고혈압
얼마나 낮추어야 좋은가?
Evidence-based medicine

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Guidelines

- 지침
- 권고안

- 미국 JNC -7, JNC-8
- 영국 NICE
- 유럽 ESH/ESC
- 일본
- 한국 2004
- ……

- 제정 (de novo)
- 수용개작(adaptation)

증례 1

- 46세 남자, 직업=은행원, subarachnoid hemorrhage로 입원 coil 시술 후 퇴원
- 수년 전부터 직장 신체검사에서 고혈압 이야기는 들었으나 치료하지 않고 지냄
- 집에서 아침에 혈압을 측정하면 128/80 mmHg, 오후에 직장에서 측정하면 150/96 mmHg
- 가족력: 부친(80세), 65세부터 고혈압으로 치료
  흡연: 하루 반 갑 25년,
- 음주 1주에 1번 정도 소주 1병 이하
- 진찰: 혈압 138/92mmHg, 그 외 정상

- 이 환자가 고혈압인가?

?고혈압의 진단

- 혈압은 시시각각으로 많이 변하기 때문에 여러 시점에 여러 상황에서 여러 번 측정해서 고혈압 진단을 하여야 한다.(BP is characterized by large spontaneous variations both during the day and between days, months and seasons. Therefore the diagnosis of hypertension should be based on multiple blood pressure measurements, taken on separate occasions over a period of time.)
- 일반적으로 고혈압의 진단은 적어도 2-3번 방문해서 한번 방문할 때마다 2번 이상 측정한 혈압으로 진단해야 한다. In general, the diagnosis of hypertension should be based on at least 2 blood pressure measurements per visit and at least 2 to 3 visits, although in particularly severe cases the diagnosis can be based on measurements taken at a single visit.

유럽심장학회, 고혈압학회

진료실 혈압

1.2.2 If blood pressure measured in the clinic is 140/90 mmHg or higher:

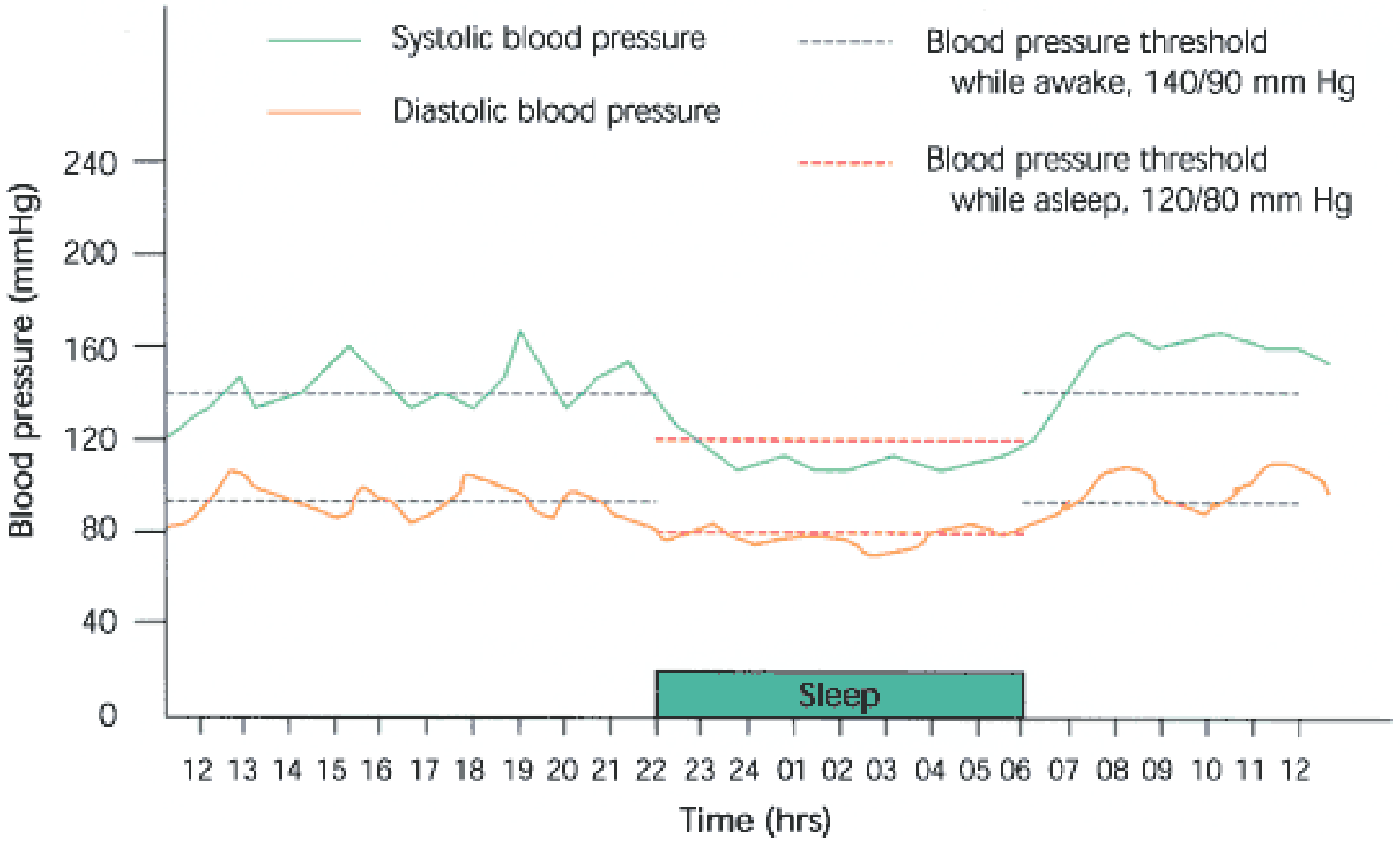
- Take a second measurement during the consultation.
- If the second measurement is substantially different from the first, take a third measurement.

Record the lower of the last two measurements as the clinic blood pressure. **[new 2011]**

언제?

영국 NICE 지침 2011

언제 혈압이 진료실 혈압?


Systolic blood pressure
Diastolic blood pressure
Blood pressure threshold while awake, 140/90 mm Hg
Blood pressure threshold while asleep, 120/80 mm Hg
Blood pressure (mmHg)
240
200
160
120
80
40
0
Sleep
12 13 14 15 16 17 18 19 20 21 22 23 24 01 02 03 04 05 06 07 08 09 10 11 12
Time (hrs)

고혈압

Stage 1 hypertension:

- Clinic blood pressure is 140/90 mmHg or higher

and

- ABPM or HBPM average is 135/85 mmHg or higher.

Stage 2 hypertension:

- Clinic BP 160/100 mmHg is or higher **and**
- ABPM or HBPM daytime average is 150/95 mmHg or higher.

Severe hypertension:

- Clinic BP is 180 mmHg or higher **or**
- Clinic diastolic BP is 110 mmHg or higher.

영국 NICE 지침 2011

활동혈압

At least two measurements per hour during the person's usual waking hours, average of at least 14 measurements to confirm diagnosis

영국 NICE 지침 2011

가정혈압

1.2.10 When using HBPM to confirm a diagnosis of hypertension, ensure that:

- for each blood pressure recording, two consecutive measurements are taken, at least 1 minute apart and with the person seated **and**
- blood pressure is recorded twice daily, ideally in the morning and evening **and**
- blood pressure recording continues for at least 4 days, ideally for 7 days.

Discard the measurements taken on the first day and use the average value of all the remaining measurements to confirm a diagnosis of hypertension. **[new 2011]**

영국 NICE 지침 2011

Home BP 평균 = 138/90
진찰실 혈압 = 138/92mmHg

치료 해야 하는가?

