

HYPERTENSION



PROF. JAMAL AL WAKEEL

Consultant Nephrology Division
Department of Medicine





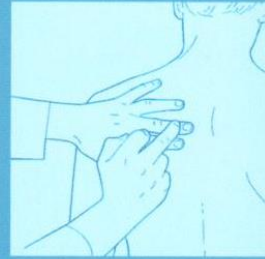
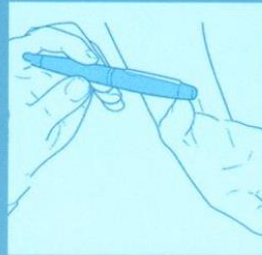
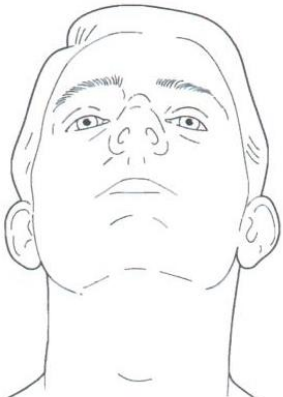
تأليف

نيكولاس ج. تالي سيمون أوكونر

كتاب الفحص الإكلينيكي الجيبي

ترجمة

أ.د. جمال بن صالح الوكيل



جامعة الملك سعود

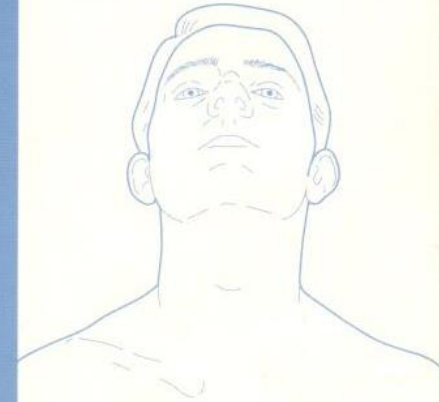
النشر العلمي والمطابع



NICHOLAS J TALLEY
SIMON O'CONNOR

POCKET CLINICAL EXAMINATION

SECOND EDITION



The Objectives of this Lecture are:

- 1. To be able to recognize the definition of hypertension**
- 2. To be able to identify the Stages of Hypertension
(ACC/AHA - European Society of Cardiology/European Society of Hypertension (ESC/ESH)**
- 3. To find out the complication of Hypertension**
- 4. To learn how to measure blood pressure**
- 5. To acquire knowledge on how to treat hypertension**

Case

47 year old man came to your clinic with headache for 3 weeks. The nurse measure his Blood Pressure and was found to be 150/95 mmHg:

1. Does he have Hypertension?
2. What is the stage of Hypertension?
3. What investigation should you perform?
4. What could be your management on his case?
5. Is there any possible prevention to his disease and its complication?

Prevalence of hypertension

- The 4th most common cause of death worldwide
- The overall prevalence of hypertension in adults is 30 - 45%
- The overall prevalence of hypertension in Saudia is 25.5%- 31.4%
- Onset stage 25-55 years mainly in 40-50y
- more common with advancing age
- prevalence of >60% in people aged >60 years
- Risk of HTN : A)As populations age, B) sedentary lifestyles C) increase their body weight

