BRAUNWALD'S HEART DISEASE

CH. 46 SYSTEMIC HYPERTENSION: MECHANISM AND DIAGNOSIS

CH. 47 SYSTEMIC HYPERTENSION: MANAGEMENT

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CH 46. OUTLINE

CH 47.OUTLINE

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Review Article
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The 2017 Focused Update of the Guidelines of the Taiwan Society of Cardiology (TSOC) and the Taiwan Hypertension Society (THS) for the Management of Hypertension

Table 2. New BP targets

Categories	Targets (mmHg)	COR	LOE
Primary prevention	< 140/90	I	B
Secondary prevention			
Diabetes	< 130/80	I	B
CHD	< 120/NA[AOBP]	I	B
Stroke	< 140/90	I	A
CKD	< 120/NA[AOBP]	I	B
Elderly (age ≥ 75 years)	< 120/NA[AOBP]	I	B
Patients receiving antithrombotics for stroke prevention	< 130/80	I	B

AOBP, unattended automated office blood pressure measurement; BP, blood pressure; CHD, coronary heart disease; CKD, chronic kidney disease; COR, class of recommendation; LOE, level of evidence; NA, not available.

Table 3. Traditional office BP targets

Categories	Targets (mmHg)	COR	LOE
Primary prevention	< 140/90	I	B
Secondary prevention			
Diabetes	< 130/80	I	B
CHD	< 130/80	I	B
Stroke	< 140/90	I	A
CKD	< 140/90	I	A
CKD with proteinuria	< 130/80	IIb	C
Elderly (age ≥ 75 years)	< 140/90	I	B
Patients receiving antithrombotics for stroke prevention	< 130/80	I	B

BP, blood pressure; CHD, coronary heart disease; CKD, chronic kidney disease; COR, class of recommendation; LOE, level of evidence.

2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults

Whelton PK, et al.
2017 High Blood Pressure Clinical Practice Guideline

Table 6. Categories of BP in Adults*

BP Category	SBP		DBP
Normal	<120 mm Hg	and	<80 mm Hg
Elevated	120–129 mm Hg	and	<80 mm Hg
Hypertension			
Stage 1	130–139 mm Hg	or	80–89 mm Hg
Stage 2	≥140 mm Hg	or	≥90 mm Hg

*Individuals with SBP and DBP in 2 categories should be designated to the higher BP category.
BP indicates blood pressure (based on an average of ≥2 careful readings obtained on ≥2 occasions, as detailed in Section 4); DBP, diastolic blood pressure; and SBP systolic blood pressure.

JACC GUIDELINE COMPARISON
ACC/AHA Versus ESC/ESH on Hypertension Guidelines

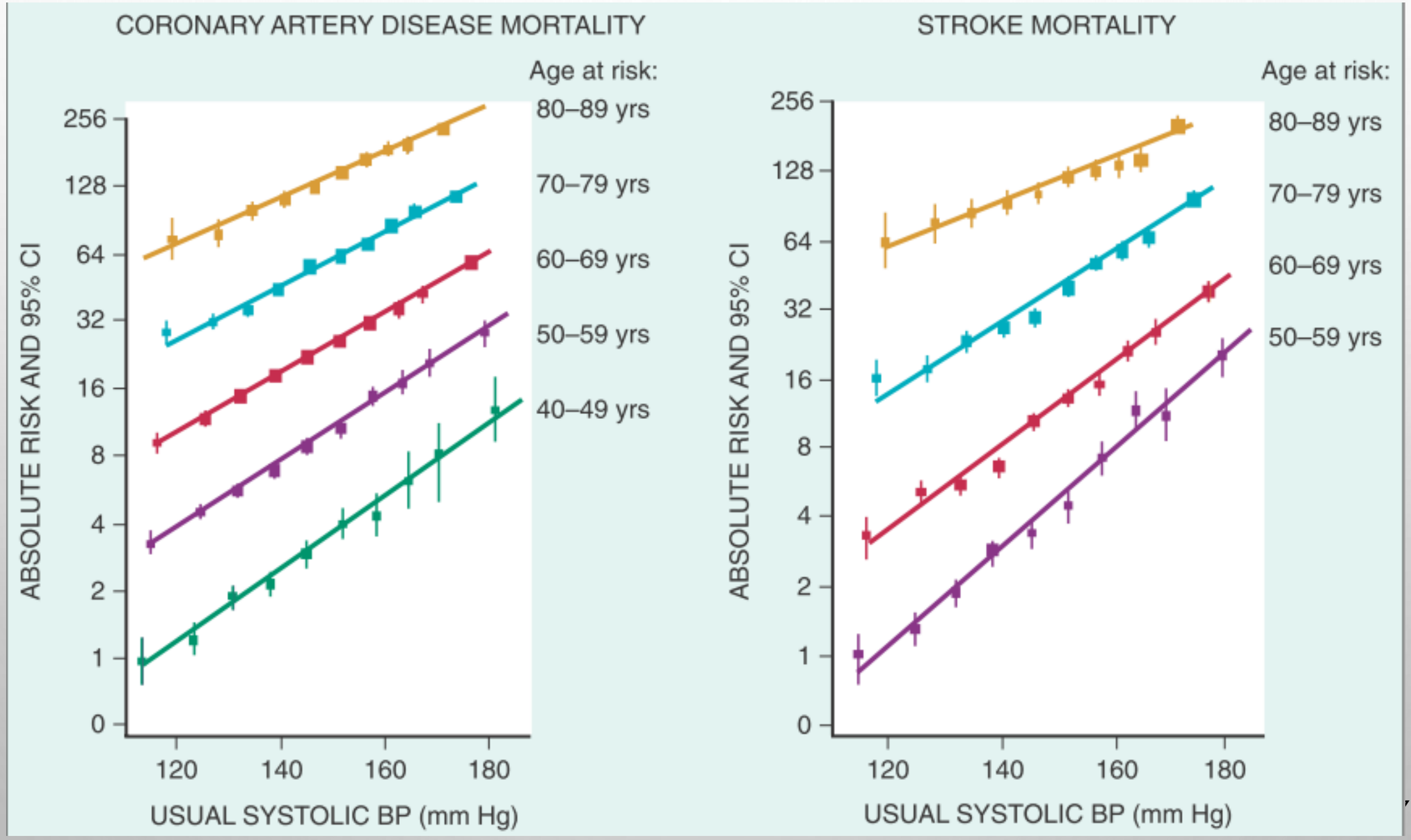
CENTRAL ILLUSTRATION: Comparison of American and European Society Definitions and Management of Hypertension

Guideline Differences	American College of Cardiology/American Heart Association (ACC/AHA)			European Society of Cardiology/European Society of Hypertension (ESC/ESH)		
Level of blood pressure (BP) defining hypertension	Systolic (mm Hg)	and/or	Diastolic (mm Hg)	Systolic (mm Hg)	and/or	Diastolic (mm Hg)
Office/Clinic BP	≥ 130		≥ 80	≥ 140		≥ 90
Daytime mean	≥ 130		≥ 80	≥ 135		≥ 85
Nighttime mean	≥ 110		≥ 65	≥ 120		≥ 70
24-hour mean	≥ 125		≥ 75	≥ 130		≥ 80
Home BP mean	≥ 130		≥ 80	≥ 135		≥ 85
BP targets for treatment	< 130/80 mm Hg			Systolic targets < 140 mm Hg and close to 130 mm Hg		
Initial Combination Therapy	Initial single-pill combination therapy in patients > 20/10 mm Hg above BP goal			Initial single-pill combination therapy in patients ≥ 140/90 mm Hg		
Hypertensive requiring intervention	> 130/80 mm Hg			≥ 140/90 mm Hg		

Guideline Similarities	ACC/AHA	ESC/ESH
Importance of home BP monitoring	• Take BP at home, twice in the morning and twice in the evening, in the week before clinic • Bring the BP machine in annually for validation	
Therapy	• Restrict beta blockers to patients with comorbidities or other indications • Initial single pill combination as initial therapy	
Follow-up	• Detect poor adherence and focus on improvement • BP telemonitoring and digital health solutions recommended	

Bakris, G. et al. J Am Coll Cardiol. 2019;73(23):3018-26.

ABSOLUTE RISKS OF CORONARY ARTERY DISEASE MOTALITY AND STROKE MORTALITY



PREVALENCE

- AGE<50: MEN>WOMEN
- MENOPAUSE: WOMEN INCREASES RAPIDLY
- 75 YEARS OF AGE — BELOW THE AVERAGE LIFE SPAN OF U.S. MEN AND WOMEN—ALMOST 90% WILL HAVE HYPERTENSION
- FROM 90% TO 95% : NO APPARENT SINGLE REVERSIBLE CAUSE OF ELEVATED BLOOD PRESSURE→ PRIMARY
- 5% TO 10% — CASES DESIGNATED AS SECONDARY OR IDENTIFIABLE

BLOOD PRESSURE VARIABILITY AND ITS DETERMINANTS--BEHAVIORAL

- INCREASE:
  - NICOTINE IN CIGARETTE SMOKE TRANSIENTLY RAISES BP BY 10-20MMHG
  - CAFFEINE IS CONSUMED IN DIET SODAS (NOT COFFEE-> SMALL TRANSIENT RISE IN BLOOD PRESSURE)
  - PHYSICAL INACTIVITY
  - CALORIES AND SODIUM
  - OBESITY
  - DECREASES WITH DIETARY POTASSIUM INTAKE
  - DECREASES IN FRESH FRUIT (LESS CITRATE)
- ALCOHOL:
  - HEAVY DRINKERS (THREE OR MORE DRINKS PER DAY, 14.0 GRAMS (0.6 OUNCES) OF PURE ALCOHOL

BLOOD PRESSURE VARIABILITY AND ITS DETERMINANTS-- GENETIC

- 70% OF THE FAMILIAL AGGREGATION OF BP IS ATTRIBUTED TO **SHARED GENES** RATHER THAN TO SHARED ENVIRONMENT
- 1 % TO 2% OF THE GENE MUTATIONS -> SALT-WASTING SYNDROMES (BARTTER AND GITELMAN SYNDROMES) → RESISTANCE AGAINST PRIMARY HYPERTENSION

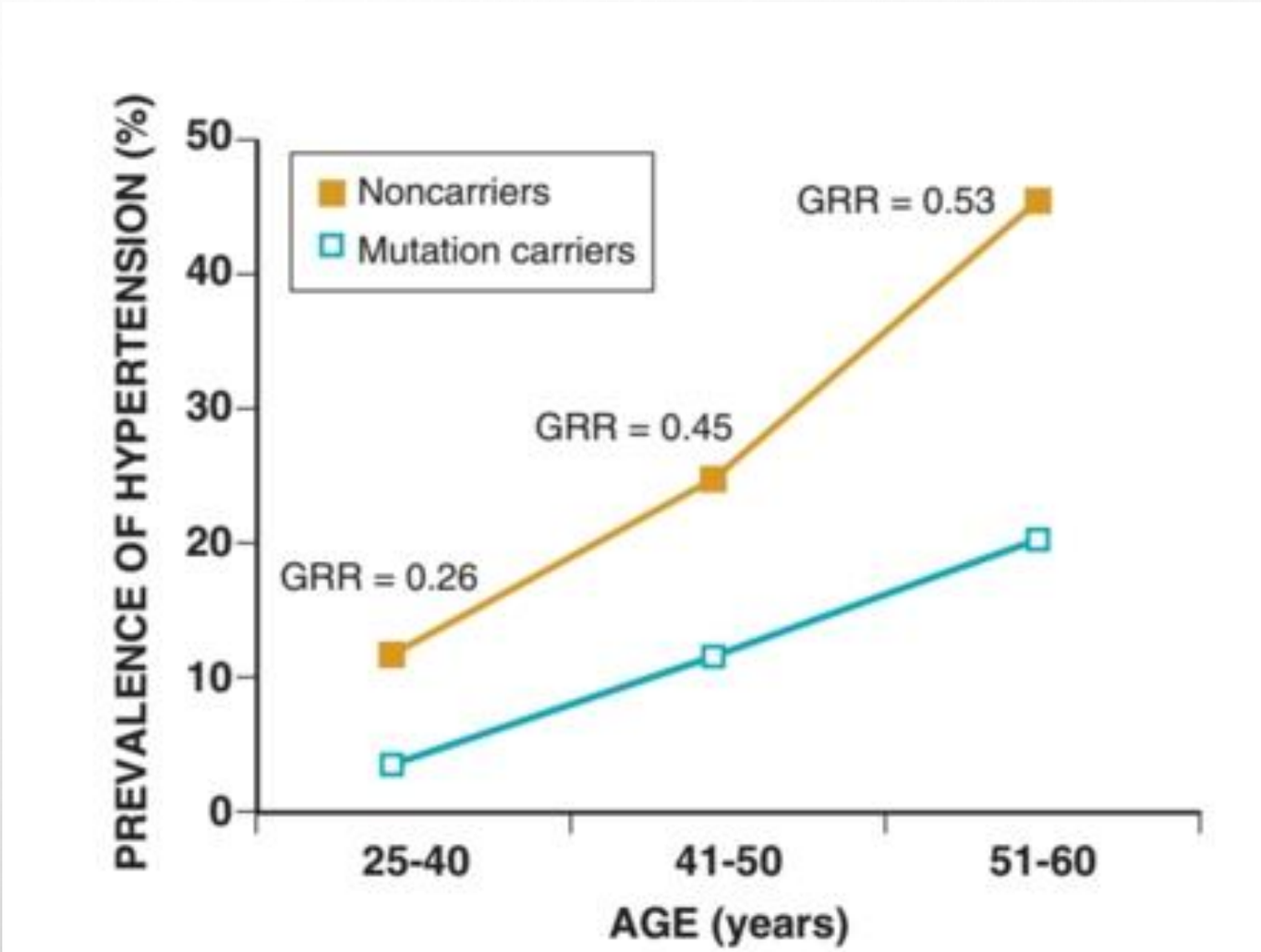


FIGURE 43-3 Reduced prevalence of hypertension among mutation carriers. Prevalence of hypertension at the last examination within ages 25 to 40, 41 to 50, and 51 to 60 years, for mutation carriers and noncarriers of genes causing Bartter and Gitelman syndromes. The genotype relative risk (GRR) for mutation carriers is shown. *(From Ji W, Foo JN, O'Roak BJ, et al: Rare independent mutations in renal salt handling genes contribute to blood pressure variation. Nat Genet 40:592, 2008.)*

SUBTYPES OF PRIMARY (ESSENTIAL) HYPERTENSION

- SYSTOLIC HYPERTENSION IN YOUNG ADULTS (17-25 Y/O)
  - INCREASED CARDIAC OUTPUT AND A STIFF AORTA (OVERACTIVE SYMPATHETIC NERVOUS SYSTEM)
  - 25% IN YOUNG MEN, 2% IN YOUNG WOMEN
  - ASSOCIATED WITH HYPERTENSION IN ELDERLY
- DIASTOLIC HYPERTENSION IN MIDDLE AGE (30-50 Y/O)
  - MORE COMMON IN MEN; **MIDDLE-AGE WEIGHT GAIN**
  - PROGRESSES TO COMBINED SYSTOLIC-DIASTOLIC HYPERTENSION
  - 80% DEVELOPED ISH
  - ELEVATED SYSTEMIC VASCULAR RESISTANCE COUPLED WITH AN INAPPROPRIATELY NORMAL CARDIAC OUTPUT
    - VASOCONSTRICTION AT THE LEVEL OF THE RESISTANCE ARTERIOLES RESULTS FROM INCREASED NEUROHORMONAL DRIVE AND AN **AUTOREGULATORY REACTION OF VASCULAR SMOOTH MUSCLE** → LATTER BECAUSE OF IMPAIRMENT IN THE KIDNEY'S ABLITIY TO EXCRETE SODIUM
- ISOLATED SYSTOLIC HYPERTENSION IN OLDER ADULTS(>50 Y/O) = ISH
  - MORE COMMON IN WOMAN (MAJOR RISK OF DIASTOLIC HEART FAILURE)
  - RESULTANT WIDENING OF PULSE PRESSURE INDICATES STIFFENING OF THE CENTRAL AORTA AND A MORE RAPID RETURN OF REFLECTED PULSE WAVES FROM THE PERIPHERY, CAUSING AN AUGMENTATION OF SYSTOLIC AORTIC PRESSURE

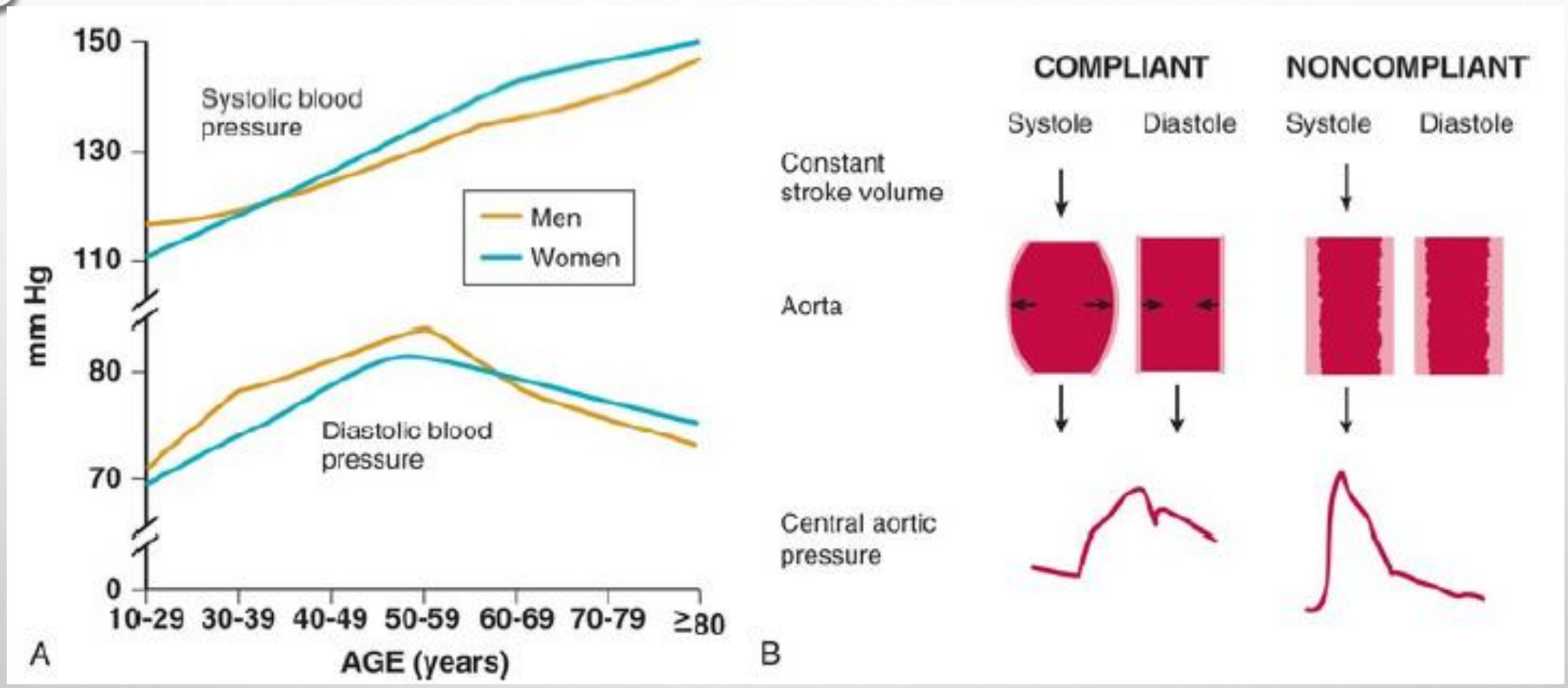


FIGURE 43-4

A, AGE-DEPENDENT CHANGES IN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE IN THE UNITED STATES. B, SCHEMATIC REPRESENTATION OF THE RELATIONSHIP BETWEEN AORTIC COMPLIANCE AND PULSE PRESSURE.

103 -C

139. 對於年輕成人的收縮性高血壓 (systolic hypertension in young adults) 的敘述，下列何者錯誤？

(A) 典型發病的年紀是 17 至 25 歲。

(B) 發生率在年輕男性中，可能高達 25%。但女性族群中，只有 2%。

(C) 造成的原因是增加 systemic vascular resistance 合併 in-appropriately normal cardiac output。

overactive sympathetic nervous system

(D) 測量 brachial artery BP 時可能會高估中心主動脈血壓，大約 20mmHg。

(E) 未來在中年時，易發展成舒張性高血壓 (diastolic hypertension)。

出自原文

103 -C

140. 對於中年人的舒張性高血壓 (diastolic hypertension in middle adults) 的敘述，下列何者錯誤？

(A) 典型發病的年紀是 30 至 50 歲。

(B) 男性較常見，大多與中年體重增加有關。

(C) 造成的原因是 overactive sympathetic nervous system，因而增加 cardiac output，並造成 stiff aorta。

(D) 若不治療，易進展至 systolic-diastolic hypertension。

(E) 易影響腎功能 excrete sodium 的能力。

elevated systemic vascular resistance coupled with an inappropriately normal cardiac output

103 -B

147. 有關老年人高血壓，下列何者錯誤？

(A) 老年人之收縮壓越來越高

(B) 老年人之舒張壓越來越高

(C) 老年人之脈壓 (Pulse pressure) 越來越大

(D) 老年人之器官血流之自主調節 (Autoregulation) 越來越差

(E) 老年人之血壓與心血管疾病風險之關聯越來越不明顯

NEURAL MECHANISM

- INCREASE SYMPATHETIC TONE

➢ OBESITY

REFLEX SYMPATHETIC ACTIVATION ➔ BURN FAT

➢ SLEEP APNEA

DESATURATION DURING APNEAS, ACTIVATION OF CAROTID BODY CHEMORECEPTORS

- BARO AND CHEMO RECEPTOR

➢ COMPLETE FAILURE : THROAT CA. S/P RADIATION

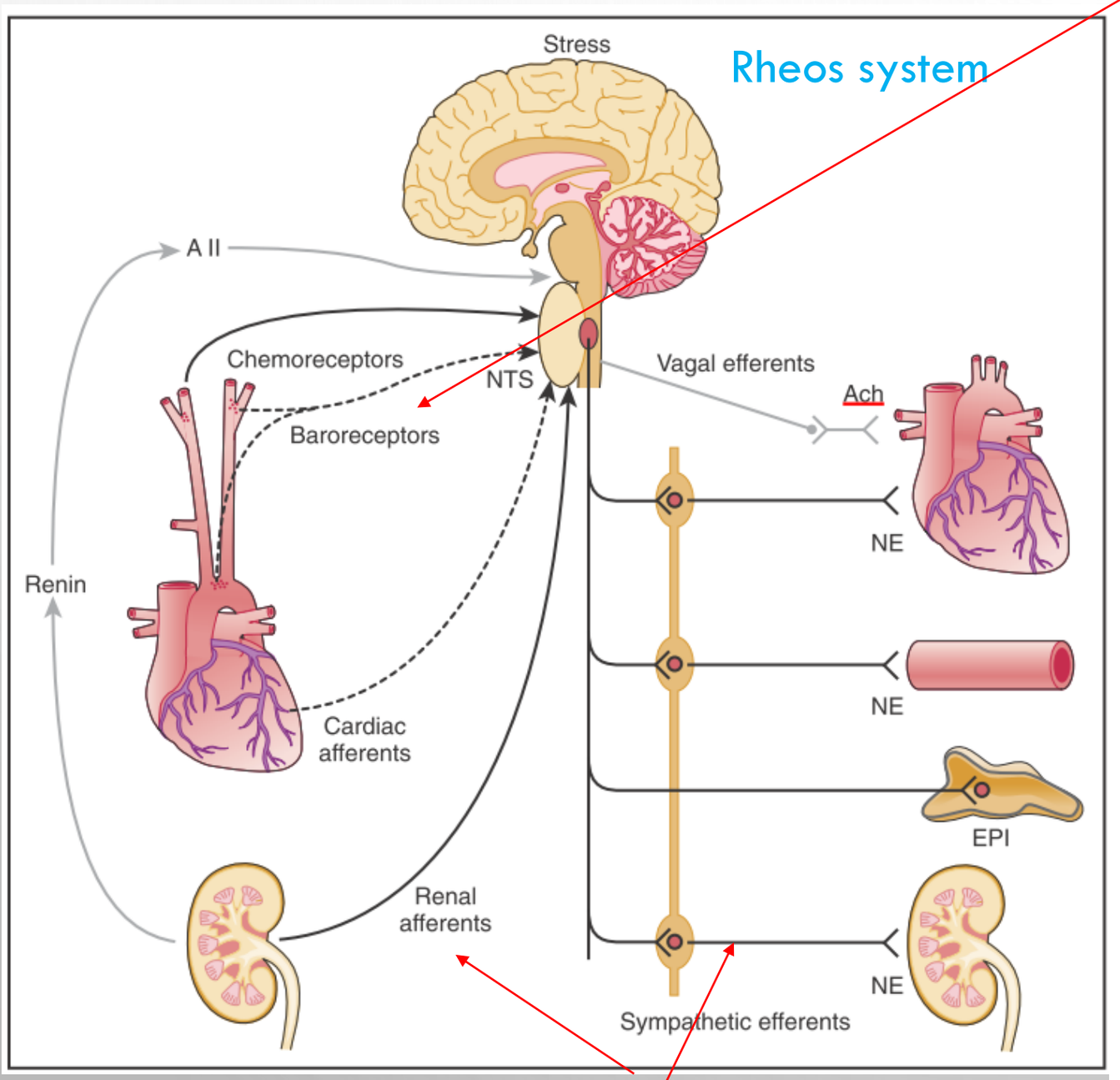
➢ PARTIAL FAILURE : ELDERLY

➢ →TRIAD : ORTHOSTATIC **HYPOTENSION**, SUPINE HTN, POSTPRANDIL HYPOTENSION

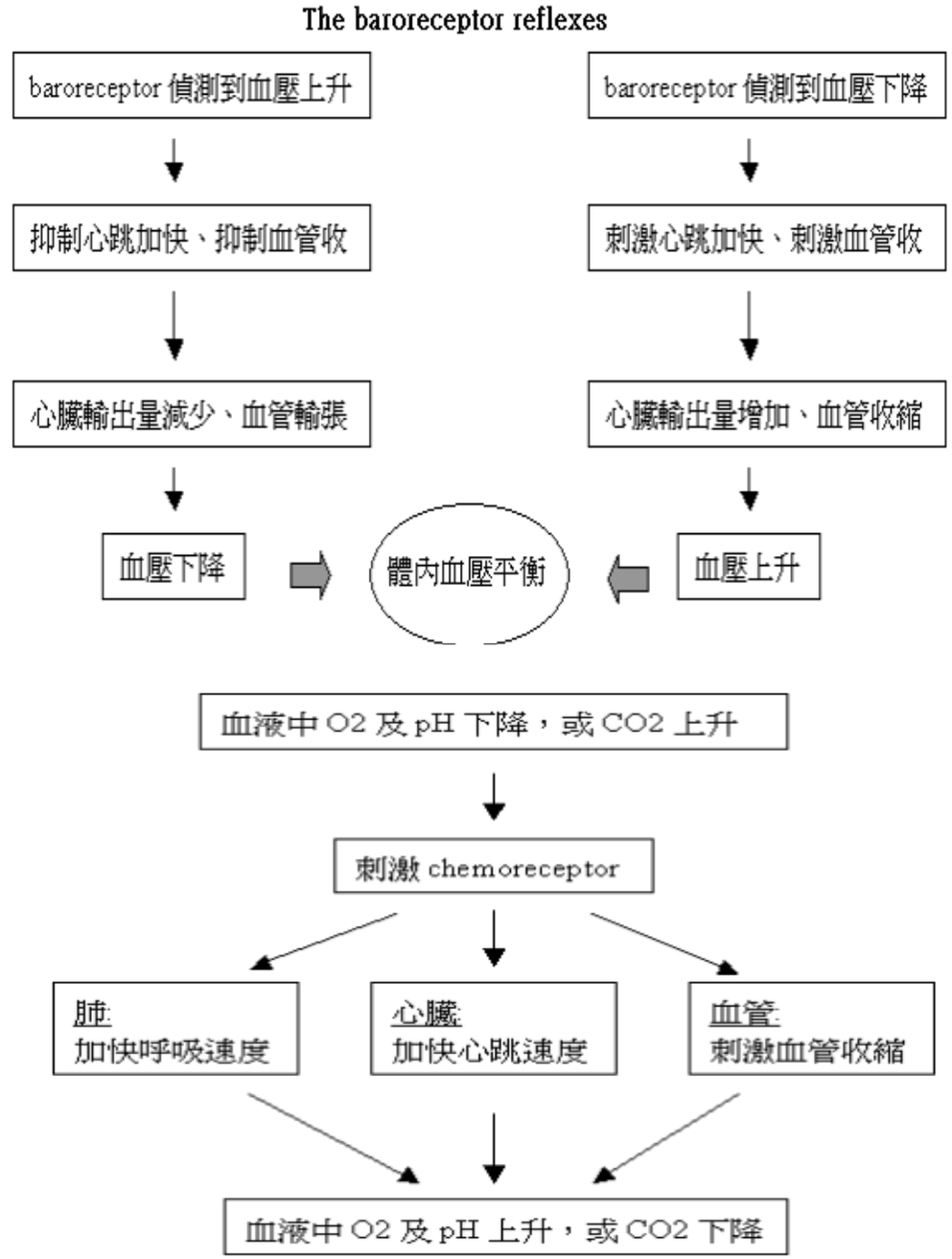
- LONG-TERM SYMPATHETIC REGULATION

BARO- AND CHEMO-RECEPTORS AND HYPERTENSION

surgical implantation of a carotid baroreceptor pacemaker



catheter-induced renal nerve ablation



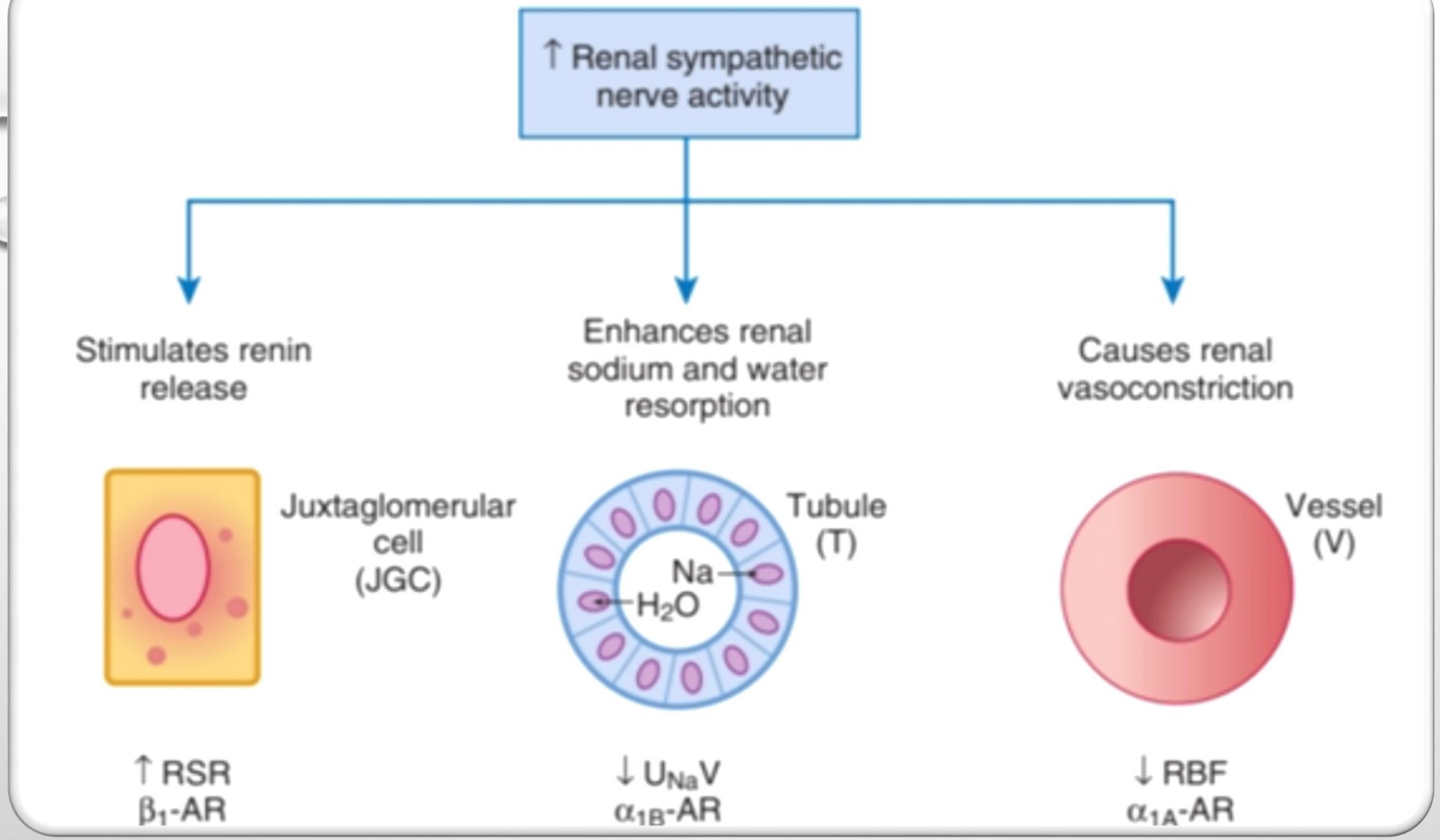


FIGURE 43-6 EFFECTS OF INCREASED RENAL SYMPATHETIC NERVE ACTIVITY ON THE THREE RENAL NEUROEFFECTORS : THE JUXTAGLOMERULAR GRANULAR CELLS WITH INCREASED RENIN SECRETION RATE (RSR) VIA STIMULATION OF THE BETA-1 ADRENOCEPTORS (B1-AR); THE RENAL TUBULAR EPITHELIAL CELLS (T) WITH INCREASED RENAL TUBULAR SODIUM REABSORPTION AND DECREASED URINARY SODIUM EXCRETION (UNAV) VIA STIMULATION OF ALPHA-1B ADRENOCEPTORS –(A1B-AR); AND THE RENAL VASCULATURE (V) WITH DECREASED RENAL BLOOD FLOW (RBF) VIA STIMULATION OF A1A-AR.

