

# Hypertension Guideline

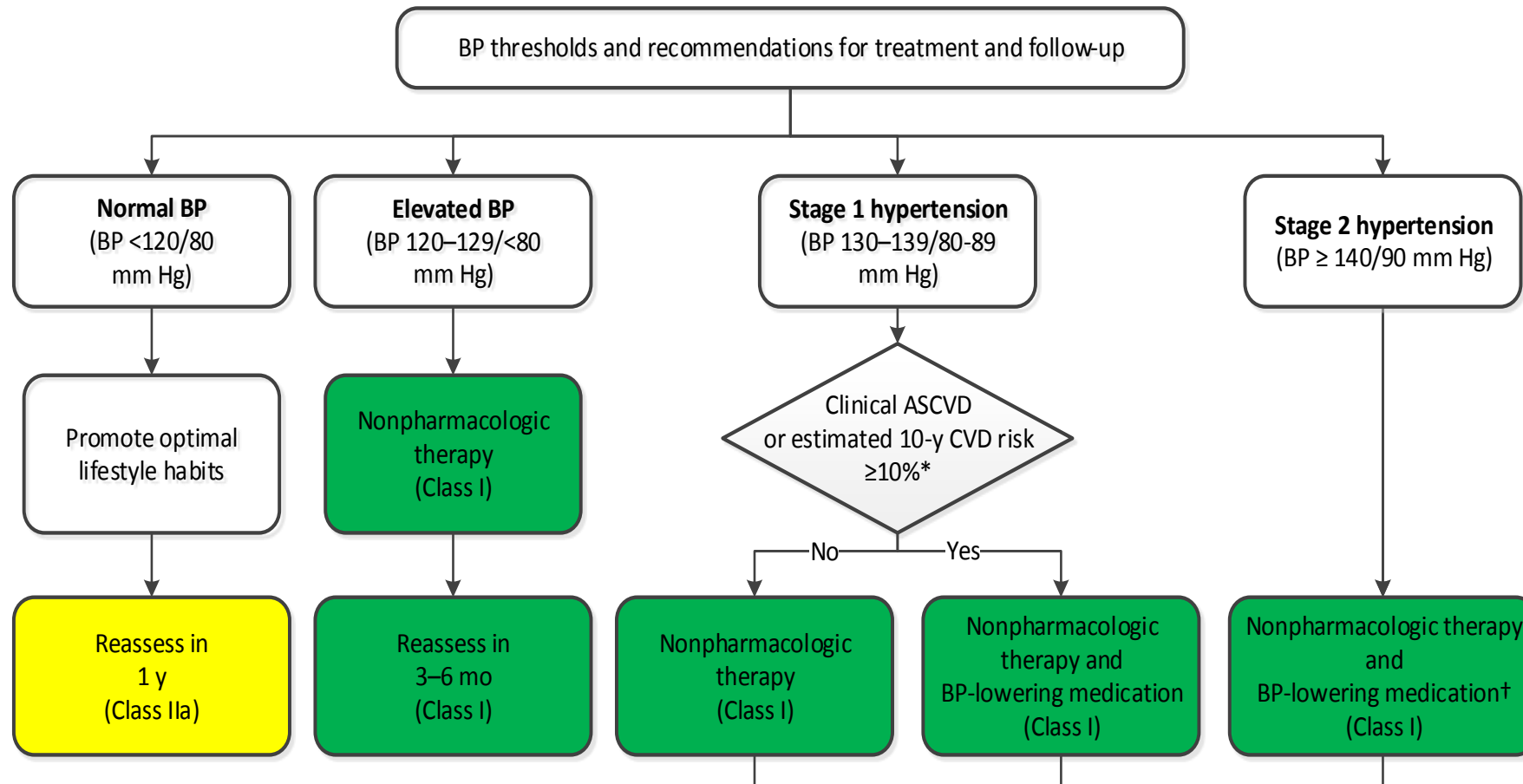
## Treatment of High BP |

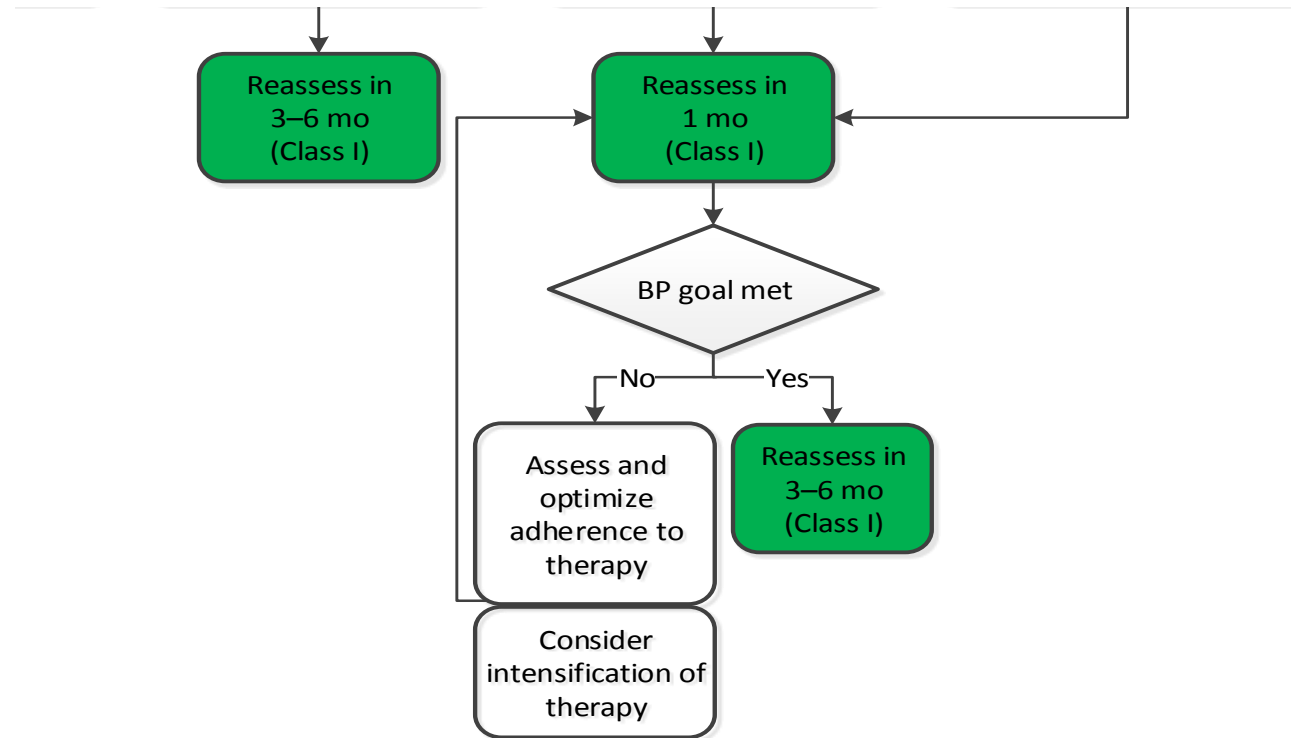
## BP Treatment Threshold and the Use of CVD Risk Estimation to Guide Drug Treatment of Hypertension

COR	LOE	Recommendations for BP Treatment Threshold and Use of Risk Estimation* to Guide Drug Treatment of Hypertension
I	SBP: A	Use of BP-lowering medications is recommended for secondary prevention of recurrent CVD events in patients with clinical CVD and an average SBP of 130 mm Hg or higher or an average DBP of 80 mm Hg or higher, and for primary prevention in adults with an estimated 10-year atherosclerotic cardiovascular disease (ASCVD) risk of 10% or higher and an average SBP 130 mm Hg or higher or an average DBP 80 mm Hg or higher.
	DBP: C-EO	
I	C-LD	Use of BP-lowering medication is recommended for primary prevention of CVD in adults with no history of CVD and with an estimated 10-year ASCVD risk <10% and an SBP of 140 mm Hg or higher or a DBP of 90 mm Hg or higher.

\*ACC/AHA Pooled Cohort Equations (<http://tools.acc.org/ASCVD-Risk-Estimator/>) to estimate 10-year risk of atherosclerotic CVD.

## Blood Pressure (BP) Thresholds and Recommendations for Treatment and Follow-Up (continued on next slide)





Colors correspond to Class of Recommendation in Table 1.

\*Using the ACC/AHA Pooled Cohort Equations. Note that patients with DM or CKD are automatically placed in the high-risk category. For initiation of RAS inhibitor or diuretic therapy, assess blood tests for electrolytes and renal function 2 to 4 weeks after initiating therapy.

