



Treatment Protocol for Hypertension

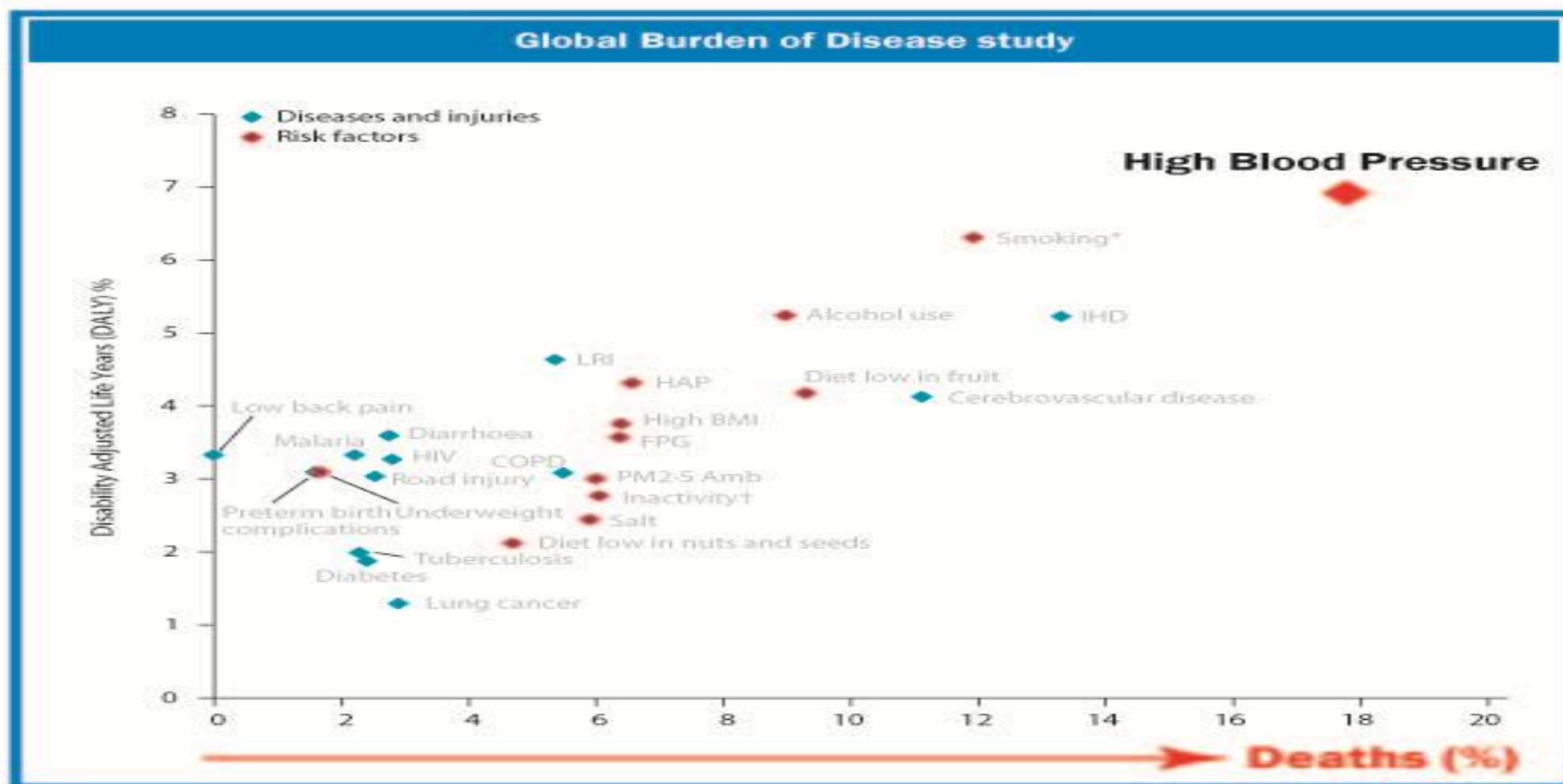
World Health Day 2013: measure your blood pressure, reduce your risk

News release 3 April 2013 | Geneva - To mark World Health Day on 7 April,

- WHO is calling for intensified efforts to prevent and control hypertension, also known as high blood pressure. Worldwide, high blood pressure is estimated to affect more than one in three adults aged 25 and over, or about one billion people.
- Hypertension is one of the most important contributors to heart disease and stroke – which together make up the world's number one cause of premature death and disability. Researchers estimate that high blood pressure contributes to nearly 9.4 million deaths from cardiovascular disease each year. It also increases the risk of conditions such as kidney failure and blindness

THE LANCET

2012;380:601-610



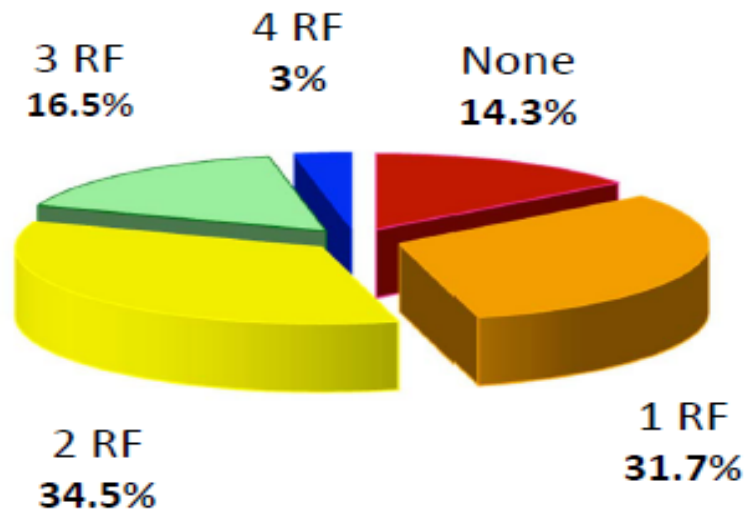
Why is blood pressure control so important to health?

