

Lab 4 Heart Rate & Blood Pressure

I. Attendance – Cards

II. Heart Rate?

What? # beats per min

< 60 (slow)
bradycardia



60-100
normal

Wide range!

> 100 (fast)
tachycardia



Where? heart or peripheral arteries

How? palpation *to feel* vs. auscultation *to hear* vs. EKG...

Why? vital sign "Vital signs are vital!" Pilar Bradshaw, MD

III. Blood Pressure?

What? force exerted by blood on large systemic arteries

Where? peripheral/systemic, large arteries

How? direct (cannula) vs. indirect (external cuff, P meter = sphygmomanometer + stethoscope/sensor)

Why? vital sign + CVD risk indicator low < 120/<80 mm Hg
Hypertension $\geq 140/90$ mm Hg? See LM pp 4-4 to 4-6

IV. Practice Tests

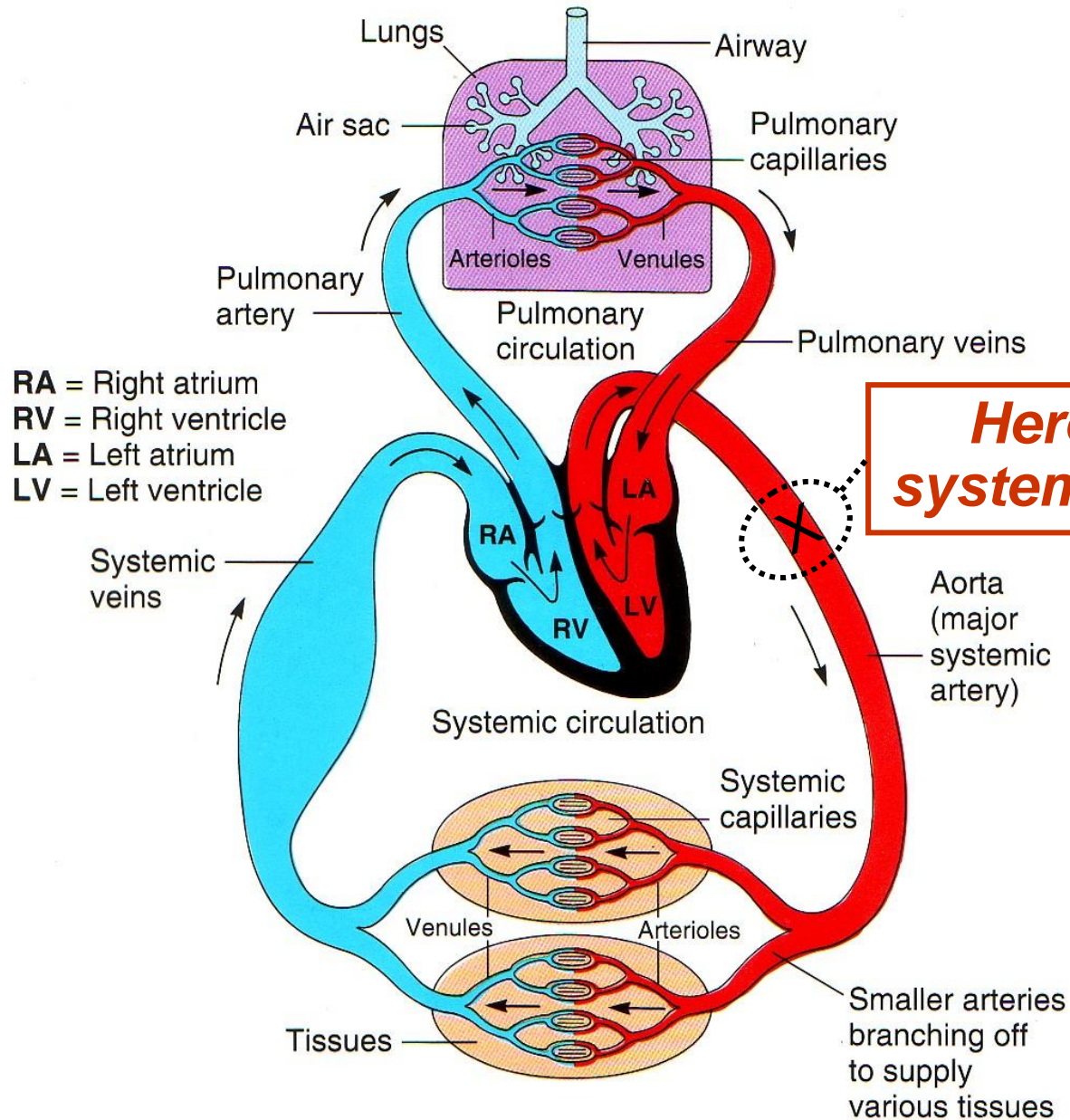
V. Old vs. New High Blood Pressure Guidelines

