# HYPERTENSION


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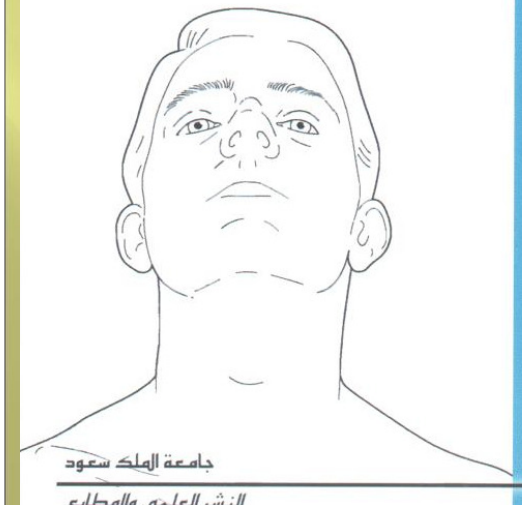
تأليف

نيكولاس ج. تالي  سيمون أوكونر

# كتاب الفحص الإكلينيكي الجيبي

ترجمة

أ.د. جمال بن صالح الوكيل



جامعة الملك سعود

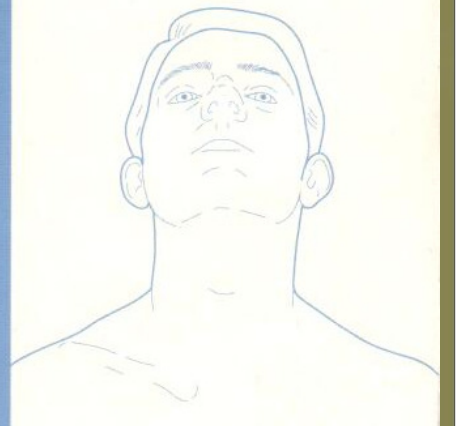
النشر العلمي والمطابع

NICHOLAS J TALLEY

SIMON O'CONNOR

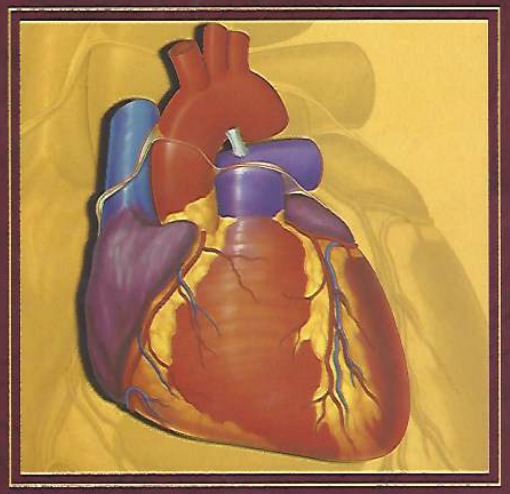
# POCKET CLINICAL EXAMINATION

SECOND EDITION



الجمهورية العربية السورية
رئاسة الجمهورية
هيئة الموسوعة العربية

# الموسوعة الطبية المتخصصة



## المجلد الثالث

## أمراض القلب والأوعية الدموية

# 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
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

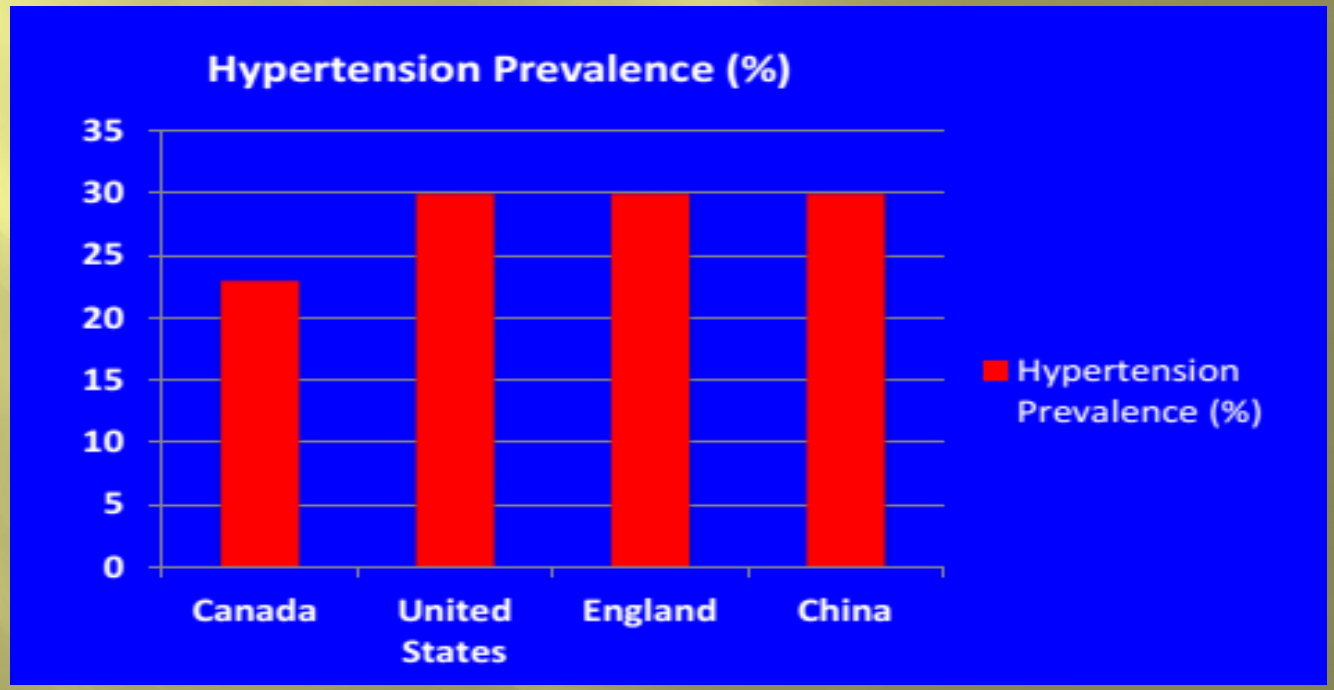
# Case

***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?**

# HYPERTENSION

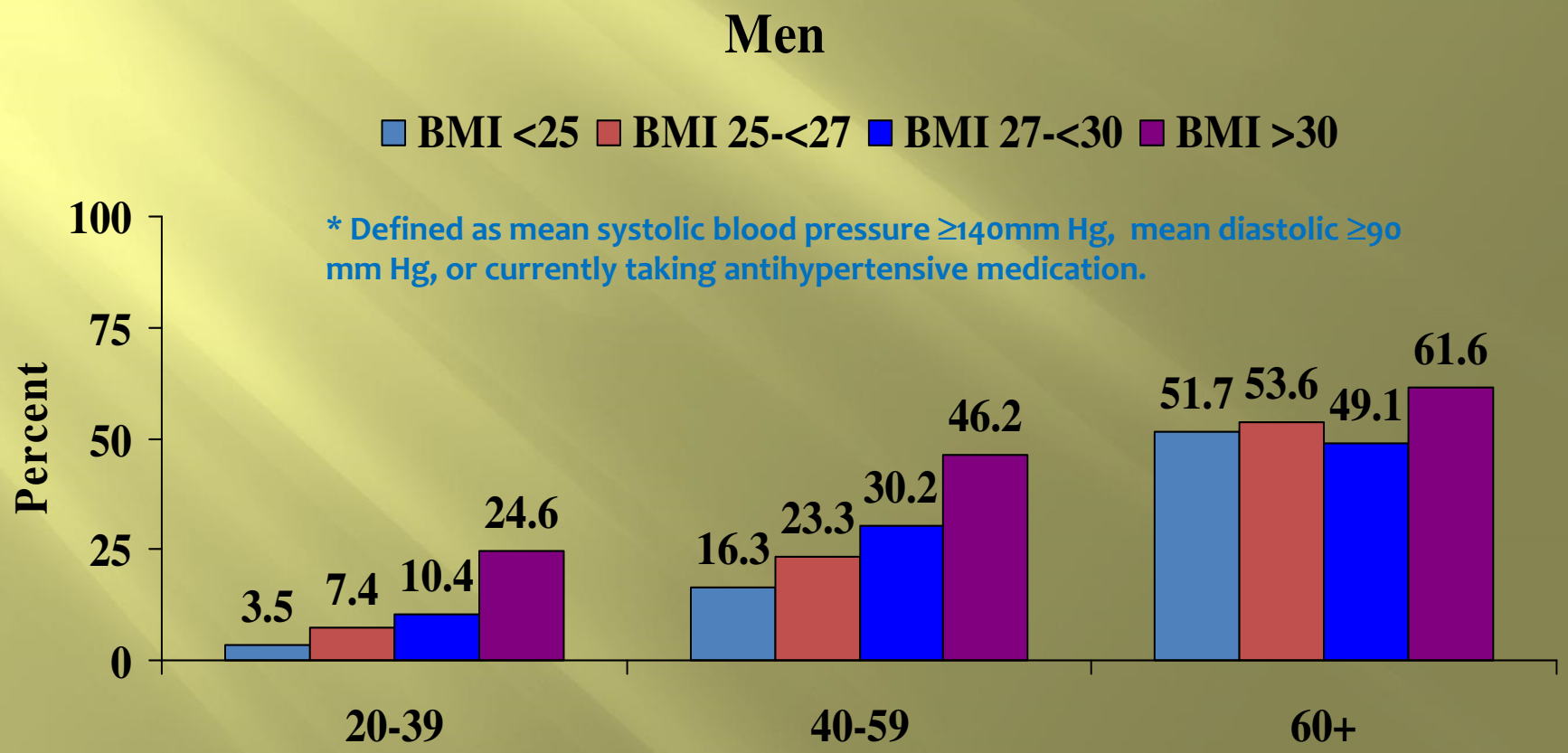
- *Worldwide high BP affects>40% of adults older than the age of 25 years*
- **Onset stage 25-55 years mainly in 40-50y**
- **Occurs over 30%of persons older than 65 y**
- *The 4th most common cause of death worldwide*
- *global BP control remains at 32.5%.*