When your blood pressure is high:

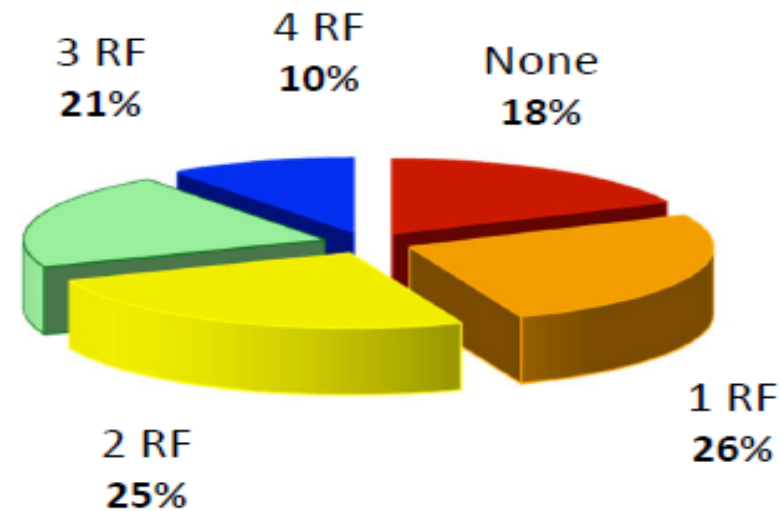
- You are **4 times more likely to die from a stroke**
- You are **3 times more likely to die from heart disease**
- Much higher risk for **CKD and Heart failure.**

Prevalence of HBP and other risk factors* in the Brisighella and Framingham Studies

*Metabolic disorders, Target Organ Damage

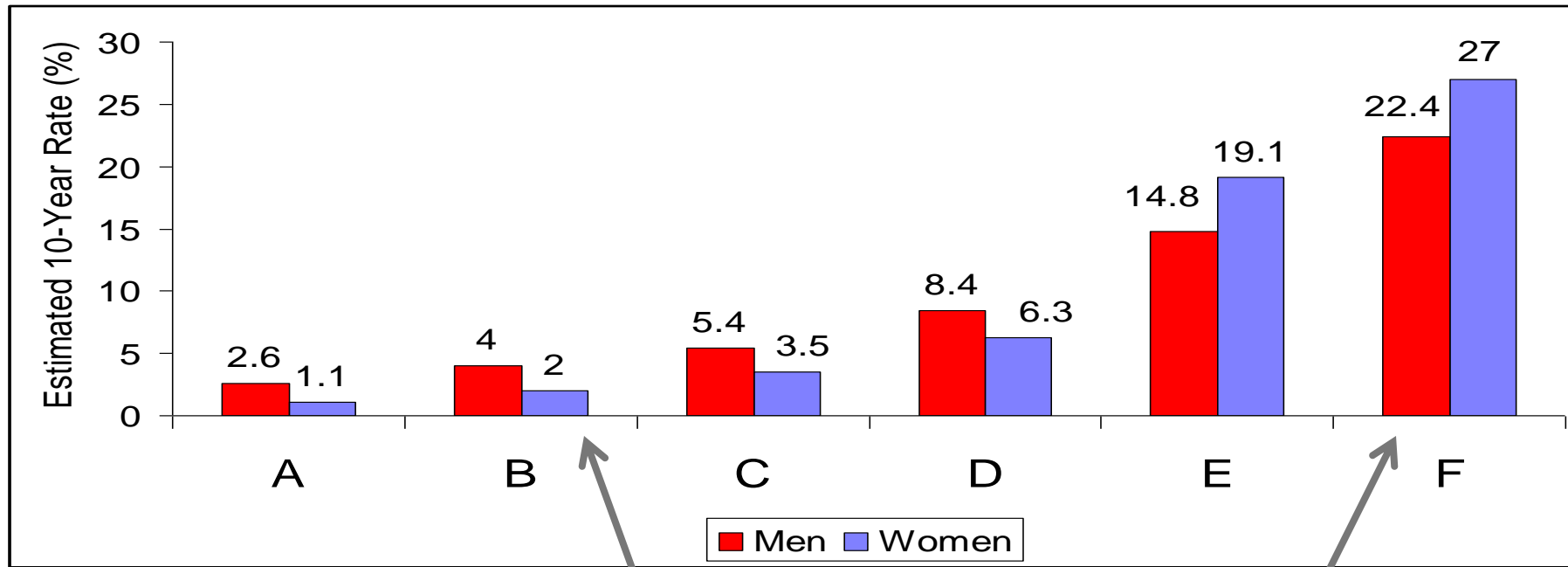


Borghi C, et al. *J Hypertens*. 2004.



Kannel WB. *Am J Hypertens*. 2000.

Estimated 10-Year Stroke Risk in 55-Year-Old Adults According to Levels of Various Risk Factors Framingham Heart Study



	A	B	C	D	E	F
Systolic BP*	95-105	130-148	130-148	130-148	130-148	130-148
Diabetes	No	No	Yes	Yes	Yes	Yes
Cigarettes	No	No	No	Yes	Yes	Yes
Prior Atrial Fib.	No	No	No	No	Yes	Yes
Prior CVD	No	No	No	No	No	Yes

Source: *Stroke* 1991;22:312-318.

*BP in millimeters of mercury (mmHg)

Criteria for diagnosing high blood pressure

Category	Systolic	Diastolic
Normal	Less than 120	Less than 80
Pre-hypertension	120-139	80-89
High Blood Pressure		
Stage 1	140-159	90-99
Stage 2	160 or higher	100 or higher

**WHICH METHOD DO I USE – AUTOMATED OR MERCURY ?
HOW DO I USE AUTOMATED DEVICE ?
HOME BP MONITORING?**

Follow-up based on initial BP

INITIAL BLOOD PRESSURE (mmHg)*	FOLLOWUP RECOMMENDED†
Normal	Recheck in 2 years
Prehypertension	Recheck in 1 year‡
Stage 1 Hypertension	Confirm within 2 months‡
Stage 2 Hypertension	Evaluate or refer to source of care within 1 month. For those with higher pressures (e.g., >180/110 mmHg), evaluate and treat immediately or within 1 week depending on clinical situation and complications.

Table 4.2.: Initial Assessment of Hypertensive Patients for history and Physical and laboratory examination

Assessment of medical history	Physical examination	Laboratory Tests
<p>A. Risk factors</p> <ul style="list-style-type: none"> ▪ Lack of physical activity (or sedentary lifestyle) ▪ Obesity or being overweight ▪ Abdominal obesity ▪ High sodium intake/high salt intake ▪ Excess alcohol consumption <p>B. Family history</p> <p>C. Symptoms of consequences of hypertension</p>	<p>A. BP measurement at least in one upper and one lower limb</p> <p>B. Measurement of Body weight and height to obtain BMI</p> <p>C. Measurement of Waist circumference</p>	<p>Essential:</p> <ul style="list-style-type: none"> ▪ Blood Sugar ▪ Urine analysis for proteinuria <p>Desirable: (at CHC/sub-district/district level hospitals depending upon the available facilities for laboratory investigations)</p> <ul style="list-style-type: none"> ▪ Haemogram
Assessment of medical history	Physical examination	Laboratory Tests
<p>D. Frequent intake of pain relieving drugs (NSAIDS)</p> <p>E. Steroid intake for asthma</p> <p>F. Breathing difficulty particularly on exertion</p> <p>G. Swelling of feet</p> <p>H. Urinary difficulties, history of passing stones in the past</p>	<p>D. Palpating all peripheral pulses</p> <p>E. Auscultation for bruit (renal, carotid, abdominal and others)</p> <p>F. Eye evaluation if ophthalmology facility is available</p>	<ul style="list-style-type: none"> ▪ Serum creatinine ▪ Serum sodium and potassium levels ▪ Lipid profile ▪ Complete Urine analysis ▪ Electrocardiogram (ECG) ▪ X-Ray chest