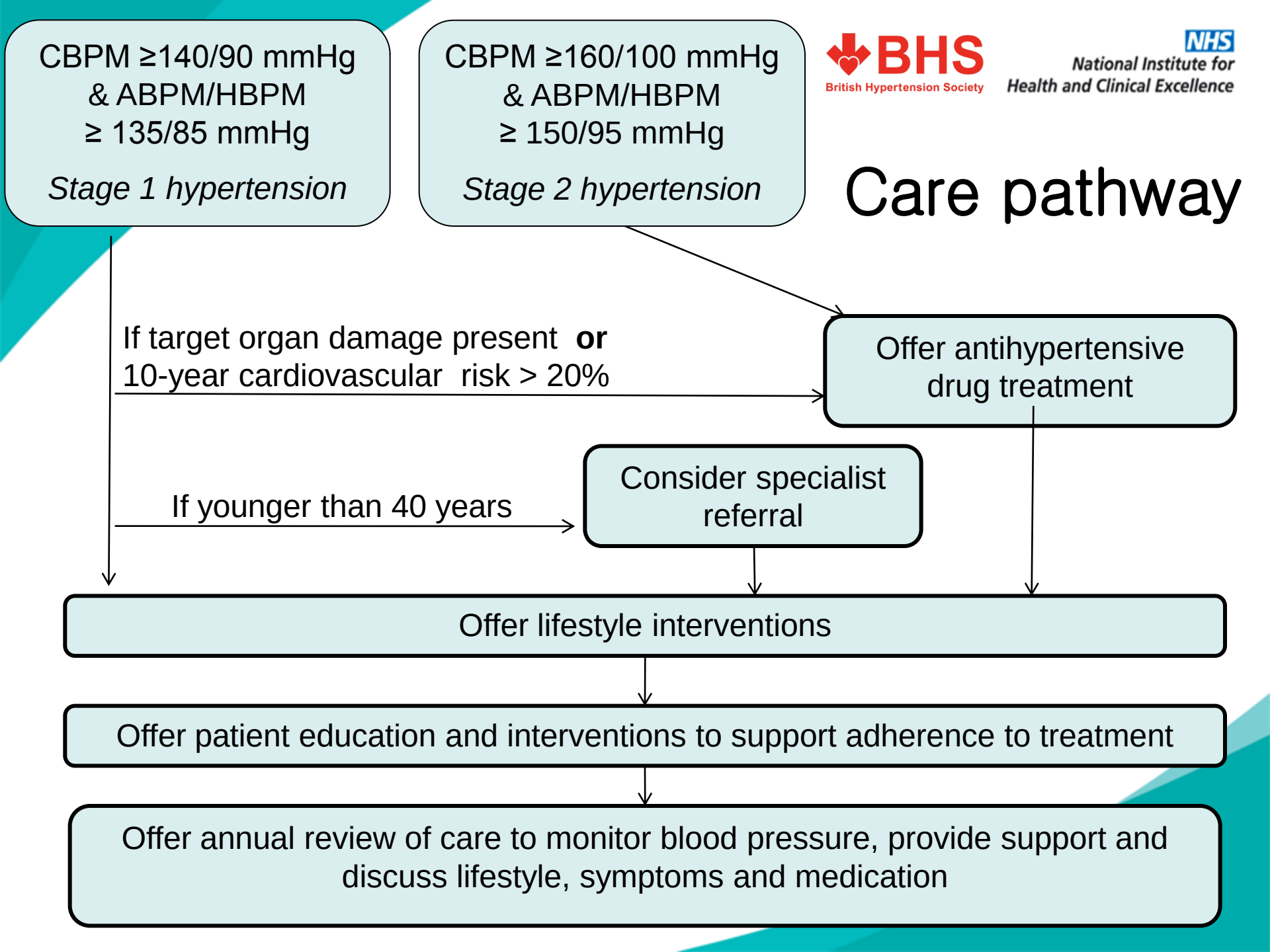
Care pathway

CBPM ≥140/90 mmHg
& ABPM/HBPM
≥ 135/85 mmHg

Stage 1 hypertension

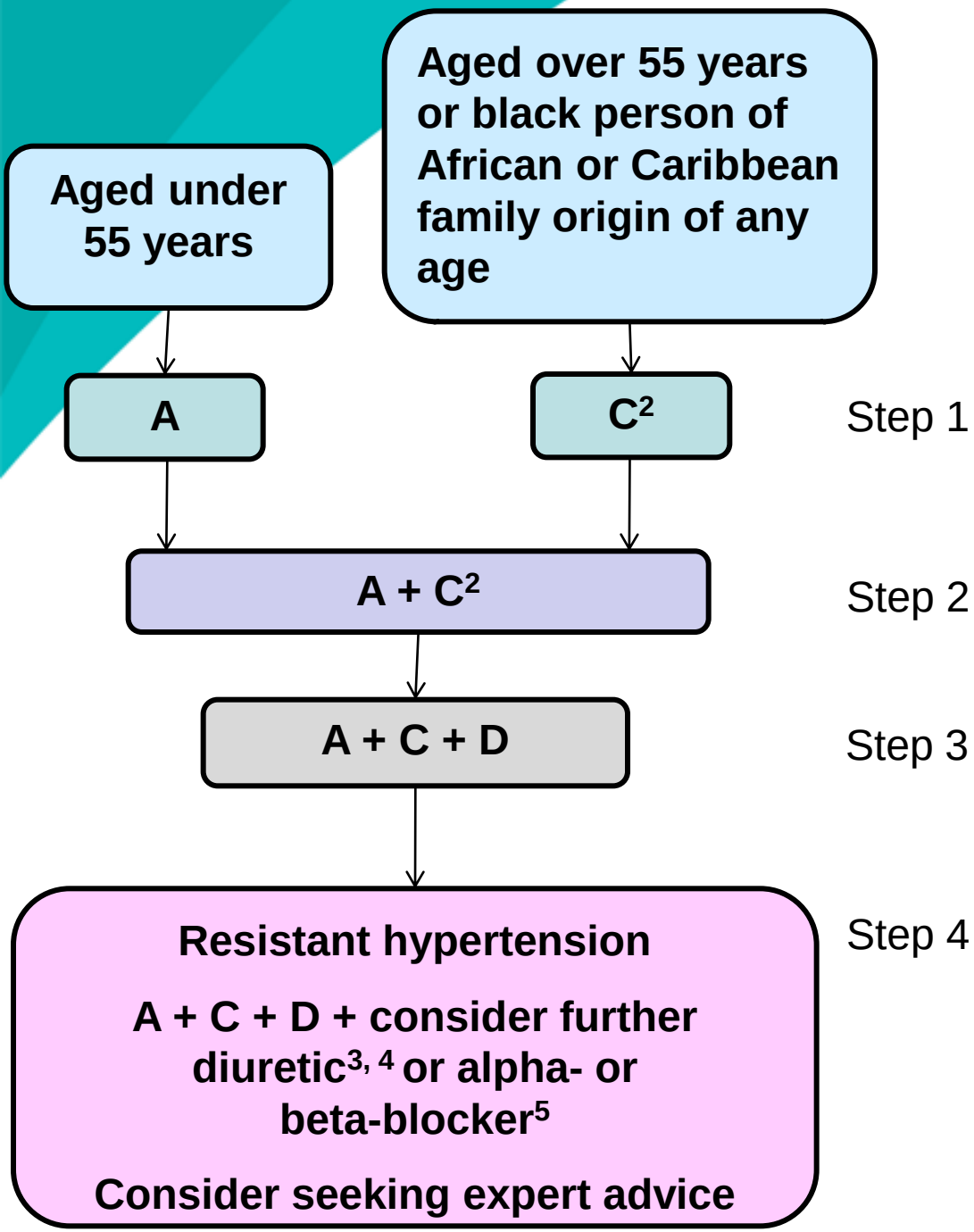
CBPM ≥160/100 mmHg
& ABPM/HBPM
≥ 150/95 mmHg

Stage 2 hypertension



치료해야 한다면 약제는?

Summary of antihypertensive drug treatment



Key

A – ACE inhibitor or angiotensin II receptor blocker (ARB)[1]

C – Calcium-channel blocker (CCB)

D – Thiazide-like diuretic

See slide notes for details of footnotes 1-5

목표 혈압은?

목표혈압

Monitoring treatment and blood pressure targets

1.5.4 Use clinic blood pressure measurements to monitor the response to antihypertensive treatment with lifestyle modifications or drugs. **[new 2011]**

1.5.5 Aim for a target clinic blood pressure below 140/90 mmHg in people aged under 80 years with treated hypertension. **[new 2011]**

1.5.6 Aim for a target clinic blood pressure below 150/90 mmHg in people aged 80 years and over, with treated hypertension. **[new 2011]**

영국 NICE 지침 2011

Target BP for prevention of IHD

AHA 2007

TABLE. Summary of Main Recommendations

Area of Concern	BP Target, mm Hg	Lifestyle Modification†	Specific Drug Indications	Comments
General CAD prevention	<140/90	Yes	Any effective antihypertensive drug or combination‡	If SBP ≥160 mm Hg or DBP ≥100 mm Hg, then start with 2 drugs
High CAD risk*	<130/80	Yes	ACEI or ARB *or* CCB *or* thiazide diuretic *or* combination	If SBP ≥160 mm Hg or DBP ≥100 mm Hg, then start with 2 drugs
Stable angina	<130/80	Yes	β-Blocker *and* ACEI or ARB	If β-blocker contraindicated, or if side effects occur, can substitute diltiazem or verapamil (but not if bradycardia or LVD is present)
				Can add dihydropyridine CCB (not diltiazem or verapamil) to β-blocker
				A thiazide diuretic can be added for BP control
UA/NSTEMI	<130/80	Yes	β-Blocker (if patient is hemodynamically stable) *and* ACEI or ARB§	If β-blocker contraindicated, or if side effects occur, can substitute diltiazem or verapamil (but not if bradycardia or LVD is present)
				Can add dihydropyridine CCB (not diltiazem or verapamil) to β-blocker
				A thiazide diuretic can be added for BP control
STEMI	<130/80	Yes	β-Blocker (if patient is hemodynamically stable) and ACEI or ARB§	If β-blocker contraindicated, or if side effects occur, can substitute diltiazem or verapamil (but not if bradycardia or LVD is present)
				Can add dihydropyridine CCB (not diltiazem or verapamil) to β-blocker
				A thiazide diuretic can be added for BP control
LVD	<120/80	Yes	ACEI or ARB *and* β-blocker *and* aldosterone antagonist¶ *and* thiazide or loop diuretic *and* hydralazine/isosorbide dinitrate (blacks)	Contraindicated: verapamil, diltiazem, clonidine, moxonidine, α-blockers

Guidelines for the Management of Spontaneous Intracerebral Hemorrhage

A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association

2010 guideline

Hypertension is the most important currently modifiable risk factor for prevention of ICH recurrence.[195,196] The importance of BP control was supported by data from the Perindopril Protection Against Recurrent Stroke Study (PROGRESS) showing that subjects with cerebrovascular disease randomized to perindopril plus optional indapamide had significantly lower risk of first ICH (adjusted hazard ratio, 0.44; 95% confidence interval, 0.28 to 0.69) and a similar, though statistically insignificant, reduction in recurrent ICH (adjusted hazard ratio, 0.37; 95% confidence interval, 0.10 to 1.38).[193] Notably, this reduction appeared to apply to lobar as well as deep hemispheric ICH. Although specific data on the optimal BP for reducing ICH recurrence are not available, a reasonable target is a BP <140/90 (or <130/80 in the presence of diabetes or chronic kidney disease) as suggested by the most recent report from the Joint National

3. **After the acute ICH period, a goal target of a normal BP of <140/90 (<130/80 if diabetes or chronic kidney disease) is reasonable** ***(Class IIa; Level of Evidence: B).*** (New recommendation)

목표 혈압
활동/가정혈압

1.5.8 When using ABPM or HBPM to monitor the response to treatment (for example, in people identified as having a 'white-coat effect'[5] and people who choose to monitor their blood pressure at home), aim for a target average blood pressure during the person's usual waking hours of:

- below 135/85 mmHg for people aged under 80 years
- below 145/85 mmHg for people aged 80 years and over.

[new 2011]

영국 NICE 지침 2011

증례 2

- 72세 남자, 3년 전 고혈압 이야기 들었으나 그동안 치료 받지 않고 지내다가 최근 혈압이 더 높아져서 치료 받기로 결심하고 내원하였다.
- 진찰 소견 키: 170 cm 몸무게 75 Kg, 혈압 158/98 mmHg
- 흡연: 30 pack-year 후 60세 경부터 금연
- 음주: 1주에 1번 정도 소주 반 병 이하 (40년)
- 어떤 Lab을 할 것인가?

유럽심장학회
Laboratory Investigations

Routine tests

- Fasting plasma glucose
- Serum lipids
- Serum potassium
- Serum uric acid
- Serum creatinine
- Estimated creatinine clearance (Cockroft–Gault formula) or glomerular filtration rate (MDRD formula)
- Haemoglobin and haematocrit
- Urinalysis (complemented by microalbuminuria dipstick test and microscopic examination)
- Electrocardiogram

Laboratory Investigations

Recommended tests

- Echocardiogram
- Carotid ultrasound
- Quantitative proteinuria (if dipstick test positive)
- Ankle–brachial BP index
- Fundoscopy
- Glucose tolerance test (if fasting plasma glucose >5.6 mmol/L (102 mg/dL)
- Home and 24h ambulatory BP monitoring
- Pulse wave velocity measurement (where available)

NICE 지침

21. For all people with hypertension offer to:

- test for the presence of protein in the urine by sending a urine sample for estimation of the albumin:creatinine ratio and test for haematuria using a reagent strip
- take a blood sample to measure plasma glucose, electrolytes, creatinine, estimated glomerular filtration rate, serum total cholesterol and HDL cholesterol
- examine the fundi for the presence of hypertensive retinopathy
- arrange for a 12-lead electrocardiograph to be performed. [2004, amended 2011]

검사 소견

- TC= 220 mg/dl, HDL=45 mg/dl , TG 200 mg/dl
- K= 4.9 mEq/L
- Cr=1.4 mg/dl
- FBS= 104 mg/dl
- AER 25 ug/mg
- ECG= LVH (voltage)

- 이뇨제를 사용하기로 결정하고 Hydrochlorthiazide 12.5 mg 사용, 약제 선택이 적절했나?