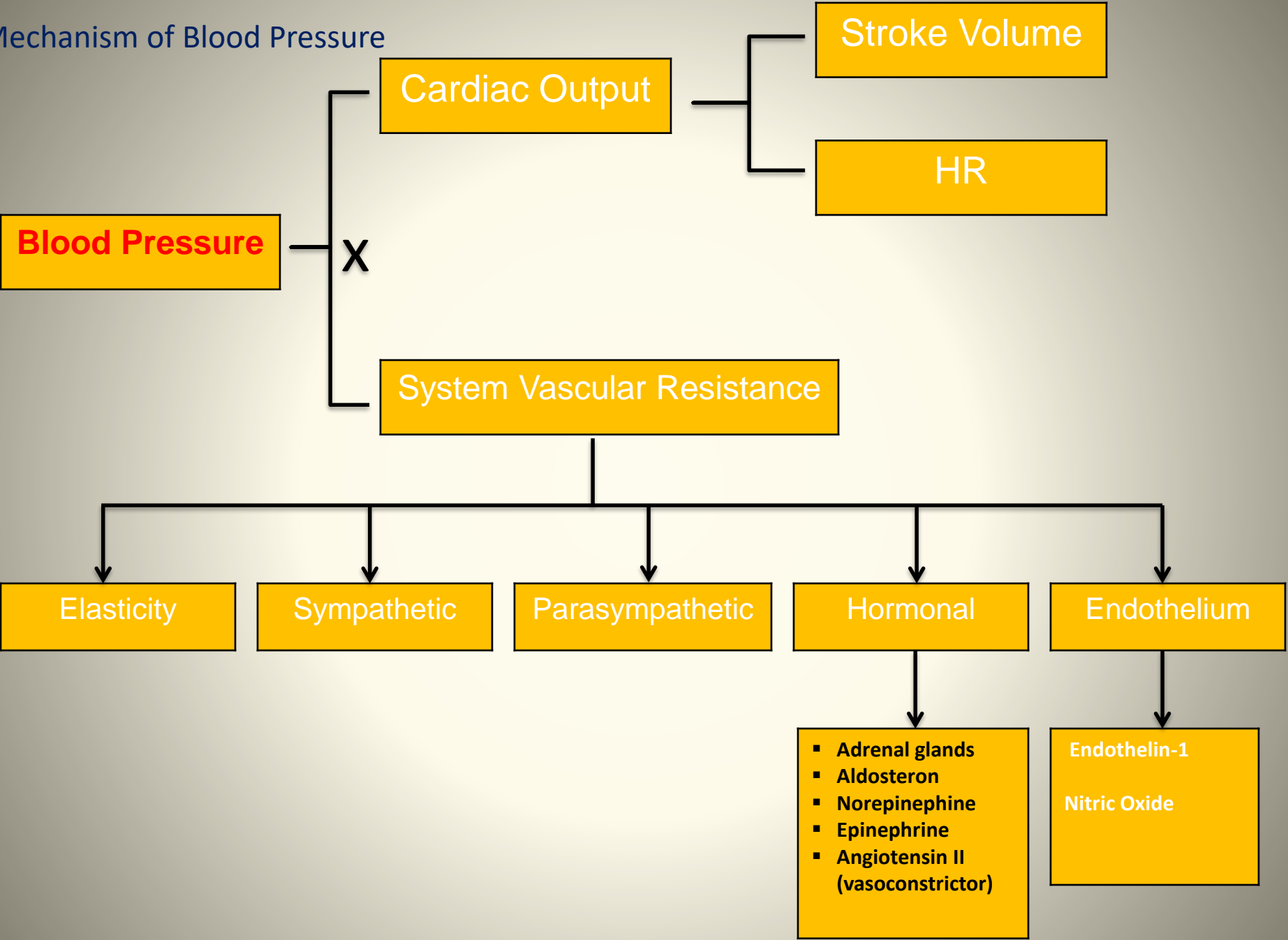


Only 72% are aware of their disease

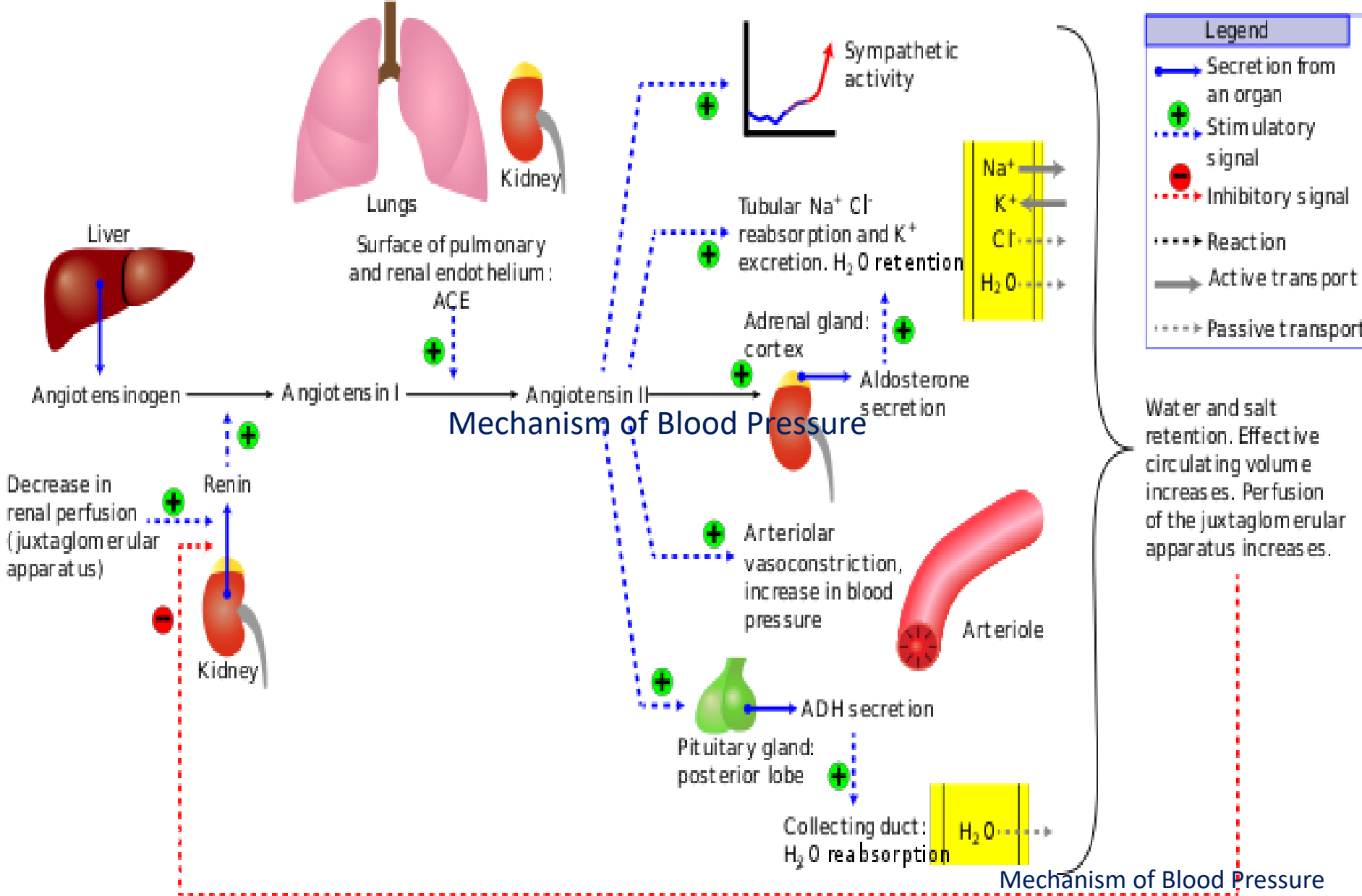


55% of participants on medication for hypertension had their blood pressure uncontrolled

Mechanism of Blood Pressure



Renin-angiotensin-aldosterone system



Hypertension

- ✚ In 90%-95% of cases no cause can be found
primary hypertension (essential)
- ✚ Secondary hypertension 5-10%

Essential HTN

□ Risk factors (modified)

- ✗ Obesity---metabolic syndrome
- ✗ Unhealthy diet—Excessive salt intake--low potassium intake
- ✗ Excessive alcohol intake
- ✗ Polycythemia
- ✗ Lack of exercise
- ✗ Non-steroid anti-inflammatory drugs

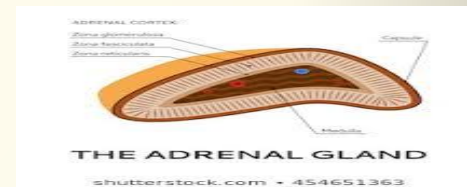
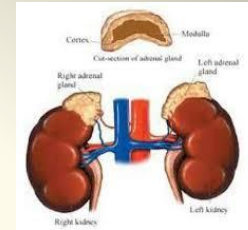
□ Risk factors (Non modified)

- ✗ Family history of essential HTN
- ✗ Aging
- ✗ Race & genetic

□ Caffeine and smoking increase the BP acutely but are not risk factors for the development of chronic essential HTN

Secondary Hypertension

- ✚ Primary renal disease
- ✚ Oral contraceptives
- ✚ Sleep apnea syndrome
- ✚ Primary hyperaldosteronism
- ✚ Renovascular disease
- ✚ Cushing's syndrome
- ✚ Pheochromocytoma
- ✚ Other endocrine disorders
- ✚ Coarctation of the aorta



Types Of BP Apparatuses

Non-automated device
[non-AOBP]



Half automated device



Digital Type



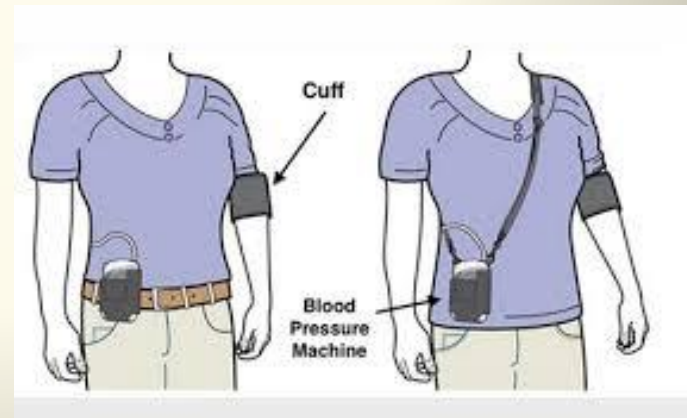
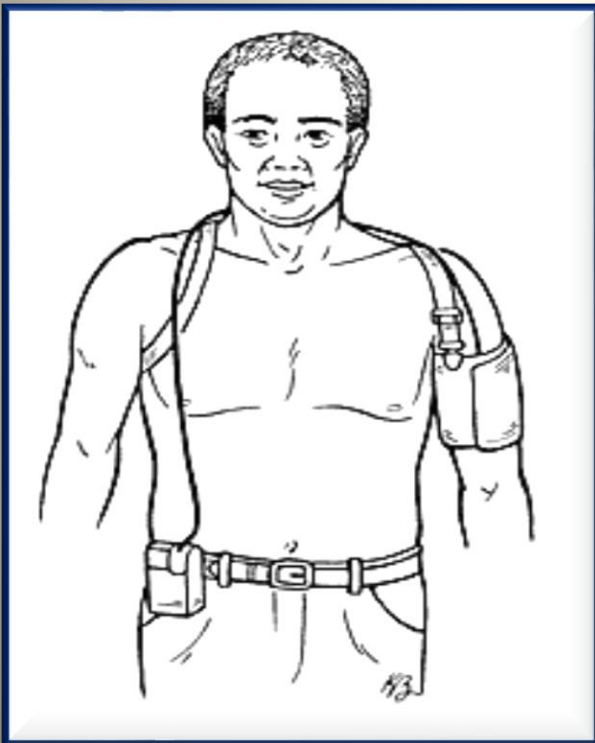
- Finger and/or wrist BP measuring devices are not recommended
- **AOBP** is the preferred method of performing in-office BP measurement

Type of Instrument of Blood Pressure Measurement



Home Blood Pressure Monitoring

Ambulatory Pressure Monitoring



Automated Blood Pressure Tru Device (Automated Office Blood pressure)