Causes of Secondary HTN

- **Common**

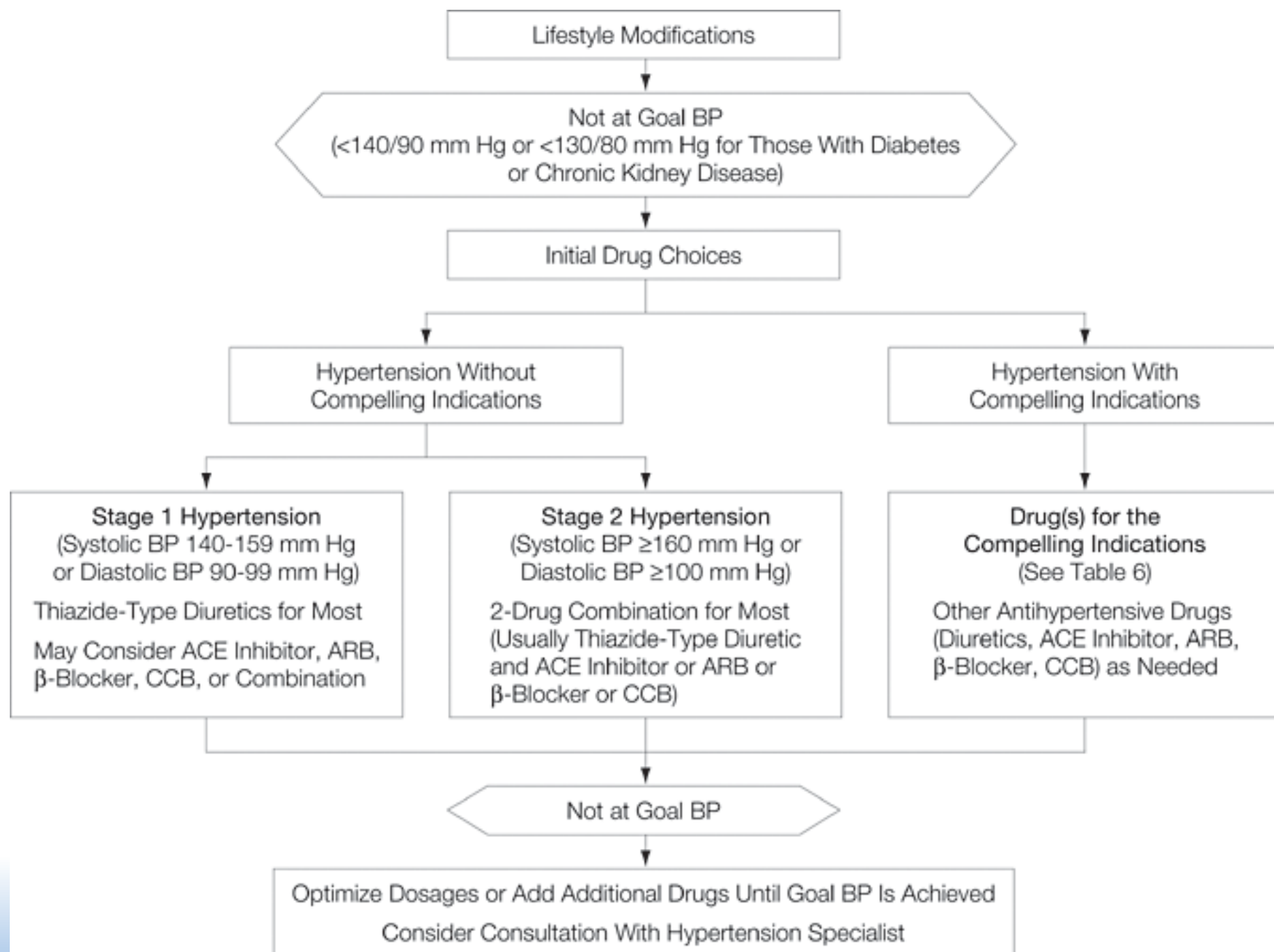
- Intrinsic renal disease
- Renovascular disease
- Mineralocorticoid excess
- Sleep Breathing disorder

- **Uncommon**

- Pheochromocytoma
- Glucocorticoid excess
- Coarctation of Aorta
- Hyper/hypothyroidism

Secondary HTN-Screening Tests

DIAGNOSIS	DIAGNOSTIC TEST
Chronic kidney disease	Estimated GFR
Coarctation of the aorta	CT angiography
Cushing's syndrome and other glucocorticoid excess states including chronic steroid therapy	History; dexamethasone suppression test
Drug induced/related (see table 18)	History; drug screening
Pheochromocytoma	24-hour urinary metanephrine and normetanephrine
Primary aldosteronism and other mineralocorticoid excess states	24-hour urinary aldosterone level or specific measurements of other mineralocorticoids
Renovascular hypertension	Doppler flow study; magnetic resonance angiography
Sleep apnea	Sleep study with O ₂ saturation
Thyroid/parathyroid disease	TSH; serum PTH



Based on risk assessment, the management of high blood pressure cases can be initiated. The management should include the following:

- Therapeutic life-style management
- Drug Therapy

Pharmacotherapy

Whether a person requires medicines for his high blood pressure and the choice of medicine best for the patient would depend on:

- The blood pressure reading
- Whether the high blood pressure has already affected target organs in the body such as heart, kidneys, eyes and arteries.
- Concurrent medical conditions such as diabetes, heart disease, kidney disease and other risk factors like use of tobacco, obesity and high blood fat levels(lipid profile) etc.

