

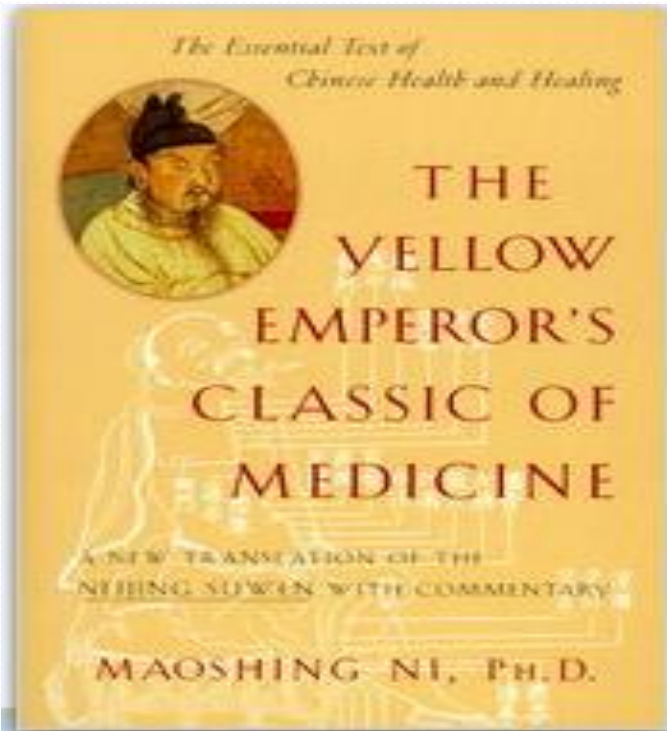
Hypertension: From the Ancient World to the JNC8 and Beyond

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Lecture Objectives

- Learn about the historical understanding of HTN and progress to treatment and evolving guidelines
- Understand the 9 recommendations of JNC 8
- Contrast JNC 7 and JNC 8
- Consider major trials including, ALLHAT, ACCORD, ACCOMPLISH, & the Sprint Trial and how these trial should guide our practice
- Share best practices and advanced management skills
- Work through some complex cases

Ancient Sources



HTN through the ages

- As early as 2600 BC the Yellow Emperors' classic of Internal Medicine stated the heart influences the force and fills the pulse with blood. It further notes that if too much salt is used in food the pulse hardens. Also noted is that when the pulse is abundant but tense and hard like a cord, there are dropsical swellings.
- Medical text from Ashurbanipal Library from Nineveh (modern day Iraq) from 669 BC recommends venesection (bleeding/phlebotomy) and cupping for apoplexy.
- Hippocrates (400 BC) believed paralysis was caused by apoplexy and recommended venesection (bleeding).
- Leeches were used for apoplexy throughout the ancient world.



Early Progress in Measuring Blood Pressure

- First measurements of BP done on horses by Stephen Hales in Horses in the 1700s
- First use of mercury manometer Pouseuille and Ludwig 1800s
- Riva-Rocco and Recklinghausen develop around the arm rubber cuff late 1896
- Breakthrough in 1905 by Nikolai Sergeyevich Korotkoff who described the sounds that he heard with a stethoscope placed over the brachial artery below the Riva-Rocci-vonRecklinghausen inflatable cuff during its slow deflation. Clinical recording of blood pressure then spread rapidly throughout the world.

Early Drug Treatment & Trials

- Prior to WWII there were no effective anti-HTN drugs
- Surgical sympathectomy was performed starting in the 1920s. For numerous reasons this did not catch on.
- Treatment was held back by prevailing view of the medical establishment against treatment.
- *“The Greatest Danger to a man with high blood pressure lies in its discovery, because then some fool is certain to try and reduce it.”* J.H. Hay, 1931
- *“Hypertension may be an important compensatory mechanism which should not be tampered with.”* Paul Dudley White, 1937

Growing evidence for the harms of HTN

- 1967 VA Cooperative study showed treating diastolic HTN (115-129) was safe and reduced stroke and CHF
- 1970 Same question for diastolic 90-115 same result
- 1985 MRC showed treating HTN in pts 35-64 also reduced CV events
- 1991 SHEP Is tx of systolic HTN helpful? Yes, treatment of systolic of >160 lowered CVA, MI and CVD
- 2002 AASK To reduce progression of CKD BP mean 92 vs 105, ACEI, BB, CCB better as drug? No difference in mean BP of 92 vs 105, ACEI better than CCB for reducing progression of CKD