대한고혈압학회 (2004)

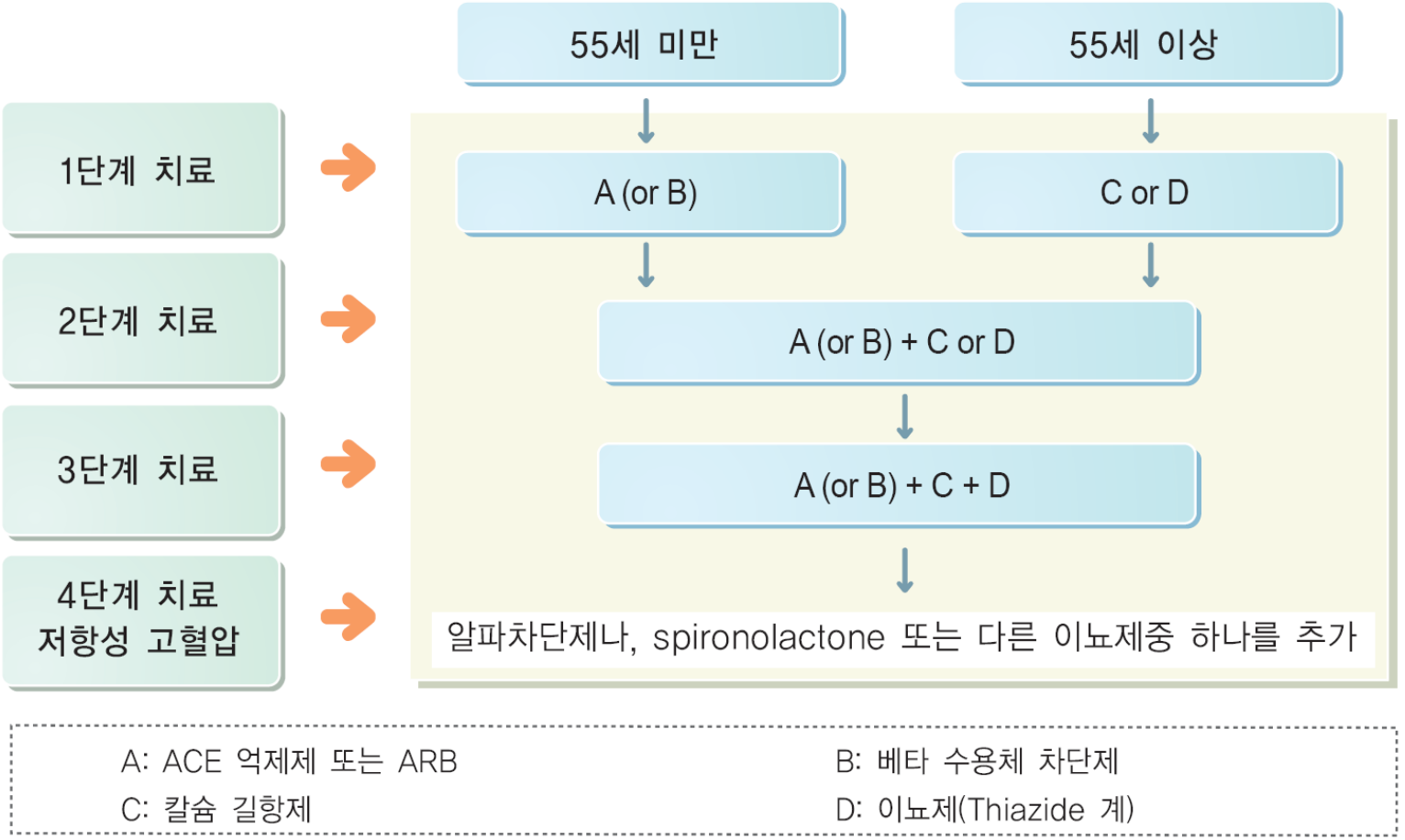


그림 7. 연령에 따른 고혈압약 선택기준

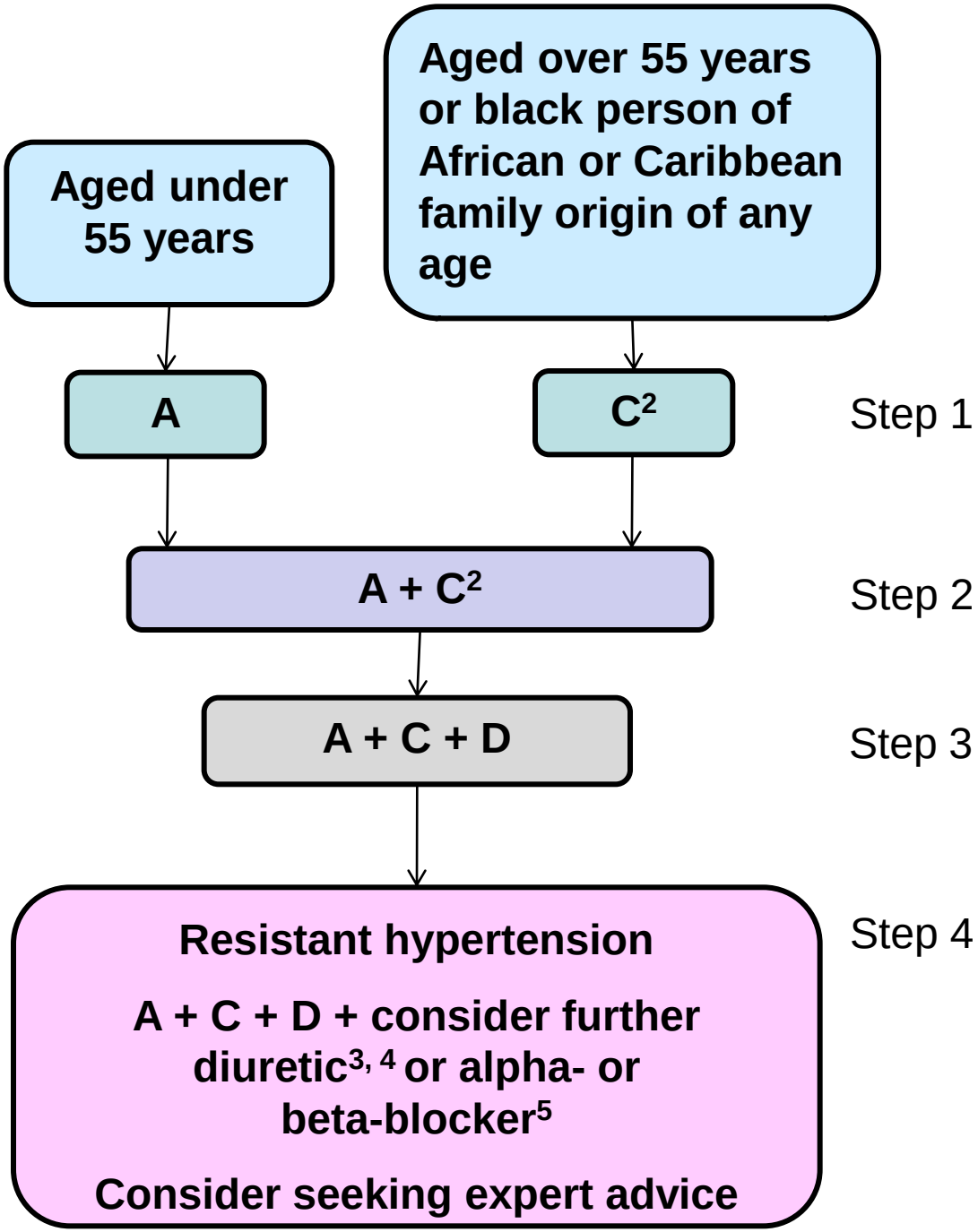
대한고혈압학회 (2004)

표 16. 질환에 따른 추천 고혈압 약물

강제 적응	이뇨제	BB	ACEI	ARB	CCB	Aldo-Ant	alpha-B
노인성 수축기 고혈압	O				O(DHP계)		
심부전	O	O	O	O		O	
심근경색후		O	O			O	
관동맥 질환		O	O		O(nonDHP)		
당뇨병성 신증			O(1형)	O(2형)			
만성 신질환	O(loop계)	O	O				
뇌졸중	O		O				
경동맥 죽상경화					O(DHP계)		
전립성 비대							O

BB: beta-blocker, ACEI: ACE inhibitor, ARB: angiotensin receptor blocker, CCB: calcium channel blocker, Aldo-Ant: aldosterone antagonist, alpha-B: alpha-blocker

Summary of antihypertensive drug treatment



Key

A – ACE inhibitor or angiotensin II receptor blocker (ARB)[1]

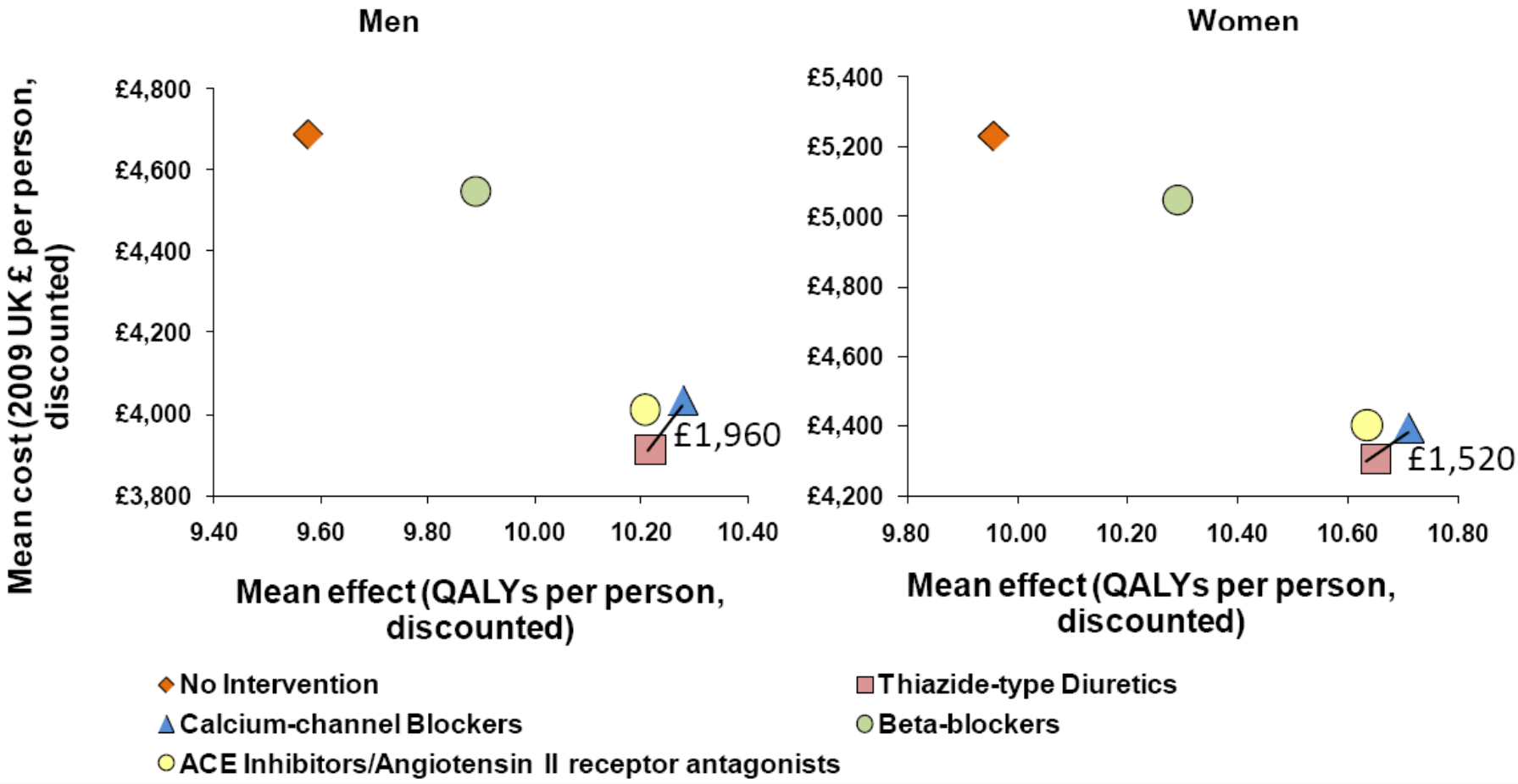
C – Calcium-channel blocker (CCB)