CONCEPTUAL FRAMEWORK BY WHICH DENERVATION OF RENAL AFFERENTS EXPLAINS ANCILLARY BENEFITS OF CATHETER-BASED RENAL DENERVATION

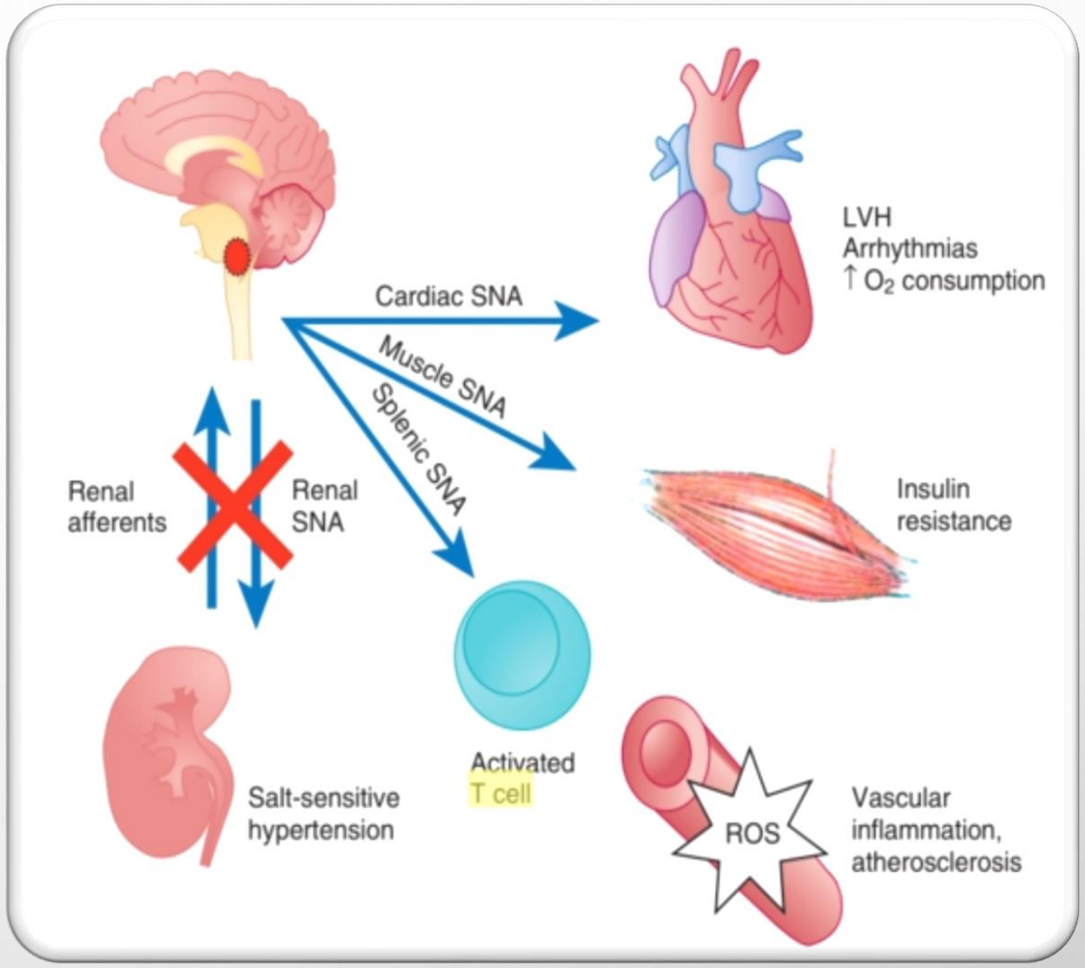


FIGURE 43-7 IN PATIENTS WITH DRUG-RESISTANT HYPERTENSION, OVERACTIVITY OF EFFERENT RENAL SYMPATHETIC NERVE ACTIVITY (SNA) CONTRIBUTES TO SALT-SENSITIVE HYPERTENSION, WHEREAS OVERACTIVITY OF RENAL SENSORY (AFFERENT) NERVES TRIGGERS SUSTAINED REFLEX INCREASES IN CARDIAC SNA (LEADING TO LEFT VENTRICULAR HYPERTROPHY, ARRHYTHMIAS, AND INCREASED OXYGEN CONSUMPTION), IN SKELETAL MUSCLE SNA (LEADING TO INSULIN RESISTANCE), AND IN SPLENIC SNA (ACTIVATING T CELLS, WHICH ARE HONED TO VASCULAR SMOOTH MUSCLE, STIMULATING REACTIVE OXYGEN SPECIES [ROS] THAT PROMOTE VASCULAR INFLAMMATION AND ATHEROSCLEROSIS)

102 -A

7. 下列引起原發性高血壓的原因中，何者與交感神經過度活動 (sympathetic overactivity) 較無關係？

(A) 鹽分敏感性 (salt-sensitive) 高血壓

(B) 肥胖

(C) 年輕人之原發性高血壓

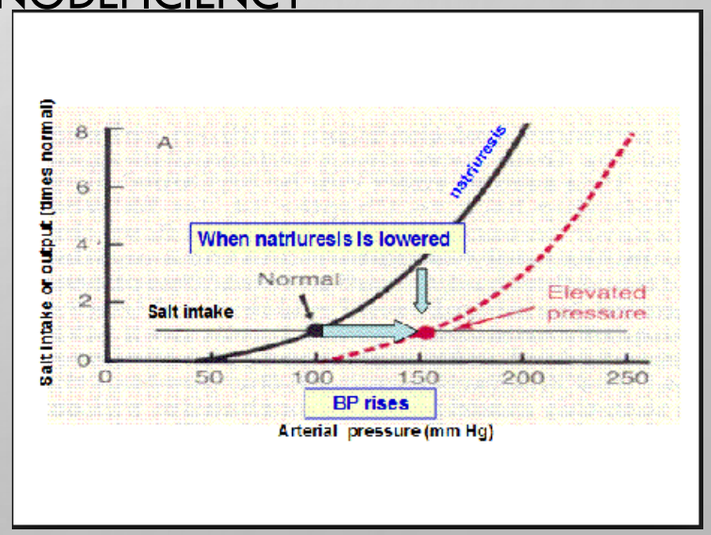
(D) 阻塞型睡眠呼吸中止症 (obstructive sleep apnea)

(E) 慢性腎病 (chronic kidney disease)

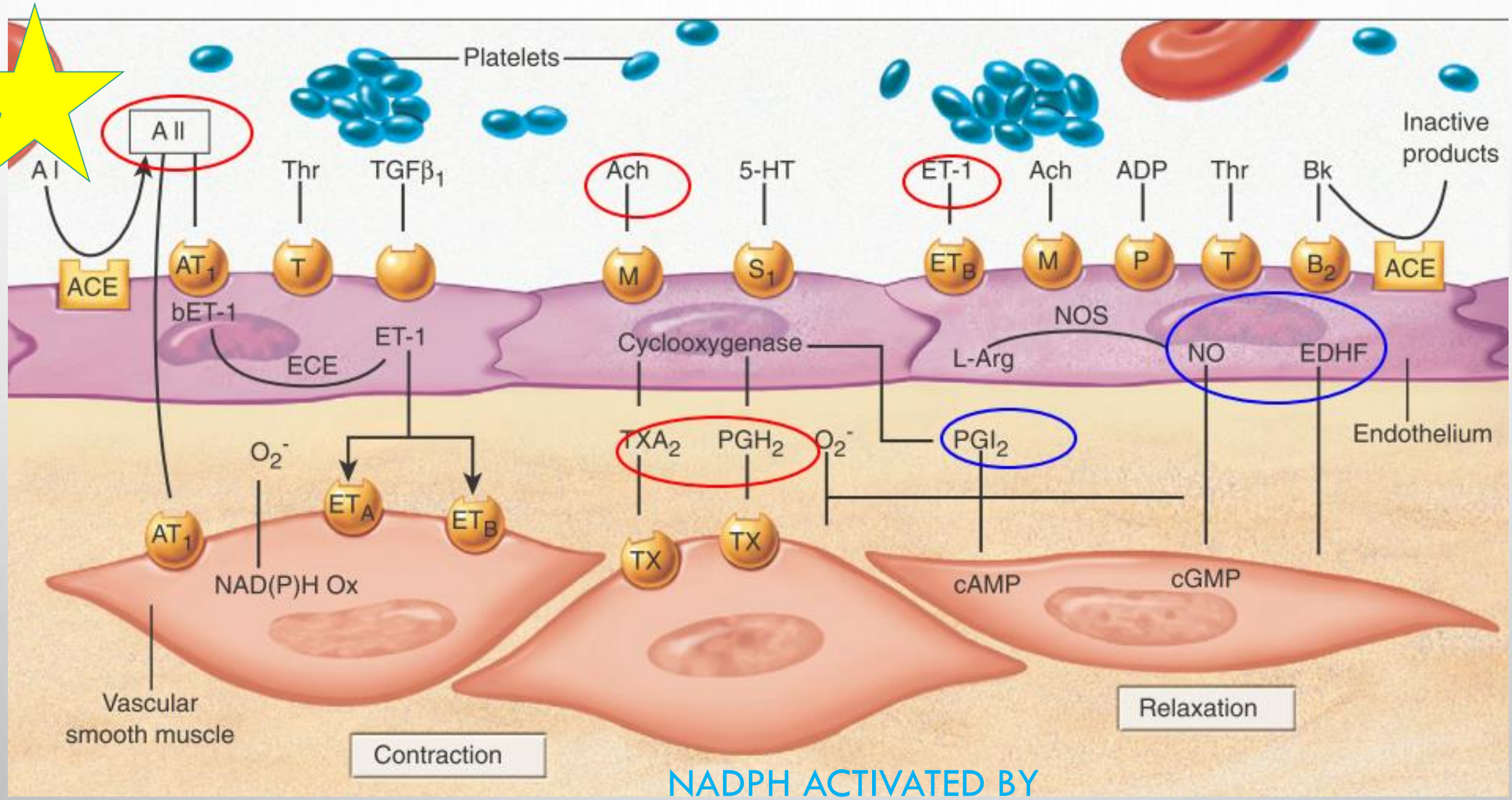
A sympathetic component may contribute to the pathogenesis of hypertension associated with obesity, sleep apnea, metabolic syndrome, CKD, heart failure and immunosuppressive tx with cakcineurin inhibitors such as cyclosporine ----------原文

RENAL MECHANISMS

- SODIUM LOAD : MEN CONSUME AN ESTIMATED 10.7 G OF NACL DAILY, AND WOMEN 7.3 G,
  - 5.8G IN GENERAL, 3.7G IN HTN
    - RENAL SODIUM RETENTION -> INCREASING CARDIAC OUTPUT AND TRIGGERING AUTOREGULATORY RESPONSES -> INCREASE SYSTEMIC VASCULAR RESISTANCE
- RESETTING OF PRESSURE-NATRIURESIS ---- IN HYPERTENSION THE PRESSURE NAREIURSIS CURVE TURNED TO RIGHT
- LOW BIRTH WEIGHT
  - INCREASES THE RISK FOR DEVELOPMENT OF ADULT SALT-DEPENDENT HYPERTENSION
- GENETIC CONTRIBUTIONS
  - SALT-SENSITIVE HYPERTENSION
  - AFIRCAN ORIGIN→ FOCAL GLOMERULOSCLEROSIS, ACQUIRED IMMUNODEFICIENCY SYNDROME (AIDS), HYPERTENSIVE NEPHROPATHY



VASCULAR MECHANISMS
ENDOTHELIAL CELL DYSFUNCTION



NADPH ACTIVATED BY
NOS (in tetrahydrobiopterin deficient), CIRCULATING AII
Xathine Oxidase

constricting, proinflammatory, prothrombotic, and growth factors

impaired release of endothelium-derived relaxing factors

NO

- THE ENDOTHELIUM OF ALL BLOOD VESSELS EXPRESSES THE ENZYME NITRIC OXIDE SYNTHASE(NOS), WHICH CAN BE ACTIVATED BY BRADYKININ, ACETYLCHOLINE, OR CYCLIC LAMINAR SHEAR STRESS.
- NITRIC OXIDE SYNTHASE GENERATES NITRIC OXIDE, A VOLATILE GAS THAT DIFFUSES TO THE ADJACENT VASCULAR SMOOTH MUSCLE AND ACTIVATES A SERIES OF G KINASES THAT CULMINATE IN VASODILATION

102 -E

8. 下列選項中，何者與內皮細胞一氧化氮 (nitric oxide, NO) 路徑活化較無關係？
   (A) Acetylcholine
   (B) Bradykinin
   (C) 層流剪力 (laminar shear stress)
   (D) Endothelin
   (E) Prostacyclin (PGI_2)

102 -C

21. 下列關於 Nitric oxide (NO) 的描述何者為非？

(A) NO 會使 vagal nerve 分泌 acetylcholine 使心跳降低。

(B) NO 會活化 Guanylate cyclase 增加 cGMP，進而抑制 calcium channel。

(C) 血管內皮細胞上 NO 主要由 eNOS 生成，當血管內血流量增加時會減少 NO 生成。

(D) Cardiogenic 或 septic shock 時心肌細胞也可經 iNOS 產生 NO。

(E) Phosphodiesterase type 5 inhibitor 可減少 cGMP 被代謝而增強 NO 效果。

103 -D

22. 有關 NO (nitric oxide) 的描述, 下列何者錯誤？

(A) NO 的產生會因為缺氧, thrombin 增加，以及 adenosine diphosphate 濃度增加…等等狀況而被強化。

(B) 在粥狀動脈硬化的血管當中，乙醯膽鹼會造成強烈的平滑肌收縮。

(C) NO 是在內皮細胞內因為 NO synthase 活化 L-arginine 等等的受質而形成。

(D) NO 同時也可以刺激平滑肌裡的 cyclic adenosine monophosphate (c-AMP) 的增加。

(E) 藥物裡的 nitroglycerin 以及 prostacyclin 所產生血管擴張效果是不完全需要依賴內皮細胞產生的 NO 來形成的。

103 -E

28. 血管內皮細胞上可分泌或與其相關之 relaxing factor(s)有數種，但下列何者不是所謂的 relaxing factor(s)？

(A) Nitric oxide (NO)

(B) Prostaglandin I_2 (PGI_2)

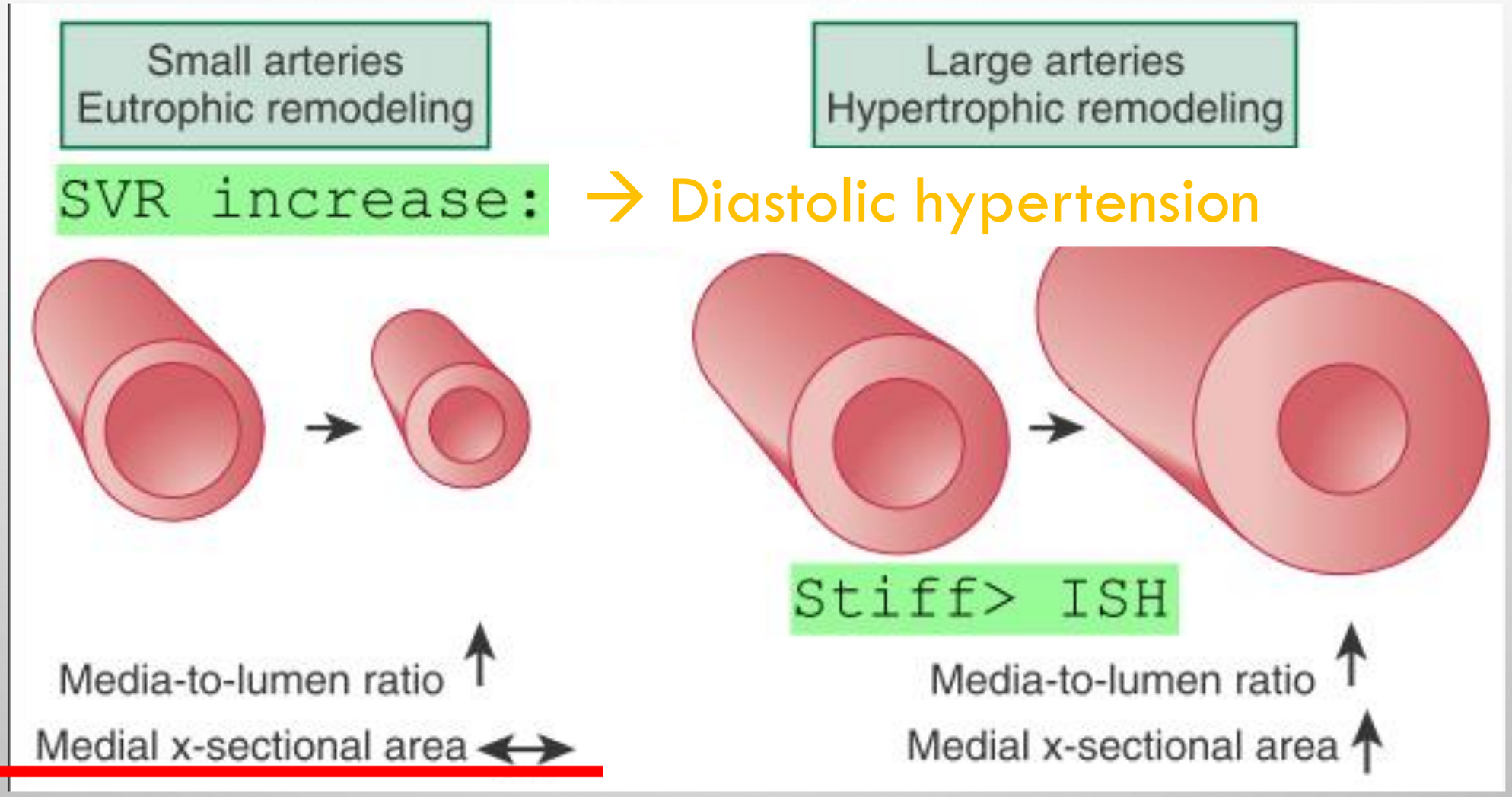
(C) Endothelium-derived hyperpolarizing factor (EDHF)

(D) Bradykinin (BK)

(E) Prostaglandin H_2 (PGH_2) contraction

VASCULAR MECHANISMS
VASCULAR REMODELING

growth factor-beta (TGF-β)



102 -B

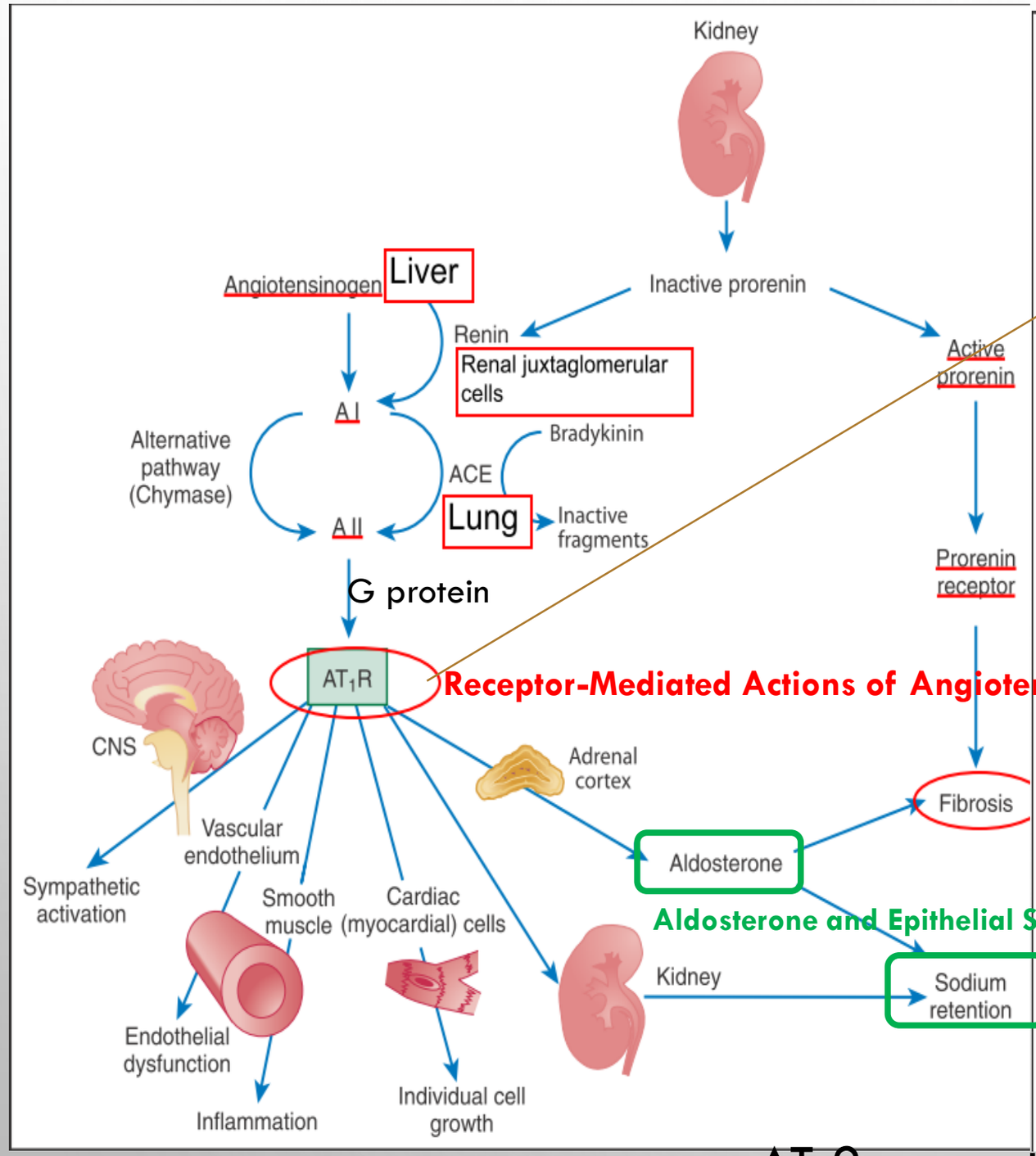
27. 高血壓之血管重塑 (vascular remodeling) 下列敘述何者有誤？

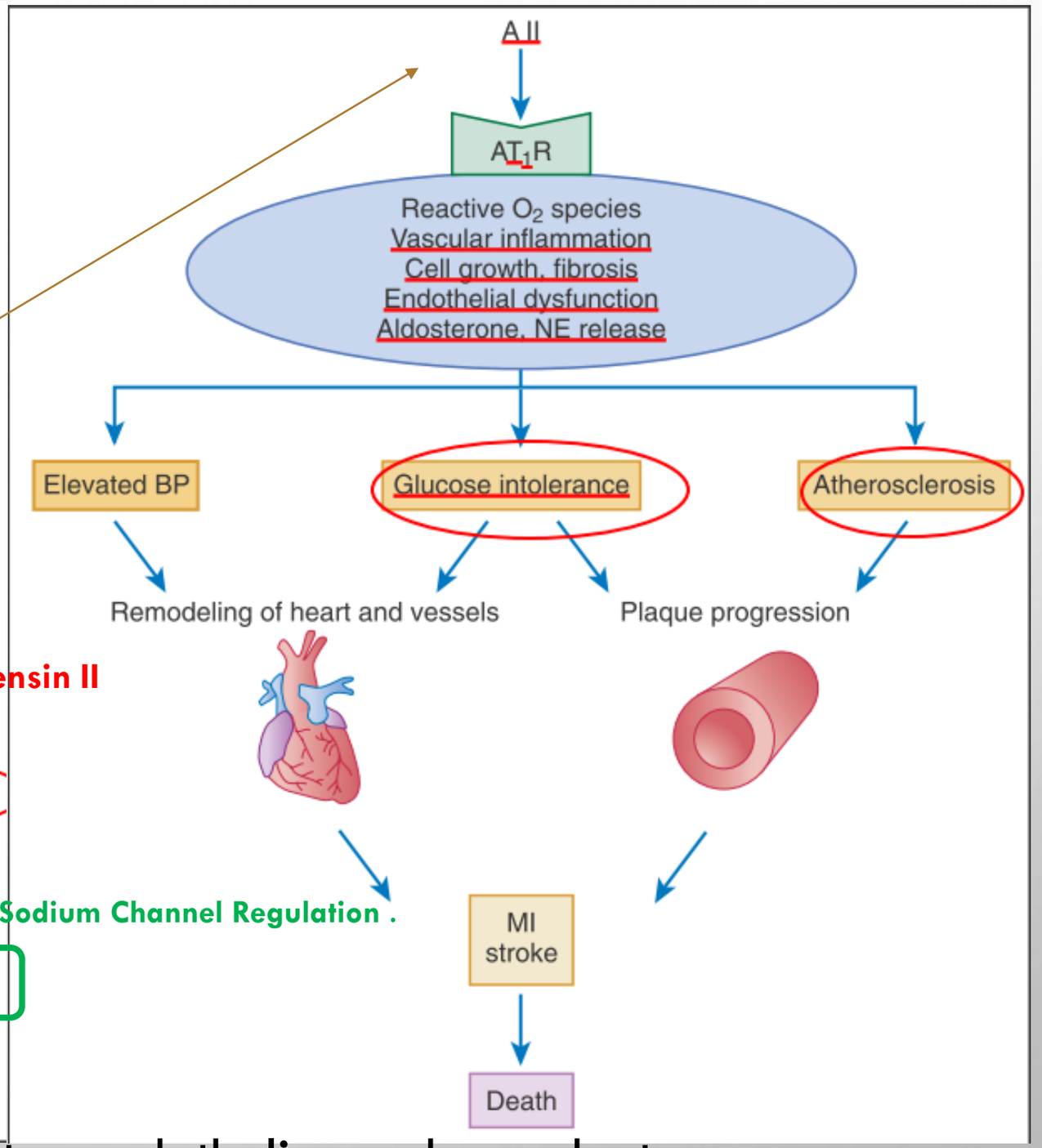
a. 增加血管中層對管腔比 (media-to-lumen ratio)。
b. 大動脈之血管重塑產生較小之管腔，但血管中層厚度不變 (eutrophic remodeling)。

c. 小動脈之血管重塑產生較厚之血管中層 (hypertrophic remodeling)。
d. 舒張期高血壓 (diastolic hypertension) 與大動脈之 hypertrophic remodeling 關係密切。
e. 獨立收縮期高血壓 (isolated systolic hypertension, ISH) 與大動脈之 hypertrophic remodeling 關係密切。

(A) a b c
(B) b c d
(C) c d e
(D) b d e
(E) a b e

HORMONAL MECHANISMS: RAAS
RENIN-ANGIOTENSIN-ALDOSTERONE SYSTEM (RAAS)



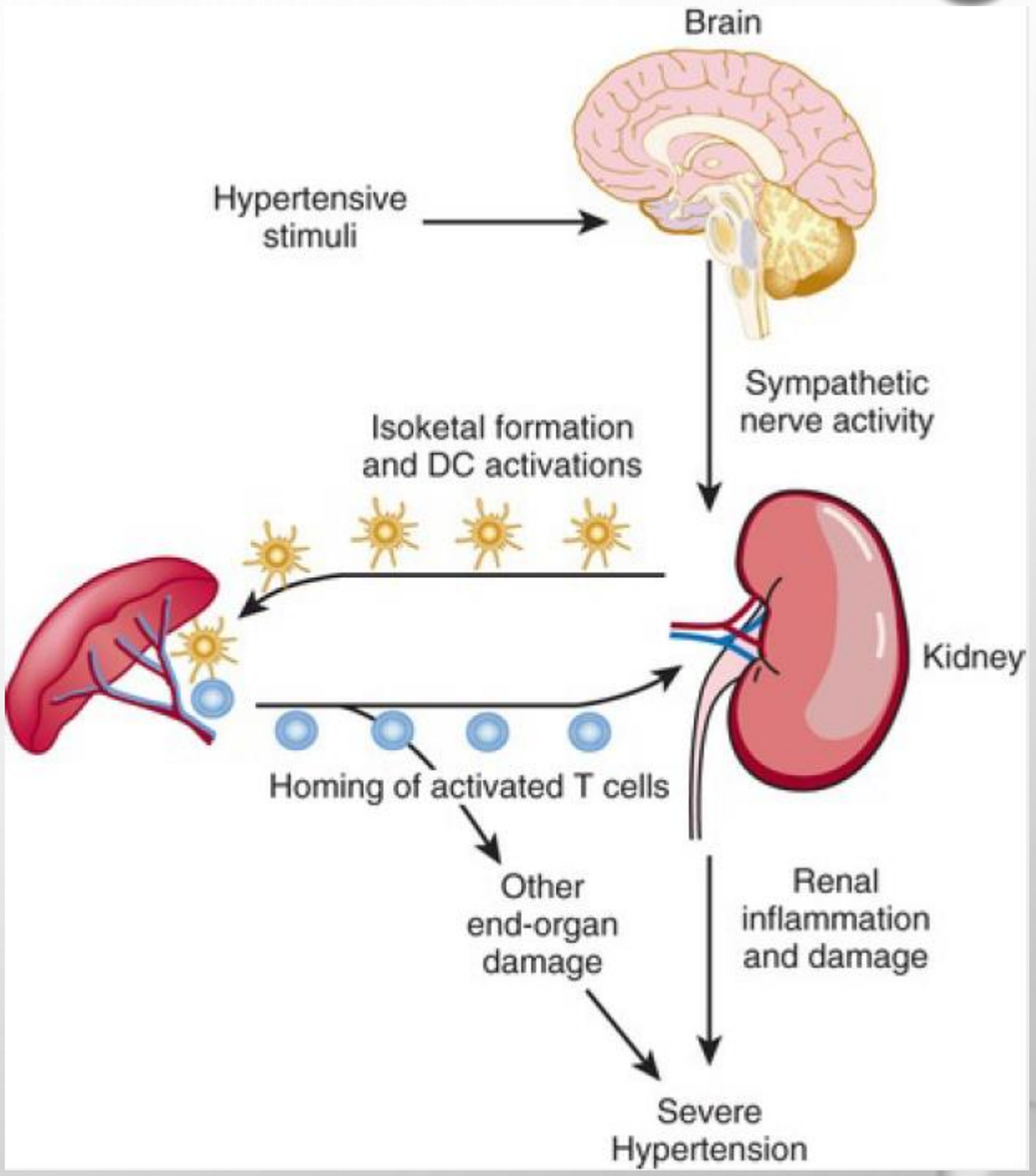


AT 2 receptor endothelium- dependent vasodilation by bradykinin and nitric oxide

VASCULAR INFLAMMATORY CELLS AND HYPERTENSION

FIGURE 46.11

PROPOSED SCHEME FOR THE CONTRIBUTION OF RENAL SYMPATHETIC NERVES IN THE ACTIVATION OF ADAPTIVE IMMUNITY IN HYPERTENSION. HYPERTENSIVE STIMULI SUCH AS ANGIOTENSIN II AND SODIUM ACT IN THE CENTRAL NERVOUS SYSTEM TO INCREASE RENAL SYMPATHETIC NERVE ACTIVITY. THE SYMPATHETIC ACTIVATION PROMOTES INFLAMMATION AND DAMAGE IN THE KIDNEY AND OTHER ORGANS (ESPECIALLY THE SYSTEMIC VASCULATURE) LEADING TO SEVERE HYPERTENSION. THE MECHANISM INVOLVES ACCUMULATION OF PROTEINS OXIDIZED BY HIGH REACTIVE GAMMA KETO-ALDEHYDES TERMED *ISOKETALS* IN ANTIGEN-PRESENTING *DENDRITIC CELLS* (DC), WHICH IN TURN PROMOTE T CELL ACTIVATION. THE ACTIVATED T CELLS ARE HOMED BY LOCAL EXPRESSION OF ADHESION MOLECULES (E.G., VCAM-1) TO PERINEPHRIC FAT (AND PERIVASCULAR FAT), WHERE THEY PRODUCE PROINFLAMMATORY CYTOKINES (E.G., IL-17, TNF-A) CAUSING RENAL (AND VASCULAR) INFLAMMATION AND DAMAGE.



101 -B

22. 下列有關高血壓對 T 細胞的敘述何者錯誤?

(A) 當交感神經興奮時，會影響脾臟釋放出 T 細胞參與血管生理反應的過程。

(B) 交感神經興奮會活化的 T 細胞，並促使血管細胞內活性氧自由基 (reactive oxygen species; ROS) 的產生，進而減少血管內皮細胞分泌 NO。

(C) 高血壓會刺激 (angiotensin II) 產生，並直接作用於 T 細胞。

(D) 交感神經興奮活化的 T 細胞，會影響腎臟對水分的調控。

(E) 交感神經興奮活化的 T 細胞，會影響腎臟對鹽分的調控。

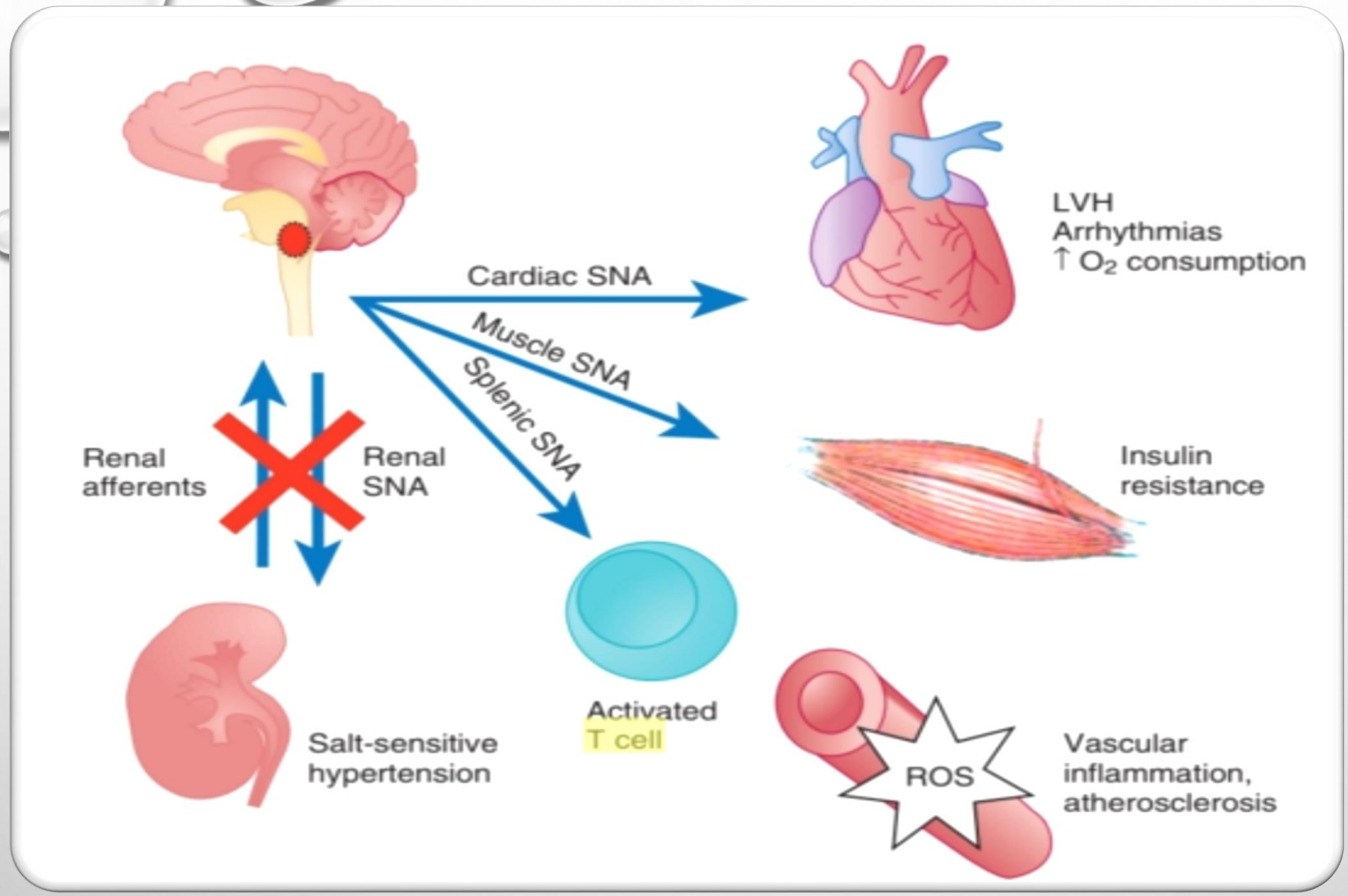


FIGURE 43-7 IN PATIENTS WITH DRUG-RESISTANT HYPERTENSION, OVERACTIVITY OF EFFERENT RENAL SYMPATHETIC NERVE ACTIVITY (SNA) CONTRIBUTES TO SALT-SENSITIVE HYPERTENSION, WHEREAS OVERACTIVITY OF RENAL SENSORY (AFFERENT) NERVES TRIGGERS SUSTAINED REFLEX INCREASES IN CARDIAC SNA (LEADING TO LEFT VENTRICULAR HYPERTROPHY, ARRHYTHMIAS, AND INCREASED OXYGEN CONSUMPTION), IN SKELETAL MUSCLE SNA (LEADING TO INSULIN RESISTANCE), AND IN SPLENIC SNA (**ACTIVATING T CELLS**, WHICH ARE HONED TO VASCULAR SMOOTH MUSCLE, STIMULATING REACTIVE OXYGEN SPECIES [ROS] THAT PROMOTE VASCULAR INFLAMMATION AND ATHEROSCLEROSIS).

