

# NEW HYPERTENSION MANAGEMENT GUIDELINES: ACC - ADA - ACP DEBATE

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# FINANCIAL DISCLOSURES

- NONE

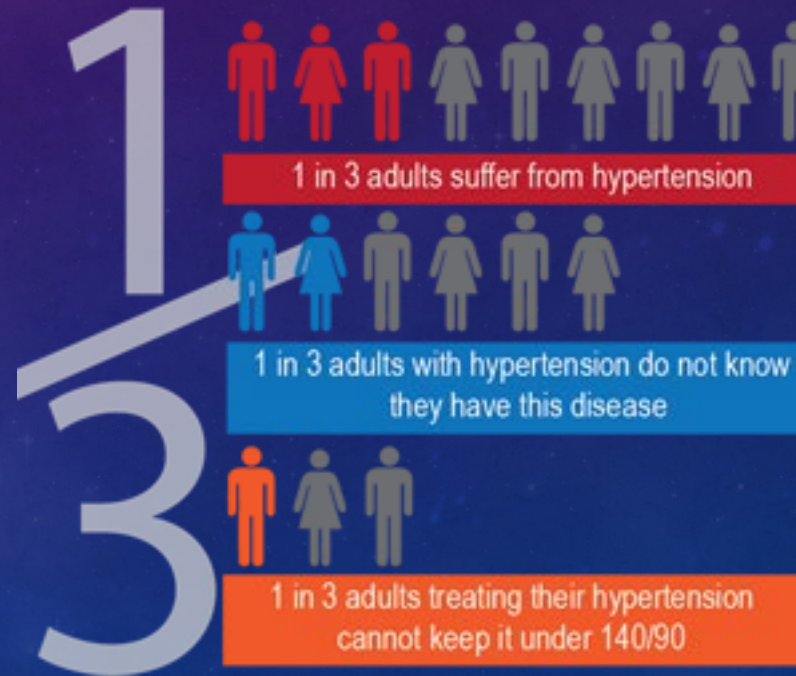


# OBJECTIVES

- Define stages of hypertension
- Utilizing risk adjustment to determine treatment options
- Understand treatment options for hypertension in certain populations

# HYPERTENSION

About 1 in 3 U.S. adults—as estimated 68 million—have high blood pressure, which increases the risk for heart disease and stroke, leading causes of death in the United States.



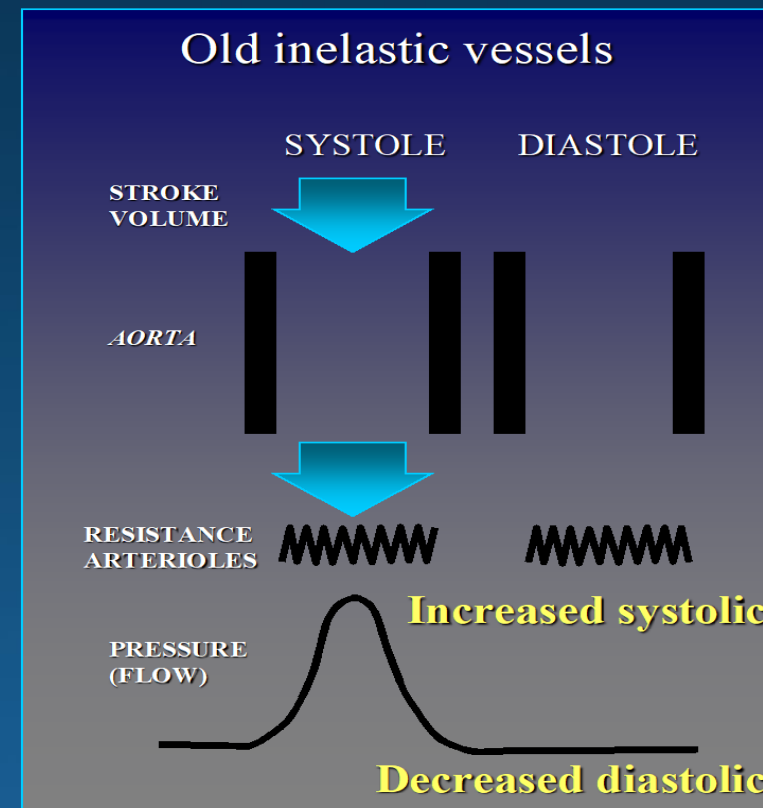
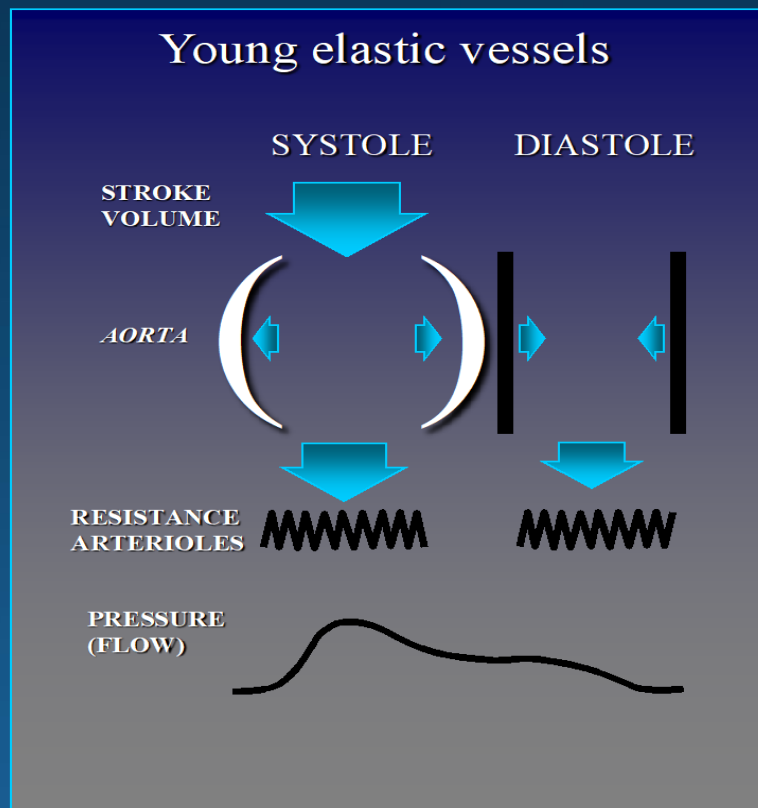