Automated
BpTRU™ BP Devices



© Continuing Medical Implementation

.....bridging the care gap



AOBP ≥ 135 or more than 85

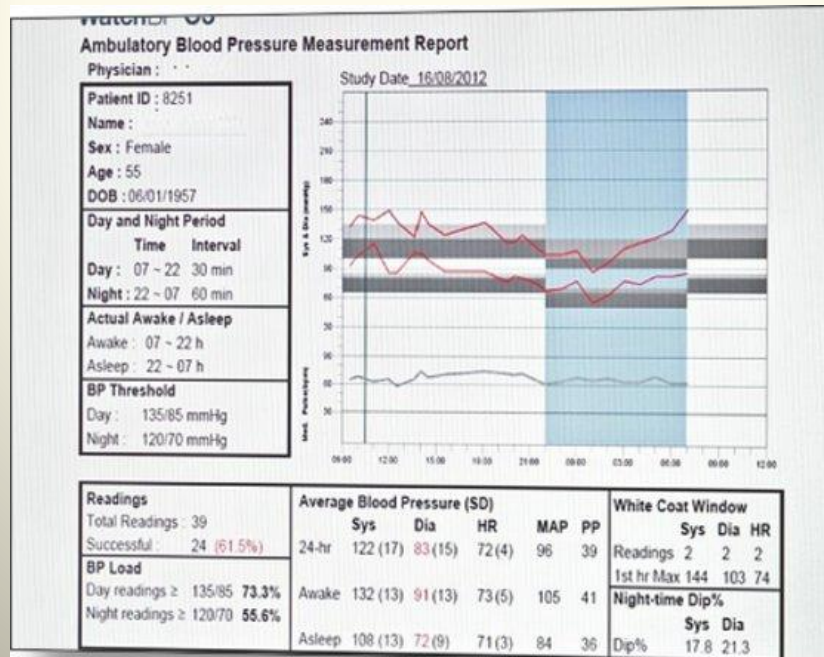
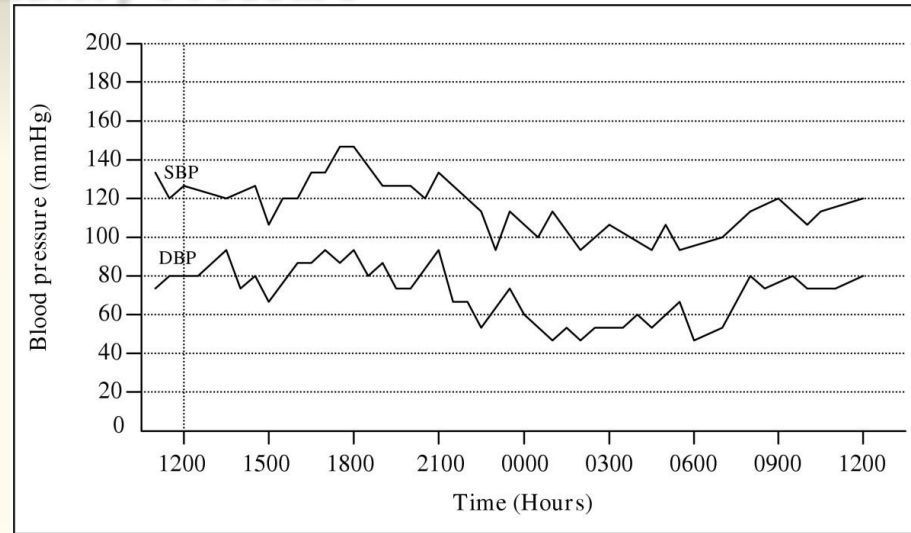


Ambulatory Pressure

Table 1 – Characteristics of the patients according to the analysis of quality of sleep

	Normal sleep (n=109)	Abnormal sleep (n=59)	p
Sex (male/female)	52/57	26/33	0.53
Age (years)	46.89±12.61	49.91±12.40	0.13
Age above 60 years (%)	24.5	19.4	0.59
Diabetes (%)	21.13	25.42	0.069
Smoking (%)	30.02	28.81	0.063
Obesity – BMI (kg/m ²) *	25.29±3.65	25.20±3.51	0.81
Indication for examination:			
- therapeutic control of hypertension/ - assessment of the "white-coat" effect	58/48	29/33	0.69
24-hour blood pressure (mm Hg)			
- Systolic	134.12±13.25	135.34±14.27	0.58
- Diastolic	84.50±10.62	84.68±9.48	0.91
Awake blood pressure (mm Hg)			
- Systolic	139.02±13.71	137.94±14.65	0.63
- Diastolic	88.52±9.86	87.87±9.86	0.71
Asleep blood pressure (mm Hg)			
- Systolic	121.44±13.54	123.78±15.30	0.30
- Diastolic	73.03±9.16	74.61±10.45	0.32

* body mass index calculated by the ratio between weight in kilograms and the square height in meters.



Choosing the correct blood pressure cuff size

Measure the circumference of your upper arm with a cloth measuring tape midway between the elbow and shoulder. Choose a cuff size that includes this measurement.



Position for taking your blood pressure at home

- 1 Rest for 5 minutes before measuring your blood pressure.
- 2 Sit in a chair with both feet flat on the ground and back straight.
- 3 Place your arm at the level of your heart or chest.
- 4 Stay still and do not talk as your blood pressure machine operates.



Measure your blood pressure in the morning right after you wake up or in the evening before you go to bed.

Try to measure your blood pressure at the same time every day.



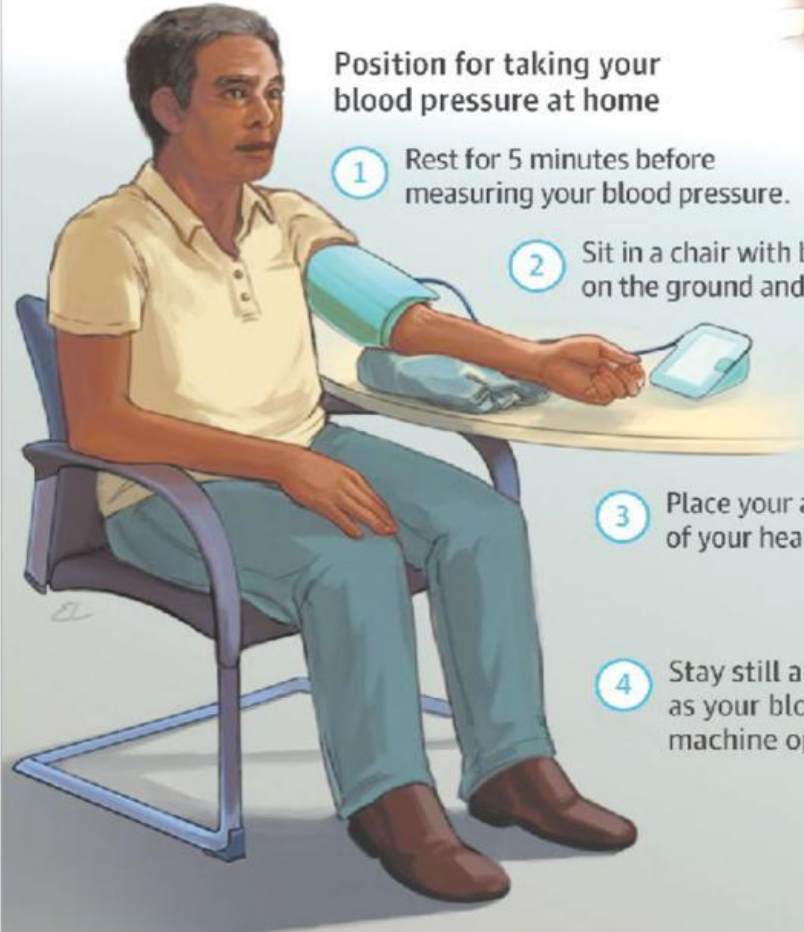
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Blood Pressure

- ✦ Apply to adults on no antihypertensive medications and who are not acutely ill.
- ✦ If there is a disparity in category between the systolic and diastolic pressures, the higher value determines the severity of the hypertension.
- ✦ Measure blood pressure to arm the high reading.