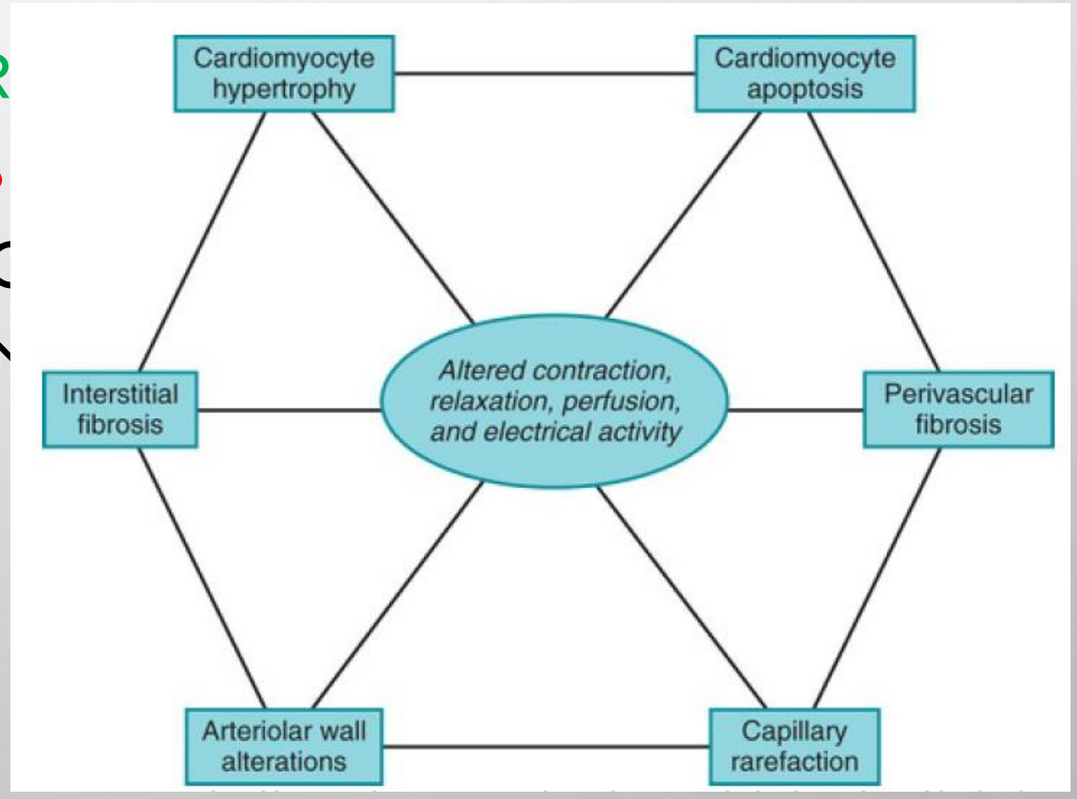
102 -B

30. 腎素—血管張力素系統 (renin-angiotensin system) 的活化是引起高血壓的重要機制。此系統的活化甚至可以影響免疫系統，間接造成血壓升高。試問目前的研究顯示以下何種免疫系統成分會受到腎素—血管張力素系統的直接影響，進而影響血壓？

(A) 嗜中性球 (neutrophil)
(B) T 淋巴球 (T lymphocyte)
(C) B 淋巴球 (B lymphocyte)
(D) 巨噬細胞 (macrophage)
(E) 巨細胞 (mast cell)

PATHOGENESIS OF HYPERTENSIVE HEART DISEASE----PRESSURE OVERLOAD HYPERTROPHY

- LVH POWERFULLY AND INDEPENDENTLY PREDICTS MORBIDITY AND MORTALITY, PREDISPOSING TO HEART FAILURE, VENTRICULAR TACHYARRHYTHMIA, ISCHEMIC STROKE, ATRIAL FIBRILLATION, AND EMBOLIC STROKE
- IN ANIMAL MODELS, A II, ALDOSTER
  PRORENIN PROMOTE CARDIAC FIB
  PATHOLOGIC LVH (IN CONTRAST TC
  HYPERTROPHY OF EXERCISE TRAINI
  FIBROSIS)



IMPAIRED CORONARY VASODILATOR RESERVE

➔ THE HYPERTROPHIED HYPERTENSIVE HEART HAS NORMAL RESTING CORONARY BLOOD FLOW, BUT VASODILATOR RESERVE BECOMES IMPAIRED=> MYOCARDIAL MICROVASCULATURE DOES NOT ACCOMPANY THE INCREASED MYOCYTE MASS, BUT RATHER BY CAPILLARY RAREFACTION

➔ SUBENDOCARDIAL ISCHEMIA + CARDIAC FIBROSIS → IMPAIRS DIASTOLIC RELAXATION → HFPEF

102 -B

79. 一個六十八歲男性，最近診斷有高血壓，臨床上沒有特殊症狀，心電圖檢查顯示有左心室肥大，請問以下描述何者為真？

(A) 對於左心室肥大，心電圖比心臟超音波檢查更敏感。

(B) 高血壓病人合併左心室肥大有較高的心臟衰竭風險。

(C) 高血壓病人合併左心室肥大通常是可預期的，因此不會增加死亡風險。

(D) 乙型阻斷劑 (例如 atenolol) 比起其它種降壓藥，可以降低合併左心室肥大的高血壓病人的心血管疾病和死亡的風險。

(E) 左心室肥大是一種代償性的保護機轉，可以保護心臟免於高血壓的進一步危害。

INITIAL E
HYPE

- **OFFICE BP**
  - BP SHOULD BE MEASUR
  - BOTH ARMS AND AFTER . INSUFFICIENCY)
- **HOME MONITORING**
  - PREDICT CARDIOVASCUI
  - MORNING AND AT NIGH READINGS BEING AVERA

Whelton PK, et al.

Table 8. Checklist for Accurate Measurement of BP (3, 4)

Key Steps for Proper BP Measurements	Specific Instructions
Step 1: Properly prepare the patient	1. Have the patient relax, sitting in a chair (feet on floor, back supported) for >5 min. 2. The patient should avoid caffeine, exercise, and smoking for at least 30 min before measurement. 3. Ensure patient has emptied his/her bladder. 4. Neither the patient nor the observer should talk during the rest period or during the measurement. 5. Remove all clothing covering the location of cuff placement. 6. Measurements made while the patient is sitting or lying on an examining table do not fulfill these criteria.
Step 2: Use proper technique for BP measurements	1. Use a BP measurement device that has been validated, and ensure that the device is calibrated periodically.* 2. Support the patient's arm (e.g., resting on a desk). 3. Position the middle of the cuff on the patient's upper arm at the level of the right atrium (the midpoint of the sternum). 4. Use 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 (Table 9). 5. Either the stethoscope diaphragm or bell may be used for auscultatory readings (5, 6).
Step 3: Take the proper measurements needed for diagnosis and treatment of elevated BP/hypertension	1. At the first visit, record BP in both arms. Use the arm that gives the higher reading for subsequent readings. 2. Separate repeated measurements by 1–2 min. 3. For auscultatory determinations, use a palpated estimate of radial pulse obliteration pressure to estimate SBP. Inflate the cuff 20–30 mm Hg above this level for an auscultatory determination of the BP level. 4. For auscultatory readings, deflate the cuff pressure 2 mm Hg per second, and listen for Korotkoff sounds.
Step 4: Properly document	1. Record SBP and DBP. If using the auscultatory technique, record SBP and ppearance of all Korotkoff ber. n before measurements.
	ons to estimate the
	and in writing.

Table 11. Corresponding Values of SBP/DBP for Clinic, HBPM, Daytime, Nighttime, and 24-Hour ABPM Measurements

Clinic	HBPM	Daytime ABPM	Nighttime ABPM	24-Hour ABPM
120/80	120/80	120/80	100/65	115/75
130/80	130/80	130/80	110/65	125/75
140/90	135/85	135/85	120/70	130/80
160/100	145/90	145/90	140/85	145/90

ABPM indicates ambulatory blood pressure monitoring; BP, blood pressure; DBP diastolic blood pressure; HBPM, home blood pressure monitoring; and SBP, systolic blood pressure.

ssure.
al. (2) (American Heart

Acta Cardiol Sin 2017;33:213–225
Review Article
doi: 10.6515/ACS20170421A

The 2017 Focused Update of the Guidelines of the Taiwan Society of Cardiology (TSOC) and the Taiwan Hypertension Society (THS) for the Management of Hypertension

Table 2. New BP targets

Categories	Targets (mmHg)	COR	LOE
Primary prevention	< 140/90	I	B
Secondary prevention			
Diabetes	< 130/80	I	B
CHD	< 120/NA[AOBP]	I	B
Stroke	< 140/90	I	A
CKD	< 120/NA[AOBP]	I	B
Elderly (age ≥ 75 years)	< 120/NA[AOBP]	I	B
Patients receiving antithrombotics for stroke prevention	< 130/80	I	B

AOBP, unattended automated office blood pressure measurement; BP, blood pressure; CHD, coronary heart disease; CKD, chronic kidney disease; COR, class of recommendation; LOE, level of evidence; NA, not available.

Table 3. Traditional office BP targets

Categories	Targets (mmHg)	COR	LOE
Primary prevention	< 140/90	I	B
Secondary prevention			
Diabetes	< 130/80	I	B
CHD	< 130/80	I	B
Stroke	< 140/90	I	A
CKD	< 140/90	I	A
CKD with proteinuria	< 130/80	IIb	C
Elderly (age ≥ 75 years)	< 140/90	I	B
Patients receiving antithrombotics for stroke prevention	< 130/80	I	B

BP, blood pressure; CHD, coronary heart disease; CKD, chronic kidney disease; COR, class of recommendation; LOE, level of evidence.

INITIAL EVALUATION OF THE HYPERTENSIVE PATIENT

- **AMBULATORY MONITORING**
  - AVERAGE DAYTIME BP <135/85 MM HG
  - NIGHT-TIME BP <120/70 MM HG
  - 24-HOUR BP <130/80 MM HG

- **WHITE COAT HYPERTENSION**
  - THE DAYTIME BP IS <135/85 MM HG (OR PREFERABLY <130/80 MM HG) AND THERE IS NO TARGET ORGAN DAMAGE DESPITE CONSISTENTLY ELEVATED OFFICE READINGS

- MASKED HYPERTENSION- INCREASES CARDIOVASCULAR RISK

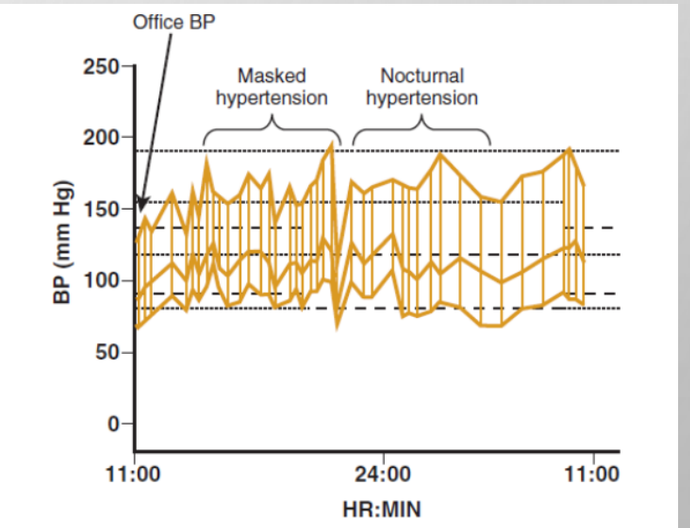
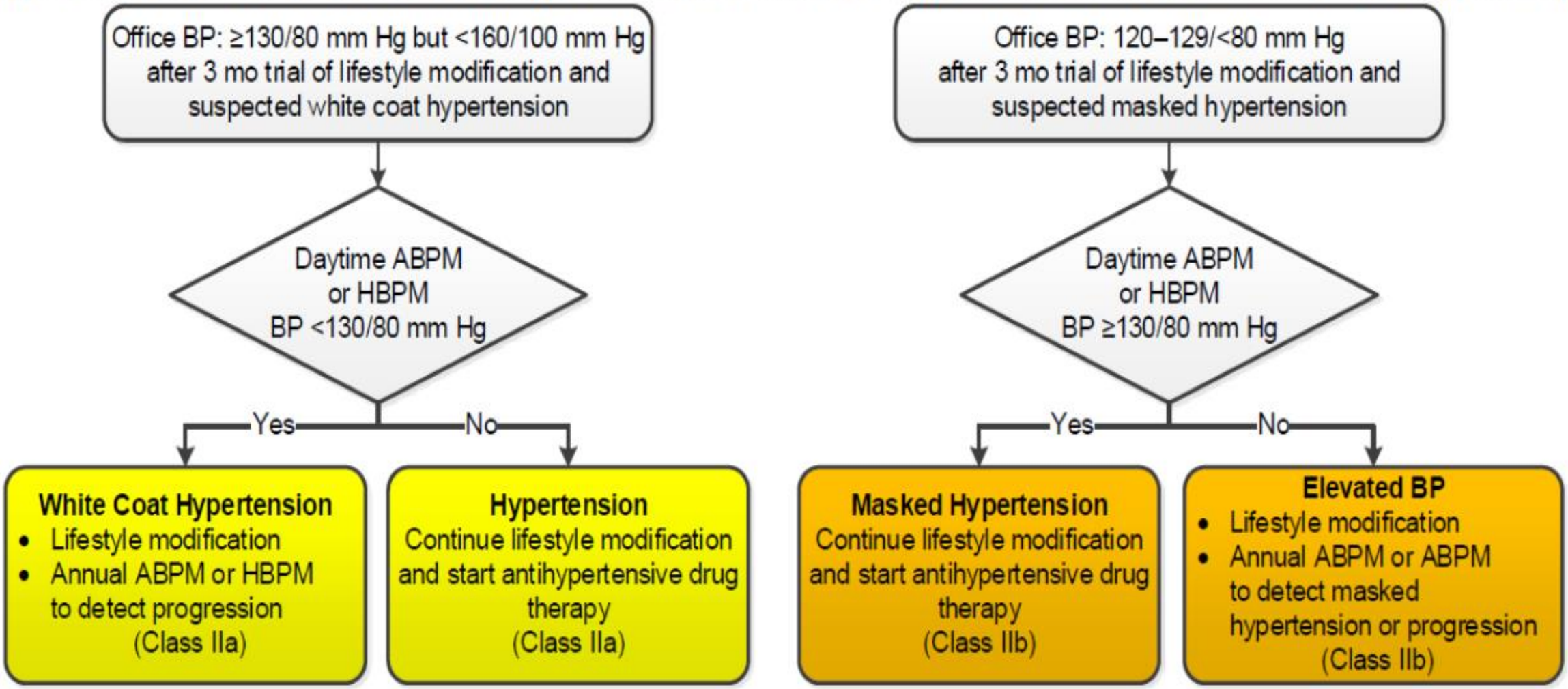


FIGURE 43-14 A 24-hour ambulatory blood pressure (BP) recording in a patient with apparently normal office blood pressure but with masked hypertension and nocturnal hypertension. *(Courtesy Dr. R.G. Victor, Cedars-Sinai Medical Center, Los Angeles.)*

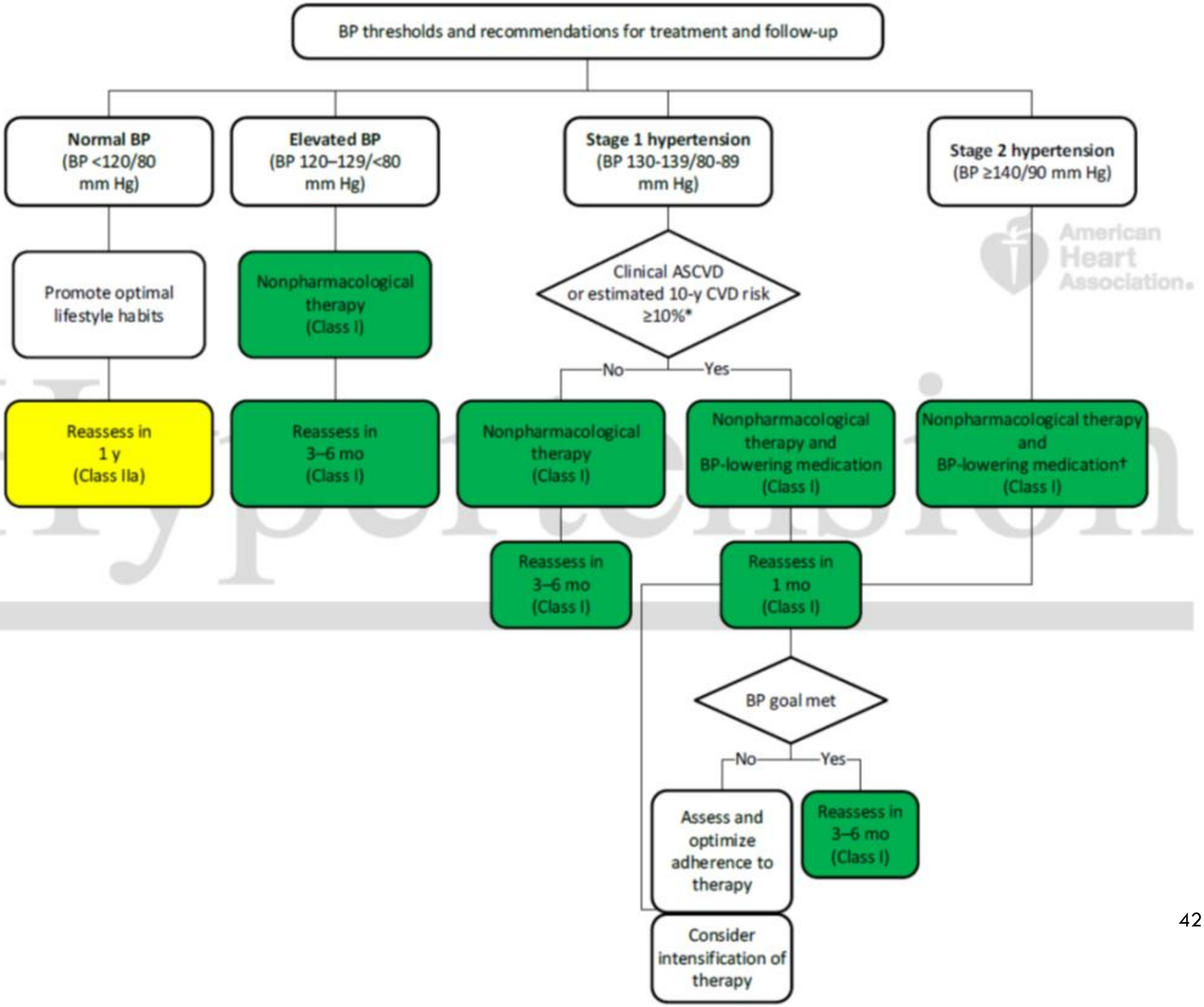
Figure 1. Detection of White Coat Hypertension or Masked Hypertension in Patients Not on Drug Therapy



Colors correspond to Class of Recommendation in Table 1.

ABPM indicates ambulatory blood pressure monitoring; BP, blood pressure; and HBPM, home blood pressure monitoring.

Figure 4. Blood Pressure (BP) Thresholds and Recommendations for Treatment and Follow-Up



INITIAL EVALUATION OF THE HYPERTENSIVE PATIENT

- NOCTURNAL HYPERTENSION INCREASES THE AGGREGATE HEMODYNAMIC LOAD ON THE CARDIOVASCULAR SYSTEM AND PREDICTS CARDIOVASCULAR OUTCOMES BETTER THAN EITHER DAYTIME AMBULATORY BP OR STANDARD OFFICE MEASURE
- NOCTURNAL HYPERTENSION IS PARTICULARLY COMMON IN PATIENTS WITH CKD, PRESUMABLY BECAUSE OF INCREASED CARDIAC OUTPUT AND INCREASED SYSTEMIC VASCULAR RESISTANCE

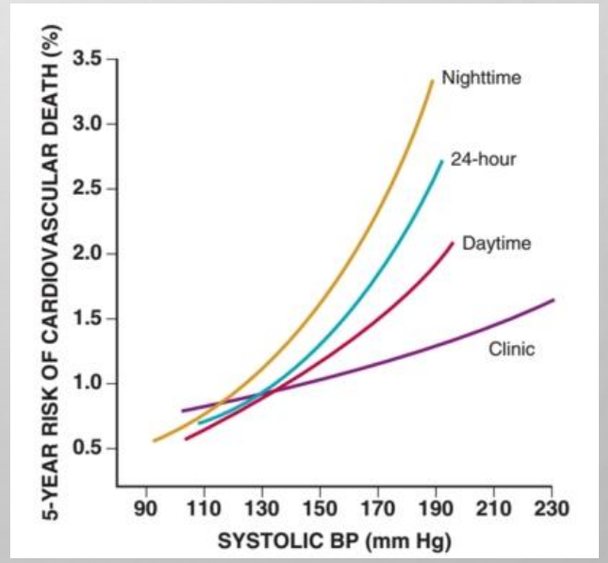


TABLE 46.1

Criteria for Diagnosis of Hypertension Using Different Methods of Blood Pressure (BP) Measurement (Systolic and/or Diastolic)

METHOD	SYSTOLIC (mm Hg)	DIASTOLIC (mm Hg)
Office		
Conventional office BP	≥140	≥90
Unattended automated office BP (AOBP)	≥135	≥85
Home		
Home BP	≥135	≥85
Ambulatory BP Monitoring (ABPM)		
Daytime (awake)	≥135	≥85
Nighttime (asleep)	≥120	≥70
24 or 48 hour (average)	≥130	≥80

Modified from Gabb GM, Mangoni A, Anderson CS, et al. Guideline for the diagnosis and management of hypertension in adults—2016. Med J Aust 2016;205:85.

102 -D

80. 下列關於高血壓閥值 (threshold) 之定義何者有誤？

(A) 家中血壓 ≧ 135/85。

(B) 24 小時攜帶式血壓監測器 (AMBP)≧130/80。

(C) AMBP 白天 ≧ 135/85。

(D) AMBP 夜間 ≧ 125/75。 (120/70)

(E) 患者在有尿意時所測量之血壓，不可當作判斷有無高血壓之參考。

102 -E

83. 以下關於 2010 年高血壓治療指引中對於居家血壓量測 (home blood pressure monitoring) 的描述何者為非？

(A) 於就診前一周應每天測量血壓。

(B) 每天早晚兩個時段測量血壓。

(C) 每個時段測量兩次，每次間隔 60 秒。

(D) 至少 12 個或更多的血壓量測值得到的平均值較能代表平均血壓。

(E) 將 7 天所有的血壓量測值平均得到的平均值作為診斷及調整用藥的參考。

Home Blood Pressure Monitoring (HBPM).

Office BP can both overestimate and underestimate a person's BP measured at home. HBPM improves medication adherence by actively involving patients in their own medical care. The latest guidelines[45] recommend that patients be carefully instructed to perform HBPM as follows: rest quietly for 5 minutes in the seated position with the back supported and the arm supported on a table at heart level; take two readings in the morning and two readings in the evening for at least 3 consecutive days (preferably 7 days). The first day's readings should be discarded as being falsely elevated, and all other readings be averaged to make clinical decisions. Hypertension is diagnosed when the average home BP is 135/85 mm Hg or higher. Each patient's monitor needs to be checked in the office for accuracy and cuff size. Monitors with sizable memory storage eliminate reporting bias. Wrist monitors are inaccurate and not recommended. The oscillometric method may not work well in patients with atrial fibrillation or frequent extrasystoles. Some patients become obsessive about taking their BP and must be advised to stop self-measurement altogether.

102 -C

133. 下列關於白袍高血壓 (white coat hypertension) 之敘述何者有誤？

(A) 約佔診間血壓 (office blood pressure) 過高患者的 20%。

(B) 必須沒有目標器官傷害 (target organ damage) 之現象。

(C) 其心血管風險必須與血壓完全正常者一樣。

(D) 24 小時攜帶式血壓監測器 (AMBP) 有助於減少不必要之降壓治療。

(E) 真正高血壓患者也可能出現白袍現象 (white coat phenomenon) 而使得診間血壓升高。

If the daytime BP is less than 135/85 mm Hg and there is no target-organ damage despite consistently elevated office readings, the patient has “office-only” or “white coat” hypertension, caused by a transient adrenergic response to the measurement of BP only in the physician's office. Patients with white coat hypertension typically do not show exaggerated pressor reactions to stressful stimuli in their daily lives. Debate continues as to whether white coat hypertension is completely benign or confers an intermediate level of CVD risk

TABLE 45-2 Risks Influencing Prognosis in Patients with Hypertension

Risk Factors for Cardiovascular Disease

Systolic and diastolic BP levels
Levels of pulse pressure (in the elderly)
Age: men >55 years; women >65 years
Smoking
Dyslipidemia (LDL-C >115 mg/dL) 75%
Impaired fasting glucose (102-125 mg/dL) or abnormal glucose tolerance test result
Family history of premature cardiovascular disease
Abdominal obesity
Diabetes mellitus 25%

Subclinical Target Organ Damage

Left ventricular hypertrophy
Carotid wall thickening or plaque
Low estimated glomerular filtration rate ≤60 mL/min/1.73 m^2
Microalbuminuria
Ankle-brachial BP index ≤0.9

Established Target Organ Damage

Cerebrovascular disease: ischemic stroke, cerebral hemorrhage, transient ischemic attack
Heart disease: myocardial infarction, angina, coronary revascularization, heart failure
Renal disease: diabetic nephropathy, renal impairment
Peripheral arterial disease
Advanced retinopathy: hemorrhages or exudates, papilledema

EVALUATION OF TARGET ORGAN DISEASE

- HYPERTENSIVE HEART DISEASE— LVH, CAD
- LARGE-VESSEL DISEASE
  - AORTIC DISSECTION, AAA (>65Y/O SMOKER, PULSATION BELOW UMBILICUS), PAOD
- CEREBROVASCULAR DISEASE
  - -- 50% OF STROKES (80% ISCHEMIC, 20% HEMORRHAGE)
    - MORNING SURGE IN BP
    - RISK OF STROKE IS GREATEST IN OLDER PATIENTS WITH ISH
- CHRONIC KIDNEY DISEASE
  - MICROALBUMINURIA (DEFINED AS A URINE ALBUMIN–TO–URINE CREATININE RATIO OF 30 TO 300 MG/MG), PREDICTOR OF CV COMPLICATIONS FROM HYPERTENSION
  - MOST PATIENTS WITH HTN ASSOCIATED CKD DIE OF HEART ATTACK OR STROKE BEFORE RENAL FUNCTION DETERIORATES SUFFICIENTLY TO REQUIRE CHRONIC H/D
  - AASK TRIAL: CHROMOSOME 22 APOL1 (BLACKS), HYPERTENSIVE NEPHROSCLEROSIS

102 -E

139. 在評估高血壓病患的心血管疾病風險時，靶器官損傷 (target organ damage) 存在與否是重要參考。以下關於各種靶器官損傷的定義何者有誤？

(A) 尿液白蛋白/肌酐比 (urine albumin/creatinine ratio) >30 mg/g。

(B) 心臟超音波左心室質量指數 (left ventricular mass index) 男性 >115 g/m^2 (BSA)，女性 >95 g/m^2 (BSA)。

(C) 頸動脈超音波內間層厚度 (intima-media thickness) >0.9 mm。

(D) 血壓踝肱比 (ankle-brachial index) <0.9。

(E) 頸股動脈脈波傳導速度 (carotid-femoral pulse wave velocity) >8 m/s。

threshold value of aortic PWV (>12 m/sec)

IDENTIFIABLE (SECONDARY) FORMS OF HYPERTENSION

TABLE 43-3 Overall Guide to Workup for Identifiable Causes of Hypertension

DIAGNOSIS	DIAGNOSTIC PROCEDURE(S)	
	Initial	Additional
Chronic renal disease	Urinalysis, serum creatinine, renal sonography	Isotopic renography, renal biopsy
Renovascular disease	Renal sonography (atrophic kidney)	Magnetic resonance or computed tomography (CT) angiography, Duplex Doppler sonography, digital subtraction renal angiography
Coarctation	Blood pressure in legs	Echocardiography, magnetic resonance imaging, aortography
Primary aldosteronism	Plasma renin, serum aldosterone	Salt loading, adrenal vein sampling
Cushing syndrome	1-mg dexamethasone suppression test	Urinary cortisol after variable doses of dexamethasone, adrenal CT, scintiscans
Pheochromocytoma	Plasma-free metanephrines	24-hour urinary metanephrines and catecholamines, adrenal CT

RENAL PARENCHYMAL DISEASE
2-5%

- MOST COMMON CAUSE OF SECOND HTN
- **DM NEPHROPATHY** >> CHRONIC GN
- MICROALBUMINURIA, ALBUMINURIA
- SERUM CYSTATIN C - FILTERED BY THE GLOMERULI AND REABSORBED AND METABOLIZED BY THE PROXIMAL TUBULAR EPITHELIUM, WITH VERY LITTLE BEING EXCRETED IN THE URINE: POTENTIAL REPLACEMENT FOR SERUM CREATININE BECAUSE IT IS LESS AFFECTED BY MUSCLE MASS

ACUTE RENAL DISEASE

- REDUCED RENAL BLOOD FLOW (CHOLESTEROL EMBOLI), OR RAAS ACTIVATION (BILATERAL URETERAL OBSTRUCTION)
- NSAID : BLOCK THE SYNTHESIS OF PROSTAGLANDINS; WHICH ACT AS VASODILATORS WITHIN THE KIDNEY
- ACEI & ARB: PRECIPITATE ACUTE RENAL FAILURE IN PATIENTS WITH BILATERAL RENOVASCULAR DISEASE

CHRONIC RENAL DISEASE

- PATIENTS WITH CKD, THE CONTROL OF HYPERTENSION SLOWS THE PROGRESSION TO END-STAGE RENAL DISEASE
- BP GOAL REMAINS UNCERTAINLY IN APOL1 NEPHROPATHY
- DM NEPHROPATHY: ARB/ACE-I: 30% ABOVE BASELINE CR → PREDICT BETTER PRESERVATION
- THE RESULTS OF THE ALISKIREN TRIAL IN TYPE 2 DIABETES USING CARDIO-RENAL ENDPOINTS (ALTITUDE) TRIAL: ALISKIREN (DIRECT RENIN INHIBITOR) ADDED ON ACE-I/ARB INCREASED ADVERSE EVENT **WITHOUT** **IMPROVING** CV OR RENAL OUTCOME

HEMODIALYSIS

- HTN IS A SIGNIFICANT RISK FACTOR FOR MORTALITY IN ESRD PATIENTS
- ACCUMULATION OF INHIBITOR OF NOS AND SYMPATHETIC OVERACTIVITY →ACCENTUATE (↑ ↑) HYPERTENSION
- WITH 8-HOUR NOCTURNAL HEMODIALYSIS, CAN GREATLY IMPROVE BLOOD PRESSURE CONTROL

RENAL TRANSPLANTATION

- **CURE** PRIMARY HYPERTENSION, VARIOUS PROBLEMS CAN RESULT

APPROXIMATELY 50% BECOMING HYPERTENSIVE WITHIN 1 YEAR

- STENOSIS OF THE SITE OF ANASTOMOSIS
- REJECTION REACTIONS
- HIGH DOSE ADRENAL STEROID, CYCLOSPORINE OR TACROLIMUS
- EXCESS RENNIN DERIVED FROM THE RETAINED DISEASED KIDNEYS

RENOVASCULAR HYPERTENSION

TABLE 46.6

Clinical Clues for Renovascular Hypertension

1. Onset of hypertension before age 30 or after 50
2. Acceleration of treated primary hypertension
3. Deterioration in renal function in treated primary hypertension
4. Acute kidney injury (AKI) during treatment of hypertension
5. Flash pulmonary edema
6. Progressive renal failure
7. Refractory heart failure
8. Unilateral small (atrophic) kidney size by ultrasound examination

Modified from Textor SC. Renal arterial disease and hypertension. Med Clin North Am 2017;101:65.