# HYPERTENSION

- High Blood Pressure



# Aging and Arterial Stiffness Pathophysiology



Adapted from: Izzo JL. *J Am Geriatr Soc* 1981;29:520-24.

# HYPERTENSION – THE NUMBERS





# OLDER BLOOD PRESSURE CLASSIFICATION

<b>Blood Pressure Category</b>	<b>Systolic mm Hg (upper #)</b>	<b>Diastolic mm Hg (lower #)</b>
<b>Normal</b>	less than <b>120</b>	and less than <b>80</b>
<b>Prehypertension</b>	<b>120 – 139</b>	or <b>80 – 89</b>
<b>High Blood Pressure (Hypertension) Stage 1</b>	<b>140 – 159</b>	or <b>90 – 99</b>
<b>High Blood Pressure (Hypertension) Stage 2</b>	<b>160 or higher</b>	or <b>100 or higher</b>
<b><u>Hypertensive Crisis</u> (Emergency care needed)</b>	Higher than <b>180</b>	or Higher than <b>110</b>



## 2017 BLOOD PRESSURE GUIDELINE CLASSIFICATION

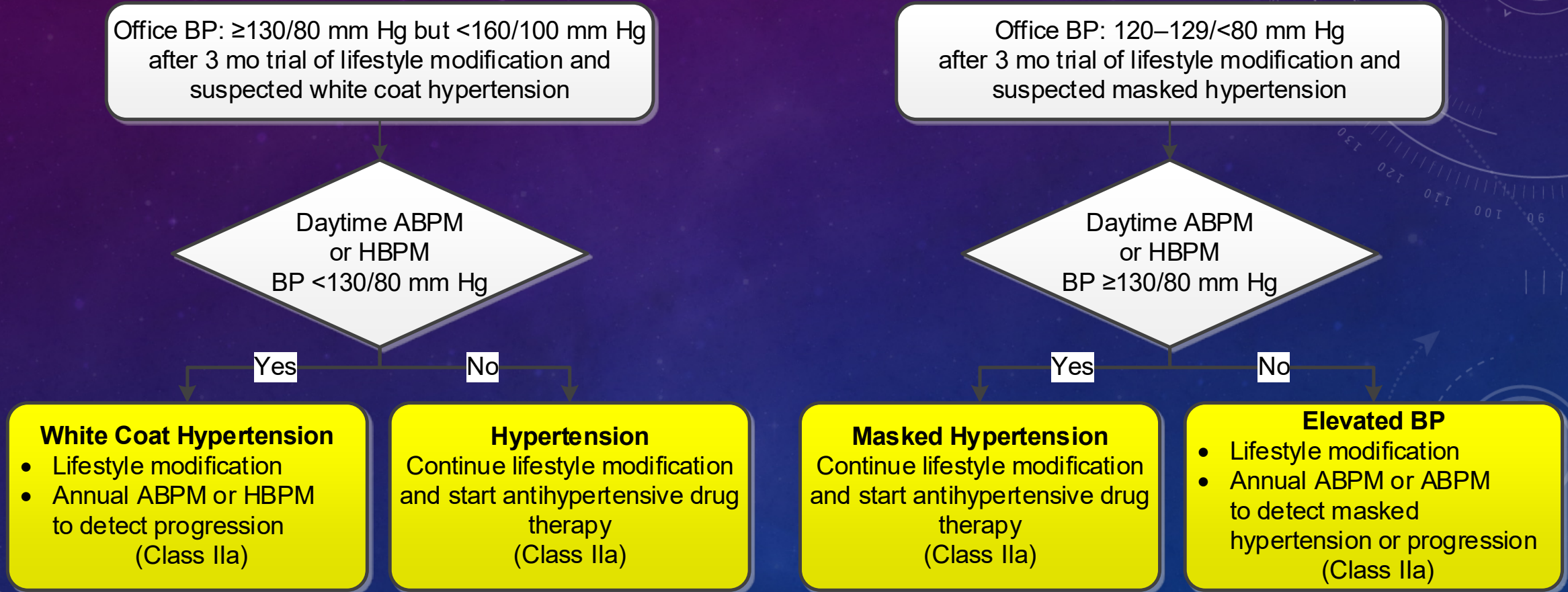
BP Category	SBP		DBP
Normal	<120 mm Hg	and	<80 mm Hg
Elevated	120–129 mm Hg	and	<80 mm Hg
Hypertension			
Stage 1	130–139 mm Hg	or	80–89 mm Hg
Stage 2	≥140 mm Hg	or	≥90 mm Hg