Padwal et al. Can J Cardiol 2016

# NHANES III Prevalence of Hypertension* According to Sex, Age, and BMI

- High prevalence of hypertension in the community is currently being driven by two phenomena:
  - the increased age of population
  - the growing prevalence of obesity
- High dietary salt intake is also a major factor




Brown C et al. Body Mass Index and the Prevalence of Hypertension and Dyslipidemia. Obes Res. 2000; 8:605-619.

# Prevalence, Awareness, Treatment, and Control of Hypertension among Saudi Adult Population: A National Survey

- *select 4758 adult participants (2011)*
- *The overall prevalence of hypertension in Saudia was 1213 (25.5%)*
- *Only 545 (44.7% )of hypertensives were aware*
- *389 ( 71.8%) of them received pharmacotherapy(32 %)*
- *Only 144 ( 37.0%) were controlled.(12%)*
- *Risk of hypertension increased among men, with age, obesity, diabetes, and hypercholesterolemia*

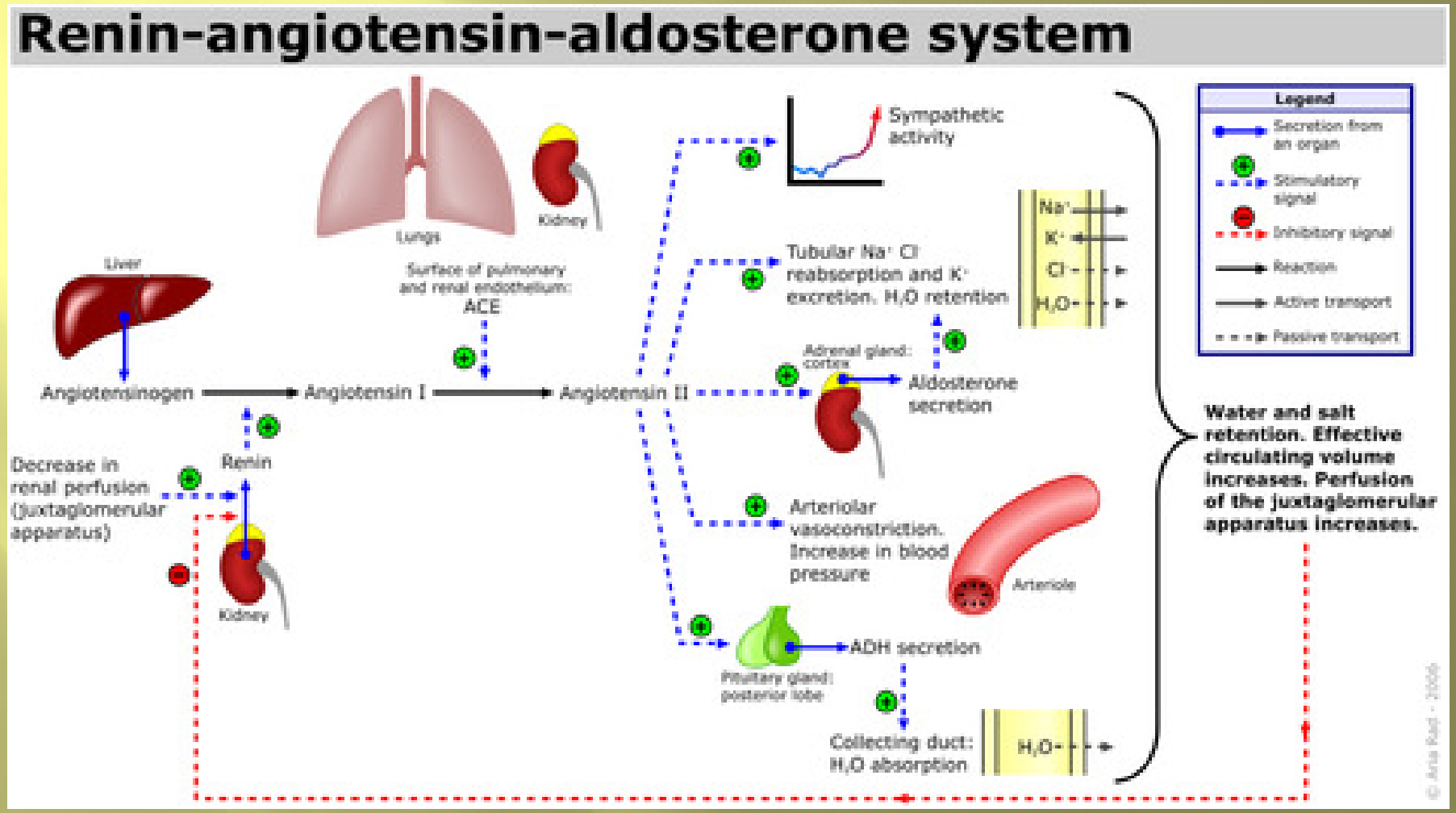
***Source: International Journal of Hypertension***
***Abdalla A. Saeed, Nasser A. Al-Hamdan***
***Volume 2011 (2011), Article ID 174135, 8 pages***

# Mechanism of Blood Pressure:

Blood Pressure = Cardiac output X
Systemic Vascular Resistance
= CO X SVR
= Stroke volume X HR X SVR

- An overactive Renin-angiotensin system leads to vasoconstriction and retention of sodium and water. The increase in blood volume leads to hypertension.
- An overactive sympathetic nervous system, leading to increased stress responses.
- Blunting of pressure-natriuresis
- Variation of cardiovascular & renal devolpment
- Elvated intracellular Na or Ca

# renin-angiotensin-aldosterone system (RAAS)



# Hypertension

- **primary hypertension (essential)-**
  **In 90%-95% of cases**
  **no cause can be found**
  **it familiar (more common in black )**
- **result between environmental , & genetic factors**
  (more than 50 genes)

- **Secondary hypertension 5-10%**

# Essential HTN

- Risk factors
  - Obesity---metabolic syndrome- DM
  - Excessive salt intake---low potassium intake
  - Excessive alcohol intake
  - Polycythemia
  - Lack of exercise
  - Family history of essential HTN
  - Vit D deficiency
  - Aging
  - smoking; increase risk of complication
- Caffeine 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**
- **Drug**; **NSAID,Cyclosporin,decongestions,** **erythropoiesis-stimulatin agent**