Treatment Goals

- Initial aim should be to obtain blood pressure level less than 140/90 mmHg
- Don't accept blood pressure levels of 140/90 mmHg or more
- Maintain healthy blood pressure throughout the person's lives
- Prevent and control risk factors which could give rise to high blood pressure

Classification

Table 1. Classification and management of blood pressure for adults*

BP CLASSIFICATION	SBP* mmHg	DBP* mmHg	LIFESTYLE MODIFICATION	INITIAL DRUG THERAPY	
				WITHOUT COMPELLING INDICATION	WITH COMPELLING INDICATIONS (SEE TABLE 8)
NORMAL	<120	and <80	Encourage		
PREHYPERTENSION	120–139	or 80–89	Yes	No antihypertensive drug indicated.	Drug(s) for compelling indications.‡
STAGE 1 HYPERTENSION	140–159	or 90–99	Yes	Thiazide-type diuretics for most. May consider ACEI, ARB, BB, CCB, or combination.	Drug(s) for the com- pelling indications.‡ Other antihypertensive drugs (diuretics, ACEI, ARB, BB, CCB) as needed.
STAGE 2 HYPERTENSION	≥160	or ≥100	Yes	Two-drug combination for most† (usually thiazide-type diuretic and ACEI or ARB or BB or CCB).	

Lifestyle modifications

MODIFICATION	RECOMMENDATION	APPROXIMATE SBP REDUCTION (RANGE) [†]
Weight reduction	Maintain normal body weight (body mass index 18.5–24.9 kg/m ²).	5–20 mmHg/10kg ^{92,93}
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 mmHg ^{94,95}
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 mmHg ^{94,96}
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 mmHg ^{97,98}
Moderation of alcohol consumption	Limit consumption to no more than 2 drinks (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 mmHg ⁹⁹

SITTING IS THE NEW SMOKING.



Sitting for 6 hours a day is equal to smoking more than a pack of cigarettes, studies reveal. It can take a toll on the heart by increasing the levels of cholesterol and fat, and the likelihood of type-2 diabetes.

The good news is that even small amounts of physical activity through the day greatly reduce risks to your heart. Here are a few simple suggestions, courtesy our heart-health partners Apollo Hospitals and their initiative - Billion Hearts Beating.

1. Stand up every 20 minutes, even if it's just for a minute or two.
2. Stand whenever you're in a short meeting.
3. Replace long emails with walking one-on-ones.
4. Do simple stretches and exercises at your desk.
5. Head to the recreation center for quick game or workout.

Take a pledge to #StandForHeartHealth.

Figure 4.1: Algorithm for Management of Hypertension

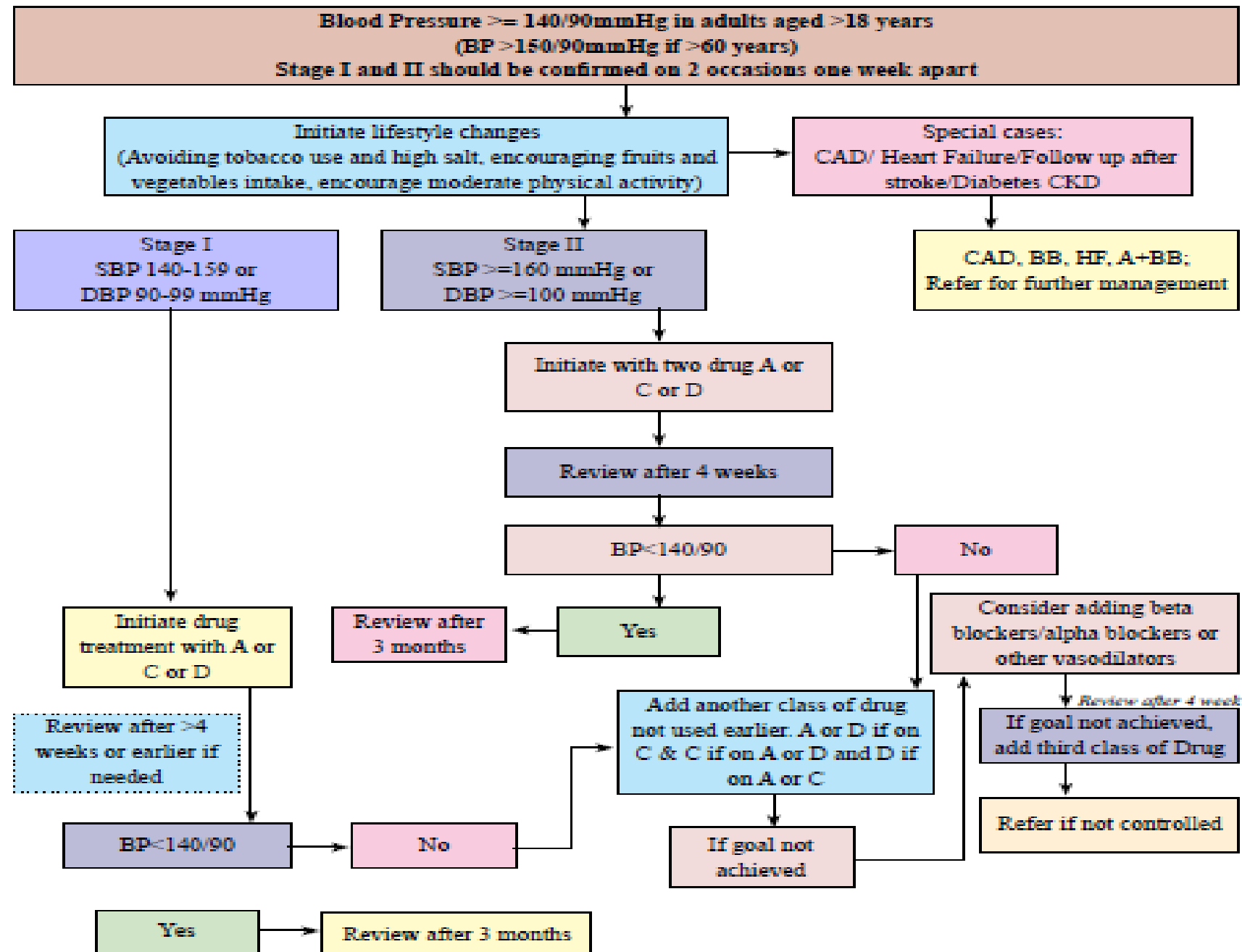
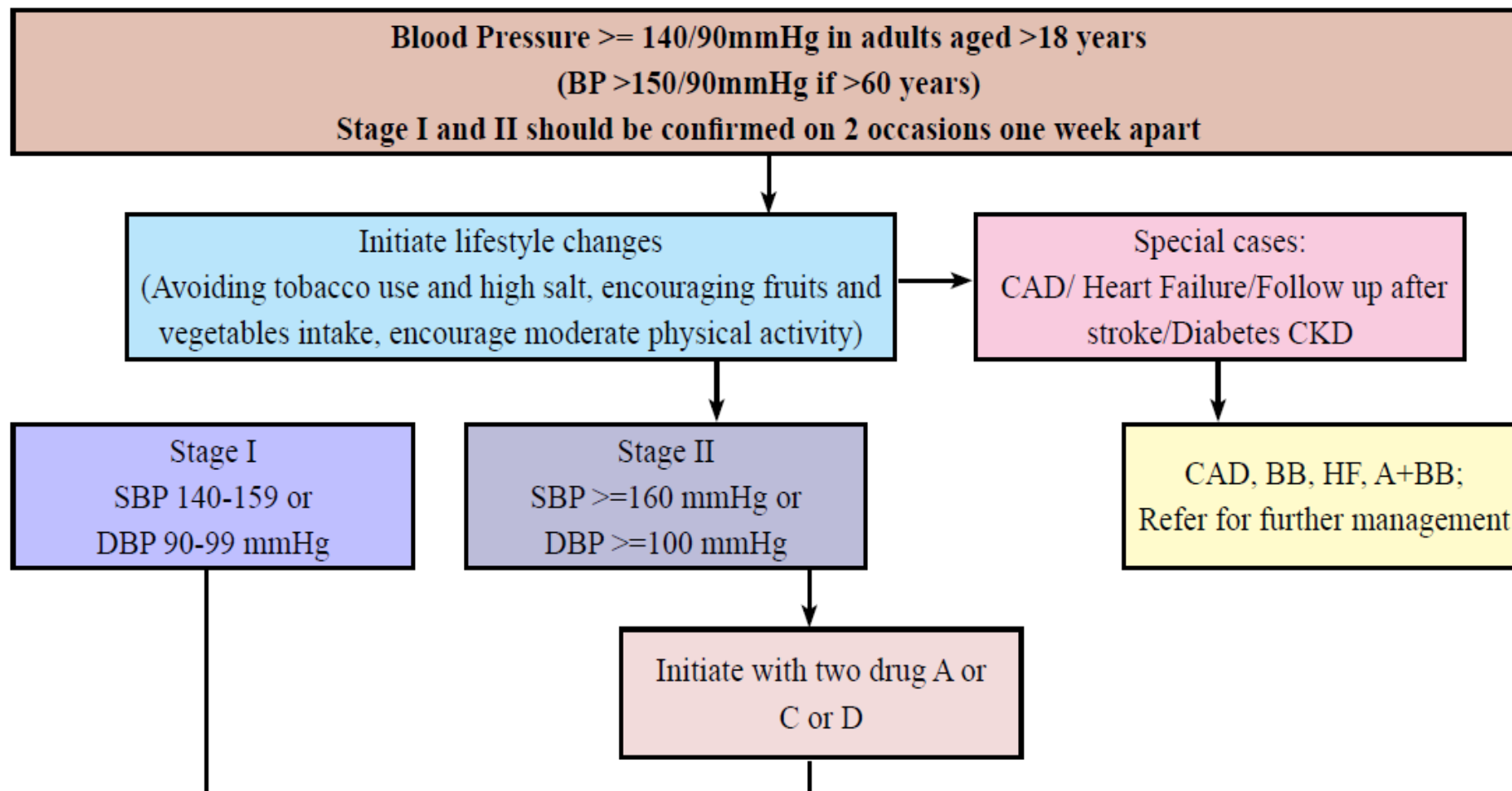