Office blood pressure measurement

- ✚ To allow the patients to sit for 3–5 minutes before beginning BP measurements
- ✚ Back straight and arm supported at heart level
- ✚ Take at least two BP measurements, spaced 1–2 min apart, and additional measurements if the first two are quite different.
- ✚ Consider the average BP if deemed appropriate.
- ✚ To use a standard bladder (12–13 cm wide and 35 cm long)
- ✚ A larger bladder for larger arm (circumference >32 cm)
- ✚ The bladder of the pressure cuff should encircle at least 80% of the upper arm





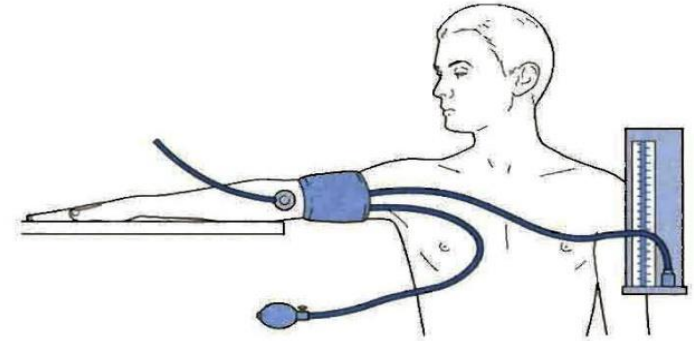
6 different size

Office blood pressure measurement

- ✚ Place the cuff at the heart level, whatever the position of the patient.
- ✚ Measure BP in both arms at first visit to detect possible differences. In this instance, take the arm with the higher value as the reference.
- ✚ Measure BP in sitting and standing position in elderly subjects and diabetic patients
- ✚ Use phase I and V (disappearance) Korotkoff sounds to identify systolic and diastolic BP, respectively.

Korotkoff sounds

Phase	Korotkoff sounds	Pressure
		120 mmHg systolic
I	A thud	
		110 mmHg
II	A blowing noise	
		100 mmHg
III	A softer thud	
		90 mmHg diastolic (1st)
IV	A disappearing blowing noise	
		80 mmHg diastolic (2nd)
V	Nothing	



المرحلة	أصوات كورتكوف	الضغط
		١٢٠ مم زئبق انقباض
١	جلجلة	
		١١٠ زئبق
٢	ضربة مزعجة	
		١٠٠ زئبق
٣	جلجلة ناعمة	
		٩٠ مم زئبق انقباضي (الأول)
٤	ضربات ناعمة مخفية	
		٨٠ مم زئبق انقباضي (الثاني)
٥	لا شيء	

شكل ١ - ٢ القيام بقياس ضغط الدم

- ✚ The diagnosis of mild hypertension should not be made until the blood pressure has been measured on at least two time in three visits**
- ✚ Average of 10 to 15 mmHg decrease between visits 1 and three**

White Coat Hypertension

- ✚ a phenomenon in which patients exhibit a blood pressure level above the normal range, in a clinical setting, though they do not exhibit it in other settings
- ✚ Approximately 20 to 25% of patients with mild office hypertension
- ✚ More common in elderly

European Society of Nephrology Classification of Blood Pressure Levels

Category	Systolic blood pressure (mmHg)	Diastolic blood pressure (mmHg)
Optimal blood pressure	<120	<80
Normal blood pressure	<130	<85
High-normal blood pressure	130-139	85-89
Grade 1 hypertension (mild)	140-159	90-99
Grade 2 hypertension (moderate)	160-179	100-109
Grade 3 hypertension (severe)	≥180	≥110
Isolated systolic hypertension	>140	<90

Categories of BP in Adults*

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

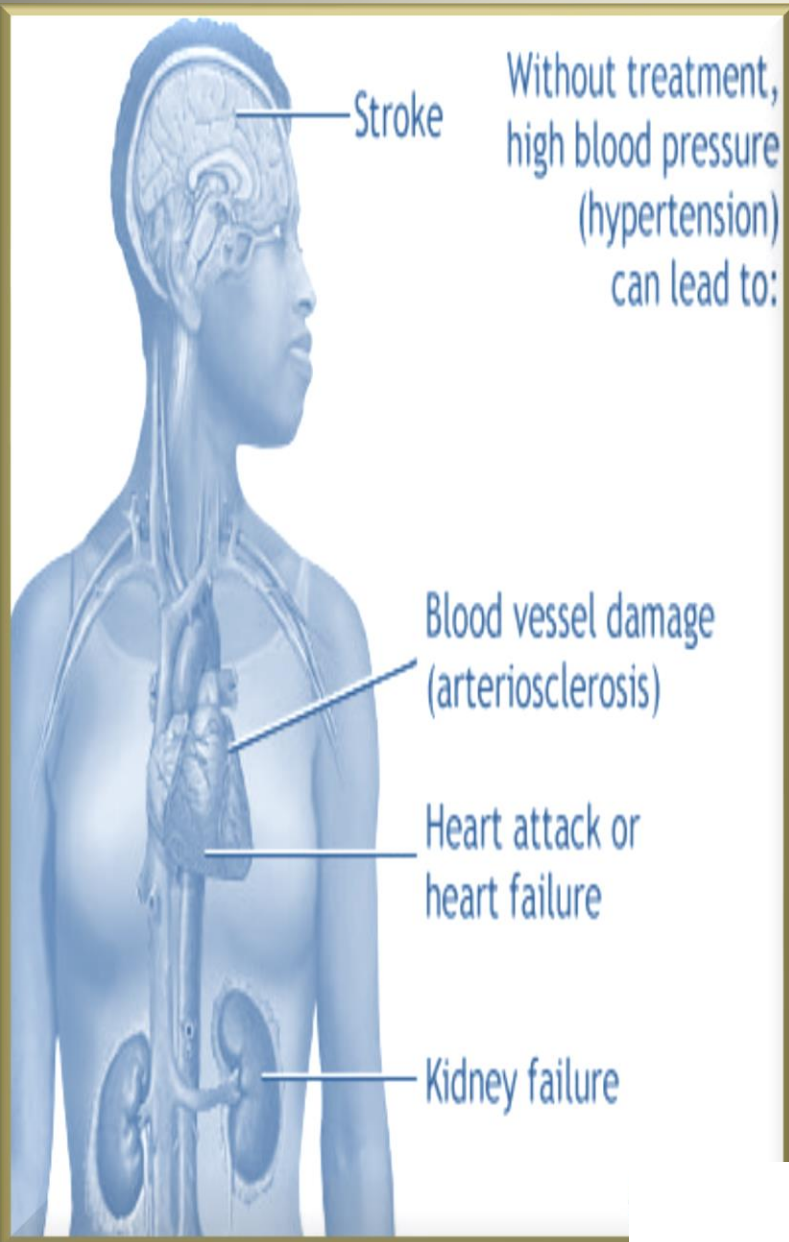
*Individuals with SBP and DBP in 2 categories should be designated to the higher BP category.

BP indicates blood pressure (based on an average of ≥2 careful readings obtained on ≥2 occasions, as detailed in DBP, diastolic blood pressure; and SBP systolic blood pressure.