# AHA GUIDELINES

- Known CAD or ASCVD > 10%
  - Goal BP <130/30
- ASCVD < 10%
  - Goal BP < 140/90



# DETECTION OF WHITE COAT HYPERTENSION OR MASKED HYPERTENSION IN PATIENTS NOT ON DRUG THERAPY



# AMBULATORY BLOOD PRESSURE MONITORING (ABPM)

<b>Normal</b>	<b>Office &lt;130/80 and ABPM &lt;130/80 with night time BP dip of 10-20%</b>
White Coat Hypertension	BP >130/80 in office with normal ABPM
Masked Hypertension	BP <130/80 in office; High readings on ABPM
Sustained Hypertension	Office and ABPM high
Nocturnal Hypertension	Sleep BP > 120/70 mm Hg



# RECOMMEND TREATMENT MEDS

- If BP > 20/10 over goal --→ 2 MEDS
- Nonblack population
  - Thiazide diuretic
  - Calcium-channel blocker
  - ACE-I/ARB
- Black population
  - Thiazide diuretic
  - Calcium-channel blocker
- CKD (>300 mg/day albuminuria)
  - ACE-I/ARB

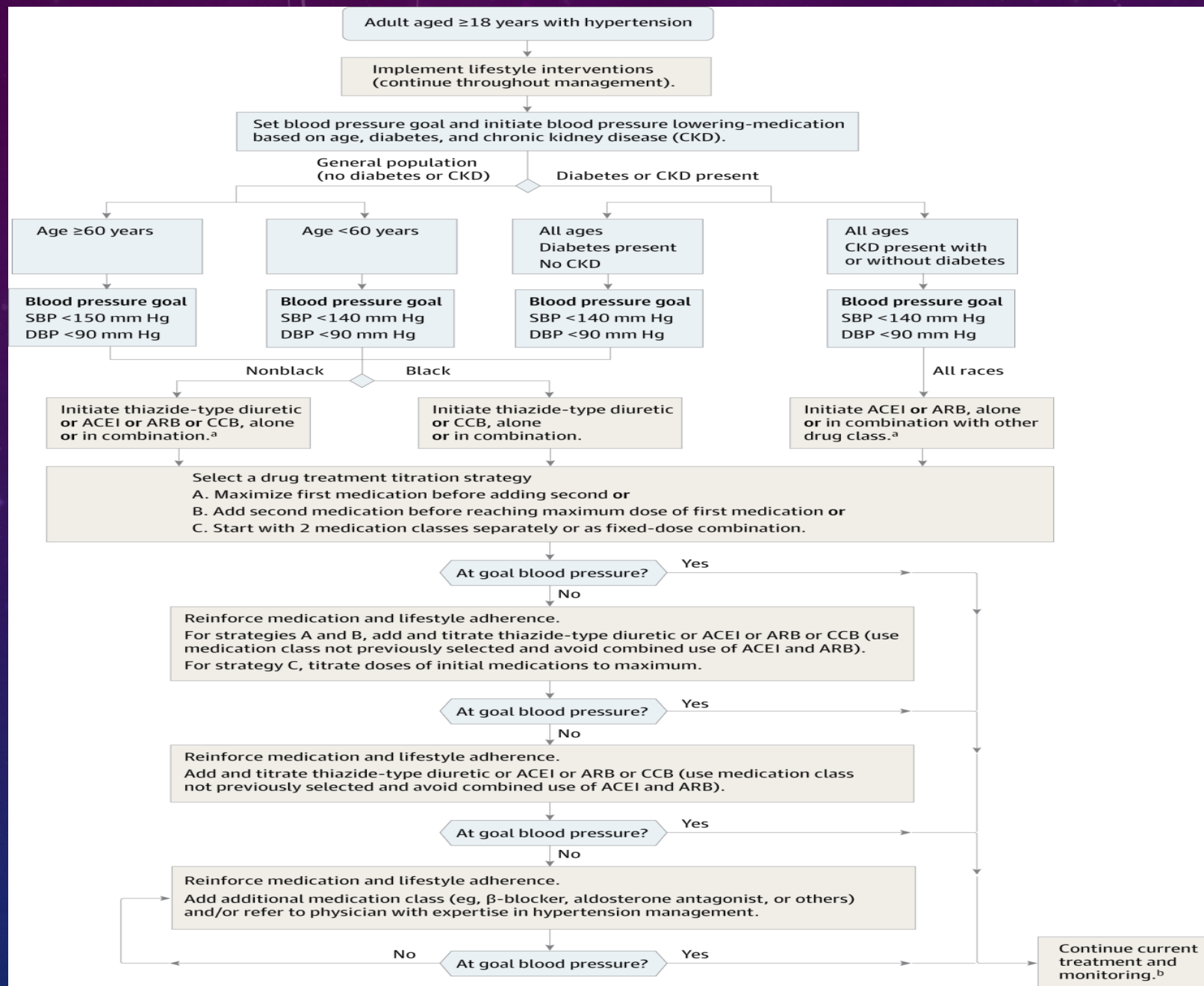
**Table 4. Evidence-Based Dosing for Antihypertensive Drugs**

