ANALYSE ET TRAITEMENT D'UNE HTA RESISTANTE

Docteur Guillaume BOBRIE

Service d'HTA - HEGP - Paris

OBJECTIFS TENSIONNELS : RECOMMANDATIONS

	Général	Diabète	I. rénale
JNC7, 2003	<140/90	<130/80	<130/80
WHO/ISH, 2003	<140	<130/80	
BHS, 2004	≤ 140/85	≤130/80	≤130/80
ANAES, 2005	<140/90	<130/80	<130/80
ESH/ESC, 2007	<140/90	<130/80	<130/80

Niveau tensionnel moyen et prévalence de l'hypertension artérielle chez les adultes de 18 à 74 ans, ÉNNS 2006-2007.

Godet-Thobie H et al. BEH 16 décembre 2008

Hommes	18-34 ans	35-44 ans	45-54 ans	55-64 ans	65-74 ans	18-74 ans	[IC95 %]
Mesure dans l'année (%)	68,3	86,4	96,5	92,7	97,5	86,5	[83,1-89,9]
Prévalence de l'HTA (%)	4,0	19,5	42,6	62,4	69,9	34,1	[29,8-38,4]
HTA connue* (%)	21,5	22,9	40,5	55,2	59,9	46,9	[39,4-54,5]
HTA connue traitée* (%)	**	55,7	60,3	85,5	91,4	77,4	[67,2-87,6]
HTA traitée contrôlée* (%)	**	**	46,8	43,5	33,9	41,8	[32,3-51,3]
Femmes	**18-34 ans**	**35-44 ans**	**45-54 ans**	**55-64 ans**	**65-74 ans**	**18-74 ans**	**[IC95 %]**
Mesure dans l'année (%)	87,5	88,1	89,5	93,6	95,7	90,2	[87,9-92,6]
Prévalence de l'HTA (%)	5,6	13,1	31,4	43,7	65,0	27,8	[24,7-30,8]
HTA connue* (%)	22,3	55,5	52,9	62,0	68,6	58,8	[52,4-65,2]
HTA connue traitée* (%)	**	60,8	78,4	91,5	94,9	86,6	[81,1-92,1]
HTA traitée contrôlée* (%)	**	**	64	59,4	49,6	58,5	[51,1-65,8]

* HTA connue= proportion d'hypertendus connus parmi les hypertendus.
HTA connue traitée= proportion d'hypertendus traités par médicaments à action antihypertensive parmi les hypertendus connus.
HTA traitée contrôlée= proportion d'hypertendus contrôlés parmi les hypertendus traités.
** Effectifs insuffisants.
Champ : France métropolitaine 18-74 ans.
Source : Étude ENNS, 2006-2007.

Outpatient Hypertension Treatment, Treatment Intensification, and Control in Western Europe and the United States.

Wang YR et al. Arch Intern Med. 2007; 167: 141-147.

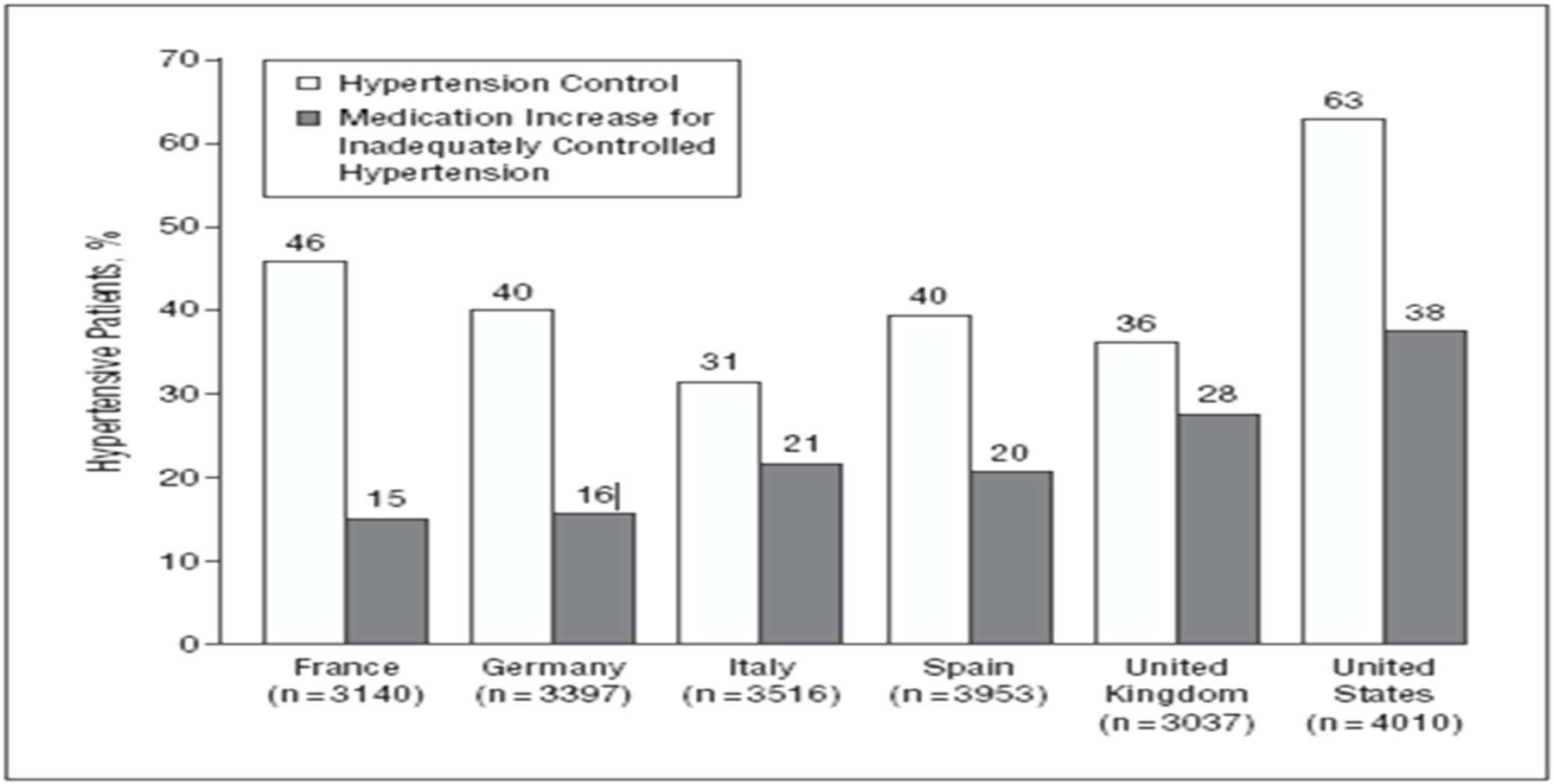
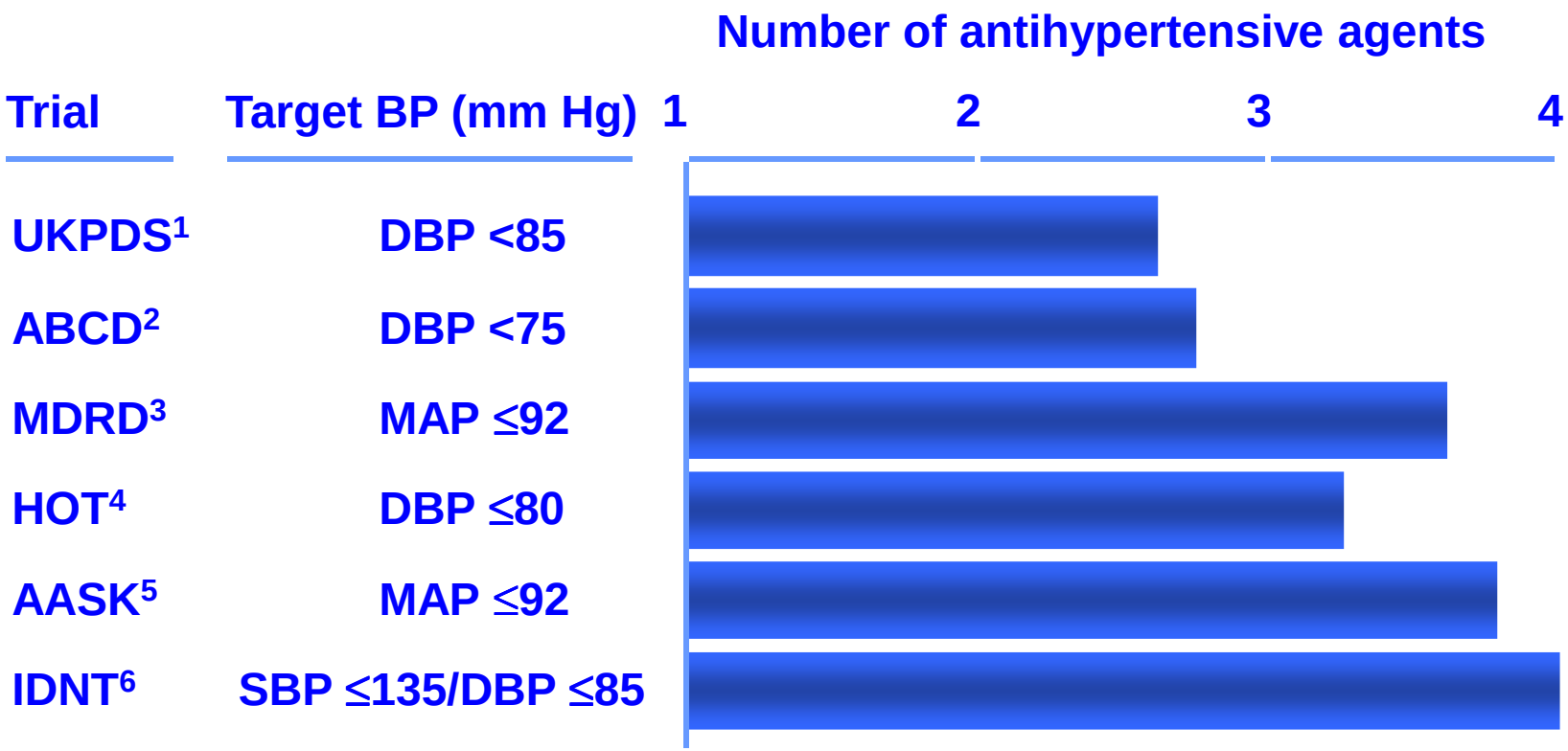


Figure 2. Cross-national differences in hypertension control (defined as a latest systolic blood pressure level of <140 mm Hg and a diastolic blood pressure level of <90 mm Hg) and medication increase for those with inadequately controlled hypertension.

Multiple Antihypertensive Agents Often Are Needed to Achieve Target BP



1. UKPDS 38. BMJ. 1998; 317: 703-713.
2. Estacio RO et al. Am J Cardiol. 1998; 82: 9R-14R.
3. Lazarus JM et al. Hypertension. 1997; 29: 641-650.
4. Hansson L et al. Lancet. 1998; 351: 1755-1762.
5. Kusek JW et al. Control Clin Trials.1996;16: 40S-46S.
6. Lewis EJ et al. N Engl J Med. 2001; 345: 851-860.

REFRACTORY HYPERTENSION: DEFINITIONS

• 2007 ESH-ESC guidelines for the management of arterial hypertension. *J Hypertens 2007; 25: 1105-1187.* **« When lifestyle measures and at least three drugs in adequate doses has failed to lower systolic and diastolic BP to goal. »**

• ESH recommendations for BP measurement. *J Hypertens 2003; 21: 821-48.*

« Clinical BP measurement consistently greater than 140/90 mmHg with three antihypertensive drugs… ».

• The Seventh Report of the Joint National Committee. *JAMA 2003; 289: 2560-72.* **« the failure to reach goal BP in patients who are adhering to full doses of an appropriate three-drug regimen that includes a diuretic. »**

• Diagnostic et prise en charge de l'HTA essentielle de l'adulte. *ANAES 2005*.

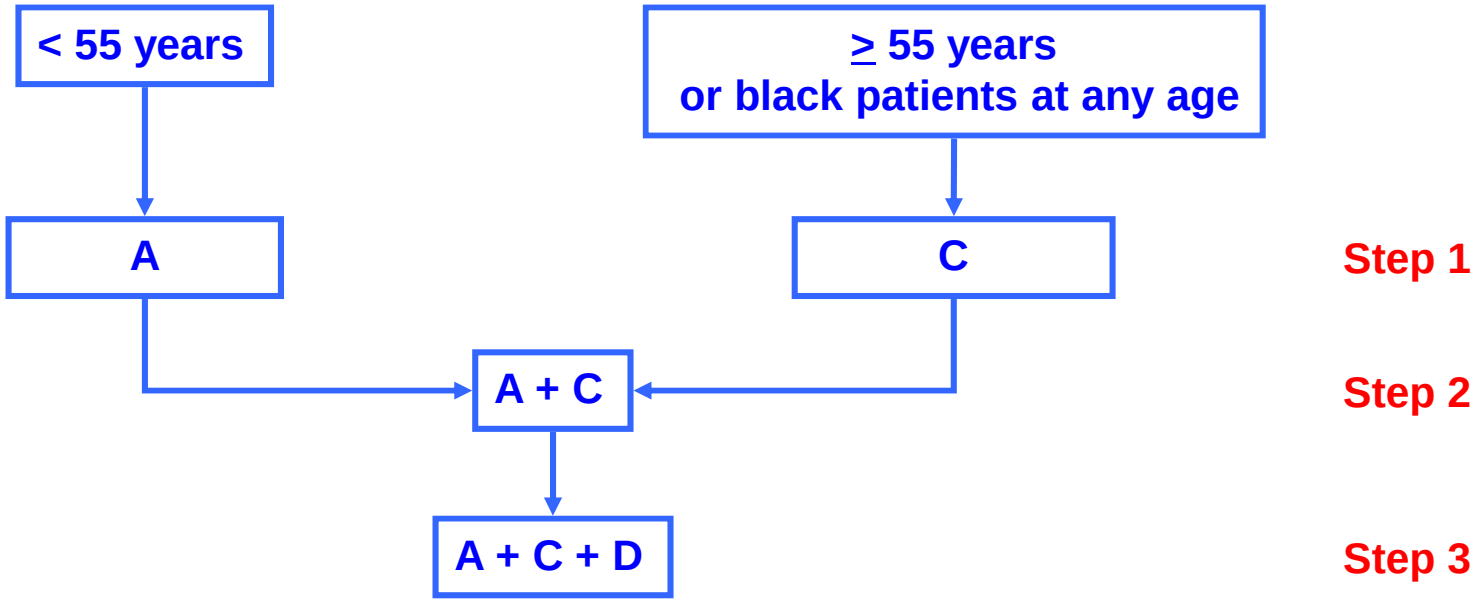
« PA restant au-dessus de la cible thérapeutique fixée (le plus souvent 140/90 mmHg) chez un patient traité par une association de 3 médicaments dont un diurétique ou parfois 2 médicaments antihypertenseurs à doses maximales ».

• Resistant Hypertension: Diagnosis, Evaluation, and Treatment. A Scientific Statement From the American Heart Association Professional Education Committee of the Council for High Blood Pressure Research. *Circulation.* 2008;117:e510-e526.

Resistant hypertension is defined as BP that remains above goal in spite of the concurrent use of 3 antihypertensive agents of different classes. Ideally, one of the 3 agents should be a diuretic and all agents should be prescribed at optimal dose amounts. Although arbitrary in regard to the number of medications required, resistant hypertension is thus defined in order to identify patients who are at high risk of having reversible causes of hypertension and/or patients who, because of persistently high blood pressure levels, may benefit from special diagnostic and therapeutic considerations. As defined, resistant hypertension includes patients whose blood pressure is controlled with use of more than 3 medications. That is, patients whose blood pressure is controlled but require 4 or more medications to do so should be considered resistant to treatment.

Management of hypertension: summary of NICE Guidance.

Krause T et al. BMJ 2011;343:bmj.d4891



A = ACE inhibitor or ARB. C = Calcium channel blocker. D = Thiazide-like diuretic **: chlortalidone (12.5-25.0 mg o.d) or indapamide (1.5 mg modified release o.d or 2.5 mg o.d), in preference to a conventional thiazide diuretic such as bendroflumethiazide or hydrochlorothiazide.**

Effects of intensive blood-pressure lowering and low-dose aspirin in patients with hypertension: principal results of the HOT randomised trial.

Hansson L et al. Lancet. 1998; 351: 1755-62.