Definitions of hypertension by office and out-of-office blood pressure levels

Category	Systolic BP (mmHg)		Diastolic (mmHg)
Office BP	≥140	and/or	≥90
Ambulatory BP			
Daytime (or awake)	≥135	and/or	≥85
Nighttime (or sleep)	≥120	and/or	≥70
24 h	≥ 130	and/or	≥80
Home BP	≥135	and/or	≥85

COMPLICATIONS



Stroke, Ischemia, Hemorrhage, Alzheimer's Disease, Cognitive, retinal hemorrhage

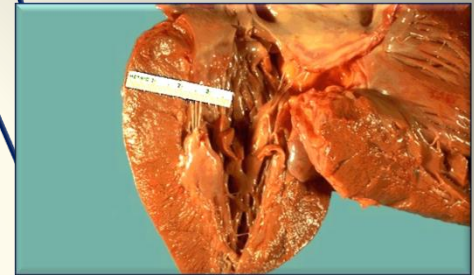
CAD, ECG, Arrhythmia, Sudden Death

CHF
LVH
Aortic Dissection

Renal Disease

Peripheral Vascular Disease

Hypertensive crises
urgency & Emergency



Hypertension



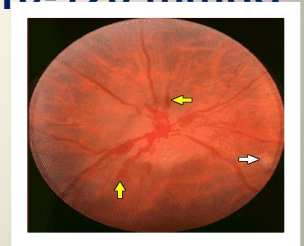
Hypertensive crises

Hypertensive Emergency

Severe hypertension (systolic BP >180-220 mm Hg or diastolic blood pressure above 120 mmHg) with
+ end organ damage (MI,STROKE,AKI,CHF)

Malignant (Accelerated) Hypertension

- ✚ hypertensive emergency
- ✚ systolic BP >180-220 mm Hg or diastolic blood pressure above 110-120 mmHg
- ✚ + with encephalopathy &
- ✚ + retinal hemorrhages, exudates, or papilledema



Hypertensive Crises necessitate immediate therapy to decrease BP within minutes to hours

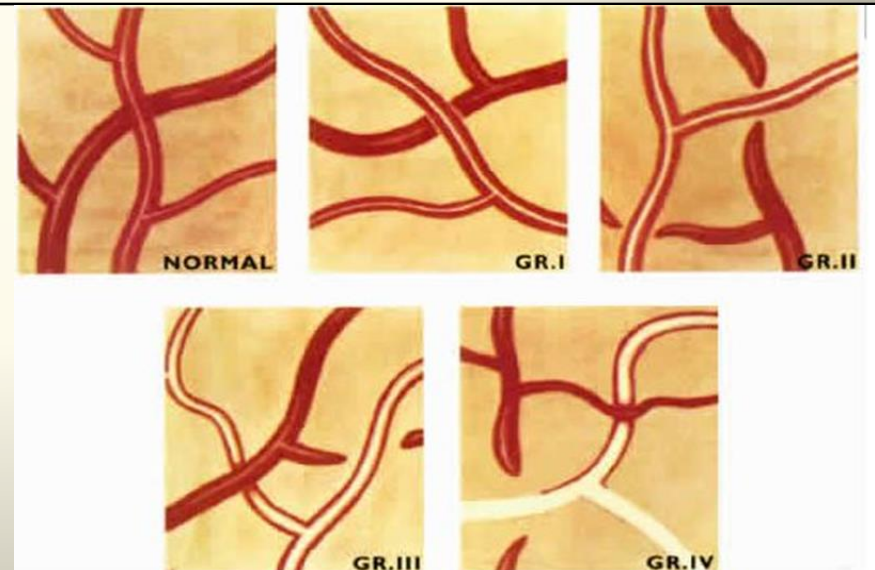
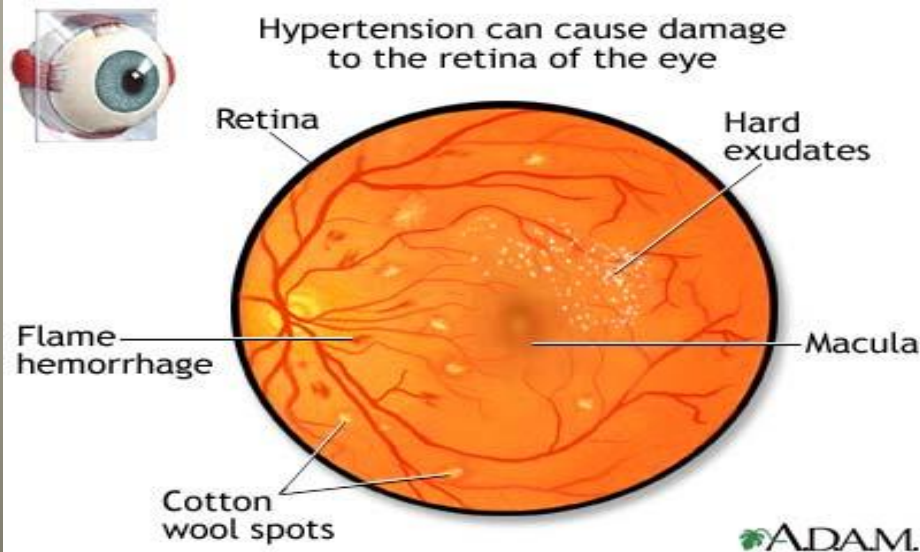
usually admitted to an intensive care unit for continuous cardiac monitoring

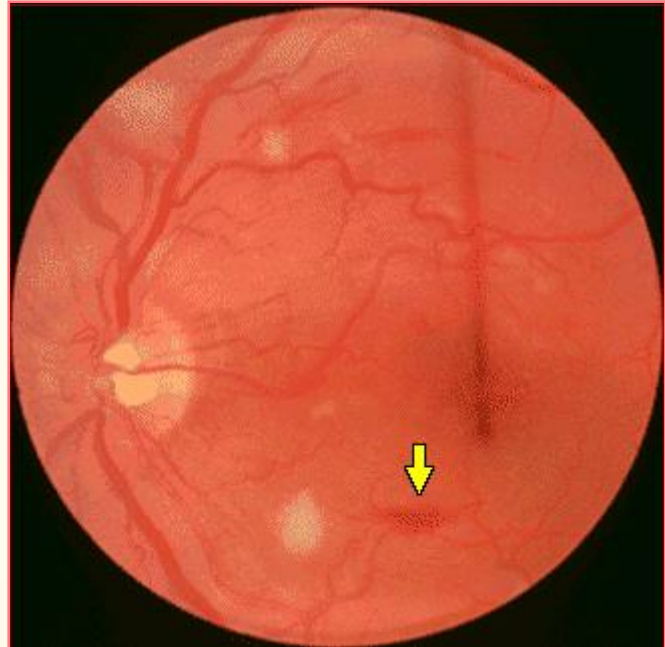
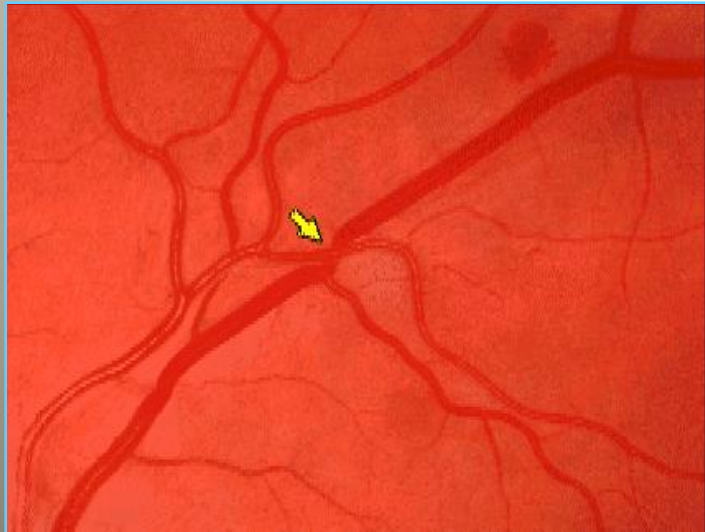
Hypertensive Urgency

- ✚ **Severe hypertension** (systolic BP >180-220 mm Hg or diastolic blood pressure above 110- 120 mmHg) in asymptomatic patients with
- ✚ **no evidence of target organ damage.**
- ✚ There is no proven benefit from rapid reduction in BP in asymptomatic patients who have no evidence of acute end-organ and are little short-term risk.
- ✚ The goal of therapy is with these cases is to reduce BP within 24 hours.