†Consider initiation of pharmacological therapy for stage 2 hypertension with 2 antihypertensive agents of different classes. Patients with stage 2 hypertension and BP  $\geq 160/100$  mm Hg should be promptly treated, carefully monitored, and subject to upward medication dose adjustment as necessary to control BP. Reassessment includes BP measurement, detection of orthostatic hypotension in selected patients (e.g., older or with postural symptoms), identification of white coat hypertension or a white coat effect, documentation of adherence, monitoring of the response to therapy, reinforcement of the importance of adherence, reinforcement of the importance of treatment, and assistance with treatment to achieve BP target.

## Follow-Up After Initial BP Evaluation

COR	LOE	Recommendations for Follow-Up After Initial BP Elevation
I	B-R	Adults with an elevated BP or stage 1 hypertension who have an estimated 10-year ASCVD risk less than 10% should be managed with nonpharmacological therapy and have a repeat BP evaluation within 3 to 6 months.
I	B-R	Adults with stage 1 hypertension who have an estimated 10-year ASCVD risk of 10% or higher should be managed initially with a combination of nonpharmacological and antihypertensive drug therapy and have a repeat BP evaluation in 1 month.
I	B-R	Adults with stage 2 hypertension should be evaluated by or referred to a primary care provider within 1 month of the initial diagnosis, have a combination of nonpharmacological and antihypertensive drug therapy (with 2 agents of different classes) initiated, and have a repeat BP evaluation in 1 month.

Follow-Up After Initial BP Evaluation (cont.)