Factors that Influence Heart Rate (HR, b/min) & Blood Pressure (BP, mm Hg)

Short list of individual, exercise & environmental variables (superimposed upon genetics) that alter HR & BP:

1. **arousal state** (asleep, awake, drowsy, unconscious...BI 121 lecture!)
2. **bladder and/or bowel distention** (if > semi-filled, higher BP!)
3. **exercise** (mode, frequency, intensity, duration, distribution)
4. **illness** (type, current, past...)
5. **menstrual phase** (follicular, ovulatory, luteal)
6. **nutritional status** (alcohol, caffeine, H₂O, meal composition & time)
7. **pets** (on lap? may lower BP!)
8. **posture** (supine, seated, standing)
9. **sleep** (less elevates!)
10. **smoking status** (# & time)
11. **temperature** (ambient & body)
12. **white-coat effect or white-coat syndrome,...**

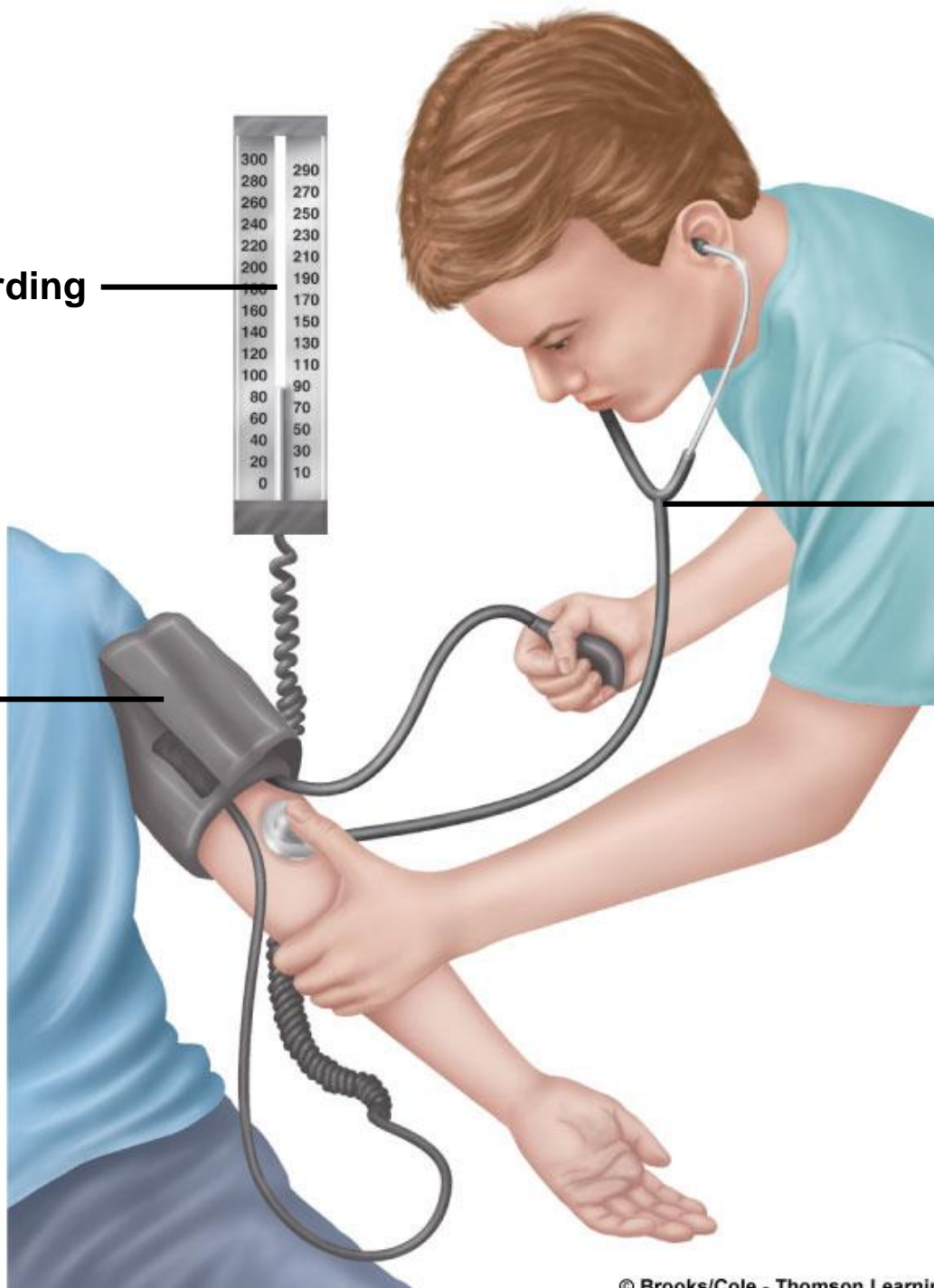
Where is BP measured?