HYPERTENSIVE RETINOPATHY

Grade	Description
I	Minimal narrowing of retinal arteries
II	Narrowing of retinal arteries in conjunction with regions of focal narrowing and arterio-venous nipping
III	Abnormalities seen in Grade 1 and II, as well as retinal hemorrhages, hard exudation and cotton wool spots.
IV	Abnormalities encountered in Grades I through III, as well as swelling of the optic nerve head and macular star

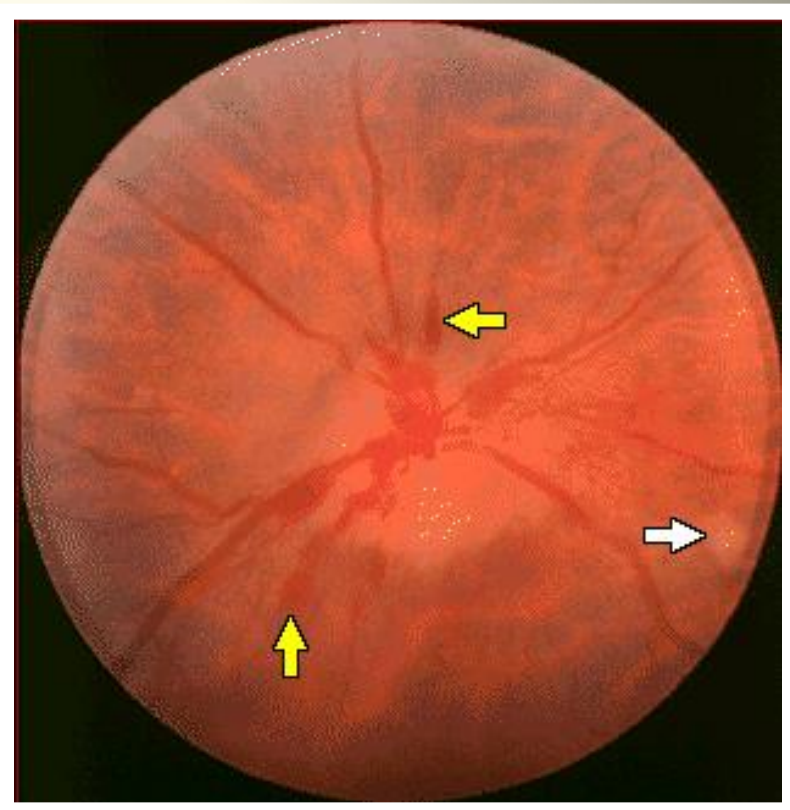
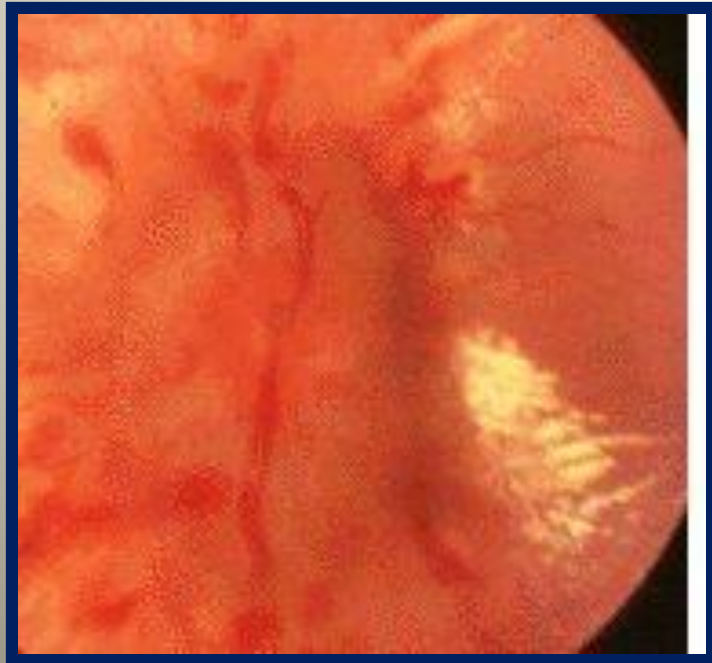




Hypertensive Retinopathy Grade

4

Papilledema from malignant hypertension. There is blurring of the borders of the optic disk with hemorrhages (yellow arrows) and exudates (white arrow)



Diagnosis Hypertension

Clinical Presentations:

- ✚ Asymptomatic
- ✚ Headache
- ✚ Epistaxis
- ✚ Chest discomfort
- ✚ Symptom of complications

Screening:

- ✚ Every one years for persons with systolic and diastolic pressures below < 120 mmHg and 80 mmHg
- ✚ Every 3-6months for persons with systolic and diastolic pressures higher >120 mmHg and 80 mmHg

Physical Examination

- 1. Confirm the diagnosis of hypertension**
- 2. Detect causes of secondary hypertension**
- 3. Assess CV risk**
- 4. Organ damage**
- 5. Concomitant clinical conditions.**

Important aspects of the physical examination in the hypertensive patient**Accurate measurement of blood pressure****General appearance**

Distribution of body fat

Skin lesions

Muscle strength

Alertness

Fundoscopy

Hemorrhage

Papilledema

Cotton-wool spots

Neck

Palpation and auscultation of carotids

Thyroid

Heart

Size

Rhythm

Sounds

Lungs

Rhonchi

Rales

Abdomen

Renal masses

Bruits over aorta or renal arteries

Femoral pulses

Extremities

Peripheral pulses

Edema

Neurologic assessment

Visual disturbance

Focal weakness

Confusion

Laboratory Tests

+ Routine Tests

- ✗ Electrocardiogram
- ✗ Urinalysis
- ✗ Serum sodium, serum potassium, creatinine, or the corresponding estimated GFR, and calcium
- ✗ Blood glucose, and hematocrit
- ✗ Lipid profile, after 9- to 12-hour fast, that includes high density and low-density lipoprotein cholesterol, and triglycerides

+ Optional tests

- ✗ Measurement of urinary albumin excretion or albumin/creatinine ratio

- + More extensive testing for identifiable causes is not generally indicated unless BP control is not achieved