Growing evidence of the harms of HTN

- 2002 ALLHAT Compared Thiazide, CCB, ACEI and AB. 41,000 pts enrolled. No difference in MI, mortality or CKD progression (except for AB which showed increased CHF)
- 2003 ANBP2 ACEI vs HCTZ ACE was better RR.83 of all CV events.
- HYVET should we treat pts >80 yrs old with sys BP >160. Yes, 30% less CVA 64% less CHF and 21% less death
- ACCORD In DM is sys <120 better than 140. No.
- SPRINT Same a ACCORD but non DM. Yes, 27% reduction in all cause mortality and 25% in CV outcome

The ACCOMPLISH Trial

- 11K pts
- Compared benazepril +amlodipine vs benazepril + HCTZ
- Trial stopped early at 36 mo
- Primary end point (composite of cv death, MI, CVA, angina, coronary revascularization)
- End point reached in 9.6 of benazepril/amlodipine 9.6 vs 11.8 for benazepril/hctz
- Less CKD in BZP/Amlodipine as well

The Sprint Trial

- **Systolic Blood Pressure Intervention Trial 2010-2015** Published 11/15. 9361 participants
- Is treating to a systolic BP of 120 better than 140 in pts >50 yrs old with 1 CV risk factor and NO DM?
- After mean follow up 3.26 yrs, the risk of MI, ACS, CVA, HF or death was 1.65%/yr vs 2.19%/yr for the two goals
- So, the RRR was 25% for ASCVD and 27% for death

Things to keep in mind

- Patient sat for 5 minutes before BP was taken
- The BP was taken by an automated measurement system (Omron 907) 3 times and the BP used was the average of the 3 readings



The AHA position

- **More aggressive treatment of high blood pressure saves lives in study**
- **BY AMERICAN HEART ASSOCIATION NEWS**

The American Heart Association

- A report published late in 2013 recommends healthcare providers take a new approach to treating high blood pressure for people older than 60. But based on the current research available, **the American Heart Association recommends that healthcare providers continue to follow existing guidelines for treating high blood pressure.**

JNC7: Classification and Treatment

EVALUATION

CLASSIFICATION OF BLOOD PRESSURE (BP)*

CATEGORY	SBP mmHg		DBP mmHg
Normal	<120	and	<80
Prehypertension	120–139	or	80–89
Hypertension, Stage 1	140–159	or	90–99
Hypertension, Stage 2	≥160	or	≥100

* See *Blood Pressure Measurement Techniques* (reverse side)

Key: SBP = systolic blood pressure DBP = diastolic blood pressure

TREATMENT

PRINCIPLES OF HYPERTENSION TREATMENT

- Treat to BP <140/90 mmHg or BP <130/80 mmHg in patients with diabetes or chronic kidney disease.
- Majority of patients will require two medications to reach goal.

Recommendation 1

In the general population aged 60 years or older, initiate pharmacologic treatment to lower BP at systolic blood pressure (SBP) of 150 mm Hg or higher or diastolic blood pressure (DBP) of 90 mm Hg or higher and treat to a goal SBP lower than 150 mm Hg and goal DBP lower than 90 mm Hg.

Strong Recommendation – Grade A

Corollary Recommendation

In the general population aged 60 years or older, if pharmacologic treatment for high BP results in lower achieved SBP (for example, <140 mm Hg) and treatment is not associated with adverse effects on health or quality of life, treatment does not need to be adjusted.

Expert Opinion – Grade E



Recommendation 2

In the general population younger than 60 years, initiate pharmacologic treatment to lower BP at DBP of 90 mm Hg or higher and treat to a goal DBP of lower than 90 mm Hg.

For ages 30 through 59 years, Strong Recommendation – Grade A

For ages 18 through 29 years, Expert Opinion – Grade E



Recommendation 3

In the general population younger than 60 years, initiate pharmacologic treatment to lower BP at SBP of 140 mm Hg or higher and treat to a goal SBP of lower than 140 mm Hg.

Expert Opinion – Grade E



Recommendation 4

In the population aged 18 years or older with CKD, initiate pharmacologic treatment to lower BP at SBP of 140 mm Hg or higher or DBP of 90 mm Hg or higher and treat to goal SBP of lower than 140 mm Hg and goal DBP lower than 90 mm Hg.