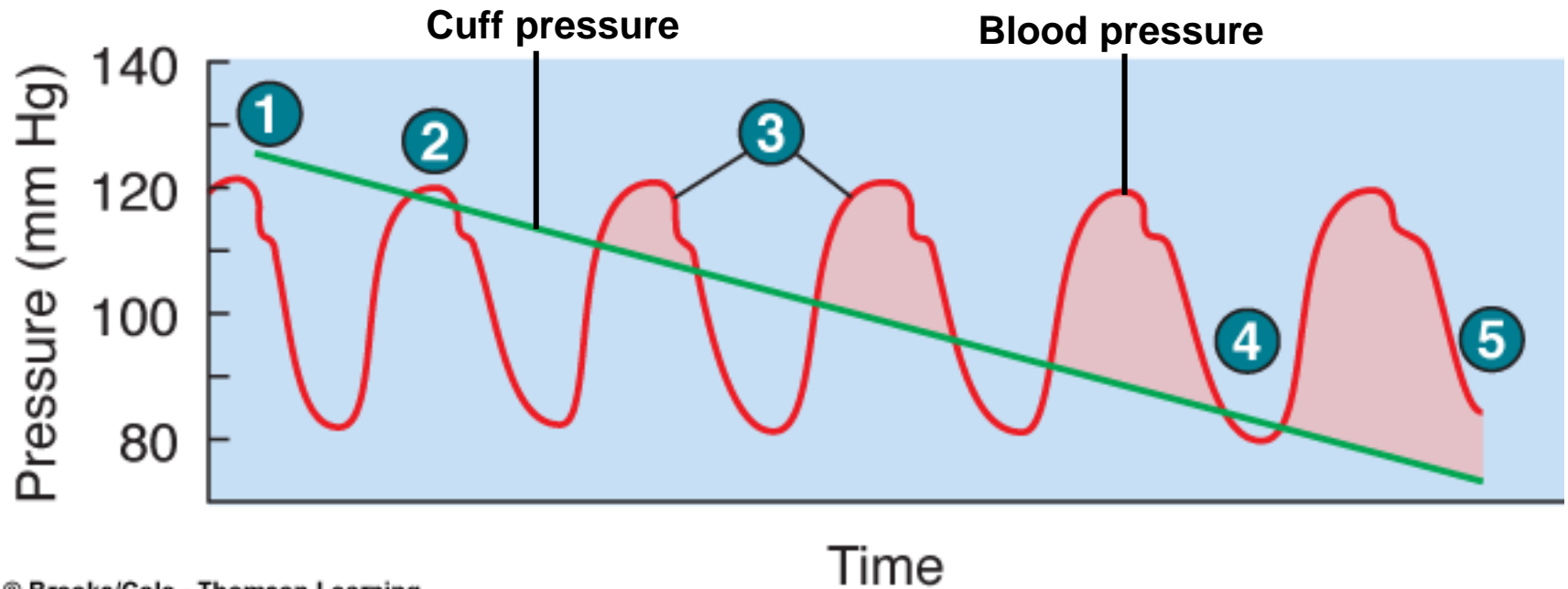
Pressure-recording device

Inflatable cuff

Stethoscope



LS 2006 fig 10-7a p 282.



© Brooks/Cole - Thomson Learning

Personal Measurements

Heart Rate (HR): Record on p 4-7, Q 1.

6-sec → add 0 to end or multiply by 10

15-sec → multiply by 4

60-sec → record as is; seated resting HR

