* Hypertension *

- Case: 54 year old man who is new to the clinic with no medical care for over 10 years

  BP ⟹ 150/85 on righ arm

  BPM ⟹ 80

What is the next step? ⟹ confirm Dx of HT as one reading is Not enough to confirm a clinical Dx

* Screening: Who should be sreened for HT ?

- USPSTF: All individuals >18 years old should be Screened Annually
- AAP: children ⩾ 3 years old with No risk factors

So if combined ⟹ all individuals ⩾ 3 years old with no risk factors should be screened anually

Blood Pressure Categories

American Heart Association | American Stroke Association

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

* Note on the slide Above : The term "Prehypertensive" has been replaced to "Elevated"

- if the patient has a sys. BP of 135 (stage 1) & dias. BP of 79 (normal) we take the highest category ⟹ Stage 1

* How to confirm Dx of HT?

① ABPM (Ambulatory BP monitoring)

- Most accurate method

The patient wears a BP monitoring device on his arm for (24-48) hours, the device measures BP every → 10-15 min if awake
→ 30-60 min if sleeping

- then an average reading of awake BP, sleeping BP, & combined BP will be recorded, Average BP of 130/80 → confirm Dx of HT

② HBPM (Home BP monitoring)

- if the patient has a well calibrated BP monitoring device & knows how to take his BP reading he can use this method.
- The patient measures his BP 2 times a day → morning
→ night

for 1-2 weeks (so 14-24 readings), the Average reading is calculated, an Average BP of 130/80 confirm Dx of HT

③ Serial office readings:

- After the first BP reading (screening), he will be given further 2 visits (with 1 week interval) to measure his BP, ending up with 3 readings, if Average BP = 130/80, confirm Dx of HT

* office VS out-of-office readings:

Masked HT	White coat HT
- BP out office > BP office (>130/80) (<130/80)	BP office > BP out of office (>130/80) (<130/80)
- more serious	- common in children, elderly, women
- more common in obese, males, chronic kidney disease, DM, obstructive sleep apnea (already have elevated BP)	
- risk of CVD is the same to those with sustained HT	- risk of CVD is higher than Normotensive patients, but Lower than sustained HT
- should measure BP to confirm Dx of HT (by routinely visits to the clinic)	- Should measure BP Annually (Like any normal individual)

	White-Coat HTN	Masked HTN
Office BP readings	≥130/80	<130/80
Out-of-office BP readings	<130/80	≥130/80
Pharmacological Treatment	Not indicated	Indicated
Risk of developing sustained HTN	Increased	Increased
CV risk	> Normotensives, <sustained HTN	= sustained HTN

✡ History ✡

- Ask about patient's lifestyle (Physical Activity, Diet, smoking)
- — — — presence of any Chronic disease (CKD, DM, ...)
- — — — Family history of HT, IHD, dyslipidemia
- Assess for presence or absence of "Target organ damage" ...

by asking for symptoms of:

- → Stroke, TIA (Brain)
- → SoB, chest pain, swelling, orthopnea (Heart)
- → Claudication, numbness, pain, paresthesia (PVD)
- → Blurred vision or any visual disturbances (retina)
- → Urinary symptoms (Kidneys)

- reveal identifiable causes of high BP (secondary HT)
- Most important cause of secondary HT ⟹ Renal causes
  (Renal-vascular disease, Renal artery stenosis, ...etc)
- other causes → Adrenal (hyperaldosteronism, cushing dz, ...etc)
  → endocrine (thyroid disorders)
  → Vascular (eg: coarctation of aorta)
  → obstructive sleep apnea
  → Medications & Drug use (eg: steroids, Antidepressants, Estrogen...)
  → Alcohol

- Arterial BP is determined by interaction of:
① Cardiac output ② Systemic vascular resistance
- So any disturbance in one of them or both may cause elevation of BP. eg:- Hyperthyroidism ⟶ ↑ cardiac output (↑ sys. BP)
  - Hypothyroidism ⟶ ↑ vascular resistance (↑ dias. BP)

✱ returning to the case: He works as a taxi driver for 12 hours (physical inactivity), has No health insurance (so he doesn't go to clinic follow ups), No Alcohol or drug use.
- Admits to occasional financial stressors (stress is a predisposing factor of HT)
- Eats a lot of fast food (poor diet, ↑salt & Fat are risk factors for HT)
- His 73 year old mother has High cholesterol & DM.
  (+ve FH of CVD)
- he reports weight gain of 6 Kg in past 5 years (still have to check BMI)
- Notes his father died from heart attack at age 64 but that doesn't indicate a +FH (unless heart attack occurs below 55 years of age)

Physical examination :-

- General appearance : eg: central obesity may indicate cushing disease
- calculate BMI
- Head & Neck → eyes : Look for signs of retinopathy / exophthalmus / corneal arcus
  → palpate the thyroid
  → check JVP (↑ JVP may indicate HF)
  → ⌐ carotid bruit
- chest : check for breath sounds / Murmus / Apex beat / S_3 & S_4 sound
- Abdomen : check for organomegally (polycystic kidney dz / Hepatomegally in HF)
- Lower limb : ~~pulse~~, pallor, pain, paresthesia, paralysis, pulselessness, poikilothermia (changes in Temprature Hot ōgo Cold ōgo)
  check for hair distribution in Legs
- Neurological examination : Motor power / C.N exam