COR	LOE	Recommendations for Follow-Up After Initial BP Elevation
I	B-R	For adults with a very high average BP (e.g., SBP $\geq$ 180 mm Hg or DBP $\geq$ 110 mm Hg), evaluation followed by prompt antihypertensive drug treatment is recommended.
Ila	C-EO	For adults with a normal BP, repeat evaluation every year is reasonable.

## General Principles of Drug Therapy

COR	LOE	Recommendation for General Principle of Drug Therapy
<b>III: Harm</b>	<b>A</b>	Simultaneous use of an ACE inhibitor, ARB, and/or renin inhibitor is potentially harmful and is not recommended to treat adults with hypertension.

## BP Goal for Patients With Hypertension

COR	LOE	Recommendations for BP Goal for Patients With Hypertension
<b>I</b>	<b>SBP: B-R<sup>SR</sup></b>	For adults with confirmed hypertension and known CVD or 10-year ASCVD event risk of 10% or higher a BP target of less than 130/80 mm Hg is recommended.
	<b>DBP: C- EO</b>	
<b>IIb</b>	<b>SBP: B-NR</b>	For adults with confirmed hypertension, without additional markers of increased CVD risk, a BP target of less than 130/80 mm Hg may be reasonable.
	<b>DBP: C- EO</b>	

SR indicates systematic review.



# Choice of Initial Medication

COR	LOE	Recommendation for Choice of Initial Medication
I	A <sup>SR</sup>	For initiation of antihypertensive drug therapy, first-line agents include thiazide diuretics, CCBs, and ACE inhibitors or ARBs.

SR indicates systematic review. 

## Choice of Initial Monotherapy Versus Initial Combination Drug Therapy

<b>COR</b>	<b>LOE</b>	<b>Recommendations for Choice of Initial Monotherapy Versus Initial Combination Drug Therapy*</b>
<b>I</b>	<b>C-EO</b>	Initiation of antihypertensive drug therapy with 2 first-line agents of different classes, either as separate agents or in a fixed-dose combination, is recommended in adults with stage 2 hypertension and an average BP more than 20/10 mm Hg above their BP target.
<b>Ila</b>	<b>C-EO</b>	Initiation of antihypertensive drug therapy with a single antihypertensive drug is reasonable in adults with stage 1 hypertension and BP goal <130/80 mm Hg with dosage titration and sequential addition of other agents to achieve the BP target.

# Follow-Up After Initiating Antihypertensive Drug Therapy

COR	LOE	Recommendation for Follow-Up After Initiating Antihypertensive Drug Therapy
I	B-R	Adults initiating a new or adjusted drug regimen for hypertension should have a follow-up evaluation of adherence and response to treatment at monthly intervals until control is achieved.

# Monitoring Strategies to Improve Control of BP in Patients on Drug Therapy for High BP

COR	LOE	Recommendation for Monitoring Strategies to Improve Control of BP in Patients on Drug Therapy for High BP
I	A	Follow-up and monitoring after initiation of drug therapy for hypertension control should include systematic strategies to help improve BP, including use of HBPM, team-based care, and telehealth strategies.