Each of you place stethoscope over your heart to detect *lub-dup, lub-dup...*

Blood Pressure (BP): Record on p 4-8, Q 4.

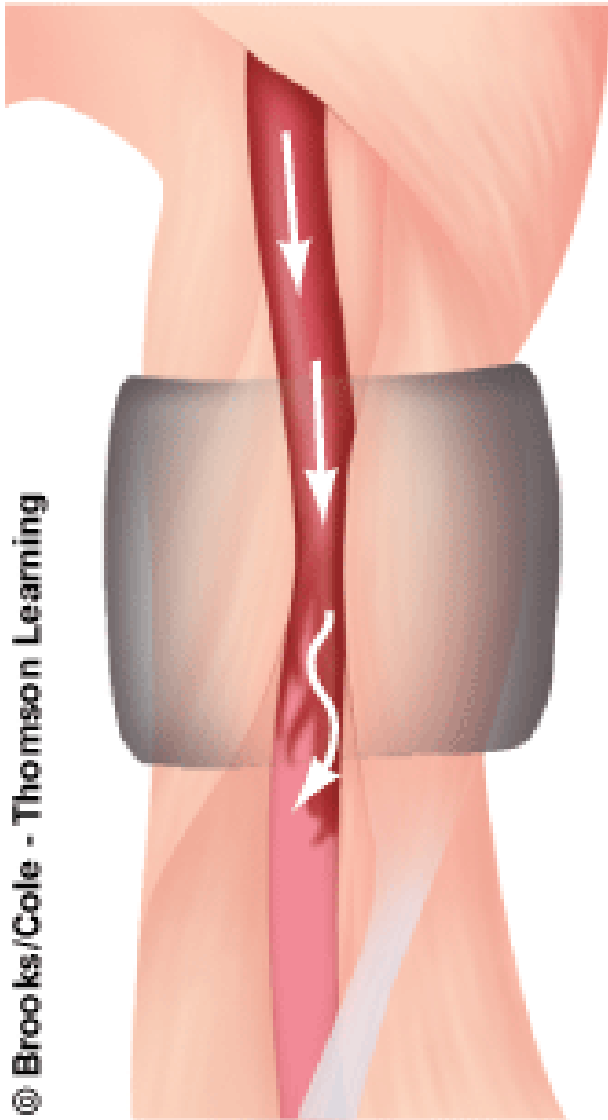
R arm x 2 → SBP/DBP & HR

L arm x 2 → SBP/DBP & HR

Try to detect Korotkoff sounds w/stethoscope during a few automated BP measurements.

