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Hypertension

The Pressure is On

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Disclosures

I may discuss off label use in my presentation

I have no financial relationships to disclose.

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Objectives

Overview

Hypertension is a disease with major implications for our patients' short- and long-term health journey.

We will review updated guideline-directed management strategies and concepts in anti-hypertension treatment. This will be done in the context of:

1) Review primary and secondary risk factors associated with development of hypertension

2) Understanding the complications, disease manifestations, and/or sequelae of hypertension

3) Identifying common co-morbid conditions (e.g., diabetes, coronary artery disease, chronic kidney disease, etc.)

4) Review the available non-pharmacologic and pharmacologic approaches and management strategies for usual and resistant hypertension

5) Discuss and review the importance of context, e.g., the patient's co-morbid conditions, age, ethnicity, and health values, on initial approaches of both non-pharmacologic and pharmacologic management of hypertension.

Objectives

At the conclusion of this session, participants should be able to:

- Recognize how to approach hypertension as a systemic disease, its multiple manifestations/sequelae, associated diseases/risk factors, and how co-existing conditions impact when and what anti-hypertensive medications classes/agents to initiate first.
- Identify and apply aggressive risk management strategies for patients with resistant hypertension
- Recognize old versus new concepts in the approach to treating hypertension
- Recognize the initial approach and non-pharmacologic management of patients with hypertension

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Blood Pressure Physiology

In simplest terms…

Blood Pressure

Cardiac Output

Peripheral Vascular Resistance

Heart Rate

Stroke Volume

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Pressure, a force for good and bad

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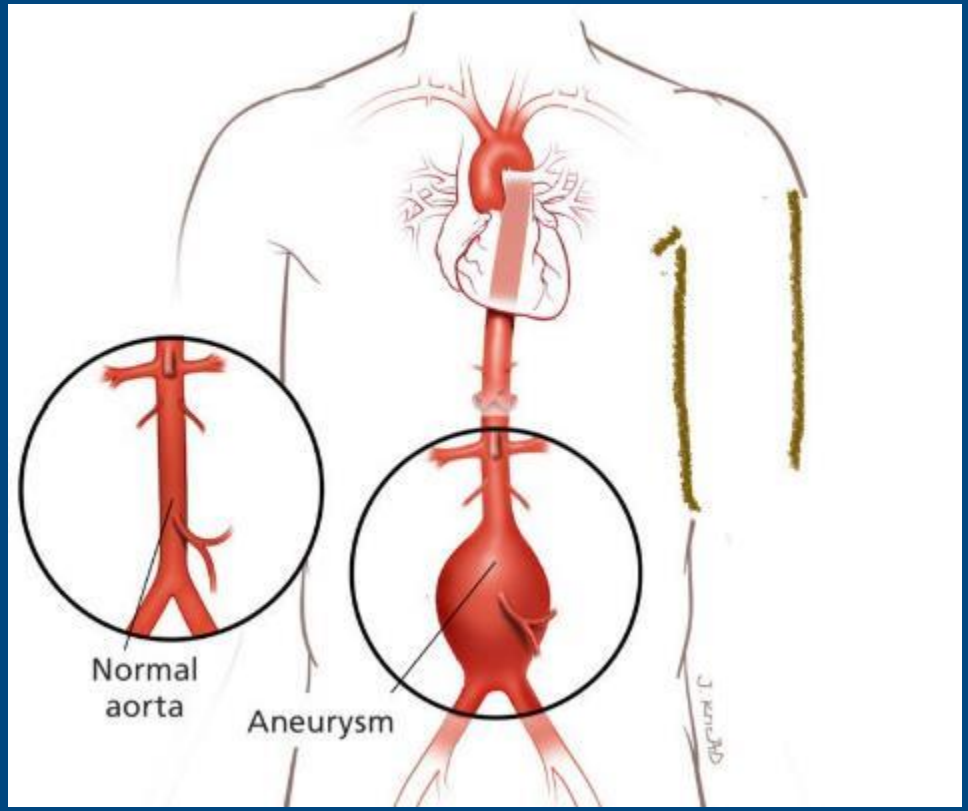
Pressure, a force for good and bad



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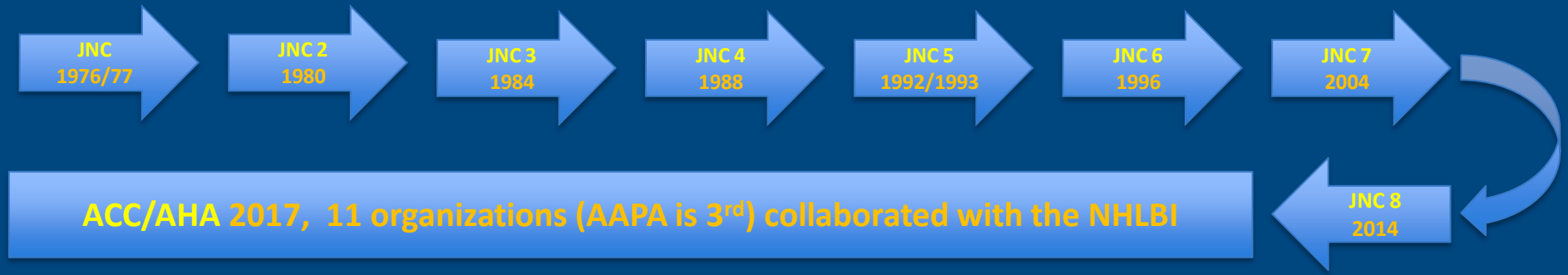
Level Setting Hypertension

Which guidelines to use?

The National High Blood Pressure Education Program (NHBPEP)



JNC Task Force I NHBEP, NHLBI "Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure. A cooperative study. JAMA. 1977;237(3):255-261."

JNC 2 "The 1980 report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure. Arch Intern Med. 1980;140(10):1280-1285.."

JNC 3 "The 1984 Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure. Arch Intern Med. 1984;144:1045–1057."

JNC 4 "The 1988 report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure. Arch Intern Med. 1988;148:1023–1038."

JNC 5 "The fifth report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure (JNC V). Arch Intern Med. 1993;153:154–183."

JNC 6 "The sixth report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure. Arch Intern Med. 1997;157:2413–2446."

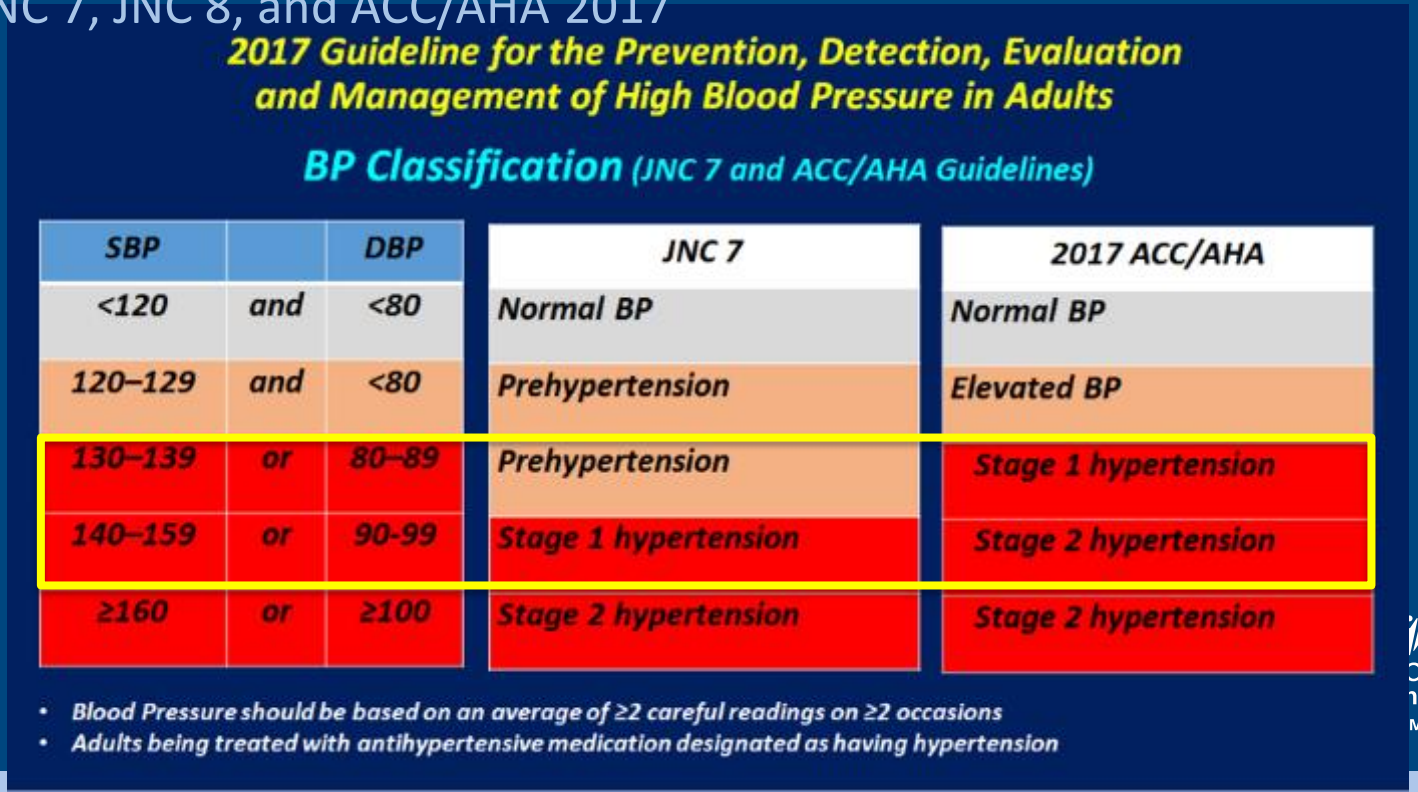
JNC 7 "The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. JAMA. 2003;289:2560–2572."