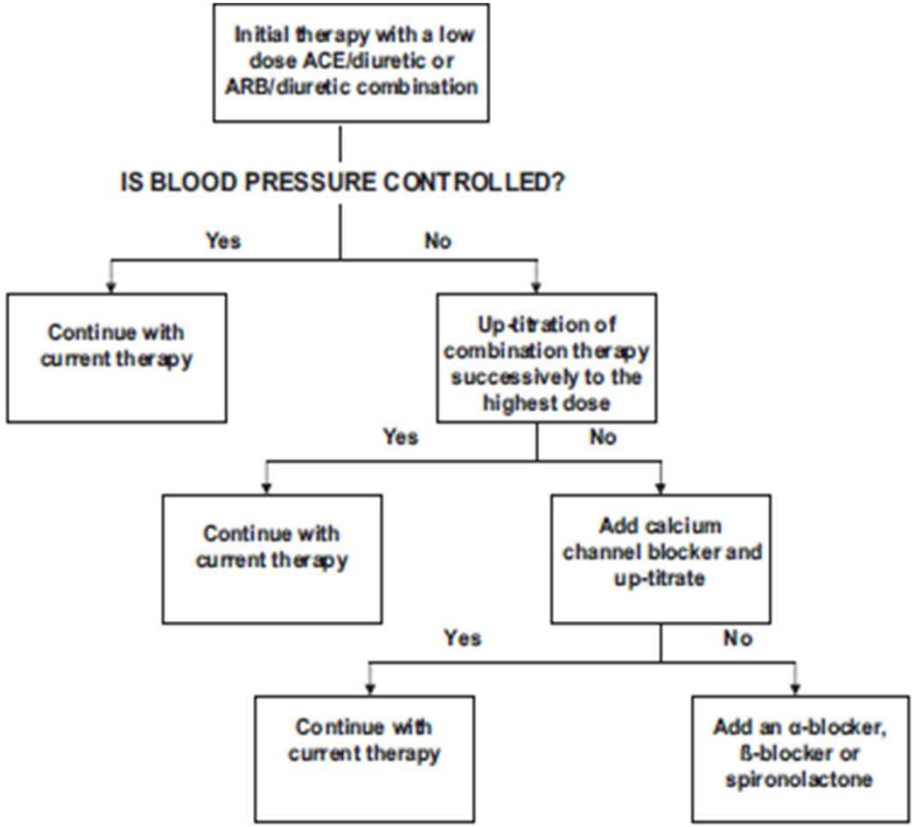
	DBP target group (mmHg)		
	≤ 90	≤ 85	≤ 80
n	6264	6264	6262
Baseline DBP (mmHg)	105.4 (3.4)	105.4 (3.4)	105.4 (3.4)
Difference DBP (mmHg)	20.3 (5.6)	22.3 (5.4)	24.3 (5.8)
Diuretics (step 5) (%)	19	22	24
final DBP > 90 mmHg (%)	12	7	6

A Simplified Approach to the Treatment of Uncomplicated Hypertension: A Cluster Randomized, Controlled Trial.

Feldman RD. et al. Hypertension 2009; 53: 646-653.

Table 2. Baseline Characteristics of the Practices and Patients

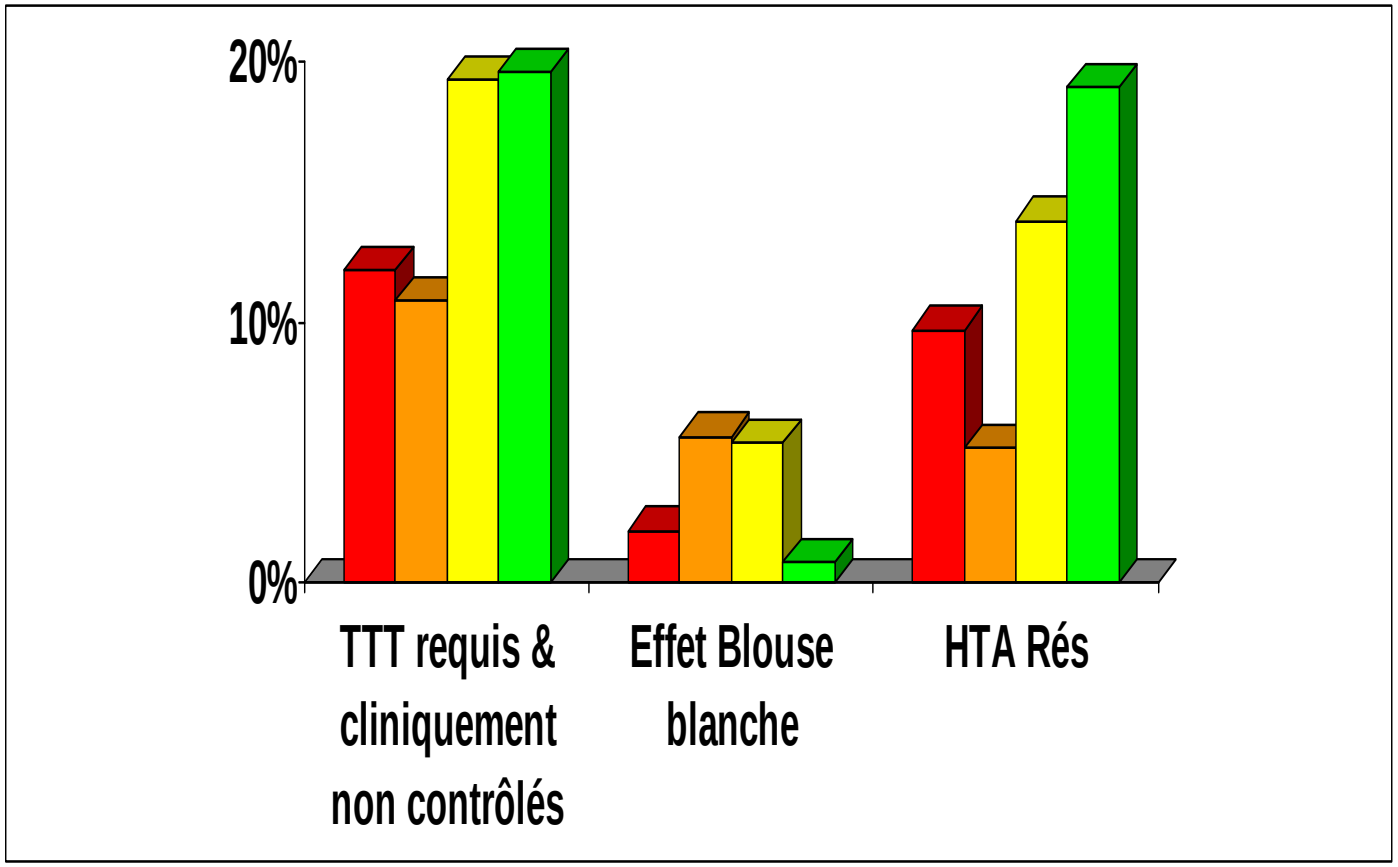
Practice/Patient Characteristics	Guideline Care	STITCH Care
Practices	27	18
Median cluster size (range)	46 (25 to 50)	46 (26 to 50)
Proportion of physicians graduated before 1984, n (%)	11 (40.7)	8 (44.4)
Mean recruitment duration by cluster, d	140	169
Urban location, n (%)	25 (92.6)	17 (94.4)
Men, n (%)	20 (74.1)	15 (83.3)
Patients		
No. of patients	1246	802
Recruitment duration, d	503	531
Age, mean (range), y	60.9 (18.6 to 93.0)	61.9 (20.4 to 92.8)
Women, %	53	56
Diabetic, %	15.9	15.1
Baseline SBP, mean (SD), mm Hg	153.4 (14.9)	155.1 (13.7)
Baseline DBP, mean (SD), mm Hg	87.7 (10.9)	88.1 (10.9)



Patients achieving target:
STITCH-care: 64.7%
Guidelines-care: 52.7%
absolute difference: 12.0% [1.5%- 22.4%]

(Simplified Treatment Intervention To Control Hypertension [STITCH])

HTA RESISTANTE AU TRAITEMENT
PREVALENCE



Uncontrolled and Apparent Treatment Resistant Hypertension in the United States,1988 to 2008.

Egan BM et al. Circulation.2011;124:1046-1058.

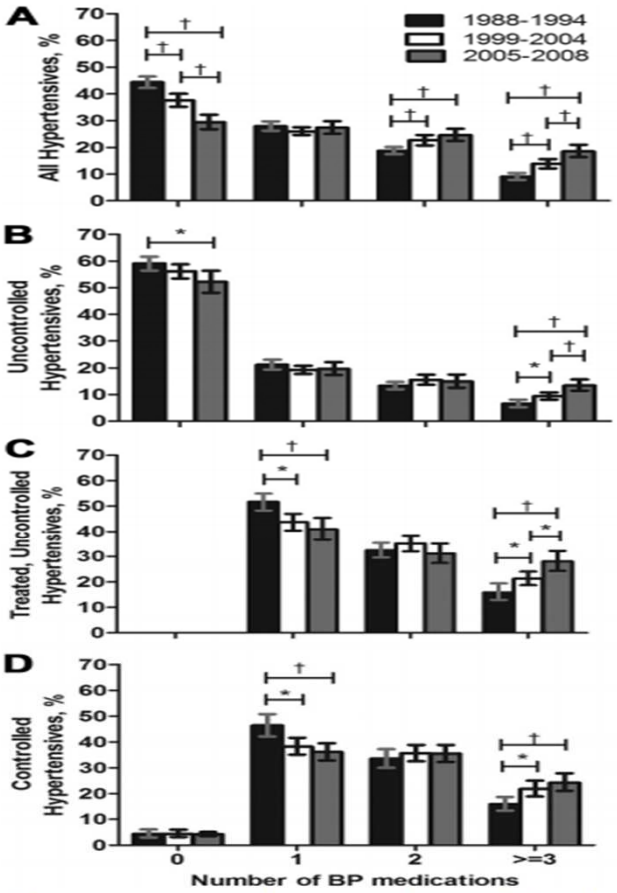


Figure 1. The percentages of hypertensive patients who reported taking 0, 1, 2, and ≥3 antihypertensive (blood pressure [BP]) medications for (**A**) all, (**B**) all uncontrolled, (**C**) treated uncontrolled, and (**D**) treated controlled patients in the different National Health and Nutrition Examination Survey (NHANESs). Symbols over a trio of columns indicate significant changes in the percentage of patients reportedly taking a given number of antihypertensive medications across the 3 NHANES time periods. *$P<0.01$; †$P<0.001$.

Prevalence of Resistant Hypertension in the United States, 2003–2008.

Persell SD. Hypertension 2011; 57: 1076-80.

Table 1. Classification of Adults With Hypertension in the United States

Classification	No. of Participants	Among All Hypertensive Adults, % (SE)	Among Drug-Treated Hypertensive Adults, % (SE)
Uncontrolled, no drug treatment	1520	30.7 (1.2)	
Controlled hypertension, ≤3 drugs	2035	40.8 (1.1)	58.9 (1.2)
Uncontrolled hypertension, ≤2 drugs	1136	19.6 (0.8)	28.3 (1.1)
Resistant hypertension, uncontrolled, ≥3 drugs or controlled ≥4 drugs	539	8.9 (0.6)	12.8 (0.9)

Uncontrolled indicates a mean systolic pressure of ≥140 or diastolic ≥90 mm Hg.

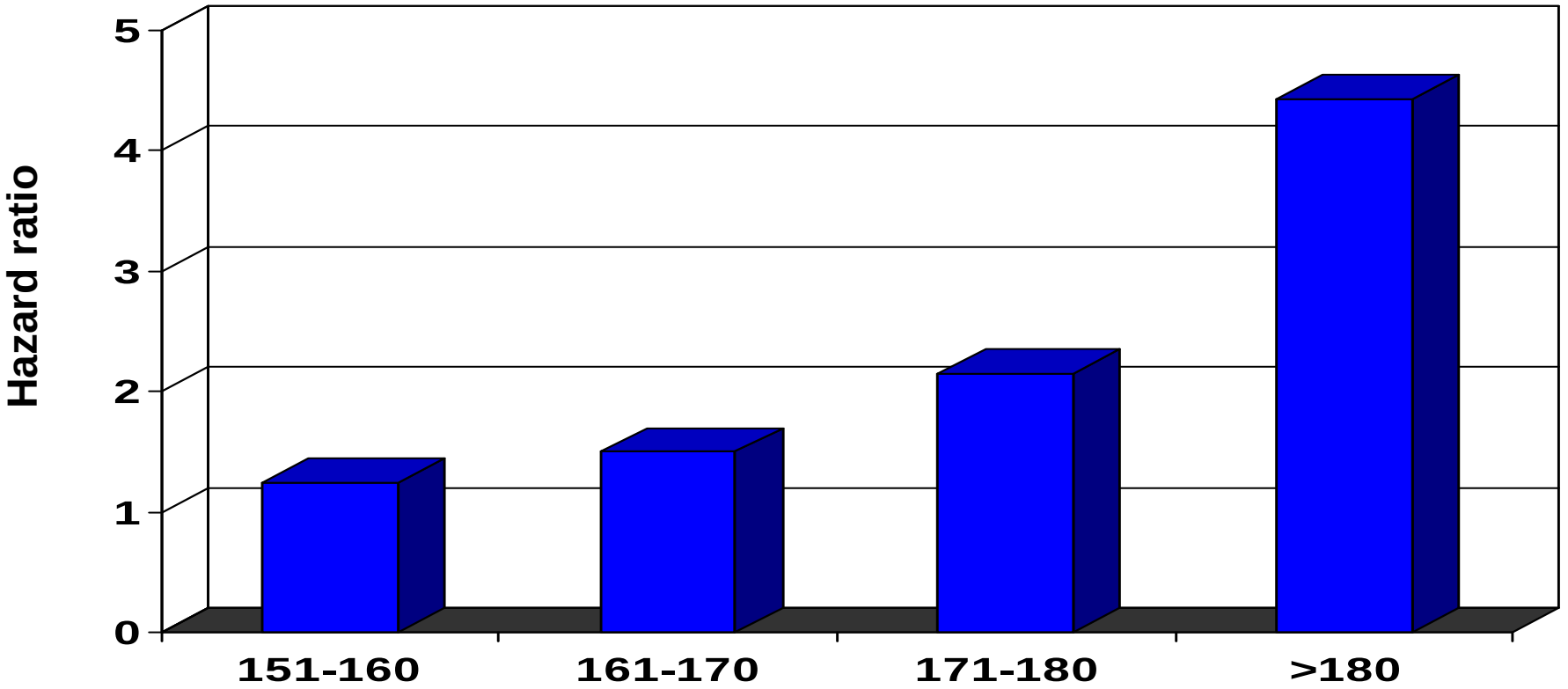
ANALYSE ET TRAITEMENT D'UNE HTA RESISTANTE

LE MALADE

Baseline predictors of resistant hypertension in the Anglo-Scandinavian Cardiac Outcome Trial (ASCOT): a risk score to identify those at high-risk.

Gupta AK et al. J Hypertens 2011; 29: 2004–2013

Predictors of development of resistant hypertension among 3666 previously untreated (or newly diagnosed) hypertensive patients



Prevalence of Resistant Hypertension in the United States, 2003–2008.

Persell SD. Hypertension. 2011;57:1076-1080.