Expected if - onset high blood pressure before age 30 or after age 55

- Sever or resistant hypertension

# 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 |

# Diagnosis of hypertension by office and out-of-office blood pressure levels

| Mothode of diagnosis hypertension |
| --- |
| Office BP |
| Ambulatory BP |
| Daytime (or awake) |
| Nighttime (or sleep) |
| mean 24 h |
| Home BP |
| AOBP(Automated office blood pressure) |

2013 ESH and ESC Guidelines

# Types Of BP Apparatuses

## Non-automated device [non-AOBP]



## Half automated device


## Automated Device



Digital Type

# Automated Blood Pressure Tru Device (Automated Office Blood pressure)



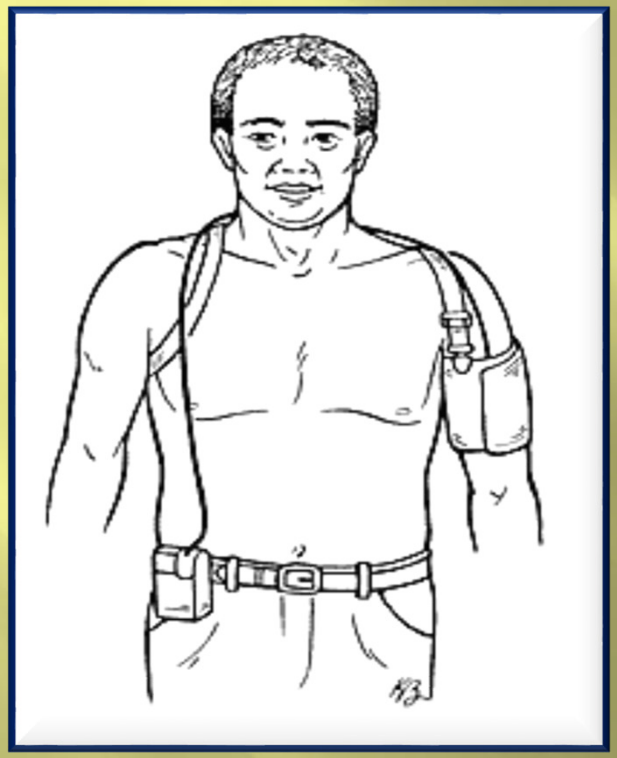
AOBP ≥135 or more than 85

## Home Blood Pressure Monitoring (HBPM)


Type of Instrument of home Blood Pressure Measurement


**Finger and/or wrist BP measuring devices are not recommended

# Ambulatory Pressure Monitoring



# 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 |
| Mean 24 h | ≥ 130 | and/or | ≥80 |
| Home BP | ≥135 | and/or | ≥85 |
| AOBP(Automated office blood pressure) | ≥135 | and/or | ≥85 |

2013 ESH and ESC Guidelines

# Blood Pressure

- Apply to adults on no antihypertensive medications and who are not acutely ill.
- Measure blood pressure to arm the high reading.

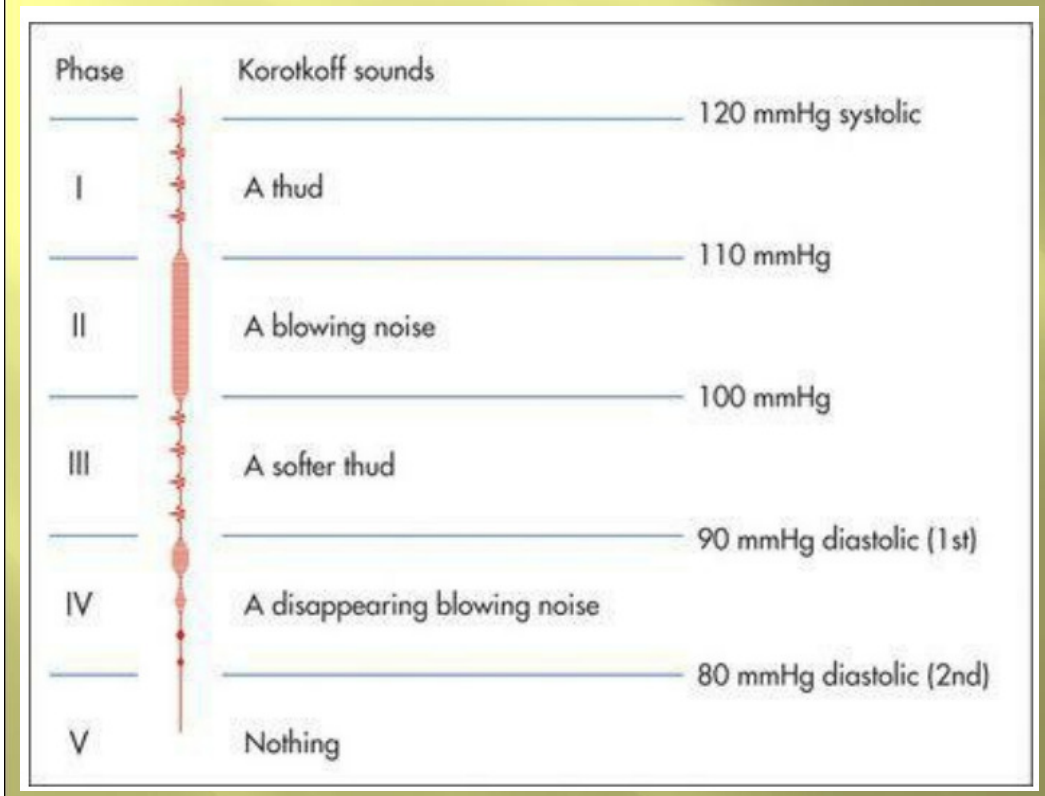
# Office blood pressure measurement

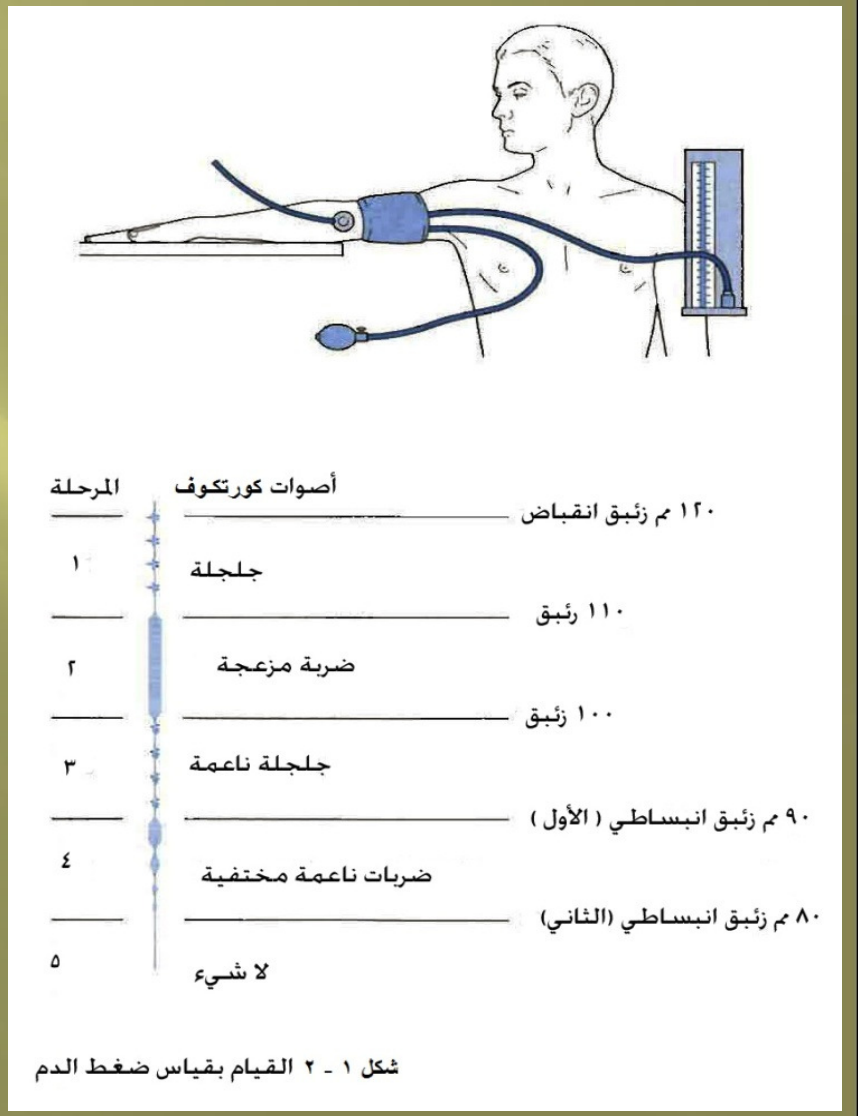
- To allow the patients to sit for 3–5 minutes before beginning BP measurements
- Back straight and arm supported at heart level
- Take at least two BP measurements, spaced 1–2 min apart, and additional measurements if the first two are quite different.
- Consider the average BP if deemed appropriate.
- 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

