Azerbaijan Society of Cardiology

European Society of Hypertension

# high central blood pressure and cardiovascular outcomes

Azerbaijan, AZ

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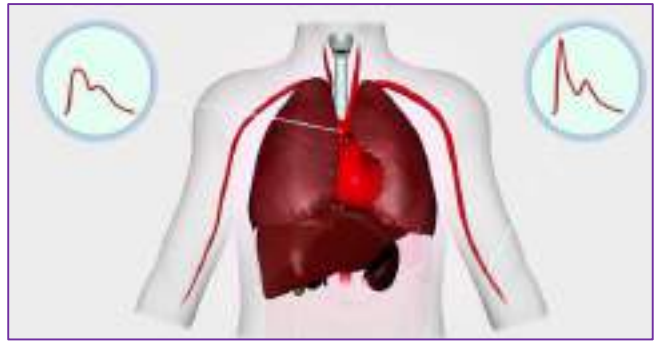
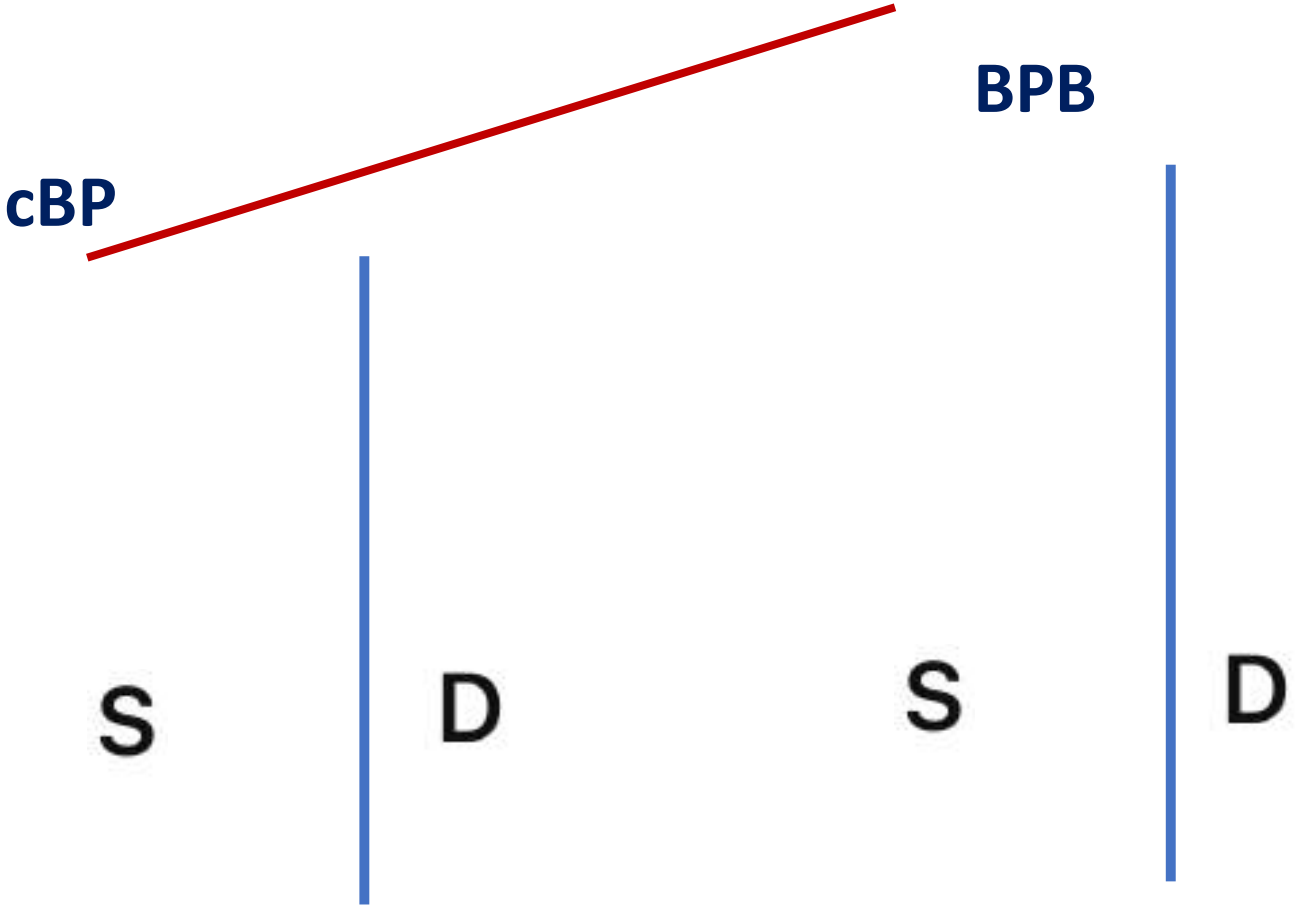
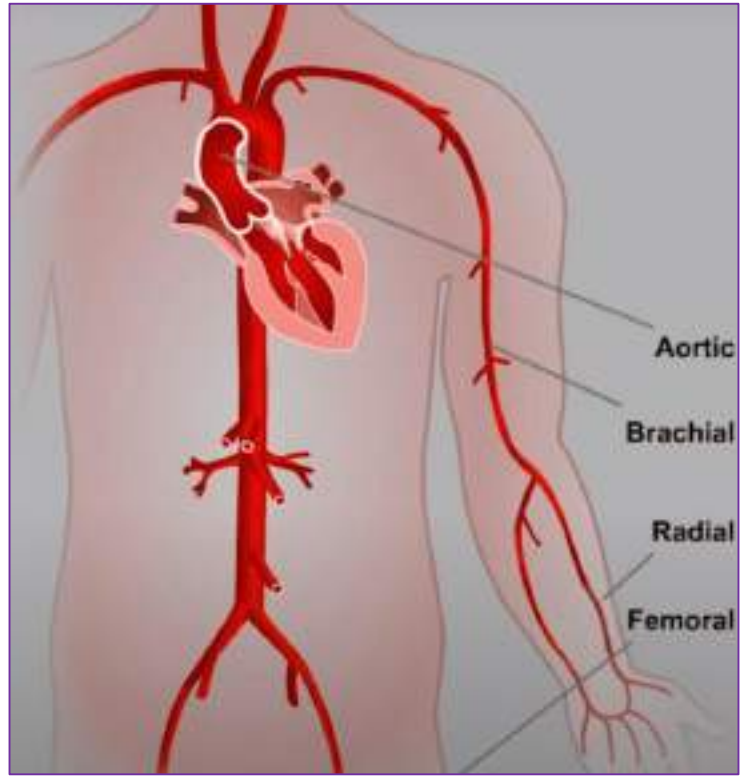
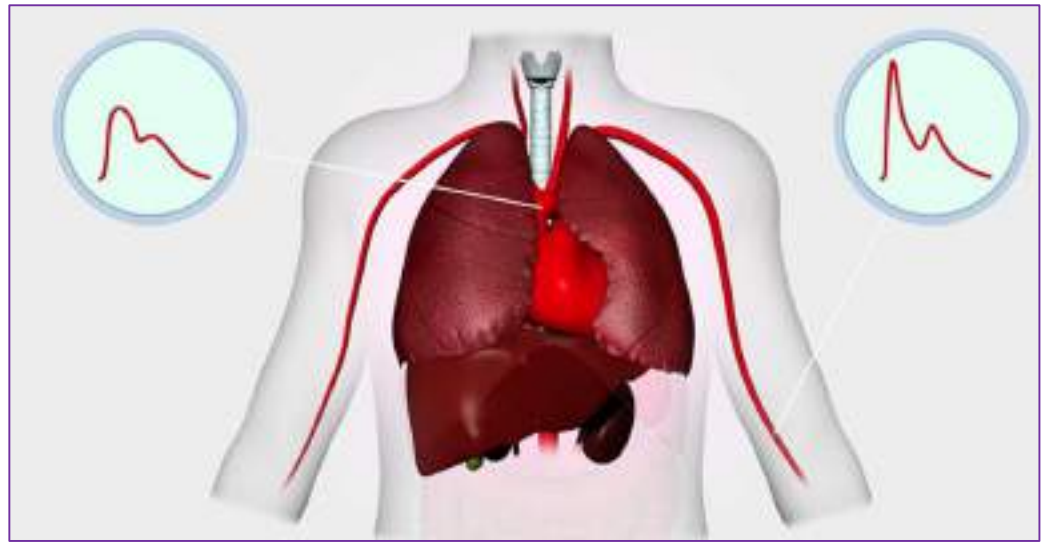
# central aortic blood pressure