RENOVASCULAR HYPERTENSION

- ATHEROSCLEROTIC DISEASE (90%)
  - PROXIMAL THIRD OF THE MAIN RENAL ARTERY
  - MOSTLY IN OLDER MEN
- FIBROPLASTIC DISEASE (10%)
  - DISTAL TWO THIRDS AND BRANCHES OF THE RENAL ARTERIES; MEDIA BUT ALSO CAN INVOLVE THE INTIMA AND ADVENTITIA
  - MOST COMMONLY IN YOUNGER WOMEN 20-60 Y/O
- RENOVASCULAR STENOSIS IS OFTEN BILATERAL, ALTHOUGH USUALLY ONE SIDE IS PREDOMINANT. BILATERAL DISEASE SHOULD BE SUSPECTED IN THOSE WITH RENAL INSUFFICIENCY, PARTICULARLY IF RAPIDLY PROGRESSIVE OLIGURIC RENAL FAILURE DEVELOPS WITHOUT EVIDENCE OF OBSTRUCTIVE UROPATHY, AND EVEN MORE SO IF IT DEVELOPS AFTER THE START OF ACEI OR ARB THERAPY

FIGURE 43-15 Computed tomography angiogram with three-dimensional reconstruction, showing a severe proximal atherosclerotic stenosis of the right renal artery and mild stenosis of the left renal artery **(A)** and the classic "string-of-beads" lesion of fibromuscular dysplasia (bilateral in this patient) **(B)**. *(Courtesy Dr. Bart Domatch, Radiology Department, University of Texas Southwestern Medical Center, Dallas.)*

RENOVASCULAR HYPERTENSION

- MECHANISMS

ALTHOUGH THE PATHOPHYSIOLOGY CLEARLY INVOLVES A II – DEPENDENT HYPERTENSION, THIS INVOLVES A WIDE SPECTRUM OF DISORDERS 1) *INCIDENTAL*, *HEMODYNAMICALLY INSIGNIFICANT RENAL ARTERY STENOSIS* 2) PROGRESSING TO (2) *RENOVASCULAR HYPERTENSION* WITH REDUCED PERFUSION AND ACTIVATION OF RAAS 3) *ACCELERATED CEREBROVASCULAR DISEASE* WITH DIASTOLIC DYSFUNCTION, HEART FAILURE, AND STROKE 4) *ISCHEMIC NEPHROPATHY* WITH RENAL TISSUE HYPOXIA, EXTENSIVE

- DIAGNOSIS
  - SONO: HIGH RESISTANCE INDEX VALUES (ABOVE 80), REFLECTING MARKED INTRARENAL VASCULAR DISEASE, HAD GENERALLY POOR OUTCOMES
  - SCREENING TEST: CONTRAST-ENHANCED CT AND MAGNETIC RESONANCE ANGIOGRAPHY

RENOVASCULAR HYPERTENSION-MANAGEMENT

- FIBROMUSCULAR DYSPLASIA
  - **BALLOON ANGIOPLASTY** (WITHOUT STENTING) IS THE TREATMENT OF CHOICE
- ATHEROSCLEROTIC
  - ANTIHYPERTENSIVE MEDICATION, STATINS, AND ANTIPLATELET
  - ACEIS AND ARBS: DOUBLE-EDGED SWORD (雙面刃)
  - MEDICALLY REFRACTORY HYPERTENSION AND PROGRESSIVE DECLINE IN RENAL FUNCTION: ONLY TWO FIRM INDICATIONS FOR BALLOON ANGIOPLASTY (NOT STENTING)
- ***RENIN-SECRETING TUMORS***
  - SECONDARY ALDOSTERONISM; WILMS TUMORS (NEPHROBLASTOMA)

103 -A

77. 臨床上偶見腎因性高血壓 (Renovascular hypertension)，下列何者不是臨床上常見的特徵？

(A) 發病年紀介於 30 歲至 50 歲

Before and after

(B) 突發性的 (Abrupt onset)

(C) 嚴重或頑固性 (Severe or resistant)的 高血壓

(D) 無家族病史

(E) 抽煙

103 -E

149. 對於 fibromuscular dysplasia 造成的腎血管狹窄 (Renal artery stenosis) 造成的高血壓，下列處置何者<u>不適當</u>？

(A) 用 CCB 控制血壓比較安全。

(B) 對於 fibromuscular dysplasia 造成的腎血管狹窄，氣球擴張術很有效。

(C) 腎功能正常，可用 MRA 來診斷。

(D) 腎功能異常，可用少量顯影劑作 angiogram 診斷。

(E) 若有病灶，直接放置支架治療最有效的方法。

ADRENAL AND OTHER CAUSES OF HYPERTENSION

TABLE 45-5 Syndromes of Mineralocorticoid Excess

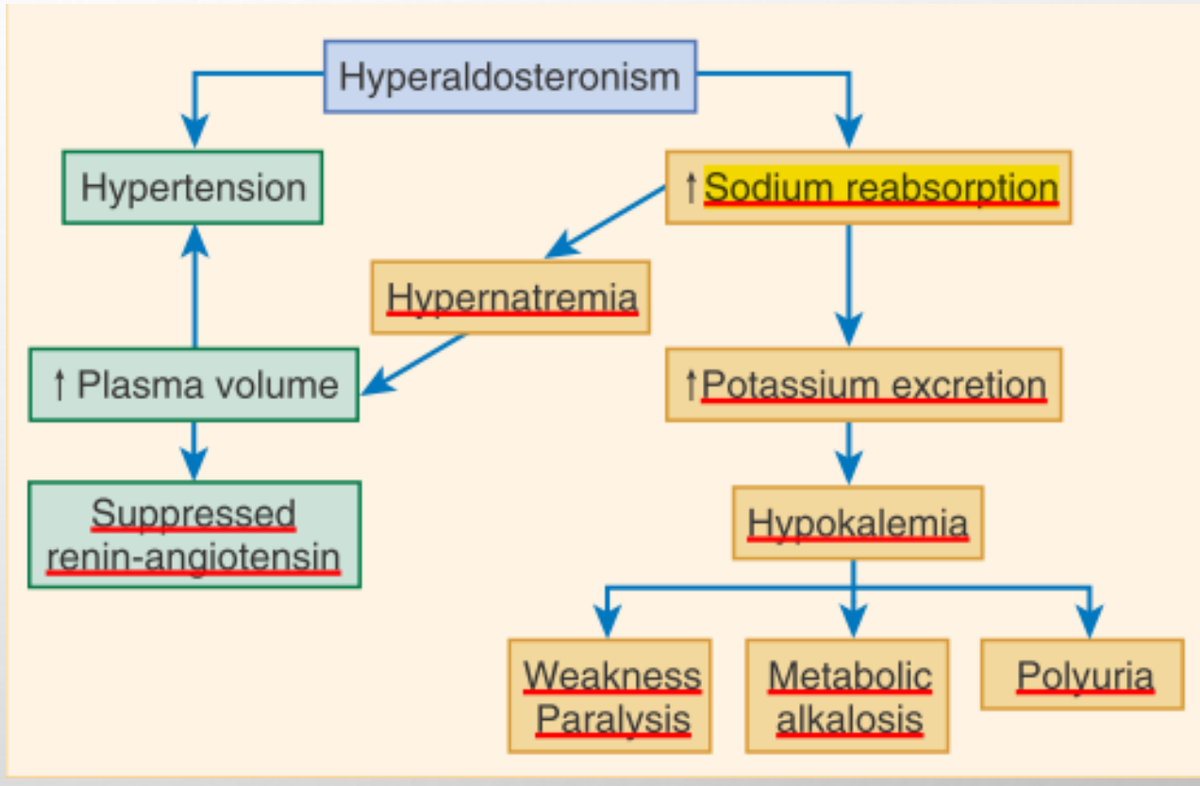
Adrenal origin
- Aldosterone excess (primary)
  - Aldosterone-producing adenoma
  - Bilateral hyperplasia
  - Primary unilateral adrenal hyperplasia
  - Glucocorticoid-remediable aldosteronism (familial hyperaldosteronism, type I)
- Adrenal carcinoma
- Extra-adrenal tumors
- Deoxycorticosterone excess
  - Deoxycorticosterone-secreting tumors
  - Congenital adrenal hyperplasia
  - 11β-Hydroxylase deficiency
  - 17α-Hydroxylase deficiency
- Cortisol excess
  - Cushing syndrome from ACTH-producing tumor
  - Glucocorticoid receptor resistance

Renal origin
- Activating mutation of mineralocorticoid receptor
- Pseudohypoaldosteronism, type II (Gordon)
- 11β-Hydroxysteroid dehydrogenase deficiency
  - Congenital: apparent mineralocorticoid excess
  - Acquired: licorice, carbenoxolone

Conn's syndrome

primary aldosteronism 最多 ->

bilateral adrenal hyperplasia (BAH).

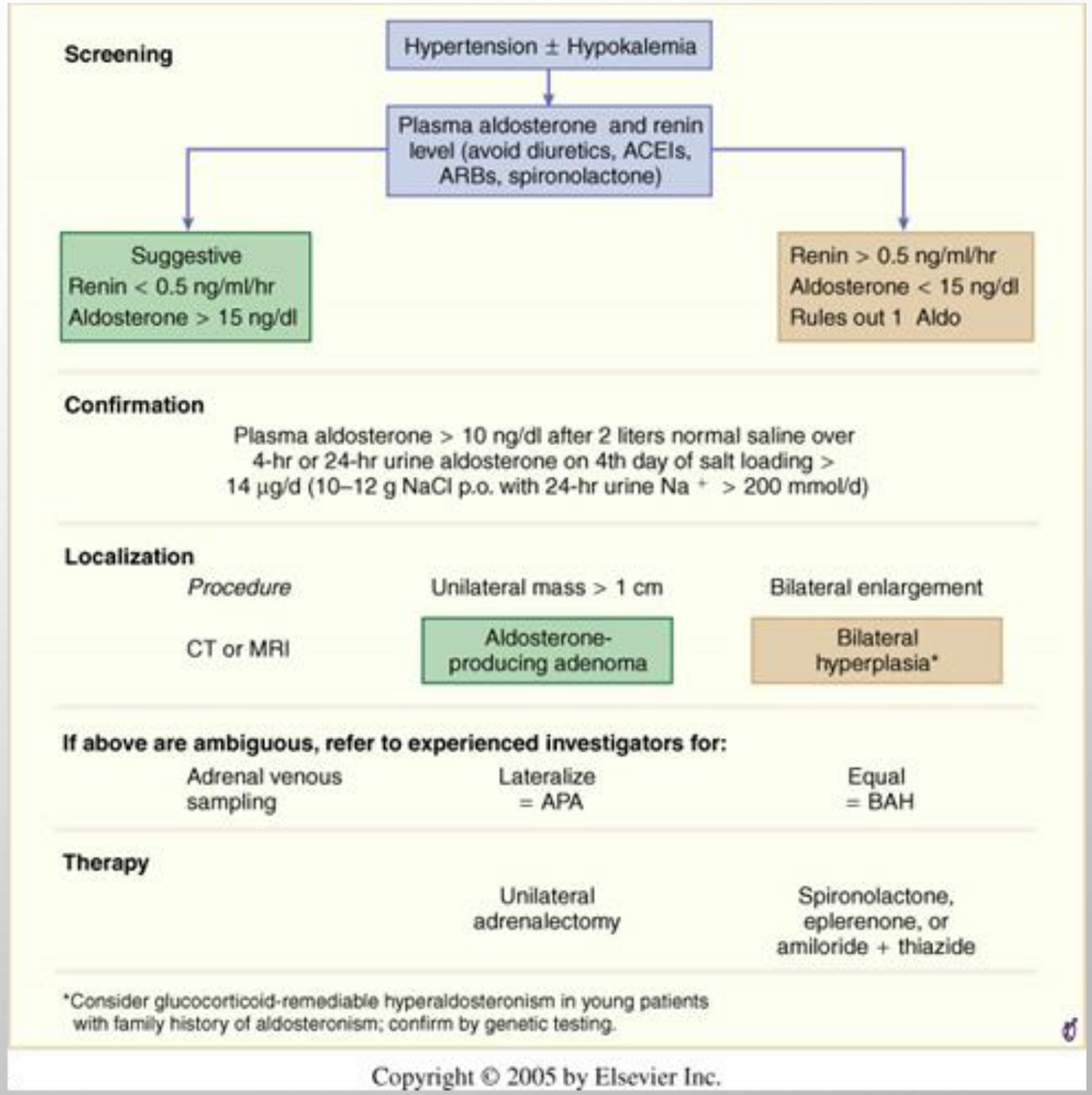


patients with aldosteronism caused by BAH are normokalemic
(lower level but not hypokalemia)

ADRENAL AND OTHER CAUSES OF HYPERTENSION --DIAGNOSIS

- (1)SCREENING, (2)SALT LOADING FOR BIOCHEMICAL CONFIRMATION, AND (3)ADRENAL VEIN SAMPLING FOR LOCALIZATION

- ELEVATED PLASMA ALDOSTERONE LEVEL (ABOVE 15 NG/DL) AND A SUPPRESSED LOW RENIN LEVEL
- ORAL SALT-LOADING SUPPRESSION
- ADRENAL VEIN SAMPLING



DIFFERENTIAL DIAGNOSIS: MENDELIAN FORMS OF HYPERTENSION

- PREMATURE ONSET

  (OFTEN BEFORE THE AGE OF

  30 YEARS)

- SEVERITY OF THE HYPERTENSION (WHICH IS FREQUENTLY DRAMATIC)
- FAMILY HISTORY INDICATIVE OF MENDELIAN INHERITANCE
- TREATMENT –
  - SOLITARY ADENOMA: LAPAROSCOPIC SURGERY
  - BILATERAL HYPERPLASIA: ALDOSTERONE ANTAGONIST (SPIRONOLACTONE OHSD2 OR EPLERENONE)

ENaC = epithelial sodium channel

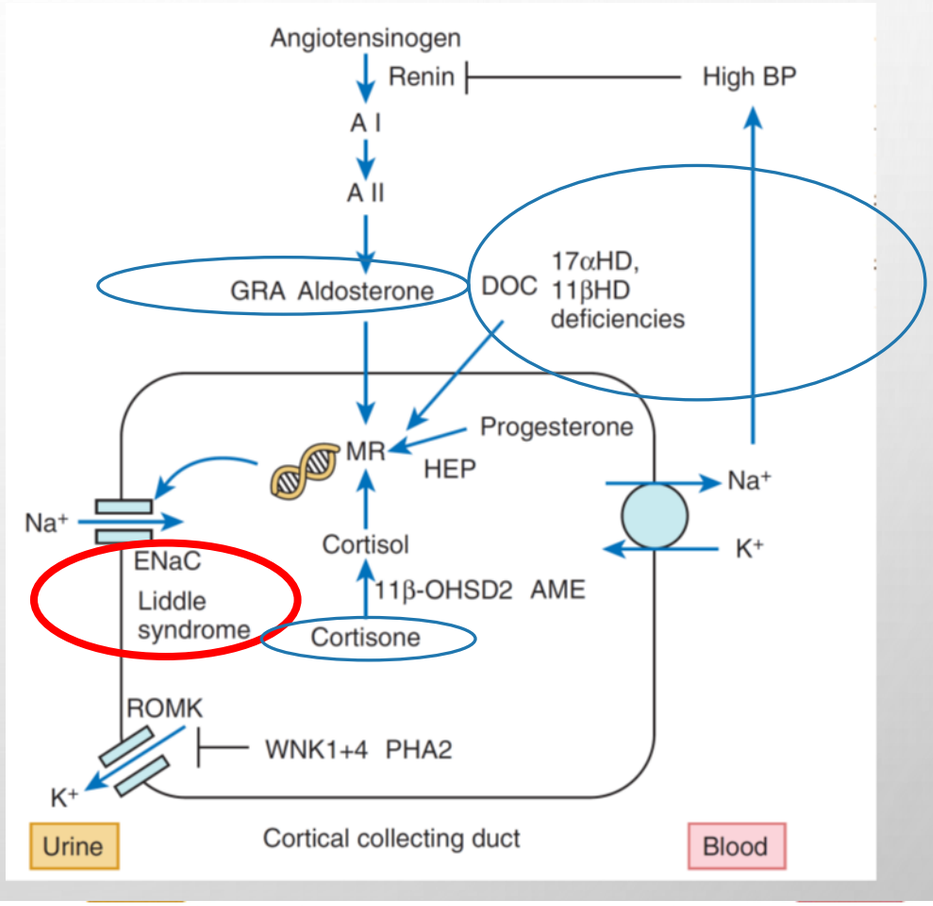


FIGURE 46.17 Mendelian forms of hypertension that cause mineralocorticoid-induced hypertension. AME, Apparent mineralocorticoid excess; A I, angiotensin I; A II, angiotensin II; BP, blood pressure; GRA, glucocorticoid-remediable aldosteronism; 11β-OHSD2, 11β-hydroxysteroid dehydrogenase type 2; DOC, deoxycorticosterone; ENaC, epithelial sodium channel; MR, mineralocorticoid receptor; PHA2, pseudohypoaldosteronism type II; ROMK, rectifying outer medullary potassium channel; WNK, with no lysine kinases; HEP, hypertension exacerbated by pregnancy; 11βHD, 11β-hydroxylase; 17αHD, 17α-hydroxylase. The effect of PHA2 on the activity of the thiazide-sensitive Na-Cl cotransporter in the distal collecting duct is not shown. See text for explanation. (Modified from Lifton RP, Gharavi AG, Geller DS. Molecular mechanisms of human hypertension. Cell 2001;104:545.)

CUSHING SYNDROME

- MECHANISM OF HYPERTENSION:
  - INCREASE CORTISOL ➔ ACTIVATOR OF THE MINERALOCORTICOID RECEPTOR ➔ RETAIN SODIUM AND EXPAND PLASMA VOLUME
- DIAGNOSIS
  - TRUNCAL OBESITY, WIDE PURPLE STRIAE, THIN SKIN, MUSCLE WEAKNESS, AND OSTEOPOROSIS
  - MEASUREMENT OF FREE CORTISOL IN A 24-HOUR URINE SAMPLE, THE SIMPLE OVERNIGHT DEXAMETHASONE SUPPRESSION TEST, LATE-NIGHT SALIVARY CORTISOL.
- THERAPY
  - 2/3: OVERPRODUCTION OF ACTH BY THE PITUITARY- CUSHING'S DISEASE
  - ADRENAL TUMOR -> REMOVED SURGICALLY
- **CONGENITAL ADRENAL HYPERPLASIA**

PHEOCHROMOCYTOMA AND PARAGANGLIOMA – CH 81

TABLE 45-6 Features Suggestive of Pheochromocytoma

Hypertension, Persistent or Paroxysmal

Markedly variable blood pressures (± orthostatic hypotension)
Sudden paroxysms (± subsequent hypertension) in relation to
- Stress: anesthesia, angiography, parturition
- Pharmacologic provocation: histamine, nicotine, caffeine, beta blockers, glucocorticoids, tricyclic antidepressants
- Manipulation of tumors: abdominal palpation, urination

Rare patients persistently normotensive
Unusual settings
- Childhood, pregnancy, familial
- Multiple endocrine adenomas: medullary carcinoma of the thyroid (MEN-2), mucosal neuromas (MEN-2B)
- Von Hippel–Lindau syndrome
- Neurocutaneous lesions: neurofibromatosis

Associated Symptoms

Sudden spells with headache, sweating, palpitations, nervousness, nausea, vomiting
Pain in chest or abdomen

Associated Signs

Sweating, tachycardia, arrhythmia, pallor, weight loss

- CATECHOLAMINES (EPINEPHRINE OR NOREPINEPHRINE)
- 5P：PRESSURE (高血壓), PAIN (頭痛、胸痛), PALPITATION (心悸), PERSPIRATION (出汗), PALLOR (蒼白)。
- 10 RULE：10%不在腎上腺(EXTRA-ADRENAL，也就是PARAGANGLIOMA)、10%發生在小孩、10%發生在雙側、10%會復發、10%為惡性腫瘤(MALIGNANT)、10%家族遺傳(FAMILIAL)。

OTHER CAUSES OF HYPERTENSION

- COARCTATION OF THE AORTA- CONGENITAL NARROWING OF THE AORTA CAN OCCUR AT ANY LEVEL OF THE THORACIC OR ABDOMINAL AORTA, BUT TYPICALLY LOCALIZES JUST BEYOND THE ORIGIN OF THE LEFT SUBCLAVIAN ARTERY OR DISTAL TO THE INSERTION OF THE LIGAMENTUM ARTERIOSUM. WITH LESS SEVERE POSTDUCTAL LESIONS, SYMPTOMS MAY NOT APPEAR UNTIL THE TEENAGE YEARS OR LATER, PARTICULARLY DURING PREGNANCY. HYPERTENSION IN THE RIGHT ARM WITH WEAK FEMORAL PULSES AND A LOUD MURMUR HEARD OVER THE BACK IN A YOUNG ADULT STRONGLY SUGGEST COARCTATION. UP TO 12% OF YOUNG WOMEN WITH TURNER SYNDROME HAVE COARCTATION. THE PATHOGENESIS OF THE HYPERTENSION CAN INVOLVE MORE THAN SIMPLE MECHANICAL OBSTRUCTION AND SEEMS TO INVOLVE SYSTEMIC ENDOTHELIAL DYSFUNCTION. THE DIAGNOSIS IS USUALLY MADE BY SUPRASTERNAL NOTCH ECHOCARDIOGRAPHY AND CONFIRMED BY CARDIAC MRI. PREOPERATIVE MANAGEMENT WITH AN ACEI FOLLOWED BY EARLY REPAIR IN CHILDHOOD IS RECOMMENDED TO REDUCE RECURRENCE OF THE COARCTATION AND PERSISTENT OR RECURRENT HYPERTENSION IN ADULTHOOD. ONCE REPAIRED, PATIENTS MAY CONTINUE TO HAVE HYPERTENSION, WHICH REQUIRES CAREFUL MONITORING AND TREATMENT.
- HORMONAL DISTURBANCES
  - ACROMEGALY, HYPOTHYROIDISM, AND HYPERPARATHYROIDISM ALL HAVE HYPERTENSION

102 -E

144. 廿九歲男性病患無特別過去病史，從兩個
診發現血壓為 184/106 毫米汞柱，心跳每
圖顯示竇性心搏過速，胸部 X 光無明顯異

(A) 應安排 24 小時血壓監測或要求自主

(B) 若有聽到腹部雜音 (Bruit) 應安排腎

(C) 若排除假性高血壓應測量血中 renin
urinary metanephrines 等可能次發性

(D) 若血清及尿中 metanephrines 增加應

斷層是否有腎上腺腫瘤。

(E) 此病患若正確診斷是嗜鉻細胞瘤應

治療

(1) 嗜鉻細胞瘤的治療，最重要是進行手術切除。

(2) 術前準備。

嗜鉻細胞瘤相當敏感，手術可能會誘發Catecholamine大量分泌，造成血壓飆升(導致hypertensive crisis)，增加手術的風險。

術前準備的藥物治療目標

a. 控制高血壓、避免術中出現hypertensive crisis

b. 增加volume

血壓控制：

同時給alpha和beta blocker，要術前7-10天先給alpha blocker，穩定後才給beta blocker，alpha receptor會促進血管的收縮， 給beta-blocker後，catecholamine會刺激 alpha receptor，導致血管收縮，血壓升高，密切監控血壓。

(3) 手術：adrenalectomy

(4) 惡性的pheochromocytoma：占10%

局部：切除、放射治療

系統性

放射性核種治療：I131 – MIBG：對於會吸收MIBG的腫瘤比較有效。

102 -A

57. 下列有關續發性高血壓 [2nd Hypertension] 的敘述，何者為非？

(A) 最常見的是腎動脈狹窄造成的高血壓。

(B) Coarctation of aorta 的病人，會表現下肢血壓較低，甚至測量不到的情況。

(C) 常發生於年輕人或是老年人。

(D) 若病人表現低血鉀，則要懷疑 hyperaldosteronism。

(E) 若病人有肥胖，合併夜尿，注意力不集中，日間嗜睡，需排除睡眠呼吸終止症候群的可能性。

Renal parenchymal disease is the most common cause of secondary hypertension, responsible for 2% to 5% of cases

103 -D

138. 下列關於續發性高血壓的敘述，何者錯誤？

(A) 最常見的續發性高血壓是腎臟疾病，佔了 2-5%。

(B) 腎動脈狹窄是第二常見原因，如果發生在年輕人，需要考慮是否為 fibromuscular dysplasia

(C) 24 小時血壓量測時，若發現晚上血壓沒有降低，需考慮是否為阻塞型睡眠終止症候群 (obstructive sleep apnea)。

(D) 背部有雜音且下肢血壓異常升高時，應懷疑主動脈窄縮 coarctation of aorta。

(E) 病患抽血有低血鉀時，需要考慮原發性醛固酮增多症 primary aldosteronism。

47

Systemic Hypertension

Management

Ronald G. Victor, Peter Libby

BENEFITS OF THERAPY

Reduce stroke, heart failure, renal failure, aortic dissection, Coronary events, and death

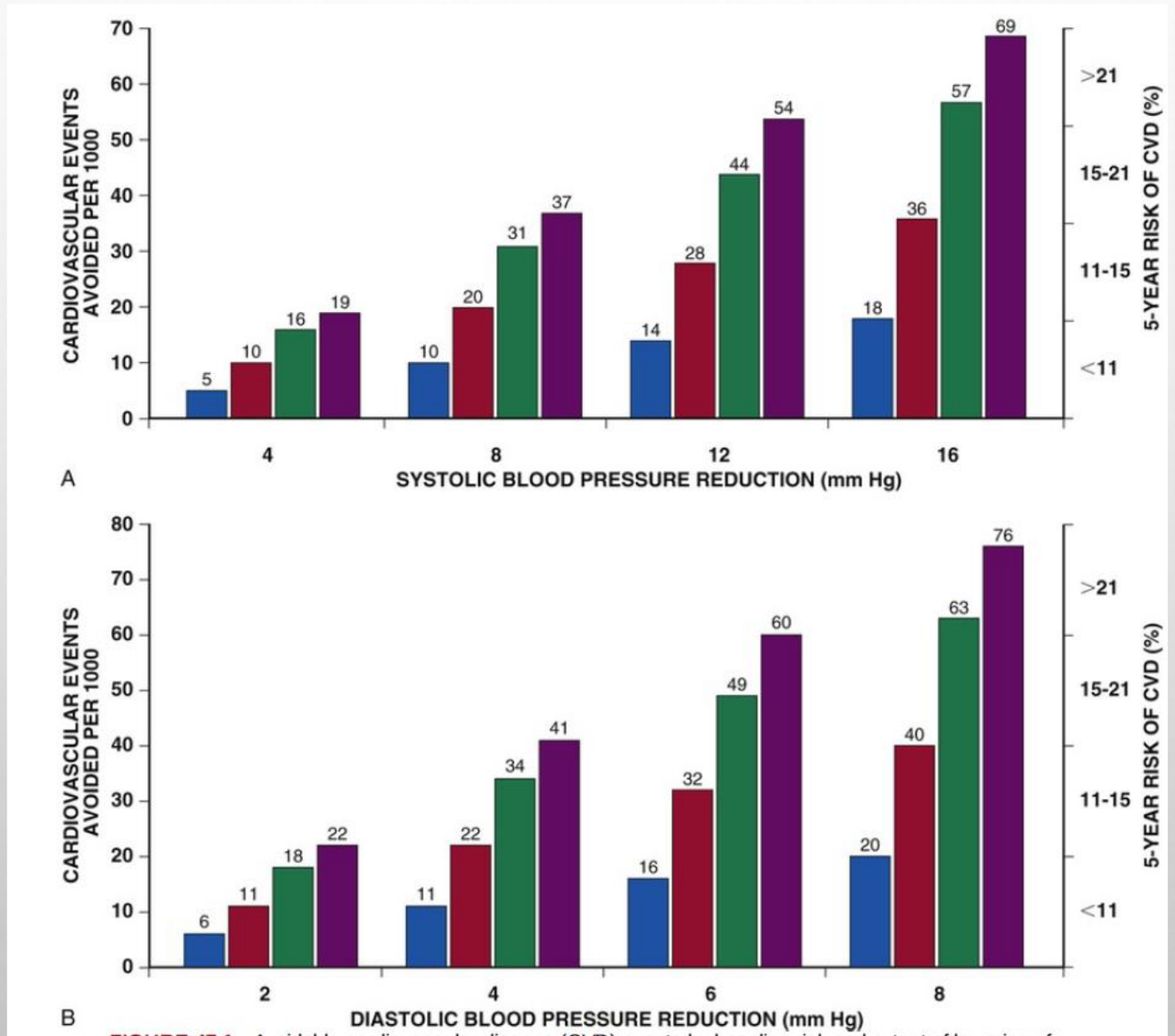
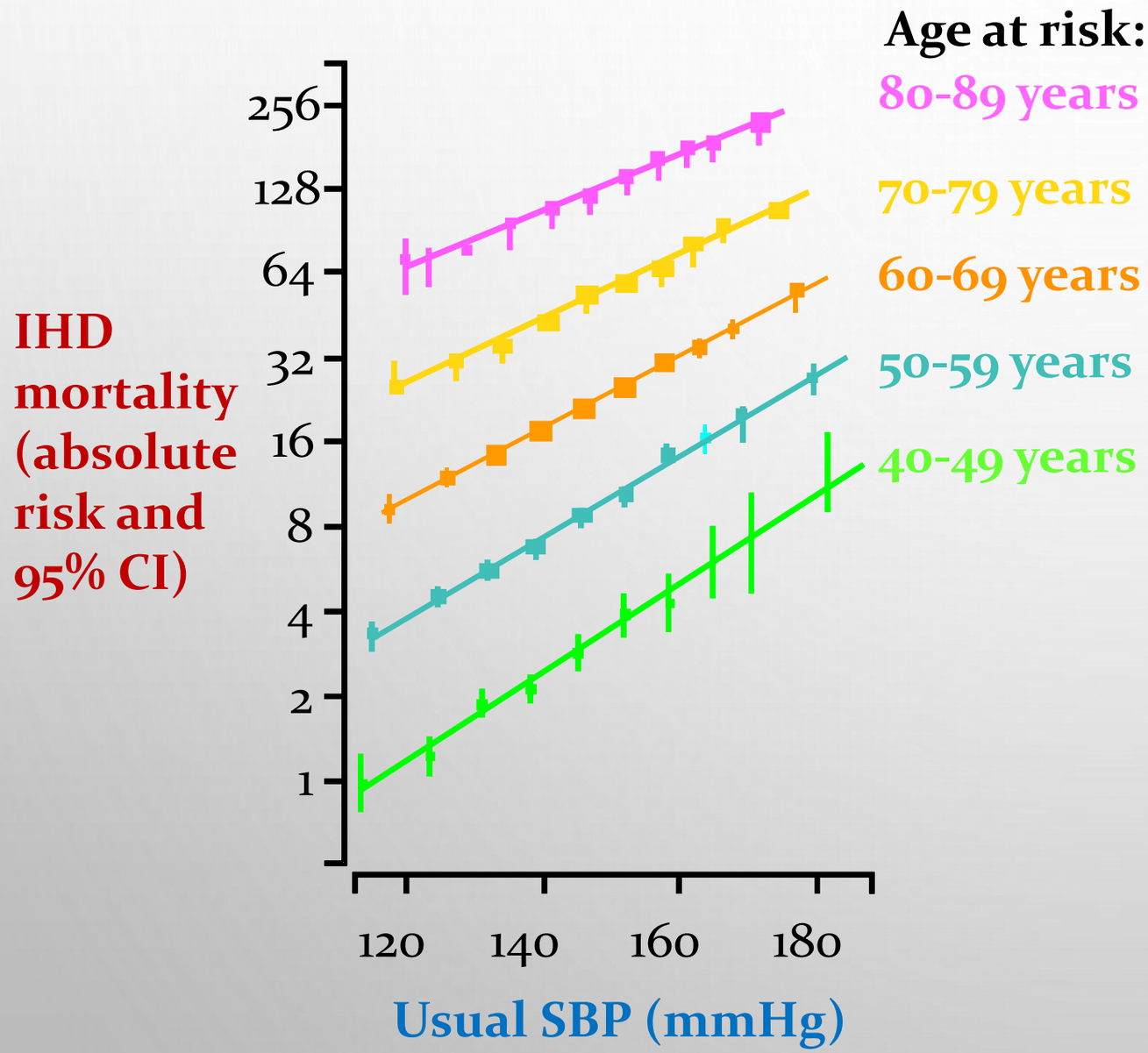


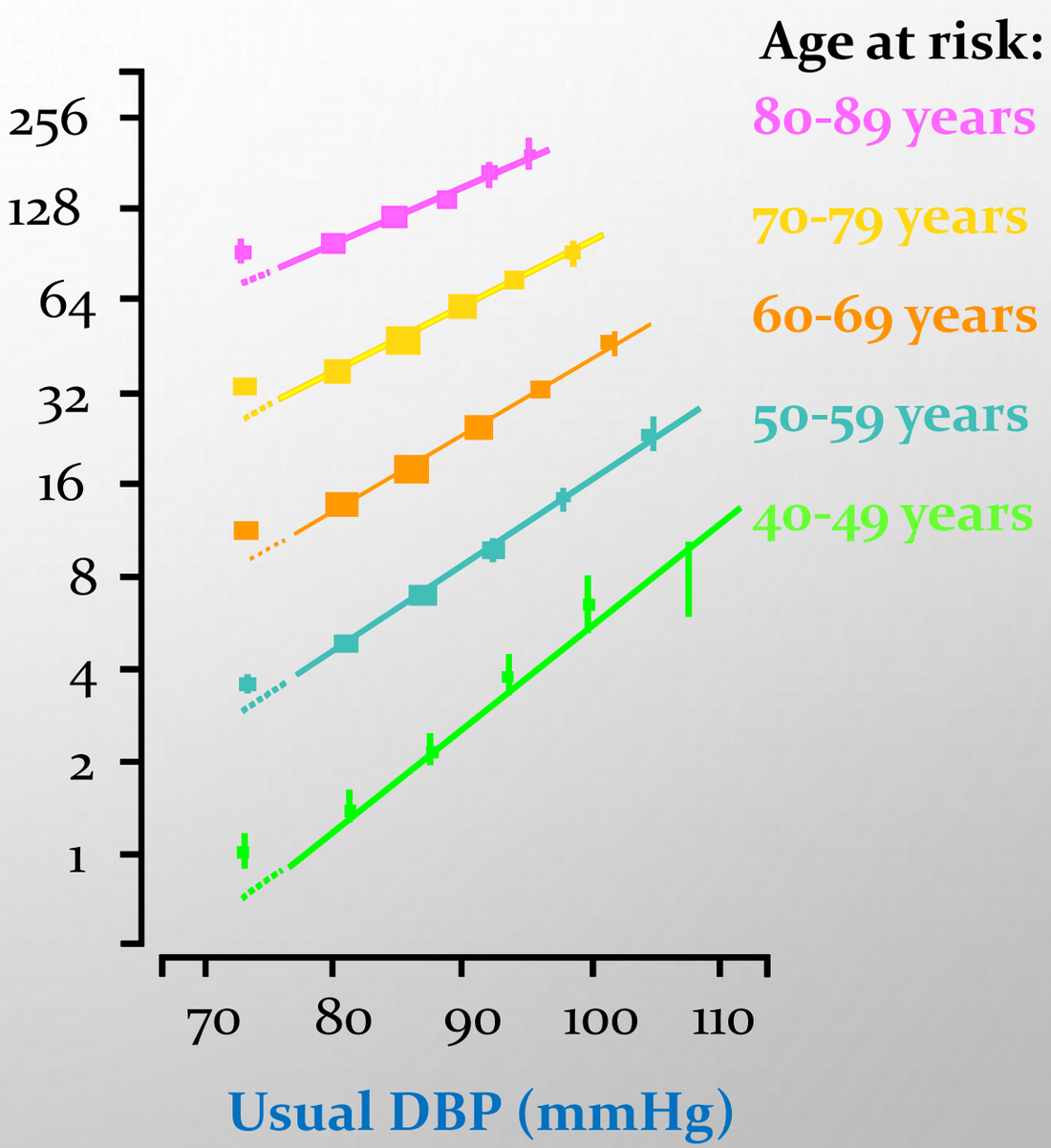
FIGURE 47.1 Avoidable cardiovascular disease (CVD) events by baseline risk and extent of lowering of systolic blood pressure **(A)** or diastolic blood pressure **(B).** (From Sundstrom J; The Blood Pressure Lowering Treatment Trialists' Collaboration. Blood pressure-lowering treatment based on cardiovascular risk: a meta-analysis of individual patient data. Lancet 2014;384:595.)