Antihypertensive Medication	Initial Daily Dose, mg	Target Dose in RCTs Reviewed, mg	No. of Doses per Day
<b>ACE inhibitors</b>			
Captopril	50	150-200	2
Enalapril	5	20	1-2
Lisinopril	10	40	1
<b>Angiotensin receptor blockers</b>			
Eprosartan	400	600-800	1-2
Candesartan	4	12-32	1
Losartan	50	100	1-2
Valsartan	40-80	160-320	1
Irbesartan	75	300	1
<b>β-Blockers</b>			
Atenolol	25-50	100	1
Metoprolol	50	100-200	1-2
<b>Calcium channel blockers</b>			
Amlodipine	2.5	10	1
Diltiazem extended release	120-180	360	1
Nitrendipine	10	20	1-2
<b>Thiazide-type diuretics</b>			
Bendroflumethiazide	5	10	1
Chlorthalidone	12.5	12.5-25	1
Hydrochlorothiazide	12.5-25	25-100 <sup>a</sup>	1-2
Indapamide	1.25	1.25-2.5	1

Abbreviations: ACE, angiotensin-converting enzyme; RCT, randomized controlled trial.

<sup>a</sup>Current recommended evidence-based dose that balances efficacy and safety is 25-50 mg daily.





# SECONDARY HYPERTENSION

- Renal artery stenosis
- Coarctation of the aorta
- Primary aldosteronism
- Pheochromocytoma
- Use of NSAIDS
- Genetics
- Sleep apnea
- Thyroid disease
- Acromegaly
- Drugs/Alcohol



# RED FLAGS FOR SECONDARY HYPERTENSION

- ❑ *Abdominal bruit*: renal artery stenosis
- ❑ *Palps, HA, pallor, perspiration*: pheochromocytoma
- ❑ *Obesity, moon face, purple striae*: Cushing's
- ❑ *Abd mass*: polycystic kidney, hydronephrosis
- ❑ *Obesity, hypersomnolence*: OSA
- ❑ *Agitation, sweating*: cocaine, ethanol/narc w/d
- ❑ *Hypokalemia*: hyperaldosteronism
- ❑ *Hypercalcemia*: hyperparathyroidism

# WORKUP OF SECONDARY HYPERTENSION

TABLE 40-3 Overall Guide to Work-up for Identifiable Causes of Hypertension		
Diagnosis	Diagnostic Procedure	
	Initial	Additional
Chronic renal disease	Urinalysis, serum creatinine, renal sonography	Isotopic renography, renal biopsy
Renovascular disease	Renal sonography Duplex Doppler sonography	Magnetic resonance or computed tomography (CT) angiography, aortography
Coarctation	Blood pressure in legs	Echocardiography, magnetic resonance imaging or contrast aortography
Primary aldosteronism	Plasma and urinary potassium, plasma renin and aldosterone	Urinary aldosterone after oral salt load, adrenal CT, adrenal venous sampling
Cushing syndrome	Morning plasma cortisol after 1 mg dexamethasone at bedtime	Urinary cortisol after variable doses of dexamethasone, adrenal CT, and scintiscans
Pheochromocytoma	Plasma-free metanephrine Urine metanephrines and catechols	Plasma normetanephrine (basal and after 0.3 mg clonidine) Adrenal CT and scintiscans

TABLE 40-3 Overall Guide to Work-up for Identifiable Causes of Hypertension.