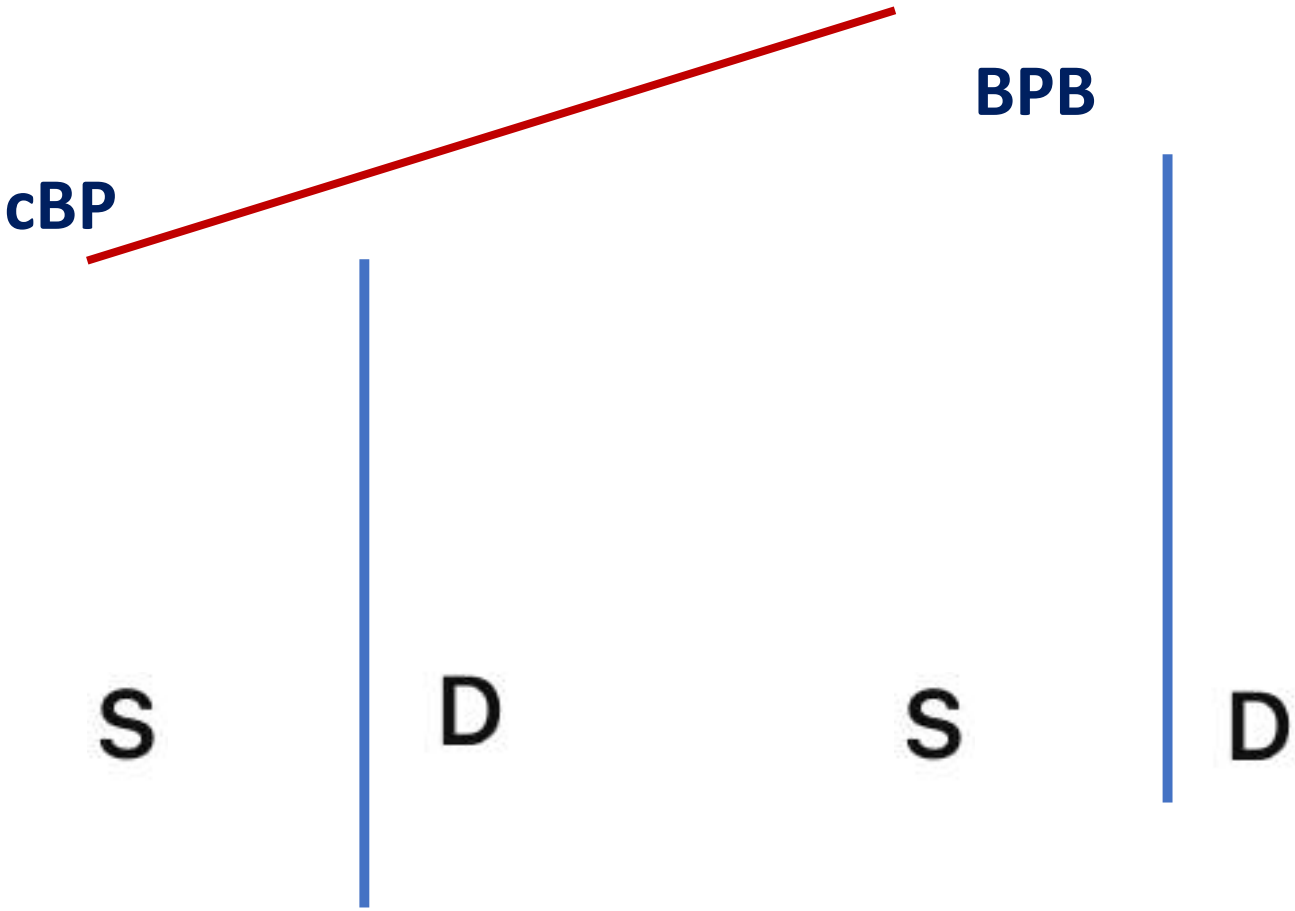


- Why is central blood pressure is important to be measured ?






cBP
BPB
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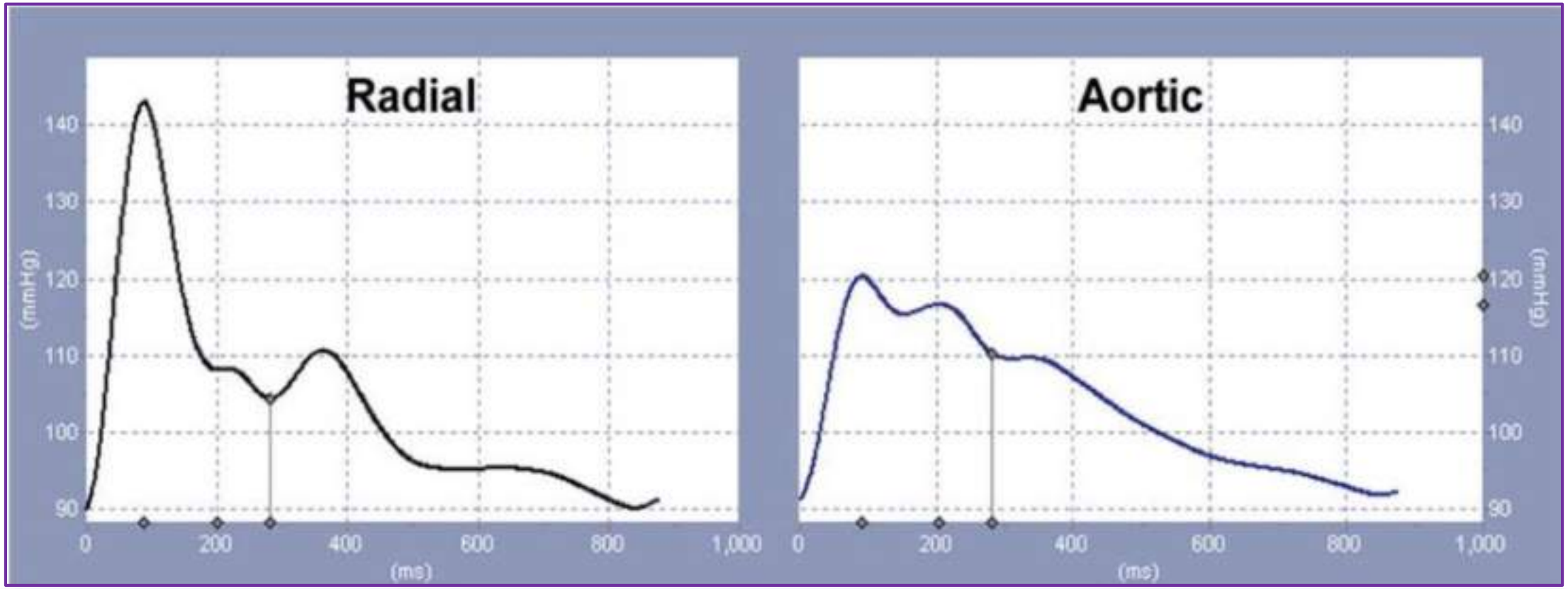
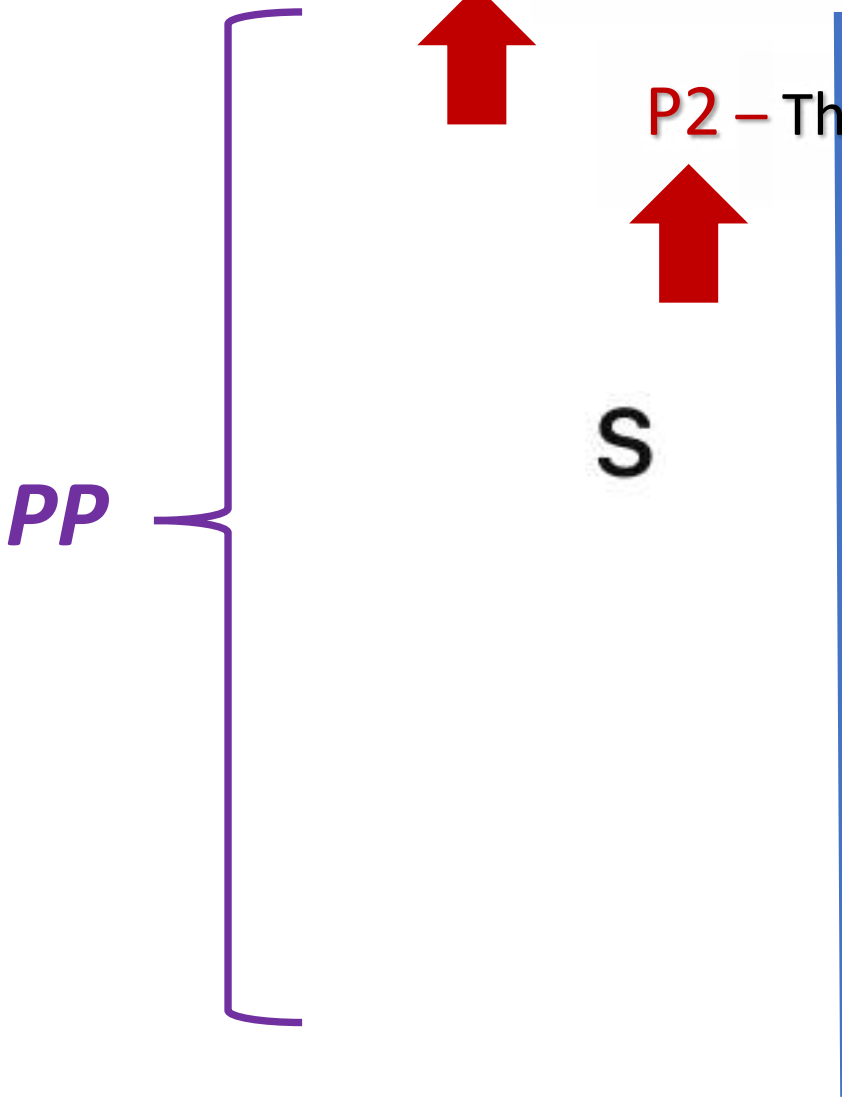
# why is central blood pressure is important to be mesured?