Table 2. Drug-Treated Hypertension Among Adults in the 2003–2008 National Health and Nutrition Examination Survey

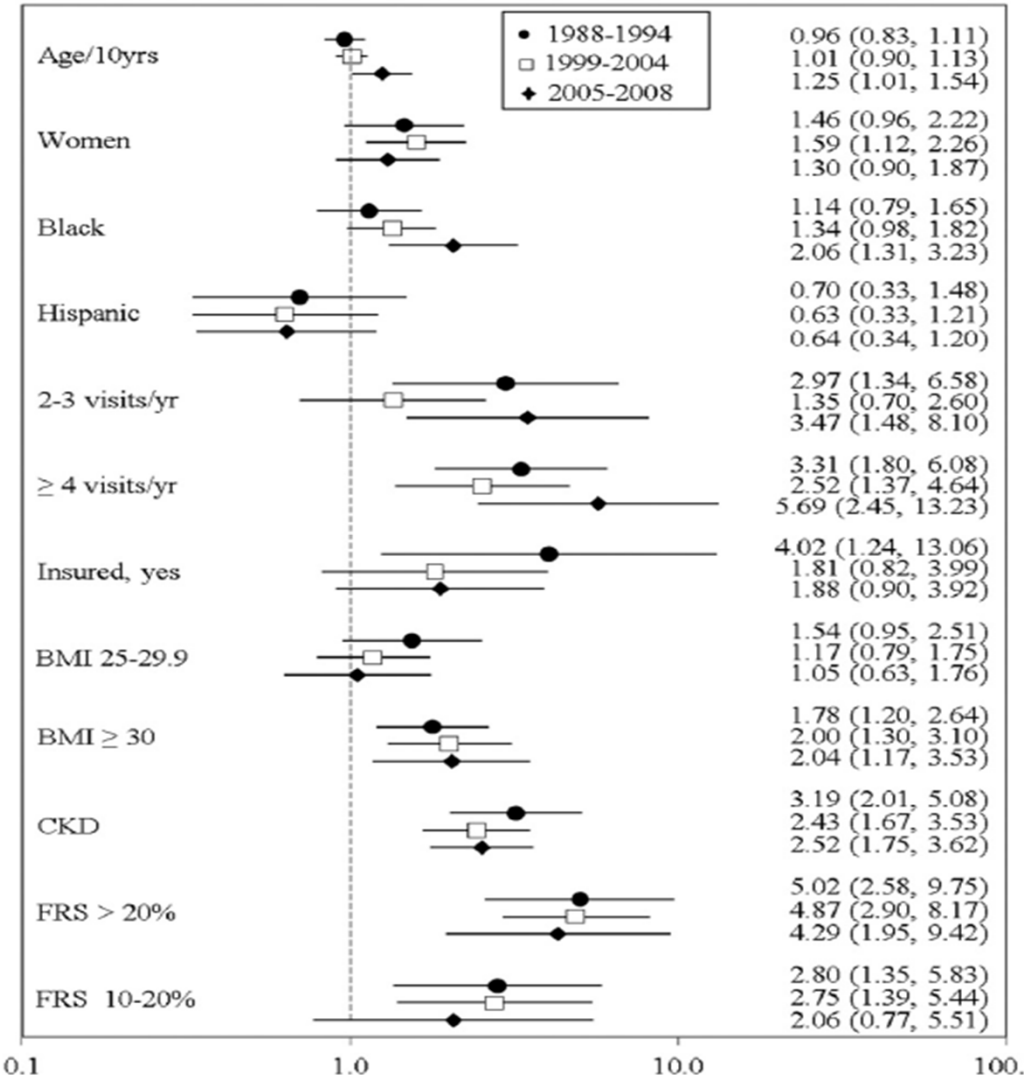
Characteristic	Resistant Hypertension, Uncontrolled, ≥3 Drugs or Controlled ≥4 Drugs (N= 539)	Uncontrolled Hypertension, ≤2 Drugs (N=1136)	P*	Controlled Hypertension, ≤3 Drugs (N=2035)	P*
Age in y, mean	66.4 (0.9)	64.7 (0.5)	0.1	59.5 (0.5)	<0.001
Women, %	53.8 (2.4)	59.2 (1.8)	0.07	53.8 (1.3)	0.9
Race/ethnicity, %			0.02		0.002
Mexican American	1.9 (0.6)	4.4 (1.1)		3.5 (0.7)	
White, non-Hispanic	72.6 (2.8)	75.9 (2.9)		77.8 (1.9)	
Black, non-Hispanic	18.5 (2.3)	13.7 (2.0)		12.6 (1.5)	
Other/multiracial	7.1 (1.7)	6.0 (0.9)		6.0 (0.9)	
Body mass index in kg/m^2, mean†	32.4 (0.5)	29.7 (0.2)	<0.001	31.0 (0.2)	0.01
Estimated GFR in mL/min, mean‡	69.1 (1.5)	78.9 (0.9)	<0.001	80.2 (0.7)	<0.001
Estimated GFR <60 mL/min, %‡	33.7 (2.6)	19.4 (1.6)	<0.001	16.5 (0.9)	<0.001
Serum potassium, mmol/L, %‡	4.03 (0.02)	4.00 (0.01)	0.4	4.00 (0.01)	0.4
Albumin:creatinine ratio, %§			<0.001		<0.001
<30 mg/g	61.0 (2.1)	75.8 (1.5)		86.8 (0.8)	
30 to 300 mg/g	26.2 (2.3)	20.1 (1.4)		11.3 (0.8)	
>300 mg/g	12.8 (2.2)	4.1 (0.7)		1.9 (0.3)	
Coronary heart disease, %	22.0 (2.6)	12.1 (1.6)	<0.001	9.4 (1.2)	<0.001
Heart failure, %	10.0 (2.0)	3.9 (0.8)	<0.001	4.1 (0.5)	<0.001
Diabetes mellitus, %	35.2 (2.6)	20.2 (1.1)	<0.001	20.0 (1.0)	<0.001
Stroke, %	10.1 (1.7)	5.8 (0.8)	0.02	3.8 (0.5)	<0.001

Uncontrolled and Apparent Treatment Resistant Hypertension in the United States, 1988 to 2008.

Egan BM. Circulation. 2011;124:1046-1058

The independent relationships between selected clinical variables and the dependent variable, apparent treatment-resistant hypertension (uncontrolled on 3 BP medications), as multivariable odds ratios and 95% confidence intervals for the 3 National Health and Nutrition Examination Survey periods.

The reference group is all uncontrolled hypertensive patients.



ADHERENCE TO MEDICATION

Osterberg L, Blaschke T. N Engl J Med 2005; 353: 487-97.

"Drugs don't work in patients who don't take them". **C. Everett Koop.**

Major Predictors of Poor Adherence to Medication

- Presence of psychological problems, particularly depression
- Presence of cognitive impairment
- **Treatment of asymptomatic disease**
- Inadequate follow-up or discharge planning
- **Side effects of medication**
- **Patient's lack of belief in benefit of treatment**
- Patient's lack of insight into the illness
- Poor provider–patient relationship
- Presence of barriers to care or medications
- Missed appointments
- **Complexity of treatment**
- Cost of medication, copayment, or both

Adherence to Medication

Osterberg L, Blaschke T. N Engl J Med 2005; 353: 487-97.

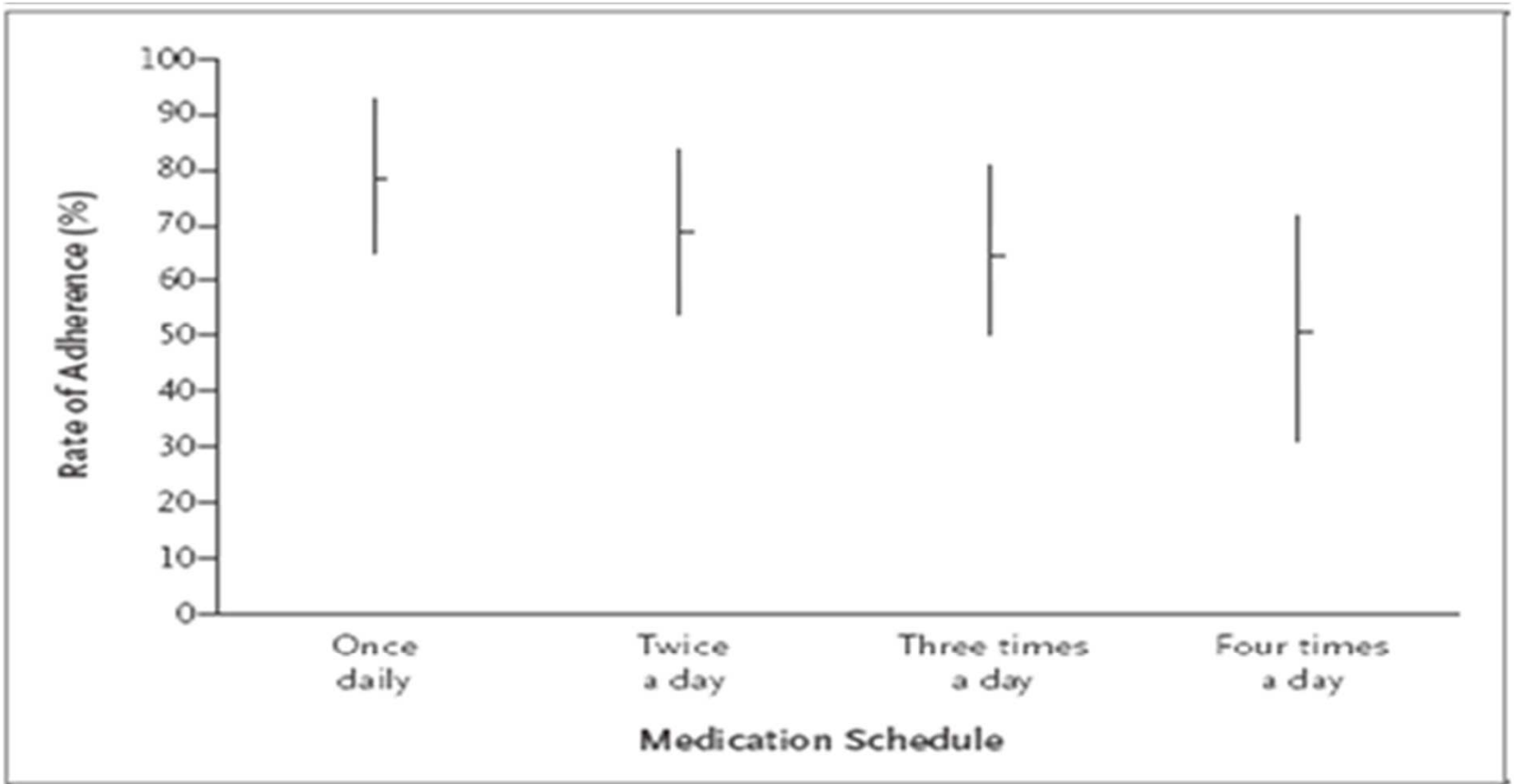


Figure 1. Adherence to Medication According to Frequency of Doses.

Vertical lines represent 1 SD on either side of the mean rate of adherence (horizontal bars). Data are from Claxton et al.[7]

Electronic monitoring of patient adherence to oral antihypertensive medical treatment: a systematic review.

Christensen A et al. J Hypertens 2009; 27: 1540–1551.

Table 2 Studies with feedback of electronic monitoring data to patients aiming to improve adherence

Reference	Participants receiving feedback (*n*)	Study length (weeks)	Adherence measures (%)	BP (mmHg)**	Change in BP during intervention (mmHg)
Baulmann *et al.* [30]	1	>20	Dosing b 50, a 91; timing b 17, a 76	b 190/80, a 137/71	−53/−9
Bertholet *et al.* [31]	69	4-9	Dosing 92	b 159/104, a 143/92; BP normalized in 33% of patients	−16/−12 ($P = 0.001$)
Braam *et al.* [35]	30	24	Taking, cutoff 80:86	b 158/105, a 148/97	−10/−8 (<0.05)
Burnier *et al.* [36]	37	13–22	Dosing >90	b 156/106, a 145/97	−11/−9 ($P < 0.01$)
Chiolero *et al.* [37]	1	>56	Taking 0–90	b 188/102, a 136/76	−52/−26
Kruse *et al.* [49]	24	30	Taking 89, 2/d 88; dosing 85, 2/d 80	Improved compliance led to reduced BP	Reduced
Mengden *et al.* [60]	24	12	Taking b 91, a 100; dosing b 78, a 97	SBPM b 154/84, a 145/80	−9/−4 ($P < 0.01$)
Santschi *et al.* [67]***	21 (34)	52	Taking 97% throughout	Various	
Wetzels *et al.* [76]***	164	8	Refill b 81, dosing a 95	b 169/96, a 153/86; 3.1% patients had normalized B intervention group; more escalations in usual care	
Mean	46.6	22			

Adjusted average BP reduction: −13.6/−9.7***

A Systematic Review of the Effects of Home Blood Pressure Monitoring on Medication Adherence.

Ogedegbe G and Schoenthaler A. J Clin Hypertens. 2006; 8: 174–180.

Table I. Characteristics of Studies Included in the Systematic Review

Study (year)	Duration of Intervention	N	Completed Follow-Up (%)		Adherence Measure	Statistical Improvement in Adherence
			Intervention	Control		
Bailey et al.[6] (1999)	8 wk	62	97	97	Pill count	No
Binstock et al.[8] (1988)	1 yr	111	100	100	Self-report	No
Friedman et al.[11] (1996)	6 mo	267	85	92	Pill count	Yes
Haynes et al.[13] (1976)	6 mo	38	100	95	Pill count	Yes
Girvin et al.[12] (2004)	6 mo	136	97	97	Pill count	No
McKenney et al.[15] (1992)	24 wk	67	94	97	Electronic monitoring device	Yes
Mehos et al.[16] (2000)	6 mo	36	98	97	Pharmacy records	No
Ogbuokiri[18] (1980)	5 mo	24	79*		Pill count	Yes
Rudd et al.[19] (2004)	6 mo	150	94	91	Electronic monitoring device	Yes
Vrijens and Goetghebeur[22] (1997)	6 wk	628	n/a	n/a	Electronic monitoring device	Yes
Zarnke et al.[23] (1997)	8 wk	31	100	98	Self-report	No

n/a=not applicable; *lost to follow-up not differentiated among conditions

Of the 11 RCTs, six (54%) reported statistically significant improvement in medication adherence attributed to the intervention. Five of these six studies were complex interventions.

Influence of Weight Reduction on Blood Pressure
A Meta-Analysis of Randomized Controlled Trials

Neter J et al. Hypertension. 2003; 42: 878-884.

An average net weight reduction of 5.1 kg was associated with a reduction in SBP of 4.44 mm Hg (95% CI, 5.93-2.95) and in DBP of 3.57 mm Hg (95% CI, 4.88-2.25).

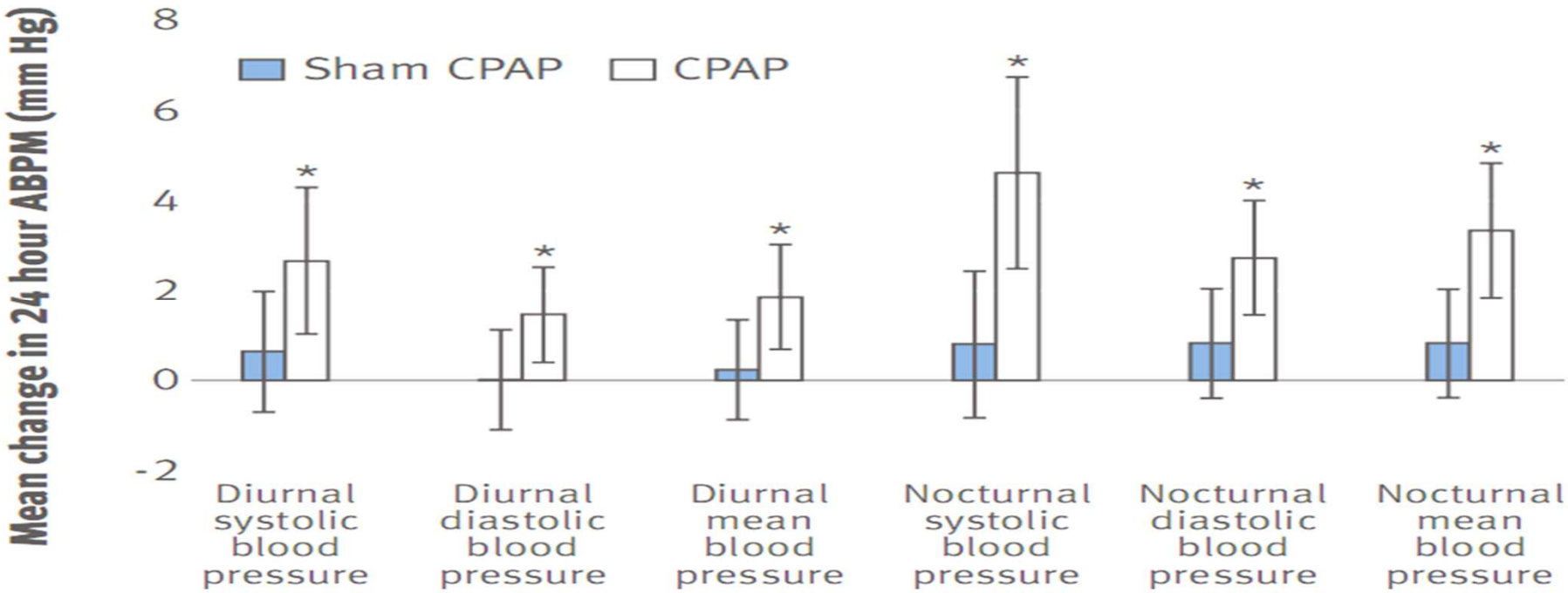
TABLE 2. Changes in SBP and DBP in 25 RCTs of Weight Reduction and BP, Overall and in Subgroups

		SBP, mm Hg†		DBP, mm Hg†	
Stratum	No. of Strata*	Unadjusted	Adjusted‡	Unadjusted	Adjusted‡
Overall	34	−4.44 (−5.93; −2.95)	−4.78 (−5.76; −3.80)	−3.57 (−4.88; −2.25)	−3.56 (−4.31; −2.81)
Age					
≤45 years	15	−4.19 (−6.19; −2.20)	−4.74 (−6.35; −3.12)	−3.17 (−5.04; −1.31)	−3.69 (−4.96; −2.43)
>45 years	19	−4.74 (−6.95; −2.52)	−4.80 (−6.48; −3.13)	−3.94 (−5.76; −2.12)	−3.43 (−4.63; −2.23)
Gender					
<50% females	21	−4.75 (−6.54; −2.97)	−5.05 (−6.10; −3.99)	−4.04 (−5.61; −2.48)	−3.89 (−4.66; −3.12)
≥50% females	13	−3.74 (−6.40; −1.07)	−3.91 (−5.69; −2.13)	−2.53 (−4.82; −0.24)	−2.50 (−3.93; −1.08)
Hypertension§					
No	17	−4.08 (−6.01; −2.16)	−4.46 (−5.71; −3.21)	−2.35 (−4.05; −0.65)	−2.62 (−3.83; −1.42)
Yes	17	−4.95 (−7.25; −2.64)	−4.73 (−6.40; −3.06)	−4.92 (−6.73; −3.12)	−4.36 (−5.72; −3.00)
Race‖					
White	14	−3.19 (−4.79; −1.59)	...	−2.50 (−3.00; −1.99)	...
Black	4	−4.67 (−8.86; −0.49)	...	−3.08 (−4.92; −1.23)	...
Asian	4	−8.77 (−11.91; −5.64)	...	−9.81 (−11.17; −8.44)	...
Intervention					
Energy restriction	19	−4.93 (−6.84; −3.02)	−4.33 (−5.70; −2.97)	−4.25 (−5.95; −2.55)	−2.84 (−3.80; −1.87)
Physical activity	8	−1.73 (−5.14; 1.69)	−4.74 (−7.60; −1.88)	−1.93 (−5.07; 1.22)	−4.65 (−6.84; −2.45)
Combined intervention	7	−5.15 (−7.78; −2.51)	−5.66 (−7.52; −3.81)	−3.12 (−5.60; −0.64)	−4.44 (−5.68; −3.19)
Initial BMI					
<30 kg/m^2	15	−4.14 (−4.95; −3.33)	−4.59 (−5.70; −3.49)	−2.61 (−3.29; −1.93)	−3.11 (−4.01; −2.21)
≥30 kg/m^2	13	−4.09 (−4.87; −3.31)	−4.05 (−5.06; −3.05)	−2.75 (−3.39; −2.11)	−2.77 (−3.50; −2.04)
Weight reduction					
≤5 kg	16	−2.44 (−4.38; −0.49)	−2.70 (−4.59; −0.81)	−1.97 (−3.71; −0.21)	−2.01 (−3.47; −0.54)
>5 kg	18	−6.24 (−8.06; −4.41)	−6.63 (−8.43; −4.82)	−4.97 (−6.62; −3.31)	−5.12 (−6.48; −3.75)
Antihypertensive drugs¶					
No	26	−3.77 (−5.33; −2.22)	−4.11 (−5.23; −3.00)	−2.97 (−4.39; −1.55)	−2.91 (−3.66; −2.16)
Yes	8	−7.00 (−10.02; −3.95)	−6.70 (−8.71; −4.69)	−5.49 (−8.06; −2.93)	−5.31 (−6.64; −3.99)

Continuous positive airway pressure as treatment for systemic hypertension in people with obstructive sleep apnoea: randomised controlled trial.