# 2017 Hypertension Guideline

## Hypertension in Patients With Comorbidities |

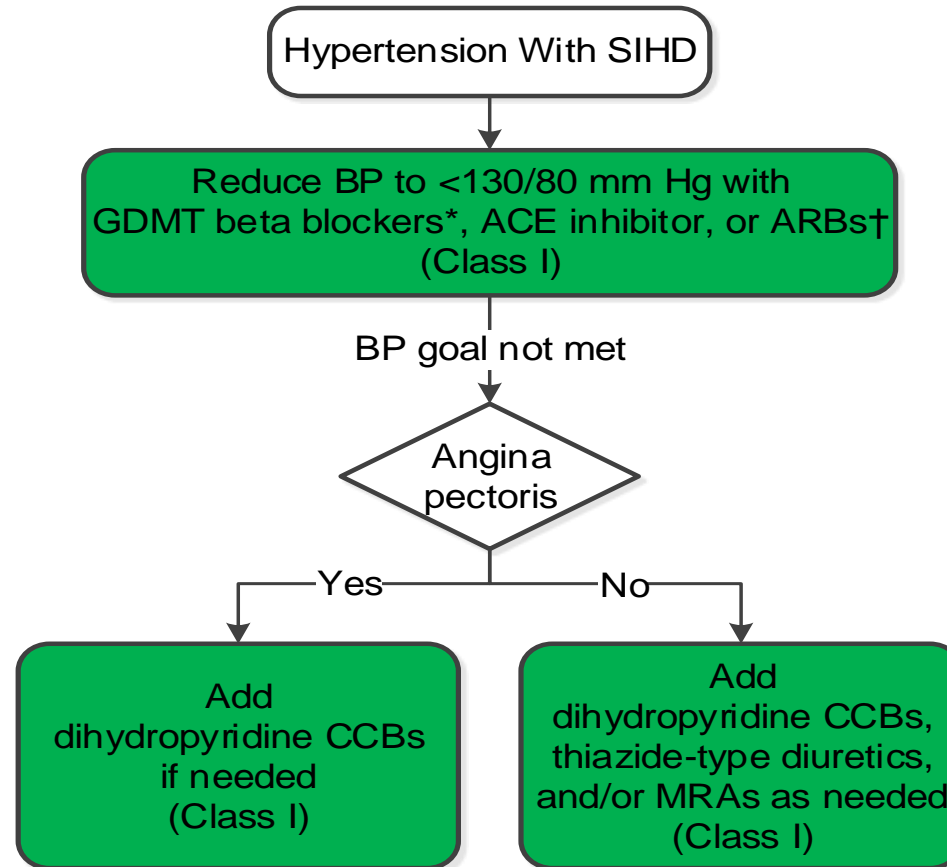
## Stable Ischemic Heart Disease

COR	LOE	Recommendations for Treatment of Hypertension in Patients With Stable Ischemic Heart Disease (SIHD)
I	SBP: B-R	In adults with SIHD and hypertension, a BP target of less than 130/80 mm Hg is recommended.
	DBP: C- EO	
I	SBP: B-R	Adults with SIHD and hypertension (BP $\geq$ 130/80 mm Hg) should be treated with medications (e.g., GDMT beta blockers, ACE inhibitors, or ARBs) for compelling indications (e.g., previous MI, stable angina) as first-line therapy, with the addition of other drugs (e.g., dihydropyridine CCBs, thiazide diuretics, and/or mineralocorticoid receptor antagonists) as needed to further control hypertension.
	DBP: C-EO	

## Stable Ischemic Heart Disease (cont.)

<b>COR</b>	<b>LOE</b>	<b>Recommendations for Treatment of Hypertension in Patients With Stable Ischemic Heart Disease (SIHD)</b>
<b>I</b>	<b>B-NR</b>	In adults with SIHD with angina and persistent uncontrolled hypertension, the addition of dihydropyridine CCBs to GDMT beta blockers is recommended.
<b>Ila</b>	<b>B-NR</b>	In adults who have had a MI or acute coronary syndrome, it is reasonable to continue GDMT beta blockers beyond 3 years as long-term therapy for hypertension.
<b>Ilb</b>	<b>C-EO</b>	Beta blockers and/or CCBs might be considered to control hypertension in patients with CAD (without HFrEF) who had an MI more than 3 years ago and have angina.

# Management of Hypertension in Patients With SIHD



Colors correspond to Class of Recommendation in Table 1.

\*GDMT beta blockers for BP control or relief of angina include carvedilol, metoprolol tartrate, metoprolol succinate, nadolol, bisoprolol, propranolol, and timolol. Avoid beta blockers with intrinsic sympathomimetic activity. The beta blocker atenolol should not be used because it is less effective than placebo in reducing cardiovascular events.

†If needed for BP control.

•ACE indicates angiotensin-converting enzyme; ARB, angiotensin receptor blocker; BP, blood pressure; CCB, calcium channel blocker; GDMT, guideline-directed management and therapy; and SIHD, stable ischemic heart disease.



# Heart Failure

COR	LOE	Recommendation for Prevention of HF in Adults With Hypertension
I	SBP: B-R	In adults at increased risk of HF, the optimal BP in those with hypertension should be less than 130/80 mm Hg.
	DBP: C-EO	

## Heart Failure With Reduced Ejection Fraction

COR	LOE	Recommendations for Treatment of Hypertension in Patients With HFrEF
I	C-EO	Adults with HFrEF and hypertension should be prescribed GDMT titrated to attain a BP of less than 130/80 mm Hg.
III: No Benefit	B-R	Nondihydropyridine CCBs are not recommended in the treatment of hypertension in adults with HFrEF.

# Heart Failure With Preserved Ejection Fraction

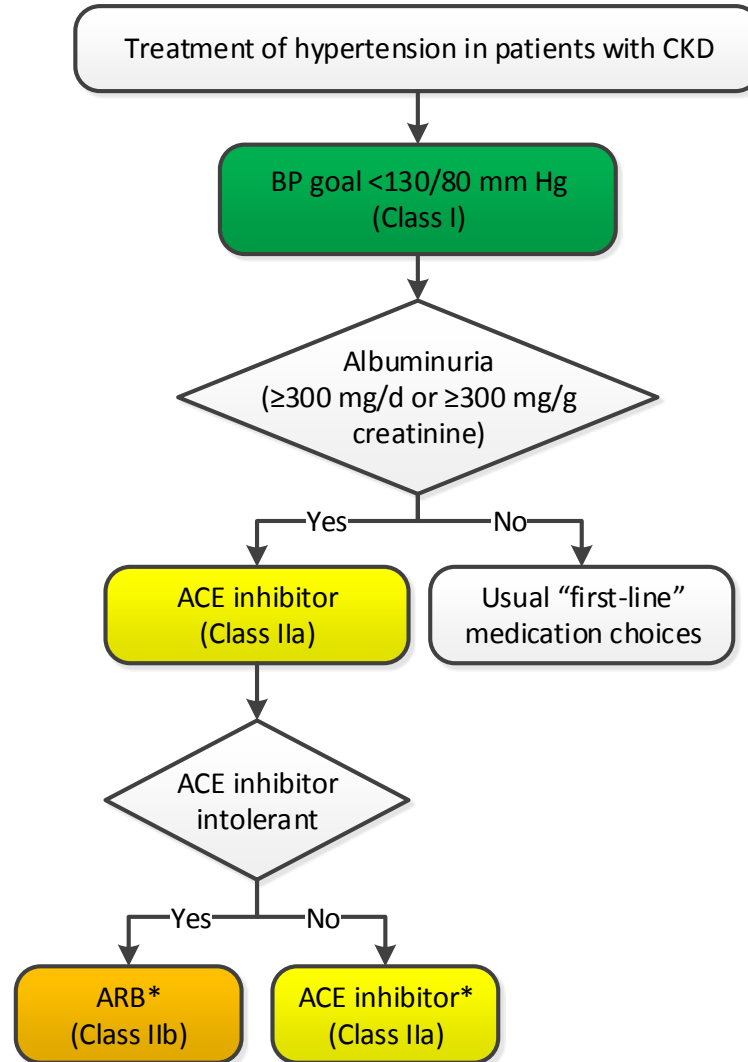
COR	LOE	Recommendations for Treatment of Hypertension in Patients With HFpEF
I	C-EO	In adults with HFpEF who present with symptoms of volume overload, diuretics should be prescribed to control hypertension.
I	C-LD	Adults with HFpEF and persistent hypertension after management of volume overload should be prescribed ACE inhibitors or ARBs and beta blockers titrated to attain SBP of less than 130 mm Hg.