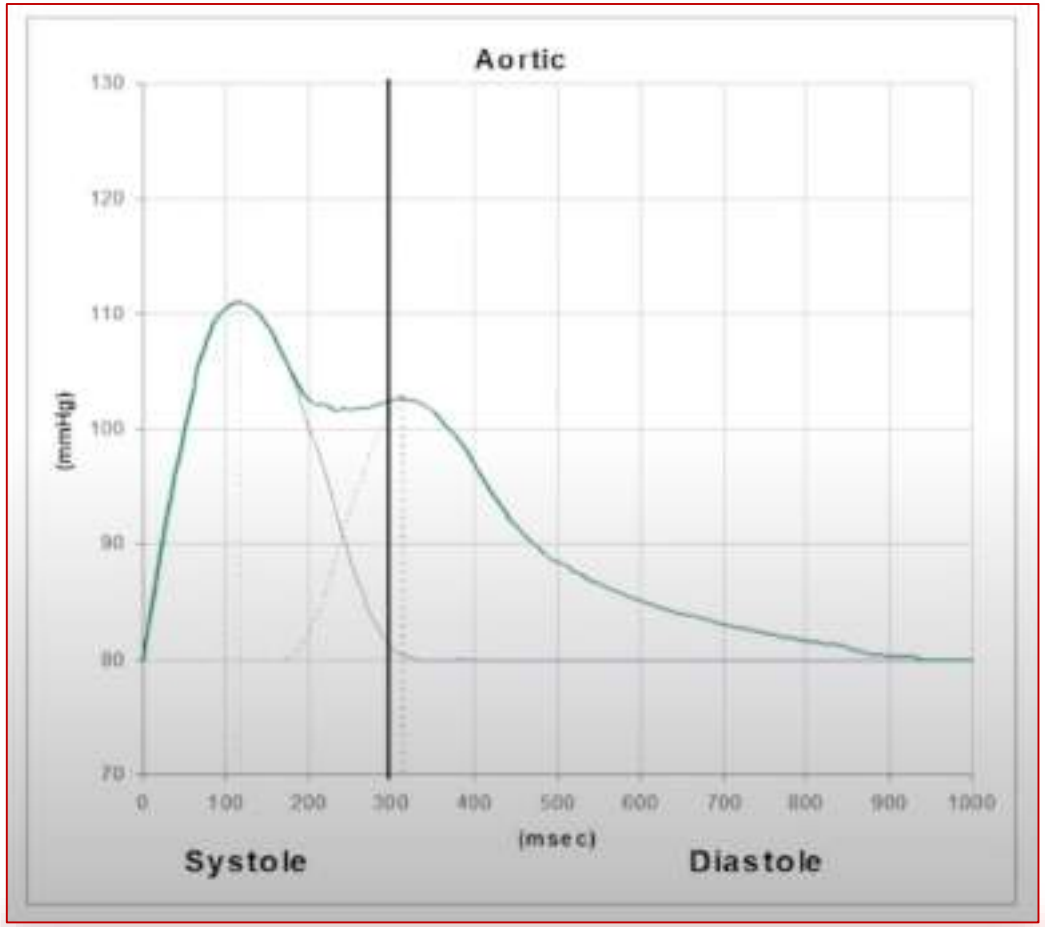
P1 – The direct wave pressure amplitude

P2 – The reflected wave pressure amplitude

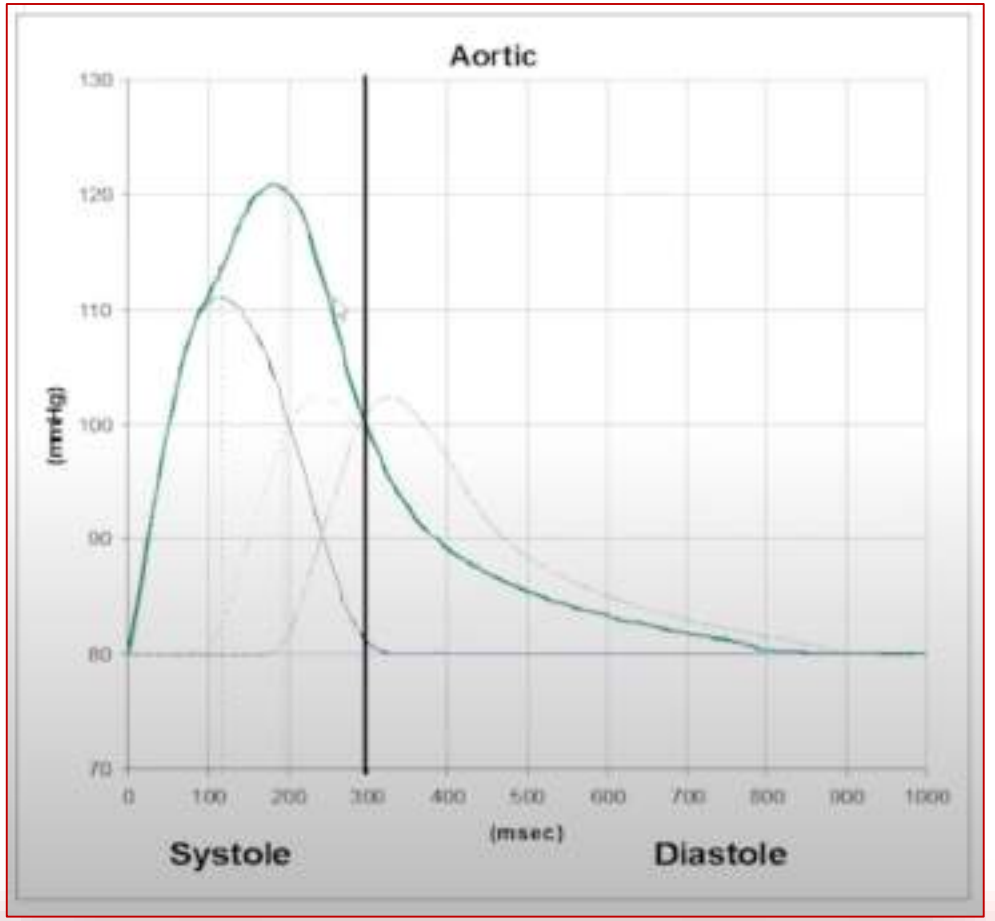



**AIX = P2-P1/PP *100**

# wave reflection timing

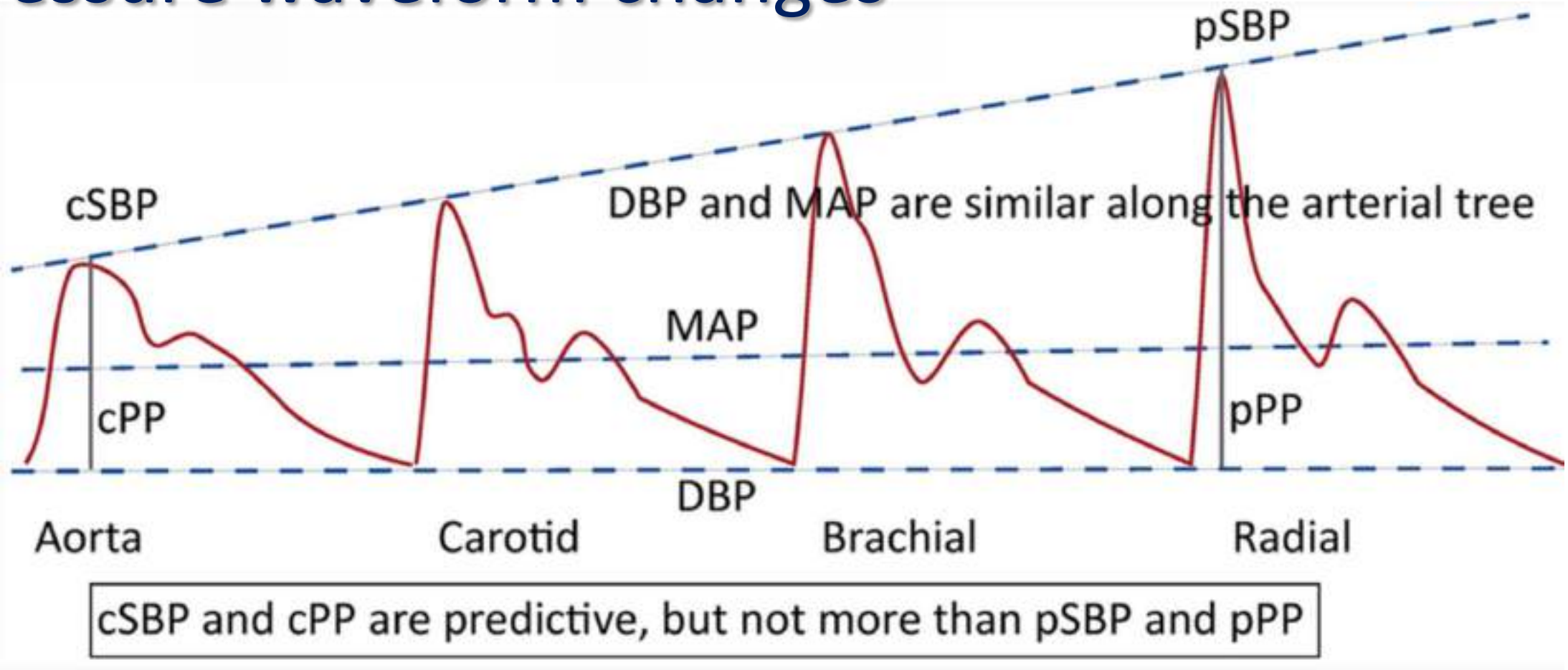



**central BP late wave reflection**



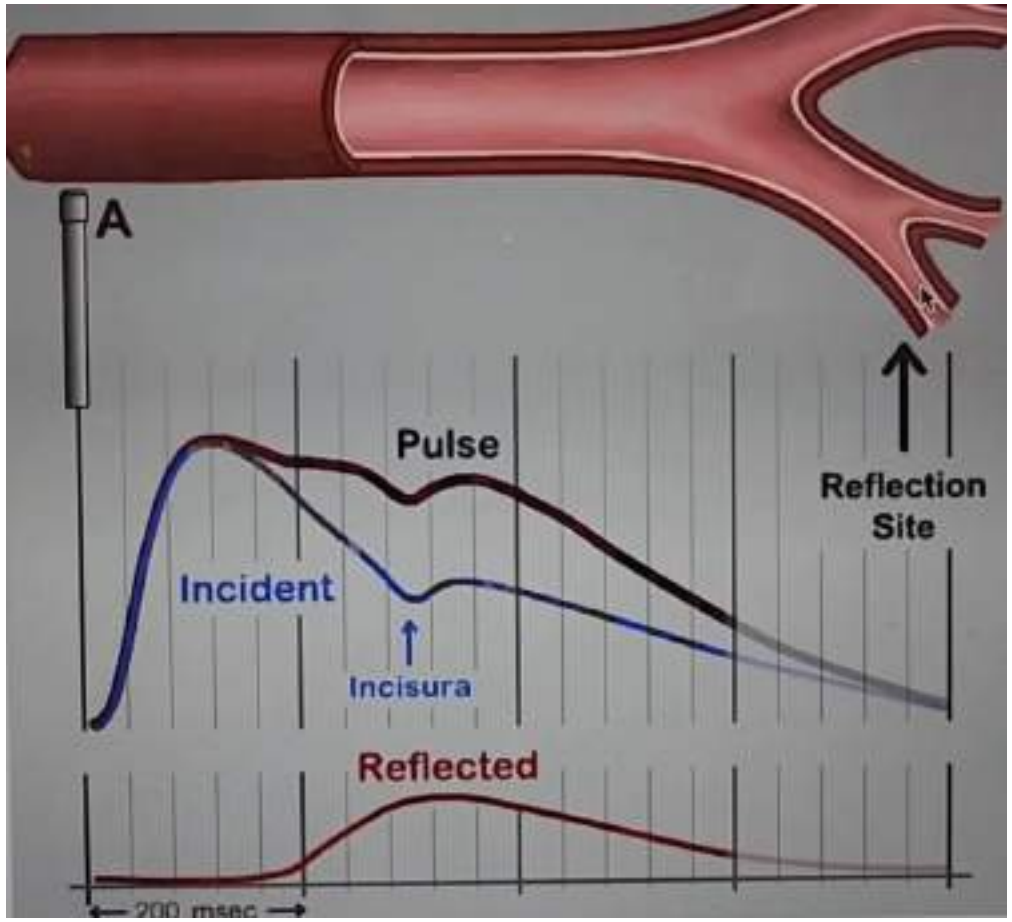