JNC 8 "2014 evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the Eighth Joint National Committee (JNC 8). JAMA."

ACC/AHA "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: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines [published correction appears in J Am Coll Cardiol. 2018 May 15;71(19):2275-2279]. J Am Coll Cardiol. 2018;71(19):e127-e248. doi:10.1016/j.jacc.2017.11.006"

Differences in HTN categories

JNC 7, JNC 8, and ACC/AHA 2017



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The short case for adoption of 2017 AHA/ACC BP guidelines

- The risk of CVD doubles for every 20/10 mmHg over 115/75* → 2x risk of CV event AT **135/85**
- JNC 7/8 Guidelines **Stage I HTN** = **≥140/≥90**

Thus: antihypertensive therapies were being considered **AFTER** patients are already ≥2x risk of CV Event

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*Lewington S, et al. *Lancet.* 2002;360(9349):1903-1913.

Differences in HTN goals

JNC 7, JNC 8, and ACC/AHA 2017

TABLE 2

Recommended BP goals according to JNC 7, JNC 8, and 2017 ACC/AHA guidelines[1,2,6]

Patient group	JNC 7	JNC 8	2017 ACC/AHA
General	<140/90 mm Hg	<140/90 mm Hg	<130/80 mm Hg*
Older patients	<140/90 mm Hg	<150/90 mm Hg†	<130 mm Hg‡
Diabetes	<130/80 mm Hg	<140/90 mm Hg	<130/80 mm Hg
Chronic kidney disease	<130/80 mm Hg	<140/90 mm Hg	<130/80 mm Hg

ACC, American College of Cardiology; AHA, American Heart Association; BP, blood pressure; JNC 7, Seventh Report of the Joint National Committee; JNC 8, Eighth Joint National Committee.

*Includes patients with atherosclerotic cardiovascular disease (ASCVD) or an estimated 10-year risk ≥10%, as well as patients needing primary prevention or those with 10-year ASCVD risk <10%.

†General population ≥60 years of age. Treatment does not need to be adjusted in patients ≥60 years who may have lower systolic BP (eg, <140 mm Hg) and are not experiencing adverse effects.

‡Ambulatory, community-dwelling, noninstitutionalized patients ≥65 years of age. Clinical judgment, patient preference, and a team-based approach to assess benefits and risks are reasonable for patients with a high burden of comorbidity and limited life expectancy.

	SBP/DBP ≥130/80 mm Hg or Self-Reported Antihypertensive Medication†		SBP/DBP ≥140/90 mm Hg or Self-Reported Antihypertensive Medication‡	
Overall, crude	46%		32%	
	Men (n=4717)	Women (n=4906)	Men (n=4717)	Women (n=4906)
Overall, age-sex adjusted	48%	43%	31%	32%
Age group, y				
20–44	30%	19%	11%	10%
45–54	50%	44%	33%	27%
55–64	70%	63%	53%	52%
65–74	77%	75%	64%	63%
75+	79%	85%	71%	78%
Race-ethnicity§				
Non-Hispanic white	47%	41%	31%	30%
Non-Hispanic black	59%	56%	42%	46%
Non-Hispanic Asian	45%	36%	29%	27%
Hispanic	44%	42%	27%	32%

Definition of Hypertension - Primary

What is ESSENTIAL? Cookie baking ingredients ;)

https://www.delish.com/cooking/a26847757/chocolate-chip-cookies-what-not-to-do-chart/

Definition of Hypertension - Primary

What is ESSENTIAL? I would argue while pressure is essential, hypertension is NOT

Low Pressure

Low Pressure

High Pressure

https://youtu.be/6b_E7GgMtvk, https://youtu.be/tDZ5qSqltN4,

Definition of Hypertension - Primary

What is ESSENTIAL? I would argue while pressure is essential, hypertension is NOT

- "Essential" - an older term based upon a hypothesis that as we age, our vasculature becomes stiffer, and that higher and higher blood pressures are required to maintain optimal cardiac output.
- Primary - sustained blood pressures meeting criteria (e.g., ACC/AHA 2017) for hypertension related to multiple genetic and environmental factors.

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

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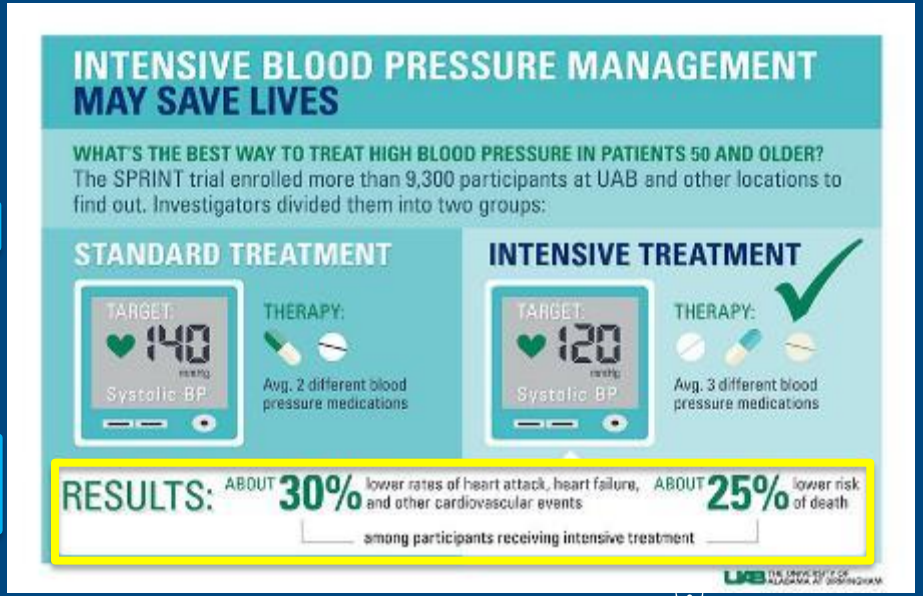
https://www.crtonline.org/news-detail/visual-guide-to-new-blood-pressure-guidelines-acc-

Hypertension is Essential? I think not.

SPRINT Trial

Table 1. Baseline Characteristics of the Study Participants.*

Characteristic	Intensive Treatment (N=4678)	Standard Treatment (N=4683)
Criterion for increased cardiovascular risk — no. (%)†		
Age ≥75 yr	1317 (28.2)	1319 (28.2)
Chronic kidney disease‡	1330 (28.4)	1316 (28.1)
Cardiovascular disease	940 (20.1)	937 (20.0)
Clinical	779 (16.7)	783 (16.7)
Subclinical	247 (5.3)	246 (5.3)
Framingham 10-yr cardiovascular disease risk score ≥15%	3556 (76.0)	3547 (75.7)
Female sex — no. (%)	1684 (36.0)	1648 (35.2)
Age — yr		
Overall	67.9±9.4	67.9±9.5
Among those ≥75 yr of age	79.8±3.9	79.9±4.1



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https://www.uab.edu/news/images/blood_pressure_infograph.jpg, SPRINT Trial N Engl J Med 2015; 373:2103-2116

Primary Hypertension

Primary - Factors that contribute:

Age

Obesity

Family History (2x more common in those w/at least 1 parent with HTN)

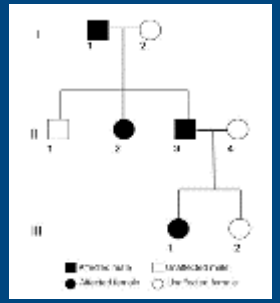
Race

High Na+ Diet

Excessive EtOH

Sedentary lifestyle

Reduced nephron number (acquired or genetic)



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Secondary Hypertension

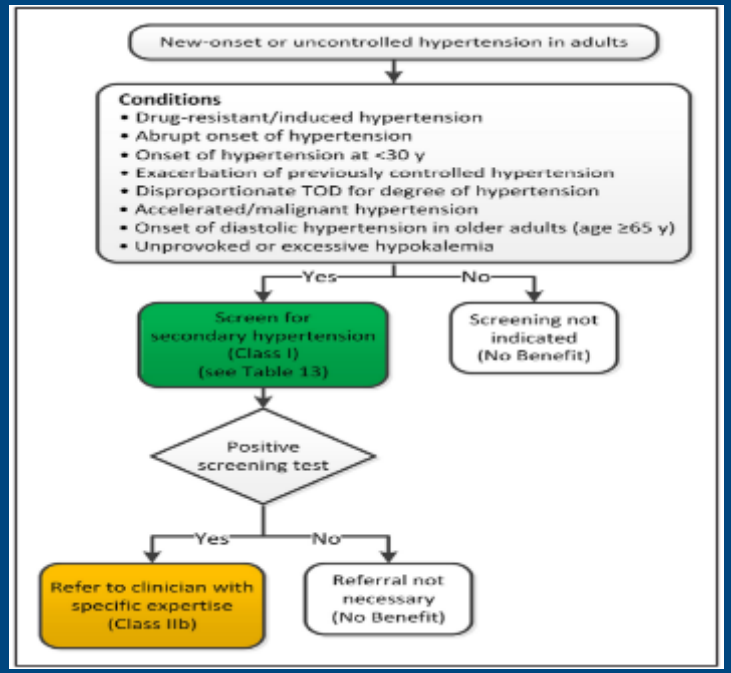
Secondary - Identifiable cause or contributor to Hypertension

Simplest definition and discovery of secondary hypertension:

- If you treat the primary disease to control, remission, or cure, the hypertension will resolve.