## Chronic Kidney Disease

COR	LOE	Recommendations for Treatment of Hypertension in Patients With CKD
<b>I</b>	<b>SBP: B-R<sup>SR</sup></b>	Adults with hypertension and CKD should be treated to a BP goal of less than 130/80 mm Hg.
	<b>DBP: C-EO</b>	
<b>IIa</b>	<b>B-R</b>	In adults with hypertension and CKD (stage 3 or higher or stage 1 or 2 with albuminuria [ $\geq 300$ mg/d, or $\geq 300$ mg/g albumin-to-creatinine ratio or the equivalent in the first morning void]), treatment with an ACE inhibitor is reasonable to slow kidney disease progression.
<b>IIb</b>	<b>C-EO</b>	In adults with hypertension and CKD (stage 3 or higher or stage 1 or 2 with albuminuria [ $\geq 300$ mg/d, or $\geq 300$ mg/g albumin-to-creatinine ratio in the first morning void]), treatment with an ARB may be reasonable if an ACE inhibitor is not tolerated.

SR indicates systematic review.

# Management of Hypertension in Patients With CKD



•Colors correspond to Class of Recommendation in Table 1.

•\*CKD stage 3 or higher or stage 1 or 2 with albuminuria ≥300 mg/d or ≥300 mg/g creatinine.

•ACE indicates angiotensin-converting enzyme; ARB, angiotensin receptor blocker; BP blood pressure; and CKD, chronic kidney disease.

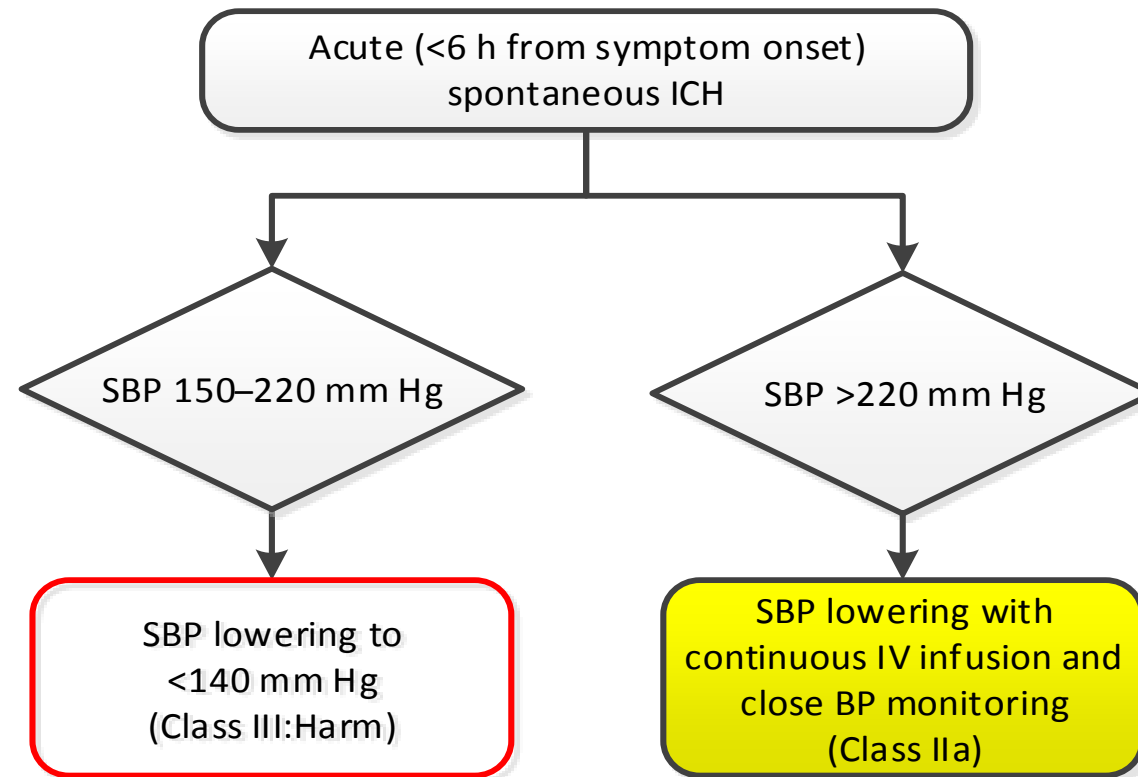
# Hypertension After Renal Transplantation

