

Hypertension

Daniel Alvarez DO FACC

Q.1 What is the target blood pressure goals for current hypertension management by the AHA/ASA?

A) <140/90 mmHg

B) <120/80 mmHg

C) <120/90 mmHg

D) <130/80 mmHg

E.) <130/90 mmHg

Q.2 which are the following drugs is not recommended for first-line monotherapy for management of hypertension?

A) amlodipine

B) enalapril

C) atenolol

D) losartan

E) hydrochlorothiazide

Q.3 Blood pressure of an asymptomatic person consistently shows 150/70 mmHg. Which stage of hypertension is this?

- A) stage I hypertension
- B) stage II hypertension
- C) hypertensive crisis
- D) hypertensive urgency
- E) normal blood pressure

What is blood pressure?

Lateral pressure exerted by blood on vessels

Depends on:

- Arterial tone

- Cardiac systolic pressure contractility

- Intravascular volume/blood

- Elasticity of blood vessels

- Autonomic output/hormone/neural activity

Single high blood pressure reading at physician's office does not mean hypertension

White coat hypertension

Home blood pressure monitoring

24 hour ambulatory blood pressure monitoring

Diagnosis requires multiple measurements whether at home or at the office

Except in cases of hypertensive emergency, hypertensive urgency, or malignant hypertension

Screening

All patients 18 + every year

Or, every 6 months in patients with risk factors or a
SBP 120-130 mmHg

In the United States

75,000,000 people diagnosed with hypertension

81% are aware

75 percentile treated

Only 51% of all controlled

More often in African Americans 41%

Caucasians 28%

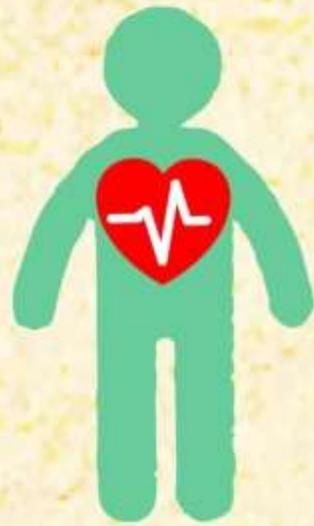
Mexican Americans 28%

Morbidity and Mortality greater in African Americans

Blood pressure increases with age

Present in 66% over age 65

GLOBAL STATISTICS ON HYPERTENSION



1.5 billion

adults will be hypertensives
worldwide by **2025**

Definition

Primary

90% of cases

complex interaction of genetic and environmental factors

Hypertension related genes identified to date regulate renal salt and water handling

Activation of the sympathetic nervous system and renin-angiotensin-aldosterone system

Endothelial dysfunction, increased vascular reactivity, and vascular remodeling maybe causes, rather than consequences of high blood pressure

Increased vascular stiffness contributes to isolated systolic hypertension in the elderly

Definition

Secondary

Common Causes:

Primary Aldosteronism
Renal Parenchymal Disease
Renovascular Disease
Obstructive Sleep Apnea

Rare Causes:

Pheochromocytoma
Cushing Syndrome
Congenital Adrenal Hyperplasia
Hypo or Hyperthyroid
Primary Hyperparathyroidism
Coarctation of the Aorta
Excessive Alcohol intake
Oral Contraceptives
DRUGS: NSAIDS, Corticosteroids, cocaine and Licorice
may contribute to worsening BP control

Table 15 : The percentage prevalence of various causes of Hypertension^{81,82}

A. Primary or Essential	94-95%
B. Secondary	
Renal	
Renal parenchymal	2-3%
Renovascular	1-2%
Endocrinal	0.3-1%
Primary aldosteronism	
Pheochromocytoma	
Cushing's Syndrome	
Acromegaly	
Vascular – Coarctation of aorta	
Nonspecific aortoarteritis	
Drugs – Oral Contraceptives, NSAIDs	0.50%
Steroids, Cyclosporine	
Miscellaneous	0.50%
Obstructive Sleep apnoea	

Definition

Resistant Hypertension

When blood pressure remains above goal despite use of 3 different antihypertensive agents including a diuretic

Patients with resistant hypertension have an increased morbidity and mortality.