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# RESISTANT HYPERTENSION

- JNC 7
  - BP  $>140/90$
  - 3 Medications (including diuretic) at max tolerated doses
- AHA
  - Uncontrolled on 3 medications
  - Controlled on 4 medications

# CAUSES OF RESISTANT HYPERTENSION

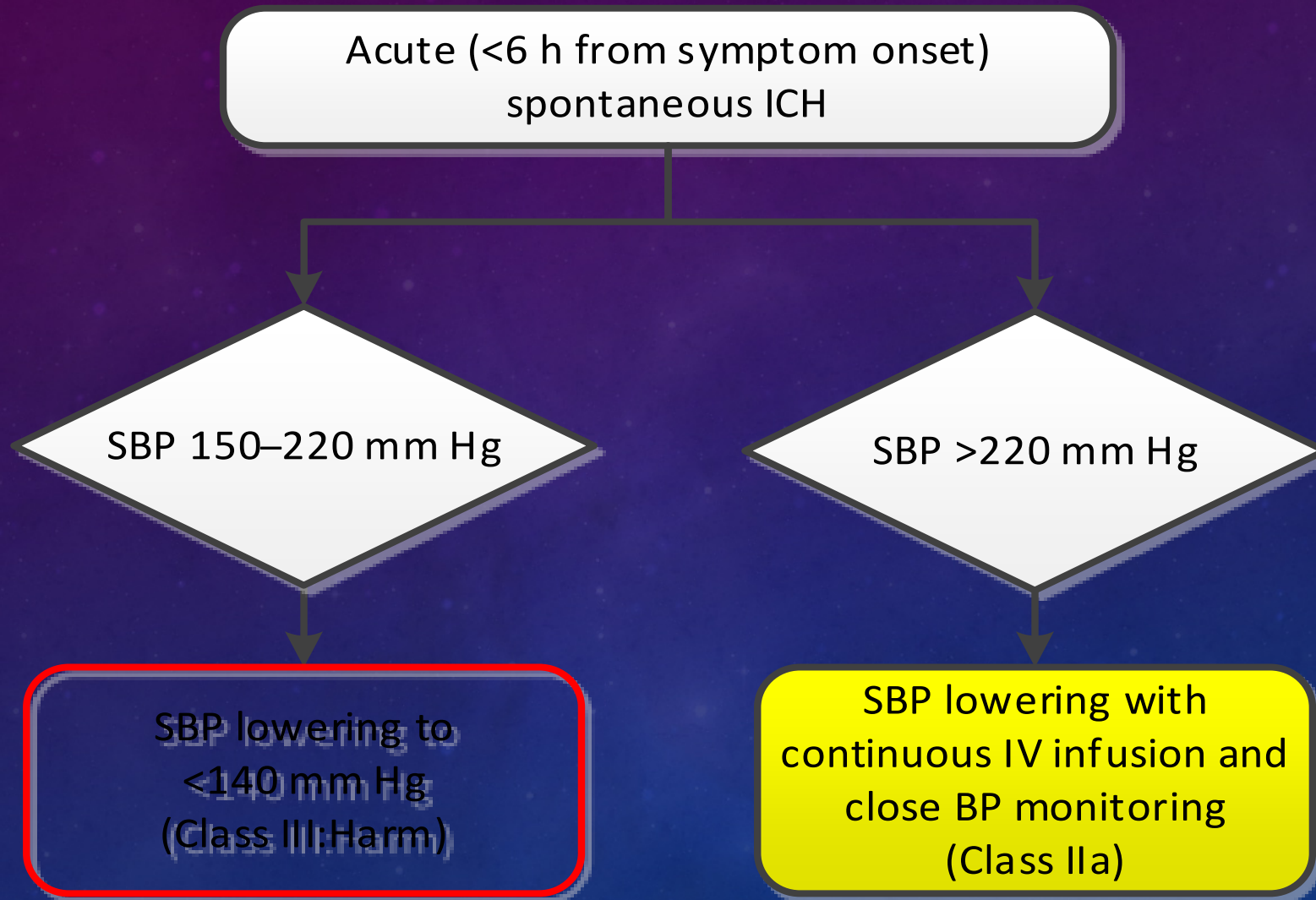
- Compliance
- Improper BP measurement
- Excess sodium intake
- Inadequate diuretic therapy
- Medication
  - Inadequate doses
  - Drug actions and interactions (e.g., nonsteroidal anti-inflammatory drugs (NSAIDs), illicit drugs, sympathomimetics, oral contraceptives)
  - Over-the-counter (OTC) drugs and herbal supplements
- Excess alcohol intake
- Identifiable causes of HTN