COR	LOE	Recommendations for Treatment of Hypertension After Renal Transplantation
IIa	SBP: B-NR	After kidney transplantation, it is reasonable to treat patients with hypertension to a BP goal of less than 130/80 mm Hg.
	DBP: C-EO	
IIa	B-R	After kidney transplantation, it is reasonable to treat patients with hypertension with a calcium antagonist on the basis of improved GFR and kidney survival.

## Acute Intracerebral Hemorrhage

COR	LOE	Recommendations for Management of Hypertension in Patients With Acute Intracerebral Hemorrhage (ICH)
<b>Ila</b>	<b>C-EO</b>	In adults with ICH who present with SBP greater than 220 mm Hg, it is reasonable to use continuous intravenous drug infusion and close BP monitoring to lower SBP.
<b>III: Harm</b>	<b>A</b>	Immediate lowering of SBP to less than 140 mm Hg in adults with spontaneous ICH who present within 6 hours of the acute event and have an SBP between 150 mm Hg and 220 mm Hg is not of benefit to reduce death or severe disability and can be potentially harmful.

# Management of Hypertension in Patients With Acute ICH



Colors correspond to Class of Recommendation in Table 1.  
BP indicates blood pressure; ICH, intracerebral hemorrhage; IV, intravenous; and SBP, systolic blood pressure.