Figure 4.1: Algorithm for Management of Hypertension



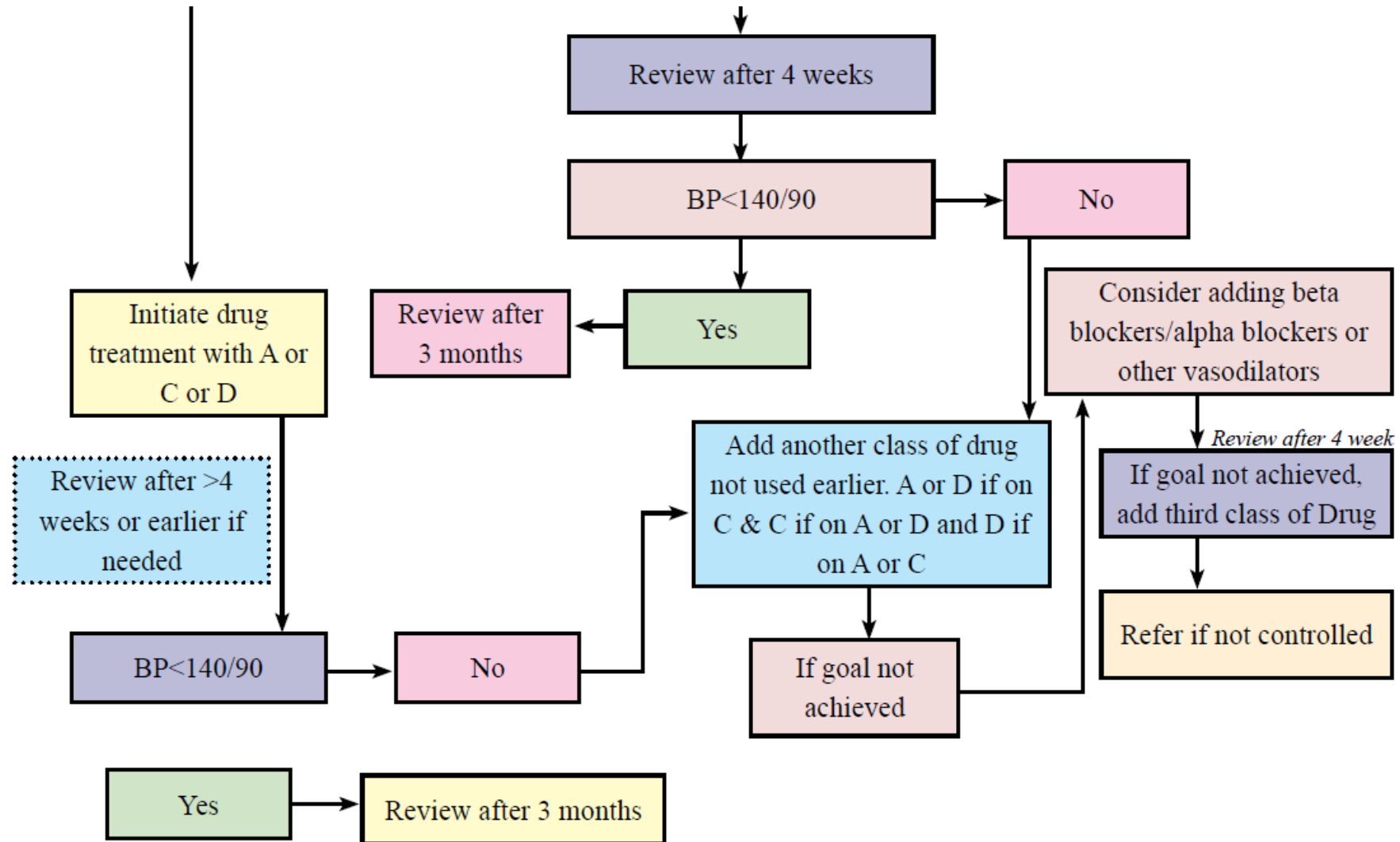


Table 4.3: List of Drugs

	Class of Drug	Drug	Initiation dose	Maximum dose
A	ACE Inhibitors	Enalapril	5 mg once daily (OD)	10 mg twice daily (BD)
		Ramipril	5 mg OD	10 mg OD
		Lisinopril	5mg OD	20mg OD
C	Calcium Channel Blocker	Amlodipine	5mg OD	10 mg OD
D	Diuretic MRA	Indapamide	1.5 mg OD	2.5 mg OD
		Chlorthalidon	12.5 mg OD	25 mg OD
		Aldosterone antagonist		
B	B-Blocker	Atenolol	50 mg OD	100 mg OD
		Metoprolol	25 mg BD	50 mg BD

ARBs

**LOSARTAN
TELMISARTAN
VALSARTAN
OLMESARTAN**

Special Situations

- **COPD:** Avoid beta-blockers
- If person is confirmed to be hypertensive and is also having diabetes the preferred drug should be ACE inhibitors for treatment of hypertension.
- **CKD:** ACE-I is recommended if Serum creatinine is $<2\text{mg\%}$, however, it should be initiated only if facilities to monitor serum creatinine and potassium are available. If these are not available then initiate with Amlodipine 5 mg.
- **CAD:** Beta-blockers are useful especially if history of angina or recent MI is present
- **Heart failure:** ACE-I are recommended as the initial drug of choice. Beta-blockers are to be added subsequently.

ABCD Compare & Contrast

Parameter	Diuretic	ACEi,ARB	β blocker	Ca ⁺ Blocker
Ischemia	No effect	Improves	Improves	Negative
LVH, LVF	Improves	Improves	Improves*	Negative
CV Mortality	Improves	Improves	Improves	Increases
Heart rate	No effect	No effect	Bradycardia	Tachycardia
Use in DM	Negative	Excellent	Negative	Negative
Lipid effects	Negative	Excellent	Negative	Neutral
Fluid & Na	Reduces	No effect	Vasoconstr.	Vasodilatory
K ex / bronchi	Enhances	No effect	Bronchospa	No effect
UA / Conduct.	↑ Uric acid	No effect	↓ conduction	No effect

Sequence of drugs

- Most important factor is compelling indication
- A /C /D – 1 OR 2 OR 3
- 4th drug – spironolactone / eplerenone - MRA – pathways 2 trial .
- 5th drug
 - Alpha blockers- prostatism
 - Central sympathetic drug- clonidine
 - Tachycardia – beta blockers

Which is better: a higher dose of a single antihypertensive drug or multiple drugs at less than maximal doses?

Many drugs have the majority of their antihypertensive effect at about half maximal dose. Increasing the dose may reduce blood pressure a few more mm Hg, but at the risk of substantial increases in the side-effect profile. Usually, the most prudent course is to add an agent rather than to press on to maximal dosage

Very young hypertensive

- Refrain from pharmacotherapy as far as possible
- Life style modifications hold the key.