Definition of Hypertension - Secondary

Secondary - HTN with an identifiable cause or contributor



1. Rx or OTC meds (e.g., NSAIDs, certain weight loss meds, etc.)
2. Primary renal disease
3. Primary aldosteronism
4. Renovascular HTN (e.g., fibromuscular dysplasia, atherosclerosis, etc.)
5. Obstructive or central sleep apnea
6. Pheochromocytoma
7. Cushing's syndrome
8. Other endocrine dysfunction (hypo- hyperthyroidism, etc.)
9. Coarctation of the Aorta
10. Etc.

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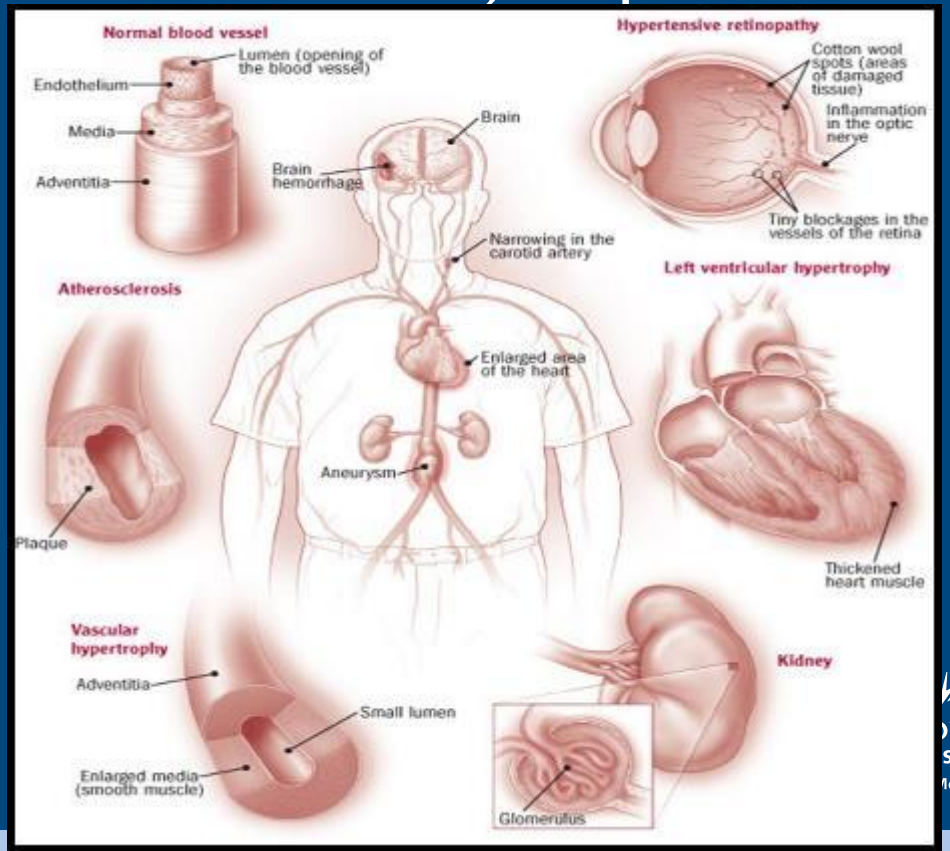
Complications, Manifestations, Sequelae

Target Organ Damage

- **Brain** – CVA/TIA
- **Eyes** – Retinopathy
- **Heart** – LVH, CHD, HF, arrhythmias
- **Kidneys** – nephropathy
- **Arteries** – Peripheral Vascular disease



http://1.bp.blogspot.com/_RDGhlo2epAM/SG5ZiMVI_UI/AAAAAAAAAKg/9AaY0k-cjto/s1600-h/effects+of+HBP.jpg

Complications, Manifestations, Sequelae

Hypertensive Headache? Not common, can occur…Caveats

- A few small studies suggest that incidence of hypertensive related headache between 15-20% when diastolic BP was between 95 – 125 mmHg, incidence up to 55% when diastolic BP was ≥110 mmHg*
- American Heart Association – Hypertensive Headaches can occur when BP ≥180/≥120

Symptom-wise, remember, there is a reason

Hypertension is called the "silent killer"

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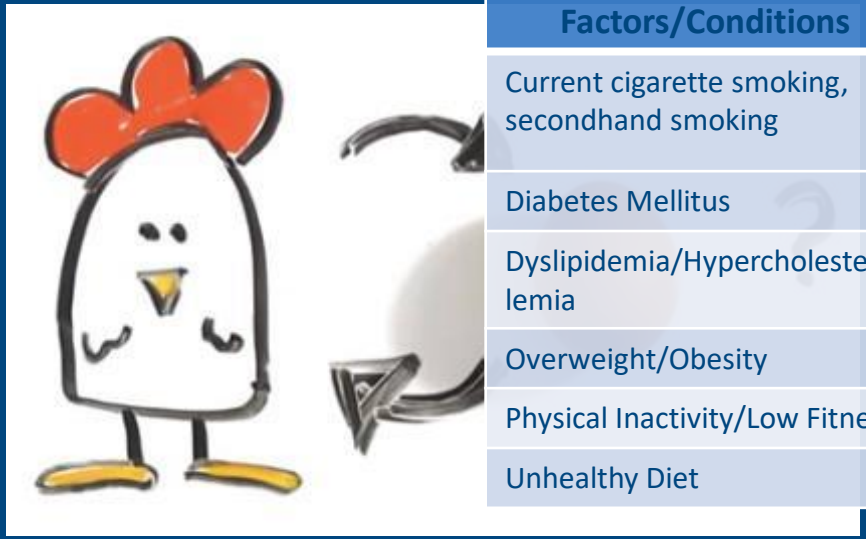
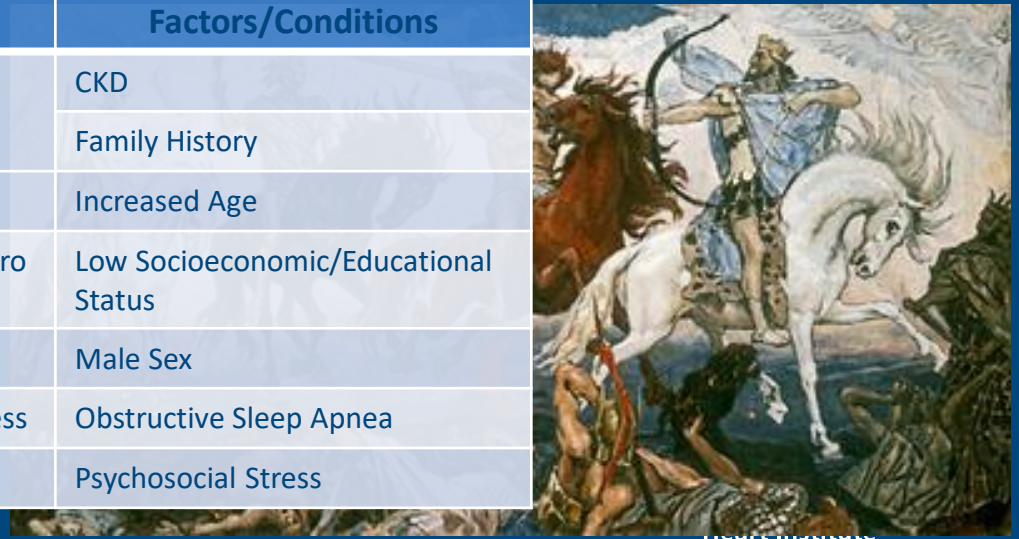
*J Hum Hypertens. 1989;341- 44

Common Travel Companions

Complications from Hypertension or Co-Morbid Conditions



Modifiable Factors/Conditions	Relatively Fixed Factors/Conditions
Current cigarette smoking, secondhand smoking	CKD
	Family History
Diabetes Mellitus	Increased Age
Dyslipidemia/Hypercholesterolemia	Low Socioeconomic/Educational Status
Overweight/Obesity	Male Sex
Physical Inactivity/Low Fitness	Obstructive Sleep Apnea
Unhealthy Diet	Psychosocial Stress



Common travel companions

Complications from hypertension or Co-Morbid Conditions

Regardless of whether a complication from previously untreated, uncontrolled hypertension or whether a co-morbid condition, the presence of diabetes, chronic kidney disease, atherosclerotic cardiovascular disease, etc. will provide context for the pharmacologic therapy deployed alongside baseline lifestyle modifications recommended.