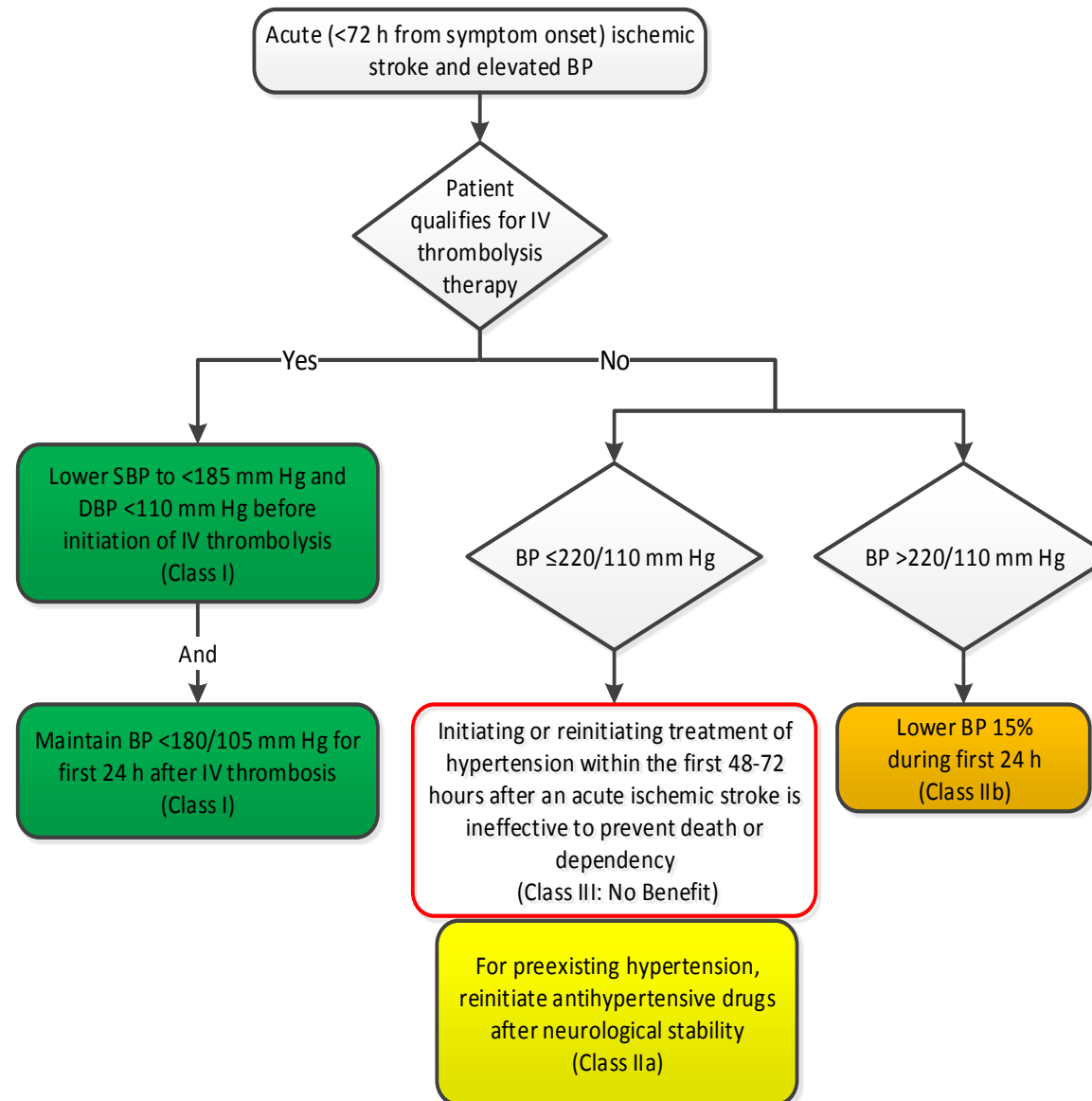
## Acute Ischemic Stroke

COR	LOE	Recommendations for Management of Hypertension in Patients With Acute Ischemic Stroke
I	B-NR	Adults with acute ischemic stroke and elevated BP who are eligible for treatment with intravenous tissue plasminogen activator should have their BP slowly lowered to less than 185/110 mm Hg before thrombolytic therapy is initiated.
I	B-NR	In adults with an acute ischemic stroke, BP should be less than 185/110 mm Hg before administration of intravenous tissue plasminogen activator and should be maintained below 180/105 mm Hg for at least the first 24 hours after initiating drug therapy.
Ila	B-NR	Starting or restarting antihypertensive therapy during hospitalization in patients with BP greater than 140/90 mm Hg who are neurologically stable is safe and reasonable to improve long-term BP control, unless contraindicated.

## Acute Ischemic Stroke (cont.)

COR	LOE	Recommendations for Management of Hypertension in Patients With Acute Ischemic Stroke
<b>IIb</b>	<b>C-EO</b>	In patients with BP of 220/120 mm Hg or higher who did not receive intravenous alteplase or endovascular treatment and have no comorbid conditions requiring acute antihypertensive treatment, the benefit of initiating or reinitiating treatment of hypertension within the first 48 to 72 hours is uncertain. It might be reasonable to lower BP by 15% during the first 24 hours after onset of stroke.
<b>III: No Benefit</b>	<b>A</b>	In patients with BP less than 220/120 mm Hg who did not receive intravenous thrombolysis or endovascular treatment and do not have a comorbid condition requiring acute antihypertensive treatment, initiating or reinitiating treatment of hypertension within the first 48 to 72 hours after an acute ischemic stroke is not effective to prevent death or dependency.

# Management of Hypertension in Patients With Acute Ischemic Stroke



Colors correspond to Class of Recommendation in Table 1.

BP indicates blood pressure; DBP, diastolic blood pressure; IV, intravenous; and SBP, systolic blood pressure.