**central BP early wave reflection**

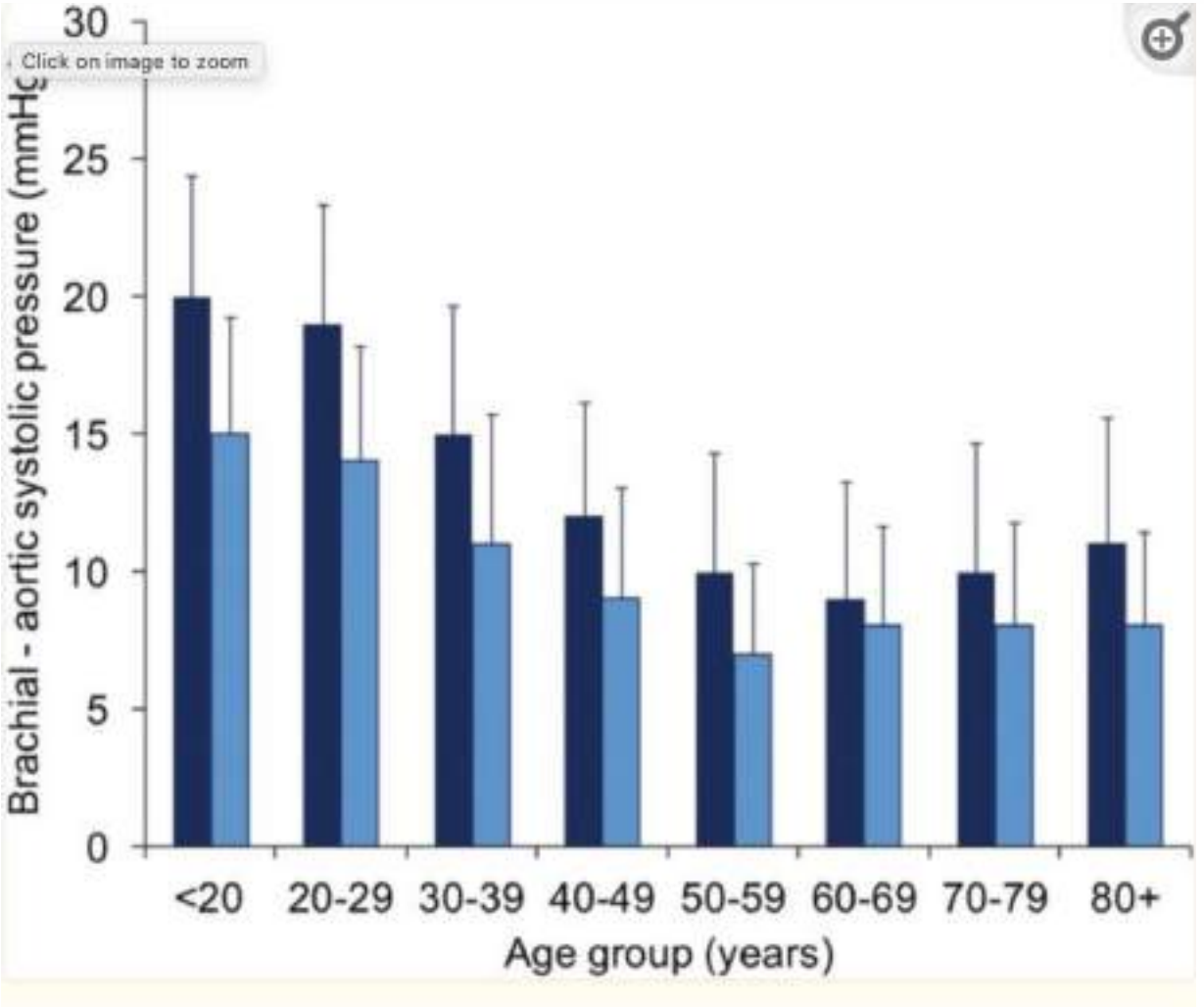
# pressure waveform changes




https://doi.org/10.1161/HYPERTENSIONAHA.120.14787

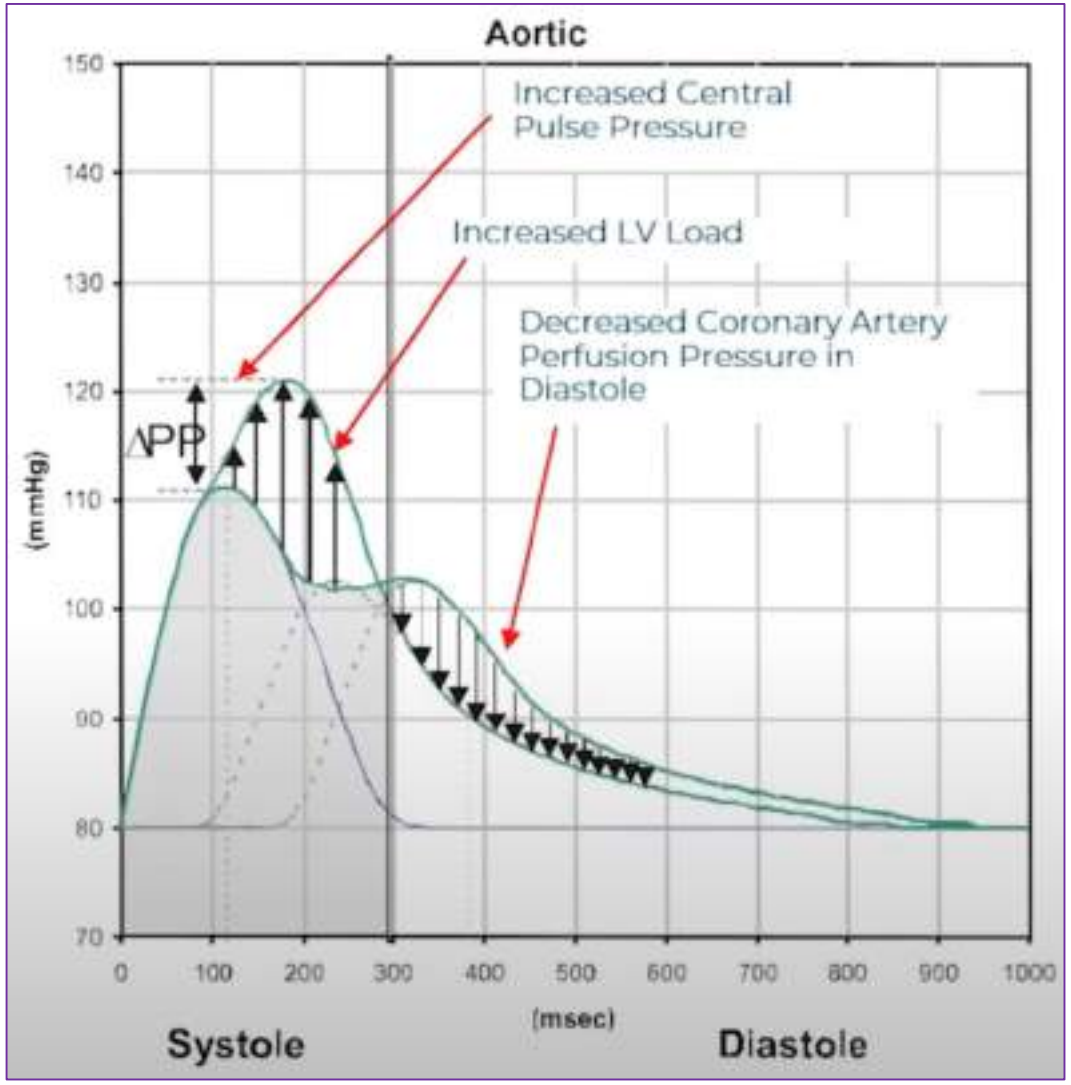
# why is central blood pressure is important to be measured?