HTN goals ACC/AHA 2017

Patient group	2017 ACC/AHA
General	<130/80 mm Hg*
Older patients	<130 mm Hg‡
Diabetes	<130/80 mm Hg
Chronic kidney disease	<130/80 mm Hg

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†General population ≥60 years of age. Treatment does not need to be adjusted in patients ≥60 years who may have lower systolic BP (eg, <140 mm Hg) and are not experiencing adverse effects.

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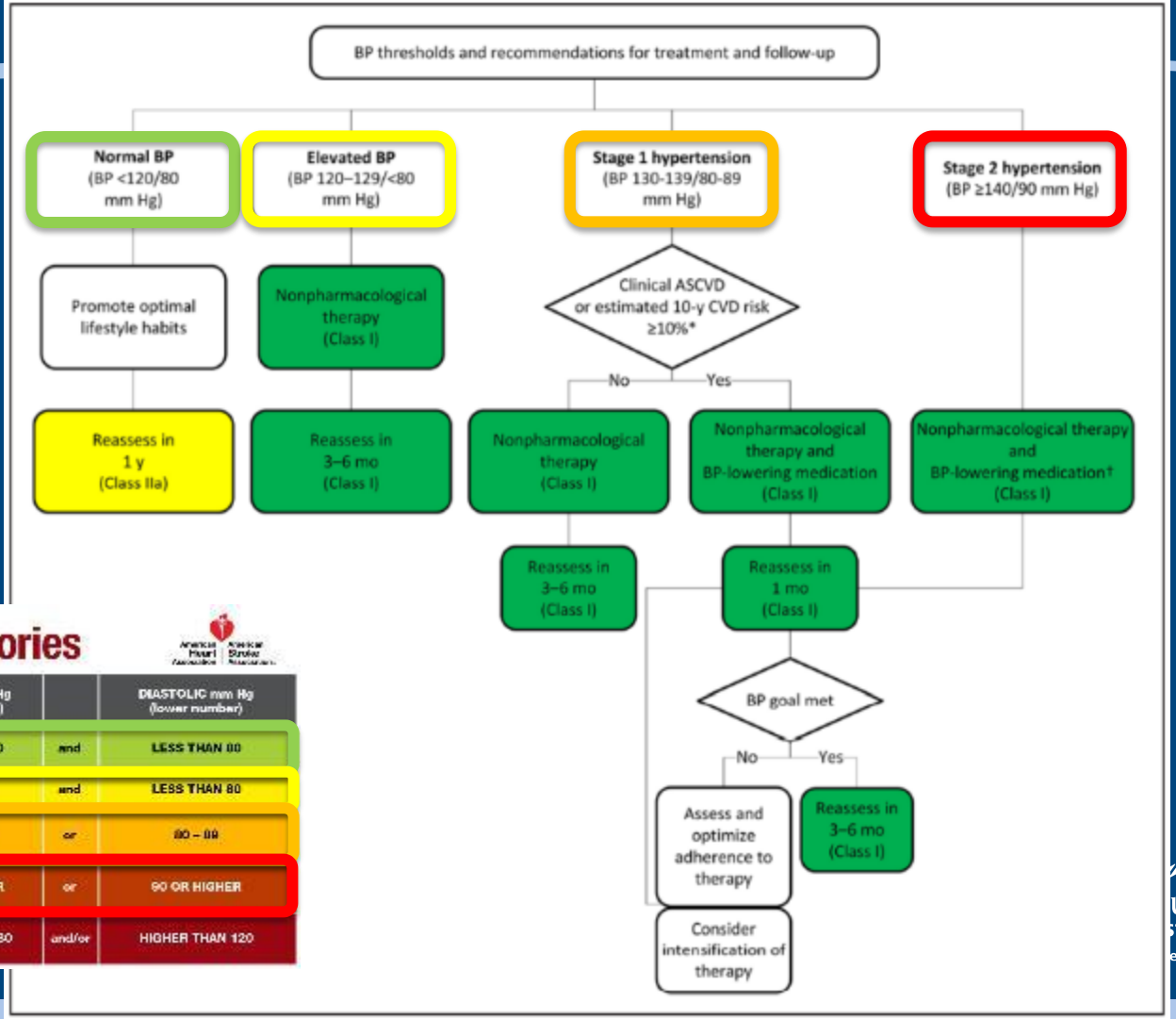

Blood Pressure Categories

BLOOD PRESSURE CATEGORY	SYSTOLIC mm Hg (upper number)		DIASTOLIC mm Hg (lower number)
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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

Blood Pressure Category	Systolic mmHg (upper number)		Diastolic mmHg (lower number)	Lifestyle/Nonpharmacological therapy	10-year ASCVD Risk Score (< or ≥ 10%)	BP Lowering Medications	Reassess	BP Goal Met (Yes/No)	
NORMAL	< 120	And	< 80	Promote optimal Lifestyle Habits	No need to calculate	-	1 year (Class IIa)	Yes	Ongoing Surveillance and measurement.
								No	
ELEVATED	120-129	And	< 80	Nonpharmacological therapy Class I	No need to calculate	-	3-6 months (Class I)	Yes	Ongoing Surveillance and measurement.
								No	
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 1	130-139	Or	80-89	Nonpharmacological therapy Class I	<10%	-	3-6 months (Class I)	Yes	Reassess in 3-6 months (Class I)
								No	Assess and optimize adherence to therapy and consider intensification of therapy
					≥10%	Initiate BP meds (Class I). Single or low-dose combination	1 month (Class I)	Yes	Reassess in 3-6 months (Class I)
								No	Assess and optimize adherence to therapy and consider intensification of therapy
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 2	≥ 140	Or	≥ 90	Nonpharmacological therapy Class I	No need to calculate	Initiate BP meds (Class I). Consider initiation of two agents (1 each from a different class)	1 month (Class I)	Yes	Reassess in 3-6 months (Class I)
								No	Assess and optimize adherence to therapy and consider intensification of therapy

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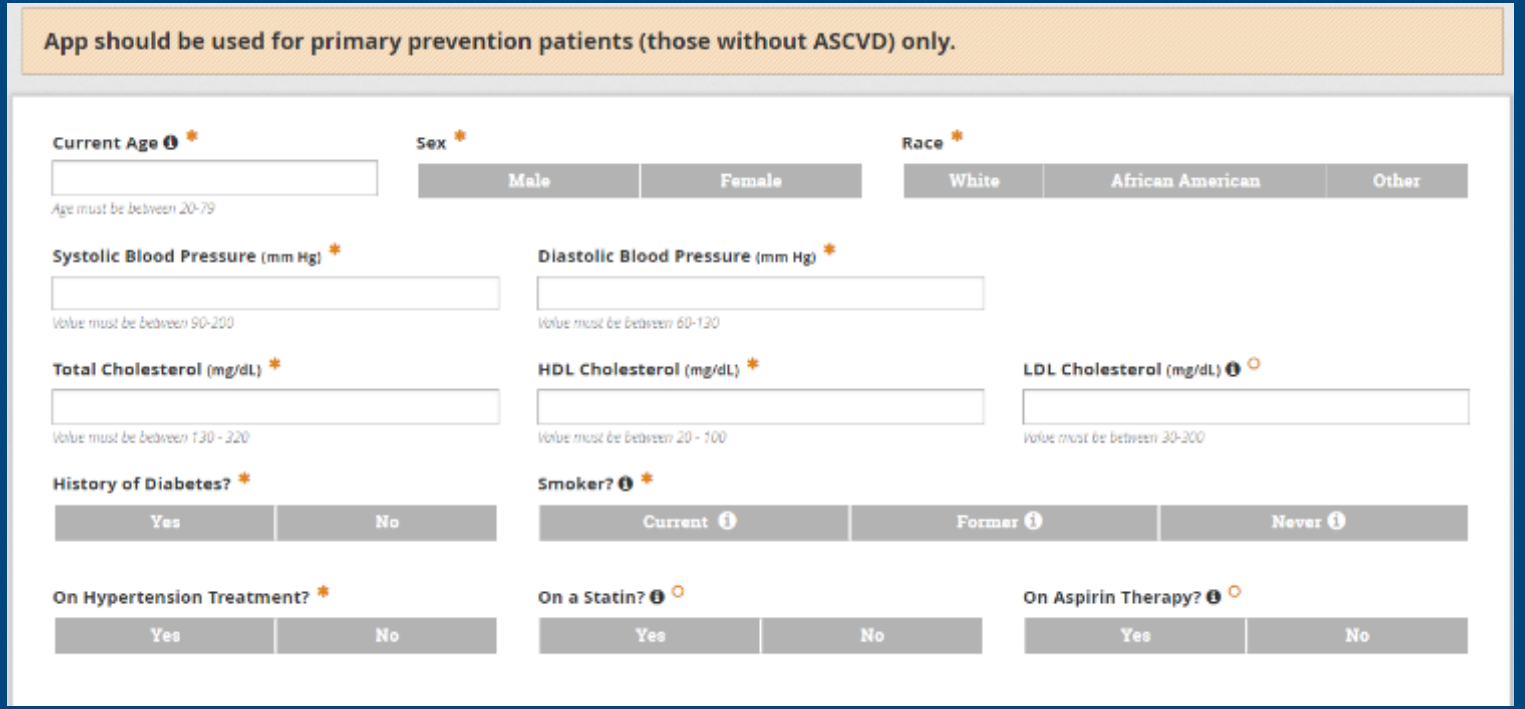
Atherosclerotic Cardiovascular Disease (ASCVD)

Stroke, coronary artery disease/myocardial infraction, peripheral artery disease.