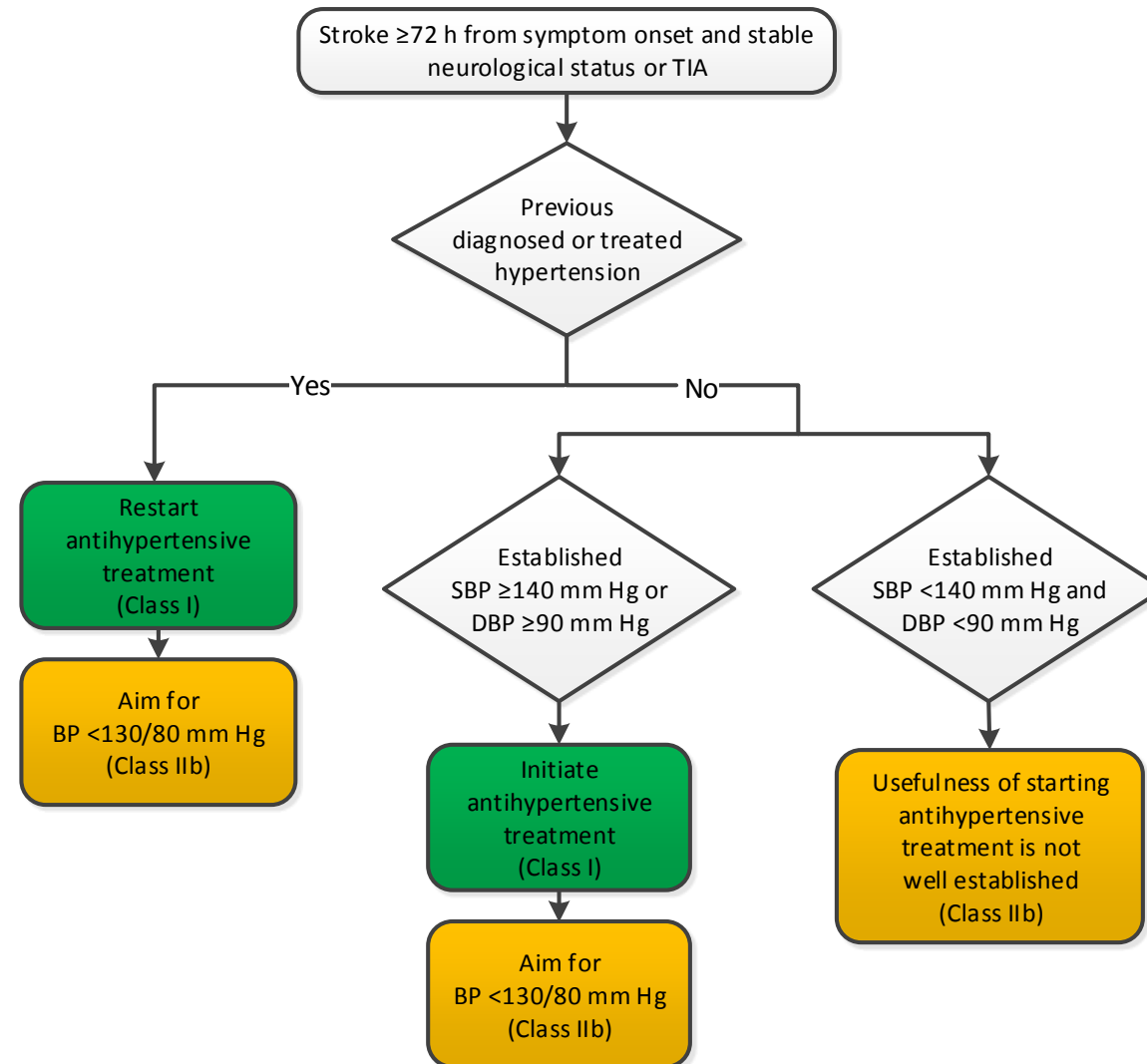
## Secondary Stroke Prevention

COR	LOE	Recommendations for Treatment of Hypertension for Secondary Stroke Prevention
I	A	Adults with previously treated hypertension who experience a stroke or transient ischemic attack (TIA) should be restarted on antihypertensive treatment after the first few days of the index event to reduce the risk of recurrent stroke and other vascular events.
I	A	For adults who experience a stroke or TIA, treatment with a thiazide diuretic, ACE inhibitor, or ARB, or combination treatment consisting of a thiazide diuretic plus ACE inhibitor, is useful.
I	B-R	Adults not previously treated for hypertension who experience a stroke or TIA and have an established BP of 140/90 mm Hg or higher should be prescribed antihypertensive treatment a few days after the index event to reduce the risk of recurrent stroke and other vascular events.

## Secondary Stroke Prevention (cont.)

<b>COR</b>	<b>LOE</b>	<b>Recommendations for Treatment of Hypertension for Secondary Stroke Prevention</b>
<b>I</b>	<b>B-NR</b>	For adults who experience a stroke or TIA, selection of specific drugs should be individualized on the basis of patient comorbidities and agent pharmacological class.
<b>IIb</b>	<b>B-R</b>	For adults who experience a stroke or TIA, a BP goal of less than 130/80 mm Hg may be reasonable.
<b>IIb</b>	<b>B-R</b>	For adults with a lacunar stroke, a target SBP goal of less than 130 mm Hg may be reasonable.
<b>IIb</b>	<b>C-LD</b>	In adults previously untreated for hypertension who experience an ischemic stroke or TIA and have a SBP less than 140 mm Hg and a DBP less than 90 mm Hg, the usefulness of initiating antihypertensive treatment is not well established.

## Management of Hypertension in Patients With a Previous History of Stroke (Secondary Stroke Prevention)



Colors correspond to Class of Recommendation in Table 1.  
DBP indicates diastolic blood pressure; SBP, systolic blood pressure; and TIA, transient ischemic attack.

# Peripheral Arterial Disease

COR	LOE	Recommendation for Treatment of Hypertension in Patients With PAD
I	B-NR	Adults with hypertension and PAD should be treated similarly to patients with hypertension without PAD.

## Diabetes Mellitus

COR	LOE	Recommendations for Treatment of Hypertension in Patients With DM
I	SBP: B-R <sup>SR</sup>	In adults with DM and hypertension, antihypertensive drug treatment should be initiated at a BP of 130/80 mm Hg or higher with a treatment goal of less than 130/80 mm Hg.
	DBP: C-EO	
I	A <sup>SR</sup>	In adults with DM and hypertension, all first-line classes of antihypertensive agents (i.e., diuretics, ACE inhibitors, ARBs, and CCBs) are useful and effective.
IIb	B-NR	In adults with DM and hypertension, ACE inhibitors or ARBs may be considered in the presence of albuminuria.

SR indicates systematic review.



## Atrial Fibrillation

COR	LOE	Recommendation for Treatment of Hypertension in Patients With AF
IIa	B-R	Treatment of hypertension with an ARB can be useful for prevention of recurrence of AF.

## Valvular Heart Disease

COR	LOE	Recommendations for Treatment of Hypertension in Patients With Valvular Heart Disease
I	B-NR	In adults with asymptomatic aortic stenosis, hypertension should be treated with pharmacotherapy, starting at a low dose and gradually titrating upward as needed.
Ila	C-LD	In patients with chronic aortic insufficiency, treatment of systolic hypertension with agents that do not slow the heart rate (i.e., avoid beta blockers) is reasonable.

## Aortic Disease

COR	LOE	Recommendation for Management of Hypertension in Patients With Aortic Disease
I	C-EO	Beta blockers are recommended as the preferred antihypertensive agents in patients with hypertension and thoracic aortic disease.