# TREATMENT OF RESISTANT HYPERTENSION

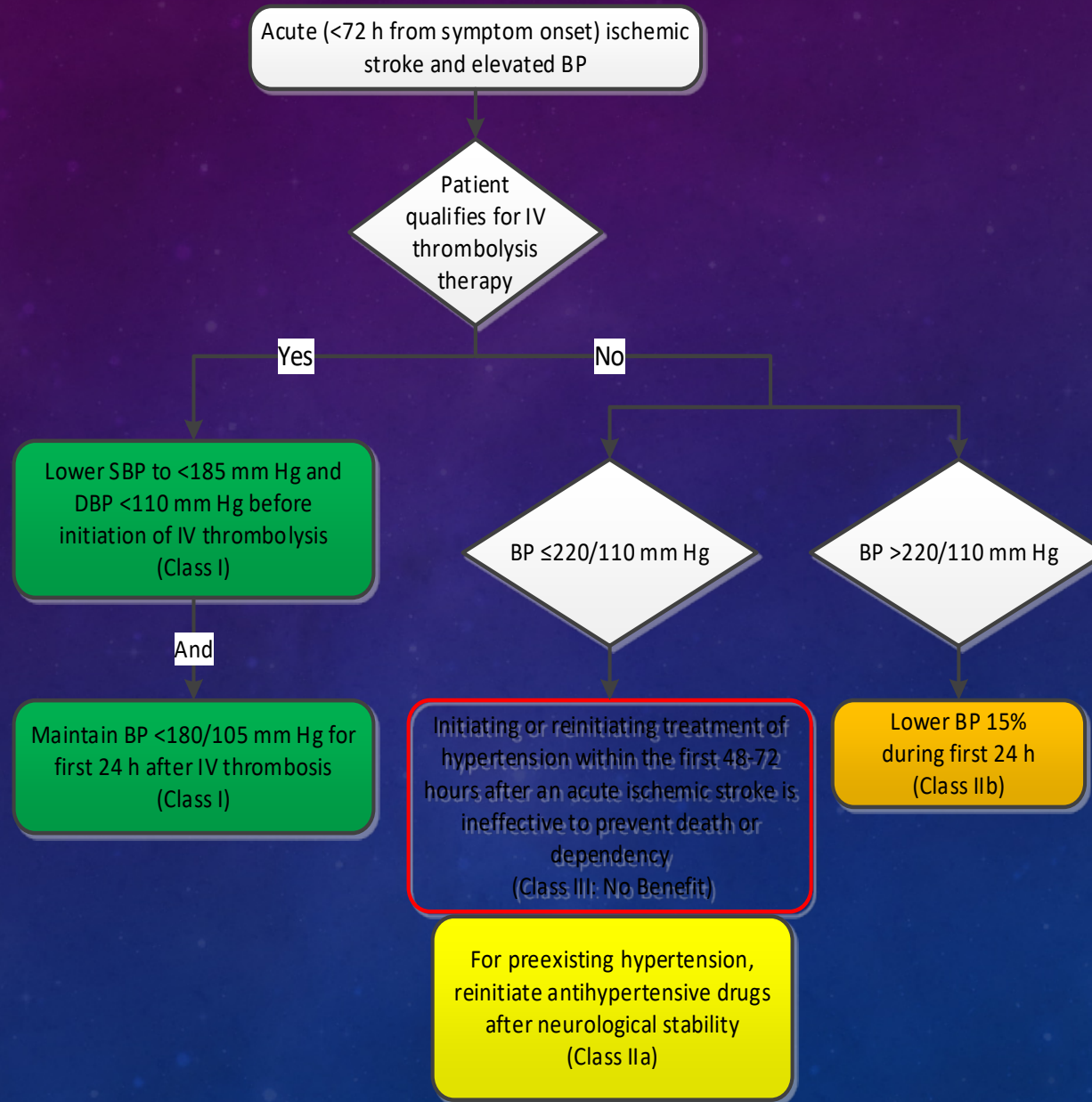
- 3 STEP APPROACH
- Optimize Diuretic
  - Thiazide
  - Thiazide Like (**Chlorthalidone**; Metolazone; Indapamide)
  - Loop diuretics
- Optimize ACE-I/ARB and CCB
- Mineralocorticoid Antagonist
  - Spironolactone/Eplerenone (12.5 – 50 mg/day)

# MANAGEMENT OF HYPERTENSION IN PATIENTS WITH ACUTE ICH





# MANAGEMENT OF HYPERTENSION IN PATIENTS WITH ACUTE ISCHEMIC STROKE



# ADDITIONAL CONSIDERATIONS IN ANTIHYPERTENSIVE DRUG CHOICES

- **Potential unfavorable effects**

- Thiazide diuretics should be used cautiously in gout or a history of significant hyponatremia.
- BBs should be generally avoided in patients with asthma, reactive airways disease, or second- or third-degree heart block.
- ACEIs and ARBs are contraindicated in pregnant women or those likely to become pregnant.
- ACEIs should not be used in individuals with a history of angioedema.
- Aldosterone antagonists and potassium-sparing diuretics can cause hyperkalemia.