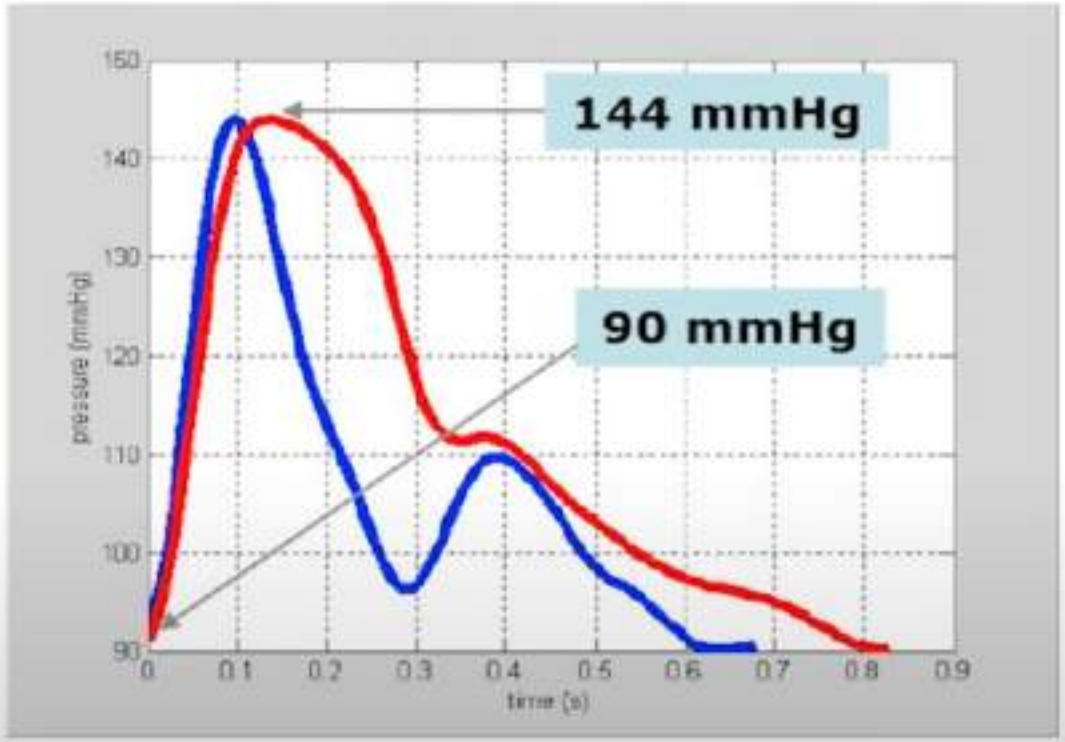

doi: 10.1093/eurheartj/eht565

# clinical implications of early wave reflection

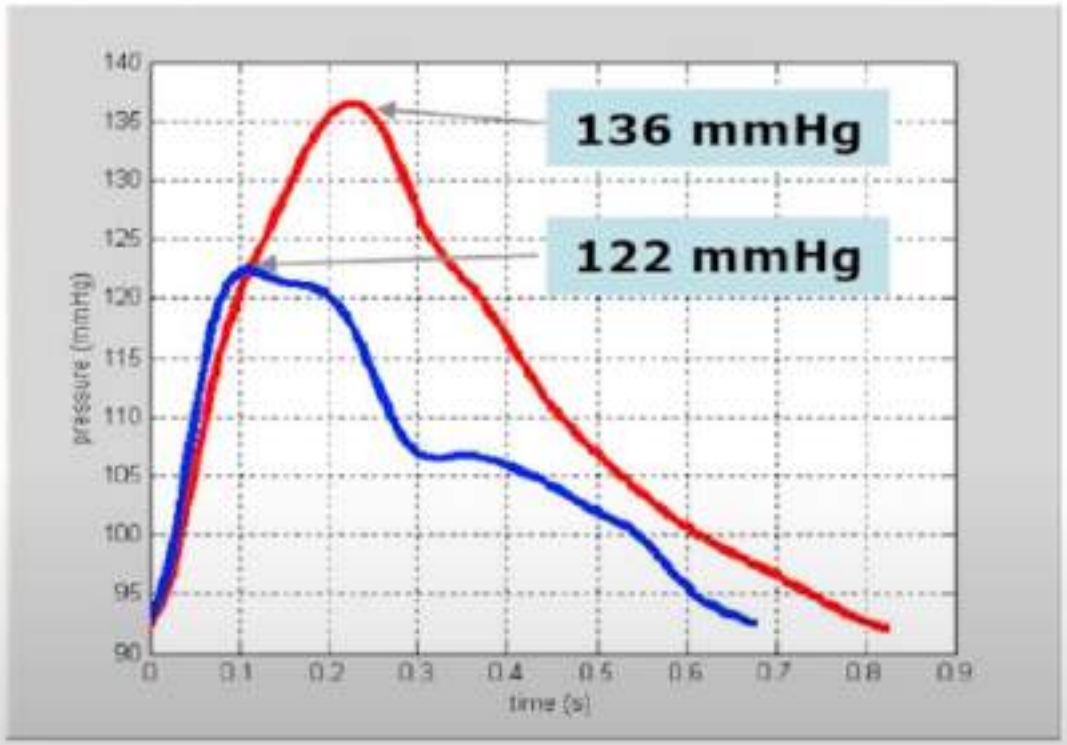


# differential central to brachial pressure amplification

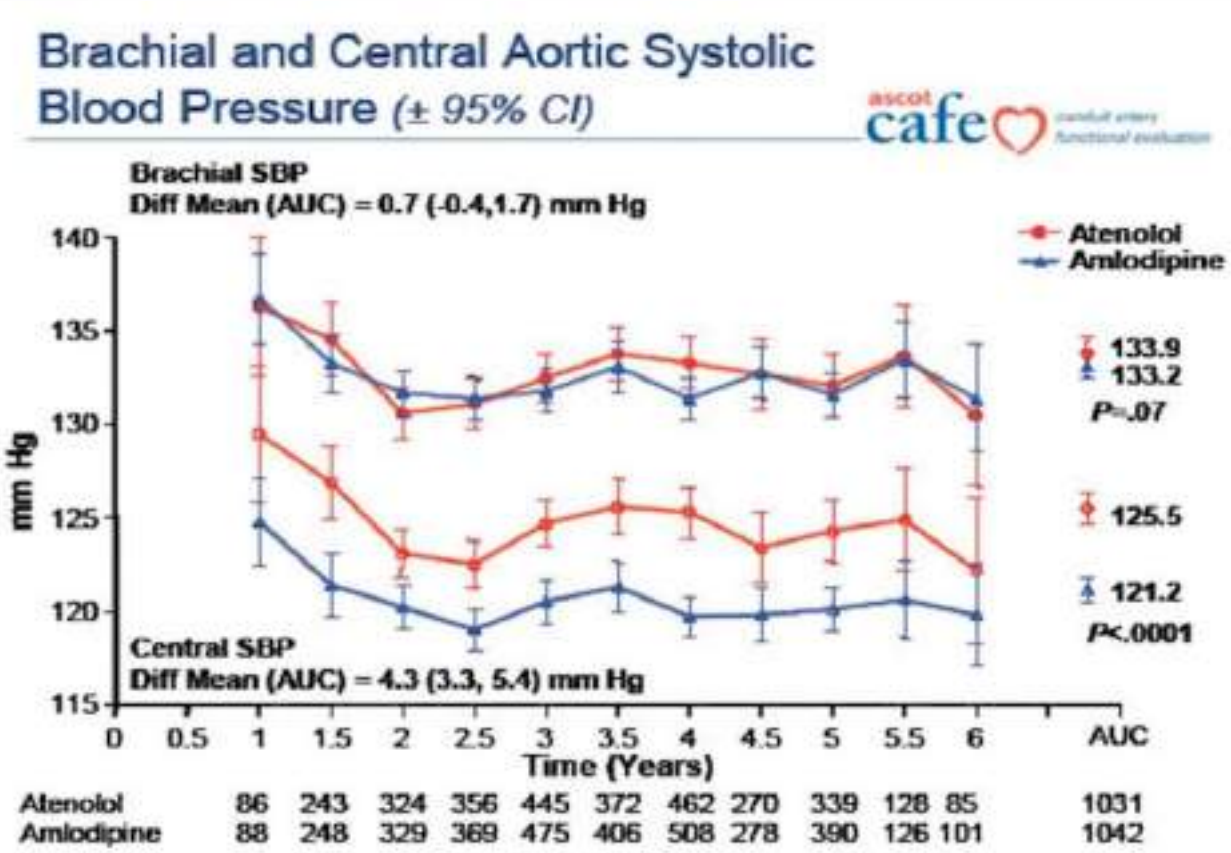
PERIPHERAL PRESSURE

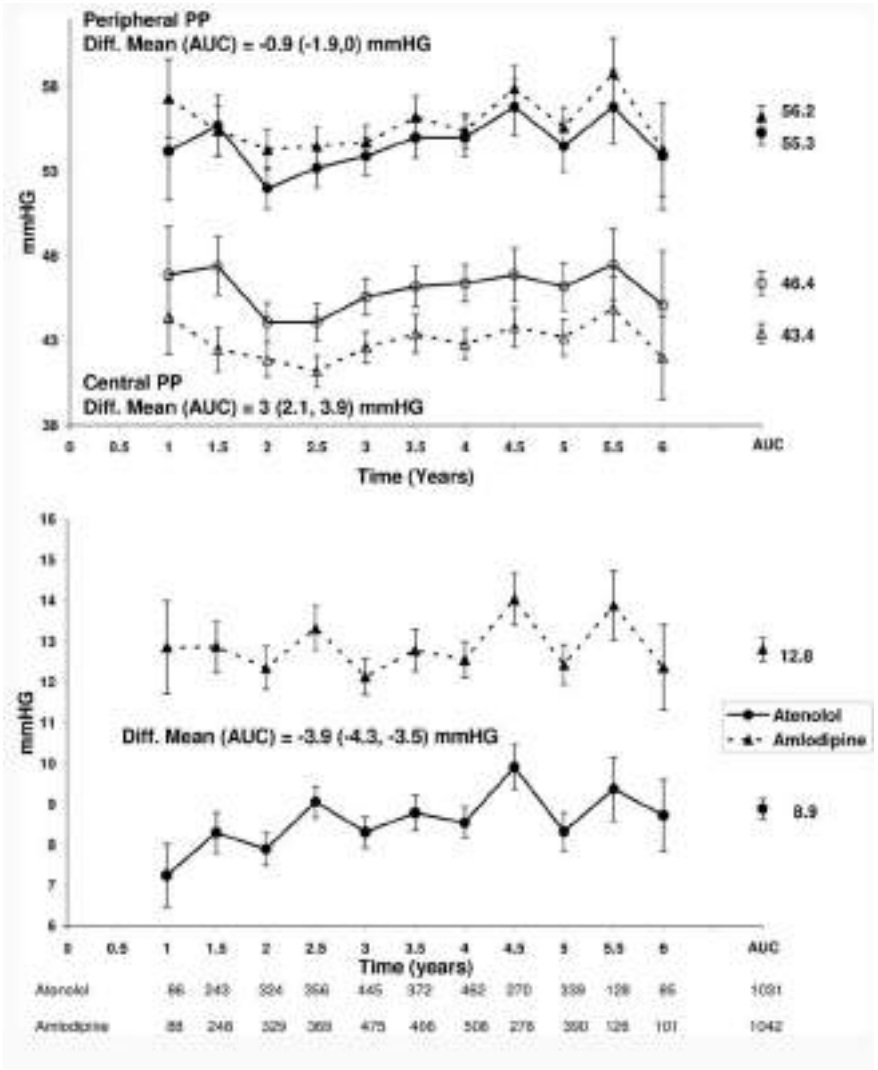



CENTRAL PRESSURE



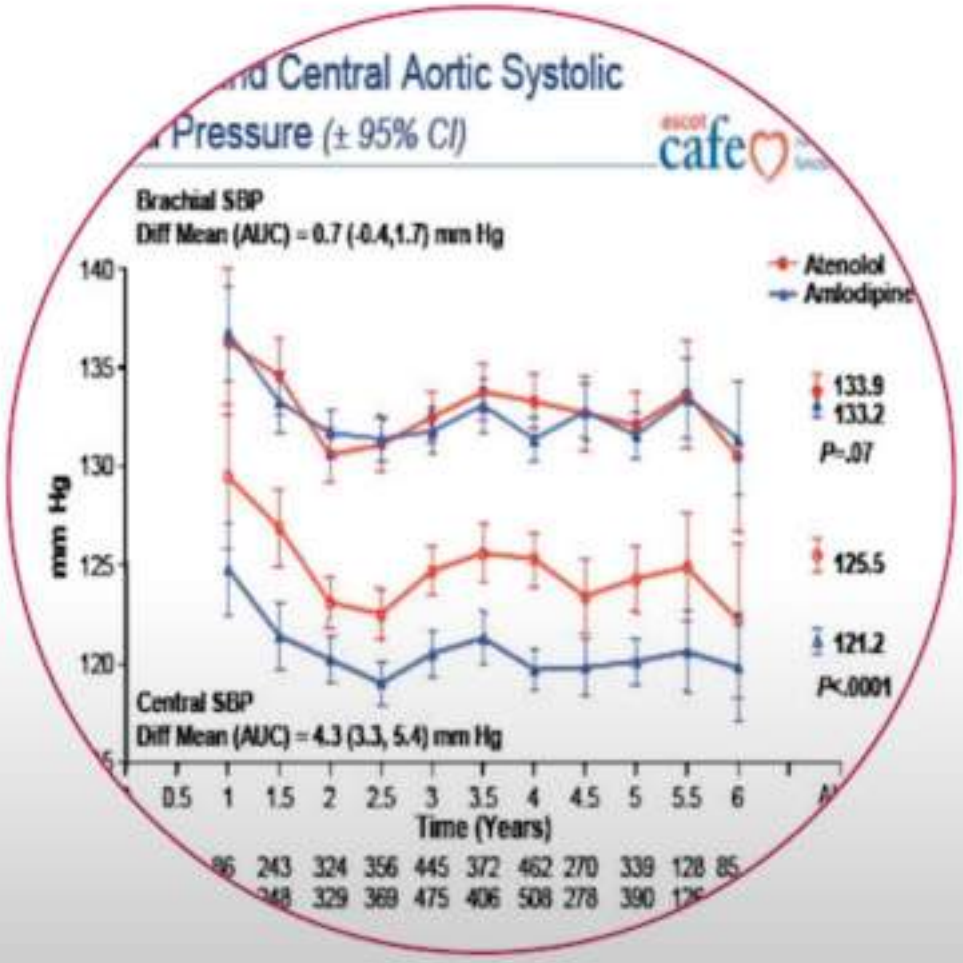
# differential drug effects (CAFE study)



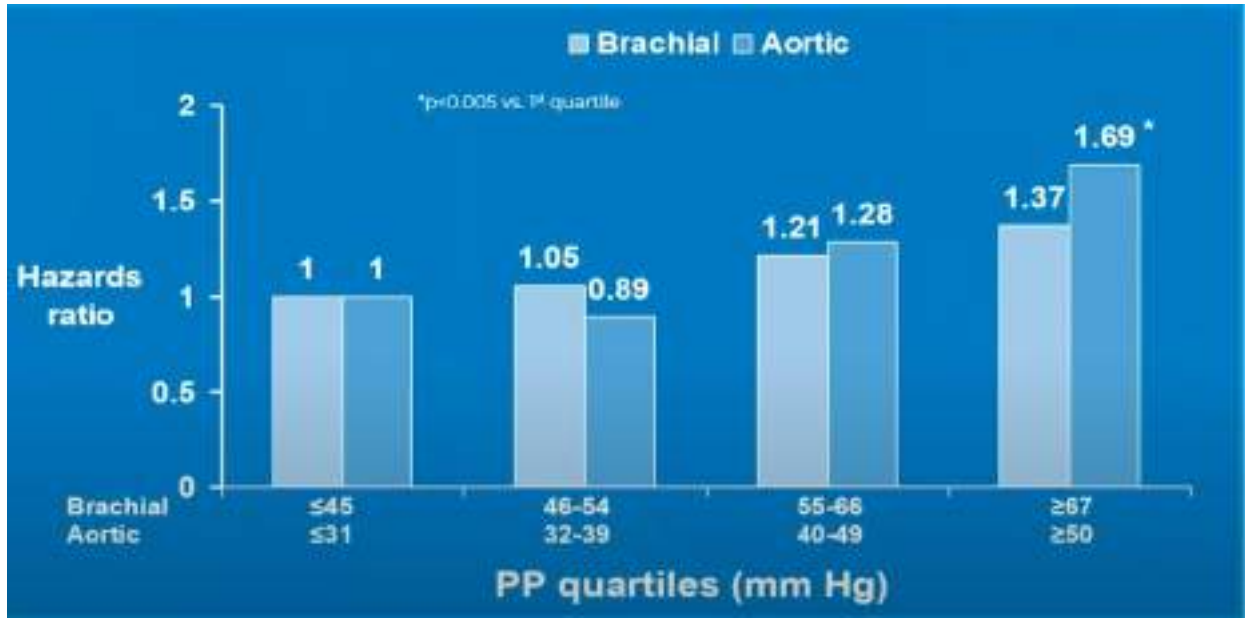

https://doi.org/10.1161/CIRCULATIONAHA.105.595496

# differential drug effects (CAFE study)




"BP-lowering drugs can have substantially different effects on central aortic pressures and hemodynamics despite a similar impact on brachial BP."

# central BP and CV outcomes (Strong Heart Study)



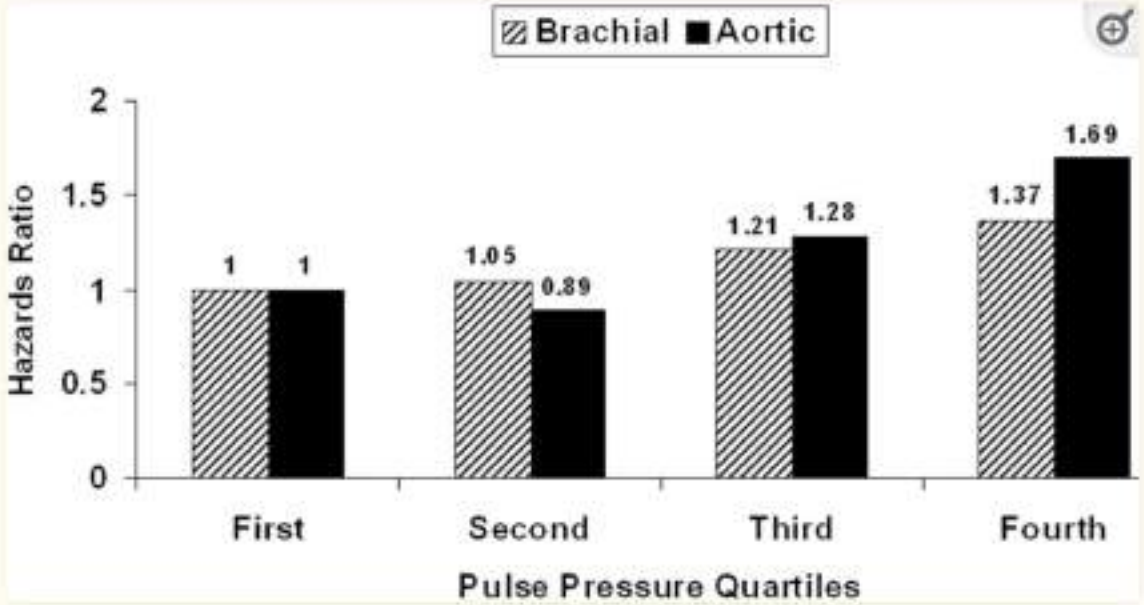



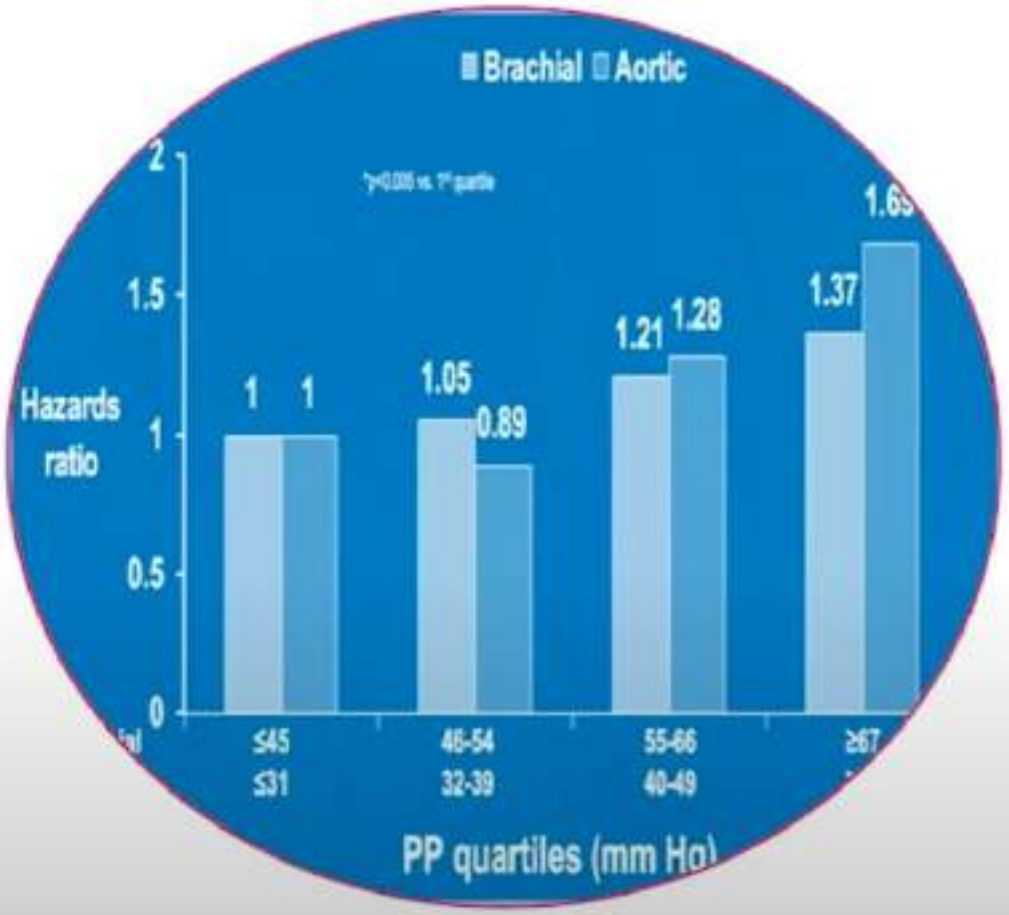

Figure 1

**Hazards Ratios for Incident Cardiovascular Event**

Hazards ratios for incident cardiovascular events in 2,405 individuals initially free of clinical cardiovascular disease are stratified by quartiles of brachial (hatched bars) and central aortic (solid bars) PPs. Quartiles of central PP ($p<0.001$) predicted outcome more strongly than quartiles of brachial PP ($p=0.052$). Only the event rate in the fourth central PP quartile (PP ≥50 mmHg) was significantly higher than in the first quartile ($p=0.003$).

***doi: 10.1016/j.jacc.2009.05.070***

# central BP and CV outcomes (Strong Heart Study)




"Noninvasively determined central aortic pressure better predicts incident cardiovascular disease than does brachial pressure."

doi: 10.1016/j.jacc.2009.05.070

# central waveform analysis and HTN management (BP Guide Study)

Hypertension

American Heart Association.