- ACE inhibitors/ ARBs /CCBs.
- Avoid beta blockers as first line but can use them as third or fourth drug.

When to refer

- Secondary hypertension – well most of them
- When not controlled on – say 5 drugs

Table 6. Clinical Trial and Guideline Basis for Compelling Indications for Individual Drug Classes

High-Risk Conditions With Compelling Indication*	Recommended Drugs						Clinical Trial Basis†
	Diuretic	β -Blocker	ACE Inhibitor	ARB	CCB	Aldosterone Antagonist	
Heart failure	•	•	•	•		•	ACC/AHA Heart Failure Guideline, ⁴⁰ MERIT-HF, ⁴¹ COPENICUS, ⁴² CIBIS, ⁴³ SOLVD, ⁴⁴ AIRE, ⁴⁵ TRACE, ⁴⁶ ValHEFT, ⁴⁷ RALES ⁴⁸
Post-myocardial infarction		•	•			•	ACC/AHA Post-MI Guideline, ⁴⁹ BHAT, ⁵⁰ SAVE, ⁵¹ Capricorn, ⁵² EPHEUS ⁵³
High coronary disease risk	•	•	•		•		ALLHAT, ³³ HOPE, ³⁴ ANBP2, ³⁵ LIFE, ³² CONVINCE ³¹
Diabetes	•	•	•	•	•		NKF-ADA Guideline, ^{21,22} UKPDS, ⁵⁴ ALLHAT ³³
Chronic kidney disease			•	•			NKF Guideline, ²² Captopril Trial, ⁵⁵ RENAAL, ⁵⁶ IDNT, ⁵⁷ REIN, ⁵⁸ AASK ⁵⁹
Recurrent stroke prevention	•		•				PROGRESS ³⁶

Abbreviations: AASK, African American Study of Kidney Disease and Hypertension; ACC/AHA, American College of Cardiology/American Heart Association; ACE, angiotensin-converting enzyme; AIRE, Acute Infarction Ramipril Efficacy; ALLHAT, Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial; ANBP2, Second Australian National Blood Pressure Study; ARB, angiotensin-receptor blocker; BHAT, β -Blocker Heart Attack Trial; CCB, calcium channel blocker; CIBIS, Cardiac Insufficiency Bisoprolol Study; CONVINCE, Controlled Onset Verapamil Investigation of Cardiovascular End Points; COPENICUS, Carvedilol Prospective Randomized Cumulative Survival Study; EPHEUS, Eplerenone Post-Acute Myocardial Infarction Heart Failure Efficacy and Survival Study; HOPE, Heart Outcomes Prevention Evaluation Study; IDNT, Irbesartan Diabetic Nephropathy Trial; LIFE, Losartan Intervention For Endpoint Reduction in Hypertension Study; MERIT-HF, Metoprolol CR/XL Randomized Intervention Trial in Congestive Heart Failure; NKF-ADA, National Kidney Foundation–American Diabetes Association; PROGRESS, Perindopril Protection Against Recurrent Stroke Study; RALES, Randomized Aldactone Evaluation Study; REIN, Ramipril Efficacy in Nephropathy Study; RENAAL, Reduction of Endpoints in Non-Insulin-Dependent Diabetes Mellitus with the Angiotensin II Antagonist Losartan Study; SAVE, Survival and Ventricular Enlargement Study; SOLVD, Studies of Left Ventricular Dysfunction; TRACE, Trandolapril Cardiac Evaluation Study; UKPDS, United Kingdom Prospective Diabetes Study; ValHEFT, Valsartan Heart Failure Trial.