2017 ACC/AHA Guidelines

Blood Pressure Categories



BLOOD PRESSURE CATEGORY	SYSTOLIC mm Hg (upper number)		DIASTOLIC mm Hg (lower number)
NORMAL	LESS THAN 120	and	LESS THAN 80
ELEVATED	120 – 129	and	LESS THAN 80
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 1	130 – 139	or	80 – 89
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 2	140 OR HIGHER	or	90 OR HIGHER
HYPERTENSIVE CRISIS (consult your doctor immediately)	HIGHER THAN 180	and/or	HIGHER THAN 120

Signs and symptoms

Asymptomatic

Complications develop in target organs

Cardiac: 4th heart sound, LVH

Neurologic: Encephalopathy , Stroke

Renal Failure CKD

Ophthalmic: Retinopathy

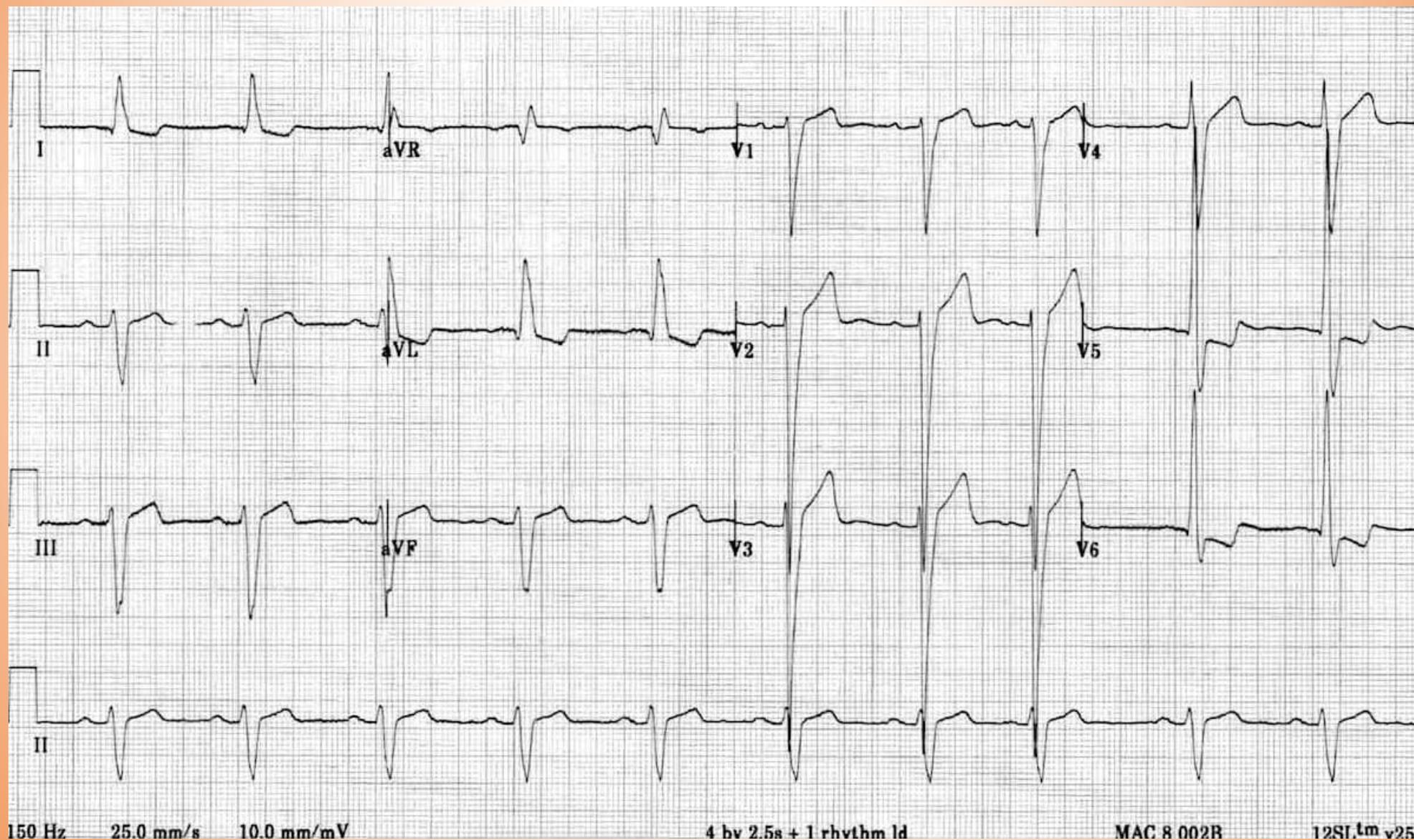
Stage I constriction of arterioles AV nicking