Lower SBP and DBP is Better

Systolic Blood Pressure



Diastolic Blood Pressure



CI, confidence interval; IHD, ischemic heart disease

Lewington S et al. *Lancet*. 2002;360:1903-1913.

BLOOD PRESSURE VARIABILITY AND ITS DETERMINANTS--BEHAVIORAL

Table 11
Life style modification for managing hypertension (**S-ABCDE**).

Changes	Recommendation	Expected benefits in SBP reduction	COR	LOE
Sodium restriction	2.0–4.0 gm/day	2.5 mmHg/1 gm sodium reduction	I	B
Alcohol limitation	Men: <30 gm/day ethanol Women: <20 gm/day ethanol	2–4 mmHg	I	B
Body weight reduction	BMI: 22.5–25.0	1 mmHg/per 1 kg reduction	I	B
Cigarette smoking cessation	Complete abstinence	No independent effect	I	C
Diet adaptation	**DASH** diet: rich in fruits and vegetables (8–10 servings/day), rich in low-fat dairy products (2–3 servings/day), and reduced in saturated fat and cholesterol	10–12 mmHg	I	A
Exercise adoption	Aerobic, at least 40 minutes/day, and at least 3-4 days/week	3–7 mmHg	I	A

BMI: body mass index; COR: class of recommendation; DASH: Dietary Approaches to Stop Hypertension; LOE: level of evidence; SBP: systolic blood pressure (Modified from Chiang et al.[9] with permission).

101,103 -D

6. 在 2010 年，中華民國心臟學會高血壓治療指引中之生活調適 (therapeutic life style modification) 中強調 S-ABCDE，其中 S 代表何意？

(A) Subject feeling
(B) Standard therapy
(C) Symptoms of hypertension
(D) Salt restriction

(E) Sensitive personality

101 -C

133. 高血壓的非藥物治療何者血壓下降幅度最多？

(A) 限鹽
(B) 減重五公斤
(C) DASH 飲食
(D) 運動
(E) 限酒

102 -E

58. 對於以生活方式的改變 (Life style change)，來改善血壓控制的策略中所提到的 S-ABCDE。S 指的是 Salt restriction，而其他選項所代表的意義，下列敘述何者為非？

(A) A-Alcohol limitation
(B) B-Body weight reduction
(C) C-Cessation of smoke
(D) D-Diet adaptation
(E) E-Emotional adoption

Exercise adoption

TABLE 44-1 Descriptions of Dietary Patterns

Mediterranean Pattern

There is no uniform definition of the Mediterranean diet in the RCTs and cohort studies examined. The most common features in these studies were diets that were higher in fruits (particularly fresh fruits), vegetables (emphasizing root and green varieties), whole grains (cereals, breads, rice, or pasta), and fatty fish (rich in omega-3 fatty acids); were lower in red meat (and emphasizing lean meats); had lower-fat or fat-free dairy products substituted for higher-fat dairy foods; and had oils (olive or canola), nuts (walnuts, almonds, or hazelnuts), or margarines blended with rapeseed or flaxseed oil in lieu of butter and other fats. The Mediterranean patterns examined tended to be moderate in total fat (32% to 35% of total calories), relatively low in saturated fat (9% to 10% of total calories), high in fiber (27 to 37 g/day), and high in polyunsaturated fatty acids (particularly omega-3 fatty acids).

Dietary Approaches to Stop Hypertension Pattern

The DASH dietary pattern is high in vegetables, fruits, low-fat dairy products, whole grains, poultry, fish, and nuts and low in sweets, sugar-sweetened beverages, and red meats; low in saturated fat, total fat, and cholesterol; and rich in potassium, magnesium, and calcium, as well as in protein and fiber.

TABLE 44-3 Risk for Hypertension According to Individual Factors Evaluated on the Basis of Estimated Population Attributed Risk

FACTOR	POPULATION ATTRIBUTED RISK (95% CONFIDENCE INTERVAL)
BMI ≥ 25 kg/m^2	50% (49-52%)
Non-narcotic analgesic use	17% (15-19%)
No DASH diet	14% (10-17%)
No vigorous exercise	14% (10-19%)
No or excessive alcohol	10% (8-12%)
Folic acid use ≤ 400 μg/day	4% (1-7%)

TABLE 44-2 Effects of Dietary Factors and Dietary Patterns on Blood Pressure: Summary of the Evidence

	HYPOTHESIZED EFFECT	EVIDENCE
Weight	Direct	+/+
Sodium chloride (salt)	Direct	+/+
Potassium	Inverse	+/+
Magnesium	Inverse	+/–
Calcium	Inverse	+/–
Alcohol	Direct	+/+
Fat		
Saturated	Direct	+/–
Omega-3 polyunsaturated	Inverse	+/+
Omega-6 polyunsaturated	Inverse	+/–
Monounsaturated	Inverse	+
Protein		
Total	Uncertain	+
Vegetable	Inverse	+
Animal	Uncertain	+/–
Carbohydrate	Direct	+
Fiber	Inverse	+
Cholesterol	Direct	+/–
Dietary patterns		
Vegetarian diets	Inverse	+/+
DASH-type dietary patterns	Inverse	+/+

ANTI-HYPERTENSIVE MEDICATIONS 2015 TAIWAN

- FIRST LINE

CCB, ACE-I/ARB, THIAZIDE

- ADD-ON

MRA, BB, ALFA-B, DIRECT VASODILATOR

Table 12
Recommended drugs.

Clinical conditions	Drugs
Target organ damage	
Left ventricular hypertrophy	ARB
Microalbuminuria	ACEI, ARB
Asymptomatic atherosclerosis	CCB
Clinical events	
History of myocardial infarction	BB, ACEI, ARB
Coronary Heart Disease	BB, ACEI, ARB, CCB (long-acting)
Heart failure	Thiazide diuretic, loop diuretic, BB, ACEI, ARB, MRA
Stroke	ACEI, ARB, Thiazide diuretic, CCB,
Chronic kidney disease	ACEI, ARB, loop diuretic
Peripheral artery disease	CCB
Diabetes mellitus	ACEI, ARB, DRI
Associated conditions	
Isolated systolic hypertension	Thiazide diuretic, CCB, ARB
Metabolic syndrome	ACEI,ARB
Benign prostate hypertrophy	Alpha-blocker

ACEI: angiotensin converting enzyme inhibitor; ARB: angiotensin receptor blocker; BB: beta blocker; CCB: calcium channel blocker; DRI: direct renin inhibitor; MRA: mineralocorticoid receptor antagonist. (Modified from Chiang et al.[9] with permission).

TABLE 44-7 Preferred Antihypertensive Drugs for Specific Conditions

CONDITION	DRUG OR DRUGS
Patients with prehypertension	ARB?
Hypertensive patients in general	CCB, ACEI or ARB, D

TABLE 44-6 Contraindications to the Use of Specific Antihypertensive Drugs

DRUG	COMPELLING	POSSIBLE
Diuretics (thiazide)	Gout	Metabolic syndrome Glucose intolerance Pregnancy Hypercalcemia Hypokalemia
Beta blockers	Asthma Atrioventricular block (grade 2 or 3)	Metabolic syndrome Glucose intolerance (except for vasodilating beta blockers) Athletes and physically active patients Chronic obstructive pulmonary disease
Dihydropyridine calcium channel blockers		Tachyarrhythmia Heart failure
Nondihydropyridine calcium channel blockers	Atrioventricular block (grade 2 or 3, trifascicular block) Severe left ventricular heart dysfunction Heart failure	
Angiotensin-converting enzyme inhibitors	Pregnancy Angioedema Hyperkalemia Bilateral renal artery stenosis	Women with childbearing potential
Angiotensin receptor blockers	Pregnancy Hyperkalemia Bilateral renal artery stenosis	Women with childbearing potential
Aldorsterone antagonists	Acute or severe renal failure (estimated glomerular filtration rate < 30 mL/min) Hyperkalemia	

101 -B

122. 根據 2010 年中華民國心臟學會高血壓治療指引，下列藥物的選擇何者最適當？

① **Coronary heart disease: ACEI, ARB, BB, long-acting CCB**
② **Heart failure: Loop diuretic, ACEI, ARB, BB, long-acting CCB**
③ **Stroke: ACEI, CCB, Thiazide diuretic**
④ **Left ventricular hypertrophy: ARB**
⑤ **Isolated systolic hypertension: ACEI, Thiazide diuretic, CCB**

(A) ②+③
(B) ①+③+④
(C) ①+③+④+⑤
(D) ①+④+⑤
(E) ③+④+⑤

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103 -A

79. 六十二歲男性有中風病史已有二年，雖然採取非藥物治療，但目前血壓為 **158/84 mmHg**，根據台灣心臟醫學會於 **2010** 所發表的台灣高血壓的治療指引，下列高血壓藥物的選擇，對於 **stroke** 病患，若無禁忌症，何者非建議的起始藥物？

(A) 乙型阻斷劑 (Beta-blocker)
(B) Angiotensin converting enzyme inhibitor (ACEI)
(C) Angiotensin receptor blocker (ARB)
(D) 利尿劑 (Thiazide diuretics)
(E) 鈣離子阻斷劑 (Calcium channel blocker)

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103 -C

129. 高血壓的病人常合併有其他疾病如心衰竭，心肌梗塞、CAD、糖尿病、慢性腎病或再中風的預防，下列何藥物對上列狀況都可使用？

(A) beta-blocker
(B) calcium channel blocker
(C) ACEI
(D) Diuretic
(E) ARB

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Recommended drugs.

Clinical conditions	Drugs
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CCB

- ALLHAT: AMLODIPINE WAS EQUIVALENT TO CHLORTHALIDONE (A POTENT THIAZIDE-LIKE DIURETIC) AND LISINOPRIL (AN ACEI) IN PROTECTING AGAINST NONFATAL CORONARY EVENTS, STROKE, AND DEATH BUT PROVIDED LESS PROTECTION AGAINST HEART FAILURE
- ASCOT: AMLODIPINE/ACEI COMBINATION THERAPY IMPROVED CV OUTCOMES BETTER THAN BETA BLOCKER/THIAZIDE COMBINATION THERAPY
- ACCOMPLISH: AMLODIPINE/ACEI COMBINATION THERAPY IMPROVED CV OUTCOMES BETTER THAN ACEI/THIAZIDE COMBINATION THERAPY
- SIDE EFFECT: ANKLE EDEMA, GINGIVAL HYPERPLASIA-REVERSIBLE, FLUSHING AND HEADACHE (RARE)

RAS INHIBITORS: ACEI & ARB

- ONTARGET: COMPARABLE EFFECTS OF THE ACEI RAMIPRIL AND THE ARB TELMISARTAN REDUCING CV EVENTS AND PREVENTING DETERIORATION
- AASK: RAS INHIBITORS PROVIDE SUPERIOR RENAL PROTECTION THAN OTHER ANTIHYPERTENSIVE AGENTS DO ONLY FOR PROTEINURIC CKD
- DUAL RAS BLOCKADE"—EITHER WITH AN ACEI PLUS AN ARB OR WITH ALISKIREN PLUS AN ACEI OR ARB— IS NOW CONTRAINDICATED
- THERE ARE NO COMPLETED OR ONGOING RCTS OF ALISKIREN MONOTHERAPY
- ARBS PRODUCE MORE REGRESSION OF LEFT VENTRICULAR HYPERTROPHY (LVH) THAN DO OTHER ANTIHYPERTENSIVE DRUGS
- SIDE EFFECT: CONTRAINDICATED IN PREGNANCY; ACEI: DRY COUGH, ANGIOEDEMA

DIURETICS

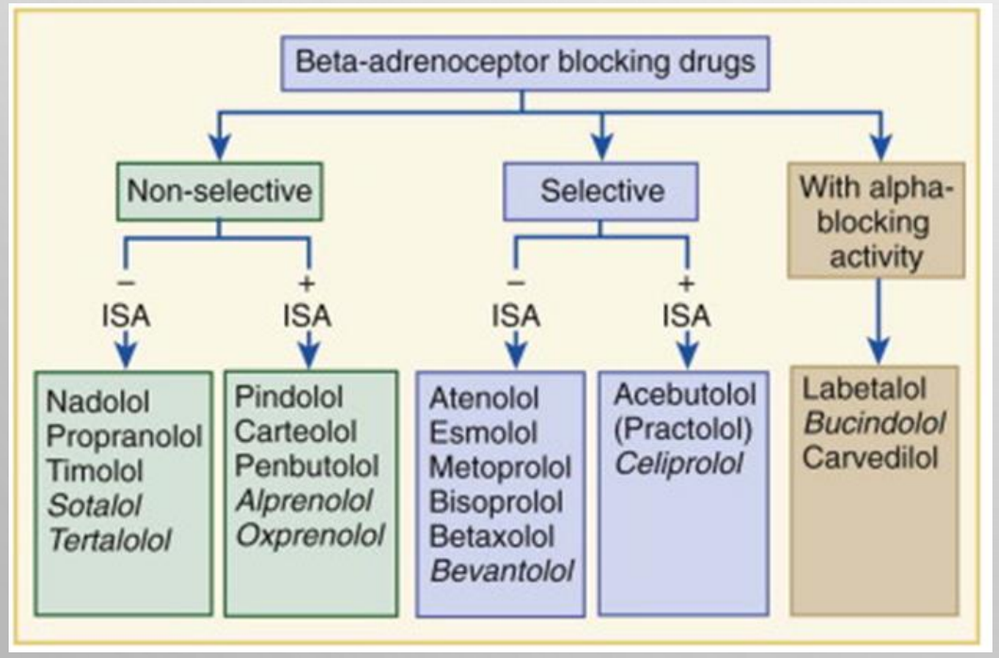
- **THIAZIDE DIURETICS** AS THE BEST CHOICE TO INITIATE ANTIHYPERTENSIVE THERAPY
- EQUALLY EFFECTIVE AS THE ACEI AND CCB IN PREVENTING CORONARY EVENTS AND STROKES, MORE EFFECTIVE THAN THE CCB IN PREVENTING HEART FAILURE, AND **IN BLACK PATIENTS,** MORE EFFECTIVE THAN THE ACEI IN PREVENTING STROKES
- CHLORTHALIDONE > HCTZ (HYDROCHLOROTHIAZIDE), MAY ALSO BE EFFECTIVE IN PATIENTS WITH STAGE 3 CKD
- SIDE EFFECT: AGGRAVATE GLUCOSE INTOLERANCE, HYPOKALEMIA AND HYPOMAGNESEMIA, GOUT, PHOTOSENSITIVE DERMATITIS, HYPERLIPIDEMIA, AND MORE ERECTILE DYSFUNCTION

MRAS- **ALDOSTERONE ANTAGONISTS**

- ASCOT: HIGHLY EFFECTIVE ADD-ON DRUG FOR DIFFICULT CASES OF HYPERTENSION
- **EPLERENONE** IS A MUCH MORE SPECIFIC ANTAGONIST
- SIDE EFFECT: PAINFUL GYNECOMASTIA, ERECTILE DYSFUNCTION, NONMENSTRUAL UTERINE BLEEDING, HYPERKALEMIA

BETA-BLOCKER

- VASODILATING : LABETALOL, CARVEDILOL, AND NEBIVOLOL- HIGHLY EFFECTIVE ADD-ON DRUGS FOR DIFFICULT HYPERTENSION
- DECREASES IN CARDIAC OUTPUT (BETA1 RECEPTORS), RENIN RELEASE (BETA1 RECEPTORS), AND NOREPINEPHRINE RELEASE (PREJUNCTIONAL BETA2 RECEPTORS)
- SIDE EFFECT: INCREASE THE RISK FOR DIABETES, FATIGABILITY, IMPAIR CARDIAC CONDUCTION, ACUTE BRONCHOSPASM



	Cadioselective	Non-cardioselective	
With ISA	**Acebutolol*+**	Carteolol++ Penbutolol+ **Pindolol*+++**	
Without ISA	**Atenolol** Betaxolol Bisoprolol **Metoprolol***	**Carvedilol**** **Labetalol**** Nadolol **Propranolol*#**	**Sotalol** Timolol*

ISA = Intrinsinc Sympathomimetic Activity ** Alpha blocking properties
+Minimal ISA ++Moderate ISA +++Significant ISA *Lipid soluble #Membrane stabilizing

101 -D

11. 下列何種 beta-blocker 具有 intrinsic sympathomimetic activity?

(A) Atenolol
(B) Bisoprolol
(C) Carvedilol
(D) Pindolol
(E) Metoprolol

101,102 -C

53. 下列對 Beta blocker 之敘述何者錯誤：

(A) Carvedilol 及 Labetalel 可拮抗 α - adrenergic receptor (α 腎上腺素接受器) 具血管舒張之效果。

(B) Nadolol, Propanolol 及 Satolol 為 non-selective 之 Beta blocker。

(C) Pindolol 及 Acebutolol 不具 intrinsic sympathomimetic activity。

(D) Atenolol 及 Nadolol 為水溶性，而 Metoprolol 及 Propanolol 為脂溶性。

(E) Nebivolol 可增加內皮細胞之一氧化氮 (Nitric oxide) 產生與釋放。

103 -C

29. 乙型阻斷劑 (Beta-blockers) 被廣泛地運用在高血壓的治療上，特別是心肌梗塞，心衰竭及 tachyarrhythmia 的族群上，下列關於乙型阻斷劑的敘述，何者錯誤？
(A) Atenolol 是屬於 selective beta-blocker。
(B) Nadolol 無 intrinsic sympathomimetic activity。
(C) Carvedilol 並不具有 alpha-blocking activity，較少有姿態性低血壓 (postural hypotension) 的副作用。
(D) Nebivolol 是此類藥物中最具 selective beta-block effect，且具釋放 NO 的效果。
(E) 可能會加重性功能障礙 (sexual dysfunction)。

102 -E

78. 下列對於 beta blocker 的敘述，何者為非？

(A) 多半會降低 insulin sensitivity。

(B) Nonselective agent 會增加 triglyceride，減少 HDL cholesterol。

(C) Angina 和 MI 是 compelling indication。

(D) Labetalol 和 carvedilol 皆具有 alpha blocker 的作用。

(E) Pindolol 和 propranolol 具有 intrinsic sympathomimetic activity。

103 -C

57. 以下常用 beta-blocker，何者為 vasodilating beta blocker？

(A) Propranolol
(B) Bisoprolol
(C) Carvedilol
(D) Atenolol
(E) Metoprolol

Carvedilol, Labetalol, Nebivolol

ALPHA-ADRENERGIC BLOCKERS

- PHENOXYBENZAMINE REMAINS THE DRUG OF CHOICE FOR PREOPERATIVE MANAGEMENT OF PHEOCHROMOCYTOMA AFTER ALPHA BLOCKADE IS ACHIEVED, A BETA BLOCKER SHOULD BE ADDED TO BLOCK AN OTHERWISE EXCESSIVE REFLEX TACHYCARDIA.
- BY DILATING URETHRAL SMOOTH MUSCLE, THEY IMPROVE SYMPTOMS OF **PROSTATISM**

DIRECT VASODILATORS--- HYDRALAZINE, MINOXIDIL

- ACT BY OPENING VASCULAR ATP SENSITIVE K+ CHANNELS
- BY CAUSING SELECTIVE AND RAPID ARTERIAL DILATION, BOTH DRUGS INDUCE PROFOUND REFLEX SYMPATHETIC ACTIVATION AND TACHYCARDIA
- HYDRALAZINE IS USEFUL FOR THE TREATMENT OF PREECLAMPSIA AND AS RESCUE THERAPY FOR VERY DIFFICULT HYPERTENSION
- A COMBINATION OF HYDRALAZINE PLUS NITRATES IS USEFUL FOR THE TREATMENT OF HF, SPECIFICALLY IN NON-HISPANIC BLACK PATIENTS, IN WHOM HYPERTENSIVE HEART DISEASE CAUSES HF MOST FREQUENTLY
- SEVERE HYPERTENSION ACCOMPANYING ADVANCED CKD IS THE MAIN INDICATION FOR MINOXIDIL, WHICH MUST BE COMBINED WITH A BETA BLOCKER TO PREVENT EXCESSIVE REFLEX TACHYCARDIA AND WITH A LOOP DIURETIC TO PREVENT EXCESSIVE FLUID RETENTION
- INITIATION OF CHRONIC HEMODIALYSIS USUALLY IS A MORE EFFECTIVE MEANS OF CONTROLLING HYPERTENSION IN THIS SETTING

DIRECT VASODILATORS---MINOXIDIL

- VASODILATE BY OPENING POTASSIUM CHANNELS
- COMBINE WITH DIURETICS AND ADRENERGIC RECEPTOR BLOCKERS
- SIDE EFFECT: PERICARDIAL EFFUSION (3%), HAIR GROW, FACIAL HIRSUTISM

101 -E

55. 根據 2010 中華民國心臟學會高血壓治療指引，下列有關降高血壓藥物之敘述，何者為正確？

(A) 心衰竭合併高血壓患者，首選之降血壓藥為甲型阻斷劑 (alpha-blocker)。

(B) 懷孕期可以使用 angiotensin receptor blocker (ARB)。

(C) 懷孕期可以使用 angiotensin converting enzyme (ACEI)。

(D) 氣喘病 (asthma) 為鈣離子阻斷劑 (calcium channel blocker) 之禁忌症 (contraindication)。

(E) 雙側腎動脈狹窄為使用 ACEI 之禁忌症 (contraindication)。

103 -E

53. 下列關於高血壓藥物與常見副作用的配對，何者錯誤？

(A) 乙型阻斷劑 (beta-blocker) - 支氣管痙攣 (bronchospasm)

(B) 利尿劑 - 痛風

(C) 鈣離子阻斷劑 - 腳踝水腫

(D) 乙型阻斷劑與利尿劑 - 血糖異常

(E) 醛固酮拮抗劑 - 低血鉀

103 -E

81. 根據 2010 中華民國心臟學會高血壓治療指引，下列有關降高血壓藥物之敘述，何者為正確？

(A) 懷孕期可以使用 angiotensin converting enzyme (ACEI)。

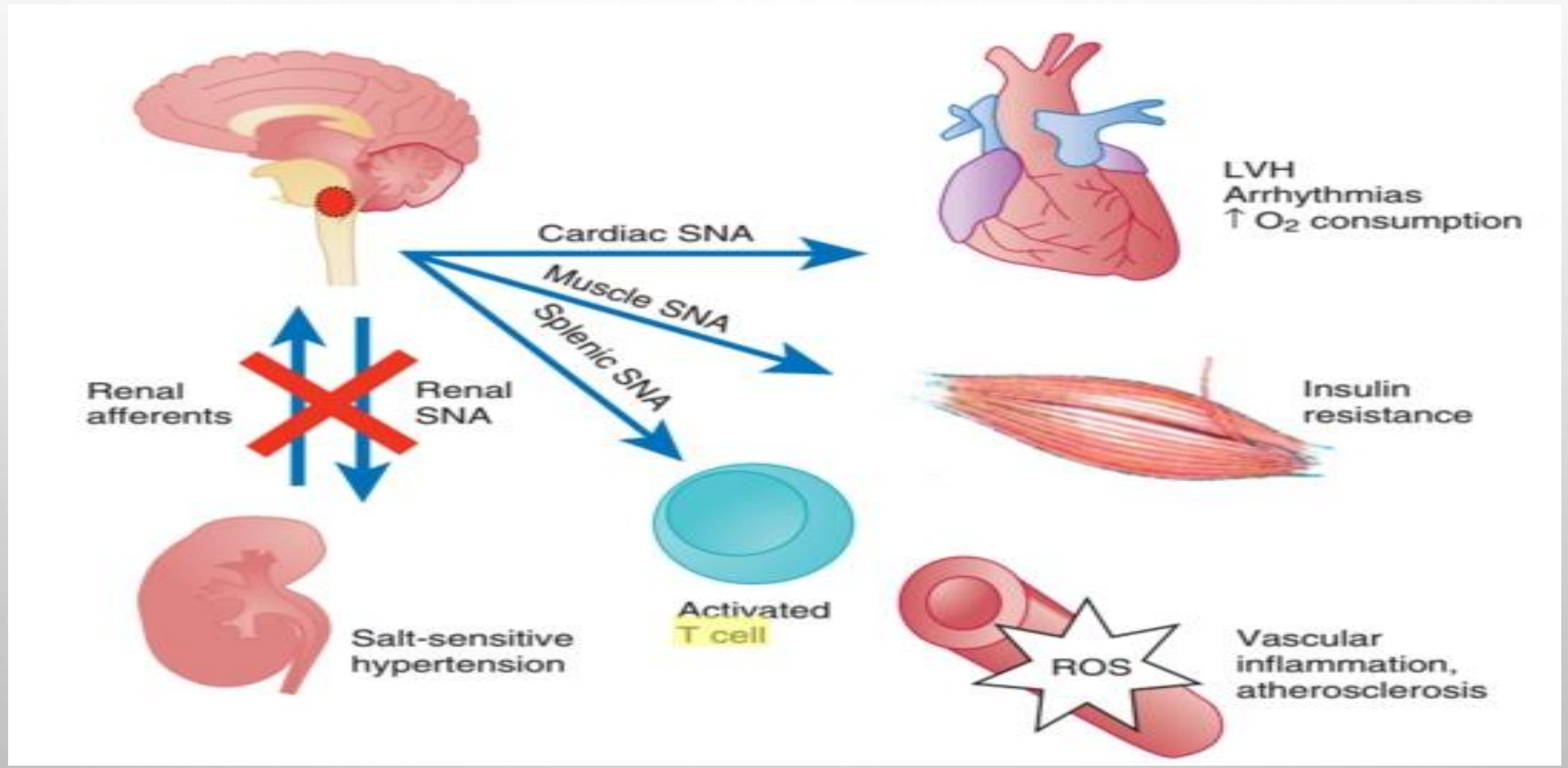
(B) 氣喘病 (asthma) 為鈣離子阻斷劑 (calcium channel blocker) 之禁忌症 (contraindication)。

(C) 懷孕期可以使用 angiotensin receptor blocker (ARB)。

(D) 高血壓合併左心室肥厚患者，首選之降血壓藥物為鈣離子阻斷劑 (calcium channel blocker)。

(E) 懷孕期，direct renin inhibitor (DRI) 為禁忌症。

RENAL DENERVATION



RENAL DENERVATION

- SYMPLICITY HTN-2 TRIALS

-- UNBLINDED, DRUG-RESISTANT HYPERTENSION

-- OFFICE-BASED BLOOD PRESSURE FELL DRAMATICALLY BY 32/12 MMHG

-- THE 24-HOUR AMBULATORY BLOOD PRESSURE BY 11/7MM HG

- SYMPLICITY HTN-1 TRIALS

-- OFFICE BLOOD PRESSURE AVERAGING −36/−14 MM HG

-- AMBULATORY BLOOD PRESSURE WAS NOT ASSESSED

- SYMPLICITY HTN-3 TRIALS

-- BLINDED

-- DID NOT SHOW A SIGNIFICANT REDUCTION IN OFFICE OR AMBULATORY BP (DISAPPOINTING……)

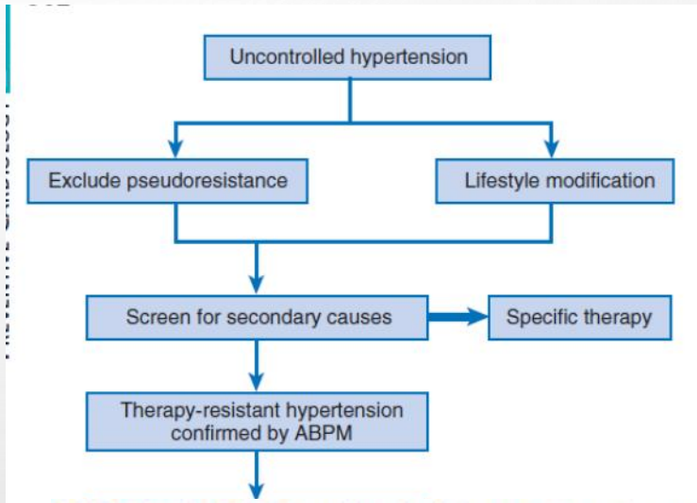
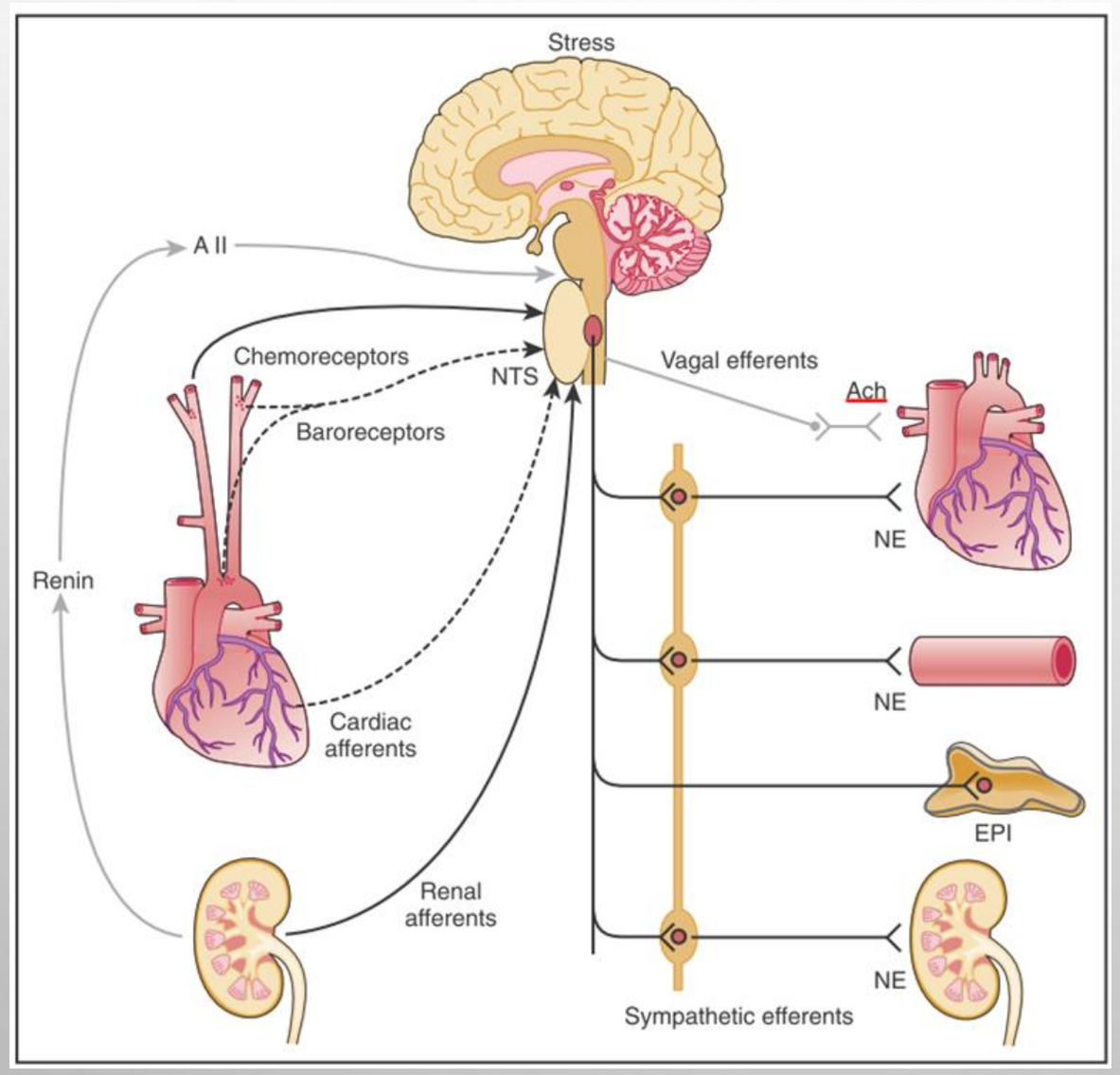


TABLE 44-8 Eligibility Criteria Before Considering Renal Denervation

Office SBP ≥ 160 mm Hg (≥150 mm Hg if type 2 diabetes)
>3 Antihypertensive drugs in adequate dosage and combination (including a diuretic)
Lifestyle modification
Exclusion of secondary hypertension
Exclusion of pseudoresistance using ABPM (average SBP ≥ 130 mm Hg or mean daytime SBP ≥ 135 mm Hg)
Preserved renal function (eGFR ≥ 45 mL/min/1.73 m^2)
Eligible renal arteries: no polar or accessory arteries, no renal artery stenosis, no previous revascularization

CAROTID BARORECEPTOR PACEMAKER –

- RHEOS SYSTEM DID NOT MEET ITS PRIMARY ENDPOINT



ALGORITHM FOR TREATMENT OF HYPERTENSION

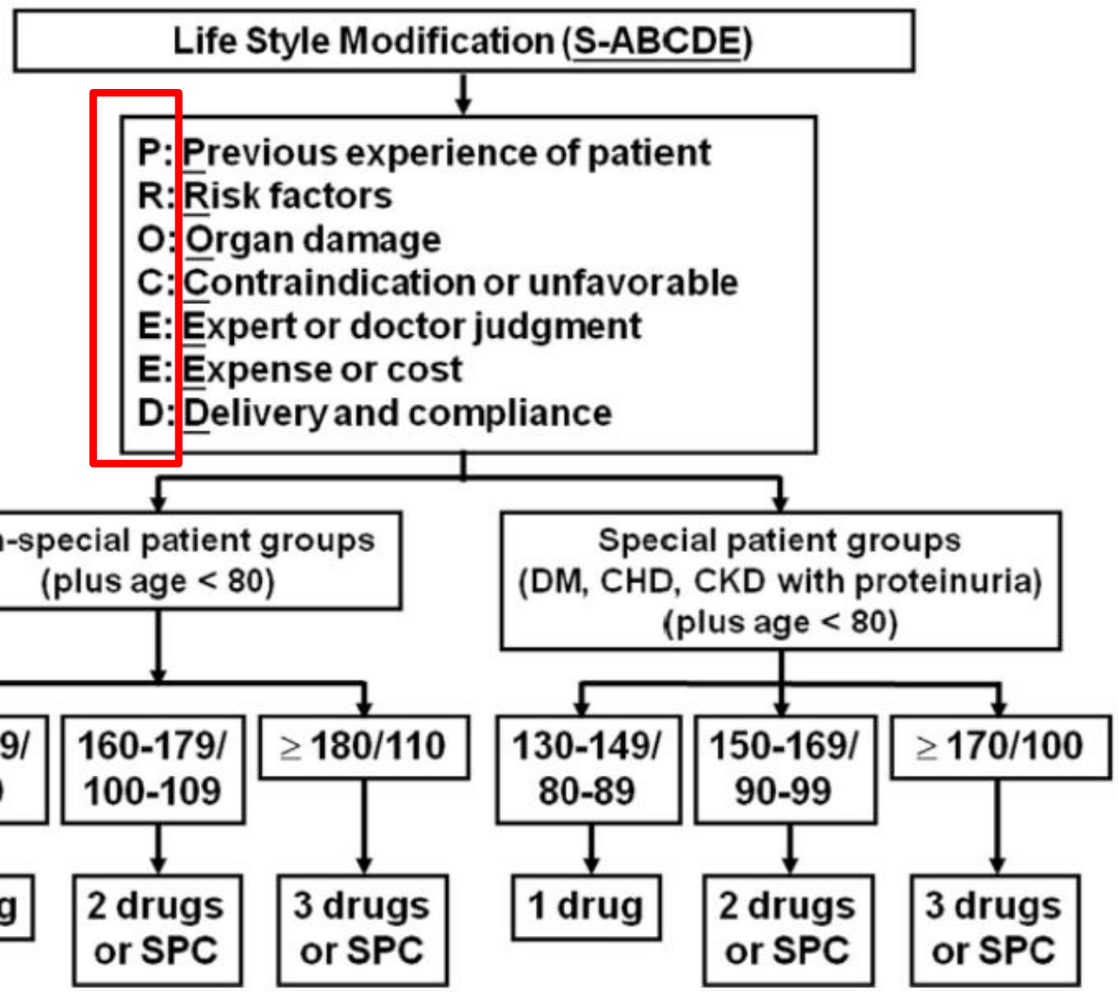


Fig. 2. Treatment algorithm. This algorithm is not applicable in very elderly patients (age ≥80 years). CHD: coronary heart disease; CKD: chronic kidney disease; DM: diabetes mellitus; SPC: single-pill combination (Modified from Chiang et al.[9] with permission).