Returning to the case :-

- After doing PE to the patient, the results were normal except for BMI (27 Kg/m²)

WHICH OF THE FOLLOWING ACCURATELY DESCRIBES THE BEST WAY TO MEASURE BP

A. THE PATIENT SHOULD BE SEATED QUIETLY FOR 30 MINUTES BEFORE A BP MEASUREMENT IS TAKEN.

B. THE PATIENT SHOULD BE SEATED ON AN EXAMINATION TABLE WHEN TAKING THEIR BP MEASUREMENT.

C. THE ARM SHOULD BE SUPPORTED AT HEART LEVEL.

D. THE LENGTH OF THE BLADDER OF THE CUFF MUST BE AT LEAST 80% OF THE ARM CIRCUMFERENCE.

E. THE WIDTH OF THE CUFF MUST BE AT LEAST 40% OF THE ARM CIRCUMFERENCE.

F. AN ADULT-SIZED CUFF SHOULD BE USED FOR MOST ADULTS.

* this slide contain T or F questions :-

(A) F (5 min are enough)

(B) F (The arm must be supported on a table) هيك حكت الدكتورة

(C) T

(D) T

(E) T

(F) F (there are more than one adult sized cuffs according to the arm circumference)

- Note: After the first reading of B.P: if it was high, inform the patient that he has ↑ B.P but follow ups must be done to confirm Dx of HT, so medications aren't prescribed yet & the management plan will focus on Lifestyle modification

Imp. Note: the only case in which medications are given at the first visit is when the patient has "Hypertensive crisis" - there is a rare case in which the patient can get medications at first visit, whic is when BP > 160/100 with target organ damage (eg: HF, IHD)

✱ Life style modification ✱

(1) Dash diet → ↑ in fibers / pottasium & Magnesium (vegetables, nuts)
→ replace red meat with chicken & fish
→ Low fat dairy products

(2) Decrease amounts of sodium

(3) Physical Activity (walk for 30 min / day)

(4) Weight reduction (↓ 1 Kg ⟶ ↓ 1 mm Hg of BP)

"WHICH LIFESTYLE CHANGE WILL NOT DECREASE BP?"

A. WEIGHT REDUCTION

B. DASH EATING PLAN

C. DIETARY SODIUM REDUCTION

D. DIETARY POTASSIUM REDUCTION

D. PHYSICAL ACTIVITY

E. MODERATION OF ALCOHOL CONSUMPTION

* This slide contains T & F questions

(A) T (B) T (C) T (D) F (E) T (F) T

* Returning to the case *

the patient comes after 2 weeks, he measured his B.P at home & was between 140-150/80-88. You take his BP & it was 155/86 on righ arm. & after 5 min. it was 152/84 on Left arm - inform the patient that both home & office B.P reading were elevated & unfortunately he has HT

* Lab investigations *

- Basic tests :

① Electrolytes (Ca, Na, K) : may indicate possible causes of secondary HT
eg: Hypokalemia : Adrenal cause / Hypercalcemia: hyperparathyroidism

② Serum creatinine (EGFR)

③ Fasting glucose

④ Fasting lipid profile

⑤ TSH (Hypo & Hyperthyroidism can lead to HT)

⑥ Urine dipstick (to detect proteinuree & glucose)

⑦ ECG

- Optional tests:

① Echocardiography

② Uric Acid

③ Urine Albumin-to-creatinine ratio

WHEN TO SCREEN FOR SECONDARY CAUSE OF HTN?

- DRUG-RESISTANT OR DRUG-INDUCED HTN
- AN ACUTE RISE IN BP OVER A PREVIOUSLY STABLE VALUE
- AGE OF ONSET BEFORE PUBERTY OR <30 Y, WITH NO FHX OF PRIMARY HTN OR OBESITY
- ONSET OF DIASTOLIC HTN IN OLDER ADULTS >65Y
- DISPROPORTIONATE TOD TO THE DEGREE OF HTN
- UNPROVOKED OR EXCESSIVE HYPOKALEMIA

Q: When to screen for Secondary cause of HT ?

- mentioned in the slide

- Note: Drug resistant HT : Diuretic with optimal dose + 2 other Antihypertensive medications don't decrease the patient's BP to the goal B.P

- Unexplained Hypokalemia → may be due to "Primary hyperaldosteronism"

"WHAT TREATMENT APPROACHES WOULD YOU RECOMMEND FOR YOUR PATIENT?"

A. LIFESTYLE MODIFICATIONS

B. NO ANTIHYPERTENSIVE MEDICATION IS INDICATED AT THIS TIME

C. INITIATE THIAZIDE DIURETIC

D. INITIATE A BETA-BLOCKER

E. INITIATE AN ALPHA BLOCKER

* this slide contains T or F questions regarding our case:

(A) T (B) F (Dx is confirmed & Tx is initiated → ACEI's, ARB's, Thiazides, CCB's)

(C) T

(D) F (unless he has HF or I HD)

(E) F (may be given in cases of resistant HT)

- Start pharmacological therapy when?