Stage II Constriction and sclerosis of arterioles

Stage III hemorrhages exudates

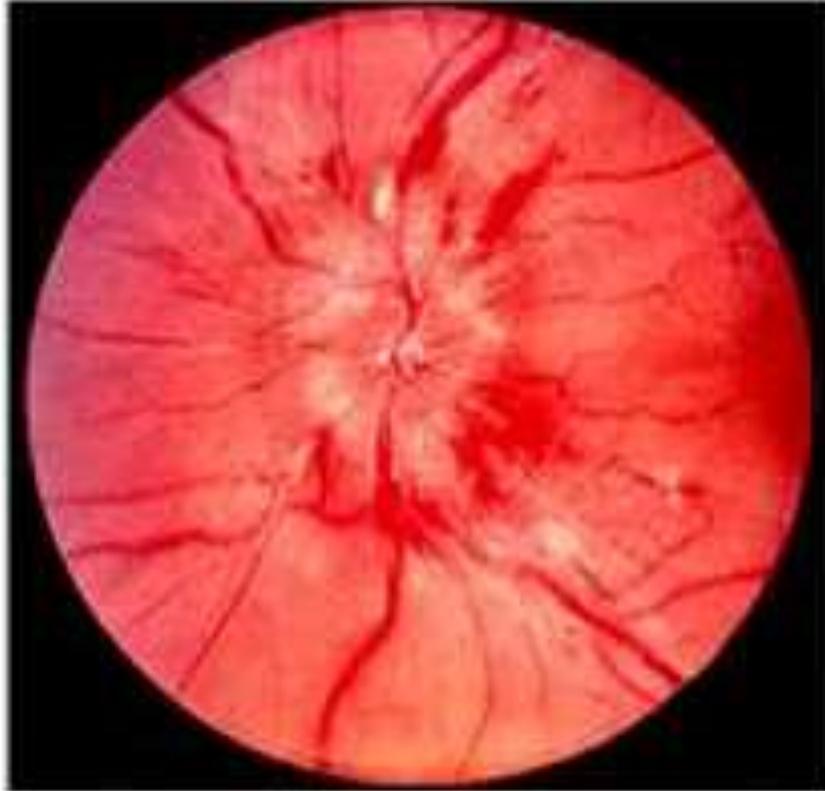
Stage IV papilledema

LVH



Papilledema

Classification and external resources



Fundal photograph showing severe papilloedema in the right eye

Diagnosis

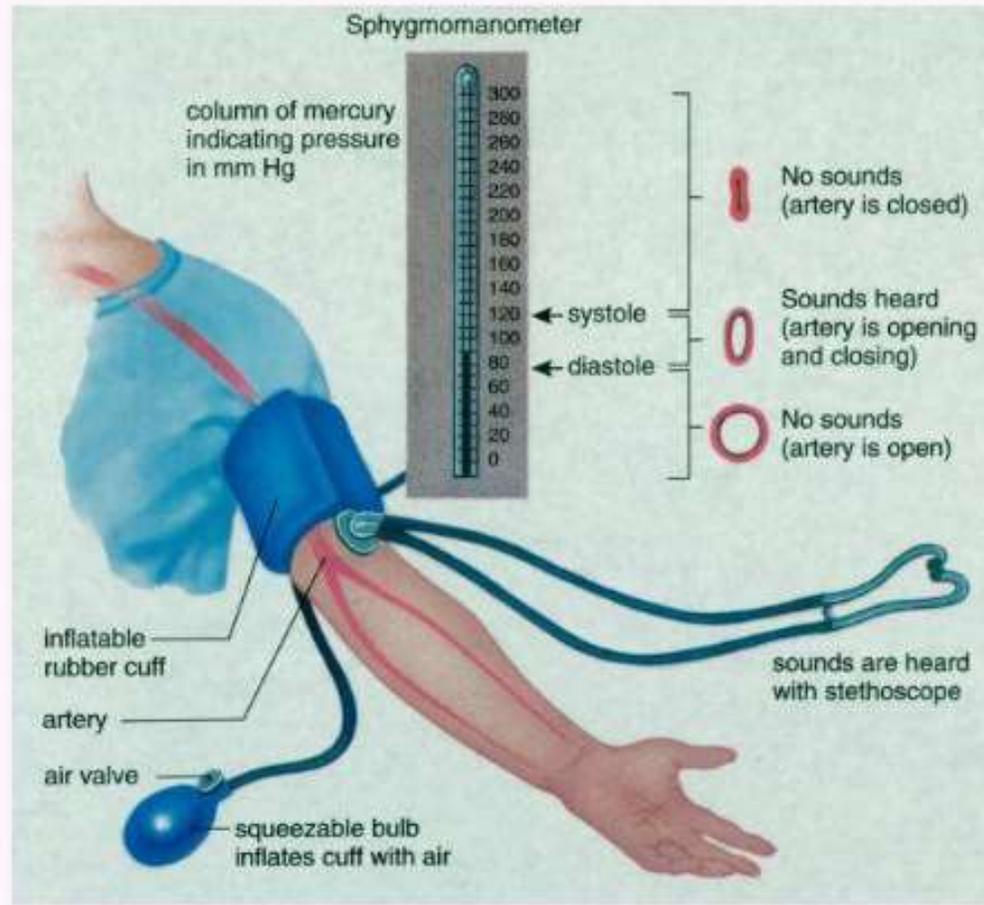
Average of 2 or 3 measurements taken at 2 different times