# 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



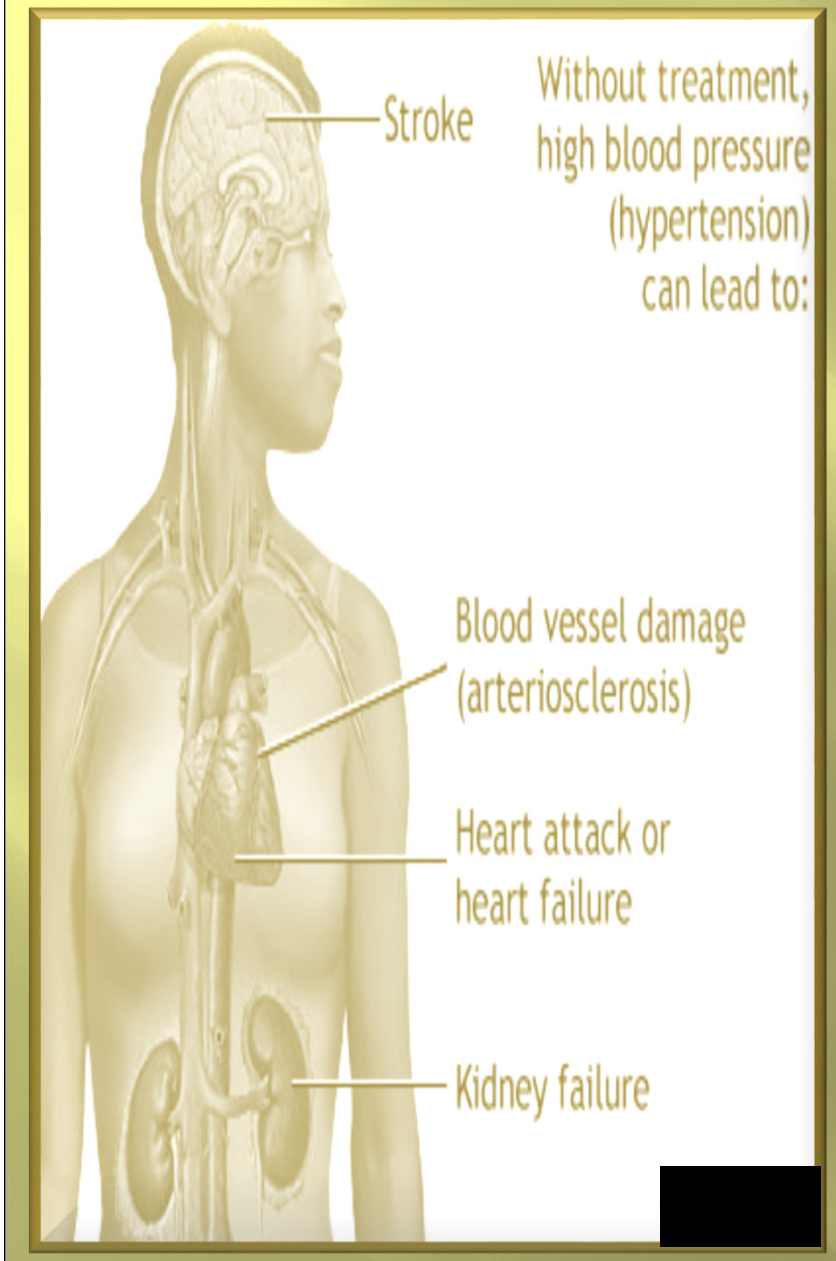




شكل ١ - ٢ القيام بقياس ضغط الدم

# White Coat Hypertension

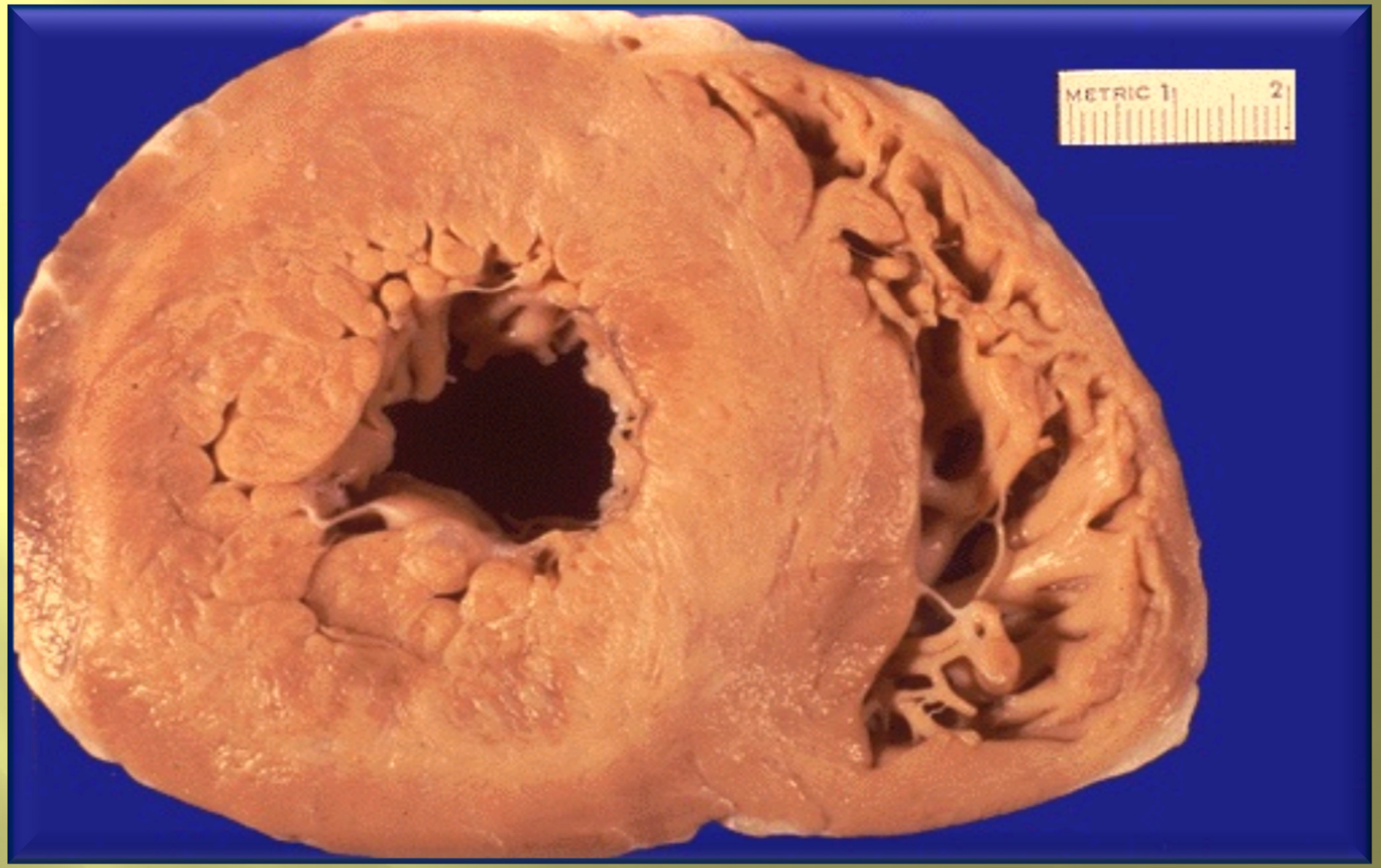
- Approximately 20 to 25% of patients with mild office hypertension
- More common in elderly
- The diagnosis of mild hypertension should not be made until the blood pressure has been measured on at least three to six visits