Evaluate values & answer Q 2, 3 & 5 later.

Sounds are heard only when blood jets through a partially occluded artery.

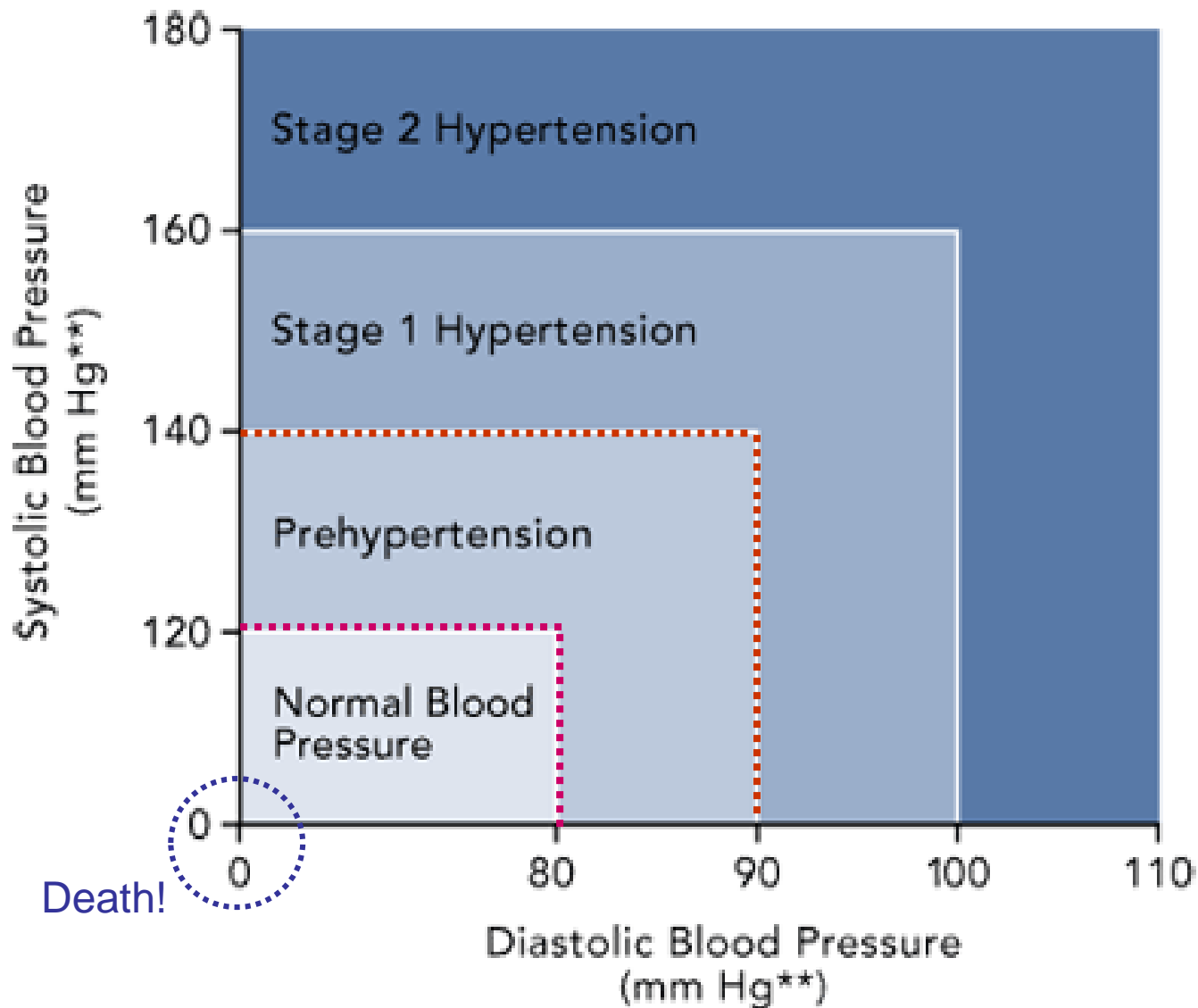


When cuff pressure is between 120 and 80 mm Hg:

Blood flow through the vessel is turbulent whenever blood pressure exceeds cuff pressure.