D – Thiazide-like diuretic

See slide notes for details of footnotes 1-5

영국 (NICE)

Figure 18: Base case results (65-year-old, 2% cardiovascular risk, 1.1% diabetes risk, 1% HF risk)



QALYs = quality-adjusted life years

이뇨제의 사용

1.6.9 If diuretic treatment is to be initiated or changed, offer a thiazide-like diuretic, such as chlortalidone (12.5–25.0 mg once daily) or indapamide (1.5 mg modified-release once daily or 2.5 mg once daily) in preference to a conventional thiazide diuretic such as bendroflumethiazide or hydrochlorothiazide. **[new 2011]**

1.6.10 For people who are already having treatment with bendroflumethiazide or hydrochlorothiazide and whose blood pressure is stable and well controlled, continue treatment with the bendroflumethiazide or hydrochlorothiazide. **[new 2011]**

영국 NICE 지침 2011

Comparative Antihypertensive Effects of Hydrochlorothiazide and Chlorthalidone on Ambulatory and Office Blood Pressure

Michael E. Ernst, Barry L. Carter, Chris J. Goerdt, Jennifer J.G. Steffensmeier, Beth Bryles Phillips, M. Bridget Zimmerman and George R. Bergus

Hypertension 2006, 47:352-358: originally published online January 23, 2006

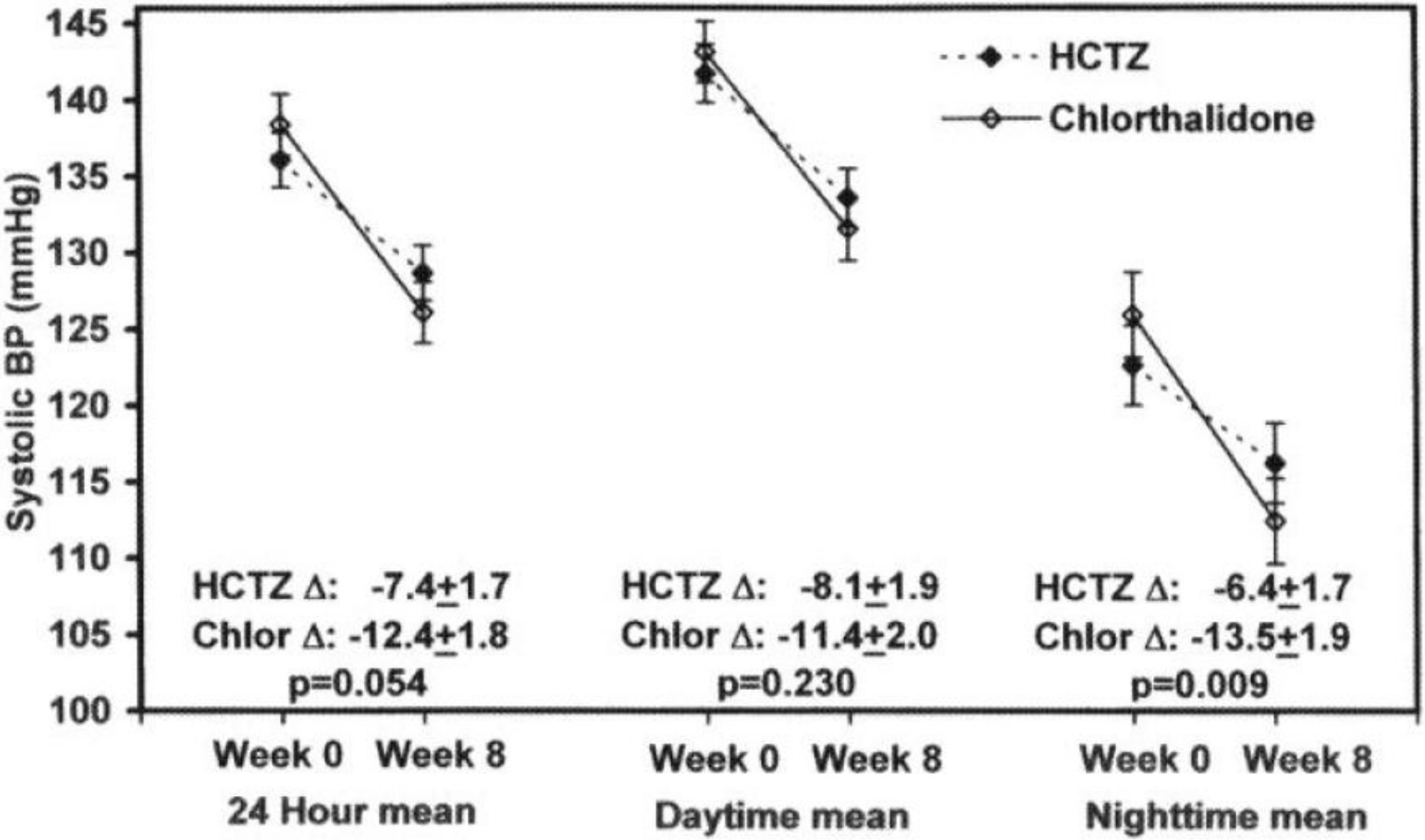
A randomized, single-blinded,8-week active treatment, crossover study comparing chlorthalidone 12.5 mg/day (force-titrated to 25 mg/day) and hydrochlorothiazide 25 mg/day (force-titrated to 50 mg/day)

Subjects: 30 untreated hypertensive patients

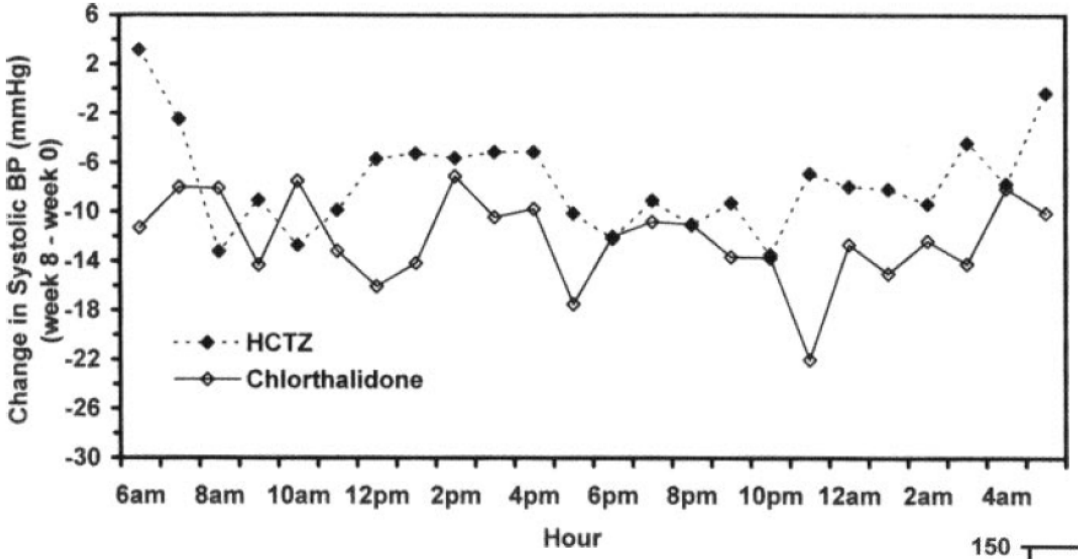
The main outcome: 24-hour ABP monitoring at baseline and week 8
The secondary: office BP every 2 weeks