Patient must be sitting feet flat on the floor for 5 minutes

No previous exercise, caffeine or smoking for at least 30 minutes

Cuff on bare arm, no clothing

General Approach: BP measurement and early identification of hypertensive crises



- Proper measurement of blood pressure:
 - Well-calibrated machine
 - Cover at least 80% arm circumference by the bladder of the cuff
 - Patient rested for at least 5 mins
 - At least 30 mins after coffee or smoking
- Identify immediately if the patient has hypertensive crises

Physical examination

Height weight waist circumference

Auscultation for abdominal or carotid bruits

Abdomen is palpated for renal enlargement or masses

Funduscopic examination for retinopathy

Diminished or delayed femoral pulses

Unilateral renal bruit

Testing

Detect target organ damage

Identify cardiovascular risk factors

Urinalysis and spot urine albumin:creatinine ratio, if abnormal consider renal ultrasonography

Blood tests including BMP, fasting lipids TSH

ECG if LVH consider echocardiography

Home or ambulatory BP measurement

Prognosis

Higher blood pressure and the more severe the retinal changes and other evidence of target organ involvement the worst is the prognosis

Systolic blood pressure predicts fatal and nonfatal cardiovascular events better than diastolic blood pressure

Without treatment 1 year survival is less than 10% in patients with Grade 3 retinopathy and less than 5% of patients with Grade 4 retinopathy

Coronary artery disease is the most common cause of death among treated patients

Ischemic or hemorrhagic stroke is a common

Effective control of hypertension prevents most complications and prolongs life

Treatment

Lifestyle modifications

All patients with elevated blood pressure at any stage of hypertension

Increased physical activity

Weight loss if overweight or obese

Healthy diet rich in fruits vegetables or whole grains and low fat dairy products reduced saturated and total fat content DASH

Reduced dietary sodium to 1500 mg a day and increase dietary potassium intake unless contraindicated

Reduce alcohol intake

Smoking cessation

Life Style Modification

Modification	Recommendation	~SBP Reduction
Weight Reduction	BMI: 18.5–24.9 kg/m ²	5–20 mmHg/10kg
Adopt DASH eating plan	<ul style="list-style-type: none">•High fruits, vegetables, and low fat dairy products•Low fat	8–14 mmHg
Dietary sodium reduction	<100 mmol per day (2.4 g Na or 6 g NaCl)	2–8 mmHg
Physical activity	regular aerobic physical activity (at least 30 min per day, most days of the week)	4–9 mmHg
Alcohol consumption	<=3units/ day-M, <=2 units/ day-F	2–4 mmHg

Treatment

Primary hypertension has no cure, but some causes of secondary hypertension can be corrected.

In all cases, control of blood pressure can significantly limit adverse consequences.

Blood pressure is lowered to the desired level in only 1/3 of patients

Treatment targets for the general population Including all those with kidney disorder or diabetes is less than 130/80 regardless of age.

How low to target?

- ❖ Traditionally blood pressure goal has been $<140/90$ mm Hg
- **ACC/AHA recommends blood pressure goal of below 130/80 mm Hg**
- JNC 8 is the opinion of writers and not the official endorsed guideline of NIH
- Elderly patients >75 years, especially with limited life expectancy can have less strict control
- ❖ **Overenthusiastic treatment can:**
 - i. Decrease cognitive ability in elderly
 - ii. Increase mortality in elderly and frail patients
 - iii. Diastolic pressure <70 mm Hg is not acceptable at all in patients with CAD

Major Controlled Trials

❑ **SPRINT trial (included high risk patients with $\geq 15\%$ Framingham risk score without diabetes):**

- Patients were ≥ 50 years
- Lower targets ($<120/80$) in these patient:
 - 27% reduction in mortality
 - 38% reduction in heart failure