101-E

129. 於 2010 年中華民國心臟學會高血壓治療指引中，所採用之 algorithm 內，於用藥前先考慮”PROCEED”，以下各項有關”PROCEED”之敘述何者為正確？

(A) PROCEED 中第一個 E 代表 Efficacy

(B) PROCEED 中第二個 E 代表 Endpoints

(C) PROCEED 中 R 代表 Receptor

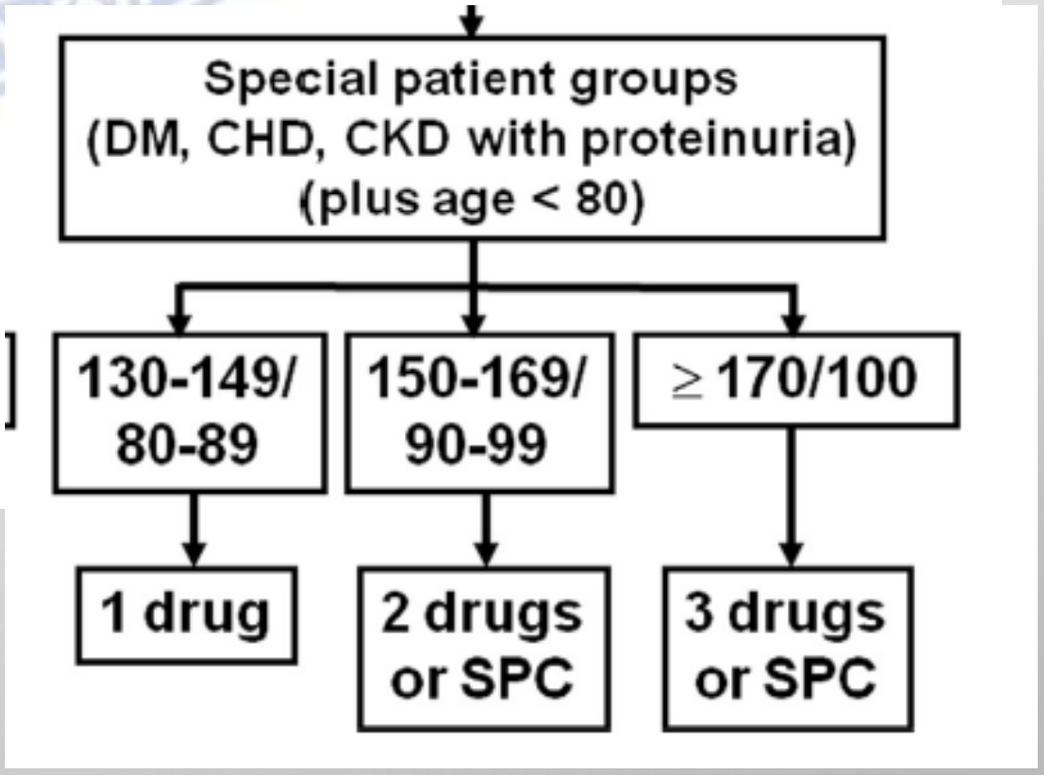
(D) PROCEED 中 P 代表 Patients

(E) PROCEED 中 D 代表 Delivery and Compliance

101 -C

76. 一位 72 歲男性病患，門診血壓為 158/78 毫米汞柱，心跳 80 次/分，家中血壓平均值為 154/72 毫米汞柱，前次門診已排除次發性高血壓之可能。理學檢查無特別異常。空腹血糖值為 162mg/dL，糖化血紅素為 7.4%，eGFR 為 72，正常肝功能、心電圖顯示左心室肥厚，無冠心症家族史。根據 2010 年中華民國心臟學會高血壓治療指引，此病患應優先使用下列何者？

(A) Therapeutic lifestyle changes alone
(B) Therapeutic lifestyle changes + 1 drug
(C) Therapeutic lifestyle changes + 2 drugs
(D) Therapeutic lifestyle changes + 3 drugs
(E) Therapeutic lifestyle changes + 4 drugs



101 -E

77. 承上題。病患接受 **therapeutic lifestyle modifications** 及 **1** 種藥物 **(angiotensin receptor blocker)**，一個月後血壓降為 **145/72** 毫米汞柱，心跳 **78** 次/分，下列何者是較合理之處理？

(A) 加上 alpha blocker
(B) 加上 angiotensin converting enzyme inhibitor (ACEI)
(C) 加上 beta blocker

(D) 加上 direct renin inhibitor
(E) 加上 calcium channel blocker

101 -C

132. 有關最近高血壓藥物的合併治療 (combination therapy)，何者錯誤？

(A) 合併治療可幫助血壓控制。

(B) ACEI與CCB的合併治療比ACEI與diuretic的合併治療可能提供較好的心血管保護。

(C) ACEI或ARB與DRI (direct renin inhibitor) 的合併治療對腎臟疾病的病人有益。

(D) 確定病人非白袍性高血壓且血壓大於 180/110 mmHg，可考慮使用三種血壓藥的合併治療。

(E) 合併治療可以減低彼此藥物的副作用。

102 -D

140. 在以下兩種降壓藥組合中，何者在大型研究中被證明能夠最有效的降低中心動脈血壓 **(central aortic blood pressure)**？

(A) 血管張力素轉化酶抑制劑 (ACE-I) + 利尿劑 (thiazide-type diuretics)。

(B) 乙型受體阻斷劑 (beta-blocker) + 利尿劑 (thiazide-type diuretics)。

(C) 乙型受體阻斷劑 (beta-blocker) + 鈣離子阻斷劑 (CCB)。

(D) 血管張力素轉化酶抑制劑 (ACE-I) + 鈣離子阻斷劑 (CCB)。

(E) 血管張力素轉化酶抑制劑 (ACE-I) + 血管張力素受體阻斷劑 (ARB)。

103 -C

145. 五十五歲男性，有糖尿病及高血壓，收縮壓 160mmHg，舒張壓 95mmHg，依 2010 年台灣心臟學會高血壓指引，最合適之初始藥物治療為？

(A) 尚不需藥物治療。
(B) 單一藥物治療。
(C) 雙重藥物治療，可用複合藥劑型 (SPC)。
(D) 雙重藥物治療，不可用 SPC。
(E) 三重藥物治療。

GOAL OF THERAPY

Table 2. New BP targets

Categories	Targets (mmHg)	COR	LOE
Primary prevention	< 140/90	I	B
Secondary prevention			
Diabetes	< 130/80	I	B
CHD	< 120/NA[AOBP]	I	B
Stroke	< 140/90	I	A
CKD	< 120/NA[AOBP]	I	B
Elderly (age ≥ 75 years)	< 120/NA[AOBP]	I	B
Patients receiving antithrombotics for stroke prevention	< 130/80	I	B

AOBP, unattended automated office blood pressure measurement; BP, blood pressure; CHD, coronary heart disease; CKD, chronic kidney disease; COR, class of recommendation; LOE, level of evidence; NA, not available.

102 -A

81. 85 歲女性，血壓 164/70 mmHg，無其他明顯全身性疾病。下列敘述何者有誤？

(A) 治療目標收縮壓為<140 mmHg。

(B) 五大類降血壓藥中，對於 mortality 和 morbidity，並無某一類被證實優於其他類。

(C) 必須小心發生飯後低血壓之可能性。

(D) 要達到治療目標常須合併不同種類之降壓藥。

(E) 對於年齡大於 65 歲之族群，女性平均收縮壓高於男性。

EVIDENCE-BASED APPROACH

TABLE 44-9 Hypertension Randomized Trials Organized by Risk Gradient

TRIAL	TREATMENT GROUP	COMPARATOR GROUP	BASELINE SBP IN TREATMENT GROUP	ACHIEVED SBP IN TREATMENT GROUP	GROUP SBP DIFF	OUTCOMES
Patients with Prehypertension						
TROPHY	ARB	Placebo	134	134	–2	–12% incident hypertension ($P <$ 0.001)
Hypertensive Patients in General						
FEVER	CCB + D	D + placebo	159	137	–4	–27% CV events ($P < 0.001$)
ELSA	CCB + D	BB + D	162	142	0	NS difference in CV events
NORDIL	CCB (DLTZ) + ACEI	BB + D	174	154	–3	NS difference in CV events ($P = 0.04$)
CAPPP	ACEI (captopril)	BB + D	162	152	+3	+5% CV events (P = NS)
CONVINCE	CCB (verapamil) + D	BB + D	150	136	0	NS difference in CV events
VALUE	CCB + D	ARB + D	156	139	–2	–3% CV events (P = NS)
ASCOT	ACEI + CCB	BB + D	164	137	–3	–16% CV events ($P < 0.001$)
ACCOMPLISH	ACEI + CCB	ACEI + D	145	132	–1	–21% CV events ($P < 0.001$)
ALLHAT	D + BB	ACEI + BB	145	134	–1	NS difference in CV events
ALLHAT	D + BB	CCB + BB	145	134	–1	NS difference in CV events
ONTARGET	ACEI + ARB	ACEI or ARB	142	132	–2	NS difference in CV events, +175% hypotension ($P < 0.001$), +58% renal impairment ($P < 0.001$)

NS: not significant

TABLE 44-9 Hypertension Randomized Trials Organized by Risk Gradient—cont'd

TRIAL	TREATMENT GROUP	COMPARATOR GROUP	BASELINE SBP IN TREATMENT GROUP	ACHIEVED SBP IN TREATMENT GROUP	GROUP SBP DIFF	OUTCOMES
Hypertension in Elderly Patients						
HYVET	ACEI + D	Placebo	173	145	−15	−34% CV events ($P < 0.001$)
SCOPE	ARB + D	D + placebo	166	144	−3.2	−28% nonfatal strokes ($P = 0.04$)
SHEP	BB + D	Placebo	171	145	−13	−36% strokes ($P < 0.001$)
SystEur	ACEI + CCB	Placebo	174	151	−10	−31% CV events ($P < 0.001$)
SystChina	ACEI + CCB	Placebo	170	159	−9	−37% CV events ($P < 0.004$)
Coope and Warrender	BB + D	Placebo	196	178	−18	−42% strokes ($P < 0.03$)
STOP	BB + D	Placebo	195	167	−20	−40% CV events ($P < 0.003$)
STOP 2	ACEI or CCB	BB + D	194	159	0	NS difference in CV events
Hypertension with Left Ventricular Hypertrophy						
LIFE	ARB + D	BB + D	176	146	−2	−37% CV mortality ($P = 0.03$)
Hypertension in Patients with Diabetes Mellitus						
ADVANCE	ACEI + D	Placebo	145	139	−6	−18% CV events ($P < 0.03$)
ALTITUDE	DRI + ACEI or ARB	Placebo + ACEI or ARB	137	139	−1	NS difference in CV + renal events; +34% hyperkalemia ($P < 0.001$); +46% hypotension ($P < 0.001$)
ACCORD	More intense (3.4 drugs)	Less intense (2.1 drugs)	139	119	−14	NS difference in CV + renal events; −41% stroke ($P = 0.03$)
Hypertension in Patients with Diabetic Nephropathy						
IDNT	ARB	Placebo	160	140	−3	−20% renal impairment ($P < 0.001$)
IDNT	ARB	CCB	160	140	0	−23% renal impairment ($P = 0.006$)
RENAAL	ARB	Placebo	152	140	−3	−16% renal impairment ($P = 0.02$)

EVIDENCE-BASED APPROACH

Hypertension in Patients with Diabetic Nephropathy						
IDNT	ARB	Placebo	160	140	−3	−20% renal impairment ($P < 0.001$)
IDNT	ARB	CCB	160	140	0	−23% renal impairment ($P = 0.006$)
RENAAL	ARB	Placebo	152	140	−3	−16% renal impairment ($P = 0.02$)
Hypertension in Patients with Nondiabetic Chronic Kidney Disease						
AASK	ACEI + D + AB	BB + D + AB	151	135	−1	−22% renal impairment ($P = 0.04$)
AASK	ACEI + D + AB	CCB + D + AB	151	135	+1	−38% renal impairment ($P = 0.004$)
REIN	ACEI	Placebo	150	145	+1	−56% renal decline ($P = 0.03$)
Blood Pressure Reduction for Secondary Prevention of Coronary Events						
INVEST	CCB (verapamil) + ACEI	BB + D	150	132	0	NS difference in CV events
Blood Pressure Reduction for Secondary Prevention of Stroke						
PROGRESS	ACEI + D	Placebo	149	133	−12	−43% strokes ($P < 0.001$)
PROGRESS	ACEI	Placebo	147	140	−5	NS difference in stroke
PROFESS	ARB	Placebo	144	136	−4	NS difference in stroke

101- E

75. 下列高血壓之臨床試驗，均以腦中風為主要事件終點。何者例外？

(A) SHEP
(B) Syst-Eur
(C) Syst-China
(D) HYVET
(E) ASCOT

SHEP trial: To assess the ability of antihypertensive drug treatment to reduce the risk of nonfatal and fatal (total) stroke in isolated systolic hypertension

Syst-Eur trial : investigated whether active treatment could reduce cardiovascular complications of isolated systolic hypertension. Fatal and non-fatal stroke combined was the primary endpoint

Syst-China trial investigate whether antihypertensive drug treatment could reduce the incidence of fatal and nonfatal stroke in older Chinese patients with isolated systolic hypertension

HYVET trial: Whether the treatment of patients with hypertension who are 80 years of age or older is beneficial. The primary end point was fatal or nonfatal stroke (indapamide or added ACEi)

ASCOT trial: The primary end point in the ASCOT study was nonfatal myocardial infarction, including silent infarcts and fatal CHD, secondary outcomes, which included fatal and nonfatal stroke, total CV events, and all-cause mortality

101 -E

125. 下列有關高血壓之臨床試驗何者錯誤？

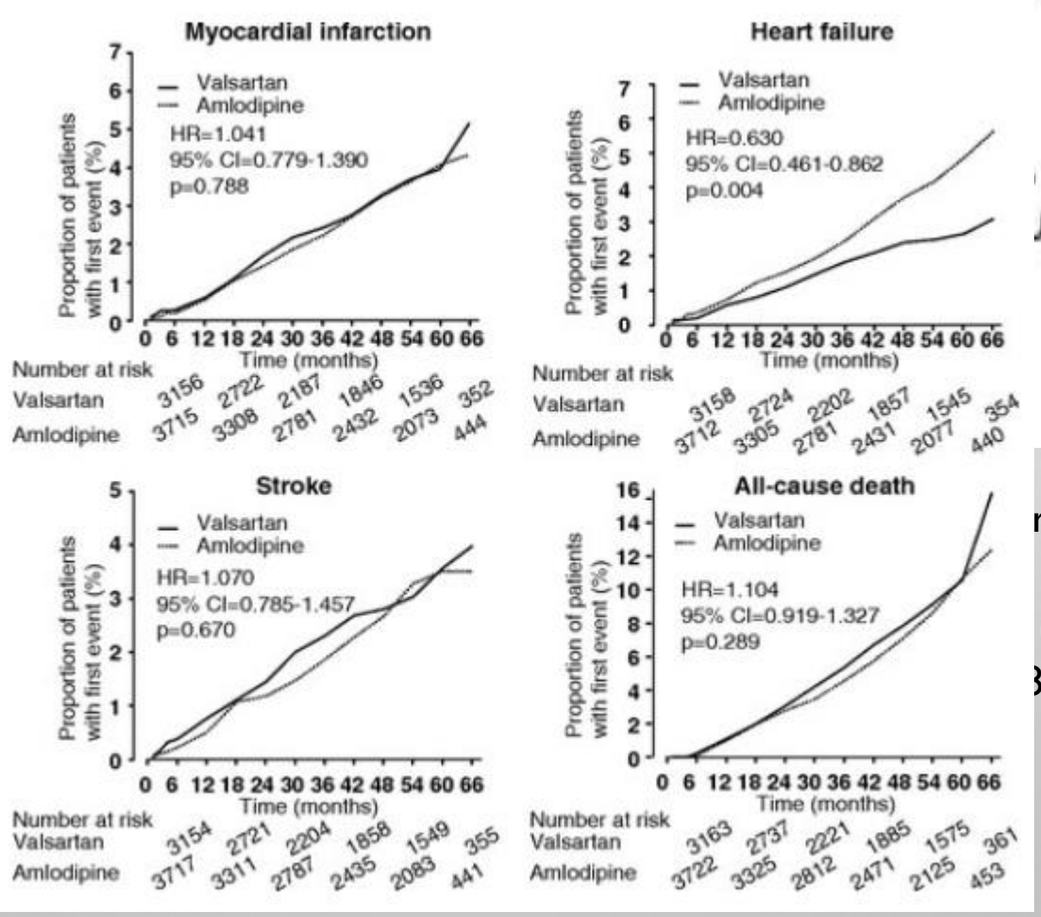
(A) 在 ASCOT 試驗中，服用 CCB 加 ACEI 的組合優於 Beta-blocker 加利尿劑的組合。

(B) 在 ACCOMPLISH 試驗中，服用 ACEI 加 CCB 之組合優於 ACEI 加利尿劑之組合。

(C) 在 LIFE 試驗中，服

(D) 在 ALLHAT 試驗中

(E) 在 VALUE 試驗中，



衰竭比率。

Life trial: aimed to establish whethe reducing blood pressure and, consequently, reduces

Allhat trial: For lisinopril vs chlorthal (33.3% vs 30.9%; RR, 1.10; 95% CI, 1.05-1.16); strok 3.7% vs 7.7%; RR, 1.19; 95% CI, 1.07-1.31)

Value trial:

101 -E

131. 下列有關 **ACCOMPLISH** 臨床試驗之敘述，何者<u>錯誤</u>？

(A) 是比較 ACEI 加 CCB 相對於 ACEI 加利尿劑之臨床試驗。

(B) 兩組治療後之平均收縮壓血壓相差 0.9 mmHg。

(C) 兩組之主要終點 (primary endpoints)，ACEI 加 CCB 組低於 ACEI 加利尿劑組 20%，具統計學意義。

(D) 減少腎病變終點 (renal outcomes)，以 ACEI 加 CCB 組較有效。

(E) 於糖尿病之亞組分析中 (subgroup analysis)中，心衰竭住院之比率，以 ACEI 加利尿劑組較高。 低

103 -E

82. 有關老老人 (>80 歲) 的高血壓何者錯誤？

(A) 收縮壓隨年紀上升

(B) 舒張壓隨年紀下降

(C) 根據 HYVET 研究，血壓降到<150/80 就可能減少心血管事件的發生。

(D) 藥物劑量的調整可保守些

(E) 乙型交感神經阻斷劑為藥物首選

Preferred Antihypertensive Drugs for Specific Conditions

CONDITION	DRUG OR DRUGS
Patients with prehypertension	ARB?
Hypertensive patients in general	CCB, ARB or ACEI, D
Hypertension in older patients	CCB, ARB or ACEI, D
Hypertension with LVH	ARB, D, CCB
Hypertension in patients with diabetes mellitus	CCB, ACEI or ARB, D
Hypertension in patients with diabetic neuropathy	ARB, D
Hypertension in patients with nondiabetic chronic kidney disease	ACEI, BB, D
BP reduction for secondary prevention of coronary events	ACEI, CCB, BB, D
BP reduction for secondary prevention of stroke	ACEI + D, CCB
BP for patients with heart failure	D, BB, ACEI, ARB, MR antagonists
Pregnancy	BB (labetalol), CCB (nifedipine)
Aortic aneurysm	BB
Atrial fibrillation, ventricular rate control	BB, non-DHP CCB

SPECIAL POPULATIONS

- HYPERTENSION IN NON-HISPANIC BLACK PATIENTS:

-- ACEI PROVIDED LESS BP REDUCTION AND THUS LESS STROKE PROTECTION THAN EITHER **THE DIURETIC OR THE CCB** DID

- **ORAL CONTRACEPTIVES AND HORMONAL REPLACEMENT THERAPY**

-- BP NORMALIZES WITHIN 6 MONTHS OF STOPPING OC THERAPY IN 50% OF PATIENTS

-- HORMONAL REPLACEMENT THERAPY DOES NOT APPEAR TO ELEVATE BP

102,103 -D

71. 下列關於口服避孕藥物與高血壓之敘述，何者為非？

(A) 使用口服避孕藥物期間若同時有飲酒習慣 (alcohol consumption) 會更增加發生高血壓之機會。

(B) 使用口服避孕藥物比沒有使用口服避孕藥物女性發生高血壓機會約為兩倍。

(C) 使用口服避孕藥物發生高血壓機會與其開始使用口服避孕藥物之年齡有關。

(D) 使用口服避孕藥物發生高血壓後，停藥後大多數患者其血壓會立即恢復正常。 一半恢復

(E) 使用口服避孕藥物發生高血壓與 renin-aldosterone-mediated volume expansion 有關。

SPECIAL POPULATIONS

- HYPERTENSION AND ERECTILE DYSFUNCTION

-- ERECTILE DYSFUNCTION 2/3 IN HYPERTENSIVE PATIENTS

-- EXACERBATED BY DIURETIC -> CHLORTHALIDONE

-- 5- PHOSPHODIESTERASE INHIBITORS

-- TOMHS:

THE ONLY RCT INCLUDE ERECTILE DYSFUNCTION AS PATIENT-REPORTED OUTCOME

- HYPERTENSION AND HYPERTROPHIC CARDIOMYOPATHY

-- ALL THE FIRST-LINE ANTIHYPERTENSIVE CAN EXACERBATE OUTFLOW TRACT OBSTRUCTION.

-- BEST TREATED WITH A BETA BLOCKER AND/OR VERAPAMIL OR DILTIAZEM

HYPERTENSION IN PREGNANCY

- PREECLAMPSIA
- CHRONIC HYPERTENSION
- CHRONIC HYPERTENSION SUPERIMPOSED PREECLAMPSIA
- GESTATIONAL HYPERTENSION

TABLE 44-10 Diagnostic Criteria for Preeclampsia

Blood pressure	≥140/90 mm Hg on 2 occasions at least 4 hr apart after 20 wk of gestation in a woman with a previously normal pregnancy ≥160/110 mm Hg; hypertension can be confirmed within a short interval (minutes) to facilitate timely antihypertensive therapy
and	
Poteinuria	≥300 mg per 24-hour urine collection *or* Protein-creatinine ratio ≥ 0.3
or in the absence of proteinuria, new-onset hypertension with the new onset of any of the following:	
Thrombocytopenia	Platelet count < 100,000/mL
Renal insufficiency	Serum creatinine > 1.1 mg/dL or doubling of serum creatinine in the absence of other renal disease
Impaired liver function	Serum liver transaminases elevated twice normal
Pulmonary edema	
Cerebral or visual symptoms	

125

Modified from Hypertension in pregnancy. Report of the American College of Obstetricians and Gynecologists' Task Force on Hypertension in Pregnancy. Obstet Gynecol 122:1122, 2013.

HYPERTENSION DURING PREGNANCY

- RISK FACTORS: YOUNG OR OLDER AGE, MULTIPLE GESTATIONS, CONCOMITANT HEART OR RENAL DISEASE, AND CHRONIC HYPERTENSION
- PREVENTION AND TREATMENT
  - PREVENTION: LOW-DOSE ASPIRIN (60 TO 80 MG DAILY BEGINNING IN THE FIRST TRIMESTER)
  - TREAT ONLY FOR STAGE 2 HYPERTENSION (BP >160/110 MM HG) OR PREECLAMPSIA
  - LABETALOL, NIFEDIPINE, OR METHYLDOPA. (ACEIS AND ARBS CONTRAINDICATION). IV NTG FOR PULMONARY EDEMA.
  - DELAY OF PREGNANCY UNTIL AFTER THE TEENAGE YEARS AND BETTER PRENATAL CARE
  - ONLY CURE FOR PREECLAMPSIA IS DELIVERY

101 -A

72. 關於子癲前症 (preeclampsia) 和慢性高血壓的比較，下列何者非子癲前症的特色？

(A) 年齡大於 30 歲

(B) 初次懷孕的婦女

(C) 在懷孕 20 周後發生高血壓

(D) 收縮壓 < 160 mmHg

(E) 蛋白尿

102 -A

138. 以下關於妊娠高血壓 (gestational hypertension) 的敘述何者為非？

(A) 發生妊娠高血壓婦女宜採低鹽飲食 (salt restriction)。

(B) 服用低劑量阿斯匹林 (low-dose aspirin) 無助於預防妊娠高血壓。

(C) 血壓 160/100 毫米汞柱 (mmHg) 之孕婦可使用口服降壓藥如 methyldopa，labetalol 等藥物治療。

(D) 使用 atenolol 可能造成胎兒生長遲滯 (fetal growth retardation)。

(E) 不應使用血管張力素轉化酶抑制劑 (ACE-I) 或血管張力素受體阻斷劑 (ARB)，由於其可能造成畸胎 (teratogenicity)。

Low dose aspirin prevents preeclampsia
in women with a history of early-onset (<28 weeks)
preeclampsia or preeclampsia in more than one prior pregnancy.

103 -C

148. 三十歲女性，懷孕 22 週，過去無高血壓，新發作血壓昇高到 165/110mmHg，24 小時尿中蛋白 100 mg，考慮以下那一個藥物為首選治療？

(A) ACEI
(B) ARB
(C) methyldopa
(D) Atenobol
(E) Dimetics

RESISTANT HYPERTENSION

TABLE 44-11 Causes of Resistant Hypertension

Pseudoresistant Hypertension
Inadequate blood pressure regimen
Pressor substances
White coat reaction
Medication nonadherence
Improper blood pressure measurement
Truly Resistant Hypertension
Chronic kidney disease
Primary aldosteronism
Other secondary hypertension
Difficult primary hypertension

101 -E

56. 何者非頑固性高血壓 (resistant hypertension) 的原因？

(A) 酗酒

(B) 不正確的血壓測量

(C) 呼吸中止症候群

(D) 不當利尿劑使用

(E) 以上皆是

103 -E

143. 關於頑固性高血壓 (Resistant hypertension) 的敘述，下列敘述何者錯誤？

(A) 使用大於或等於三種血壓藥〈其中包含利尿劑〉，舒張壓無法控制在 90mmHg 以內。

(B) 原因之一為通常是病患不服用藥物或自行調整藥物劑量。

(C) 可能考慮藥物的交互作用，例如：止痛藥物如 NSAIDs 或口服避孕藥物。

(D) 睡眠呼吸中止症 (sleep apnea) 也是考慮的因素之一。

(E) 可能是利尿劑使用過度導致，應降低劑量。

THERAPY FOR HYPERTENSIVE CRISES

- ACUTE TARGET-ORGAN DAMAGE TO THE BRAIN, HEART, KIDNEY, RETINA, OR BLOOD VESSELS. TYPICALLY, BP IS 220/130 MM HG OR

TABLE 44-13 Recommended Treatment of Hypertensive Emergencies by End-Organ Involved

TYPE OF EMERGENCY	TIMELINE, TARGET BLOOD PRESSURE	FIRST-LINE THERAPY	ALTERNATIVE THERAPY
Hypertensive crisis with retinopathy, microangiopathy, or acute renal insufficiency	Several hours, MAP –20% to –25%	Labetalol	Nitroprusside Nicardipine Urapidil
Hypertensive encephalopathy	Immediate, MAP –20% to –25%	Labetalol	Nicardipine Nitroprusside
Acute aortic dissection	Immediate, SBP < 110 mm Hg	Nitroprusside + metoprolol	Labetalol
Acute pulmonary edema	Immediate, MAP 60 to 100 mm Hg	Nitroprusside with loop diuretic	Nitroglycerin Urapidil with loop diuretic
Acute coronary syndrome	Immediate, MAP 60 to 100 mm Hg	Nitroglycerin	Labetalol
Acute ischemic stroke and BP >220/120 mm Hg	1 hour, MAP –15%	Labetalol	Nicardipine Nitroprusside
Cerebral hemorrhage and SBP >180 mm Hg or MAP >130 mm Hg	1 hour, SBP < 180 mm Hg and MAP <130 mm Hg	Labetalol	Nicardipine Nitroprusside
Acute ischemic stroke with indication for thrombolytic therapy and BP >185/110 mm Hg	1 hour, MAP less than –15%	Labetalol	Nicardipine Nitroprusside
Cocaine/XTC intoxication	Several hours, SBP < 140 mm Hg	Phentolamine (after benzodiazepines)	Nitroprusside
Pheochromocytoma crisis	Immediate	Phentolamine	Nitroprusside Urapidil
Perioperative hypertension during or after CABG	Immediate	Nicardipine	Urapidil Nitroglycerin
During or after craniotomy	Immediate	Nicardipine	Labetalol
Severe preeclampsia/eclampsia	Immediate, BP < 160/105 mm Hg	Labetalol (plus $MgSO_4$ and oral antihypertensives)	Ketanserin Nicardipine

102 -C

141. 一位 **48** 歲男性抱怨近 **2** 日厲害的清晨頭痛，且右眼視力模糊，他的血壓值為 **220/130 mmHg**，心跳 **78 BPM**，眼底檢查呈現右眼視乳頭水腫，理學檢查皆正常，實驗室檢查發現 **hematuria (2+)** 和 **serum creatinine level 2.1mg/dl**。這位病患最理想的處置為？

(A) 需儘快降血壓將舒張壓於 2-3 小時內降至 90mmHg。

(B) 慢慢的降血壓將舒張壓於 2 天內降至 90-100mmHg。

(C) 於 2-3 小時內，將平均血壓 (MAP, mean arterial pressure) 降至 120mmHg。

(D) 於 6-12 小時內，將 MAP 降至 120mmHg。

(E) 應先測量顱內壓 (Intracranial pressure)，再考慮降血壓。

Initially reduced no more than 25% MAP over mins to hrs

THANK YOU

SPRINT TRIAL AND 2017 TSOC HYPERTENSION GUIDELINE

SPRINT TRIAL

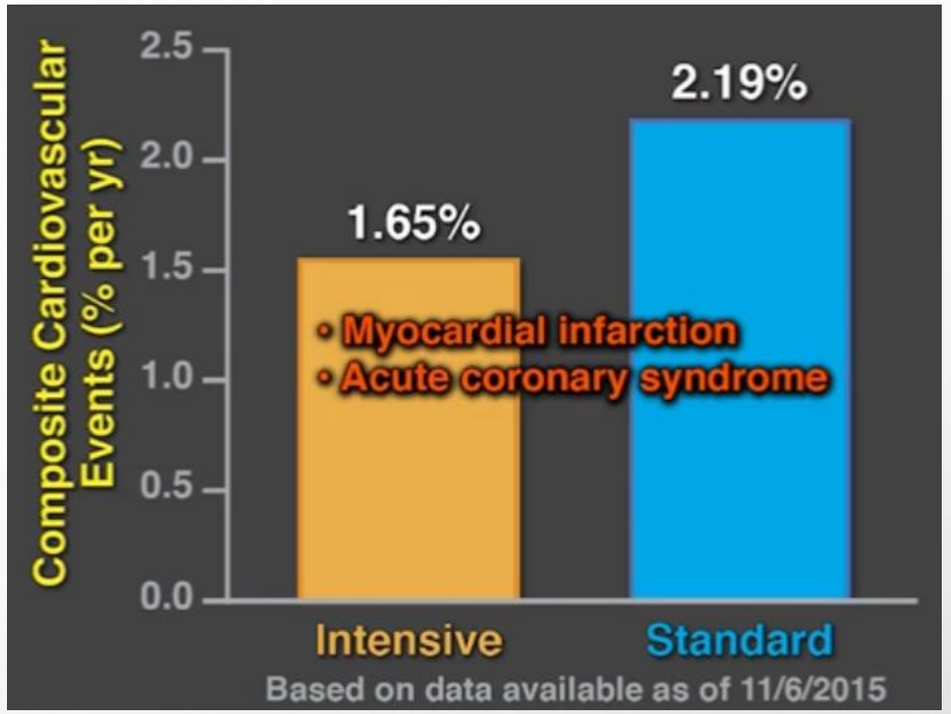
沒有糖尿病但有心血管風險因子的病患

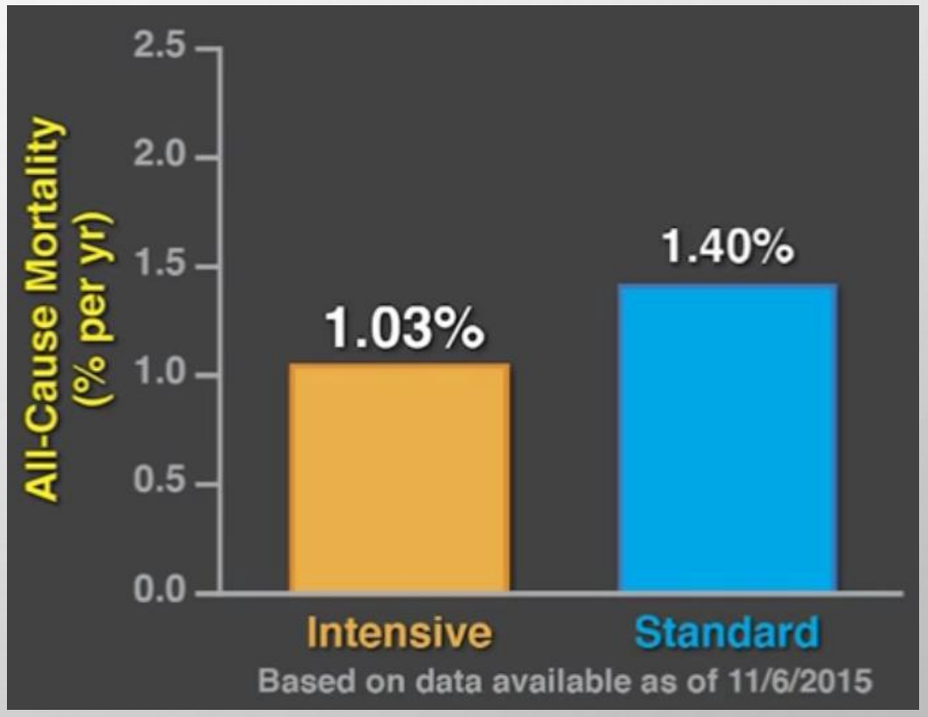
AOBP

N=9361

SBP < 120MMHG V.S SBP < 140MMHG

https://chunting.me/blood-pressure-measurement-2017-taiwan-guideline/





AOBP:。什麼是自動化診間血壓測量？簡單來說，它有以下四個原則，簡稱 **EMAU**：

1.使用**自動血壓計** **(Electronic and automated device)**：推薦採用標準化的血壓測量設備；在測量前，病人至少要處在休息狀態下五分鐘。

2.進行**多次測量** **(Multiple readings)**：使用自動血壓計，測量三次，每次間隔一分鐘。

3.數值**取平均值** **(Averaged mean)**：紀錄三次血壓數值，取平均值。

4.保持**空間安靜**(**Unattended and undisturbed spaces)**：讓病人在休息狀態下，處在安靜不受打擾的診間量血壓；沒有任何醫療人員在場，避免緊張感造成高血壓 (例如:白袍症候群)。

Table 2

New BP targets

Categories	Targets (mmHg)	COR	LOE
Primary prevention	< 140/90	I	B
Secondary prevention			
Diabetes	< 130/80	I	B
CHD	< 120/NA[AOBP]	I	B
Stroke	< 140/90	I	A
CKD	< 120/NA[AOBP]	I	B
Elderly (age ≥ 75 years)	< 120/NA[AOBP]	I	B
Patients receiving antithrombotics for stroke prevention	< 130/80	I	B

AOBP, unattended automated office blood pressure measurement; BP, blood pressure; CHD, coronary heart disease; CKD, chronic kidney disease; COR, class of recommendation; LOE, level of evidence; NA, not available.