Needed information

- Age
- Sex
- Race
- SBP
- DBP
- Total cholesterol
- HDL
- Y/N DM I or II
- Y/N Smoking
- Y/N HTN



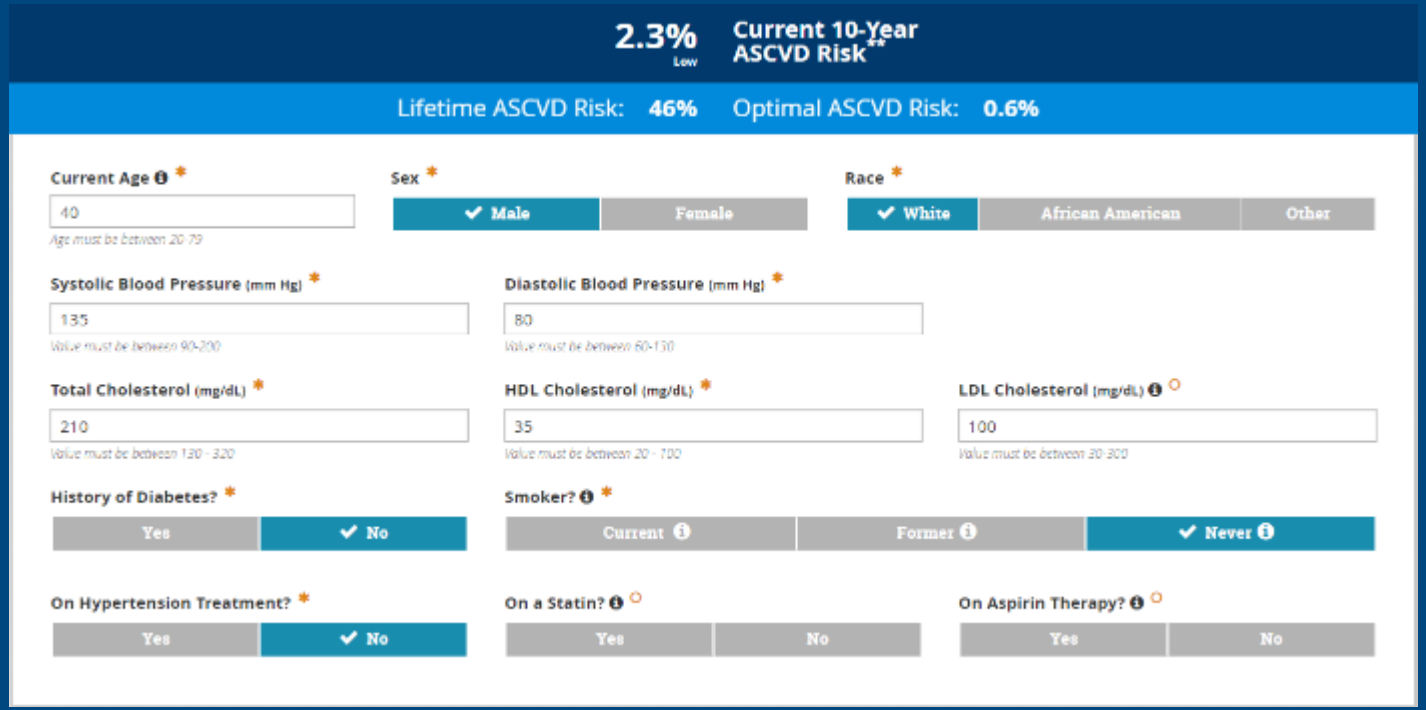
https://tools.acc.org/ascvd-risk-estimator-plus/#!/calculate/estimate/

Atherosclerotic Cardiovascular Disease (ASCVD)

Stroke, coronary artery disease/myocardial infraction, peripheral artery disease.

40 yo male w/BP 135/80 (stage I) and TC 210, HDL 35, LDL 100. No history of DM, life-time non-smoker, and not on HTN treatment.

10-yr ASCVD risk score = 2.3%



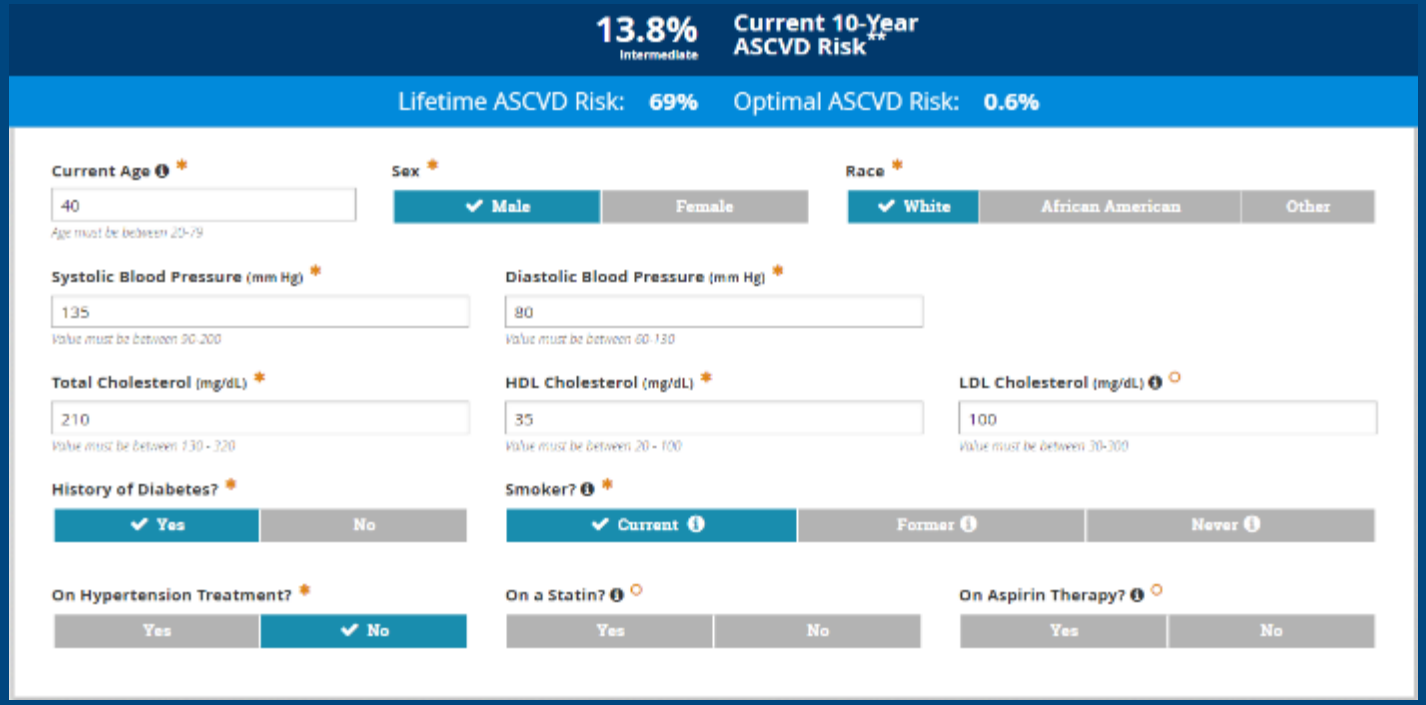
https://tools.acc.org/ascvd-risk-estimator-plus/#!/calculate/estimate/

Atherosclerotic Cardiovascular Disease (ASCVD)

Stroke, coronary artery disease/myocardial infraction, peripheral artery disease.

40 yo male w/BP 135/80 (stage I) and TC 210, HDL 35, LDL 100. History of DM, current smoker, but not on HTN treatment.

10-yr ASCVD risk score = 13.8%



https://tools.acc.org/ascvd-risk-estimator-plus/#!/calculate/estimate/

Lifestyle first and foremost

Its about the quality of life we live, not just how long we live it

Consider discussing lifestyle modifications not as “work” you do to become healthy. Rather as doing enjoyable activities by yourself or with others that happen to help keep you feeling healthy.