Intermittent sounds are heard as blood pressure fluctuates throughout the cardiac cycle.

Where Does Your Pressure Fall? Previous Guidelines < Nov 2017



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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http://www.heart.org/HEARTORG/Conditions/HighBloodPressure/GettheFactsAboutHighBloodPressure/How-High-Blood-Pressure-is-Diagnosed_UCM_301873_Article.jsp#.W0P-VbgnaUk
<https://www.health.harvard.edu/heart-health/reading-the-new-blood-pressure-guidelines>



European Society of Hypertension

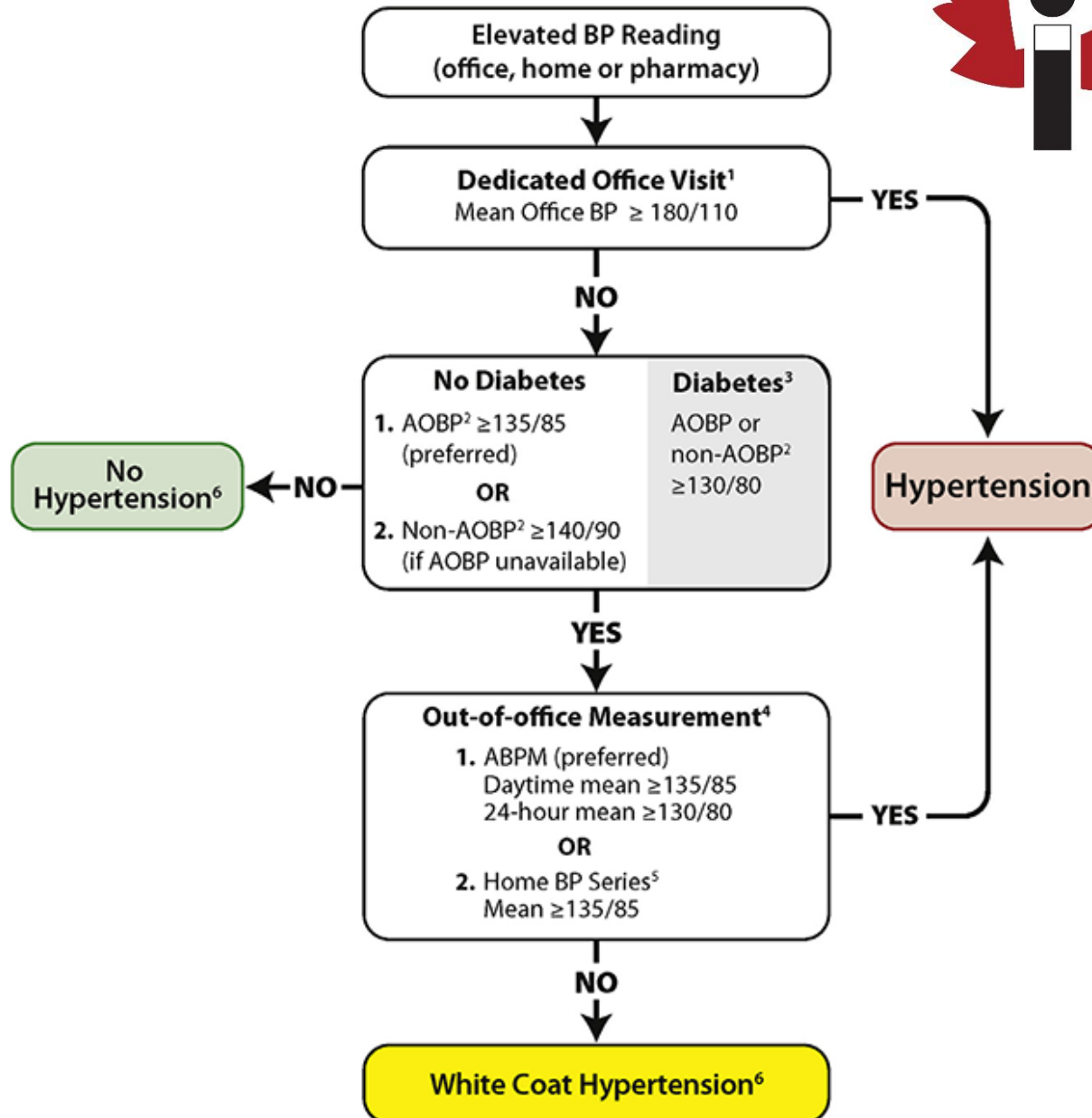
Guidelines 2018

Class	Systolic blood pressure (mmHg)		Diastolic blood pressure (mmHg)	
Optimal	< 120	AND	< 80	Green
Normal	120-129	AND/OR	80-84	Green
High normal	130-139	AND/OR	85-89	Green
Grade 1 hypertension	140-159	AND/OR	90-99	Yellow
Grade 2 hypertension	160-179	AND/OR	100-109	Yellow
Grade 3 hypertension	≥ 180	AND/OR	≥ 110	Red
Isolated systolic hypertension	≥ 140	AND	< 90	White

2018 Guidelines



Hypertension
CANADA



Notes:

1. If AOBP is used, use the mean calculated and displayed by the device. If non-AOBP (see note 2) is used, take at least three readings, discard the first and calculate the mean of the remaining measurements. A history and physical exam should be performed and diagnostic tests ordered.
2. **AOBP** = Automated Office BP. This is performed with the patient unattended in a private area. **Non-AOBP** = Non-automated measurement performed using an electronic upper arm device with the provider in the room.