Table 10
Blood pressure targets.

Categories	Targets (mmHg)	COR	LOE
Primary prevention	<140/90	IIa	B
Secondary prevention			
Diabetes	<130/80	I	B
CHD	<130/80	I	B
Stroke	<140/90	I	A
CKD	<140/90	I	A
CKD with proteinuria	<130/80	IIb	C
Very elderly (age ≥80 years)	<150/90	IIa	B
Patients receiving antithrombotics for stroke prevention	<130/80	I	B

CHD: coronary heart disease; CKD: chronic kidney disease; COR: class of recommendation; LOE: level of evidence.

新血壓控制目標

Ref: 2017 台灣高血壓&心臟學會指引

Google 葉峻榳醫師

血壓 < 120/NA*AOBP

冠狀動脈心臟病

≥ 75歲

慢性腎衰竭

一般人

中風

血壓 < 140/90

糖尿病

抗血栓藥物

血壓 < 130/80

*AOBP：自動化診間血壓

傳統血壓控制目標

Ref: 2017 台灣高血壓&心臟學會指引

Google 葉峻榳醫師

血壓 < 140/90

一般人

≥ 75歲

中風

慢性腎衰竭

血壓 < 130/80

冠狀動脈心臟病

糖尿病

抗血栓藥物

高血壓定義

HBPM, ABPM, AOBP

Table 7
Definition of hypertension by HBPM and ABPM.

Category	Systolic blood pressure (mmHg)		Diastolic blood pressure (mmHg)
HBPM	≥135	or	≥85
ABPM	≥130	or	≥80
Daytime	≥135	or	≥85
Nighttime	≥120	or	≥70

ABPM: ambulatory blood pressure monitoring; HBPM: home blood pressure monitoring (Modified from Chiang et al.[9] with permission).

Conventional Office BP	≥140	*and/or*	≥90
Automated Office BP (AOBP)	≥135		≥85

THE AVERAGED NIGHT-TIME BP HAS BECOME A STRONGER PREDICTOR THAN AVERAGED DAYTIME BP

DIPPING" PATTERN:NIGHT-TIME BP FALL OF >10% OF DAYTIME VALUES

EARLY MORNING HYPERTENSION : ELEVATION OF AVERAGED BP OVER THE 2 HOURS AFTER AWAKING => ASSOCIATED WITH HIGHER RISK OF STROKE

MORNING BP SURGE, ON THE OTHER HAND, IS AN INCREASE IN BP OCCURRING FROM THE NIGHT-TIME TO THE EARLY MORNING. SIMILAR TO EARLY MORNING HYPERTENSION

=>A RISK FACTOR FOR CARDIOVASCULAR EVENTS, ESPECIALLY HEMORRHAGIC STROKE

106-22. 關於下圖,線 1 代表以下何種血壓？

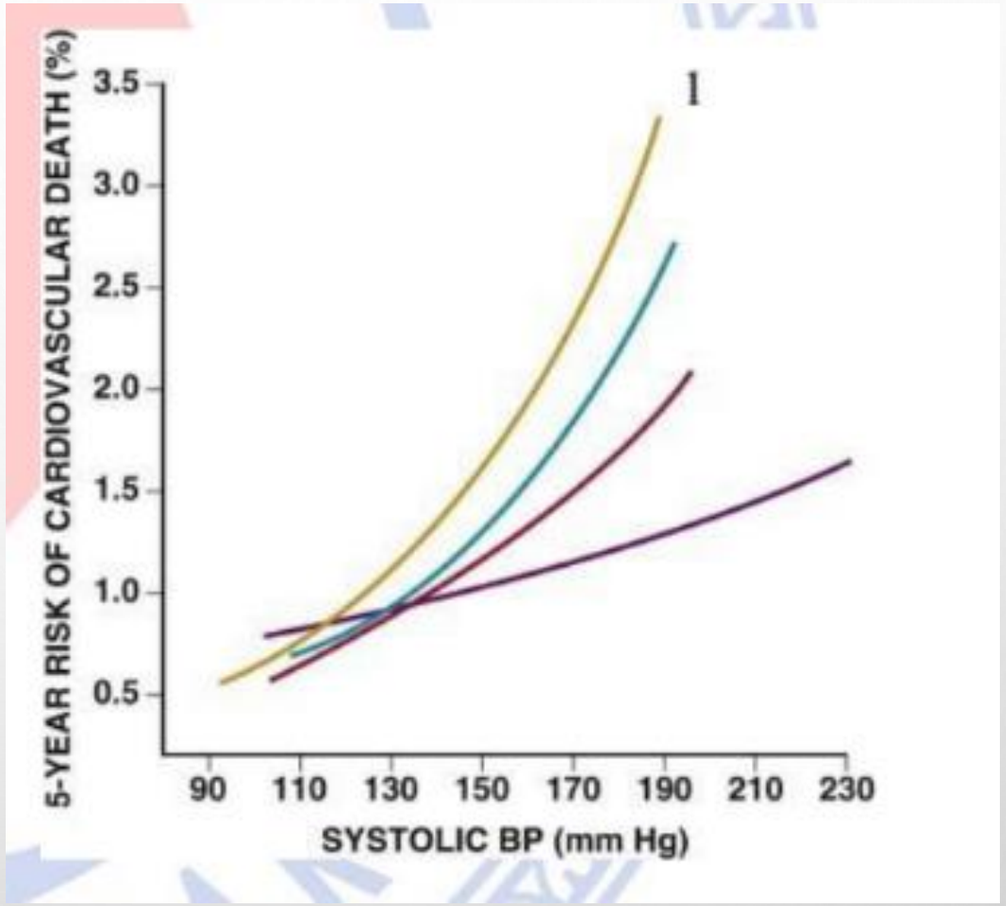
(A) Clinic

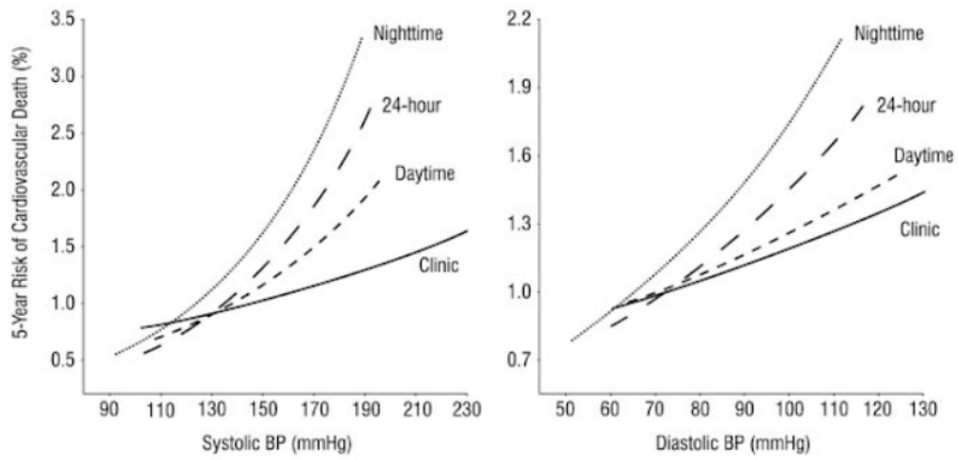
(B) Daytime

(C) Nighttime

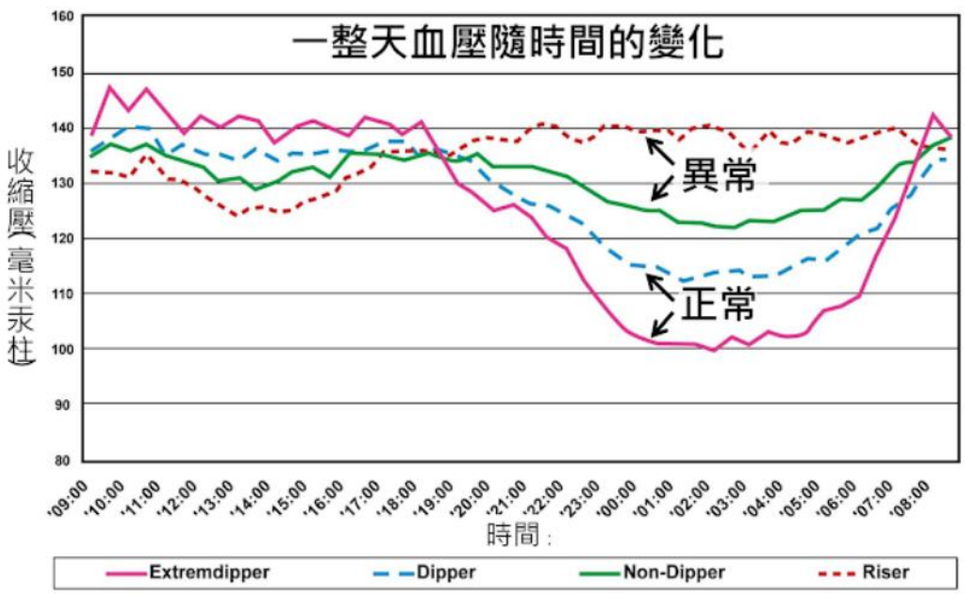
(D) 24 hours

(E) None of above

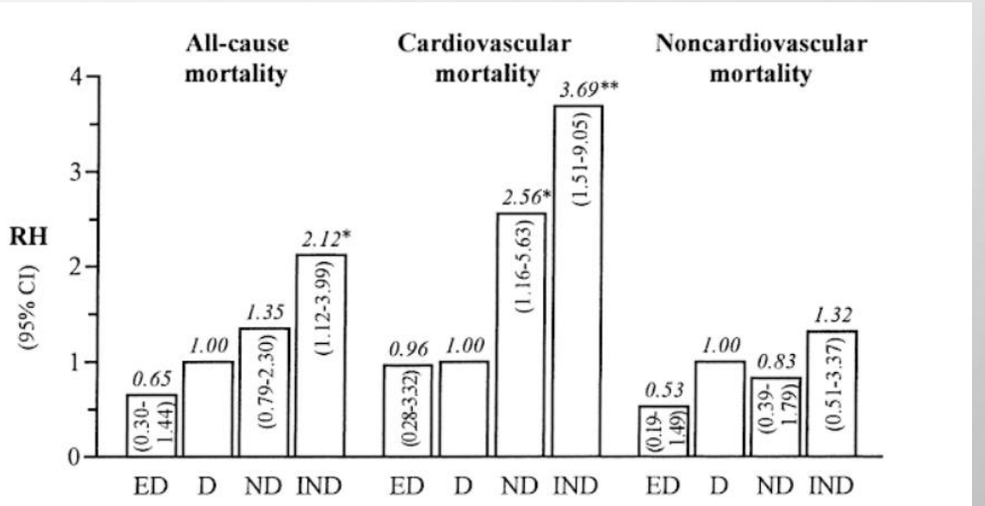




圖一。不同的血壓量測方式和心血管疾病死亡率的相關性。[2]可以看到夜間血壓（Nighttime）和24小時平均血壓（24-hour）的斜率較大，即和心血管疾病死亡率的相關性較高，且相同的讀值和診間血壓（Clinic）比有更高的死亡率。



圖二。一整天的血壓變化（修改自Slany J. Journal für Hypertonie 2008;12(2):34）。正常睡覺時血壓應下降10%以上（dipping）。



圖三。睡覺時血壓下降的程度和死亡率的相關性，[5]其中下降不足10%（ND = non-dippers）和不降反升者（IND = inverted dippers）會有較高的心血管疾病死亡率。（RH = relative hazard）

106-108.有關高血壓數值的建議何者為非? A

(A) unattended automated office blood pressure 130/- mmHg in coronary artery disease (135/85)

(B) home blood pressure monitoring 135/85 mmHg

(C) ambulatory blood pressure monitoring (ABPM) 130/80 mmHg

(D) Daytime ABPM 135/85 mmHg

(E) Nighttime ABPM 120/70 mmHg

A

105-44.有關各種高血壓異常之定義，何者為真？

(A)MASKED HYPERTENSION病人之心血管風險不低於一般高血壓患者。

(B)WHITE COAT HYPERTENSION者，如合併左心室肥厚，則未來心血管風險並未增加。

(C)MORNING SURGE之病患，其增加心肌梗塞之HAZARD RATIO超過中風之HAZARD RATIO。 STROKE 多

(D)MORNING SURGE是指起床後到中午時段血壓增加。

(E)EARLY MORNING HYPERTENSION指的是半夜到起床這段時間之血壓增加。

E

104-160. 有關 2015 TSOC/TSH 高血壓治療指引中,有關各種高血壓的定義,下列何者為真?

(A) white-coat hypertension 是指高血壓患者,經治療後,門診血壓仍 ≧140/90 mmHg,但家中血壓 (HBPM) ≦135/85 mmHg 者。

(B) white-coat effect 是指未治療過之病人,其門診血壓≧140/90 mmHg,而家中血壓 (HBPM) ≦135/85 mmHg 者。

(C) masked hypertension 是指高血壓患者,經治療後,門診血壓仍≦140/90 mmHg,但家中血壓 (HBPM) ≧135/85 mmHg 者。

(D) masked uncontrolled hypertension 是指未治療過之病人,其門診血壓≦140/90mmHg,但家中血壓 (HBPM) ≧135/85 mmHg 者。

(E) 如果門診血壓為<120/80 mmHg,則為 masked hypertension 之機會只有 3.9%。

E

104-161. 有關 2015 TSOC/TSH 高血壓治療指引中,以家中血壓監測 (HBPM) 及 24 小時動態血壓監測 (ABPM) 高血壓之定義,下列何者為真?

(A) HBPM 之收縮壓 ≧130 mmHg 即為高血壓

(B) ABPM 之全日平均收縮壓 ≧135 mmHg 即為高血壓

(C) ABPM 之日間平均收縮壓 ≧130 mmHg 即為高血壓

(D) ABPM 之夜間平均收縮壓 ≧130 mmHg 即為高血壓

(E) HBPM 之舒張壓≧85 mmHg 即為高血壓

Table 7
Definition of hypertension by HBPM and ABPM.

Category	Systolic blood pressure (mmHg)		Diastolic blood pressure (mmHg)
HBPM	≥135	or	≥85
ABPM	≥130	or	≥80
Daytime	≥135	or	≥85
Nighttime	≥120	or	≥70

ABPM: ambulatory blood pressure monitoring; HBPM: home blood pressure monitoring (Modified from Chiang et al.[9] with permission).

105- 91. 下列有關高血壓的敘述,何者為是?

(A) 睡眠時的血壓 (SLEEP-TIME BLOOD PRESSURE) 比平均日間血壓 (AVERAGED DAYTIME BLOOD PRESSURE) 及平均夜間血壓 (AVERAGED NIGHT-TIME BLOOD PRESSURE) 更能準確預測高血壓病人未來發生心血管事件 (CARDIOVASCULAR EVENTS)。

(B) 病人在診間所測得的血壓數值 (OFFICE BLOOD PRESSURE) 正常,但二十四小時測量或在家測量所得的血壓數值 (AMBULATORY OR HOME BLOOD PRESSURE MEASUREMENT) 超過標準,稱為白袍高血壓 (WHITE-COAT HYPERTENSION)。

(C) 病人在診間所測得的血壓數值超過標準,但二十四小時測量或在家測量所得的血壓數值正常,稱為隱匿性高血壓 (MASKED HYPERTENSION)。

(D) 使用二十四小時測量或在家測量的血壓來診斷血壓,其要求的診斷標準血壓數值比診間所測得的血壓數值為高。

(E) 白袍高血壓及隱匿性高血壓通常不需要治療。

=>A

E

104- 8. 有關各種高血壓異常之定義,何者為真?

(A) Early morning hypertension 指的是半夜到起床這段時間之血壓增加。

(B) Morning surge 是指起床後到中午時段血壓增加。

(C) Morning surge 之病患,其增加心肌梗塞之 hazard ratio 超過中風之 hazard ratio。

(D) White coat hypertension 者,如合併左心室肥厚,則未來心血管風險並未增加。

(E) Masked hypertension 病人之心血管風險不低於一般高血壓患者。

A

104- 60. 在 2015 台灣高血壓治療指引中,以下關於門診、居家及動態血壓 (ambulatory blood pressure) 測量的高血壓診斷定義敘述何者錯誤?

(A) 平均動態血壓 收縮壓 ≥130 mmHg,舒張壓 ≥75 mmHg。

(B) 日間平均動態血壓 收縮壓 ≥135 mmHg,舒張壓 ≥85 mmHg。

(C) 夜間平均動態血壓 收縮壓 ≥120 mmHg,舒張壓 ≥70 mmHg。 。

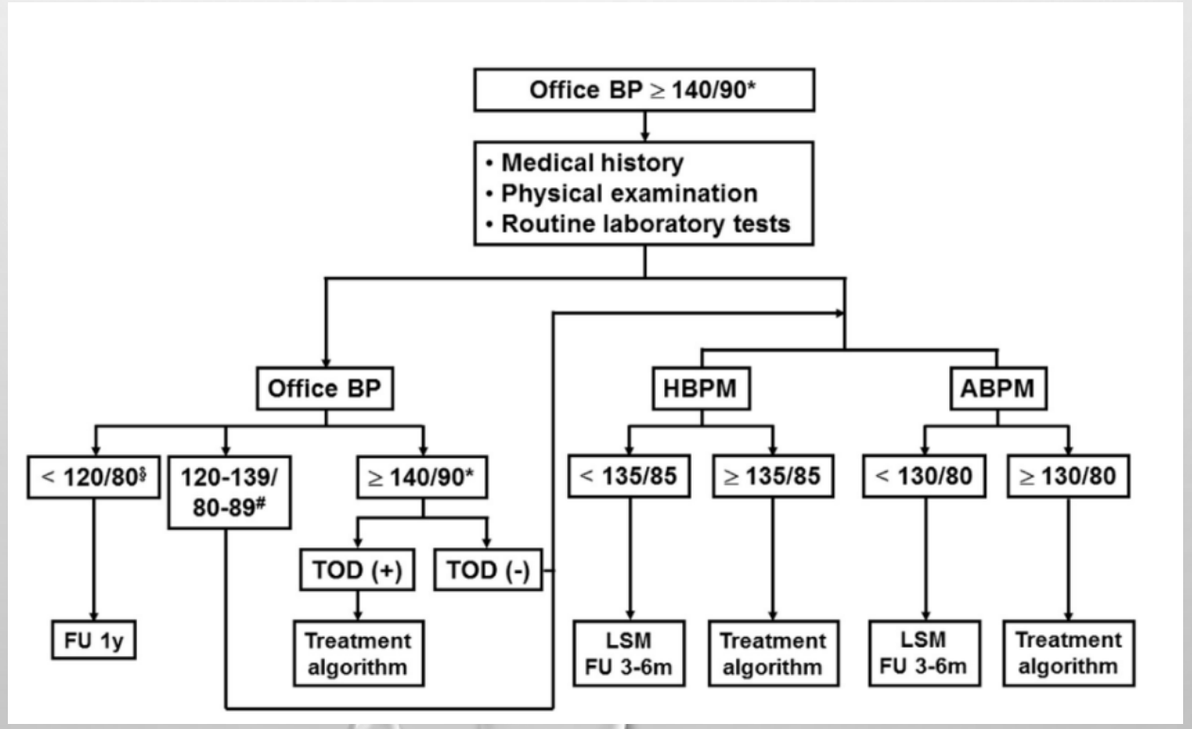
(D) 居家血壓 收縮壓 ≥135 mmHg,舒張壓 ≥85 mmHg。

(E) 診間血壓 收縮壓 ≥140 mmHg,舒張壓 ≥90 mmHg。

D

104-151. 以下為 2015 年台灣高血壓治療指引診斷治療流程,下列敘述何者錯誤?

(A) 以上流程並不適合所有的人,包括大於 80 歲的老人,冠狀動脈疾病患者、糖尿病患、慢性腎臟病有蛋白尿者。
(B) 大於 80 歲老人的高血壓診斷條件為 ≥150/90 毫米汞柱。
(C) 冠狀動脈疾病患者其診斷高血壓之條件不同,改為 130/80。
(D) TOD 指的是心臟衰竭、腦中風、或心肌梗塞。
(E) 糖尿病患其診斷高血壓之條件不同,改為 120-129/70-79。



DIFFERENT DISEASE TARGET BP

Table 2

New BP targets

Categories	Targets (mmHg)	COR	LOE
Primary prevention	< 140/90	I	B
Secondary prevention			
Diabetes	< 130/80	I	B
CHD	< 120/NA[AOBP]	I	B
Stroke	< 140/90	I	A
CKD	< 120/NA[AOBP]	I	B
Elderly (age ≥ 75 years)	< 120/NA[AOBP]	I	B
Patients receiving antithrombotics for stroke prevention	< 130/80	I	B

AOBP, unattended automated office blood pressure measurement; BP, blood pressure; CHD, coronary heart disease; CKD, chronic kidney disease; COR, class of recommendation; LOE, level of evidence; NA, not available.

Table 10
Blood pressure targets.

Categories	Targets (mmHg)	COR	LOE
Primary prevention	<140/90	IIa	B
Secondary prevention			
Diabetes	<130/80	I	B
CHD	<130/80	I	B
Stroke	<140/90	I	A
CKD	<140/90	I	A
CKD with proteinuria	<130/80	IIb	C
Very elderly (age ≥80 years)	<150/90	IIa	B
Patients receiving antithrombotics for stroke prevention	<130/80	I	B

CHD: coronary heart disease; CKD: chronic kidney disease; COR: class of recommendation; LOE: level of evidence.

A

105-45.有關2015 TSOC/TSH高血壓治療指引中，有關各種疾病血壓治療之目標(BP TARGETS)，下列何者為真？

(A)在接受抗血栓藥預防中風之患者，為＜130/80 MMHG。

(B)有過中風之患者為＜130/80 MMHG。

(C)冠狀動脈性心臟病患者為＜140/90 MMHG。

(D)糖尿病患者為＜140/90 MMHG。

(E)一級預防(PRIMARY PREVENTION) 為＜150/90 MMHG。

105-86. 根據 2015 中華民國心臟學會/台灣高血壓學會高血壓治療指引,下列情況應把血壓控制在 130/80 MMHG 以下,何者有誤?

(A) 糖尿病

(B) 冠狀動脈疾病

(C) 慢性腎病變併蛋白尿

(D) 腦中風

(E) 心房顫動使用抗凝血劑

=>D

106-73. 根據 2015 台灣高血壓治療指引,以下哪一種高血壓病人血壓建議可控制140/90mmHg?

(A) 腦中風

(B) 糖尿病

(C) 慢性腎臟病有蛋白尿

(D) 接受 warfarin 治療

(E) 心肌梗塞

→ A

C

104-87. 依據 2015 年 Taiwan Society of Cardiology 之高血壓治療指引建議,下列關於高血壓控制目標的敘述何者錯誤?

(A) 60 歲李先生有中風病史,建議血壓控制小於 140/90 mmHg。
(B) 85 歲黃女士,建議血壓控制小於 150/90 mmHg。
(C) 55 歲陳先生有慢性腎臟病變第三期病史,同時合併蛋白尿,建議血壓控制小於140/90 mmHg。
(D) 65 歲張先生末期腎病變長期洗腎,建議洗腎前血壓控制小於 140/90 mmHg。
(E) 75 歲蔡女士有冠狀動脈心臟病史,建議血壓控制小於 130/80 mmHg。
=> 2017 年紀大的不再建議血壓比較高

E??

104- 162. 陸先生,67 歲,慢性腎病第五期 (chronic kidney disease stage 5) 合併蛋白尿。試問根據 2015 台灣高血壓治療指引,其門診血壓目標為何?

(A) <120/80 毫米汞柱

(B) <130/80 毫米汞柱

(C) <140/80 毫米汞柱

(D) <140/90 毫米汞柱

(E) <150/90 毫米汞柱(X)

=> 應該是B

TARGET ORGAN DEMAGE

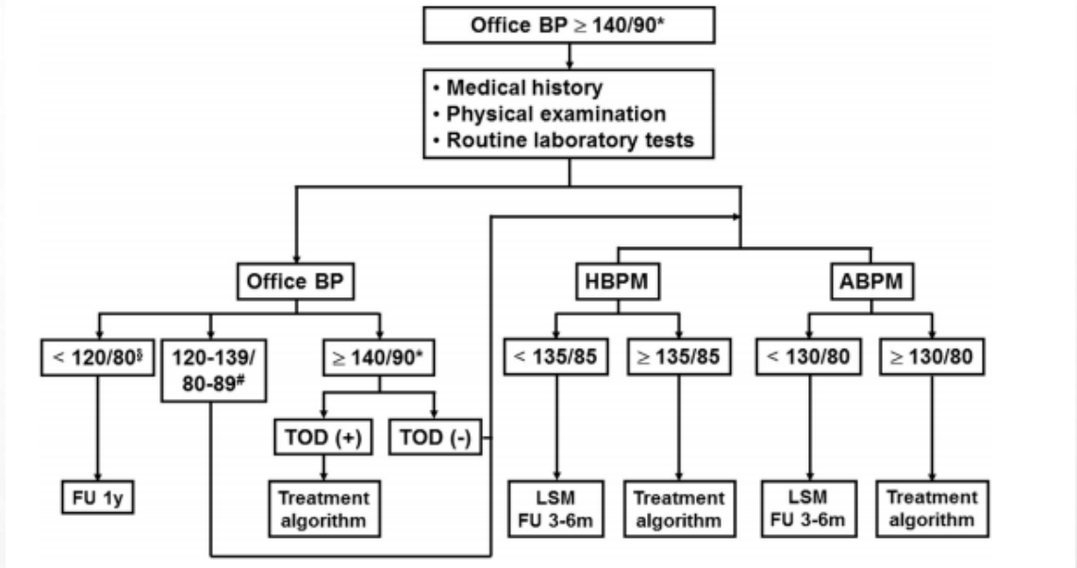


Fig. 1. Diagnosis algorithm. This algorithm does not apply to very elderly patients (age 80 years) because their treatment threshold and targets are 150/90 mmHg. For special patient groups (coronary heart disease, diabetes, or proteinuric chronic kidney disease), lower BPs are applied (*: 130/80 mmHg; #: 120-129/70- 79 mmHg; x: <120/70 mmHg).;
LSM: Life style modification; m: month;
TOD: target organ damage (including left ventricular hypertrophy by electrocardiogram, microalbuminuria, or asymptomatic atherosclerosis [carotid intima-media thickening or aortic plaque], ankle-brachial index<0.9, or increased pulse wave velocity);

105-170.在評估高血壓病患的心血管疾病風險時,標的器官損傷 (Target organ damage) 存在與
否是重要參考。關於各種標的器官損傷的定義何者為非?
(A) 心臟超音波左心室質量指數 (left ventricular mass index),男性> 115 g/m2,女性 > 95g/m2。
(B) 頸股動脈脈波傳導速度 (carotid-femoral pulse wave velocity) > 10 m/s。
(C) 頸動脈超音波內膜-中層厚度 (intima-media thickness) > 0.9 mm。
(D) 單次小便檢查中,尿中白蛋白與肌酐酸的比值 (urinary albumin/creatinine ratio) >20mg/g。 (30-300)
(E) 血壓踝肱比 (ankle-brachial index) < 0.9。

==>D

B

104-88.

鄭先生 52 歲,門診血壓測量三次平均為 152/98 毫米汞柱。根據 2015 台灣高血壓治療指引,醫師進一步評估鄭先生是否有靶器官損傷 (target organ damage) 狀況以決定是否即刻開立降血壓藥物治療。請問以下何者不屬於靶器官損傷指標?

(A) 心電圖呈現左心室肥厚 (left ventricular hypertrophy)
(B) 超音波顯示左右腎長徑差距 >1 公分 (renal length discrepancy)
(C) 尿液分析顯示存在微蛋白尿 (microalbuminuria)
(D) 頸動脈超音波顯示總頸動脈有斑塊 (aortic plaque)
(E) 脈波傳導速度增快 (increased pulse wave velocity)

D???=>A

106-55. The following items are established target organ damage of hypertension, EXCEPT?

(A) Coronary revascularization

(B) Transient ischemic attack

(C) Peripheral arterial disease

(D) Left ventricular hypertrophy

DRUG OF CHOICE

Recommended drugs.

Clinical conditions	Drugs
Target organ damage	
Left ventricular hypertrophy	ARB
Microalbuminuria	ACEI, ARB
Asymptomatic atherosclerosis	CCB
Clinical events	
History of myocardial infarction	BB, ACEI, ARB
Coronary Heart Disease	BB, ACEI, ARB, CCB (long-acting)
Heart failure	Thiazide diuretic, loop diuretic, BB, ACEI, ARB, MRA
Stroke	ACEI, ARB, Thiazide diuretic, CCB,
Chronic kidney disease	ACEI, ARB, loop diuretic
Peripheral artery disease	CCB
Diabetes mellitus	ACEI, ARB, DRI
Associated conditions	
Isolated systolic hypertension	Thiazide diuretic, CCB, ARB
Metabolic syndrome	ACEI,ARB
Benign prostate hypertrophy	Alpha-blocker

D

104-150. 高血壓併周邊血管疾病在台灣 2015 高血壓治療指引建議使用的第一線藥物為？

(A) ACEI

(B) ARB

(C) Diuretic

(D) CCB

(E) -blocker

D

104-154. 下列狀況的高血壓病患,降壓藥物可優先選擇鈣離子阻斷劑,除了:

(A) 無症狀的動脈硬化

(B) 中風

(C) 周邊血管疾病

(D) 代謝症候群

(E) 單獨收縮高血壓 (isolated systolic hypertension)

106-109.高血壓併腦中風在台灣 2015 高血壓治療指引何者非建議使用的第一線藥物為?

(A) ACEI

(B) ARB

(C) Diuretic

(D) CCB

(E) Beta blocker

→ E

106-76. C

廿四歲男性因頭痛看診。理學檢查發現血壓 184/132 mmHg,脈搏每分鐘 80 次。聽診發現第一度收縮期雜音。腹部可聽見收縮期雜音。雙下肢無水腫且脈壓正常。應避免開下列哪些降血壓藥物?

(A) 鈣離子阻斷劑
(B) 乙型交感神經阻斷劑
(C) 血管張力素轉化酶抑制劑
(D) Hydralazine 血管擴張劑
(E) 甲型交感神經阻斷劑

Hint: Renal artery stenosis

105-151.

下列何者不屬於治療一般單純高血壓 (Uncomplicated hypertension) 常見之第一線(first-line) 治療藥物?

(A) Calcium channel blocker (CCB)

(B) Angiotensin-converting enzyme inhibitor (ACEI)

(C) Angiotensin receptor blocker (ARB)

(D) Thiazide-type diuretic

(E) Beta-adrenergic blocker

=>E

106-67

請問關於降血壓藥物所引發副作用的敘述,下列何者正確?

(A) ACE inhibitors 引起之咳嗽,亞洲人種較 Caucasians (高加索人) 少發生。

(B) ACE inhibitors 引起之咳嗽,部分在停藥後會消失。

(C) Gingival hyperplasia 是使用鈣離子阻斷劑可能出現的副作用。

(D) Bradycardia 是使用 hydralazine 常出現的副作用之一。

(E) 老年高血壓患者使用 α-blockers 出現頭暈現象,不需考慮姿態性低血壓

→ C

105-95.

下列各種高血壓藥物之組合 (combination) 均為 2015 TSOC/TSH 高血壓治療指引所建議,何者除外?

(A) ACEI + ARB

(B) calcium channel blocker + beta-blocker

(C) ARB + calcium channel blocker

(D) ARB + diuretic

(E) ACEI + diuretic

=>A

Recommended 2-drug combinations include:

- ✓ ARB+CCB (A+C)
- ✓ ACE inhibitor+CCB (A+C)
- ✓ ARB+thiazide diuretic (A+D)
- ✓ ACE inhibitor+thiazide diuretic (A+D)
- ✓ CCB+beta-blocker (B+C)

106-106.