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Lifestyle first and foremost

Strongest Recommendation (I), highest level of evidence (Level A)

Table 15. Best Proven Nonpharmacological Interventions for Prevention and Treatment of Hypertension*

	Nonpharmacological Intervention	Dose	Approximate Impact on SBP		
			Hypertension	Normotension	Reference
Weight loss	Weight/body fat	Best goal is ideal body weight, but aim for at least a 1-kg reduction in body weight for most adults who are overweight. Expect about 1 mm Hg for every 1-kg reduction in body weight.	−5 mm Hg	−2/3 mm Hg	S6.2-1
Healthy diet	DASH dietary pattern	Consume a diet rich in fruits, vegetables, whole grains, and low-fat dairy products, with reduced content of saturated and total fat.	−11 mm Hg	−3 mm Hg	S6.2-6,S6.2-7
Reduced intake of dietary sodium	Dietary sodium	Optimal goal is <1500 mg/d, but aim for at least a 1000-mg/d reduction in most adults.	−5/6 mm Hg	−2/3 mm Hg	S6.2-9,S6.2-10
Enhanced intake of dietary potassium	Dietary potassium	Aim for 3500–5000 mg/d, preferably by consumption of a diet rich in potassium.	−4/5 mm Hg	−2 mm Hg	S6.2-13
Physical activity	Aerobic	90–150 min/wk 65%–75% heart rate reserve	−5/8 mm Hg	−2/4 mm Hg	S6.2-18,S6.2-22
	Dynamic resistance	90–150 min/wk 50%–80% 1 rep maximum 6 exercises, 3 sets/exercise, 10 repetitions/set	−4 mm Hg	−2 mm Hg	S6.2-18
	Isometric resistance	4 × 2 min (hand grip), 1 min rest between exercises, 30%–40% maximum voluntary contraction, 3 sessions/wk 8–10 wk	−5 mm Hg	−4 mm Hg	S6.2-19,S6.2-31
Moderation in alcohol intake	Alcohol consumption	In individuals who drink alcohol, reduce alcohol† to: Men: ≤2 drinks daily Women: ≤1 drink daily	−4 mm Hg	−3 mm Hg	S6.2-22—S6.2-24

Hypertension. 2018;71:e13-e115.

Weight/Body Fat loss → -5 mmHg

Loss of 1 kg = ~ -1 mmHg

BMI tells “a” story, just not the full one.

Consider also body fat/composition assessment.

Discuss weight loss as a “journey”. Most don’t suddenly find themselves heavier, don’t expect weight loss to be sudden either.

	Healthy Weight						Overweight					Obese					
BMI	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**
Height	**Weight (in pounds)**																
4'10"	91	96	100	105	110	115	119	124	129	134	138	143	148	153	158	162	167
4'11"	94	99	104	109	114	119	124	128	133	138	143	148	153	158	163	168	173
5'0"	97	102	107	112	118	123	128	133	138	143	148	153	158	163	168	174	179
5'1"	100	106	111	116	122	127	132	137	143	148	153	158	164	169	174	180	185
5'2"	104	109	115	120	126	131	136	142	147	153	158	164	169	175	180	186	191
5'3"	107	113	118	124	130	135	141	146	152	158	163	169	175	180	186	191	197
5'4"	110	116	122	128	134	140	145	151	157	163	169	174	180	186	192	197	204
5'5"	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210
5'6"	118	124	130	136	142	148	155	161	167	173	179	186	192	198	204	210	216
5'7"	121	127	134	140	146	153	159	166	172	178	185	191	198	204	211	217	223
5'8"	125	131	138	144	151	158	164	171	177	184	190	197	203	210	216	223	230
5'9"	128	135	142	149	155	162	169	176	182	189	196	203	209	216	223	230	236
5'10"	132	139	146	153	160	167	174	181	188	195	202	209	216	222	229	236	243
5'11"	136	143	150	157	165	172	179	186	193	200	208	215	222	229	236	243	250
6'0"	140	147	154	162	169	177	184	191	199	206	213	221	228	235	242	250	256
6'1"	144	151	159	166	174	182	189	197	294	212	219	227	235	242	250	257	265
6'2"	148	155	163	171	179	186	194	202	210	218	225	233	241	249	256	264	272
6'3"	152	160	168	176	184	192	200	208	216	224	232	240	248	256	264	272	279
6'4"	156	164	172	180	189	197	205	213	221	230	238	246	254	263	271	279	287

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DASH Eating Plan → -11 mmHg

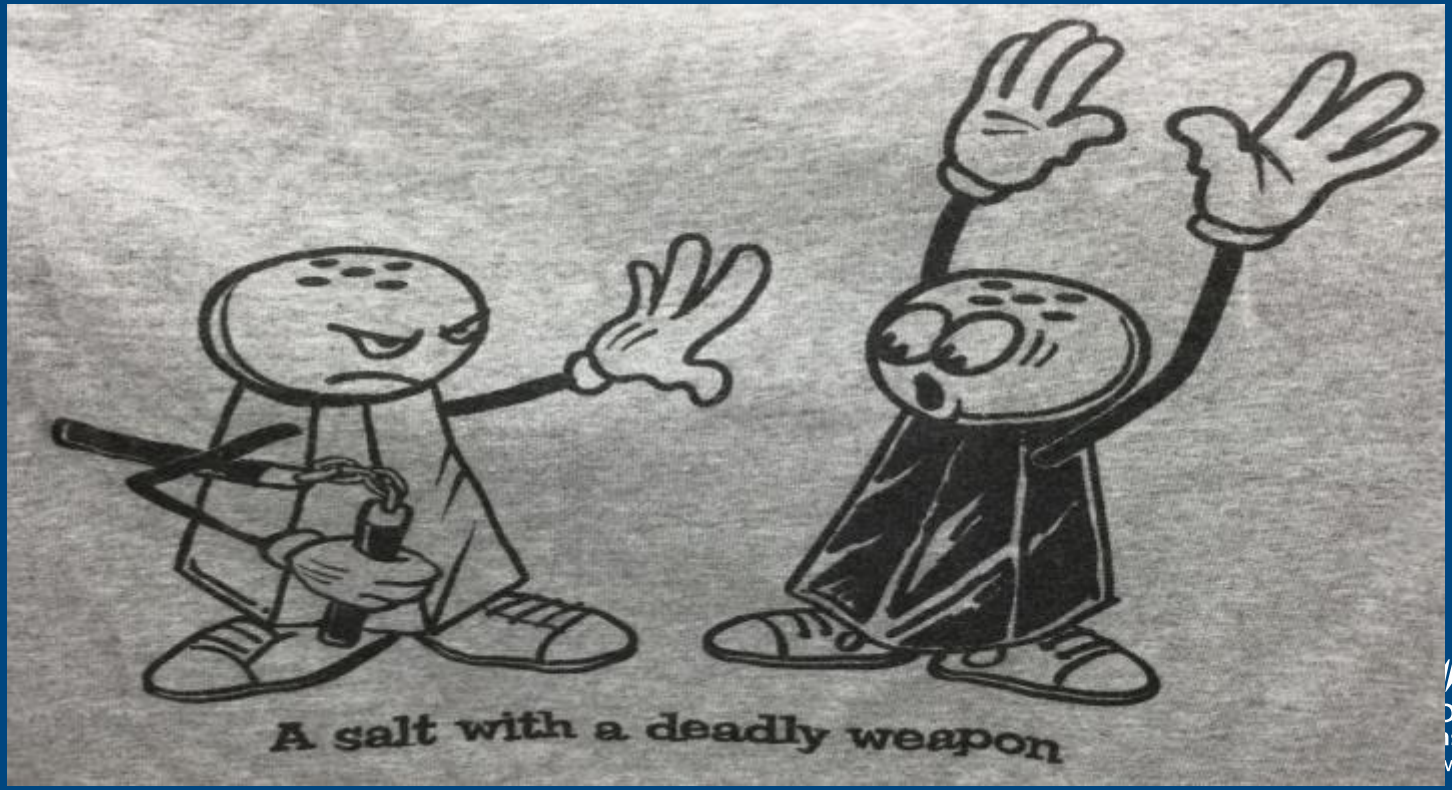
Food Group	Daily Servings
Grains	6–8
Meats, poultry, and fish	6 or less
Vegetables	4–5
Fruit	4–5
Low-fat or fat-free dairy products	2–3
Fats and oils	2–3
Sodium	2,300 mg*
	Weekly Servings
Nuts, seeds, dry beans, and peas	4–5
Sweets	5 or less

Simply Stated:

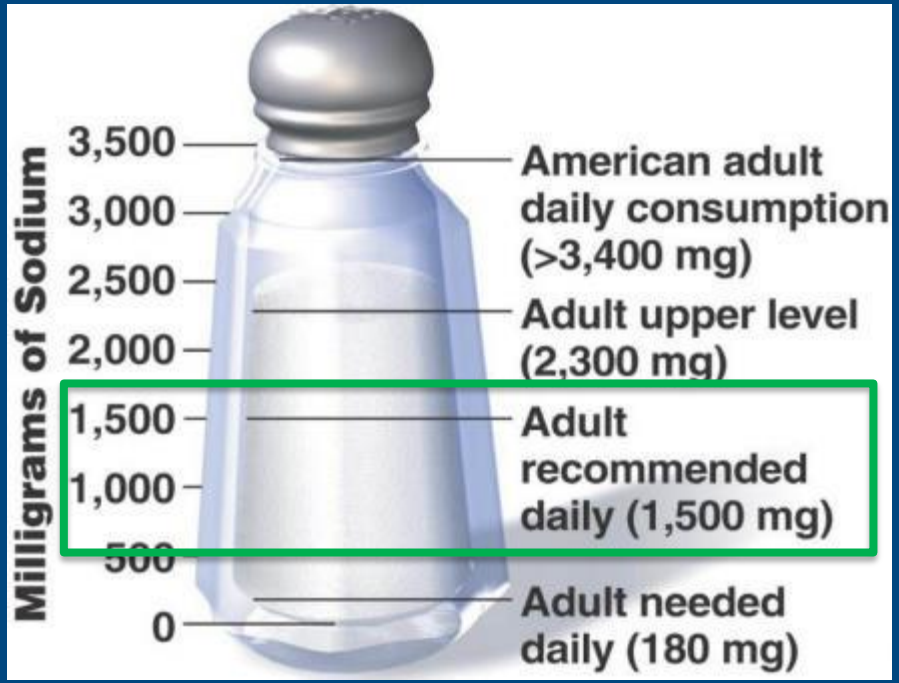
Eat **MORE**: Fruits, Vegetables, Whole Grains, Unsaturated Fats & Oils, Lean Proteins and Low-Fat Dairy

Eat **LESS**: Saturated Fats and Sugars

Reduce Sodium → **-5/6 mmHg**



Reduce Sodium



Physical Activity → -4 to 8 mmHg

No matter the desire and knowledge, it still takes motivation

American Heart Association Physical Activity Recommendations

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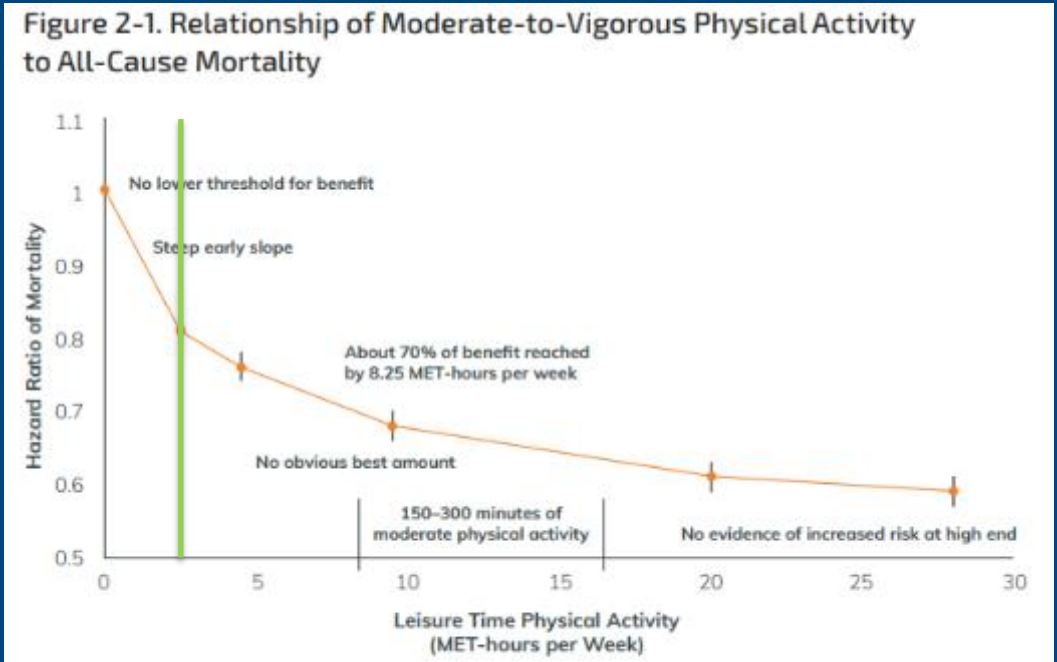
Most important lesson of physical activity

Anything leisure time activity is better than nothing.



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Alcohol → **-4 mmHg**

Moderation…

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When to consider medications?

Risk Stratification + Blood pressure staging

- Stage 1 (≥ 130/≥ 80) hypertension AND 10-year ASCVD risk of <10%, IF BP still elevated between 3-6 months after non-pharmacologic (i.e., lifestyle) therapy initiation
- Stage 1 (≥ 130/≥ 80) hypertension and 10-year ASCVD risk of ≥10%
- Stage 2 (≥ 140/≥ 90) hypertension, consider 2 agents of different classes
- Very high BP (≥ 180/≥ 110) evaluate and prompt antihypertensive treatment

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Pharmacologic approaches

Monotherapy, low(er)-dose combination, or max-out then add-on

Rationale for low(er) fixed dose combination therapies over monotherapy for initial therapy:

- Combination of 2 agents at low doses gives greater blood pressure reductions than higher dose of 1 drug
- Fewer adverse effects (than high dose monotherapy)
- Blockade of several pathways that increase blood pressure
- Increased protection of target organs
- Prompt blood pressure control
- Effects independent of their antihypertensive actions
- Improved adherence in combination vs single add-ons

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Integr Blood Press Control. 2009; 2: 55–62; Drugs Context. 2018; 7: 212531; J Am Heart Assoc. 2017;6:e006986; Patient Prefer Adherence. 2019 Nov 11;13:1961-1969

Pharmacologic approaches

Night-time or morning/daytime

There is a diurnal pattern of higher blood pressure in the morning and a decline in the late evening well described on 24-48 hour Ambulatory BP Monitoring (ABPM). There are those who do not experience dipping – so-called “non-dippers”. This is associated with stroke, MI, and cardiovascular death.

- Several studies have shown reduced new-onset DM, improved 24-hour blood pressure, and more importantly, reduction in cardiovascular events with night-time dosing versus morning/daytime.

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European Heart Journal (2020) 41, 4577–4579; J Hypertens 2014;32:82–89; Intern Med J 2017;47:900–906.; Hypertens Res 2018;41:342–353

Medication class for hypertension is like putting out a fire

Not enough, not the right liquid, think of fire mechanism

Pharmacotherapeutics

Initiation, what to start with? First line and/or condition driven

Regardless of underlying conditions, start with agents that have data for clinical outcomes benefits, i.e., have clinical trial data demonstrating reduction of CVD events, CKD progression, etc.

Primary agents used in the treatment of hypertension include:

- thiazide diuretics – (e.g., chlorthalidone, hydrochlorothiazide, indapamide, etc.)
- ACE inhibitors – (e.g., enalapril, lisinopril, benazepril, etc.)
- ARBs – (e.g., candesartan, irbesartan, losartan, etc.)
- CCBs dihydropyridine – (e.g., amlodipine, felodipine, nicardipine, etc.)
- CCBs nondihydropyridine – (e.g., diltiazem and verapamil)

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Hypertension. 2018;71:e13-e115

Case 1

45-year-old female presents to establish care. She reports feeling well.

PMHx: Hypothyroidism. OB/GYN: No pre-eclampsia. Last menses 3 weeks ago.

FMHx: Mother had MI at age 65, 2 stents. Father is A&W.

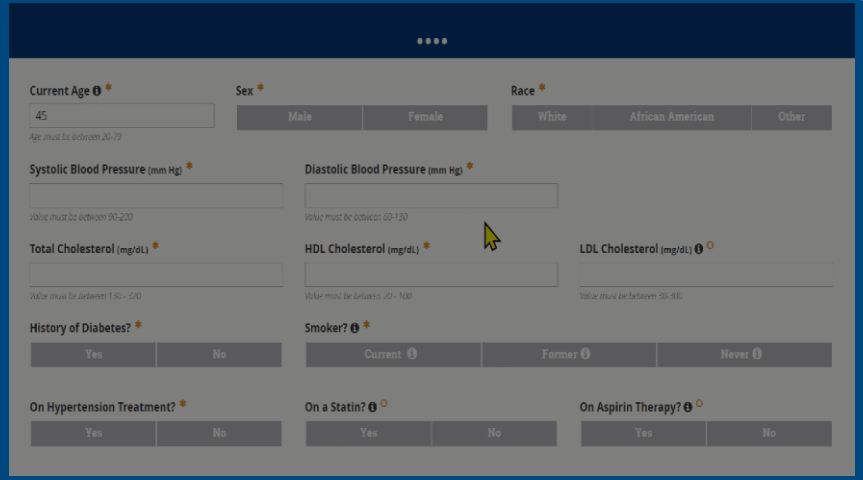
SocHx: Bank manager. Married with 2 children. Current smoker and drinks 1-3 glasses of wine a week with dinner. Does not follow any specific physical activity regimen.

MEDS: levothyroxine 88 mcg qd, MVI

Vitals: BP 135/85, HR 80, SaO2 96%, T 98.9, Wt 165 Ht 5'5" BMI 27.5

LABS: TC 220, Trig 200, HDL 50, LDL 145. A1c 5.6%, Fasting Glucose 99 mg/dL

What is her ASCVD risk score? Do you agree? What are your recommendations?