# COMPLICATIONS




- Stroke, Ischemia, Hemorrhage, Alzheimer's Disease, Cognitive, retinal hemorrhage
- CHF
  LVH
  Aortic Dissection
- CAD, ECG,
  Arrthymia, Sudden Death
- Renal Disease
- Peripheral Vascular Disease
- Hypertensive Emergency
  And Increase Emergency Morbidity

**Hypertension**




**The left ventricle is markedly thickened in this patient with severe hypertension that was untreated for many years. The myocardial fibers have undergone hypertrophy.**

# Malignant (Accelerated)Hypertension

- **Marked hypertension with encephapapathy& retinal hemorrhages, exudates, or papilledema**
- **Associated with a diastolic pressure above 120 mmHg**

# Hypertensive Emergency

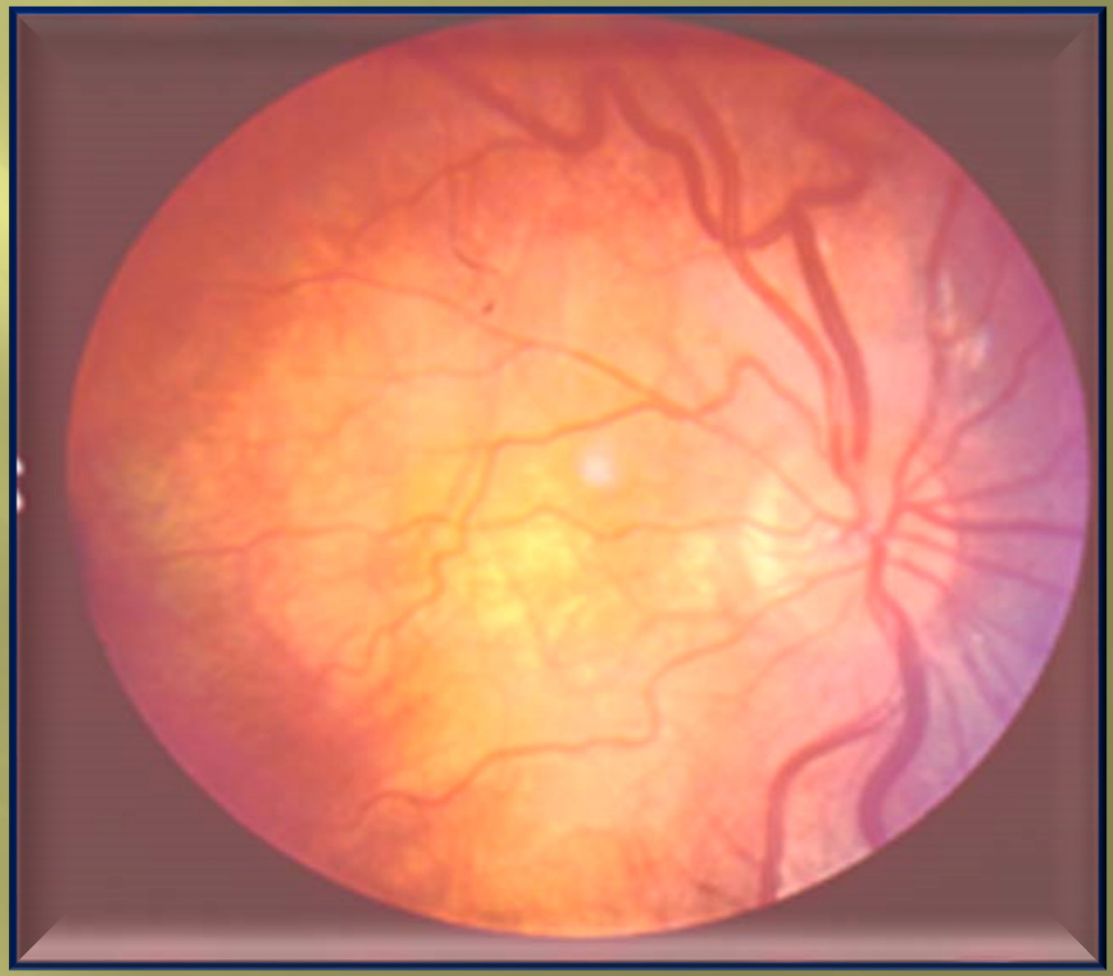
**Severe hypertension (diastolic blood pressure above 120 mmHg) in end organ damage (MI,STROKE,AKI,CHF**

# HYPERTENSIVE RETINOPATHY

| | Description |
|---|---|
| | Minimal narrowing of retinal arteries |
| | Narrowing of retinal arteries in conjunction with regions of focal narrowing and arterio-venous nipping |
| | retinal hemorrhages, hard exudation and cotton wool spots. |
| | **papilledema**<br>swelling of the optic nerve head and macular star |

# Hypertensive Retinopathy Grade 1

Generalized arteriolar constriction- seen as `silver wiring` and Vascular tortuosities