Thiazide 利尿劑可有效降低血壓,但可能的副作用不包括以下那一項:

(A) 低血鉀症。

(B) 高尿酸血症。

(C) 升高膽固醇及三酸甘油脂。

(D) 增加糖尿病發病率。

(E) 高血鈉症。

=> E

PREGNANCY

- Recommendations ACE inhibitors, ARBs, DRI, mineralocorticoid receptor antagonists, and chlorothiazide are teratogenic. They should be avoided or immediately withdrawn in case of pregnancy. (COR III, LOE C)

- For women with gestational hypertension, a normal diet without salt restriction is recommended. (COR IIa, LOE C)
- For women with hypertension during pregnancy, early initiation of antihypertensive treatment to keep BP lower than 150/100 mmHg and >=DBP 80 mmHg is suggested. Oral methyldopa, labetalol, and nifedipine are preferred drugs. (COR IIb, LOE C)
- A BP >=160/110 mmHg during pregnancy should be considered an emergency requiring hospitalization. Intravenous labetalol or oral nifedipine can be used as the firstline treatment. (COR IIa, LOE B)
- In women with a history of early-onset (<28 weeks) preeclampsia or preeclampsia in more than one prior pregnancy, low-dose aspirin (60-80 mg/d) for a period of time from 12 weeks until the birth of the baby is suggested to prevent preeclampsia. (COR IIb, LOE B)

106-113.

Which of the following clinical features is LEAST likely to present in patients with preeclampsia?

(A) Proteinuria

(B) Left ventricular hypertrophy

(C) Hypertension onset after 20 weeks of pregnancy

(D) Primigravida 初孕婦

Gestational hypertension generally develops after 20 weeks of gestation and, in most cases, resolves within 6 weeks postpartum.,

preeclampsia is defined as gestational hypertension associated with significant proteinuria (>300 mg/24 h, protein/creatinine ratio >0.3 [each measured as mg/dl] or dipstick>= 1+).

105-93.

李小姐為 36 歲女性,目前第二胎懷孕 12 周,最近在家量血壓大約 155/105mmHg,上次懷孕在第 24 周被診斷子癲前症,請問針對李小姐的治療,根據 2015 年台灣高血壓治療指引,下列敘述何者錯誤?

(A) 建議每天應限制鈉離子攝取小於 2-4 克,以利血壓控制。

(B) ACE inhibitors, ARBs, direct renin inhibitors, minerocorticoid receptor antagonist 以及 chlorothiazide 因有致畸胎的疑慮,禁止使用。

(C) 血壓控制目標在 150/100mmHg 以下,可選擇的藥物包括 labetalol,nifedipine 或 methyldopa

(D) 過去曾經在懷孕 28 週前就診斷子癲前症,或是曾有兩次以上子癲前症病史的孕婦,建議從懷孕第 12 週開始使用低劑量 aspirin (60-80mg/day)直到生產,以避免子癲前症的發生。

(E) 血壓如果超過 160/110mmHg 應該視為急症,需住院接受治療,一線用藥可選擇口服nifedipine 或是注射 labetalol。

=>A

B

104-85.

下列有關妊娠高血壓的敘述何者為非?

(A) 通常飲食不需要特別限鹽

(B) 建議控制舒張壓小於 80mmHg

(C) Atenonol 可能會造成胎兒生長遲緩 (fetal growth retardation)

(D) ACE、ARB 或是 direct rennin inhibitor 會造成致畸胎性 (teratogenicity)

(E) 若血壓高於 160/110 毫米汞柱,建議使用靜脈注射 labetalol 或是口服 nifedipine 作為

第一線用藥。

106-6.

治療懷孕期高血壓,哪一類降血壓藥物最適合?

(A) methyldopa

(B) ACE inhibitors

(C) direct rennin inhibitors

(D) chlorothiazide

(E) angiotensin receptor blocker

Table 2. Medications for Hypertensive Disorders of Pregnancy

Drug	Dose	Effects
Methyldopa	250 mg PO BID up to 1,000 mg PO every 8 hours (3,000 mg total daily dose)	Agent with greatest available data in pregnancy and followup of offspring; limited by maternal dizziness, fatigue.
Labetalol	100 mg PO BID up to 800 mg PO every 8 hours, 10-80 mg IV for BP ≥160/110 (2,400 mg total daily dose)	First line for acute hypertensive crisis; uteroplacental flow mostly unaffected; no fetal growth impairment in contrast to atenolol, propranolol.
Nifedipine	Short-acting: 10 mg PO every 8 hrs.; extended release: 30-90 mg PO qd (120 mg total daily dose)	Short-acting use preferable; rapid vasodilation/hypotension; pregnancy data limited.
Hydralazine	10 mg PO every 6 hours up to 50 mg PO every 6 hours, 2.5-10 mg IV for BP >=160/110 (200 mg total daily dose)	Consider for acute hypertensive crisis; note delayed onset, reflex tachycardia, flushing, headache.
ACE inhibitors/ Angiotensin Receptor Blockers	Any dosage	Contraindicated, adverse fetal effects in later gestation.

C

104-166.

以下關於妊娠高血壓 (gestational hypertension) 敘述何者為非?

(A) 發生妊娠高血壓婦女不宜限制鹽份攝取。

(B) 服用低劑量阿斯匹林 (low-dose aspirin) 可預防子癇前症(preeclampsia)。

(C) 血壓 158/98 毫米汞柱 (mmHg) 孕婦可使用口服降壓藥如 methyldopa,amlodipine,labetalol 等治療。

(D) 使用 atenolol 可能造成胎兒生長遲滯 (fetal growth retardation)。

(E) 不應使用血管張力素轉化酶抑制劑 (ACE-I) 或利尿劑 chlorothiazide,因其可能造成
畸胎 (teratogenicity)。

106-122. B

請問關於 oral contraceptives 和高血壓相關性的敘述,下列何者錯誤?

(A) 使用 oral contraceptives 若同時飲酒會增加高血壓的機會。

(B) 使用 oral contraceptives 引發高血壓和使用年齡無關。

(C) 使用 oral contraceptives 引發的高血壓,約半年後有一半的病患會恢復正常。

(D) 使用 oral contraceptives 引發的高血壓其機轉和 renin-aldosterone 引發之 volume expansion 有關。

Oral contraceptives result in a mild increase (~5%) in BP in most women. The increase in BP usually disappears within 6 months of withdrawal. Estrogens are generally believed to be the culprit responsible for the BP-raising effect, but the mechanisms are still unknown. The progestogen-only pill is a contraceptive option for women having hypertension

In women who smoke and were 35 years of age, oral contraceptives should be prescribed with caution. In women with uncontrolled hypertension, oral contraceptives are not recommended.

量血壓的動作

105-62. 下列有關測量血壓的敘述,何者為是?

(A) 病人手臂很粗,量血壓的壓脈帶 (CUFF) 若太小,所量到的血壓數值會偏低。

(B) 在有周邊血管硬化的老人家,用手臂血壓計所量到的血壓數值通常會低於直接由動脈量得的血壓數值 (INTRA-ARTERIAL PRESSURE) 。

(C) 即便沒有周邊血管疾病,用手臂血壓計所量到的兩側上臂血壓數值相差20-30MMHG者相當常見。

(D) 年輕高血壓病人的身體檢查應該要例行測量其上下肢血壓。

(E) 診間所測得的血壓數值 (OFFICE BLOOD PRESSURE) 比二十四小時測量的血壓數值(AMBULATORY BLOOD PRESSURE MEASUREMENT) 更能準確預測高血壓病人未來發生心血管事件 (CARDIOVASCULAR EVENTS)。

105-63. 根據 2015 TSOC/TSH 高血壓治療指引,下列有關門診血壓之測量何者為真?

(A) 量完血壓後,必須測量脈搏。

(B) 兩次測量血壓之間隔時間,必須大於 5 分鐘。

(C) 血壓只能量右手。

(D) 患者必須以坐姿測量,而且必須坐圓板凳,背部不可有支撐。

(E) 患者必須先靜坐 30 分鐘。

=>A

Table 6
Correct methods for office blood pressure measurement.

Before measurement	
Timing	
1 hour	Avoiding coffee, food, smoking, decongestants
30 minutes	Avoiding exercise
5 minutes	Sitting calmly
Preparation	Emptying bladder and bowel, and removing all clothing that covers the location of cuff placement
Environment	Calm and warm place
During measurement	
Body position	Seated, back supported, legs uncrossed, feet flat on floor, and relaxed
Arm	Supported, using the arm with higher value
Cuff	at heart level, using appropriate sized one
Measurement	Taking two measurement, spaced 1-2 minutes apart, and additional measurement if needed
	Measuring heart rate by pulse palpation (at least 30 seconds) after the second measurement
	For patients with atrial fibrillation, measuring blood pressure manually, using direct auscultation over the brachial artery
	When suspecting orthostatic hypotension, measuring blood pressure 1 and 3 minutes after assumption of standing position
After measurement	
Blood pressure readings	Averaging, but not rounding them
	Recording

壓脈帶過窄－會導致血壓測量值假性偏高

壓脈帶過寬－會導致血壓測量值假性偏低

太緊會導致血壓測量值假性偏高

太鬆會導致血壓測量值假性偏低

CUFF 太小 或 周邊血管硬化的老人家 都會讓量到的血壓偏高

E

104- 165. 以下關於 2015 台灣高血壓治療指引中對居家血壓量測 (home blood pressure monitoring) 的描述何者為非?

(A) 於就診前一周應每天測量血壓。

(B) 每天早晚兩個時段測量血壓。

(C) 每個時段測量兩次。

(D) 至少 12 個或更多的血壓量測值得到的平均值較能代表平均血壓。

(E) 將 7 天所有的血壓量測值平均得到的平均值作為診斷及調整用藥的參考。

(6天?)

SECONDARY HYPERTENSION

SECONDARY HYPERTENSION

RENAL PARENCHYMAL DISEASE IS THE LEADING CAUSE OF SECONDARY HYPERTENSION, CAN BE DIAGNOSIS BY RENAL ECHO

RENOVASCULAR HYPERTENSION IS THE SECOND MOST COMMON CAUSE OF SECONDARY HYPERTENSION.

RENAL ARTERY STENOSIS DUE TO ATHEROSCLEROSIS OR FIBROMUSCULAR DYSPLASIA IS THE LEADING CAUSE IN THE ELDERLY AND YOUNGER POPULATION(<35 OR >55Y/O) , CLINICAL FEATURE INCLUDING : UNEXPLAINED HYPOKALEMIA,, RESISTANCE TO ANTIHYPERTENSIVE THERAPY, SUSTAINED RISE IN CREATININE AFTER INITIATION OF ACEI OR ARB, PRESENCE OF HYPERTENSIVE RETINOPATHY, OR FLASH PULMONARY EDEMA. RENAL ULTRASOUND CAN BE USED AS A SCREENING TOOL (兩邊腎臟大小相差 >1.5 CM)

105-94. 以下關於腎性高血壓的敘述,何者正確?
(A) 血管粥狀硬化主要影響遠端三分之一的腎動脈。
(B) 使用 ACEi/ARB 治療高血壓導致腎功能惡化可能暗示有單側腎動脈疾病。
(C) 突然出現之嚴重且難以控制之高血壓,不應考慮腎性高血壓。
(D) 當發現血管粥狀硬化引起之腎動脈狹窄,介入性治療是選擇之一。
(E) 纖維肌發育不良 (Fibromuscular dysplasia) 之腎動脈高血壓好發於 20-60 歲女性。(平均47歲)

=>E

105-172.六十二歲男性高血壓病人因突發急性肺水腫來院急診。病人持續使用包括利尿劑(diuretic)、鈣離子阻斷劑 (calcium channel blocker) 及血管張力素受體拮抗劑(angiotensin receptor blocker) 等藥物後血壓仍持續超過 150/100mmHg,且最近腎功能持續惡化。此病人檢驗及檢查中最可能出現的異常結果為何?

(A) 低血鉀症 (hypokalemia)
(B) 上肢血壓明顯高於下肢血壓
(C) 尿液中兒茶酚胺 (catecholamines) 及其代謝產物 (metabolites) 增加
(D) 腎動脈攝影發現腎動脈肌纖維發育不良 (fibromuscular dysplasia)
(E) 腎動脈攝影發現腎動脈粥樣硬化狹窄 (atherosclerosis with stenosis)

==>E

PHEOCHROMOCYTOMA

PHEOCHROMOCYTOMA SHOULD BE CONSIDERED IN PATIENTS WITH PAROXYSMAL BP ELEVATION.

THE TYPICAL SYMPTOMS OF THIS DISEASE INCLUDE HEADACHE, PERSPIRATION, PALPITATIONS, AND PALLOR. THE DIAGNOSIS IS CONFIRMED BY AN INCREASE IN PLASMA OR URINARY CATECHOLAMINES OR THEIR METABOLITES.

FLUDROCORTISONE SUPPRESSION TEST OF ALDOSTERONE AND RENIN, UNDER STANDARDIZED CONDITIONS. A CUT-OFF OF ALDOSTERONE TO RENIN RATIO >100 NG/DL PER NG/ML/HR AND PLASMA ALDOSTERONE >20 NG/DL AFTER CAPTOPRIL DIFFERENTIATES BILATERAL ALDOSTERONEPRODUCING ADENOMA FROM BILATERAL ADRENAL HYPERPLASIA

106-105.

關於續發型高血壓 (Secondary hypertension),以下敘述何種錯誤?

(A) 嗜鉻細胞瘤 (Pheochromocytoma) 是最常見的續發性高血壓。

(B) 嗜鉻細胞瘤常表現頭痛、出汗、心悸等症狀。

(C) 原發性高醛固酮症 (Primary Aldosteronism) 常表現低血鉀現象。

(D) 約 80%庫欣症候群 (Cushing's syndrome) 表現高血壓。

(E) 肥胖病人要考慮睡眠呼吸中止症候群為高血壓的可能原因。

→A

A

104-84. 黃女士 42 歲,服用三種降血壓藥物血壓仍然在 160/90 毫米汞柱上下。醫師後來檢查出陳女士患有原發性高醛固酮症 (primary hyperaldosteronism),請問以下何種臨床表現與此症無關?

(A) 代謝性酸血症 (metabolic acidosis)
(B) 高鈉血症 (hypernatremia)
(C) 低鉀血症 (hypokalemia)
(D) 多尿 (polyuria)
(E) 血中腎素 (renin) 濃度下降

106-114.

A multitude of neurohormonal, renal, and vascular mechanisms interact to varying degrees in contributing to different forms of hypertension. Which of the following causes of hypertensive is LEAST likely to be neurogenic in origin?

(A) Obesity-related hypertension

(B) Salt-sensitive hypertension

(C) Obstructive sleep apnea-related hypertension

(D) Hypertension of young adults

CLINICAL STUDIES

SPRINT	沒DM的病人降到120比降到140好	ALLHAT 2012	CKD的病人 amlodipine or lisinopril 跟 chlorthalidone-based 比沒有比較好，洗腎率也沒差
ACCORD	有 DM 病人 降到 120以下沒有比降到140以下好	LIFE	hypertension + LVH(EKG), Losartan 比 atenolol 好
HOPE III 2016	在中等風險的病人上 (meanBP 138/82) candesartan 16 mg p+hydrochlorothiazide12.5 mg 不會降低風險	VALUE	valsartan V.S amlodipine primary composite cardiac end points, strokes, MI, and all-cause deaths 沒差，hear failure, new onset DM 較少
ACCOMPLISH 2008	benazepril+amlodipine is better than benazepril+hydrochlorothiazide		
ASCOT-BPLA 2005	第一線藥物用amlodipine-based regimen 比用 atenolol-based regimen好	STITCH trial	single pill combination(SPC)比較好

106-111.

近來對於高血壓合併療法 (combination therapy),以下何者為非?

(A) 如血壓為 180/100 mmHg,2015 台灣高血壓治療指引建議可直接使用 SPC (single pill combination)。

(B) ACCOMPLISH 研究顯示 A+C 比 A+D 好。

(C) B+D 要注意代謝的副作用,不建議第一線使用。

(D) 2011 年的 NICE 高血壓治療指引建議第一線合併療法用 A+C。

(E) ASCOT-BPLA 的研究使用 SPC,發現可增加病人醫囑順從性。

ACCOMPLISH The benazepril–amlodipine combination was superior to the benazepril–hydrochlorothiazide combination in reducing cardiovascular events in patients with hypertension who were at high risk for such events

ASCOT-BPLA :The amlodipine-based regimen prevented more major cardiovascular events and induced less diabetes than the atenolol-based regimen

106-107.

有關高血壓藥物臨床研究的描述何者為是?

(A) SPRINT 建議超過 75 歲的病人血壓目標可為<120/-mmHg

(B) ACCORD 研究發現慢性腎臟病病人降到 120/-沒降低心血管事件 (primary endpoint)

(C) HOPE III 研究使用 ARB+diuretic 可降低心血管事件

(D) VALUE 研究發現 ARB 降低心血管事件的效果優於 CCB

(E) LIFE 研究發現 ACEI 可減少左心室肥厚高血壓病人的心血管事件

1. SPRINT : > 75 y/o 降到120以下比140 以下好
2. ACCORD

In patients with type 2 diabetes at high risk for cardiovascular events, targeting a systolic blood pressure of less than 120 mm Hg, as compared with less than 140 mm Hg, did not reduce the rate of a composite outcome of fatal and nonfatal major cardiovascular events.

3. HOPE III

Therapy with candesartan at a dose of 16 mg per day plus hydrochlorothiazide at a dose of 12.5 mg per day was not associated with a lower rate of major cardiovascular events than placebo among persons at intermediate risk who did not have cardiovascular disease. (BP >160mmHg)

VALUE :

VALSARTAN VS AMLODIPINE PRIMARY COMPOSITE CARDIAC END POINTS, STROKES, MYOCARDIAL INFARCTIONS, AND ALL-CAUSE DEATHS 沒差，HEAR FAILURE, NEW ONSET DM 較少

LIFE:

IN PATIENT WITH HYPERTENSION + LVH(EKG), LOSARTAN PREVENTS MORE CARDIOVASCULAR MORBIDITY AND DEATH THAN ATENOLOL FOR A SIMILAR REDUCTION IN BLOOD PRESSURE AND IS BETTER TOLERATED. LOSARTAN SEEMS TO CONFER BENEFITS BEYOND REDUCTION IN BLOOD PRESSURE.

E

105-92. 關於高血壓藥物治療的敘述何者錯誤?
(A) ASCOT 和 ACCOMPLISH 兩個臨床試驗證實 amlodipine/ACE inhibitors,比起 beta-blocker/thiazide 或 ACE inhibitor/thiazide,顯著降低心血管併發症。
(B) CCB 類降血壓藥物作用在 voltage-gated L-type calcium channels,包括心肌細胞和周邊血管的平滑肌細胞。降血壓的作用來自於周邊動脈舒張,其降壓效果> diltiazem >verapamil。CCB 類藥物比其他類藥物更能預防腦中風。
(C) Dihydropyridines CCB 類的藥物所引起的腳踝水腫與劑量相關。可以合併使用 ACE inhibitor 或 ARB,以降低此副作用的發生。所有的 CCB 都可能造成可逆的牙齦增生。
(D) Meta-analysis 顯示 ARB 比起其他降血壓藥較能改善左心室肥大。
(E) ONTARGET trial 顯示在高心血管風險的高血壓病人,ramipril 比 telmisartan 較能降低心血管風險及腎功能惡化。

105-167.

有關高血壓治療下列何者為非?

(A) ALLHAT study 中,利尿劑降血壓預防黑人中風效果優於 ACEI。

(B) ALLHAT study 使用之利尿劑為 hydrochlorothiazide。

(C) ACCOMPLISH trial 中合併使用 hydrochlorothiazide 那組結果較差。

(D) Loop diurteics 可使用於較嚴重之慢性腎疾病。

(E) 利尿劑可造成代謝性疾病。

=>B

105-168.

有關血壓控制之目標血壓 (office BP goal) 下列何者為非?

(A) 有糖尿病腎病變無蛋白尿者: 140/90 mmHg 以下。

(B) 2013 KDIGO guideline,無蛋白尿非糖尿病之慢性腎病變者:140/90 mmHg 以下。

(C) 在 SPRINT trial 之前,老年收縮性高血壓 (isolated systolic hypertension):150 mmHg 以下。

(D) SPRINT trail結果建議50歲以上高血壓病患積極控制血壓 (SBP<130mmHg) 有較好的結果 (primary composite outcome),對原無慢性腎疾病者也不會影響其 GFR。

(E) ACCORD study 結果積極控制血壓 (SBP 120mmHg 以下) 其 primary CV outcome 並無有意義優於標準治療 (SBP 140mmHg 以下)。

=>D

105-169.

有關高血壓藥物之選擇,下列敘述何者為非?

(A) 在比較降血壓效果方面,thiazide diuretics 優於 loop diuretics。

(B) LIFE 試驗中,在減少中風比率方面,ARB + diuretic 優於 beta-blocker + diuretic。

(C) ALLHAT 試驗中,在降低心衰竭發生率方面,ACE inhibitor 優於 diuretic。

(D) ACCOMPLISH 試驗中,在減少心血管疾病發生率方面,ACE inhibitor + CCB 優於 ACE inhibitor + diuretic。

(E) ASCOT 試驗中,在減少心血管疾病死亡率方面,CCB + ACE inhibitor 優於 beta-blocker + diuretic。

==>C

105-180.下列有關高血壓之臨床試驗之敘述,下列何者為真?
(A) ACCOMPLISH 試驗中之 renal events 以 ACEI + calcium channel blocker 組較少。
(B) ACCOMPLISH 試驗中,糖尿病病人之 subgroup 分析,以 ACEI +利尿劑組,其心血管事件較 ACEI + calcium channel blocker 組少。
(C) ACCOMPLISH 試驗中,ACEI + calcium channel blocker 組相較於 ACEI +利尿劑組,心血管事件較多。
(D) ALLHAT 試驗中,病人有心肌梗塞病史者,必須排除,不能入選。
(E) ASCOT 試驗中,病人必須有心血管病史才可納入。

==>A

E

104-158. 下列有關高血壓之臨床試驗之敘述,下列何者為真?

(A) ASCOT 試驗中,病人必須有心血管病史才可納入。

(B) ALLHAT 試驗中,病人有心肌梗塞病史者,必須排除,不能入選。

(C) ACCOMPLISH 試驗中,ACEI + calcium channel blocker 組相較於 ACEI +利尿劑組,心血管事件較多。

(D) ACCOMPLISH 試驗中,糖尿病病人之 subgroup 分析,以 ACEI +利尿劑組,其心血管事件較 ACEI + calcium channel blocker 組少。

(E) ACCOMPLISH 試驗中之 renal events 以 ACEI + calcium channel blocker 組較少。

ASCOT primary endpoint was non-fatal myocardial infarction (including silent myocardial infarction) and fatal CHD

We excluded persons with known cardiovascular disease,

ALLHAT: 55 years or older who had stage 1 or stage 2 hypertension with at least 1 additional risk factor for CHD events.[18,22] The risk factors included previous (>6 months) myocardial infarction or stroke, left ventricular hypertrophy demonstrated by electrocardiography or echocardiography, history of type 2 diabetes, current cigarette smoking, high-density lipoprotein cholesterol of less than 35 mg/dL (<0.91 mmol/L), or documentation of other atherosclerotic CVD. Individuals with a history of hospitalized or treated symptomatic heart failure (HF) and/or known left ventricular ejection fraction of less than 35% were excluded.

B

104-156. 近來對於高血壓合併療法 (combination therapy),以下何者為非?

(A) 如需合併療法,2015 台灣高血壓治療指引建議可直間使用 SPC (single pill combination)。

(B) ASCOT-BPLA 研究顯示 A+C 比 A+D 好

(C) 2015 台灣高血壓治療指引建議可使用 B+C

(D) 2011 年的 NICE 高血壓治療指引建議第一線合併療法用 A+C

(E) ACCOMPLISH 的研究使用 SPC

=>(B) 應為ACCOMPLISH

D

104- 159. 有關 2013 ESH/ESC,2014 JNC Report,及 2015 TSOC/TSH 各高血壓 guideline 之
比較,下列何者為真?
(A) 2013 ESH/ESC 高血壓 guideline 包含 diagnosis flow chart 及 treatment flow chart, 但缺少 adjustment flow chart。
(B) 2013 ESH/ESC 高血壓 guideline 缺少 life style modification。
(C) 2014 JNC Report 包含 diagnosis flow chart 及 treatment flow chart 但缺少

Table 4
Comparison of the 2013 ESH/ESC hypertension guidelines, the 2014 JNC Report, and the 2015 TSOC/THS hypertension guidelines.

	2013 ESH/ESC	2014 JNC Report	2015 TSOC/THS
Diagnosis flow chart	−	−	+
Treatment flow chart	−	+	+
Adjustment flow chart	−	+	+
Life style modification	+	−	+
Blood pressure targets	+	+	+
	Universally <140/90	<140/90 (<150/90 for age>60)	<140/90 (or <130/80 for special patient groups[a])
Treatment in special conditions	+	−	+
Treatment of associated risk factors	+	−	−
Standards of IOM			
Transparency	?	?	+[b]
Conflict of interests	Full disclosure	Full disclosure	Full disclosure
Group compositions	N = 55	N = 51	N = 53
Advisory board member			
Systemic review	+[c]	+[d]	+[e]
Strength of recommendation	+	+	+
Articulation	+	?	+
External review	+	+	+
Updating	+	+	+
Appropriateness for Asians	?	?	+

TRH

TREATMENT RESISTENT HYPERTENSION

TRH WAS DEFINED BY THE AMERICAN HEART ASSOCIATION AS BP ABOVE GOALS ON >=3 MEDICATIONS OR CONTROLLED TO GOAL ON >=4 BP MEDICATIONS PRESCRIBED AT OPTIMAL DOSES, INCLUDING A DIURETIC.399 THE PREVALENCE OF TRH HAS BEEN REPORTED TO RANGE FROM 5 TO 30% OF THE OVERALL HYPERTENSIVE POPULATION.

medication added:

1.thiazide diuretic=>

2. spironolactone(sub-clinical or clinical apparent mineralocorticoid excess of up to 20%

)=>

3. Apha blocker

Table 14
Causes of treatment resistant hypertension.

Improper blood pressure measurement technique
Failure to modify lifestyle including
Heavy sodium intake
Weight gain
Heavy alcohol intake
Intake of drugs that raise blood pressure
Cocaine, sympathomimetics, glucocorticoids, non-steroidal anti-inflammatory drugs, erythropoietin, cyclosporine, anti-VEGF, etc.
Obstructive sleep apnea
Unsuspected secondary hypertension
Irreversible or scarcely reverse organ damage
Volume overload due to:
Inadequate diuretic therapy
Progressive renal insufficiency
High sodium intake
Hyperaldosteronism

VEGF: vascular endothelial growth factor.
(Modified from Chiang et al.[9] with permission)

105-177.
關於頑固性高血壓,下列敘述何者錯誤?
(A) 根據 PATHWAY-2 trial,頑固性高血壓已經使用三種降血壓藥物後,第四線藥物選擇doxazocin,效果優於 spironolactone 或 bisoprolol。
(B) 頑固性高血壓有一半是假性的,可能原因包括測量血壓方式不正確,白袍反應,不按時服藥,降血壓藥物開立不適當,或是使用其他可能引起高血壓的藥物。
(C) 應該評估是否有續發性高血壓,包括睡眠呼吸中止,慢性腎病,腎動脈狹窄,原發性高醛固酮症,或嗜鉻細胞瘤。
(D) 此類病人的心血管疾病和慢性腎病的風險較其他高血壓患者更高。
(E) 使用三種不同類且已達適當劑量的降血壓藥物仍然無法達到血壓控制目標,或是需使用四種以上的降血壓藥物才能達到目標。

==>A

E

104-157. 七十二歲黃女士因高血壓長期規律接收 diuretic、ARB 與 CCB 的治療,近期家中收縮血壓都在 140-150mmHg 且有頭痛情形。以下的描述何者為非?

(A) 如果已服用足量的 diuretic 則可診斷是 resistant 高血壓
(B) 診斷是 resistant 高血壓則可考慮加上 aldosterone antagonist
(C) 要考慮是否有次發性高血壓的可能
(D) 若有冠心病可考慮加上 beta-blocker
(E) 若有冠心病台灣 2015 高血壓治療指引建議治療目標值是 140/90 mmHg

其他

Table 11
Life style modification for managing hypertension (**S-ABCDE**).

Changes	Recommendation	Expected benefits in SBP reduction	COR	LOE
Sodium restriction	2.0–4.0 gm/day	2.5 mmHg/1 gm sodium reduction	I	B
Alcohol limitation	Men: <30 gm/day ethanol Women: <20 gm/day ethanol	2–4 mmHg	I	B
Body weight reduction	BMI: 22.5–25.0	1 mmHg/per 1 kg reduction	I	B
Cigarette smoking cessation	Complete abstinence	No independent effect	I	C
Diet adaptation	**DASH** diet: rich in fruits and vegetables (8–10 servings/day), rich in low-fat dairy products (2–3 servings/day), and reduced in saturated fat and cholesterol	10–12 mmHg	I	A
Exercise adoption	Aerobic, at least 40 minutes/day, and at least 3-4 days/week	3–7 mmHg	I	A

BMI: body mass index; COR: class of recommendation; DASH: Dietary Approaches to Stop Hypertension; LOE: level of evidence; SBP: systolic blood pressure (Modified from Chiang et al.[9] with permission).

E

104-152. 生活調適 S-ABCDE 為控制血壓重要之一環,是台灣高血壓治療指引一大特點,下
列描述何者為非?
(A) S 指的是 Sodium restriction,每一公克下降 2.5 毫米汞柱。
(B) D 指的是飲食調整,DASH 飲食模式的降壓效果較運動佳。
(C) B 指的是 Body weight reduction,每一公斤下降 1 毫米汞柱。
(D) C 指的是 Cigarette smoking cessation,但對血壓的下降影響有限。
(E) E 指的是 Emotional stress 對血壓的影響。

C

104- 163.

健康的生活習慣與維持良好血壓有密切關係。在 2015 年台灣高血壓治療指引中,以下何種生活型態調整建議在實證醫學上有最強的降血壓效果?

(A) 每日減少三克鈉攝取 (3 gm sodium reduction)。2.5/g

(B) 每日酒精攝取少於 20 公克 (<20 gm/day ethanol)。

(C) 體重減輕 10 公斤 (body weight 10 kg reduction)。1/1kg

(D) 戒菸 (cessation of smoking)。

(E) 每周運動至少 3-4 天,每天至少 40 分鐘有氧運動。

106-123.

請問關於高血壓的敘述,下列何者正確?

(A) White-coat hypertension 大約佔不到 5%高血壓患者。(45~20%)

(B) Renal parenchymal disease 是次發型高血壓最常見的原因。

(C) 若病患有周邊血管疾病 (atherosclerotic brachial disease),量測血壓時常會被低估。

(D) 量測血壓時若 cuff 寬度太小,量測血壓會被低估。

(E) Pheochromocytoma 和 Cushing syndrome 所造成之高血壓佔所有高血壓比例約10%左右。

Pheochromocytomas are rare, reportedly occurring in 0.05–0.2% of hypertensive individuals.

D

104- 153. 至少一種降血壓藥在夜間投與,有助於減少發生心血管事件。以下藥物目前已被證實在夜間投與時,有效且安全,除了:

(A) ACE inhibitor

(B) ARB

(C) CCB

(D) Beta-blocker

(E) Alfa-blocker

Several classes of medications, such as ACE inhibitors, ARB, or CCB, have been proven to be safe and effective for bed-time administration. There has been no evidence supporting the use of diuretics or beta-blockers at bedtime.

B

104-164. 劉先生,67 歲,儘管服用四種降血壓藥物血壓仍然在 150/80 毫米汞柱上下。在考量是否有其他因素造成劉先生血壓控制不良時,使用其他可能造成血壓上升藥物也是臨床評估的重要一環。試問以下何種藥物不至於造成王劉先生血壓控制不良?

(A) 非固醇類抗發炎藥物 (non-steroidal anti-inflammatory drugs)
(B) TZD 類胰島素增敏劑 (thiazolidinedione, glitazone)
(C) 環孢靈 (cyclosporine)
(D) 甘草類 (licorice)止咳藥水
(E) 血管內皮細胞生長因子抑制劑 (vascular endothelial growth factor inhibitor)

PHARMACOLOGY

C

104- 35. 在高血壓的病生理機轉中,Renin-Angiotensin-Aldosterone 系統活化扮演了重要的
角色,下列敘述何者錯誤?

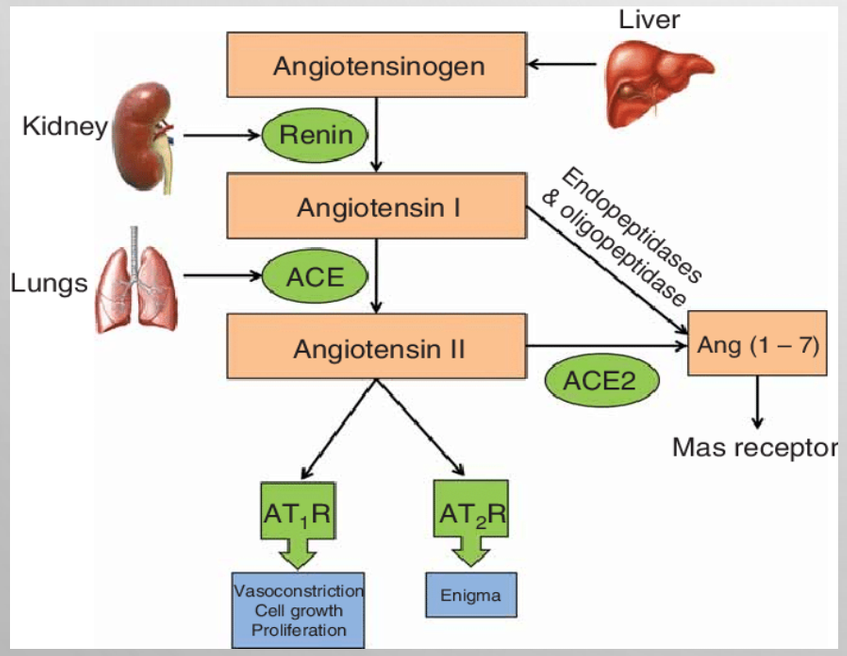
(A) Angiotensin converting enzyme (ACE) 在肺部最多,但在心臟以及全身血管亦存在。

(B) Chymase,是存在於心臟和全身血管的一種蛋白酶,提供另一個路徑用於轉換 angiotensin I 為 angiotensin II。

(C) Angiotensin I 與 G-protein 相互作用會造成高血壓及其併發症。

(D) 活化 (pro) renin 接受器會增加 TGF-β產生,導致膠原蛋白沉澱和纖維化。

(E) ACEI or ARB 會刺激反應性 (pro) renin 和 renin 產生,可能會抵銷掉一些心血管保護效果。



agiotensin II 與G protein

D

104- 39. 腎素—血管張力素系統 (renin-angiotensin system) 的活化是引起高血壓的重要機
制。此系統的活化甚至可以影響免疫系統,間接造成血壓升高。試問目前的研究顯示以
下何種免疫系統成分會受到腎素—血管張力素系統的直接影響,進而影響血壓?

(A) 嗜中性球 (neutrophil)
(B) 巨噬細胞 (macrophage)
(C) 肥大細胞 (mast cell)
(D) T 淋巴球 (T lymphocyte)
(E) B 淋巴球 (B lymphocyte)

angiotensin II stimulate T cell