Duran-Cantolla J. BMJ 2010; 341: c5991

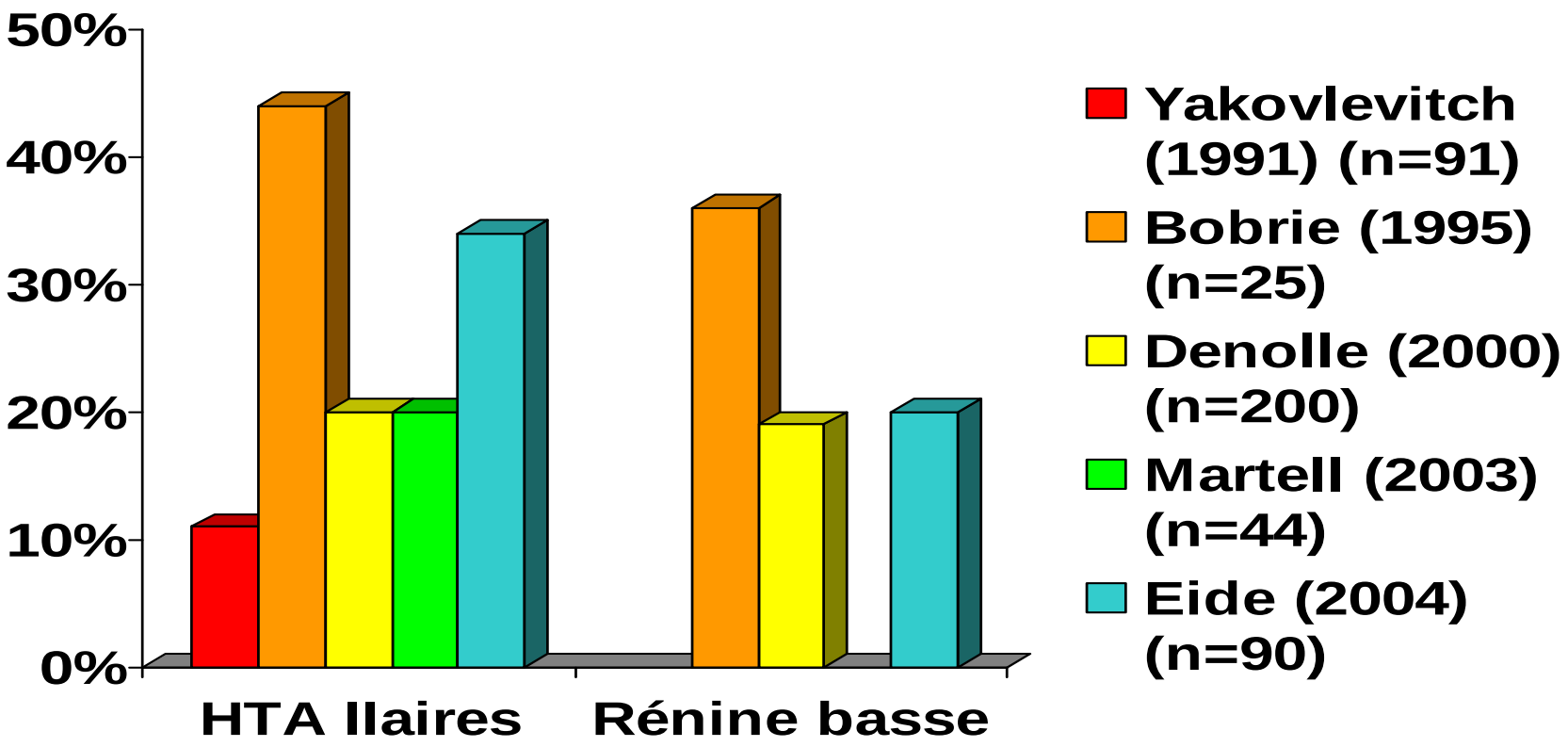
340 patients recently diagnosed as having hypertension (≥140 and/or 80mmHg) and an apnoea-hypopnoea index of >15 events/hour of sleep.
CPAP (n=169) or sham CPAP(n=171) for three months.
277(81%) men; mean age 52.4(SD10.5) years, BMI 31.9(5.7), Epworth sleepiness scale score of 10.1(4.3), apnoea-hypopnoea index of 43.5(24.5).



ANALYSE ET TRAITEMENT D'UNE HTA RESISTANTE

LA MALADIE HYPERTENSIVE

HTA RESISTANTE AU TRAITEMENT
HTA SECONDAIRES



NEPHROPATHIE ET I. RENALE

STENOSE ARTERIELLE RENALE

HAP & HYPERCORTICISME & PHEOCHROMOCYTOME

Lifestyle interventions to reduce raised blood pressure: a systematic review of randomised controlled trials.

Dickinson HO et al. J Hypertens 2006; 24: 215–233.

	Net reduction in blood pressure (mmHg)													
			Systolic blood pressure (SBP)				Diastolic blood pressure (DBP)				Withdrawals[a]			
Type of intervention	*n*	*N*	MD	(95% CI)	I^2	Size, *P*	MD	(95% CI)	I^2	Size, *P*	*n*	RD	(95% CI)	I^2
Diet	14	1339	−6.0	(−8.6 to −3.4)	72%	0.49	−4.8	(−6.9 to −2.7)	81%	0.25	12	0.04	(−0.02 to 0.09)	65%
Diet (excl. [28])	13	1256	−5.0	(−7.0 to −3.1)	52%	0.81	−3.7	(−5.1 to −2.4)	52%	0.59	12	0.04	(−0.02 to 0.09)	65%
Exercise	21	1346	−6.1	(−10.1 to −2.1)	87%	0.57	−3.0	(−4.9 to −1.1)	74%	0.45	17	0.03	(−0.01 to 0.08)	19%
Exercise (excl. [49])	20	1270	−4.6	(−7.1 to −2.0)	65%	0.13	−2.4	(−4.0 to −0.7)	58%	0.21	16	0.04	(−0.01 to 0.08)	26%
Relaxation	23	1231	−4.0	(−6.4 to −1.6)	62%	0.93	−3.1	(−4.7 to −1.5)	70%	0.68	12	0.04	(−0.01 to 0.09)	38%
Alcohol restriction	4	305	−3.8	(−6.1 to −1.4)	0%	0.71	−3.2	(−5.0 to −1.4)	0%	0.73	1	−0.09	(−0.25 to 0.08)	*
Sodium restriction	7	491	−4.7	(−7.2 to −2.2)	59%	0.21	−2.5	(−3.3 to −1.8)	5%	0.002	3	0.02	(−0.09 to 0.13)	4%
Sodium restriction (excl. [94])	6	450	−3.6	(−4.6 to −2.5)	0%	0.43	−2.5	(−3.2 to −1.7)	4%	0.008	3	0.02	(−0.09 to 0.13)	4%
Combined interventions	6	374	−5.5	(−8.8 to −2.3)	51%	0.41	−4.5	(−6.9 to −2.0)	53%	0.70	5	0.05	(−0.02 to 0.13)	12%
Calcium supplements	13	461	−2.5	(−4.4 to −0.6)	42%	0.90	−0.8	(−2.1 to 0.4)	48%	0.64	4	0.00	(−0.06 to 0.06)	0%
Magnesium supplements	12	527	−1.3	(−4.0 to 1.5)	62%	0.14	−2.2	(−3.4 to −0.9)	47%	0.78	8	0.00	(−0.04 to 0.03)	0%
Potassium supplements	5	398	−11.3	(−25.2 to 2.7)	98%	0.57	−5.0	(−12.4 to 2.4)	99%	0.23	3	−0.02	(−0.07 to 0.02)	0%
Potassium suppl. (excl. [133])	4	350	−3.9	(−8.6 to 0.8)	73%	0.96	−1.5	(−6.2 to 3.1)	96%	0.26	3	−0.02	(−0.07 to 0.02)	0%
Fish oil supplements	8	375	−2.3	(−4.3 to −0.2)	0%	0.10	−2.2	(−4.0 to −0.4)	34%	0.03	5	0.02	(−0.04 to 0.07)	28%

n, Number of included trials; *N*, number of participants assessed; MD, mean difference between treatment and control; CI, confidence interval; I^2, % of variation between trials not explained by sampling variation [11]; Size, *P*, *P* value for relationship between treatment effect and size of trial [12]; RD, risk difference. *, Not enough trials. [a]For parallel trials only.

Resistant Hypertension.
Comparing Hemodynamic Management to Specialist Care.

Taler SJ et al. Hypertension 2002; 39: 982-988.

104 resistant hypertension patients randomized to drug selection:
• based on serial hemodynamic measurements (thoracic bioimpedance) and a predefined algorithm,
• directed by a hypertension specialist,
in a 3-month intensive treatment program.

Cardiac index	Systemic vascular resistance index	Medication choices
low	high	1. Add or increase C, A or direct vasodilator 2. Reduce B 3. Evaluate Δ TBI: if reduced, add or intensify D
high	low	1. Add B or central agonist 2. Reduce vasodilators 3. Evaluate ΔTBI: if reduced, add or intensify D
normal	normal	Evaluate ΔTBI: if reduced, add or intensify D

Resistant Hypertension.
Comparing Hemodynamic Management to Specialist Care.

Taler SJ et al. Hypertension 2002; 39: 982-988.

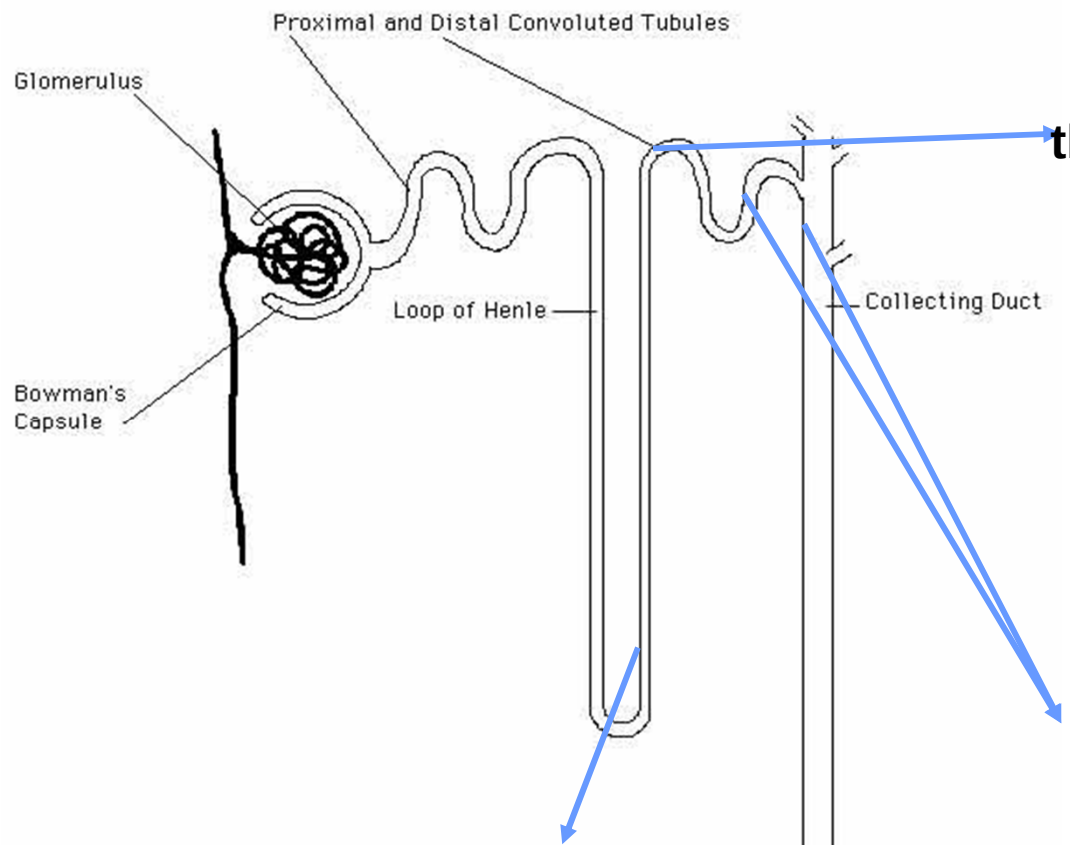
	Hemodynamic care	p	Specialist care
n	50		54
Age, y	67±2		64±2
BMI, kg/m²	31.4±1.0		32.7±1.2
Diabetes mellitus	16 (32)		18 (33)
BP, mmHg	169±3 / 87±2		173±3 / 91±2
HR, bpm	66±1	*	72±2
No. of medications	3.6±0.1		3.6±0.1
DDD	1.1±0.1		1.2±0.2
obstructive sleep apnea	9 (18)		11 (20)
	After 3 months of treatment		
BP, mmHg	139±2 / 72±1	*/*	147±2 / 79±1
Control ≤ 140/90 mmHg	28 (56)	*	18 (33)
No. of medications	4.3±0.1	*	4.1±0.1
DDD	2.1±0.2	*	1.4±0.1

Addition of Spironolactone in Patients With Resistant Arterial Hypertension (ASPIRANT). A Randomized Double-Blind Placebo-Controlled Trial.

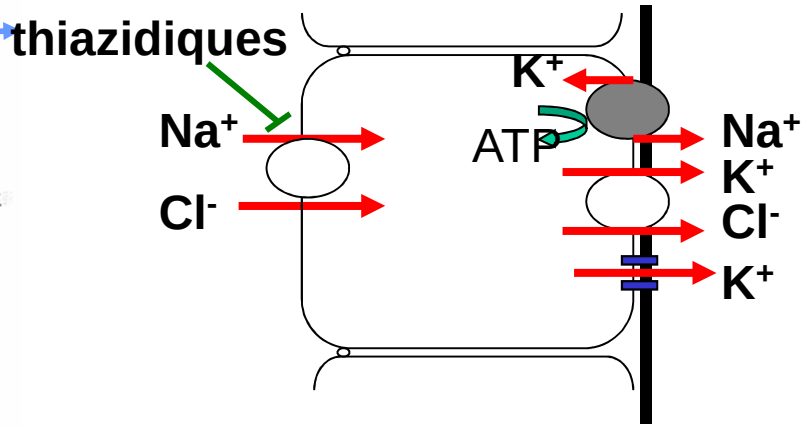
Vaclavík J. et al. Hypertension 2011; 57: 1069-1075.