# Copper wiring

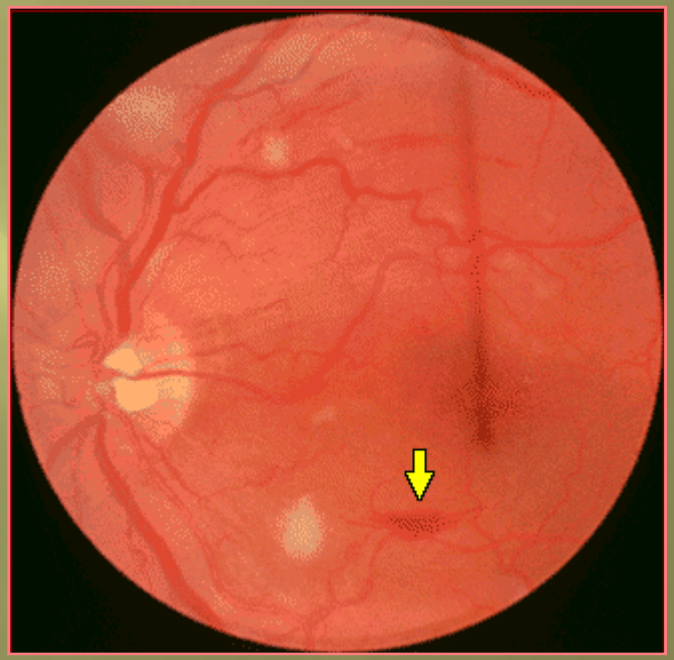
# Hypertensive Retinopathy Grade 2

**Arteriovenous nicking in association with hypertension Grade 2**

**(yellow arrow)**

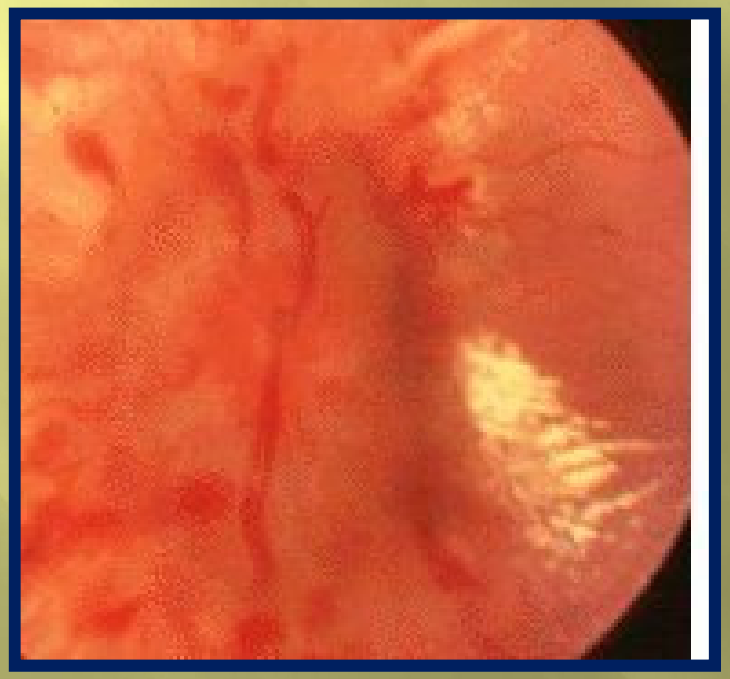
# Hypertensive Retinopathy Grade 3

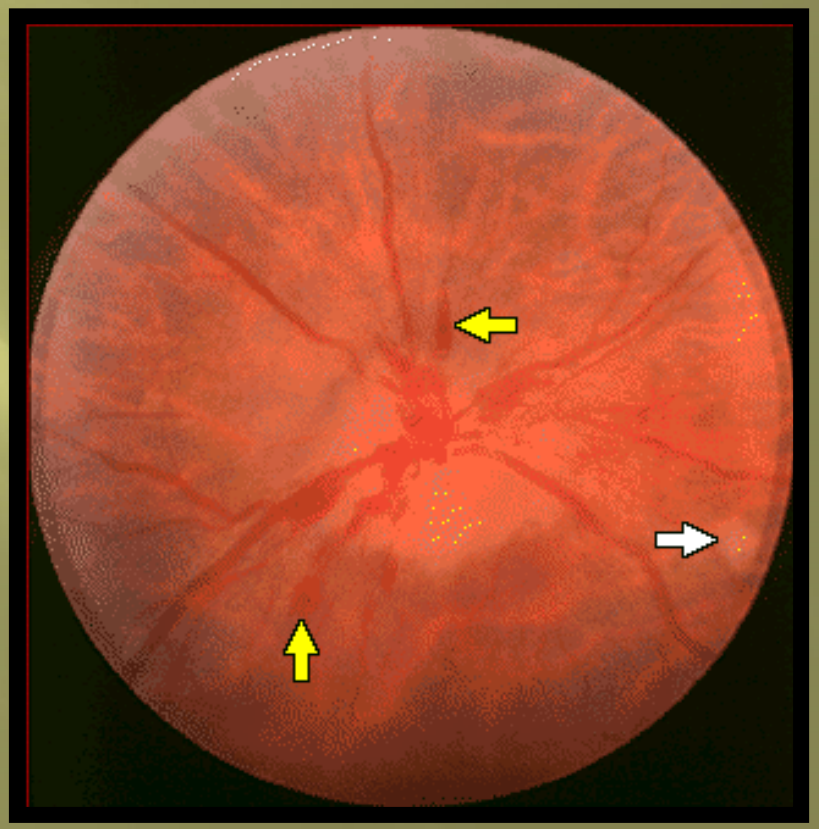
**Flame-shaped hemorrhage in association with severe hypertension Grade 3 (yellow arrow)**



# 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 two years for persons with systolic and diastolic pressures below 120 mmHg and 80 mmHg**
- **Yearly for persons high risk or High-normal blood pressure(**130-139 or 85-89)

# 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,uric acid
  - 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

# Who should be treated?

## LOW risk

- 1-If the visit 1 mean office systolic BP is 180mm Hg and/or DBP is 110 mm Hg then hypertension is diagnosed
- 2-At visit 2, mean office BP measurement is 140 mm Hg systolic and/or 90 mm Hg diastolic in patients with macrovascular target organ damage, diabetes mellitus, or chronic kidney disease (glomerular filtration rate < 60 mL/min/1.73 m2
- 3- At visit 3, mean office BP measurement is 160 mm Hg systolic or 100mm Hg diastolic

- 4-At visit 4-5, mean office BP measurement is 140 mm Hg systolic or 90 mmHg diastolic without risk factor
- Treat all cardiovascular risk factors

# EVALUATING THE PATIENT

- High blood pressure is only one of several cardiovascular risk factors that require attention
- Before starting treatment for hypertension, it is useful to evaluate the patient more thoroughly :
  - Risk factors include age, male sex, smoking, dyslipidemia, glucose intolerance, obesity and family history of premature CVD. Asymptomatic organ damage mainly involves left ventricular hypertrophy, evidence of vascular damage and microalbuminuria; CKD; CVD, DM

Source: Clinical Practice Guidelines for the Management of Hypertension in the Community ; A Statement by the American Society of Hypertension and the International Society of Hypertension
Michael A. Weber, MD; Ernesto L. Schiffrin, MD, et al.

# Patient Monitoring and Support
# CVD Risk Check

Home | CVD Risk Check | Reynolds vs. Framingham | FAQ

## Framingham Risk Score[1]

**Risk assessment tool for estimating a patient's 10-year risk of developing cardiovascular disease**

| | |
|---|---|
| Age: | ☐ Years |
| Gender: | ○ Female ○ Male |
| Total cholesterol: | ☐ mmol/L |
| HDL cholesterol: | ☐ mmol/L |
| Smoker: | ○ Yes ○ No |
| Diabetes: | ○ Yes ○ No |
| Systolic blood pressure: | ☐ mm Hg |
| Is the patient being treated for high blood pressure? | ○ Yes ○ No |

Calculate risk

This online assessment tool is intended as a clinical practice aid for use by experienced healthcare professionals. Results obtained from this tool should not be used alone as a guide for patient care.

The risk assessment tool above uses information from the Framingham Heart Study as recommended by the 2009 CCS Canadian Cholesterol Guidelines to predict a person's chance of developing cardiovascular disease in the next 10 years, modified for family history (double the CVD risk percentage if any CVD present in a first degree relative before age 60). In men over 50 or women over 60 of intermediate risk whose LDL-C does not already suggest treatment, hsCRP can be used for risk stratification. Please enter your patient's information in the fields below.

The time is 11/9/2016 11:32:06 AM

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Français

## Framingham Risk Score - RESULTS[1,4]

**Your patient's Framingham Risk Score is** 25.3%

### 2009 CCS Canadian Cholesterol Guidelines Recommendation[1]

| Risk Level | Initiate/consider treatment if any of the following: | Primary LDL-C targets |
|---|---|---|
| **High*** (FRS > 20% RRS > 20%) | • Consider treatment in all patients. | Either:<br>• < 2.0 mmol/L or<br>• ≥ 50% reduction |

Adapted from Genest et al. *Can J Cardiol.* 2009.[1]

* The **high-risk** includes patients with evidence of atherosclerosis in any vascular bed, diabetic men over 45 and diabetic women over 50.

**In high-risk patients**, pharmacological therapy should be considered concomitantly with lifestyle changes. Please consult guidelines for complete recommendations

Clinicians should exercise judgment when implementing lipid-lowering therapy; lifestyle modifications will have an important long-term impact on health and the long-term effects of pharmacotherapy must be weighed against potential side-effects.