BP Thresholds and Recommendations for Treatment and Follow-up

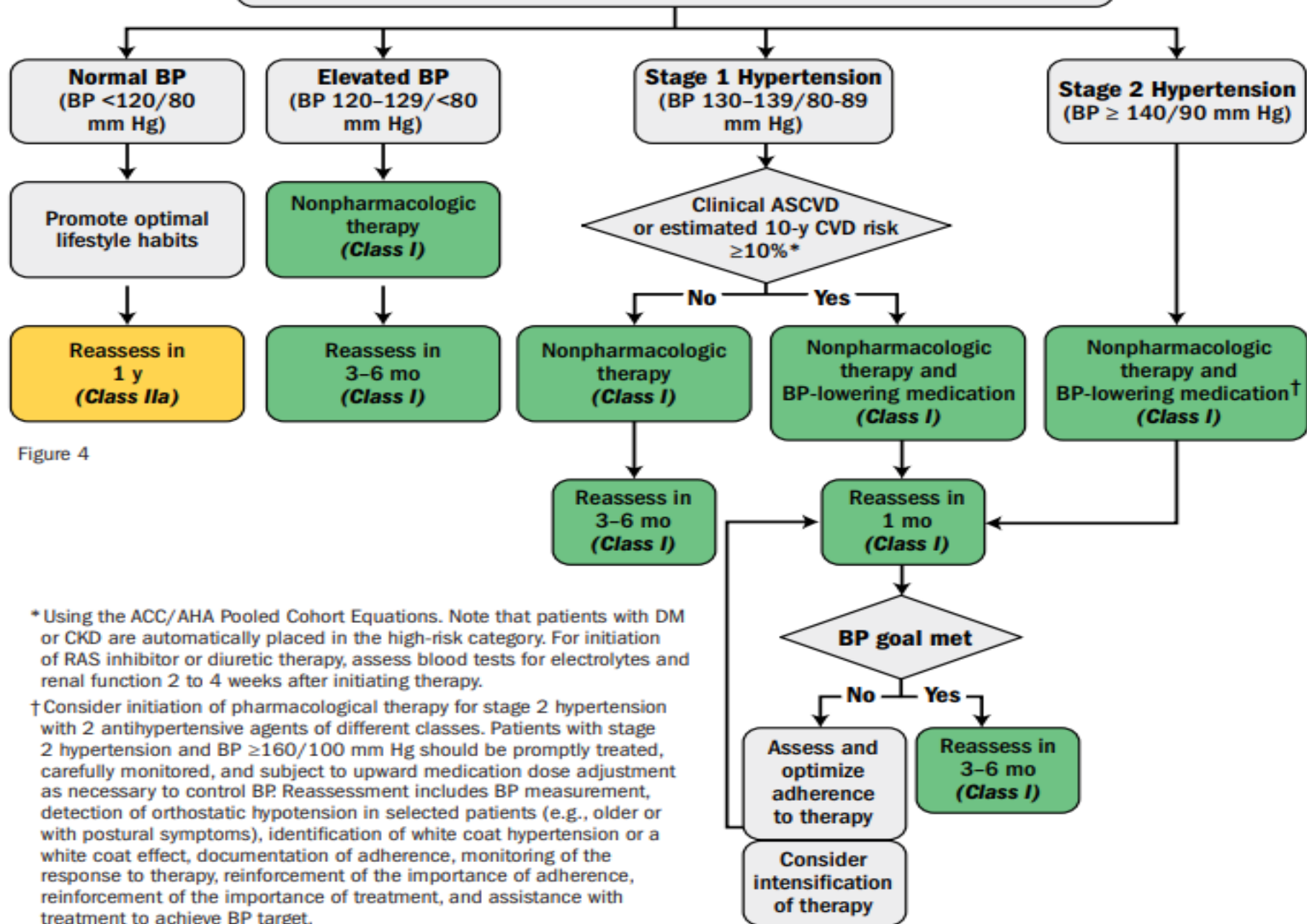


Figure 4

* 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.

Heart Risk Calculator

Age (years)

40-79

Gender

- Male
 Female

Race

- African American
 Other

Total cholesterol (mg/dL)

130-320

HDL cholesterol (mg/dL)

20-100

Systolic blood pressure (mmHg)

90-200

Diastolic blood pressure (mmHg)

30-140

Treated for high blood pressure

- No
 Yes

Diabetes

- No
 Yes

Smoker

- No
 Yes

Calculate

High Risk Group Therapy

- ✚ CHF – Thiazide, ACE-1, Aldosterone, BB
 - ✚ Post Myocardial Infarction – BB, ACEi
 - ✚ Diabetes Mellitus – proteinuria ACEi, ARB, NO
 - ✚ Nonproteinuria Thiazide, CCB, ARB, ACEi
 - ✚ CKD – ACEi, ABB, Thiazide
 - ✚ Stroke – CCB +ACEi
 - ✚ Pregnancy Aldomet ,labetalol, Ca channel bloocker
 - ✚ **Start in >130/80(130 – 139)/(85 – 89) mmHg**
Lifestyle change +Medication
- BP target of less than 130/80 Hg is recommended

Best Proven Nonpharmacological Interventions for Prevention and Treatment of Hypertension*

	<u>Nonpharmacological Intervention</u>	Dose	Approximate Impact on SBP	
			Hypertension	<u>Normotension</u>
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
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
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
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

*Type, dose, and expected impact on BP in adults with a normal BP and with hypertension.

DASH indicates Dietary Approaches to Stop Hypertension; and SBP, systolic blood pressure.

Resources: Your Guide to Lowering Your Blood Pressure With DASH—How Do I Make the DASH?

Available at: <https://www.nhlbi.nih.gov/health/resources/heart/hbp-dash-how-to>.

Top 10 Dash Diet Tips. Available at: http://dashdiet.org/dash_diet_tips.asp



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Best Proven Nonpharmacological Interventions for Prevention and Treatment of Hypertension* (cont.)

	Nonpharmacological Intervention	Dose	Approximate Impact on SBP	
			Hypertension	Normotension
Physical activity	Aerobic	<ul style="list-style-type: none"> ● 90–150 min/wk ● 65%–75% heart rate reserve 	-5/8 mm Hg	-2/4 mm Hg
	Dynamic resistance	<ul style="list-style-type: none"> ● 90–150 min/wk ● 50%–80% 1 rep maximum ● 6 exercises, 3 sets/exercise, 10 repetitions/set 	-4 mm Hg	-2 mm Hg
	Isometric resistance	<ul style="list-style-type: none"> ● 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
Moderation in alcohol intake	Alcohol consumption	In individuals who drink alcohol, reduce alcohol [†] to: <ul style="list-style-type: none"> ● Men: ≤2 drinks daily ● Women: ≤1 drink daily 	-4 mm Hg	-3 mm

*Type, dose, and expected impact on BP in adults with a normal BP and with hypertension.

†In the United States, one "standard" drink contains roughly 14 g of pure alcohol, which is typically found in 12 oz of regular beer (usually about 5% alcohol), 5 oz of wine (usually about 12% alcohol), and 1.5 oz of distilled spirits (usually about 40% alcohol).



Summary of antihypertensive drug treatment

Single medicine
=>130-160/80-100
Or frail older(80y) patients

A CCB is preferred but consider a thiazide-like diuretic if a CCB is not tolerated or the person has edema, evidence of heart failure or a high risk of heart failure.

Consider a low dose of spironolactone¹⁵ or higher doses of a thiazide-like diuretic.

Consider an alpha- or beta-blocker if further diuretic therapy is not tolerated, or is contraindicated or ineffective.