Table 2. Change of Patient Characteristics at 8 Weeks Compared to Baseline

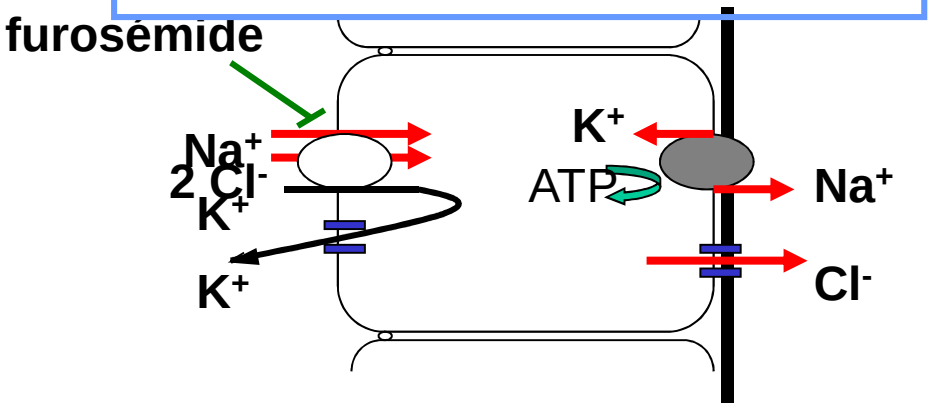
Patient Characteristics	Spironolactone (n=55)	Placebo (n=56)	Between-Group Difference*	P†
Systolic BP				
ABPM daytime systolic BP, mm Hg	−9.3 (±12.6)	−3.9 (±12.1)	−5.4 (−10.0; −0.8)	0.024
ABPM nighttime systolic BP, mm Hg	−11.2 (±17.6)	−2.6 (±17.7)	−8.6 (−15.2; −2.0)	0.011
24-h ABPM systolic BP, mm Hg	−13.8 (±11.8)	−4.0 (±12.7)	−9.8 (−14.4; −5.2)	0.004
Office systolic BP, mm Hg‡	−14.6 (±15.6)	−8.1 (±14.8)	−6.5 (−12.2; −0.8)	0.011
Diastolic BP				
ABPM daytime diastolic BP, mm Hg	−4.2 (±8.0)	−3.2 (±8.2)	−1.0 (−4.0; 2.0)	0.358
ABPM nighttime diastolic BP, mm Hg	−5.6 (±10.5)	−2.6 (±11.0)	−3.0 (−7.0; 1.0)	0.079
24-h ABPM diastolic BP, mm Hg	−4.2 (±7.0)	−3.2 (±7.7)	−1.0 (−3.7; 1.7)	0.405
Office diastolic BP, mm Hg‡	−6.6 (±9.6)	−4.1 (±8.6)	−2.5 (−5.9; 0.9)	0.079
Pulse Pressure§				
ABPM daytime pulse pressure, mm Hg	−5.1 (±8.4)	−0.7 (±8.3)	−4.4 (−7.5; −1.3)	0.007
ABPM nighttime pulse pressure, mm Hg	−5.6 (±12.9)	0.0 (±10.4)	−5.6 (−10.0; −1.2)	0.005
24-h ABPM pulse pressure, mm Hg	−6.5 (±7.2)	−0.8 (±7.6)	−5.7 (−8.5; −2.9)	<0.001
Office pulse pressure, mm Hg‡	−8.0 (±11.2)	−4.0 (±11.8)	−4.0 (−8.3; 0.3)	0.056
Other Characteristics				
Weight, kg	0.3 (±1.6)	0.5 (±2.6)	−0.2 (−1.0; 0.6)	0.772
Serum Na, mmol/L	−1 (−6; 3)	−1 (−5; 4)	0.0	0.135
Serum K, mmol/L	0.3 (−0.5; 1.5)	0.0 (−0.8; 0.6)	0.3	<0.001
Serum creatinine, μmol/L	7 (−11; 22)	0 (−11; 18)	7.0	<0.001
Microalbuminuria, mg/day	−4.4 (−257.0;11.0)	0.0 (−87.0; 98.0)	−4.4	0.023
Proteinuria, g/day	0.0 (−0.5; 0.1)	0.0 (−0.3; 1.7)	0.0	0.221



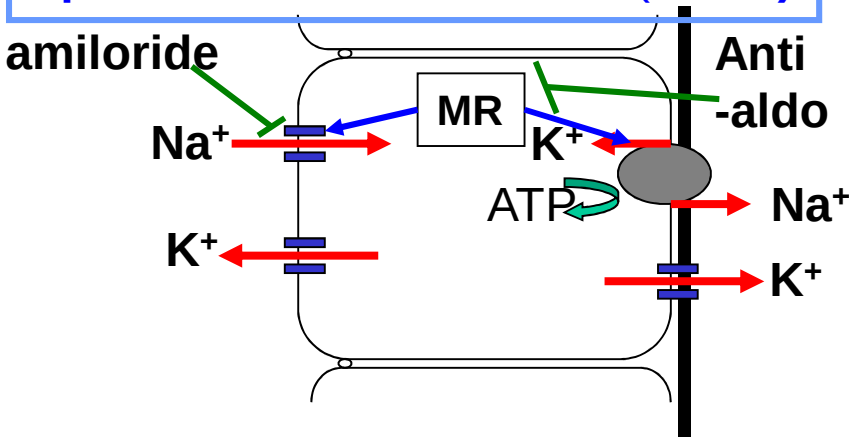
Na^+Cl^- Co-transporter (NCC)



$Na^+K^+Cl^-$ Co-transporter (NKCC2)

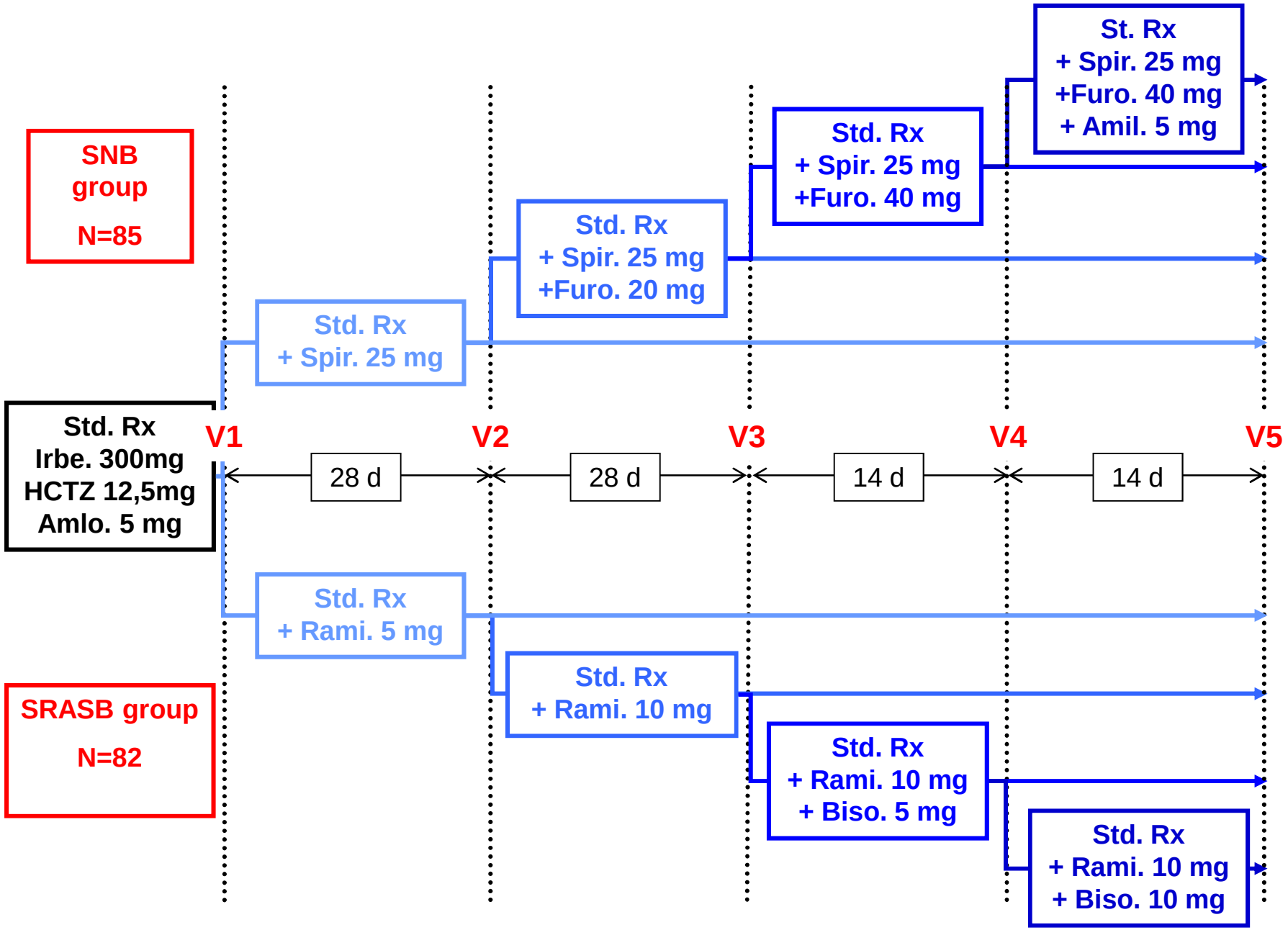


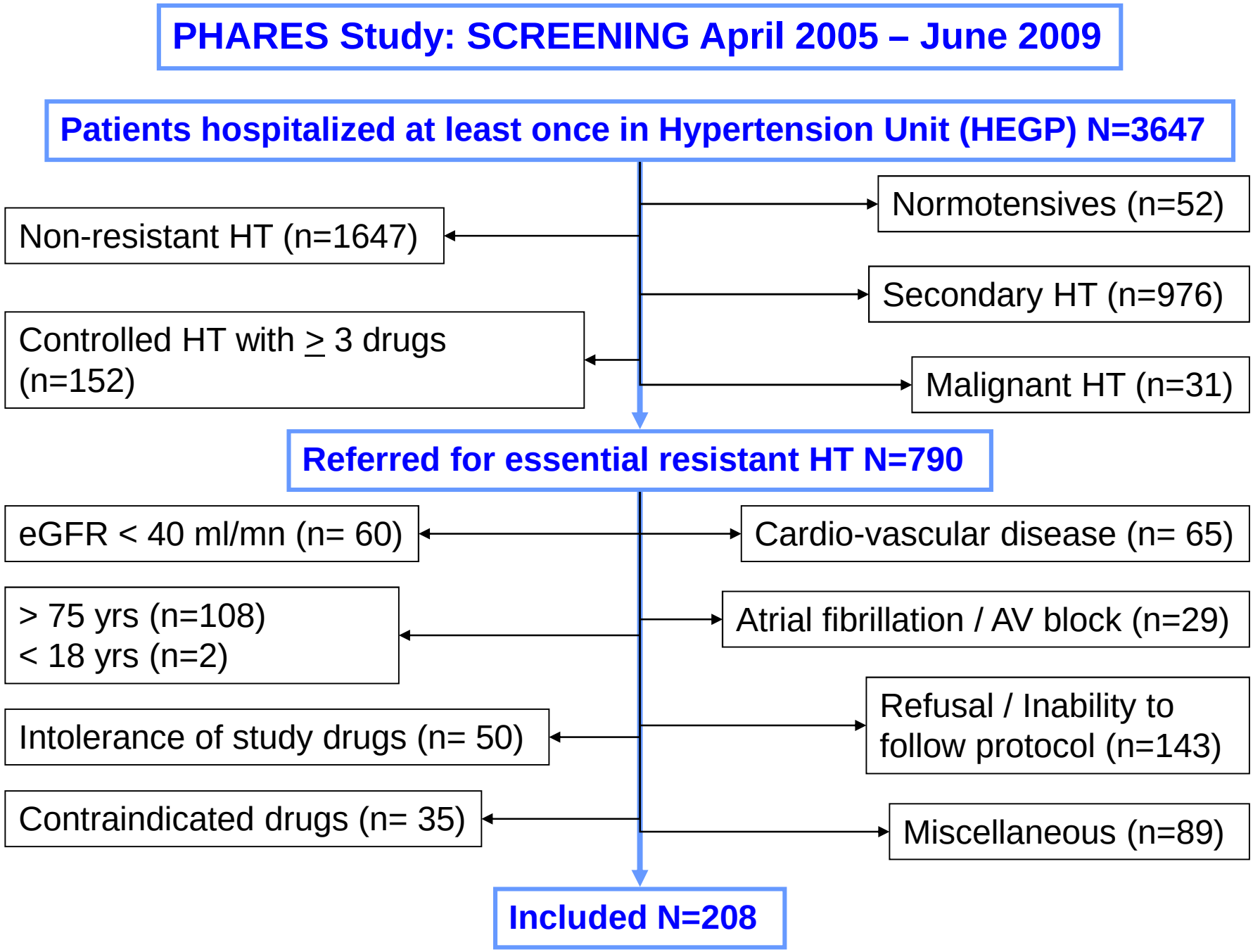
Epithelial sodium channel (ENaC)

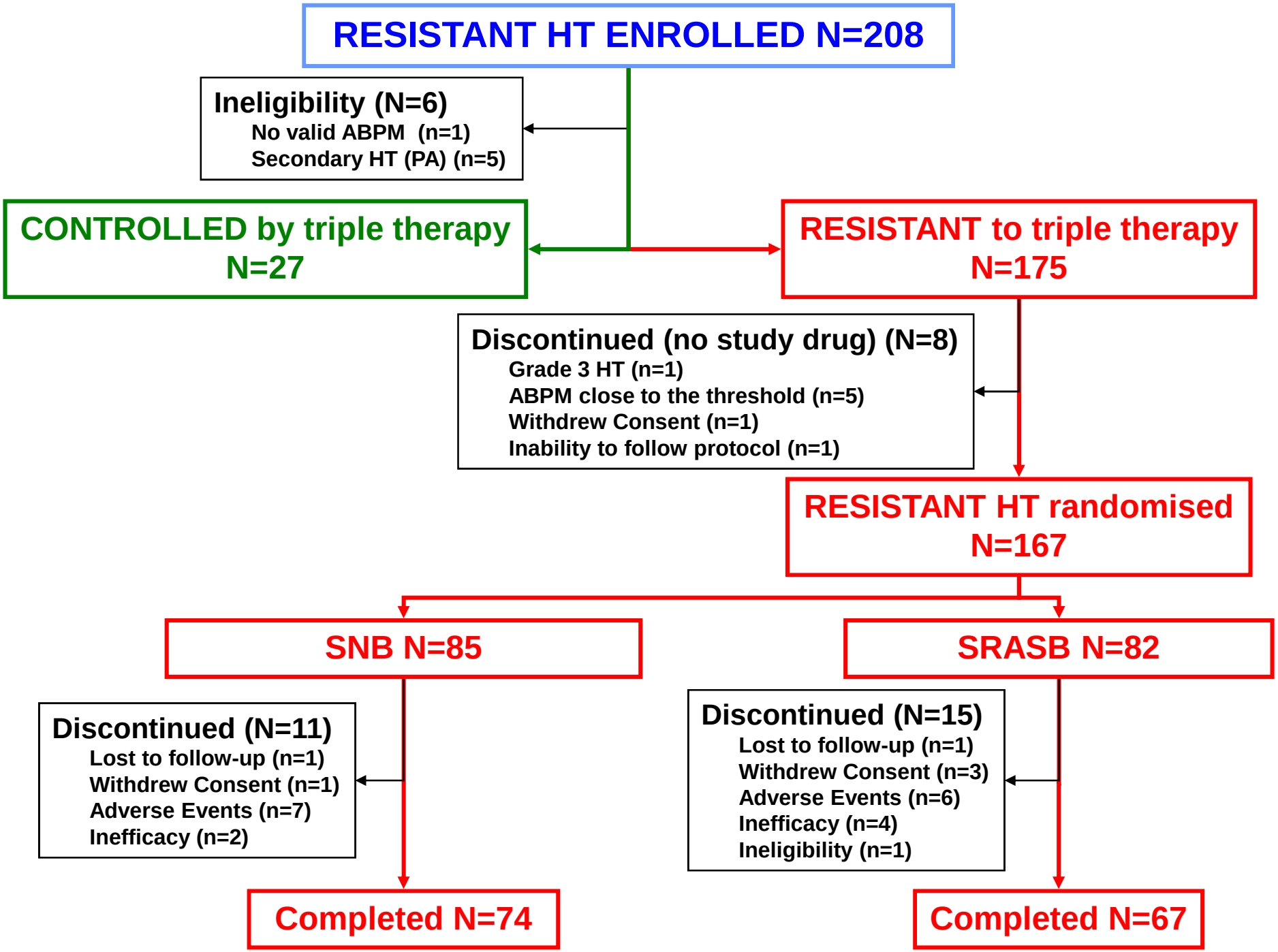


RESISTANCE TO DIURETIC TREATMENT

- **Sodium balance cancellation** *(Freis 1958)*
- **Extracellular volume contraction (thiaz): ⇘ filtered NaCl, ⇗ NaCl proximal reabsorption** *(Walter 1986)*
- **Antinatriuretic effect: NaCl reabsorption downstream of the diuretic action site** *(Wilcox 1983)*
- **Epithelial cells hypertrophy and ⇗ number of NaCl transporter in the distal tubule (furosemide)** *(Kaissling 1988; Ellison D. 1989)*
- **Sodium intake (mouse): high salt regimen: undetectable cytoplasmic ENaC sub-units; low salt regimen: detectable ENaC sub-units in the apex cells of the proximal and collector tubules** *(Loffing 2003)*
- **Loop diuretics treatment (rats): ⇗ NKCC2 and ENaC** *(Na 2003)*
- **Thiazides treatment (rats) : ⇗ NCC and ENaC** *(Na 2003)*
- **Aldosterone exposition (Xenopus laevis ovocytes): ⇗ α ENaC expression and apical transfert of ENaC sub-units** *(Loffing 2003)*
- **Spironolactone treatment (rats): ⇘ NCC and α and γENaC, then regulation via MR which don't block ENaC redistribution related to sodium diet.** *(Nielsen 2003)*