❑ **ACCORD trial (diabetic patients):**

- Target < 130 mm Hg systolic is justified in diabetic patients with high risk for CVA

Stage 1 Hypertension

- High risk patients ($\geq 10\%$) should be started on medications
- Low risk patients ($< 10\%$) can be managed with lifestyle modifications alone
- Pharmacotherapy Options: long acting CCBs, Thiazide diuretics, ACE inhibitors or ARBs

Stage 2 Hypertension

- All stage 2 patients require pharmacotherapy
- If bp already at or more than 150/90 mm Hg, ASA clearly recommends for starting combination therapy directly
- If bp not controlled by combination therapy, you can either start a third agent or increased the dose of first two agents

Special Patient Requirements

- **Black patients:** ACEI or ARBs are less effective as monotherapy. Start thiazide diuretics or CCBs. If blood pressure still above goal, ACEI/ARBs can be added as 2nd agent in combination
- **Hypertension with protenuric CKD:** ACEIs and ARBs are 1st line agent
- **Hypertension with diabetes:** ACEIs or ARBs
- **Hypertension with heart failure and decreased EF (HFrEF):** Beta blockers and ACEIs or ARBs (reduce mortality, especially if h/o ACS)
- **Hypertension with AF, angina, essential tremors, migraine:** Beta blockers (monotherapy not recommended unless other indications for their use present along with hypertension)
- **Hypertension with BPH:** Alpha blockers (monotherapy again not recommended)

Resistant Hypertension

- Uncontrolled HTN with a regimen of 3 drugs, one of which must be a diuretic
- Raise a suspicion of secondary hypertension. But first:
 - Check medications appropriate or not
 - Check adherence to treatment
 - Workup for secondary causes of hypertension
 - Add aldosterone receptor antagonist (Spironolactone, Eplerenone)
 - Add adrenergic receptor blockers: Labetalol, Carvedilol, Bisoprolol
 - Add direct vasodilators: Hydralazine, Minoxidil
 - Add Clonidine

Hypertension Guidelines in a Nutshell

- ❖ Blood pressure goal is **< 130/80 mm Hg** (less strict control if >75 years, co-morbidities or limited life expectancy). The recommendation is by ACC/AHA. JNC 7 previously opted the same target for DM/CKD patients and < 140/90 for all others.
- ❖ JNC 8 is the **opinion of writers and not the official endorsed guideline of NIH** (states elderly low risk patients to be started on therapy if bp > 150 mm Hg). Recent SPRINT trial showed that high risk individuals aged 50-80 years could benefit from lower targets of <120/80 mm Hg.
- ❖ Lifestyle Modification must always be emphasized with or without drugs (Exercise, DASH diet, Potassium supplements, Reduce salt intake, Limit alcohol, Quit smoking)

Hypertension Guidelines in a Nutshell

- ❖ **Stage 1 (Systolic: 130-139 or Diastolic: 80-89) & Low risk patients:** Lifestyle modifications
- ❖ **Stage 1 (Systolic: 130-139 or Diastolic: 80-89): & High risk patients:** Thiazide, ACEI or ARB or CCB. Switch classes if not controlled.
- ❖ **Stage 2 (Systolic: ≥ 140 or Diastolic ≥ 90) :** Medications similar to Stage 1. If already $\geq 150/90$ mm Hg, start combination therapy. If not controlled:
 - Check compliance
 - Switch to more suitable class (ACEI/ARB for DM, β -blocker for HF) or add a 3rd agent
 - Suspect resistant HTN/Secondary hypertension
 - Treat cause. Initiate Spironolactone, Eplerenone; Labetalol, Carvedilol, Hydralazine, Clonidine.

Q.1. What is the target blood pressure goal for current hypertension management by AHA/ASA?

- a) < 140/90 mm Hg
- b) < 120/80 mm Hg
- c) < 120/90 mm Hg
- d) < 130/80 mm Hg**
- e) < 130/90 mm Hg

Q.2. Which of the following drugs is not recommended for 1st line monotherapy for management of hypertension?

- a) Amlodipine
- b) Enalapril
- c) Atenolol**
- d) Losartan
- e) Hydrochlorothiazide

Q.3. Blood pressure of an asymptomatic person consistently shows 150/70 mm Hg. Which stage of hypertension does he fit in?

- a) Stage 1 Hypertension
- b) Stage 2 Hypertension**
- c) Hypertensive crisis
- d) Hypertensive Urgency
- e) Normal blood pressure

FIN