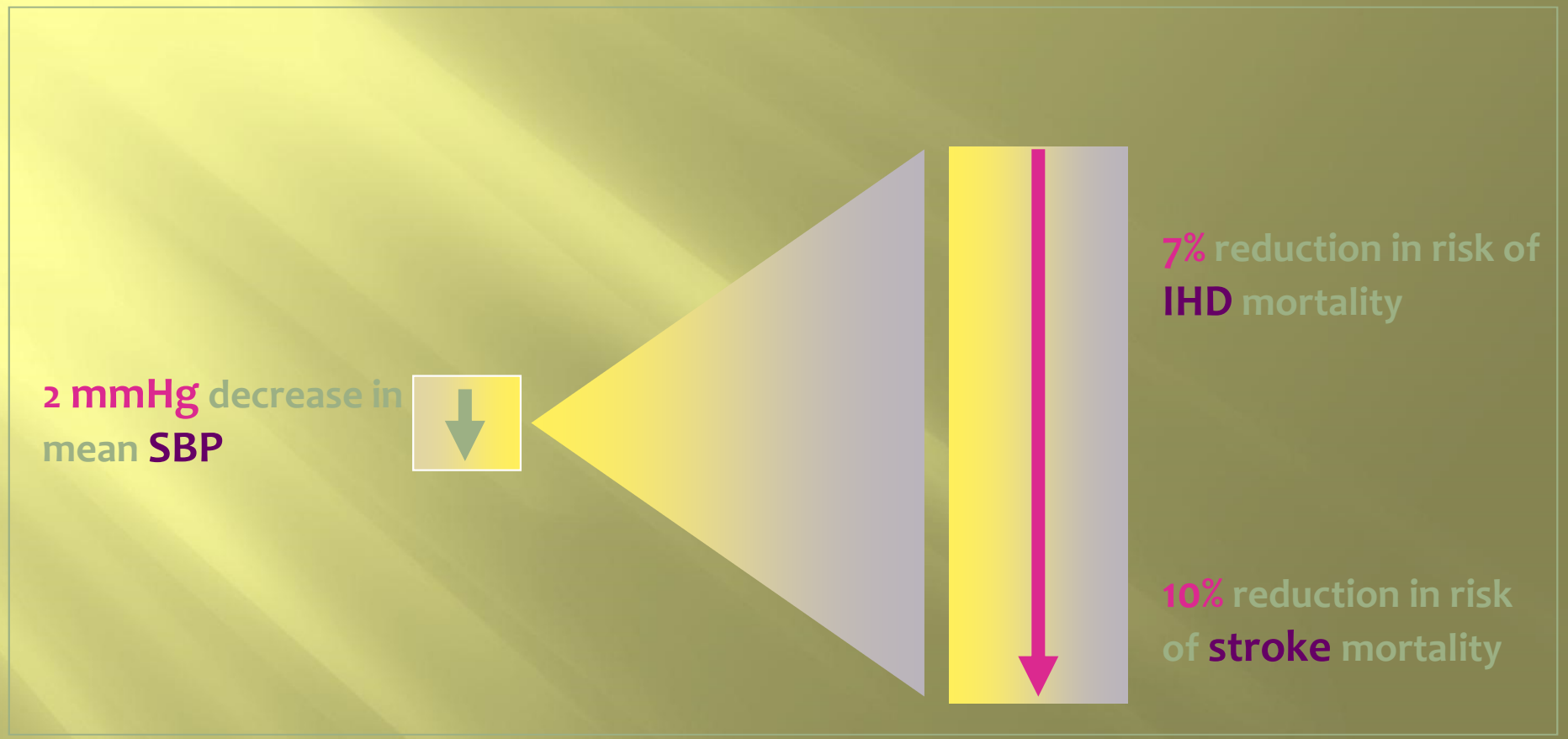
Print results

Click here for information on the Framingham Risk Score vs. The Reynolds Risk Score

# Benefits of Lowering BP

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

# 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*

# TREATMENT OF HYPERTENSION

- **Lifestyle modifications**
  - High normal SBP >130 – 139 mmHg
    DBP 85 – 89 mmHg
  - in high risk patients
- **Drug therapy**
  - Low risk : If BP is 140/90 mmHg
  - High risk: If BP is 130-140/90 mmHg

# Lifestyle changes:

- Salt restriction to 5-6 gm/day.
- Increased consumption of vegetables, fruits and low-fat dairy products.
- 7-8 servings/day of grain/grain products, 4-5 vegetable, 4-5 fruit
- Reduction of weight to BMI of 25 $kg/m^2$.
- Regular exercise (≥30 min of moderate dynamic exercise on 5-7 days per week)
- Smoking cessation
- Vit D replacement

# Summary of antihypertensive drug treatment low risk group

BHS
British Hypertension Society

NHS
National Institute for Health and Clinical Excellence

[12] Choose a low-cost ARB.

[13] 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.

**Aged under 55 years**

**Aged over 55 years or black person of African**

**Step 1**

**A&B**

**C &D**

A low dose of initial drug should be used, slowly titrating upward

**Step 2**

**A(B) + C or A(B)+D**

Combination therapies may provide additional efficacy with fewer adverse effects.

**Step 3**

**A + C + D**
**B + C + D**

Optimal formulation should provide 24-hour efficacy with once-daily dose.

**Step 4**

**Resistant hypertension**

A + C + D + consider further diuretic[14, 15] or alpha- or beta-blocker[16]

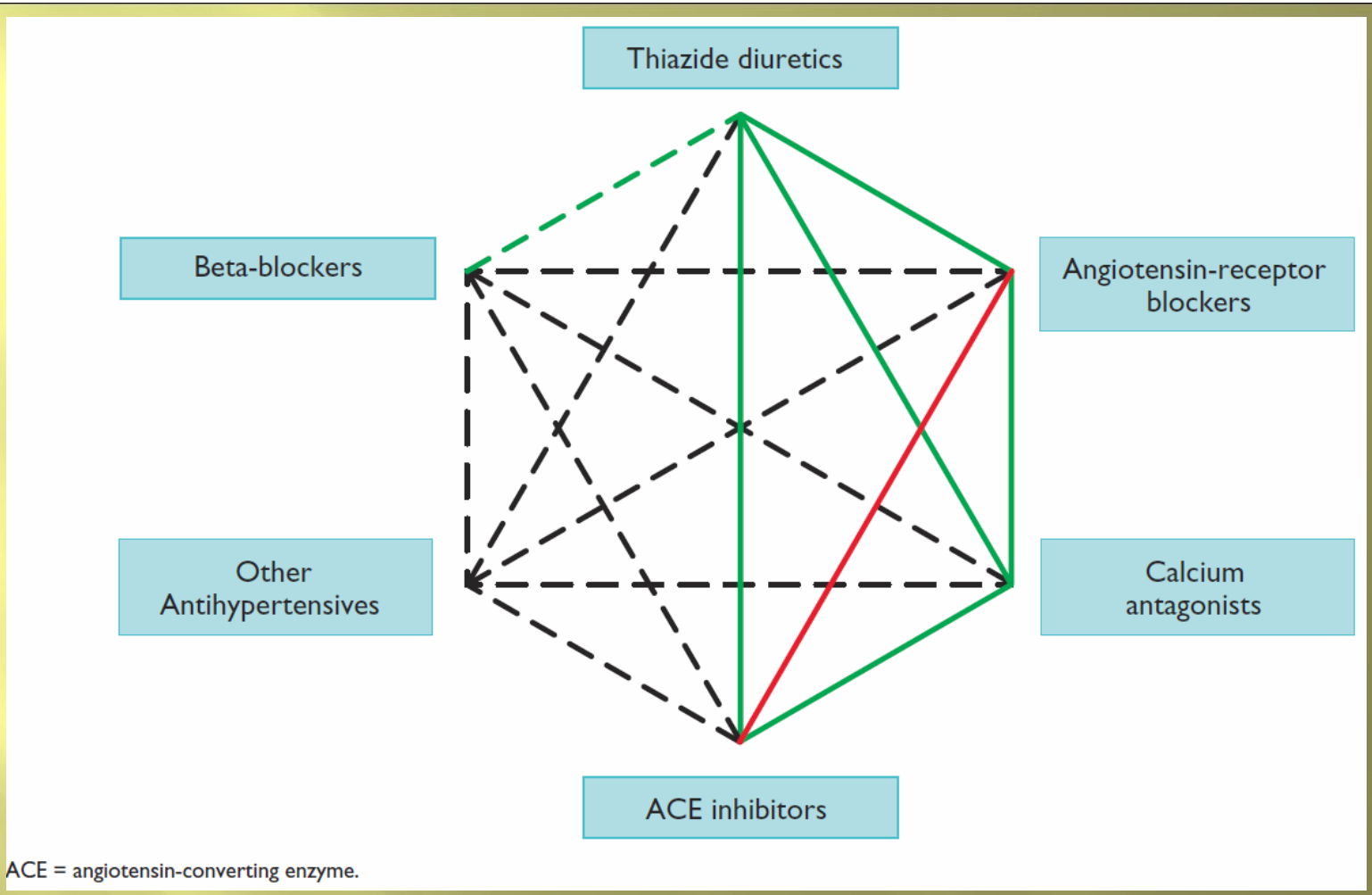
Consider seeking expert advice

**Key**

A – ACE inhibitor B-angiotensin II receptor blocker (ARB)[12]

C – Calcium-channel blocker (CCB)[13]

D – Thiazide-like diuretic




ACE = angiotensin-converting enzyme.