SNB group
N=85
Std. Rx
Irbe. 300mg
HCTZ 12,5mg
Amlo. 5 mg
Std. Rx
+ Spir. 25 mg
Std. Rx
+ Spir. 25 mg
+Furo. 20 mg
Std. Rx
+ Spir. 25 mg
+Furo. 40 mg
St. Rx
+ Spir. 25 mg
+Furo. 40 mg
+ Amil. 5 mg
V1
V2
V3
V4
V5
28 d
28 d
14 d
14 d
SRASB group
N=82
Std. Rx
+ Rami. 5 mg
Std. Rx
+ Rami. 10 mg
Std. Rx
+ Rami. 10 mg
+ Biso. 5 mg
Std. Rx
+ Rami. 10 mg
+ Biso. 10 mg

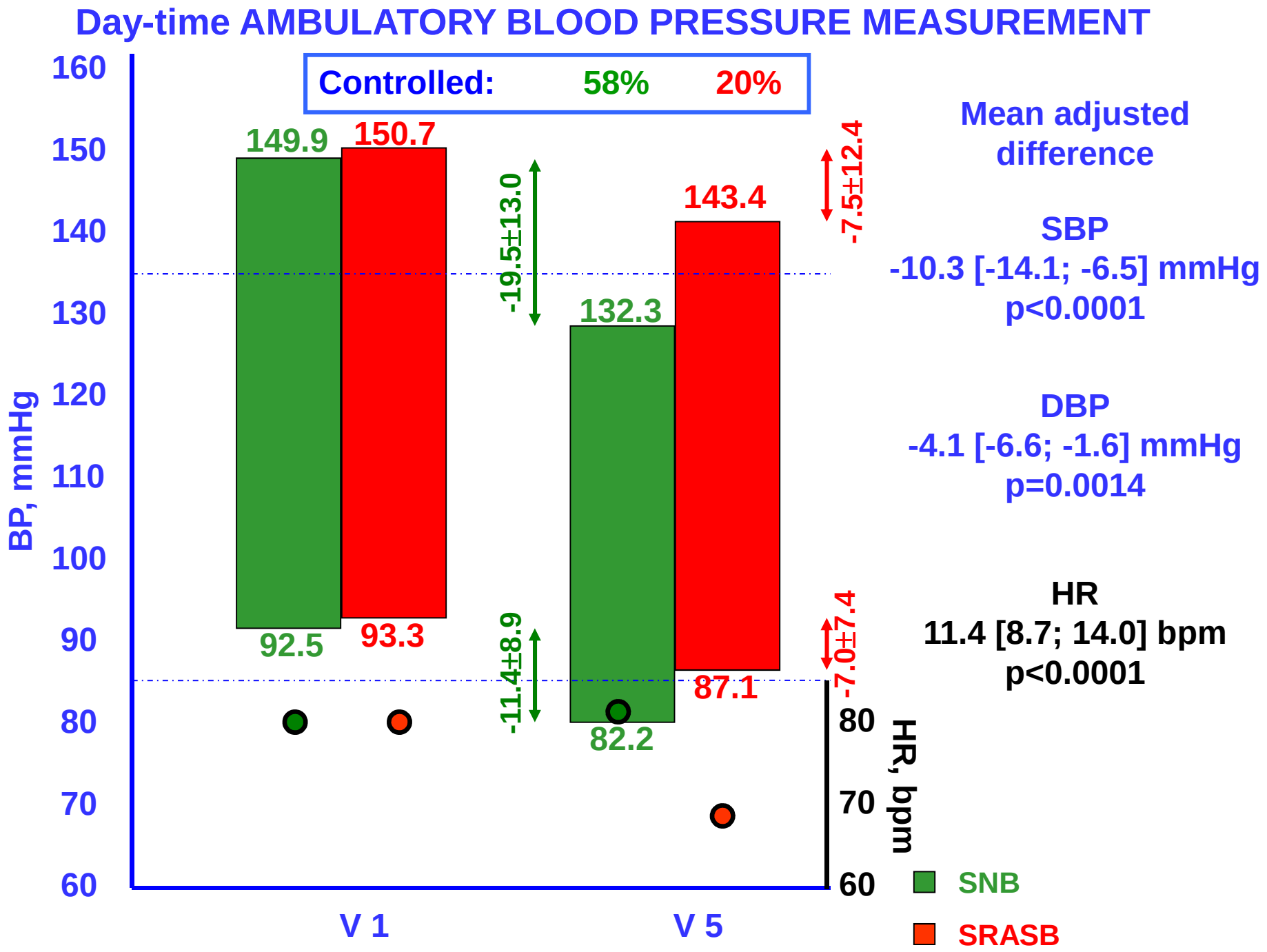

PHARES Study: SCREENING April 2005 – June 2009
Patients hospitalized at least once in Hypertension Unit (HEGP) N=3647
Normotensives (n=52)
Non-resistant HT (n=1647)
Secondary HT (n=976)
Controlled HT with ≥ 3 drugs (n=152)
Malignant HT (n=31)
Referred for essential resistant HT N=790
eGFR < 40 ml/mn (n= 60)
Cardio-vascular disease (n= 65)
> 75 yrs (n=108)
< 18 yrs (n=2)
Atrial fibrillation / AV block (n=29)
Refusal / Inability to follow protocol (n=143)
Intolerance of study drugs (n= 50)
Contraindicated drugs (n= 35)
Miscellaneous (n=89)
Included N=208

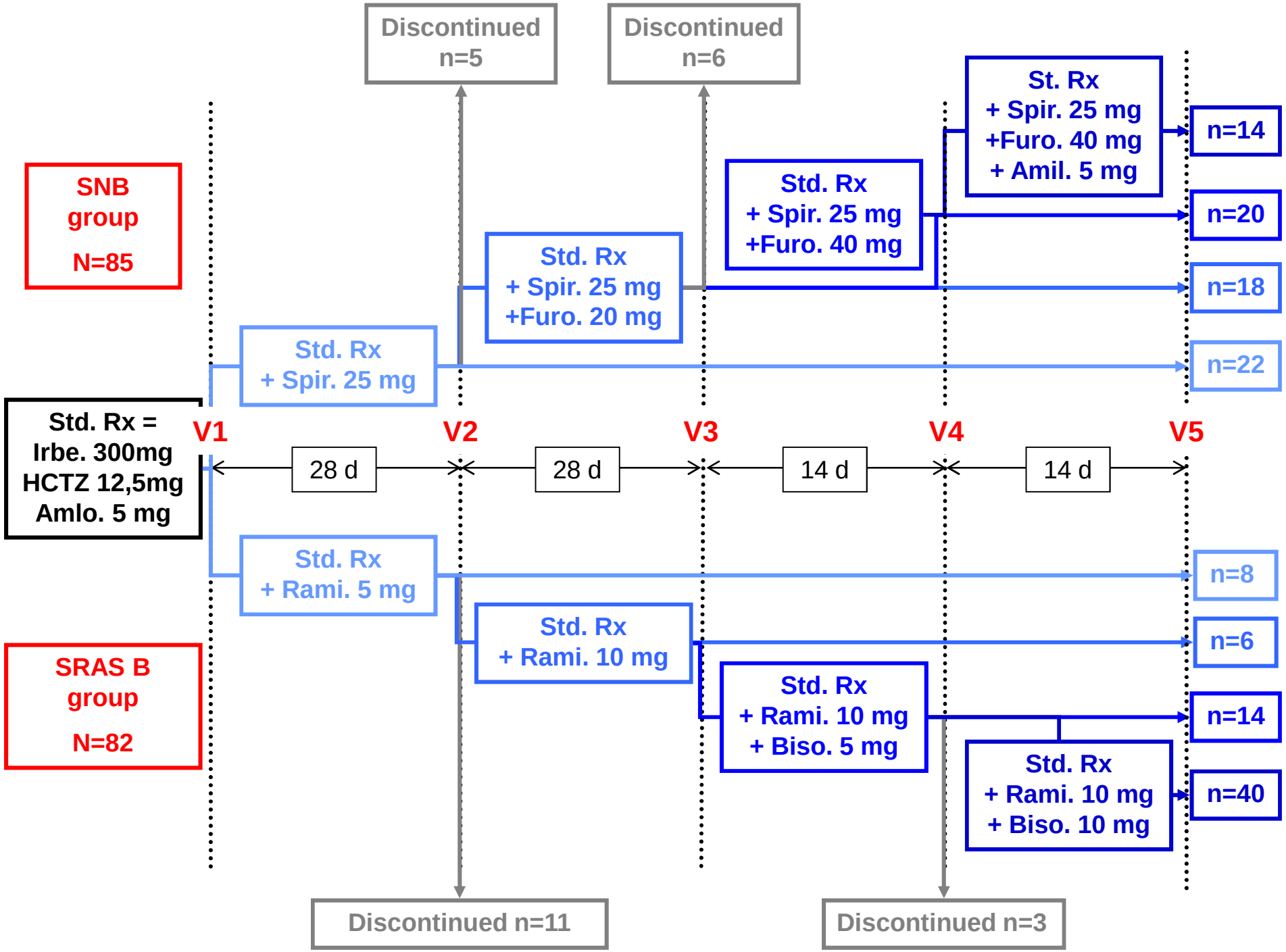

RESISTANT HT ENROLLED N=208
Ineligibility (N=6)
No valid ABPM (n=1)
Secondary HT (PA) (n=5)
CONTROLLED by triple therapy N=27
RESISTANT to triple therapy N=175
Discontinued (no study drug) (N=8)
Grade 3 HT (n=1)
ABPM close to the threshold (n=5)
Withdrew Consent (n=1)
Inability to follow protocol (n=1)
RESISTANT HT randomised N=167
SNB N=85
SRASB N=82
Discontinued (N=11)
Lost to follow-up (n=1)
Withdrew Consent (n=1)
Adverse Events (n=7)
Inefficacy (n=2)
Discontinued (N=15)
Lost to follow-up (n=1)
Withdrew Consent (n=3)
Adverse Events (n=6)
Inefficacy (n=4)
Ineligibility (n=1)
Completed N=74
Completed N=67

BASELINE CHARACTERISTICS

(after a standardized 4-week 3 drug-regimen) (Med [IQR])

	SNB-group N=85	SRASB-group N=82	p
Males, n (%)	64 (75.3)	62 (75.6)	0.9622
Black, n (%)	22 (25.9)	17 (20.7)	0.4316
Age, y	56.7 [50.7-62.3]	55.0 [46.7-63.5]	0.5881
BMI, kg/m²	28.7 [25.9-32.4]	28.0 [25.9-30.8]	0.1125
Obesity (BMI >30 kgm²), n (%)	35 (41.2)	27 (32.9)	0.2445
Diabetes, n (%)	15 (17.6)	18 (22.0)	0.6896
Glycemia, mmol/L	6.0 [5.5-6.5]	5.8 [5.3-6.4]	0.3067
HbA1c, %	5.7 [5.3-6.1]	5.5 [5.2-6.0]	0.2791
Never smokers, n (%)	45 (52.9)	35 (42.7)	0.2019
Cholesterolemia, mmol/L	4.8 [4.0-5.4]	4.5 [4.0-5.2]	0.1982
Triglyceridemia, mmol/L	1.3 [0.9-1.6]	1.1 [0.7-1.7]	0.2554
Creatininemia, µmol/L	84 [76-103]	81.5 [73-95]	0.1193
eGFR (MDRD), ml/mn/1.73m²	80 [69-96]	87 [75-101]	0.0539
Uricemia, µmol/L	352 [295-398]	344 [272-391]	0.2385
Protidemia, g/L	69 [66-73]	68 [66-71]	0.2325
U Na / U Creat, mmol/mmol	10.4 [8.0-13.3]	11.4 [8.6-14.7]	0.1263
Microalbuminuria, mg/24h	10 [6-23]	10 [5-18]	0.6983
Natremia, mEq/L	141 [139-142]	141 [139-142]	0.7775
Kaliemia, mEq/L	3.9 [3.6-4.2]	3.9 [3.6-4.2]	0.3227


Day-time AMBULATORY BLOOD PRESSURE MEASUREMENT
Controlled: 58% 20%
BP, mmHg
160
150
140
130
120
110
100
90
80
70
60
149.9
150.7
92.5
93.3
-19.5±13.0
-11.4±8.9
143.4
132.3
87.1
82.2
-7.5±12.4
-7.0±7.4
80
70
60
HR, bpm
V 1
V 5
Mean adjusted difference
SBP
-10.3 [-14.1; -6.5] mmHg
p<0.0001
DBP
-4.1 [-6.6; -1.6] mmHg
p=0.0014
HR
11.4 [8.7; 14.0] bpm
p<0.0001
SNB
SRASB


Discontinued n=5
Discontinued n=6
SNB group N=85
Std. Rx + Spir. 25 mg +Furo. 20 mg
Std. Rx + Spir. 25 mg +Furo. 40 mg
St. Rx + Spir. 25 mg +Furo. 40 mg + Amil. 5 mg
n=14
n=20
n=18
n=22
Std. Rx + Spir. 25 mg
Std. Rx = Irbe. 300mg HCTZ 12,5mg Amlo. 5 mg
V1
V2
V3
V4
V5
28 d
28 d
14 d
14 d
Std. Rx + Rami. 5 mg
n=8
Std. Rx + Rami. 10 mg
n=6
SRAS B group N=82
Std. Rx + Rami. 10 mg + Biso. 5 mg
n=14
Std. Rx + Rami. 10 mg + Biso. 10 mg
n=40
Discontinued n=11
Discontinued n=3

FINAL CHARACTERISTICS (Med [IQR])

	SNB-group N=85	SRASB-group N=82	p
Creatininemia, µmol/L	98 [84-118]	86 [71-101]	<0.0001
Weight, kg	84.0 [77.0-90.0]	82.5 [75.0-92.4]	0.0627
Uricemia, µmol/L	399 [324-449]	359 [289-398]	<0.0001
Protidemia, g/L	70 [67-74]	69 [65-71]	0.0759
U Na / U Creat, mmol/mmol	10.4 [8.3-13.3]	9.7 [7.7-13.8]	0.1264
Natremia, mEq/L	139 [137-140]	140 [139-141]	<0.0001
Kaliemia, mEq/L	4.2 [3.9-4.5]	3.9 [3.7-4.3]	<0.0001
Glycemia, mmol/L	6.1 [5.6-6.8]	6.0 [5.4-6.4]	0.4630
HbA1c, %	5.9 [5.5-6.5]	5.6 [5.3-5.9]	0.0003
Cholesterolemia, mmol/L	4.9 [4.1-5.4]	4.4 [3.8-5.2]	0.1851
Triglyceridemia, mmol/L	1.4 [0.9-1.9]	1.1 [0.8-1.7]	0.3548

ANALYSE ET TRAITEMENT D'UNE HTA RESISTANTE

LES MEDICAMENTS

ANTI HYPERTENSEURS

ET AUTRES

QUALITE DU TRAITEMENT

- **doses**
- **synergie des associations**
- **délai de jugement**
- **passage hépatique et cytochrome P 450**
- **biodisponibilité**
- **relation concentration / effet (vallée / pic)**
- **distribution et adaptation au poids**
- **élimination et insuffisances hépatique et/ou rénale**
- **activité du SRAA et autres systèmes hormonaux**
- **interactions médicamenteuses / déplétion sodée**

SUBSTANCES VASOPRESSIVES

AINS

Alcool

Cocaïne

Réglisse

Sympathicomimétiques

Anti-VEGF

Corticoïdes

Erythropoïétine

Oestrogènes de synthèse

Tacrolimus (*FK-506, Prograf*®)

Ciclosporine (*Sandimmun*®, *Neoral*®)

The effects of cyclooxygenase-2 inhibitors and NSAI therapy on 24-h BP in patients with hypertension, osteoarthritis, and type 2 DM.

Sowers JR et al. Arch Intern Med 2005; 165: 161-8.