Chlorthalidone vs hydrochlorthiazide

Mean 24-hour, daytime, and nighttime ambulatory SBP with change from baseline

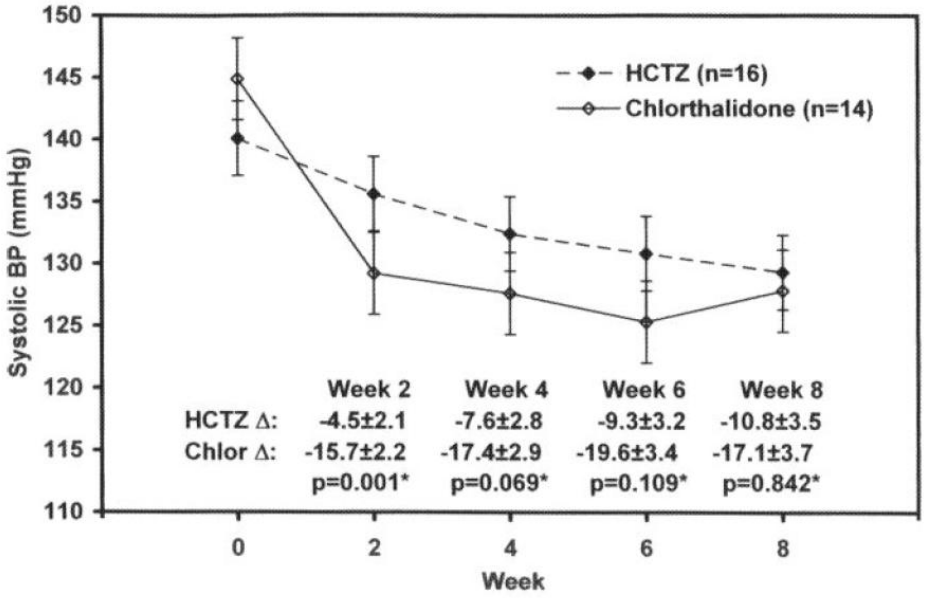


Chlorthalidone vs hydrochlorthiazide



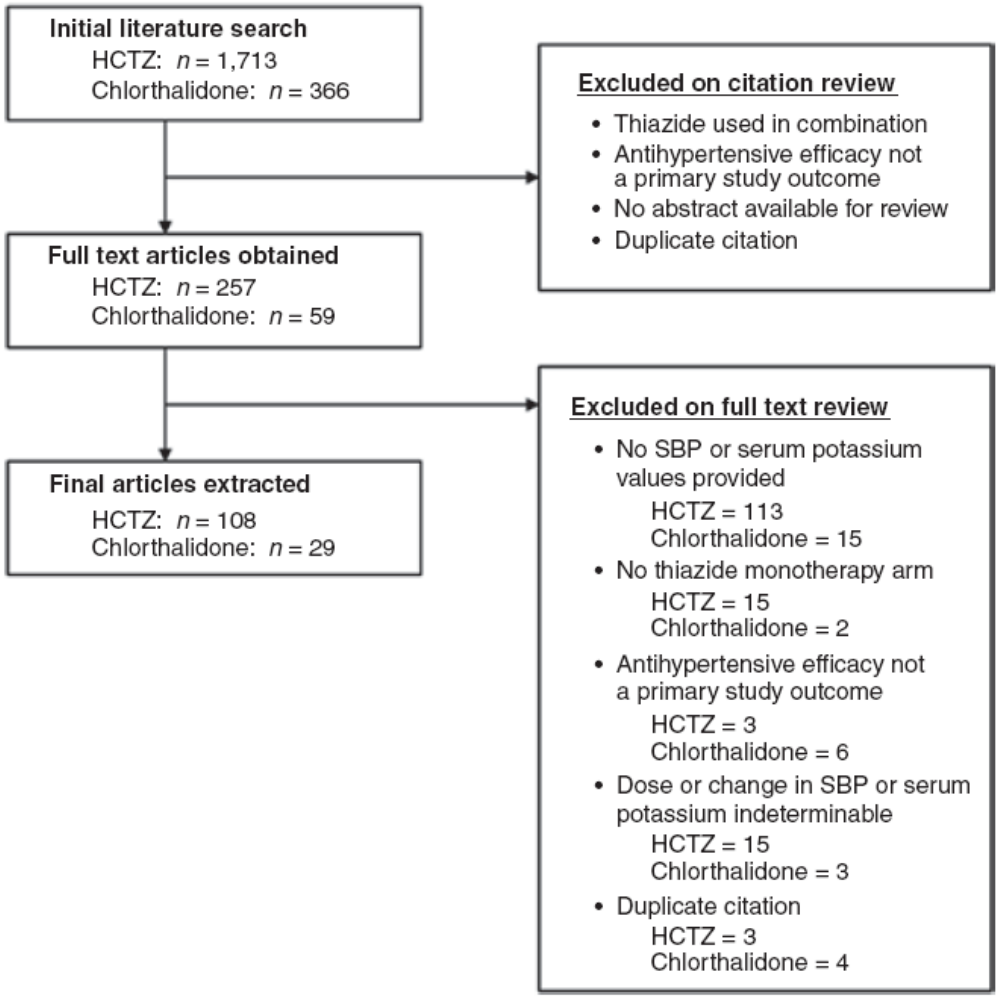
Mean change from week 0 to week 8 in average hourly ambulatory systolic BP.

Mean office SBP and change during the first 8-week study period



*P-values reported are Bonferroni adjusted p-values (unadjusted p-value X 4 tests)

메타분석



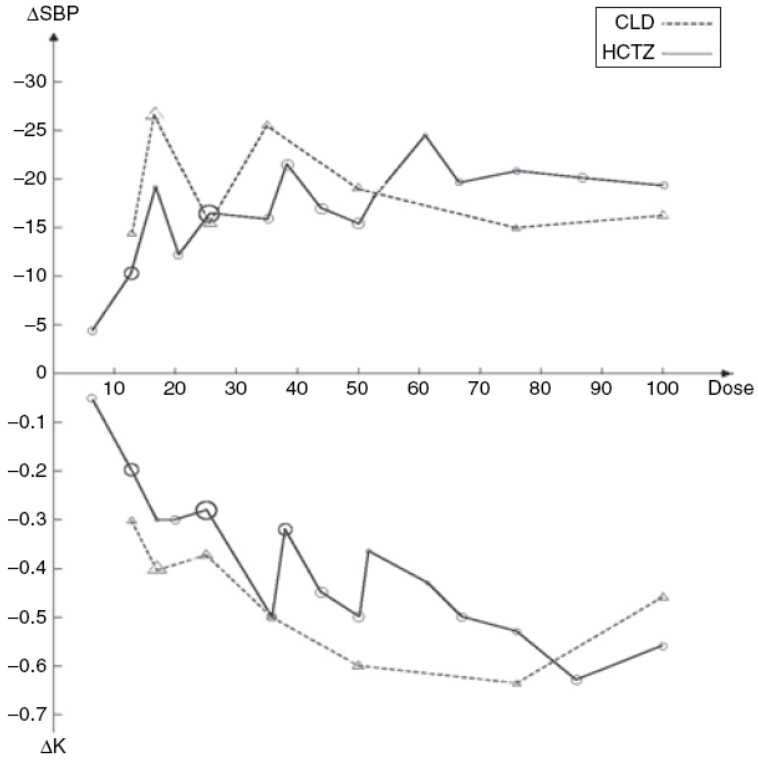


Figure 2 | Mean change in SBP (mm Hg) and potassium (mEq/l) for chlorthalidone and HCTZ by dose (mg) using pooled data from all studies and time points. (Sample size at each data point corresponds in a relative manner to the size of the circle or triangle point. Doses >100 mg were not plotted due to limited sample size).

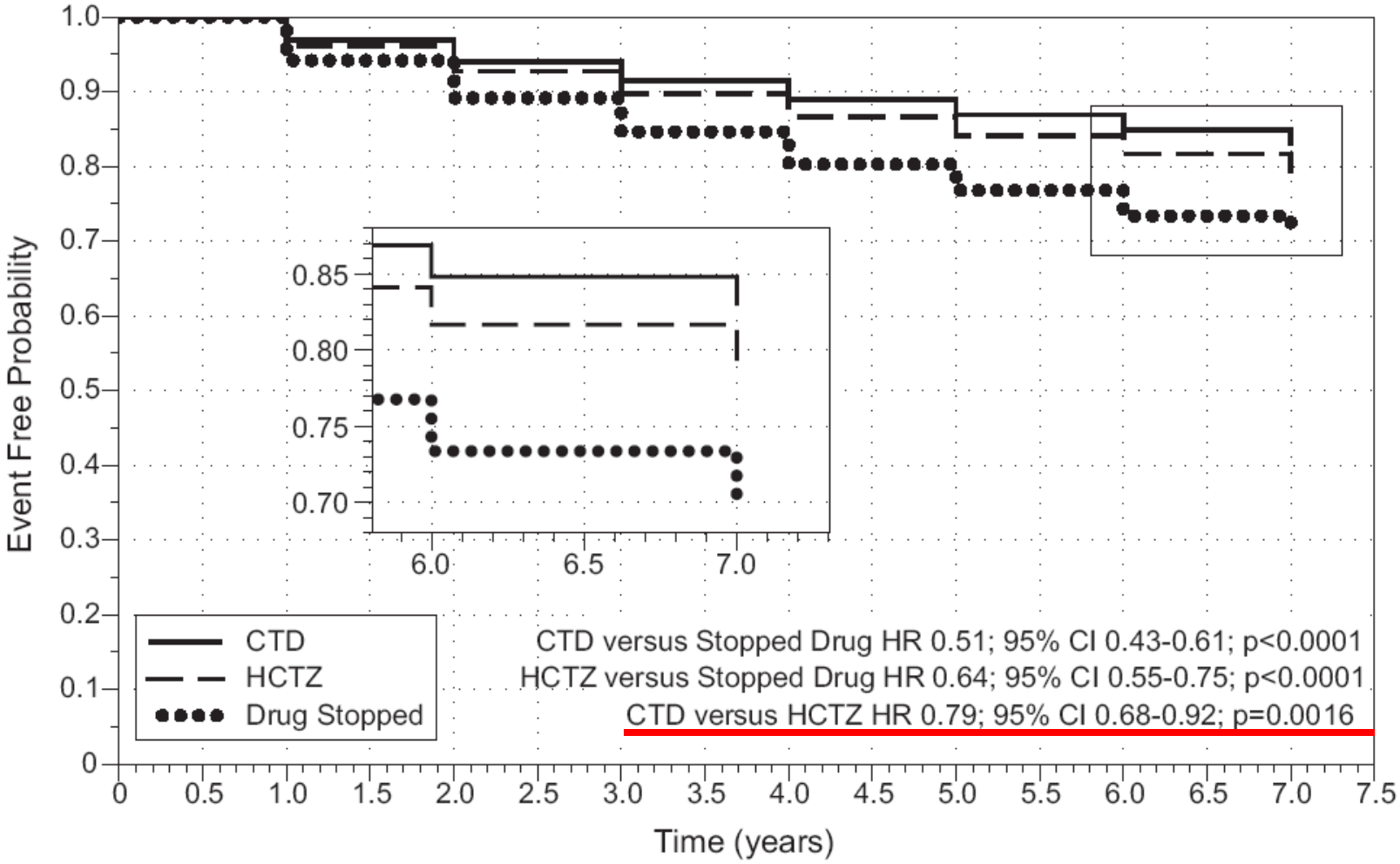
Ernst ME, et al. Am J Hypertens 2010; **23**:440-446

Chlorthalidone Reduces Cardiovascular Events Compared With Hydrochlorothiazide : A Retrospective Cohort Analysis

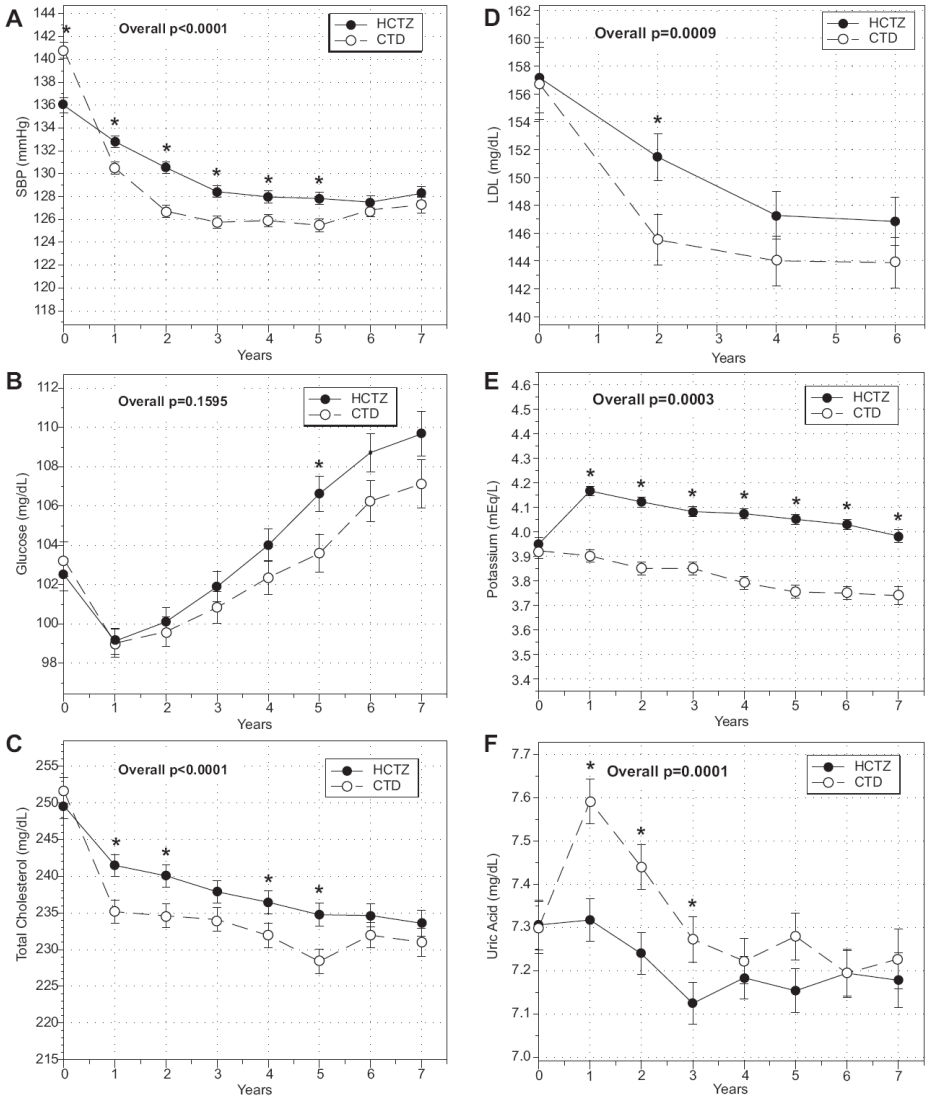
Michael P. Dorsch, Brenda W. Gillespie, Steven R. Erickson, Barry E. Bleske and Alan B. Weder

