MyTemp)
- La dialyse froide (Td-0,5°C) garde une place dans une population sélectionnée (mauvaise tolérance hémodynamique)
- Intérêt de limiter l'augmentation de température corporelle au cours de la séance (ex. Modules BTM)