# BENEFITS OF LOWERING BP

	<b>Average Percent Reduction</b>
Stroke incidence	35–40%
Myocardial infarction	20–25%
Heart failure	50%

## Lifestyle Modifications to Manage Hypertension\*†

Modification	Recommendation	Approximate SBP Reduction (Range)
Weight reduction	Maintain normal body weight (body mass index 18.5–24.9 kg/m <sup>2</sup> ).	5–20 mm Hg/10 kg weight loss <sup>1,2</sup>
Adopt DASH eating plan	Consume a diet rich in fruits, vegetables, and lowfat dairy products with a reduced content of saturated and total fat.	8–14 mm Hg <sup>3,4</sup>
Dietary sodium reduction	Reduce dietary sodium intake to no more than 100 mmol per day (2.4 g sodium or 6 g sodium chloride).	2–8 mm Hg <sup>3-5</sup>
Physical activity	Engage in regular aerobic physical activity such as brisk walking (at least 30 min per day, most days of the week).	4–9 mm Hg <sup>6,7</sup>
Moderation of alcohol consumption	Limit consumption to no more than 2 drinks (1 oz or 30 mL ethanol; e.g., 24 oz beer, 10 oz wine, or 3 oz 80-proof whiskey) per day in most men and to no more than 1 drink per day in women and lighter weight persons.	2–4 mm Hg <sup>8</sup>

DASH, Dietary Approaches to Stop Hypertension.

\* For overall cardiovascular risk reduction, stop smoking.

† The effects of implementing these modifications are dose and time dependent, and could be greater for some individuals.



# PREVIOUS RECOMMENDED TREATMENT GOALS

- In adults (general population) greater than 60 years of age:
  - SBP<150, DBP<90
- In adults (general population) less than 60 years of age:
  - SBP<140, DBP<90
- In adults with diabetes or chronic kidney disease:
  - SBP<140, DBP<90

# RECOMMENDED TREATMENT MEDS

- Nonblack population
  - Thiazide diuretic
  - Calcium-channel blocker
  - ACE-I/ARB
- Black population
  - Thiazide diuretic
  - Calcium-channel blocker
- CKD
  - ACE-I/ARB



# PHARMACOLOGIC TREATMENT

- ❑ Heart failure: ACE-I, ARB, diuretics, BB
- ❑ Diabetes: ACE-I, ARB, CCB, Thiazide diuretics
- ❑ CAD/post-MI: BB, ACE-I, (CCB for intol.)
- ❑ Systolic HTN: ACE-I/ARB, diuretic, CCB
- ❑ Pregnancy: labetalol, methyldopa, CCB
- ❑ Prostate enlargement: alpha blocker
- ❑ Renal disease: ACE-I or ARB

# AHA/ACC/ASH STATEMENT

- Ischemic systolic HF
  - avoid CCB's s/a diltiazem/verap.....dihydropyridine CCB's ok (amlodipine/felodipine)..PRAISE and V-HEFT trials
  - Avoid clonidine
  - Avoid doxazosin (ALLHAT trial)



**Table 6. Guideline Comparisons of Goal BP and Initial Drug Therapy for Adults With Hypertension**

Guideline	Population	Goal BP, mm Hg	Initial Drug Treatment Options
2014 Hypertension guideline	General ≥60 y	<150/90	Nonblack: thiazide-type diuretic, ACEI, ARB, or CCB; black: thiazide-type diuretic or CCB
	General <60 y	<140/90	
	Diabetes	<140/90	
	CKD	<140/90	
ESH/ESC 2013 <sup>37</sup>	General nonelderly	<140/90	Diuretic, β-blocker, CCB, ACEI, or ARB
	General elderly <80 y	<150/90	
	General ≥80 y	<150/90	
	Diabetes	<140/85	
	CKD no proteinuria	<140/90	
CHEP 2013 <sup>38</sup>	CKD + proteinuria	<130/90	ACEI or ARB
	General <80 y	<140/90	Thiazide, β-blocker (age <60y), ACEI (nonblack), or ARB
	General ≥80 y	<150/90	
	Diabetes	<130/80	
CKD	<140/90		
ADA 2013 <sup>39</sup>	Diabetes	<140/80	ACEI or ARB
KDIGO 2012 <sup>40</sup>	CKD no proteinuria	≤140/90	ACEI or ARB
	CKD + proteinuria	≤130/80	
NICE 2011 <sup>41</sup>	General <80 y	<140/90	<55 y: ACEI or ARB
	General ≥80 y	<150/90	≥55 y or black: CCB
ISHIB 2010 <sup>42</sup>	Black, lower risk	<135/85	Diuretic or CCB
	Target organ damage or CVD risk	<130/80	

Abbreviations: ADA, American Diabetes Association; ACEI, angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor blocker; CCB, calcium channel blocker; CHEP, Canadian Hypertension Education Program; CKD, chronic kidney disease; CVD, cardiovascular disease; DHPCCB, dihydropyridine calcium channel blocker; ESC, European Society of Cardiology; ESH, European Society of Hypertension; ISHIB, International Society for Hypertension in Blacks; JNC, Joint National Committee; KDIGO, Kidney Disease: Improving Global Outcome; NICE, National Institute for Health and Clinical Excellence.