Hypertension 2011, 57:689-694: originally published online March 7, 2011

MRFIT study



Effects of CTD vs HCTZ on risk factors over time



Chlorthalidone Reduces Cardiovascular Events Compared With Hydrochlorothiazide : A Retrospective Cohort Analysis

Michael P. Dorsch, Brenda W. Gillespie, Steven R. Erickson, Barry E. Bleske and Alan B. Weder

Hypertension 2011, 57:689-694: originally published online March 7, 2011

베타차단제

1.6.11 Beta-blockers are not a preferred initial therapy for hypertension. However, beta-blockers may be considered in younger people, particularly:

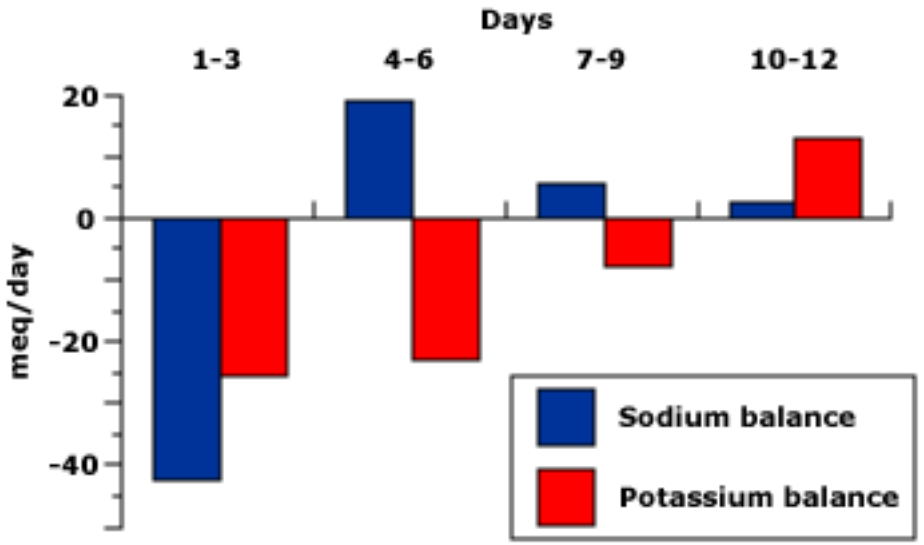
- those with an intolerance or contraindication to ACE inhibitors and angiotensin II receptor antagonists **or**
- women of child-bearing potential **or**
- people with evidence of increased sympathetic drive. **[2006]**

영국 NICE 지침 2011

이뇨제 부작용 감시를 위한 방문은 언제?

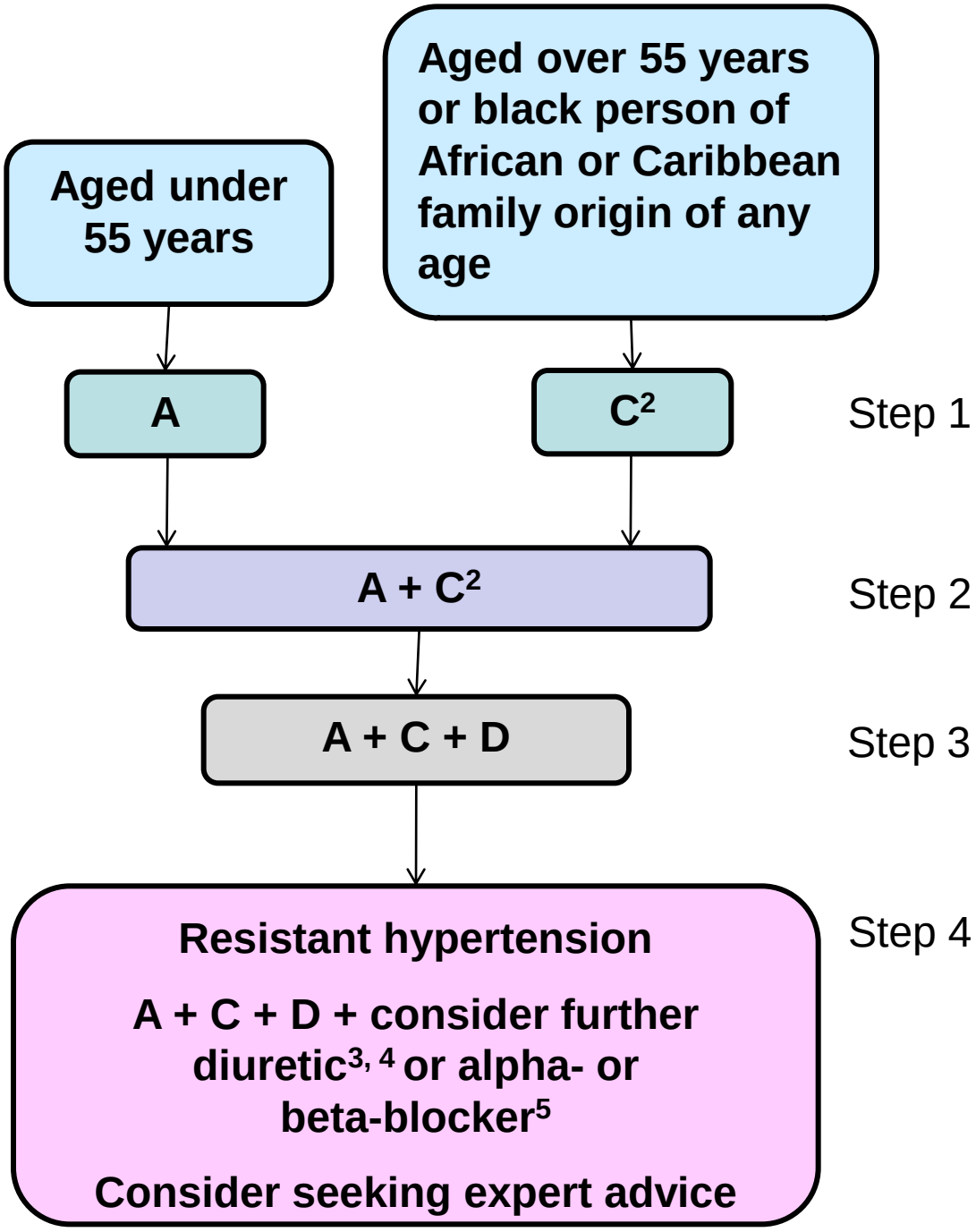
① 1 주
② 2-3주
③ 4-5주
④ 2 개월
⑤ 5개월

Thiazide 이뇨제 사용 후 전해질 변화



Changes in sodium and potassium balance (intake minus excretion) after the administration of 100 mg of hydrochlorothiazide to 3 normal subjects. Negative balance persisted for only three days for sodium and six days for potassium before a steady state was reestablished in which intake and excretion were roughly equal.
Data from Maronde, RF, Milgrom, M, Vlachakis, ND, Chan, L, JAMA 1983; 249:237.

- 2개월 후
  - 혈압이 150/92 mmHg
  - K=4.6 mEq/L, Cr= 1.4 mg/dL
- 다음 조치는?



BHS British Hypertension Society

NHS National Institute for Health and Clinical Excellence

Summary of antihypertensive drug treatment

Key

A – ACE inhibitor or angiotensin II receptor blocker (ARB)[1]

C – Calcium-channel blocker (CCB)

D – Thiazide-like diuretic

See slide notes for details of footnotes 1-5

Step 2 treatment

1.6.13 If blood pressure is not controlled by step 1 treatment, offer step 2 treatment with a CCB in combination with either an ACE inhibitor or an ARB[6]. **[new 2011]**

1.6.14 If a CCB is not suitable for step 2 treatment, for example because of oedema or intolerance, or if there is evidence of heart failure or a high risk of heart failure, offer a thiazide-like diuretic. **[new 2011]**

약제의 병용

12.5.2.2 Evidence statements - clinical

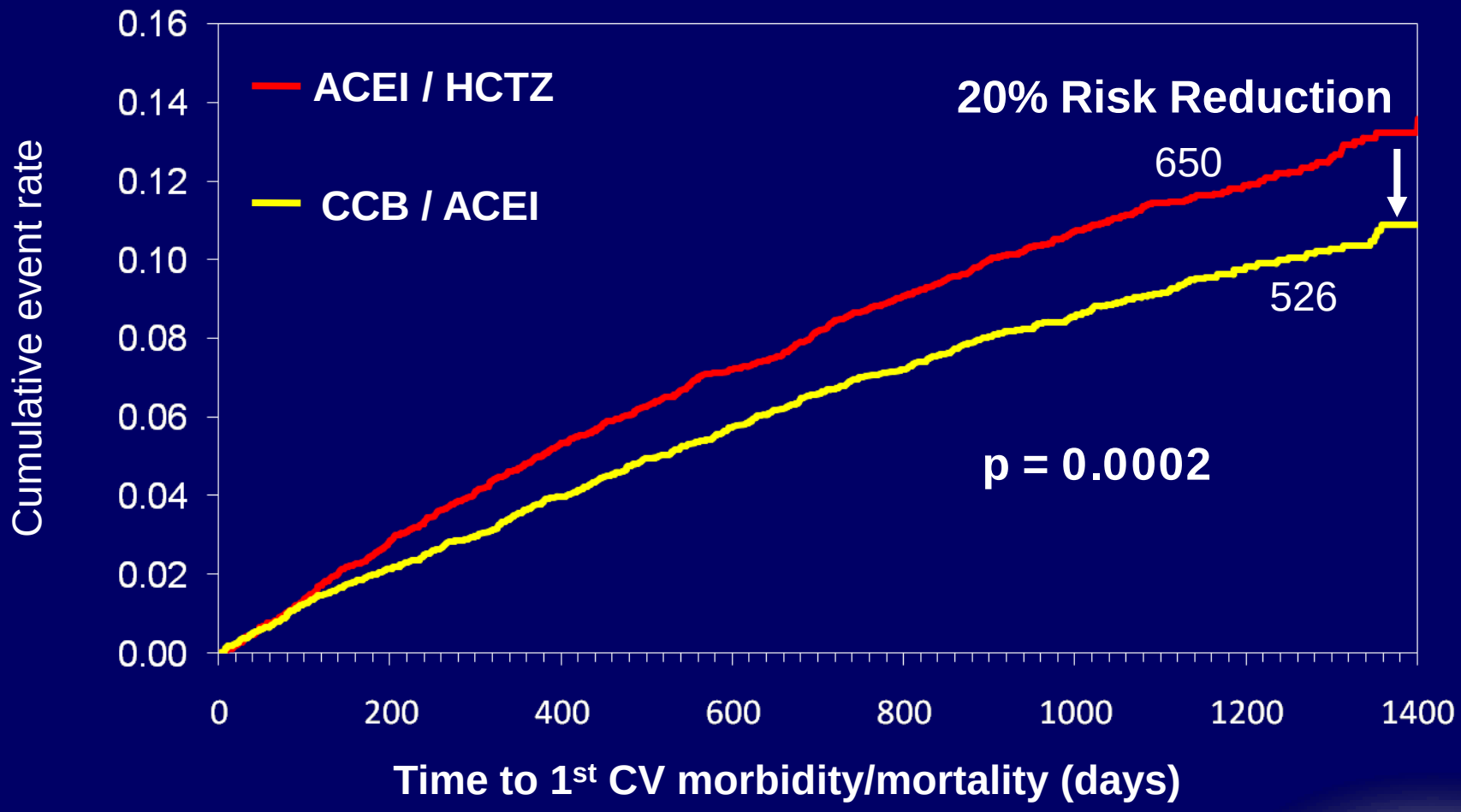
ACEi + CCB was significantly better than ACEi + D for:

- MI (fatal and non-fatal) [moderate quality evidence]
- less study drug withdrawals [moderate quality evidence]

There was NS difference between A+C and A+D for:

- mortality (all cause) [moderate quality evidence]
- stroke (fatal and non-fatal) [moderate quality evidence]
- hospitalisation for unstable angina [moderate quality evidence]
- coronary revascularisation [moderate quality evidence]
- new onset diabetes [moderate quality evidence]

Kaplan Meier for Primary Endpoint



HR (95% CI): 0.80 (0.72, 0.90)

ACCOMPLISH

Perindopril 4 mg추가하였다. 언제 K와 Creatinine을 측정하는 것이 좋을까?