Characteristic	Celecoxib (n = 136)	Rofecoxib (n = 138)	Naproxen (n = 130)
Patient Baseline Characteristics			
Age, y	61.8	63.6	63.6
Sex, % (M/F)	38/62	41/59	40/60
Race, %			
White	75	76	77
Black	15	15	13
Other	10	9	10
Weight, kg	90.6	90.9	92.2
24-h SBP, mm Hg	131.9	132.1	134.3
24-h DBP, mm Hg	75.8	76.2	76.0
24-h pulse pressure, mm Hg	56.2	55.9	58.3
Glycosylated hemoglobin, %	7.0	7.0	7.0
Nonfasting plasma glucose, mg/dL	154.2	138.0	142.0
Serum creatinine, mg/dL	0.86	0.87	0.87
Osteoarthritis index, %			
Hip	16	11	10
Knee	84	89	90
Antihypertensive Therapies†			
Combination	84 (62)	85 (64)	84 (66)
ACE inhibitor	114 (84)	109 (83)	106 (83)
ARB	24 (18)	24 (18)	19 (15)
Calcium channel blocker	38 (28)	40 (30)	39 (30)
β-Blocker	24 (18)	30 (23)	28 (22)
Diuretic	55 (40)	54 (41)	52 (41)
Other	17 (13)	13 (10)	7 (6)

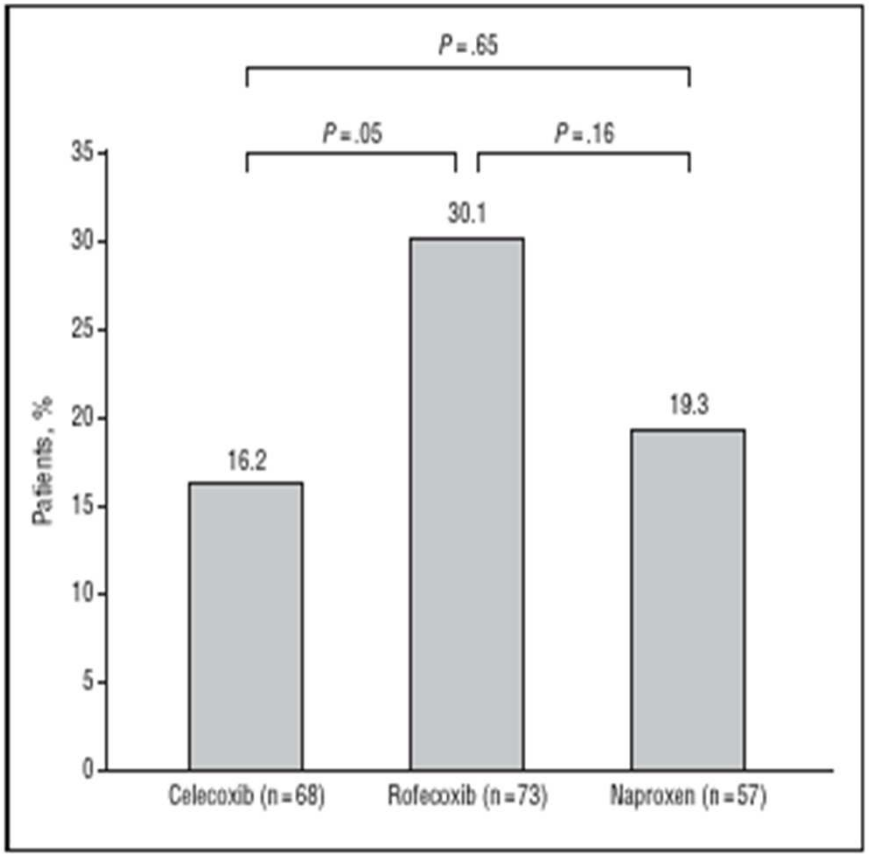


Figure 2. Percentage of baseline normotensive patients who became hypertensive at week 6. *Normotensive* is defined as an ambulatory systolic blood pressure (SBP) lower than than 135 mm Hg. *Hypertensive* is defined as an ambulatory SBP of 135 mm Hg or higher. *P* values are based on a χ^2 test. Nearly twice as many patients in the rofecoxib treatment group became hypertensive compared with the celecoxib and naproxen treatment groups.

Home Blood-Pressure Monitoring in Patients Receiving Sunitinib.

Azizi M et al. N Engl J Med. 2008; 358: 95-7.

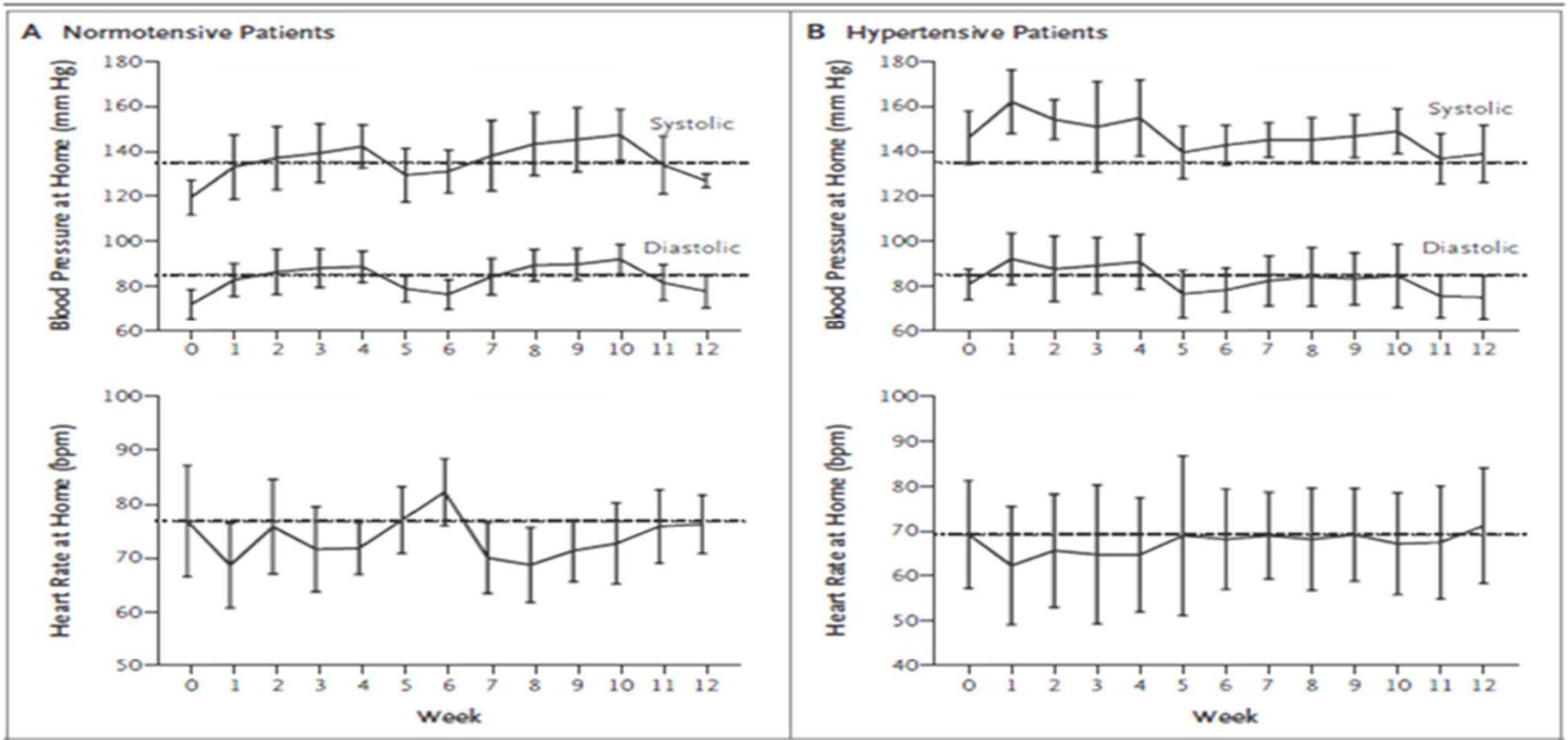


Figure 1. Changes in Systolic and Diastolic Blood Pressure and Heart Rate.

The graphs show the changes in mean blood pressure and heart rate as measured by teletransmitted results of home monitoring in patients with metastatic renal-cell carcinoma who were treated with two cycles of sunitinib at a dose of 50 mg daily for 4 weeks (shaded area), followed by 2 weeks without treatment. The results are shown separately for patients who were normotensive (Panel A) and those who were hypertensive (Panel B) before starting sunitinib treatment. In the graphs of home blood-pressure monitoring, the dotted line shows the blood-pressure threshold for the diagnosis of hypertension (systolic pressure, >135 mm Hg; or diastolic pressure, >85 mm Hg).[5] For changes in heart rate, the dotted line represents the baseline value. The I bars indicate the standard deviation.

Lifestyle interventions to reduce raised blood pressure: a systematic review of randomised controlled trials.

Dickinson HO et al. J Hypertens 2006; 24: 215–233.

	Net reduction in blood pressure (mmHg)													
			Systolic blood pressure (SBP)				Diastolic blood pressure (DBP)				Withdrawals[a]			
Type of intervention	*n*	*N*	MD	(95% CI)	I^2	Size, *P*	MD	(95% CI)	I^2	Size, *P*	*n*	RD	(95% CI)	I^2
Diet	14	1339	−6.0	(−8.6 to −3.4)	72%	0.49	−4.8	(−6.9 to −2.7)	81%	0.25	12	0.04	(−0.02 to 0.09)	65%
Diet (excl. [28])	13	1256	−5.0	(−7.0 to −3.1)	52%	0.81	−3.7	(−5.1 to −2.4)	52%	0.59	12	0.04	(−0.02 to 0.09)	65%
Exercise	21	1346	−6.1	(−10.1 to −2.1)	87%	0.57	−3.0	(−4.9 to −1.1)	74%	0.45	17	0.03	(−0.01 to 0.08)	19%
Exercise (excl. [49])	20	1270	−4.6	(−7.1 to −2.0)	65%	0.13	−2.4	(−4.0 to −0.7)	58%	0.21	16	0.04	(−0.01 to 0.08)	26%
Relaxation	23	1231	−4.0	(−6.4 to −1.6)	62%	0.93	−3.1	(−4.7 to −1.5)	70%	0.68	12	0.04	(−0.01 to 0.09)	38%
Alcohol restriction	4	305	−3.8	(−6.1 to −1.4)	0%	0.71	−3.2	(−5.0 to −1.4)	0%	0.73	1	−0.09	(−0.25 to 0.08)	*
Sodium restriction	7	491	−4.7	(−7.2 to −2.2)	59%	0.21	−2.5	(−3.3 to −1.8)	5%	0.002	3	0.02	(−0.09 to 0.13)	4%
Sodium restriction (excl. [94])	6	450	−3.6	(−4.6 to −2.5)	0%	0.43	−2.5	(−3.2 to −1.7)	4%	0.008	3	0.02	(−0.09 to 0.13)	4%
Combined interventions	6	374	−5.5	(−8.8 to −2.3)	51%	0.41	−4.5	(−6.9 to −2.0)	53%	0.70	5	0.05	(−0.02 to 0.13)	12%
Calcium supplements	13	461	−2.5	(−4.4 to −0.6)	42%	0.90	−0.8	(−2.1 to 0.4)	48%	0.64	4	0.00	(−0.06 to 0.06)	0%
Magnesium supplements	12	527	−1.3	(−4.0 to 1.5)	62%	0.14	−2.2	(−3.4 to −0.9)	47%	0.78	8	0.00	(−0.04 to 0.03)	0%
Potassium supplements	5	398	−11.3	(−25.2 to 2.7)	98%	0.57	−5.0	(−12.4 to 2.4)	99%	0.23	3	−0.02	(−0.07 to 0.02)	0%
Potassium suppl. (excl. [133])	4	350	−3.9	(−8.6 to 0.8)	73%	0.96	−1.5	(−6.2 to 3.1)	96%	0.26	3	−0.02	(−0.07 to 0.02)	0%
Fish oil supplements	8	375	−2.3	(−4.3 to −0.2)	0%	0.10	−2.2	(−4.0 to −0.4)	34%	0.03	5	0.02	(−0.04 to 0.07)	28%

n, Number of included trials; *N*, number of participants assessed; MD, mean difference between treatment and control; CI, confidence interval; I^2, % of variation between trials not explained by sampling variation [11]; Size, *P*, *P* value for relationship between treatment effect and size of trial [12]; RD, risk difference. *, Not enough trials. [a]For parallel trials only.

ANALYSE ET TRAITEMENT D'UNE HTA RESISTANTE

LE MEDECIN

Inadequat management of blood pressure in a hypertensive population.

Berlowitz DR et al. NEJM 1998; 339: 1957-1963.

800 hommes hypertendus, 66 ans, suivis 2 ans

	basal	final	p
PA (mmHg)	146/84	145/82	NS/< 0,001
patients PA ≥ 160/90 mmHg (%)	46	39	0,001
augmentation traitement (%)			
si PA ≥ 155/90		26	
si PA ≥ 165 (<90)		22	

Outpatient Hypertension Treatment, Treatment Intensification, and Control in Western Europe and the US

Wang YR et al. Arch Intern Med. 2007; 167: 141-147

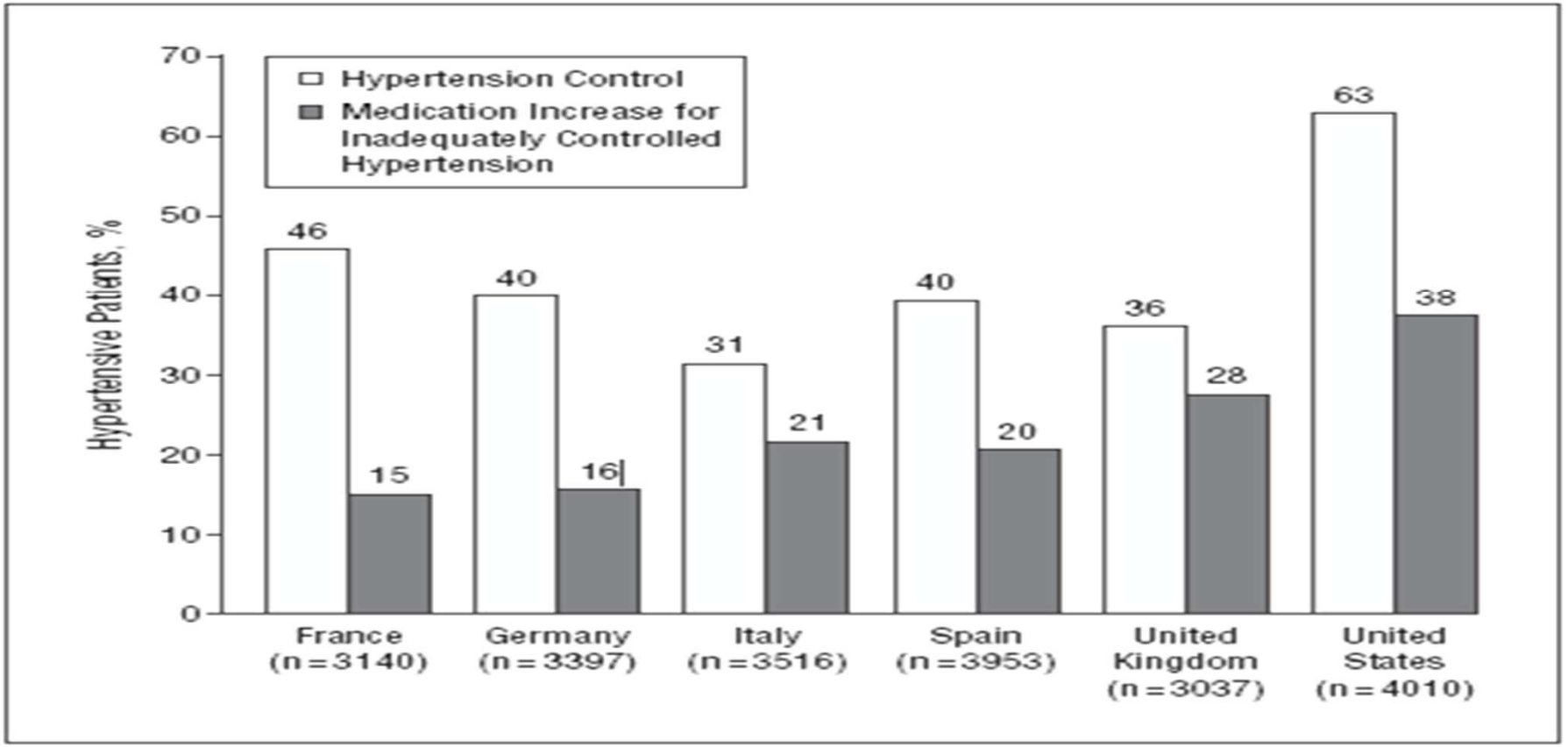
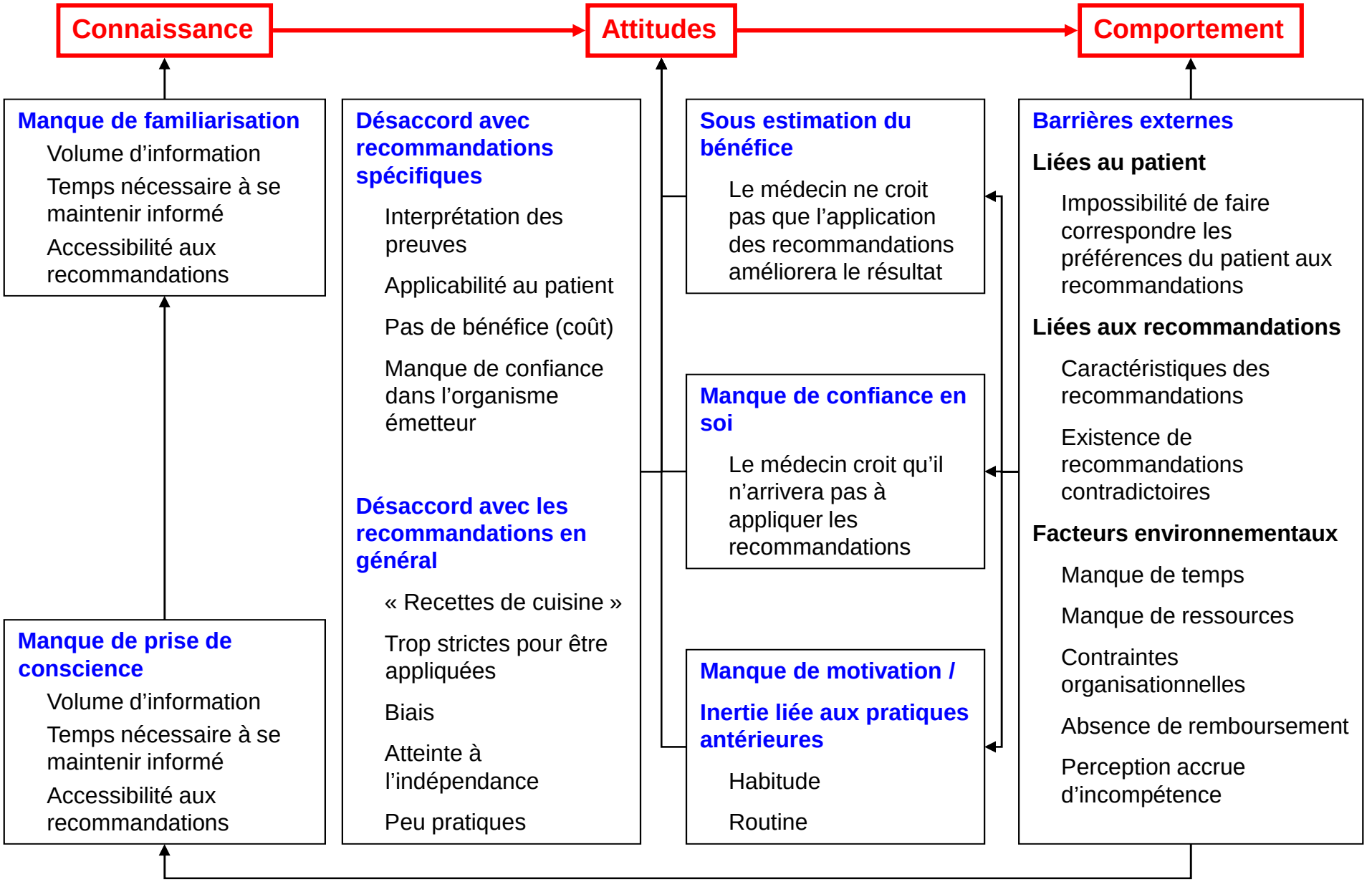