⟹ B.P ≥ 140/90 (office reading) (stage II)

⟹ B.P ≥ 135 sys. or ≥ 85 dias. (HBPM) (stage II)

⟹ B.P > 130/80 with
- → Established CVD
- → ↑ CVD risk (10% ↑ risk in 10 years)
- → CKD / Type II DM
- → Age 65

Corresponding Values of Systolic BP/Diastolic BP for Clinic, Home (HBPM), Daytime, Nighttime, and 24-Hour Ambulatory (ABPM) Measurements.

Clinic	HBPM	Daytime ABPM	Nighttime ABPM	24-Hour ABPM
120/80	120/80	120/80	100/65	115/75
130/80	130/80	130/80	110/65	125/75
140/90	135/85	135/85	120/70	130/80
160/100	145/90	145/90	140/85	145/90

- IN ADDITION TO LIFESTYLE MODIFICATIONS, YOU HAVE STARTED YOUR PATIENT ON THIAZIDE DIURETIC.
- WHICH OF THE FOLLOWING STATEMENTS ARE TRUE ABOUT ANTIHYPERTENSIVE MEDICATIONS?

A. THIAZIDES MAY AFFECT ELECTROLYTE LEVELS.

B. BETA BLOCKERS SHOULD BE GIVEN TO ALL HYPERTENSIVE PATIENTS WITH DM

C. AVOID PRESCRIBING NONDIHYDROPYRIDINE CCB TO A PATIENT WITH HEART FAILURE

D. ACE-I USE CAN RESULT IN IRREVERSIBLE DRY COUGH WITH ONSET FROM FROM 1 WEEK UP TO 6 MONTHS OF TREATMENT INITIATION

E. IT IS BETTER TO DOUBLE THE DOSE RATHER THAN ADDING ANOTHER MEDICATION TO DECREASE THE SIDE EFFECTS

* This slide contains T or F questions:

(A) T (B) F (BB's can mask symptoms of hypoglycemia)

(C) T (D) F (reversible) (E) F (its better to add another medication)

- Patients must be followed up every 2-4 weeks until we reach the desired B.P, after that, follow up is every 3-6 months (done)

- in follow ups; we check for → Adverse effects of medications
  → Patient's compliance to both medications & lifestyle modification
  → Assess the patients tests

* Returning to the case *:

- our patient starts Walking / new B.P is 145/70
- has hard time taking medications in morning
- Have to urinate so much when out in the road (as a result of thiazides early treatment, it decreases over time)
- office B.P = 143/75 (the goal is < 130/80)

* goal B.P for treated patients *

in the slide above

- our patients ECG → Normal sinus rhythm, rate & Axis
  - → ~~No~~
  - → No Bradycardia nor Tachycardia
  - → No Heart blocks
  - → No evidence of Ischemia or LVH

- Normal Glucose, Lipids, No proteinuria (Normal results in general)

REGARDING HIS HIGH BP MEASUREMENT TODAY, WHAT DOES THE AHA RECENT GUIDELINES RECOMMEND AS THE NEXT STEP IN HIS DRUG MANAGEMENT?

A. DISCONTINUE LIFESTYLE MODIFICATIONS

B. CONTINUE LIFESTYLE MODIFICATIONS

C. CONTINUE THE HCT AT THE CURRENT DOSE (25MG/DAY)

D. DISCONTINUE THE HCT

E. INCREASE THE HCT TO 50MG/DAY

F. INITIATE AN ALPHA BLOCKER DRUG

G. INITIATE AN ACEI

* This slide contains T or F questions!

(A) F (B) T (C) T (D) F (E) F (F) F (G) T

- our patient started taking ACEI's along side thiazides
- 4 weeks later, our patient came for a follow up his office B.P = 145/75 / there is no side effect of medications he still walks daily & ↓ his salt intake
- The B.P still didn't reach the goal ⟶ we rise the dose of his ACEI, but the patient tells you that he didn't take his ACEI (Noncompliance), in that case, you ask the patient if he
  - ⟶ has any problems with the drug
  - ⟶ — — worries about the side effects
  - ⟶ what kind of Tx would work for him

- Note:

① Systolic HF: give β-blocker①/ACEI② or ARB/Aldosterone antagonist③ /Frusemide④ if has fluid overload (↓ ejection fraction)

② diastolic HF: give loop diuretics⑤ (Frusemide) for fluid overload
- we may Add β-blocker & ACEI

③ CAD or IHD: give β-blockers / ACEI or ARB

④ DM & CKD: give ACEI

⑤ recurrent stroke prevention: give ACEI / Thiazides

⑥ Pregnancy: Don't use ACEI, Diuretics, β-blockers
give Methyl dopa / Nephidipine (CCB)

HT in children

- if B.P in screening is high, confirm Dx either by → ABPM
  → Serial office readings

(HBPM isn't used to confirm Dx)

Risk factors for Secondary HT in children:

1. Diastolic HT
2. Nocturnal HT
3. age < 3 years with no risk factors for primary HT

Most common cause of Secondary HT ⟹ Renal