**Randomized Trial of Guiding Hypertension Management Using Central Aortic Blood Pressure Compared With Best-Practice Care: Principal Findings of the BP GUIDE Study**

James E. Sharman, Thomas H. Marwick, Deborah Gilroy, Petr Otahal, Walter P. Abhayaratna and Michael Stowasser

*Hypertension*. 2013;62:1138-1145; originally published online September 23, 2013;
doi: 10.1161/HYPERTENSIONAHA.113.02001
*Hypertension* is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231

Print ISSN: 0194-911X. Online ISSN: 1524-4563

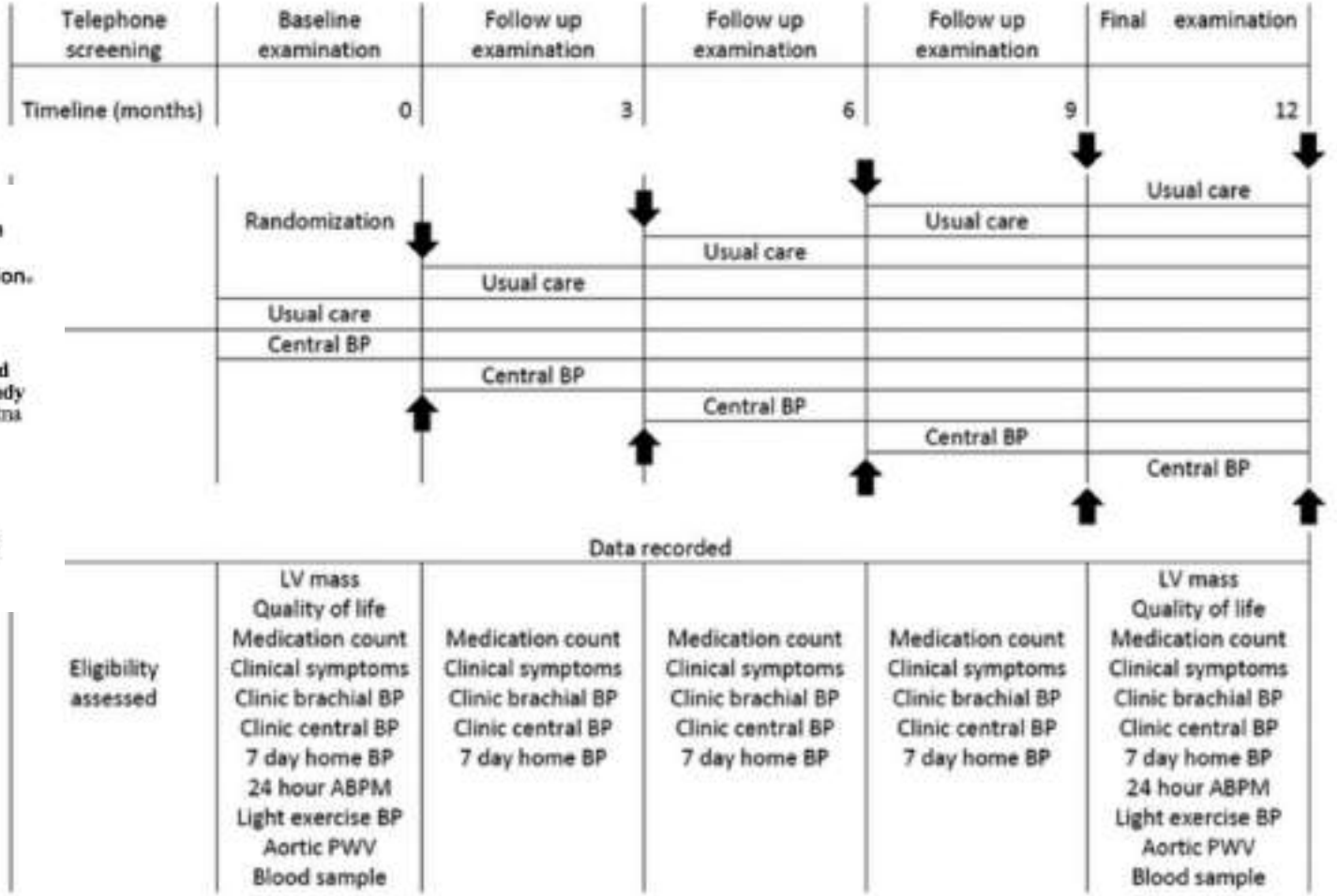
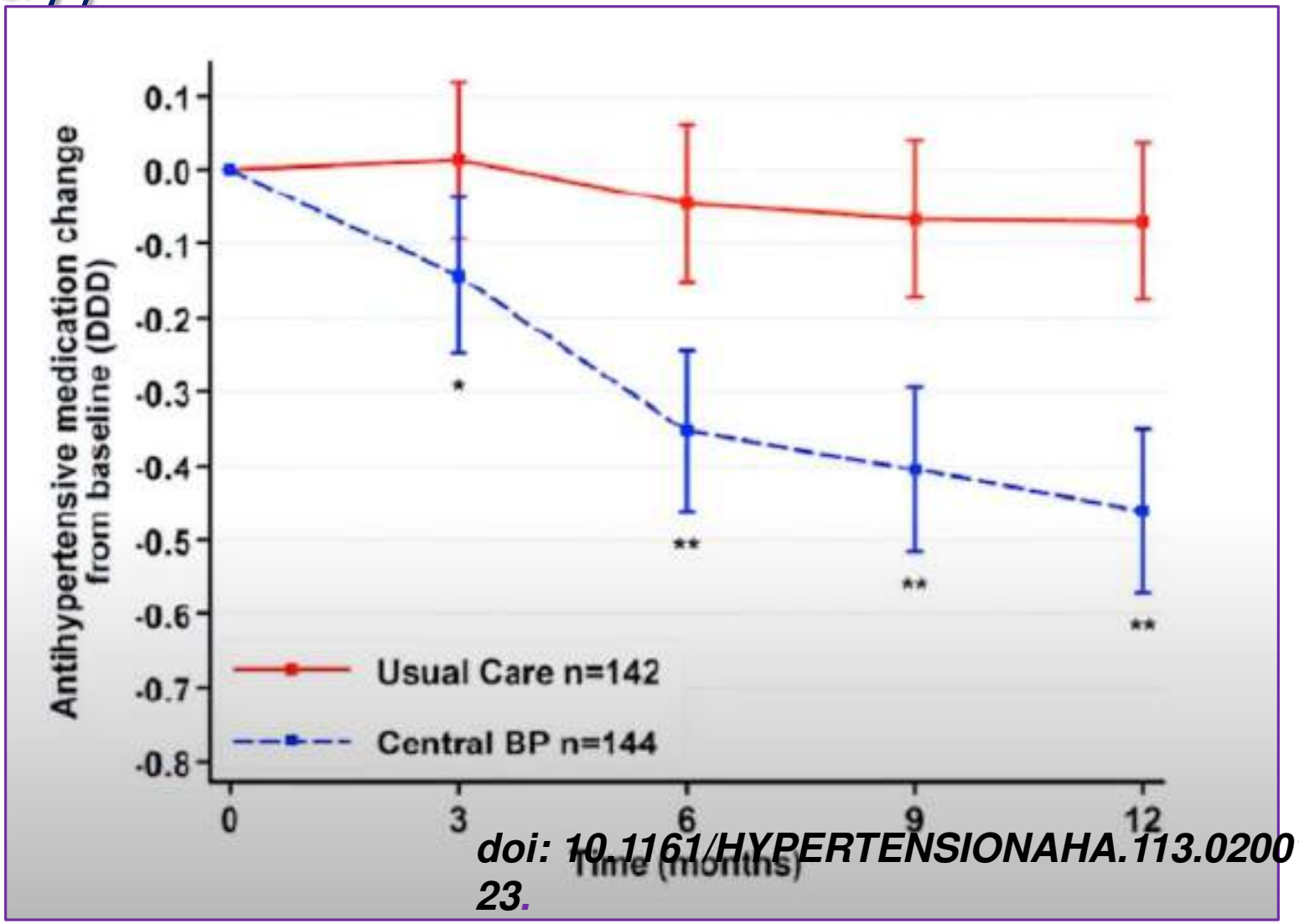


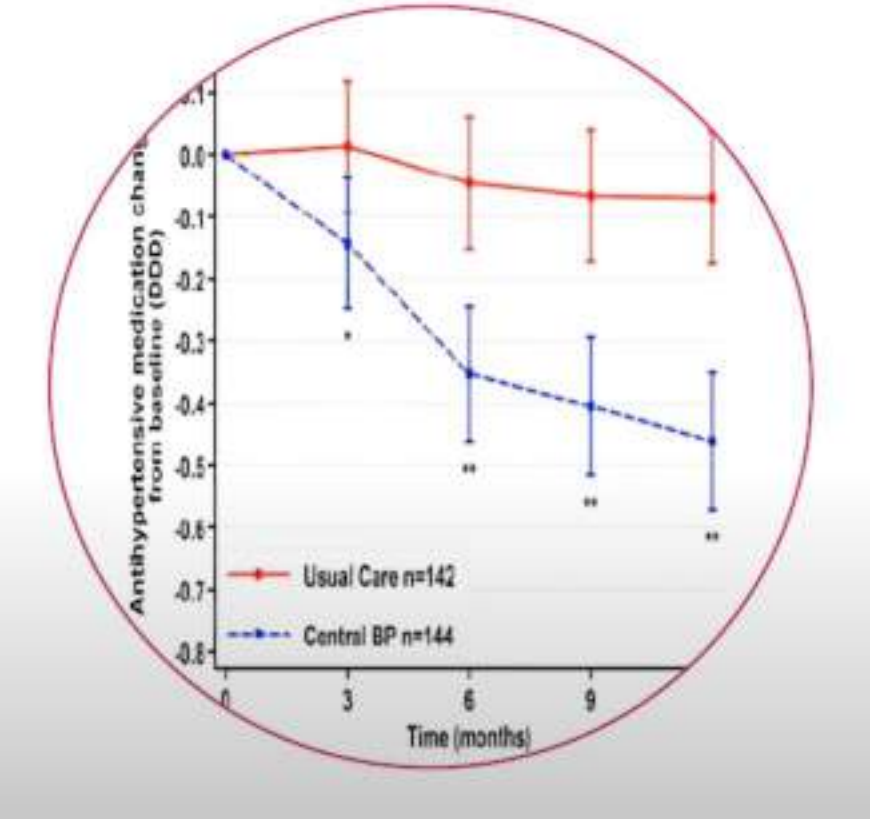

**Figure 1.** Overview of study protocol and measures acquired. Arrows indicate the time at which a recommendation letter on antihypertensive treatment titration (maintain, increase, or decrease) was sent to each patient and their attending doctor. ABPM indicates ambulatory BP monitoring; BP, blood pressure; LV, left ventricular; and PWV, pulse wave velocity.