① 1주 이내
② 2-4주
③ 1-2개월
④ 3-6개월
⑤ 1년

Recommended intervals to monitor for side effects after initiation or change in dose of ACEi or ARB therapy according to baseline values

Baseline Value	SBP (mm Hg)	≥120*	110-119	<110
	Baseline GFR (mL/min/1.73 m²)	≥60	30-59	<30
	Early GFR Decline (%)	<15	15-30	>30
	Serum Potassium (mEq/L)	≤4.5	4.6-5.0	>5.0
Interval (Weeks)		**4-12**	**2-4**	**≤2**

Clinicians are advised to evaluate each parameter and select the follow-up interval that requires the earliest follow-up.
*See Guideline 7, Table 90, for recommended intervals to reach blood pressure goal.

K/DOQI guideline

Recommended intervals to monitor for side effects of ACEi or ARB therapy after BP is at goal and dose is stable, according to baseline values

Baseline Value	SBP (mm Hg)	120-129	110-119	<110
	GFR (mL/min/1.73 m^2)	≥60	30-59	<30
	Early GFR Decline (%)	<15	<15	≥15
	Potassium (mEq/L)	≤4.5	4.6-5.0	>5.0
Interval (Months)		6-12	3-6	1-3

Clinicians are advised to evaluate each parameter and select the follow-up interval for the parameter that requires the earliest follow-up.

K/DOQI guideline

- 3개월 후 혈압 148/62mmHg 다음 조치는?

J-curve?

Prospective Studies Collaboration
No threshold down
to at least 115/75 mm Hg

one million adults with no previous vascular disease
in 61 prospective observational studies

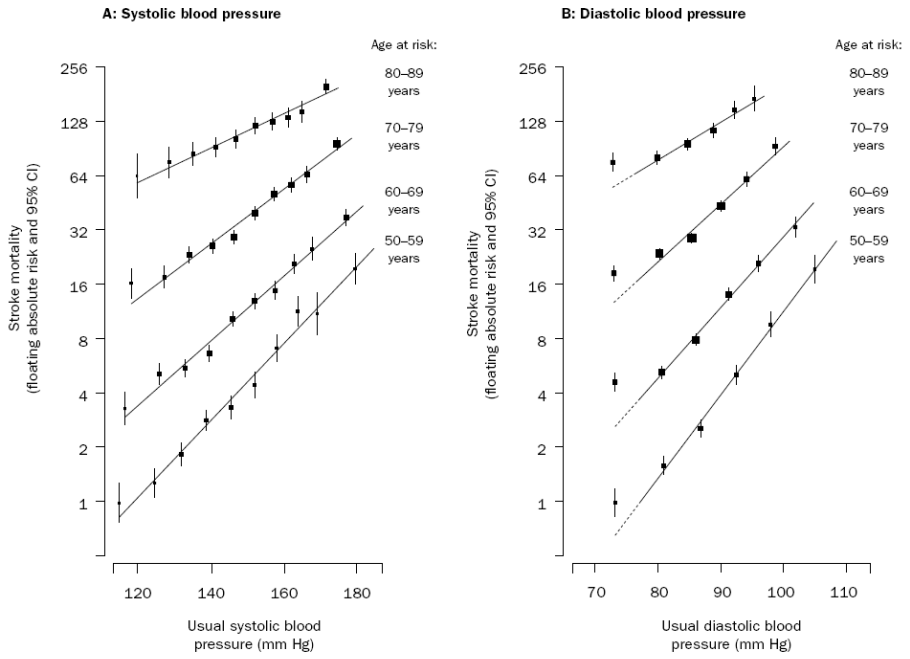


Figure 2: **Stroke mortality rate in each decade of age versus usual blood pressure at the start of that decade**

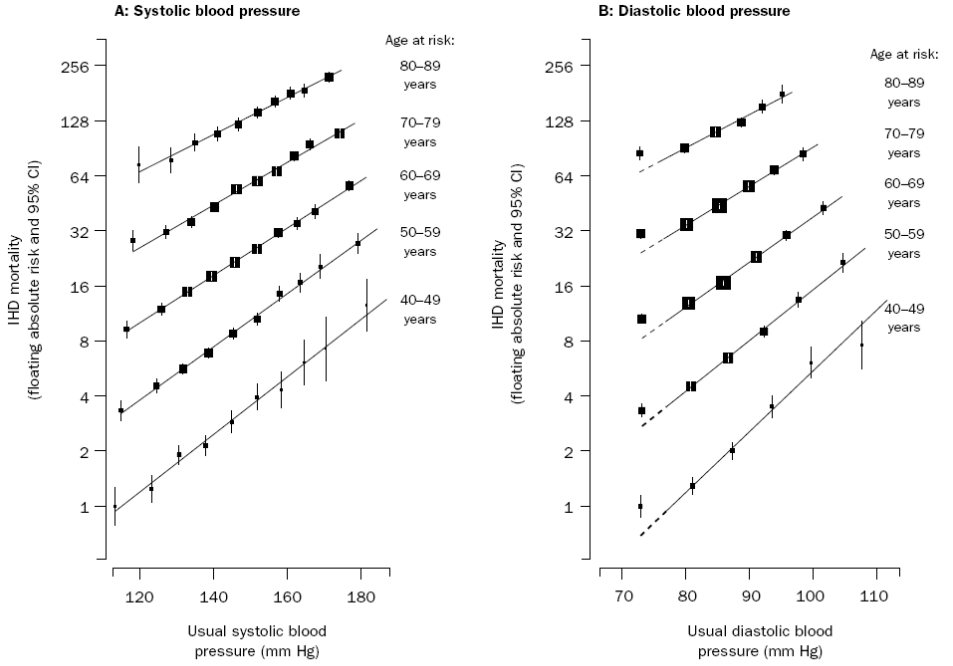
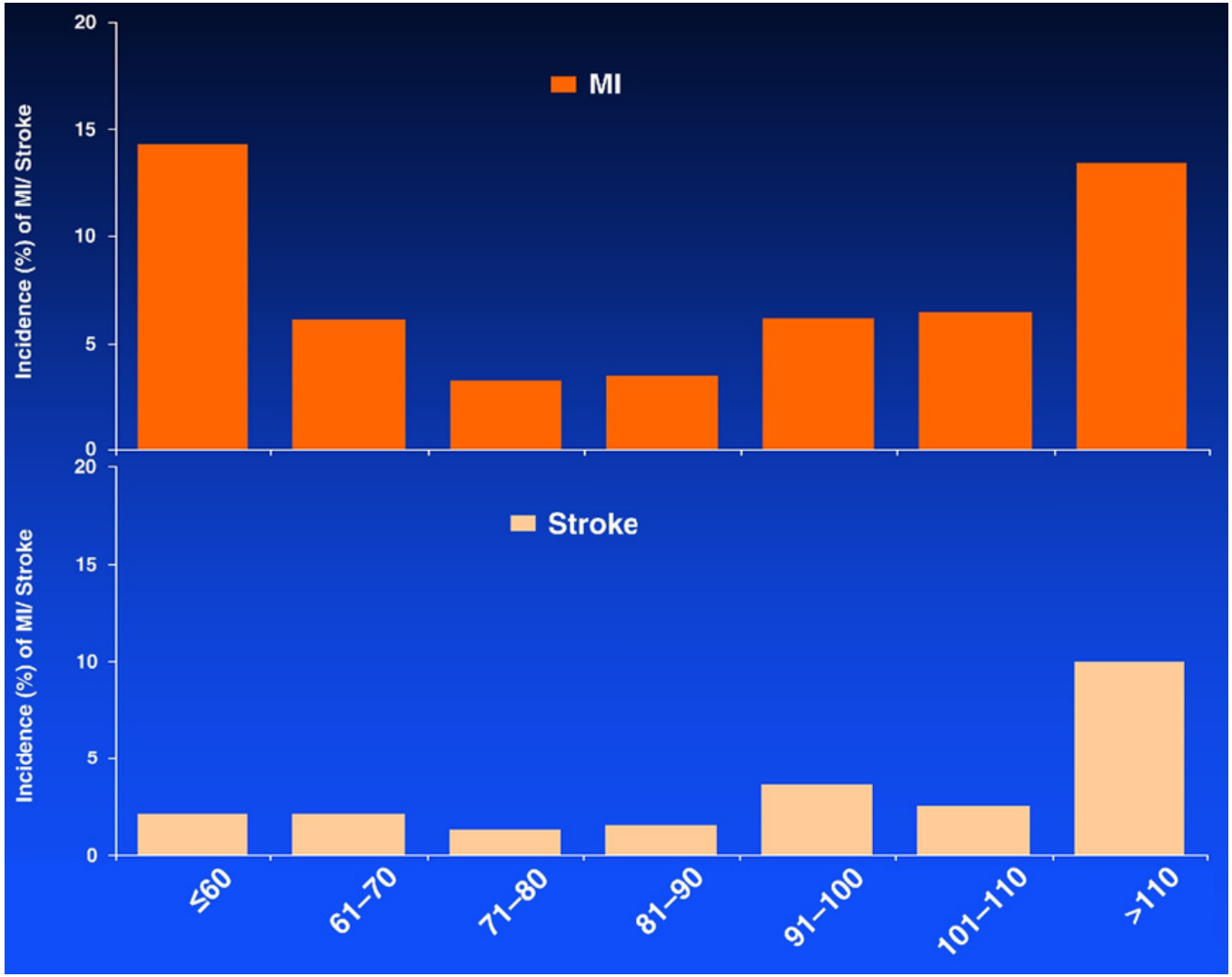


Figure 4: **Ischaemic heart disease (IHD) mortality rate in each decade of age versus usual blood pressure at the start of that decade**
Conventions as in figure 2.