Stage 1 - ≥ 130/ ≥ 80, ASCVD <10%

1. Lifestyle modifications for health, e.g., smoking cessation, etc.
2. Teach self measurement and keep a home BP journal
3. Reassess progress at 3-6 months

HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 1	130-139	Or	80-89	Nonpharmacological therapy Class I	<10%	-	3-6 months (Class I)	Yes	Reassess in 3-6 months (Class I)
								No	Assess and optimize adherence to therapy and consider intensification of therapy

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Case 2

63-year-old female presents for annual follow-up. She reports feeling well.

PMHx: Occasional headaches OB/GYN: Post-menopausal since early 50's.

FMHx: Sister suffered MI at age 65, 3vCABG. Parents have passed. 2 brothers, 1 with DMII.

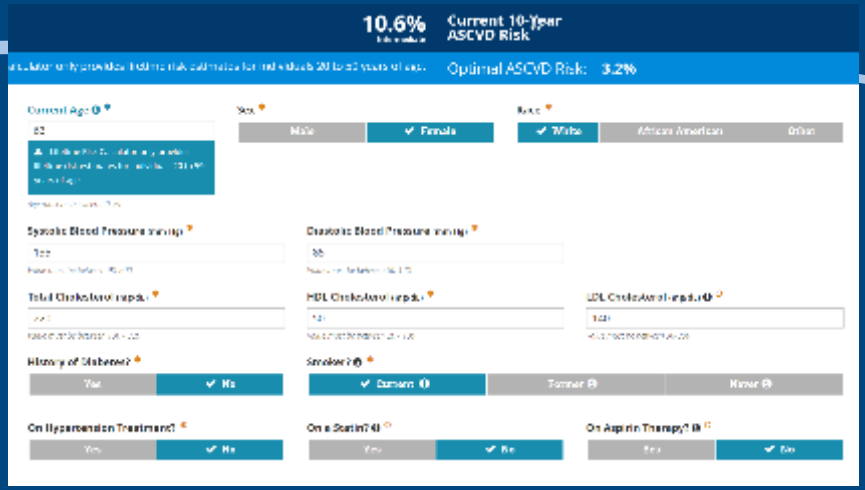
SocHx: Medical Technologist, working part-time. Married with 2 adult children. Current smoker, no EtOH. Does not follow any specific physical activity regimen.

MEDS: Ibuprofen 400 mg PRN for headaches, MVI.

Vitals: BP 135/85, HR 80, SaO2 96%, T 98.9, Wt 155 Ht 5'5" BMI 25.8

LABS: TC 220, Trig 200, HDL 50, LDL 145. A1c 5.6%, Fasting Glucose 99 mg/dL

What is her ASCVD risk score? Do you agree? What are your recommendations?



Stage 1 - ≥ 130/ ≥ 80, ASCVD ≥ 10%

1. Lifestyle modifications for health
2. BP lowering medication – absent risk factors, **chlorthalidone 25 mg** is reasonable.
3. Teach self measurement and keep a home BP journal
4. Reassess at 1 month

HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 1	130-139	Or	80-89	Nonpharmacological therapy Class I	≥10%	Initiate BP meds (Class I). Single or low-dose combination	1 month (Class I)	Yes	Reassess in 3-6 months (Class I)
								No	Assess and optimize adherence to therapy and consider intensification of therapy

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Case 3

35-year-old male presents to establish care. He reports feeling well.

PMHx: Has not seen a provider since he was a child.

FMHx: He doesn't contact his family often.

SocHx: Receptionist at dental office. Single, no children or significant other. Nonsmoker, no EtOH. Exercises 1-2 times a week, lifting at the gym.

MEDS: Occasional "pre-workout protein powder"

Vitals: BP 150/75, HR 60, SaO2 97%, T 98.9, Wt 170 Ht 5'8" BMI 25.8

LABS: TC 200, Trig 135, HDL 40, LDL 120. A1c 5.5%, Fasting Glucose 70 mg/dL

What are your recommendations?

Stage 2 - ≥ 140/ ≥ 90

1. Lifestyle modifications for health
2. BP lowering medication, consider two agents – absent risk factors, **chlorthalidone 12 (or 25) mg and lisinopril 5 (or 10-20) mg** is reasonable.
3. Teach self measurement and keep a home BP journal
4. Reassess at 1 month

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HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 2	≥140	Or	≥90	Nonpharmacological therapy Class I	No need to calculate	Initiate BP meds (Class I) Consider initiation of two agents (1 each from a different class)	1 month (Class I)	Yes	Reassess in 3-6 months (Class I)
								No	Assess and optimize adherence to therapy and consider intensification of therapy

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Resistance

When blood pressure refuses to be controlled

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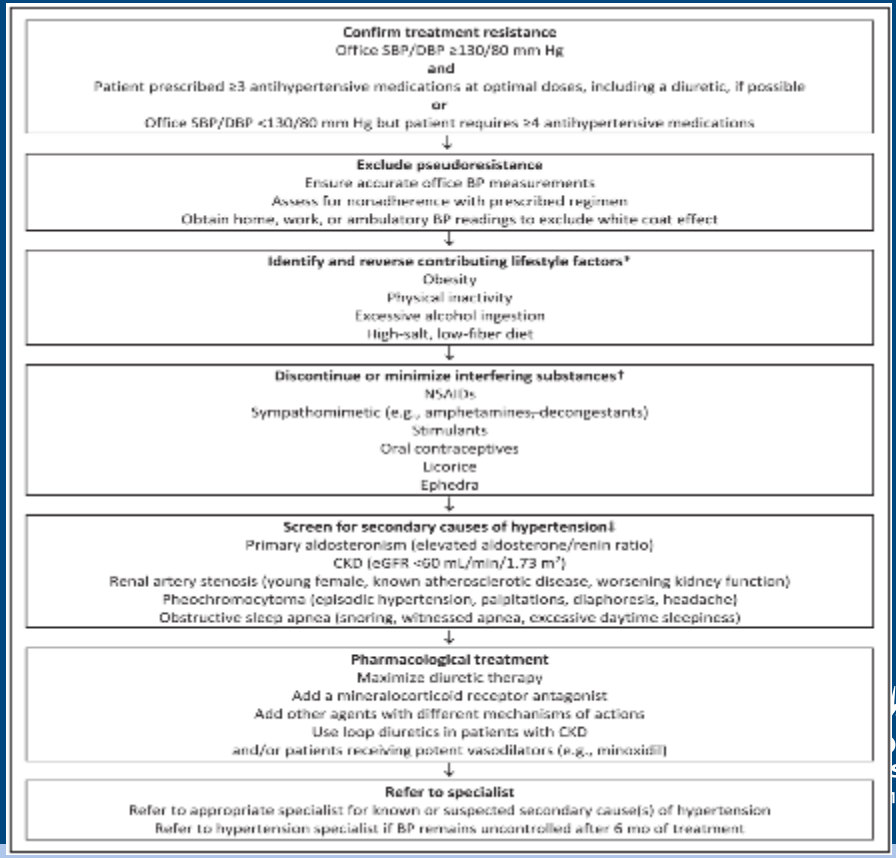
Resistance? Recheck secondary causes

On average, it takes 2 and ½ BP medications to control BP

After 3 medications (one from three different classes, e.g., thiazide, ACEi/ARB, and CCB), if BP is still above goal:

a) Reassess for modifiable secondary causes.

b) Treat/Refer for treatment of secondary cause.



Specific diseases and populations

BP goals (<130/<80) are the same. Individuals and disease are not.

Stable Ischemic Heart Disease – GDMT Bblockers, ACEi/ARB.

- Angina Pectoris, present = DHP CCB, not present = DHP CCBs, thiazides, MRA

HFrEF – GDMT Bblockers, ACEi/ARB/ARNI, MRA. NDHP CCB NOT recommended.

CKD – albuminuria (≥300 mg/day or ≥300 mg/g creatinine by first morning void) is present, ACEi, ARB if ACEi not tolerated.

DM – All first line medications (e.g., thiazides, ACEi/ARB, DHP/NDHP CCBs) are reasonable.

Specific diseases and populations

BP goals (<130/<80) are the same. Individuals and disease are not.

African American, Black – Thiazides and DHP/NDHP CCB are recommended first line.

Pregnant Women – methyldopa, nifedipine, and/or labetolol.

Age >65 – **If** high burden of comorbidity and limited life expectancy, **then** clinical judgment, patient preference, and a team-based approach to assess risk/ benefit is reasonable for decisions regarding intensity of BP lowering and choice of antihypertensive drug

Summary

1. Utilize the latest guidelines, 2017 AHA/ACC
2. Blood Pressures ≥ 130/ ≥ 80 = HYPERTENSION
3. Goal in almost all people, across disease and populations = < 130/ < 80
4. PROMOTE OPTIMAL LIFESTYLE, ALWAYS
5. 1st Line BP classes also have evidence for outcome benefit – Thiazides (specifically chlorthalidone), ACEi/ARB, CCBs.
6. Individualize therapy to population and disease, consider low(er)-combination doses before maximal single, educate and engage patients.