# central waveform analysis and HTN management (BP Guide Study)




*doi: 10.1161/HYPERTENSIONAHA.113.02001. Epub 2013 Sep 23.*

# central waveform analysis and HTN management (BP Guide Study)




"... guidance of hypertension management with central BP results in a significantly different therapeutic pathway than conventional cuff BP, with less use of medication to achieve BP control."

***doi: 10.1161/HYPERTENSIONAHA.113.02001. Epub 2013 Sep 23.***

# cardiovascular abnormalities and brain lesions

Observational Study > Hypertension. 2020 Feb;75(2):580-587.
doi: 10.1161/HYPERTENSIONAHA.119.13478. Epub 2019 Dec 23.

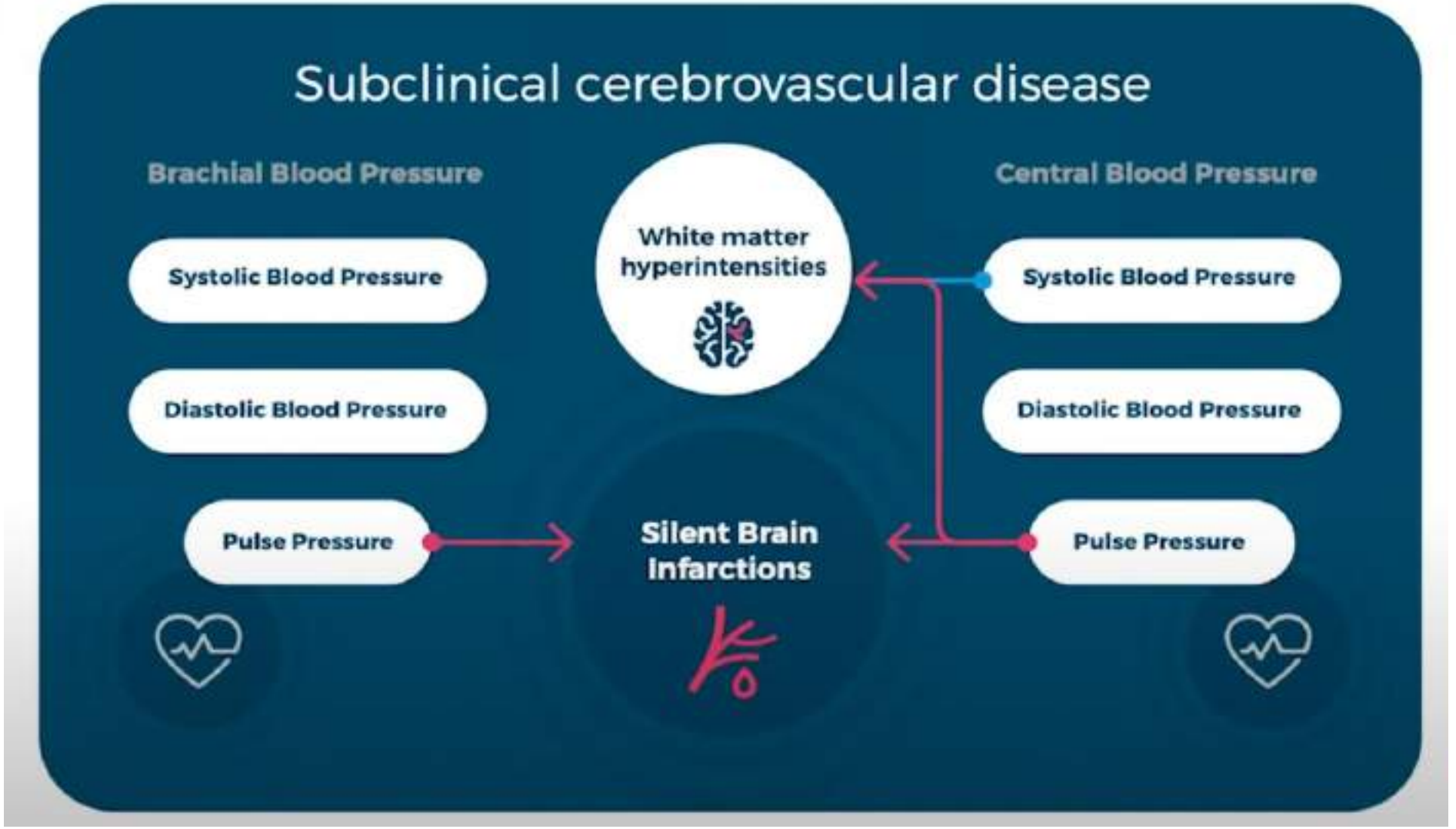
## Association Between Central Blood Pressure and Subclinical Cerebrovascular Disease in Older Adults

Kenji Matsumoto [1], Zhezhen Jin [2], Shunichi Homma [1], Mitchell S V Elkind [3 4], Tatjana Rundek [5 6], Carlo Mannina [1], Tetz C Lee [1], Mitsuhiro Yoshita [7], Charles DeCarli [8], Clinton B Wright [9], Ralph L Sacco [5 6 10], Marco R Di Tullio [1]

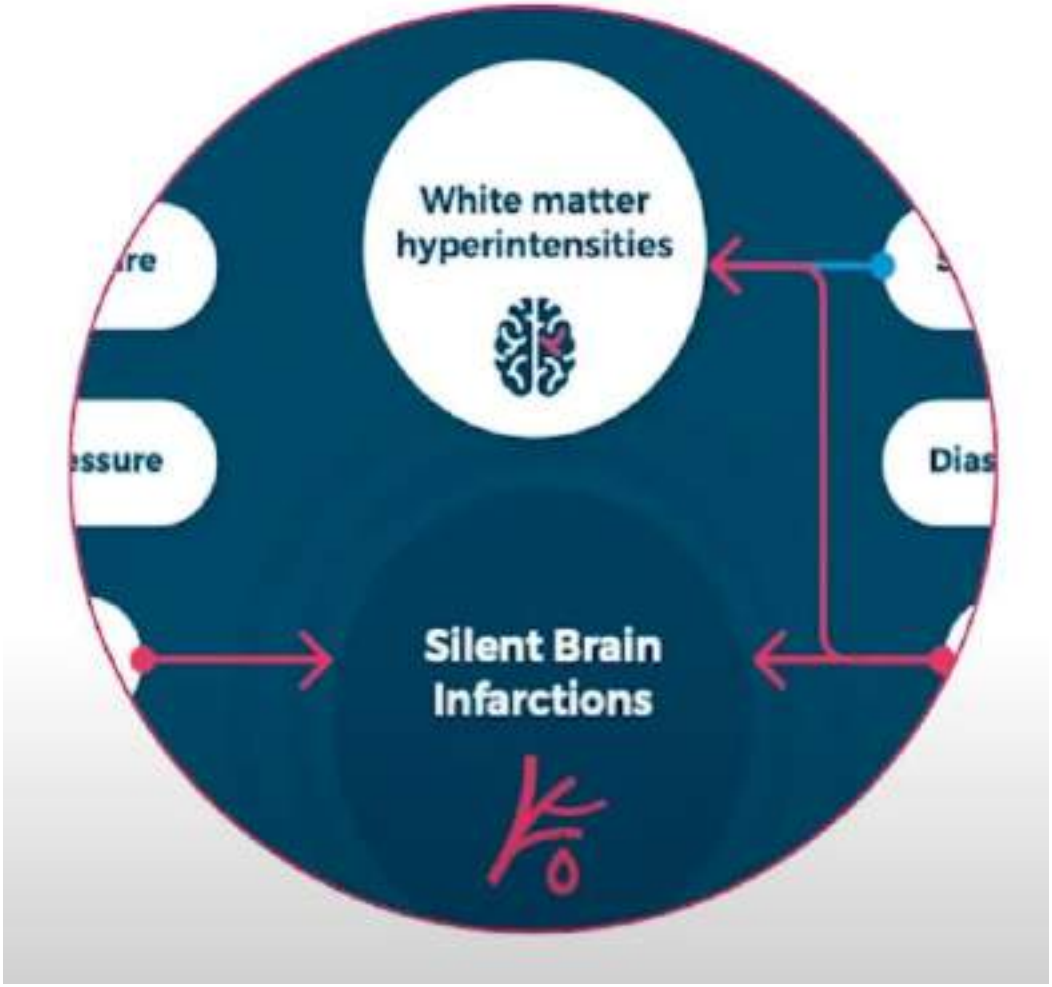
Affiliations + expand

PMID: 31865782 PMCID: PMC7008935 DOI: 10.1161/HYPERTENSIONAHA.119.13478

# cardiovascular abnormalities and brain lesions



# cardiovascular abnormalities and brain lesions




"White matter hyperintensities have emerged as an important marker of cerebrovascular insult contributing to vascular dementia and to Alzheimer's disease (possibly as a mixed dementia).

Determining that only central blood pressure assessments were linked with increased white matter hyperintensity burden may have important clinical implications for management of blood pressures among the elderly to promote healthy brain aging."

# clinical use of pulse wave analysis and ways to accurately estimate central aortic pressure by non-invasive pathway

1. Deciding whether to initiate, intensify, or change **therapy in younger, asymptomatic individuals** with systolic hypertension.
2. Deciding on which **class of antihypertensive agent** to add when another medication is needed based on the brachial BP.
3. Deciding on whether a change in a **previous office encounter** has had as desirable effect on central pressure as it may have had on brachial BP.

# take home messages

1. **Studies document the superiority of central PP and central aortic pressure - over brachial PP in predicting cardiovascular events.**
2. **From a pathophysiological perspective, central blood pressure correlates better with target organ damage and cardiovascular outcomes than brachial blood pressure.**
3. **Central pressure more accurately reflects afterload on the left ventricle, cerebral and coronary vascular systems.**
4. **It is important to test this concept and develop accurate, non-invasive techniques that allow pulse wave analysis and determination of central blood pressure and be widely used in certain situations.**