심근경색과 뇌졸중의 빈도

Incidence of MI and Stroke Stratified by Diastolic Blood Pressure in the INVEST Study



J–curve

Table 1 Summary of Clinical Studies Reporting Association Between Low DBP and Adverse End Points

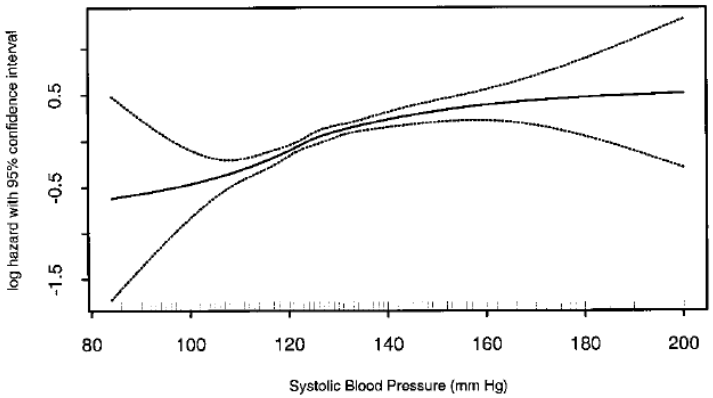
First Author/ Study Name (Ref. #)	Year	Subjects (n)	Mean Age (yrs)	Mean Entry DBP (mm Hg)	Includes Subjects With CVD	Mean Follow-Up (yrs)	J-Curve Relationship for DBP and Event			J-Point DBP (mm Hg)
							MI	Stroke	Total Mortality or Non-CV Events	
Cruickshank (7)	1987	902	55	109	Yes	6.1	Yes	No	No	85–90 (in ischemic patients only)
Fletcher (41)	1988	2,145	51	107	Yes	4.0	Yes	No	No	86–91
Abernethy (42)	1986	10,053	51	90–104	Yes	4.0	—	—	Yes	*26
Waller (43)	1988	3,350	50	110	Yes	6.5	Yes	No	No	91–98
Coope (44)	1986	884	68	98	Yes	4.4	Yes	—	—	80–89
Stewart (6)	1979	169	44	124	No	6.3	Yes	—	—	100–109
Alderman (45)	1989	1,765	51	102	Yes	4.2	Yes	No	—	84–88
Staessen (46)	1989	840	71	101	Yes	4.7	Yes	Yes	Yes	90–95
IPPPSH (47)	1985	6,357	52	108	No	4.0	Yes	—	—	92
ANBP (48)	1981	3,931	50	101	No	4.0	Yes	Yes	—	85–89
Wilhelmsen (49)	1987	6,569	40–60	107	No	3.9	Yes	Yes	Yes	86–89
Samuelsson (50)	1990	686	52	106	Yes	12.0	Yes	Yes	—	81
McCloskey (51)	1992	912	30–79	104	Yes	3–21	Yes	No	—	84
Lindblad (16)	1994	2,574	59	92	Yes	7.4	Yes	—	—	90–95
Somes (33)	1999	4,736	72	77	Yes	5.0	Yes	Yes	—	60–65
Hasebe (52)	2002	234	64	88	Yes	6.0	Yes	—	—	95–104
Pastor-Barriuso (53)	2003	7,830	54	82	No	15.0	Yes	Yes	—	80
Zanchetti (54)	2003	18,790	62	100–115	No	3.8	Yes	No	Yes (in smokers only)	80–85
Pepine (55)	2003	22,576	66	86	Yes	2.7	Yes	Yes	Yes	76.4–85.8
Kannel (36)	2004	7,798	35–80	—	No	10.0	Yes	Yes	No	80–89
Lubsen (38)	2005	7,661	63	80	Yes	4.9	Yes	Yes	Yes	—
Protegoru (39)	2007	331	85	—	Yes	3–4	Yes	Yes	Yes	<70
Fagard (40)	2007	4,695	70	85	Yes	1–8	Yes	Yes	Yes	*70–75

No J–curve?

Table 2 Summary of Clinical Studies Reporting No Clear Association Between Low DBP and Adverse End Points But Upon Further Inspection of Data Pointing to Existence of a J-Curve

First Author/ Study Name (Ref. #)	Year	Subjects (n)	Mean Age (yrs)	Mean Entry DBP (mm Hg)	Include Subjects With CAD	Mean Follow-Up (yrs)	MI	Stroke	Total Mortality or Non-CV Events	J-Point DBP (mm Hg)
Hansson (20)	1998	18,790	62.0	105.0	Yes	3.8	Yes	No	No	80–85*
Psaty (22)	2001	4,902	72.6	71.0	No	6.7	Yes	No	No	≤69
Glynn/PHS (19)	2002	22,071	53.2	78.8	No	13.0	Yes	No	No	65–70
Glynn/WHS (19)	2002	39,876	53.8	77.7	No	6.2	Yes	No	No	70

Physicians' Health Study
? No J-curve



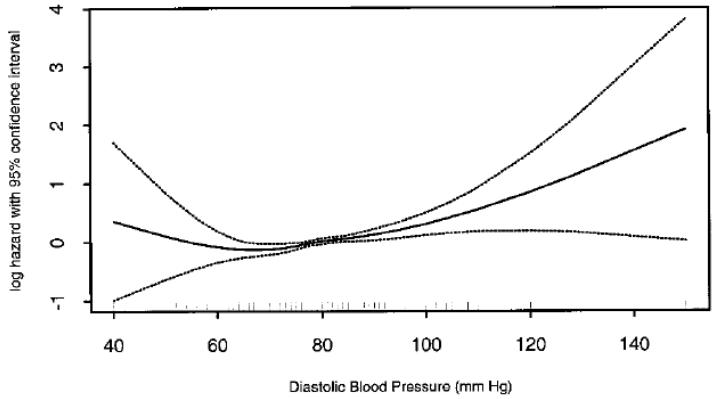
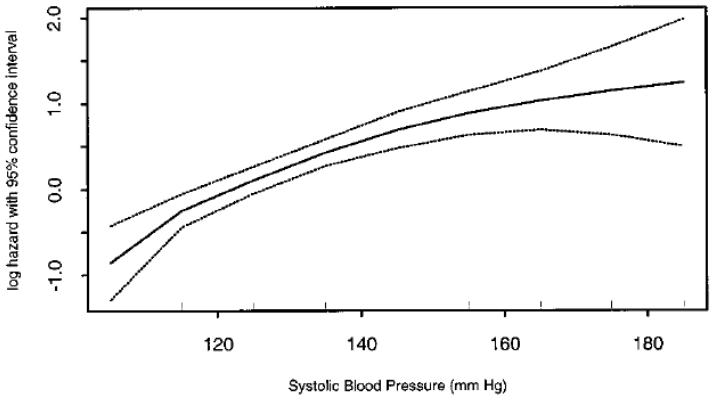


Figure 1. SBP, DBP, and the hazard of cardiovascular disease in men by use of cubic splines in a single Cox model controlling for covariates in Table 1.



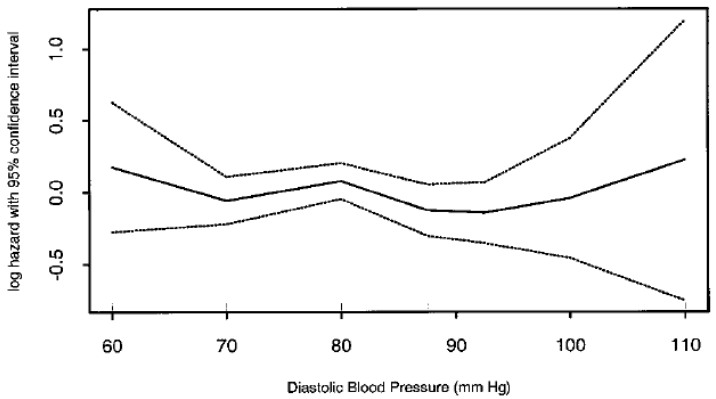


Figure 2. SBP, DBP, and the hazard of cardiovascular disease in women by use of cubic splines in a single Cox model controlling for covariates in Table 1.

Glynn RJ et al

Cardiovascular Health Study
Women's Health Study

Psaty BM, et al Arch Int Med 2001

Table 3. Risk of Myocardial Infarction by Blood Pressure Level and Quintiles of Blood Pressure in All 4902 Subjects*

		Unadjusted Model			Adjusted Model†		
	BP Range	HR (95% CI)	χ^2	*P*	HR (95% CI)	χ^2	*P*
Linear term							
1. Systolic BP	SD = 21.4	1.37 (1.27-1.48)	62.1	<.001	1.24 (1.15-1.35)	28.3	<.001
2. Diastolic BP	SD = 11.2	1.14 (1.05-1.24)	9.5	.002	1.13 (1.04-1.22)	8.3	.004
3. Pulse pressure	SD = 18.5	1.33 (1.24-1.43)	52.2	<.001	1.21 (1.12-1.31)	20.6	<.001
2-Term models							
4a. Systolic BP	SD = 21.4	1.40 (1.28-1.53)	63.0	<.001	1.25 (1.13-1.37)	28.3	<.001
4b. Diastolic BP	SD = 11.2	0.96 (0.87-1.05)			1.00 (0.91-1.10)		
5a. Systolic BP	SD = 21.4	1.29 (1.11-1.50)	63.0	<.001	1.24 (1.07-1.45)	28.3	<.001
5b. Pulse pressure	SD = 18.5	1.07 (0.92-1.25)			1.00 (0.85-1.17)		
6a. Diastolic BP	SD = 11.2	1.14 (1.05-1.24)	63.0	<.001	1.12 (1.03-1.21)	28.3	<.001
6b. Pulse pressure	SD = 18.5	1.34 (1.24-1.44)			1.21 (1.11-1.31)		
Quintiles							
7. Systolic BP							
1	≤125	1.00 Reference	77.0	<.001	1.00 Reference	44.4	<.001
2	>125 to ≤135	1.63 (1.26-2.11)			1.45 (1.12-1.88)		
3	>135 to ≤147	1.64 (1.27-2.11)			1.37 (1.06-1.77)		
4	>147 to ≤160	2.53 (1.96-3.27)			2.19 (1.70-2.84)		
5	>160	2.69 (2.08-3.49)			1.98 (1.52-2.58)		
8. Diastolic BP							
1	≤62	1.00 Reference	13.0	.01	1.00 Reference	10.5	.03
2	>62 to ≤69	0.93 (0.72-1.20)			0.98 (0.76-1.27)		
3	>69 to ≤75	1.10 (0.85-1.42)			1.13 (0.88-1.46)		
4	>75 to ≤82	1.26 (0.97-1.63)			1.34 (1.03-1.73)		
5	>82	1.42 (1.09-1.85)			1.37 (1.05-1.79)		
9. Pulse pressure							
1	≤56	1.00 Reference	68.5	<.001	1.00 Reference	32.4	<.001
2	>56 to ≤65	1.64 (1.28-2.12)			1.46 (1.13-1.88)		
3	>65 to ≤73	1.87 (1.44-2.42)			1.65 (1.27-2.15)		
4	>73 to ≤86	2.21 (1.72-2.83)			1.83 (1.42-2.37)		
5	>86	2.65 (2.05-3.44)			1.98 (1.50-2.60)		

JNC-VII

- There is no definitive evidence of an increase in risk of aggressive treatment (a J-curve) unless DBP is lowered to 55 or 60 mm Hg by treatment.

고혈압 관리
요약

- 진단
- 평가
- 치료
  - 시점
  - 약제선택, 병용
  - 목표혈압
  - J-curve 현상에 대한 고려