Figure 2. Cross-national differences in hypertension control (defined as a latest systolic blood pressure level of <140 mm Hg and a diastolic blood pressure level of <90 mm Hg) and medication increase for those with inadequately controlled hypertension.

Why Don't Physicians Follow Clinical Practice Guidelines?: A Framework for Improvement

Cabana MD et al. JAMA. 1999; 282:1458-1465



Physician-related barriers to the effective management of uncontrolled hypertension.

Oliveria SA et al. Arch Intern Med 2002; 162: 413-420.

- **5 145 patients avec diagnostic d'HTA (CIM 9) en 6 mois**
- **314 patients non contrôlés dont 231 interviews téléphoniques :**
  69 ans ; 50% blancs; 152/84 mmHg ; 94% traités.
- **21/ 26 (81%) médecins ont répondu au questionnaire et donné informations sur 270 visites patients (taux de réponse : 86%).**

Connaissance du JNC VI (%)	52
En accord avec JNC VI (%)	76
Appliquent JNC VI (toujours ou habituellement) (%)	76

- **Motifs de non augmentation (%)**

Poursuivre mesures PA avant changement traitement	35
Satisfait de la réponse tensionnelle	30
Motif de la visite indépendant de l'HTA	29
PAD satisfaisante	16
HTA limite	10

- **Analyse multivariée (OR)**

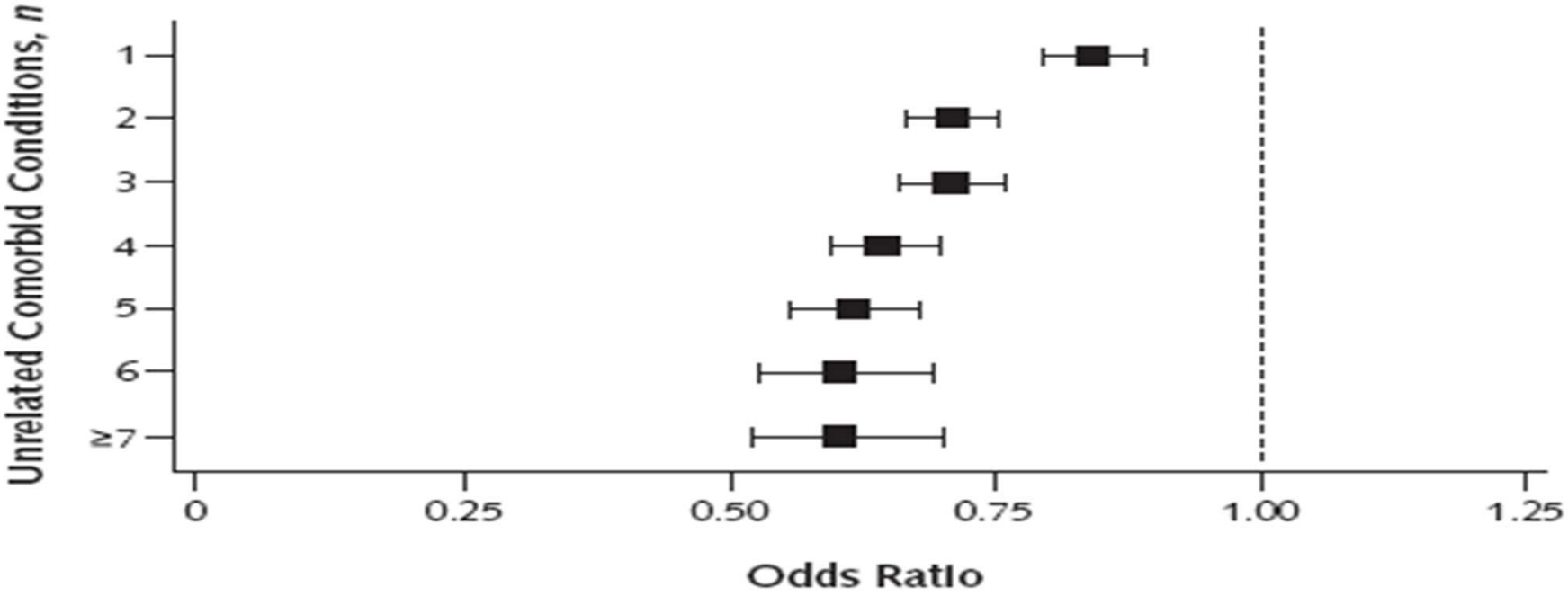
Augmentation de TTT dans les 6 mois précédents	2.88 (1.42-5.96)
Niveau tensionnel obtenu	2.96 (1.53-5.83)

Effect of Unrelated Comorbid Conditions on Hypertension Management.

Turner BJ. Ann Intern Med. 2008; 148: 578-586.

Examination of a database derived from electronic medical records collected during routine care of a cohort of primary care: 15 459 patients with uncontrolled hypertension who made 70 557 visits to 200 clinicians (01/2004 – 12/2006).

Adjusted association of unrelated comorbid conditions with management of uncontrolled hypertension



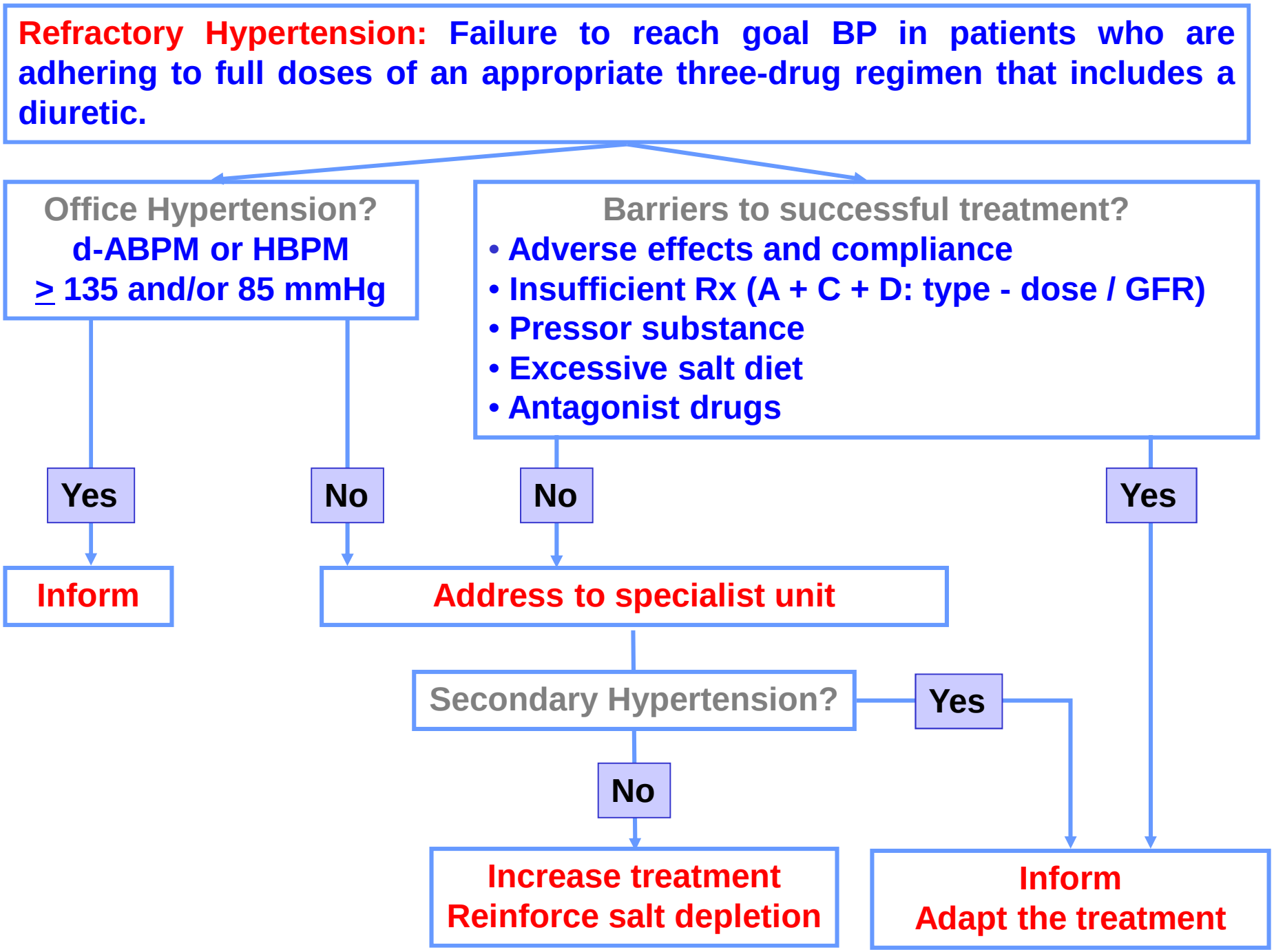
The role of clinical uncertainty in treatment decisions for diabetic patients with uncontrolled blood pressure.

Kerr EA et al. Ann Intern Med. 2008; 148: 717-727.

1169 diabetic patients (2005-2006).

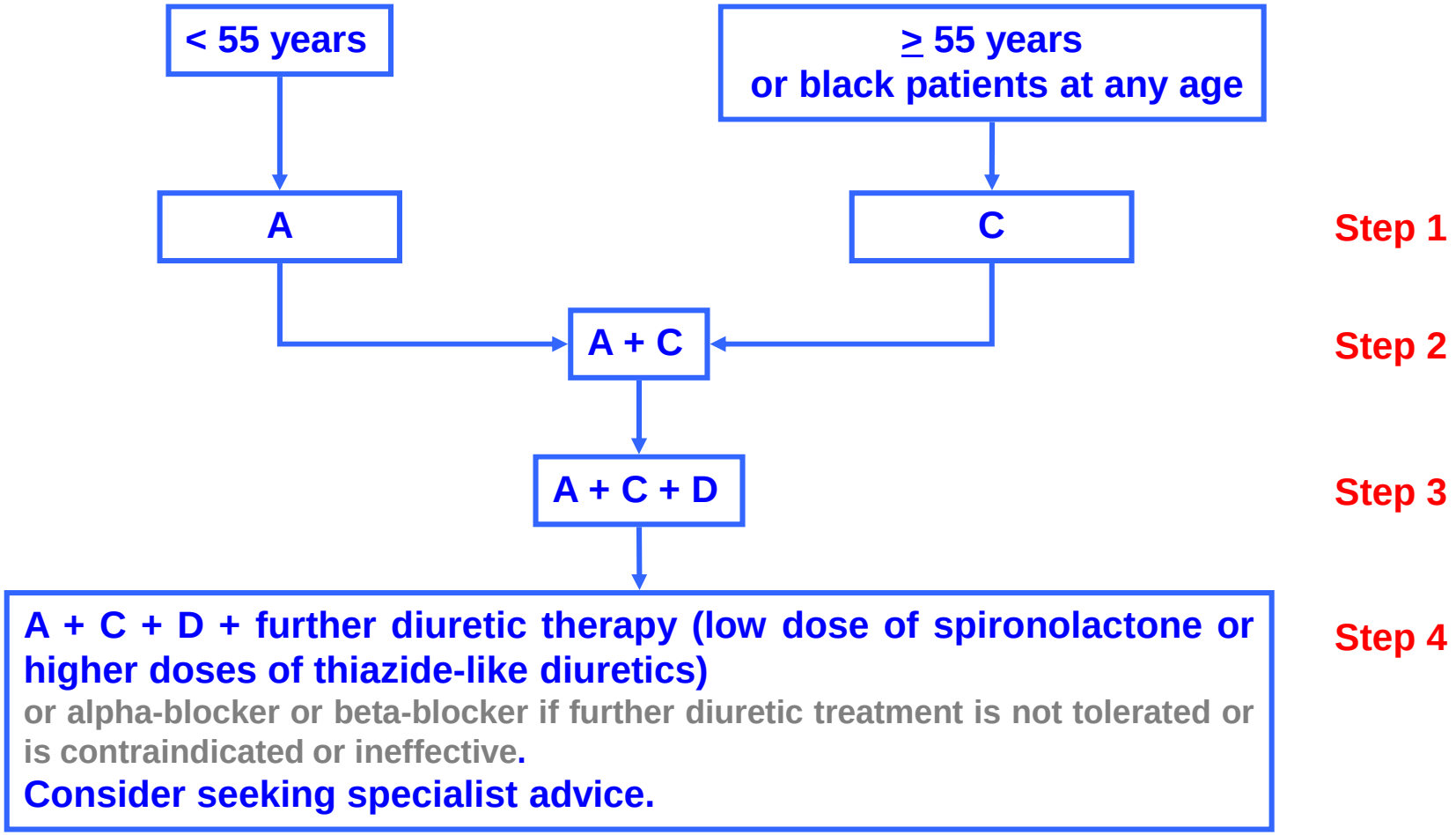
Despite an average SBP of 154 mmHg, only 49% of patients had a change in a BP treatment (medication intensification or planned follow-up within 4 weeks).

Factors of intensification			p
OBP < 140/90 vs. ≥ 140/90 mmHg or no OBP	13%	61%	<0.001
HBPM < 140/90 vs. ≥ 140/90 mmHg or no HBPM	18%	52%	<0.001
OSBP goal > 130 mmHg vs < 130 mmHg	33%	52%	0.008
Discussion of medication issues vs no	23%	52%	<0.001


Refractory Hypertension: Failure to reach goal BP in patients who are adhering to full doses of an appropriate three-drug regimen that includes a diuretic.
Office Hypertension?
d-ABPM or HBPM
≥ 135 and/or 85 mmHg
Barriers to successful treatment?
• Adverse effects and compliance
• Insufficient Rx (A + C + D: type - dose / GFR)
• Pressor substance
• Excessive salt diet
• Antagonist drugs
Yes
No
No
Yes
Inform
Address to specialist unit
Secondary Hypertension?
Yes
No
Increase treatment
Reinforce salt depletion
Inform
Adapt the treatment

Management of hypertension: summary of NICE Guidance.

Krause T et al. BMJ 2011;343:bmj.d4891



A = ACE inhibitor or ARB. C = Calcium channel blocker. D = Thiazide-like diuretic **: chlortalidone (12.5-25.0 mg o.d) or indapamide (1.5 mg modified release o.d or 2.5 mg o.d), in preference to a conventional thiazide diuretic such as bendroflumethiazide or hydrochlorothiazide.**