=>160/100

If BP not control

Aged under 55 years

Aged over 55 years or black person of African

AORB

CORD

A(B) + C or A(B)+D
One pill dual combination

A + C + D
One pill triple combination

Resistant hypertension
A + C + D + consider further diuretic^{14, 15} or alpha- or beta-blocker¹⁶
Consider seeking expert advice

Key
A – ACE inhibitor
B-angiotensin II receptor blocker (ARB)¹²
C – Calcium-channel blocker (CCB)¹³
D – Thiazide-like diuretic

DO NOT START with B-BLOCKER

DO NOT USE A+B

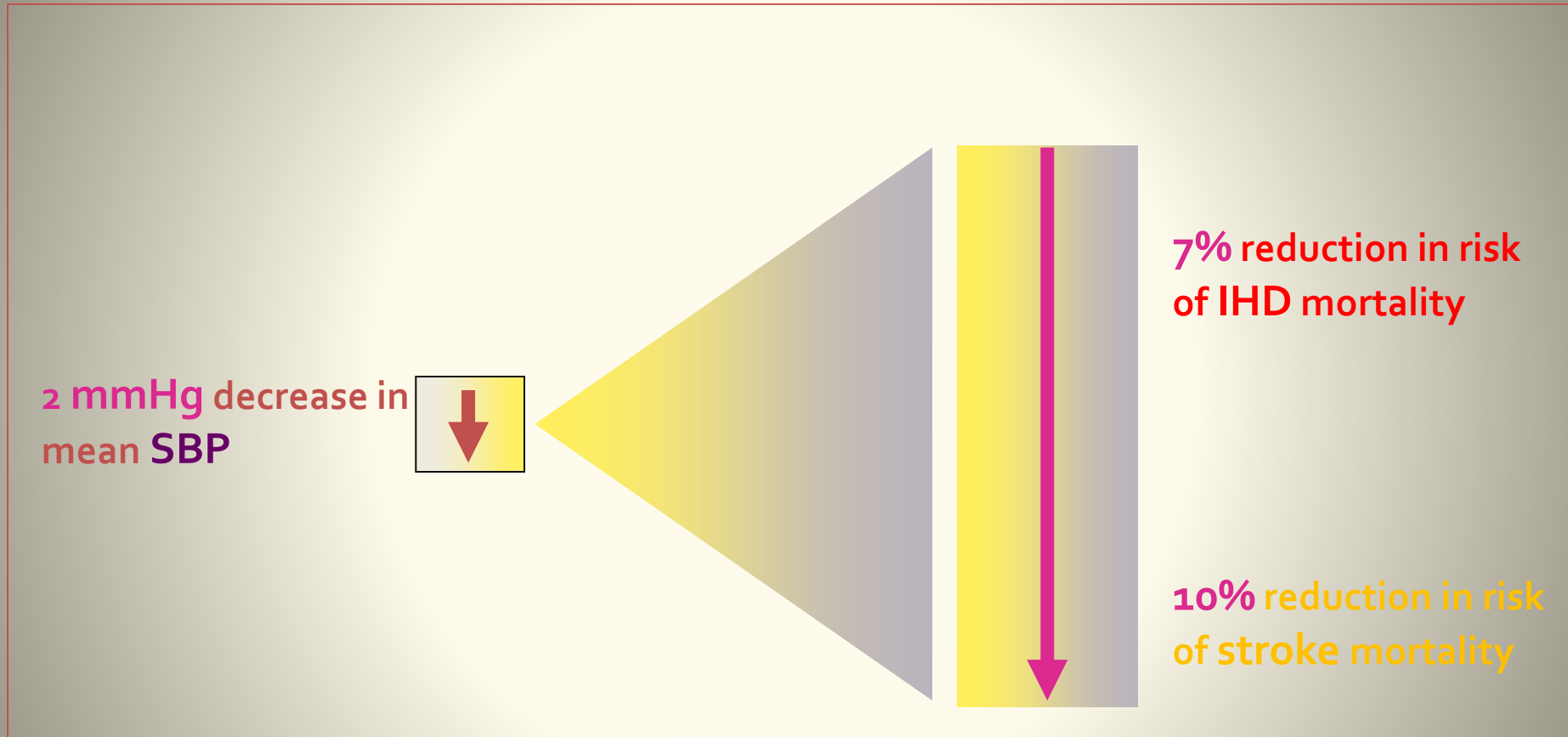
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- ✦ Diabetes Mellitus – proteinuria ACEi, ARB, NO
- ✦ Nonproteinuria Thiazide, CCB, ARB, ACEi
- ✦ CKD – ACEi, ABB, Thiazide
- ✦ Stroke – CCB + ACEi
- ✦ Pregnancy Aldomet, labetalol, Ca channel blocker
- ✦ Start in $>130/80(130 - 139)/(85 - 89)$ mmHg
Lifestyle change + Medication
- BP target of less than 130/80 Hg is recommended

Anti-hypertensive Medications and Complications

- ✚ Diuretics → Hypokalemia
- ✚ β -Adrenergic Blocking Agents → Bradycardia
- ✚ Angiotensin-Converting Enzyme Inhibitors → Hyperkalemia + cough
- ✚ Angiotensin II Receptor Blockers → Hyperkalemia
- ✚ Calcium Channel Blocking Agents → Edema + Tachycardia + Bradycardia
- ✚ α -Adrenoceptor Antagonists → 1st dose hypotension
- ✚ Drugs with Central Sympatholytic Action → Drowsiness
- ✚ Arteriolar Dilators → Tachycardia + Edema

Blood Pressure Reductions as Little as 2 mmHg Reduce the Risk of Cardiovascular Events by up to 10%



Meta-analysis of 61 prospective, observational studies conducted by Lewington et al involving one million adults with no previous vascular disease at baseline mmHg

Benefits of Lowering BP

Average Percent Reduction	
Stroke incidence	35–40%
Myocardial infarction	20–25%
Heart failure	50%
Renal Failure	35-50%

Threshold & Targeted BP

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
General		
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 (≥ 65 years of age; noninstitutionalized, ambulatory, community-living adults)	≥ 130 (SBP)	< 130 (SBP)
Specific comorbidities		
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	$\geq 130/80$	$< 130/80$

An SBP target range of 130–139 mmHg is recommended for people older than 80 years, if tolerate

ASCVD indicates atherosclerotic cardiovascular disease; BP, blood pressure; CVD, cardiovascular disease; and SBP, systolic blood pressure.



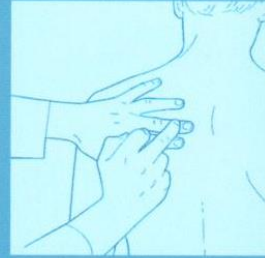
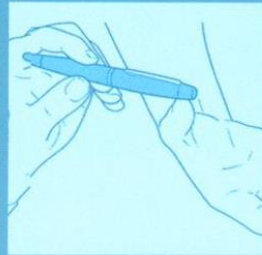
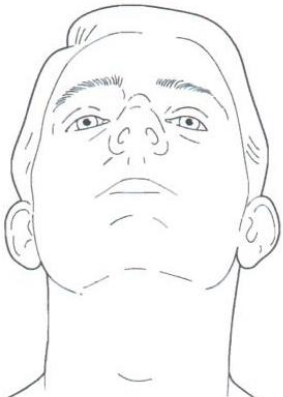
تأليف

نيكولاس ج. تالي سيمون أوكونر

كتاب الفحص الإكلينيكي الجيبي

ترجمة

أ.د. جمال بن صالح الوكيل



جامعة الملك سعود

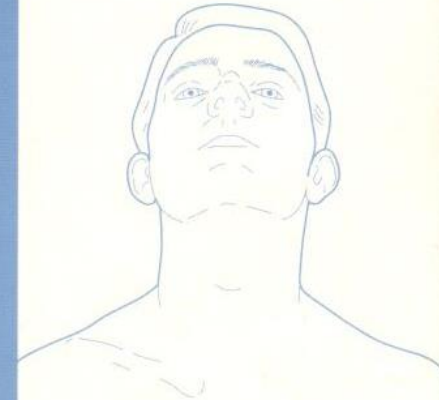
النشر العلمي والمطابع



NICHOLAS J TALLEY
SIMON O'CONNOR

POCKET CLINICAL EXAMINATION

SECOND EDITION



summary

- **The overall prevalence of hypertension in adults is around 30 - 45%**
- **Need proper technique in measurement**
- **Lead cause coronary death or myocardial infarction, CHF or fatal or nonfatal stroke, CKD**
- **Threshold of treatment start 130/80 mm Hg**
- **Target treatment < 130/80 mm Hg**
- **nonpharmacological and antihypertensive drug are effective to reduce all complications in all ages**

Thank you