Expert Opinion – Grade E



Recommendation 5

In the population aged 18 years or older with diabetes, initiate pharmacologic treatment to lower BP at SBP of 140 mm Hg or higher or DBP of 90 mm Hg or higher and treat to a goal SBP of lower than 140 mm Hg and goal DBP lower than 90 mm Hg.

Expert Opinion – Grade E



Recommendation 6

In the general nonblack population, including those with diabetes, initial antihypertensive treatment should include a thiazide-type diuretic, calcium channel blocker (CCB), angiotensin-converting enzyme inhibitor (ACEI), or angiotensin receptor blocker (ARB).

Moderate Recommendation – Grade B



Recommendation 7

In the general black population, including those with diabetes, initial antihypertensive treatment should include a thiazide-type diuretic or CCB.

For general black population: Moderate Recommendation – Grade B

For black patients with diabetes: Weak Recommendation – Grade C



Recommendation 8

In the population aged 18 years or older with CKD and hypertension, initial (or add-on) antihypertensive treatment should include an ACEI or ARB to improve kidney outcomes. This applies to all CKD patients with hypertension regardless of race or diabetes status.

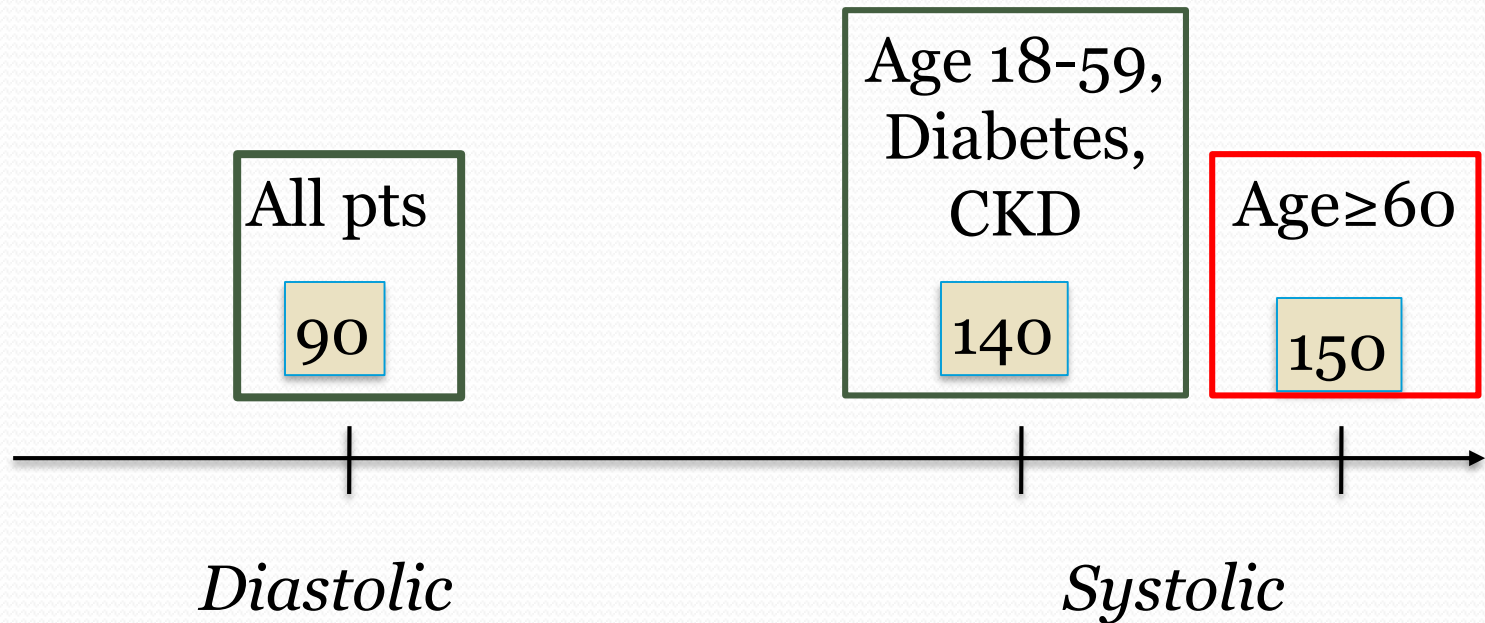
Moderate Recommendation – Grade B

Recommendation 9

The main objective of hypertension treatment is to attain and maintain goal BP. If goal BP is not reached within a month of treatment, increase the dose of the initial drug or add a second drug from one of the classes in recommendation 6 (thiazide-type diuretic, CCB, ACEI, or ARB). The clinician should continue to assess BP and adjust the treatment regimen until goal BP is reached. If goal BP cannot be reached with 2 drugs, add and titrate a third drug from the list provided. Do not use an ACEI and an ARB together in the same patient. If goal BP cannot be reached using the drugs in recommendation 6 because of a contraindication or the need to use more than 3 drugs to reach goal BP, antihypertensive drugs from other classes can be used. Referral to a hypertension specialist may be indicated for patients in whom goal BP cannot be attained using the above strategy or for the management of complicated patients for whom additional clinical consultation is needed.

Expert Opinion – Grade E

JNC8: BP Goals



JNC8: Initial Preferred Meds

Preferred

ACE

ARB

CCB

Thiazide

ACE

ARB

CCB

Thiazide

CKD ≤ 75

*African American Descent,
Without CKD*

20 amazing HTN Peals:

- Moderate salt restriction will lower BP 4.8/2.5
- Wt loss produces about 1 mmHg decrease for each pound of wt loss
- DASH diet reduces BP 6/4 as compared to usual American diet
- Regular aerobic exercise lowers BP 5/3
- ETOH beyond 2/1 increases BP