*Compelling indications for antihypertensive drugs are based on benefits from outcome studies or existing clinical guidelines; the compelling indication is managed in parallel with the blood pressure.

†Conditions for which clinical trials demonstrate benefit of specific classes of antihypertensive drugs.

Relation of Beta-Blocker–Induced Heart Rate Lowering and Cardioprotection in Hypertension

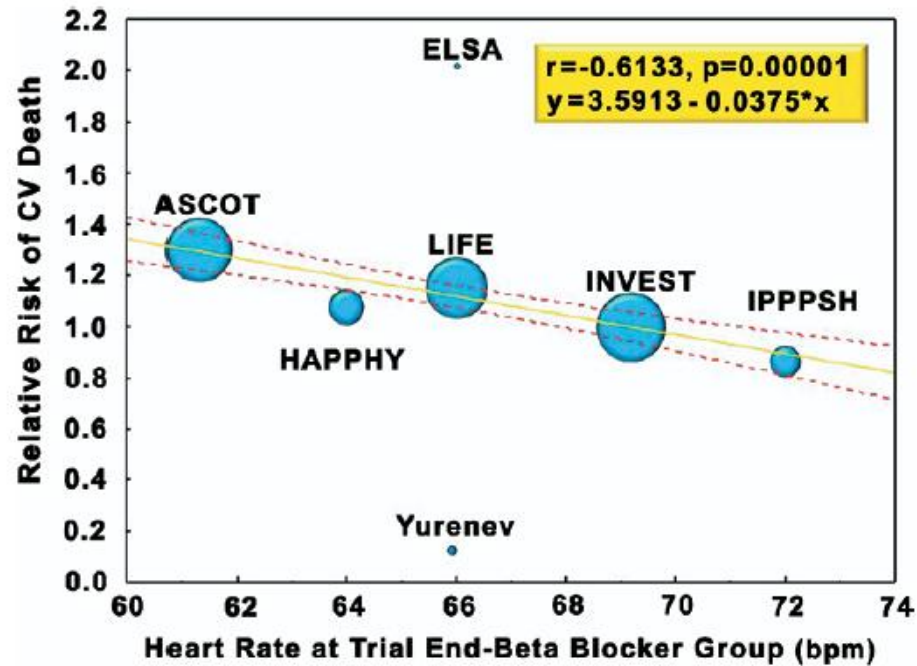


Figure 2

Risk of Cardiovascular Mortality as Function of Heart Rate

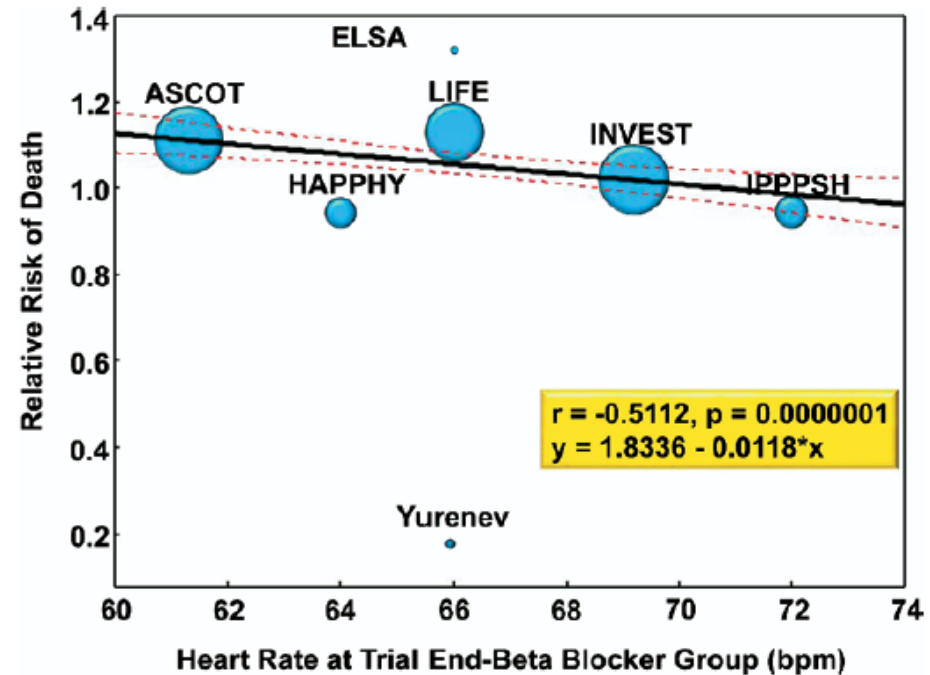


Figure 7

Risk of All-Cause Mortality as Function of Heart Rate

Relation of Beta-Blocker–Induced Heart Rate Lowering and Cardioprotection in Hypertension