- Possible combinations of classes of antihypertensive drugs. Green continuous lines: preferred combinations; green dashed line: useful combination (with some limitations); black dashed lines: possible but less well-tested combinations; red continuous line: not recommended combination.
- Although verapamil and diltiazem are sometimes used with a beta-blocker to improve ventricular rate control in permanent atrial fibrillation, only dihydropyridine calcium antagonists should normally be combined with beta-blockers.

2013 ESH and ESC Guidelines

# High Risk Group Therapy

- Drug therapy (If BP is 130-140/85-90 mmHg)
- CHF – Thiazide, ACE-1, Aldosterone Antagonists, BB
- Post Myocardial Infarction – BB, ACEi
- Diabetes Mellitus – ACEi, ARB, Thiazide, CCB
- CKD – ACEi, ABB, Thiazide
- Stroke – CCB +ACEi

# Recommended Office BP Treatment Targets

## Treatment consists of health behaviour ± pharmacological management

| Population | SBP | DBP |
|---|---|---|
| High Risk | ≤120 | 85 |
| Diabetes | < 130 | < 80 |
| All others*<br>TIA,Stroke | < 140 | < 90 |

*** Target BP with AOBP < 135/85**

*Additional cardiovascular disease (CVD) risk*

*Clinical or subclinical CVD (excluding stroke)*
*Chronic kidney disease (CKD), defined as eGFR 20 – <60 ml/min/1.73m²*
*Framingham Risk Score for 10-year CVD risk ≥ 15%*
*Age ≥ 75 years*

**In selected high cardiovascular risk populations where a treatment is being targeted to <120 mmHg systolic, close follow up of patients is recommended to identify treatment related adverse effects including hypotension, syncope, electrolyte abnormalities and acute kidney injury.

Source: Guideline for the diagnosis and management of hypertension in adults 2016
National Heart Foundation of Australia;

Hypertension Update 2016

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Click here for information on the Framingham Risk Score vs. The Reynolds Risk Score

# 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

# Follow-up And Monitoring

- Patients should return for follow-up after 2- 4 weeks and adjustment of medications until the BP goal is reached
- More frequent visits for stage 2 HTN or with complicating co-morbid conditions.
- Serum potassium and creatinine monitored 1–2 times per year.

# Hypertension Renal Denervation

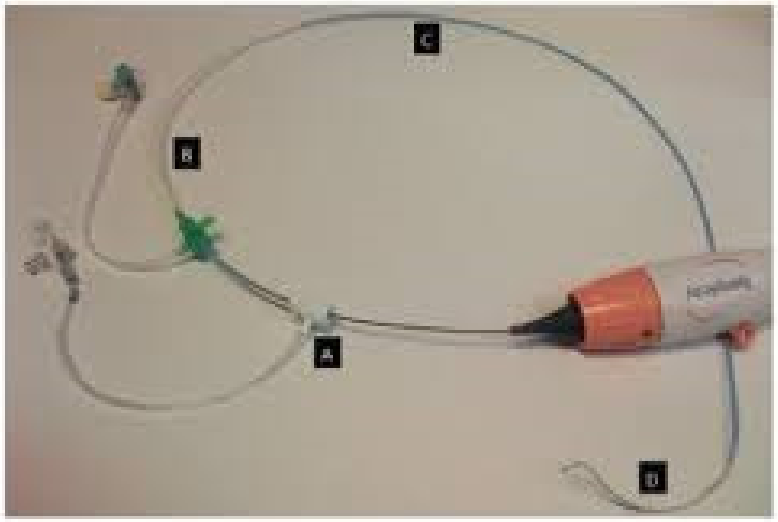
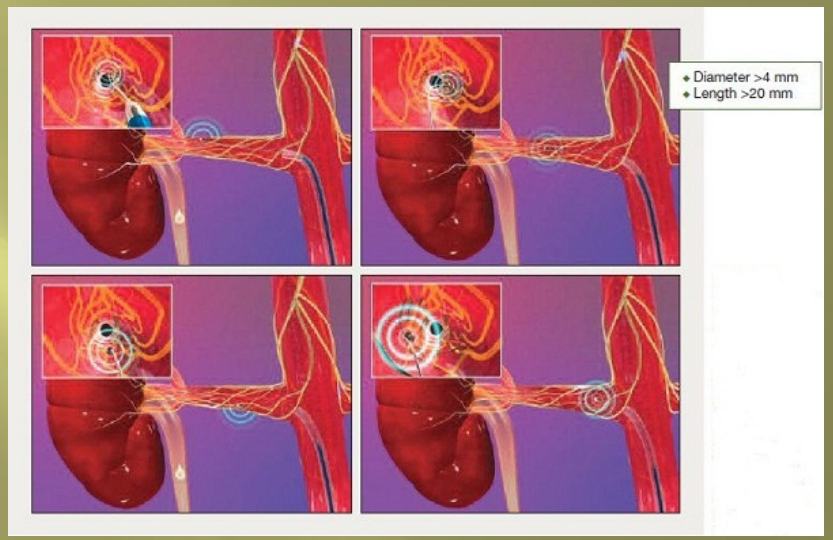



Figure 1. "Customized" 6 Fr JR catheter, with the proximal end adapted to a cut 5 Fr sheath. (A) 5 Fr sheath. (B) 6 Fr radial sheath. (C) JR catheter. (D) Tip of the radiofrequency catheter.




A Controlled Trial of Renal Denervation for Resistant Hypertension. This blinded trial did not show a significant reduction of systolic blood pressure in patients with resistant hypertension 6 months after renal-artery denervation as compared with a sham control

Source: The New England Journal of Medicine
April 10, 2014


An implantable device designed to activate baroreceptors to reduce blood pressure does not appear to reduce blood pressure

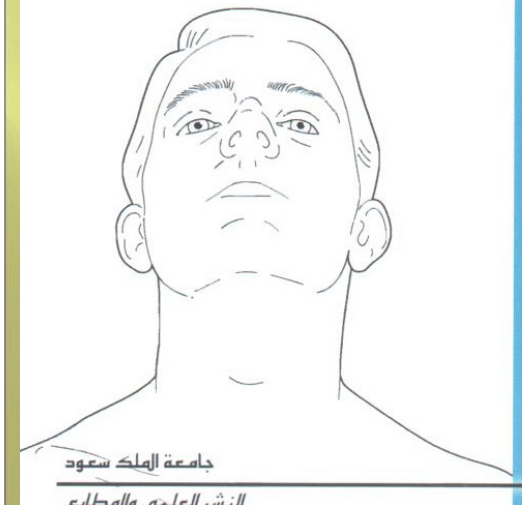
تأليف

نيكولاس ج. تالي  سيمون أوكونر

# كتاب الفحص الإكلينيكي الجيبي

ترجمة

أ.د. جمال بن صالح الوكيل



جامعة الملك سعود

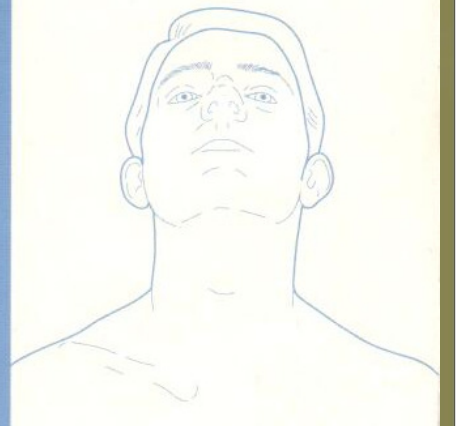
النشر العلمي والمطابع

NICHOLAS J TALLEY

SIMON O'CONNOR

# POCKET CLINICAL EXAMINATION

SECOND EDITION




Thank you

# National Institute for Health and Clinic Excellence Hypertension Guidelines 2011 (UK)

- Stage 1
  - Clinical Blood Pressure – 140/90 mmHg
  - Ambulatory Blood Pressure day time Monitoring (ABPM) – 135/85 mmHg
  - Home Blood Pressure Monitoring (HBPM) - 135/85 mmHg
- Stage 2
  - Clinical Blood Pressure – 160/100 mmHg
  - Ambulatory Blood Pressure day time Monitoring (ABPM) – 150/95 mmHg
  - Home Blood Pressure Monitoring (HBPM) - 150/95 mmHg
- Severe hypertension (Stage 3)
  - Clinical Blood Pressure – 180/110 mmHg