## BP THRESHOLDS FOR AND GOALS OF PHARMACOLOGICAL THERAPY IN PATIENTS WITH HYPERTENSION ACCORDING TO CLINICAL CONDITIONS

Clinical Condition(s)	BP Threshold, mm Hg	BP Goal, mm Hg
<b>General</b>		
Clinical CVD or 10-year ASCVD risk $\geq 10\%$	$\geq 130/80$	$< 130/80$
No clinical CVD and 10-year ASCVD risk $< 10\%$	$\geq 140/90$	$< 130/80$
Older persons ( $\geq 65$ years of age; noninstitutionalized, ambulatory, community-living adults)	$\geq 130$ (SBP)	$< 130$ (SBP)
<b>Specific comorbidities</b>		
Diabetes mellitus	$\geq 130/80$	$< 130/80$
Chronic kidney disease	$\geq 130/80$	$< 130/80$
Chronic kidney disease after renal transplantation	$\geq 130/80$	$< 130/80$
Heart failure	$\geq 130/80$	$< 130/80$
Stable ischemic heart disease	$\geq 130/80$	$< 130/80$
Secondary stroke prevention	$\geq 140/90$	$< 130/80$
Secondary stroke prevention (lacunar)	$\geq 130/80$	$< 130/80$
Peripheral arterial disease	$\geq 130/80$	$< 130/80$



# COMPARING BP CONTROL – JNC 7 TO JNC8

- Atherosclerosis Risk in Communities Study
  - 6088 participants
    - JNC 7 Prevalence: 82%
    - JNC 7 Controlled: 63%
    - JNC 8 Controlled: 79%
  - Despite criteria used, >20% still uncontrolled.
    - Therapeutic Inertia

# SPRINT TRIAL

- Systolic Blood Pressure Intervention Trial
  - NIH Sponsored Trial
  - Began Fall 2009
  - 9300 Participants aged 50 and over
  - 100 Centers in US and Puerto Rico
  - Excluded pts. with previously known DM, stroke, polycystic kidney disease



# SPRINT TRIAL

- Compared CV events of SBP goal of 120mmHg to 140mmHg
- SBP goal of 140
  - 2 meds
- SBP goal of 120
  - 3 meds
- SBP goal of 120:
  - decrease in CV events (MI, HF, stroke) by 1/3
  - Decrease in death by 1/4

# ACCORD TRIAL

- Population
  - 4,733 participants with T2D aged 40–79 years with prior evidence of CVD or multiple cardiovascular risk factors
- Intensive
  - Systolic blood pressure target: <120 mmHg
  - Achieved (mean) systolic/ diastolic: 119.3/64.4 mmHg
- Standard
  - Systolic blood pressure target: 130–140 mmHg
  - Achieved (mean) systolic/ diastolic: 133.5/70.5 mmHg
- Outcomes
  - No benefit in primary end point: composite of nonfatal MI, nonfatal stroke, and CVD death
  - Stroke risk reduced 41% with intensive control, not sustained through follow-up beyond the period of active treatment
  - Adverse events more common in intensive group, particularly elevated serum creatinine and electrolyte abnormalities



# QUESTION #1

LR is a 50 year old black male with medical history of diabetes and dyslipidemia. His blood pressure is 160/90. Which agent is best for initial therapy?

- A) Lisinopril
- B) Amlodipine
- C) Losartan
- D) Carvedilol

# QUESTION #1

LR is a 50 year old black male with medical history of diabetes and dyslipidemia. His blood pressure is 160/90. Which agent is best for initial therapy?

- A) Lisinopril
- B) **Amlodipine** (Correct)
- C) Losartan
- D) Carvedilol



## QUESTION #2

LT is a 34 year old non-black female with a medical history of diabetes and dyslipidemia. Her blood pressure is 160/90. Which agent is best for initial therapy?

- A) Lisinopril
- B) Nifedipine
- C) Losartan
- D) Clonidine

## QUESTION #2

LT is a 34 year old non-black female with a medical history of diabetes and dyslipidemia. Her blood pressure is 160/90. Which agent is best for initial therapy?

- A) Lisinopril
- B) **Nifedipine** (Correct)
- C) Losartan
- D) Clonidine



## QUESTION #3

TL is a 50 year old black male with a medical history of DM, dyslipidemia, and CKD2. His blood pressure is 160/90. Which agent is best for initial therapy?

- A) Lisinopril
- B) Amlodipine
- C) Atenolol
- D) Chlorthalidone

## QUESTION #3

TL is a 50 year old black male with a medical history of DM, dyslipidemia, and CKD2. His blood pressure is 160/90. Which agent is best for initial therapy?

- A) **Lisinopril** (Correct)
- B) Amlodipine
- C) Atenolol
- D) Chlorthalidone



## QUESTION #4

RT is a 54 year old female with a medical history of DM, dyslipidemia, and tobacco abuse. Her 10 year ASCVD risk is 11%. Which blood pressure prompts initiation of treatment?

- A) >120/80
- B) >130/80
- C) >140/80
- D) >140/90

## QUESTION #4

RT is a 54 year old female with a medical history of DM, dyslipidemia, and tobacco abuse. Her 10 year ASCVD risk is 11%. Which blood pressure prompts initiation of treatment?

- A) >120/80
- B) **>130/80** (Correct)
- C) >140/80
- D) >140/90



QUESTIONS

???