Should I increase the dose or add a second agent?

- Combination therapy with drugs from different classes has a substantially greater blood pressure lowering effect than doubling the dose of a single agent. The steepest part of the dose response curve is seen in the $\frac{1}{2}$ half of the dosing range.
- Keep in mind that low doses i.e. 10 of lisinopril may not last 24 hours nor will HCTZ (6-12 hour duration of action)
- Chlorthalidone 12.5mg and idapamidine 1.25 to 2.5 are particularly good at 24 hour coverage and HCTZ is not. This will improve night time BP and could be easily missed with daytime BP readings. We all (including me) should use more chlorthalidone and less hctz. However if we do, we must be mindful of the K⁺. Best time to check is 2-3 wks

Nocturnal dosing

- Average nocturnal BP should be 15% lower than day time
- Failure to fall by 10% during sleep is called “nondipping” and is a stronger predictor of adverse cardiovascular outcomes than daytime blood pressure
- There is some evidence that in pts taking more than 1 BP med, shifting at least one drug from AM to HS may restore the normal nocturnal BP dip, reduce 24 hour mean BP and decrease the incidence of CV disease.

Considerations for specific therapy

- BPH alpha blocker – terazosin, doxazosin
- Essential tremor – Propranolol
- Migraine prophylaxis – BB, CCB
- Osteoporosis – thiazide
- Raynaud's - Dihydropyridine CCB (nifedipine)
- Avoid the following: thiazide in gout, ACE with angioedema, at risk for pregnancy-ACE/ARB, hyponatremia-thiazide, hyperkalemia ACE/ARB, second or third degree HB – BB or non HDP CCB

More specific considerations

- Young pts seem to respond best to ACE/ARB
- African American pts often respond best to diuretic or long acting CCB
- ACE fist line for HF, LV dsfunction, STe MI, protienuric kidney dz

Case 1

- 55 yo Hispanic male with BP 155/90
- Father had MI age 75
- CMP WNL, UA normal, FBS 101, A1c 5.8

What do you want to do?

When do you want him to f/u?

What if the A1c is 7.1?

What if there is nephropathy?

What if he is 65 not 55?

What if he is Black rather than Hispanic?

Case 1 Cont

- Returns on medication and his BP is 145/ 88
- What do you do next?
- When would you have him f/u?
- What if he has had an MI in the past?
- What if he has had a TIA/CVA in the past?

Case 2

- 65 yo AA male with h/o CVA
- BP 165/88
- What do you start?
- What do you add?
- What if he says his BP is normal at home?
- What if has CKD?
- What if his right arm bp is 20 mmHg higher than the left?
- What if he has OA and take naproxen daily?

Case 2 cont.

- What if his diastolic gets below 55 and he gets light-headed but his systolic is still elevated?
- Would you suggest any dietary intervention?
- How about salt restriction?