3. Diagnostic thresholds for AOBP, ABPM, and home BP in patients with diabetes have yet to be established (and may be lower than 130/80 mmHg).
4. Serial office measurements over 3-5 visits can be used if ABPM or home measurement not available.
5. Home BP Series: Two readings taken each morning and evening for 7 days (28 total). Discard first day readings and average the last 6 days.
6. Annual BP measurement is recommended to detect progression to hypertension.

What can I do if I have prehypertension or hypertension?

1. See your doctor & have your BP checked regularly.
Also, see if it's safe to start an exercise program.
2. Exercise, exercise, exercise!
20-60 min of aerobic exercise on most days.
3. Lose weight, if overweight.
Exercise, exercise, exercise!
4. Add spice to your life, not salt.
Garlic, cilantro, oregano, pepper & onion instead of salt!
5. Do the *DASH*, don't overdo it!
[*Dietary Approaches to Stop Hypertension*](#), plant-based Mediterranean diet w/plenty of vegetables, fruits, whole grains & non-/low-fat dairy to ensure much Ca^{2+} , K^{+} & Mg^{2+} intake.
6. Limit alcohol intake.
No more than 1-2 drinks/d for ♀, 2-3 drinks/day for ♂.

Resources that may be helpful...



<https://newsroom.heart.org/news/high-blood-pressure-redefined-for-first-time-in-14-years-130-is-the-new-high>

<https://www.khanacademy.org/science/health-and-medicine/circulatory-system/blood-pressure-ddp/v/what-is-blood-pressure-1>

<https://www.youtube.com/watch?v=o3UA-bTbWDc>

<https://www.youtube.com/watch?v=sOwBDmu1Y0c>

<https://www.youtube.com/watch?v=JA0Wb3gc4mE>