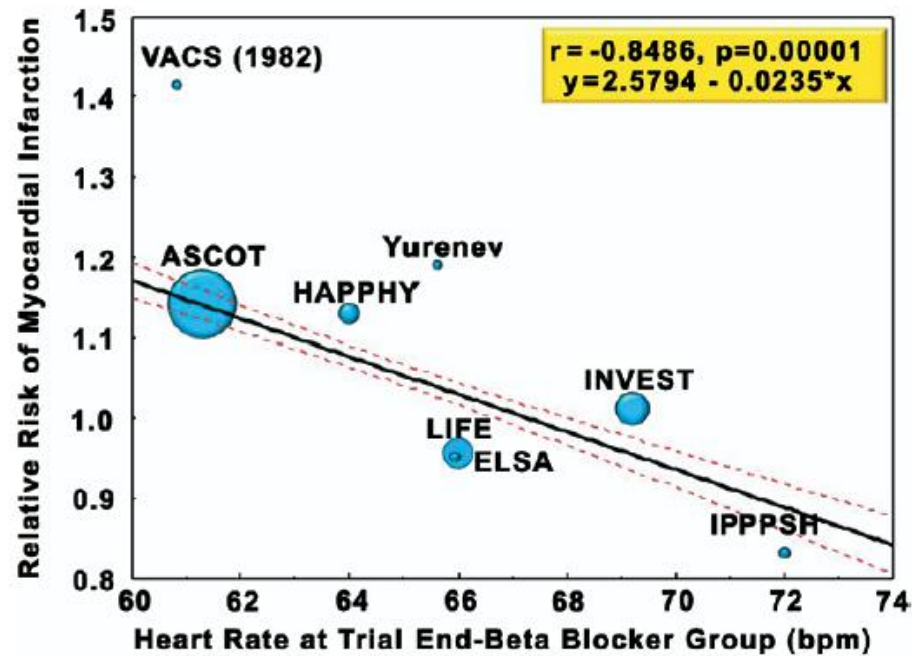


Figure 3 Risk of Nonfatal MI as Function of Heart Rate

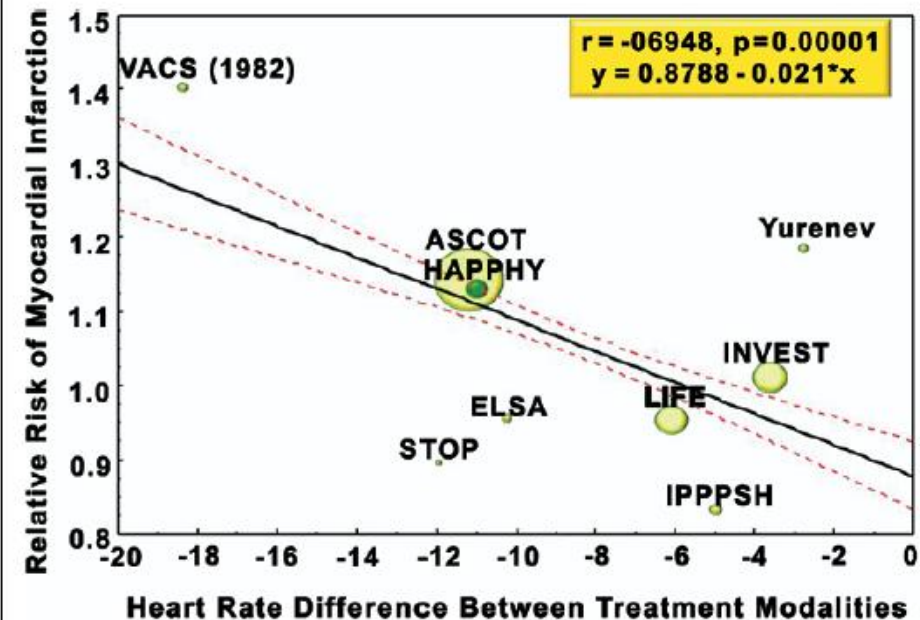


Figure 4 Risk of Nonfatal MI as Function of Heart Rate Difference Between Treatments

Relation of Beta-Blocker–Induced Heart Rate Lowering and Cardioprotection in Hypertension

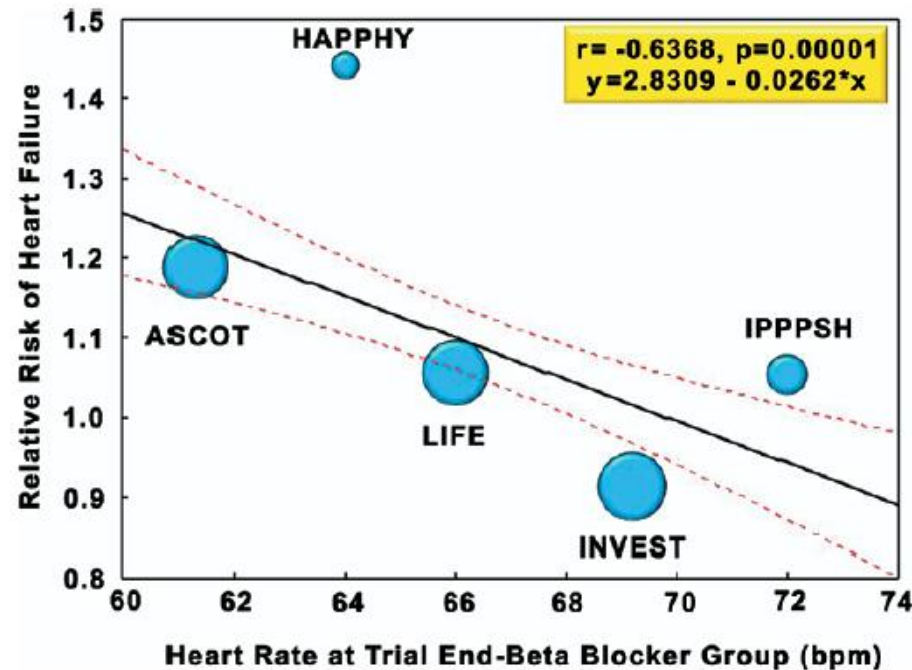


Figure 5 Risk of HF as Function of Heart Rate

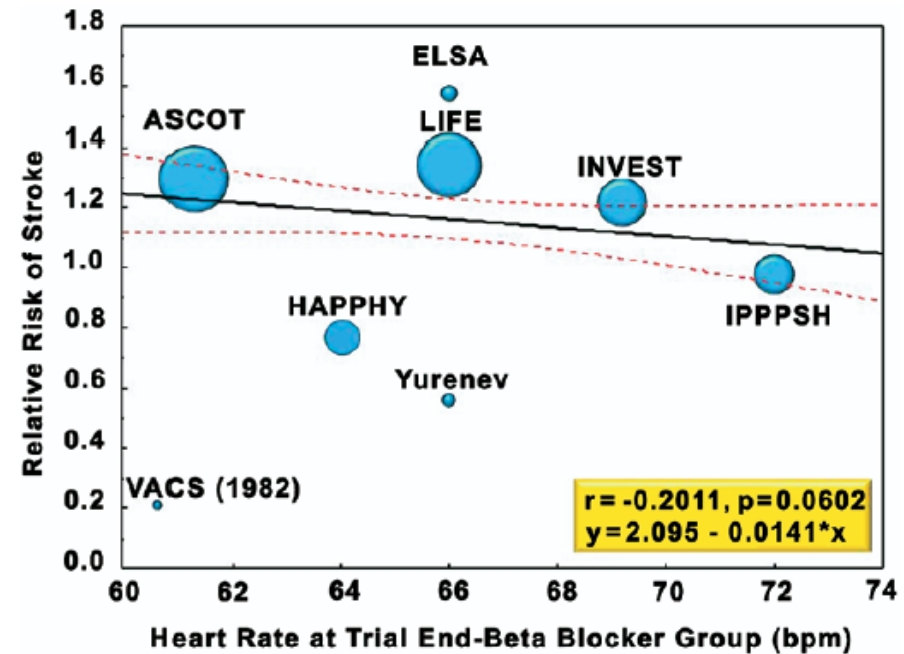


Figure 6 Risk of Stroke as Function of Heart Rate



**THANK
YOU**