Learning Objectives

- Review the JNC8 guidelines for hypertension in adults, with special attention to new blood pressure goals

- Consider patient factors such as age, co-morbidities, and race when prescribing anti-hypertensive therapy
2014 Evidence-Based Guideline for the Management of High Blood Pressure in Adults: Report From the Panel Members Appointed to the Eighth Joint National Committee (JNC 8)
Important to Note…

- JNC 7 was “The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure”

- JNC 8 is the “2014 Evidence-Based Guideline for the Management of High Blood Pressure in Adults”

- In JNC 8 they give 9 Evidence based Recommendations

- “… these recommendations are not a substitute for clinical judgment, and decisions about care must carefully consider and incorporate the clinical characteristics and circumstances of each individual patient.”
### Strength of Recommendation

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td><strong>Strong recommendation</strong>: There is high certainty based on evidence that the net benefit is substantial.</td>
</tr>
<tr>
<td>B</td>
<td><strong>Moderate recommendation</strong>: There is moderate to high certainty based on evidence that the net benefit is moderate to substantial.</td>
</tr>
<tr>
<td>C</td>
<td><strong>Weak recommendation</strong>: There is at least moderate certainty based on evidence that there is a small net benefit.</td>
</tr>
<tr>
<td>D</td>
<td><strong>Recommendation against</strong>: There is at least moderate certainty based on evidence that it has no net benefit or that risks/harms outweigh benefits.</td>
</tr>
</tbody>
</table>
| E     | **Expert opinion** ("There is insufficient evidence or evidence is unclear or conflicting, but this is what the Panel recommends.")  
Net benefit is unclear. Balance of benefits and harms cannot be determined because of no evidence, insufficient evidence, unclear evidence, or conflicting evidence, but the Panel thought it was important to provide clinical guidance and make a recommendation. Further research is recommended in this area. |
| N     | **No recommendation for or against** ("There is insufficient evidence or evidence is unclear or conflicting.")  
Net benefit is unclear. Balance of benefits and harms cannot be determined because of no evidence, insufficient evidence, unclear evidence, or conflicting evidence, and the Panel thought no recommendation should be made. Further research is recommended in this area. |
Recommendation #1

1. In patients aged ≥60 years, initiate pharmacologic treatment in systolic BP ≥150mmHg or diastolic BP ≥90mmHg and treat to a goal systolic BP <150mmHg and goal diastolic BP <90mmHg.

(Strong Recommendation – Grade A)

In other words:

Ease up on Hypertension Treatment in Older Adults (60 years of age or older)

Treat if BP >150/90
Aim for <150/90
“Antihypertensive agents produce no obvious benefit in patients over 65”

Fry J, Lancet 1974

“Hypertensive drugs should probably not be given (in the elderly) unless the blood pressure is more than 200/110 mm Hg.”

Treatment of Hypertension in Patients 80 Years of Age or Older

Nigel S. Beckett, M.B., Ch.B., Ruth Peters, Ph.D., Astrid E. Fletcher, Ph.D., Jan A. Staessen, M.D., Ph.D., Lisheng Liu, M.D., Dan Dumitrascu, M.D., Vassil Stoyanovsky, M.D., Riitta L. Antikainen, M.D., Ph.D., Yuri Nikitin, M.D., Craig Anderson, M.D., Ph.D., Alli Belhani, M.D., Françoise Forette, M.D., Chakravarthi Rajkumar, M.D., Ph.D., Lutgarde Thijs, M.Sc., Winston Banya, M.Sc., and Christopher J. Bulpitt, M.D., for the HYVET Study Group∗
HYVET Trial: Study Design

Prospective, Double Blind, Placebo controlled RCT. 3845 patients ≥ 80 years with standing SBP ≥ 160 mm Hg; Mean follow-up 1.8yrs; **BP GOAL** < 150/80

**Inclusion Criteria:**
- Aged 80 or more,
- Systolic BP: 160 – 199 mm Hg
- + diastolic BP: <110 mm Hg,

**Exclusion Criteria:**
- Standing SBP < 140 mmHg
- Stroke in last 6 months
- Dementia; Need for daily nursing care

**Active Treatment**
- 1.5 mg Indapamide SR (± perindopril)
  - n=1933

**Placebo**
- Matching Dose
  - n=1912

**Target blood pressure**
- 150/80 mmHg

■ **Primary Endpoint:** fatal and non-fatal strokes
■ **Secondary Endpoints:** death from: stroke, cardiovascular causes, cardiac causes and any cause

*N Engl J Med 2008;358/ACC 2008*
TOTAL MORTALITY

**A** Fatal or Nonfatal Stroke

No. of Events per 100 Patients

<table>
<thead>
<tr>
<th>Follow-up (yr)</th>
<th>Placebo group</th>
<th>Active-treatment group</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

**B** Death from Any Cause

No. of Events per 100 Patients

<table>
<thead>
<tr>
<th>Follow-up (yr)</th>
<th>Placebo group</th>
<th>Active-treatment group</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

**C** Death from Cardiovascular Causes

No. of Events per 100 Patients

<table>
<thead>
<tr>
<th>Follow-up (yr)</th>
<th>Placebo group</th>
<th>Active-treatment group</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
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<tr>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>2</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

**D** Death from Stroke

No. of Events per 100 Patients

<table>
<thead>
<tr>
<th>Follow-up (yr)</th>
<th>Placebo group</th>
<th>Active-treatment group</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
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<td>7</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

No. at Risk

<table>
<thead>
<tr>
<th>Group</th>
<th>1 yr</th>
<th>2 yr</th>
<th>3 yr</th>
<th>4 yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placebo group</td>
<td>1912</td>
<td>1492</td>
<td>814</td>
<td>379</td>
</tr>
<tr>
<td>Active-treatment group</td>
<td>1933</td>
<td>1565</td>
<td>877</td>
<td>420</td>
</tr>
</tbody>
</table>

**p = 0.02**
Hypertension in the Elderly

Two “treat-to-target” trials in the elderly

- **Japanese Trial to Assess Optimal SBP (JATOS)**
  - 4416 patients aged 65-85 (average age of 74)
  - Randomized to SBP<140 vs. SBP 140-160
  - Achieved BP of 136/75 vs. 146/78
  - No difference in CV events or renal failure (p=0.99)

- **VALISH trial**
  - 3079 patients aged 70-84 (average age of 76)
  - Randomized to SBP<140 or SBP 140-149
  - No significant reductions in stroke, CV events, or renal failure

Antihypertensive Use Linked to Serious Fall Risk in Elderly Patients

- 4961 hypertension patients enrolled in Medicare interviewed about number and dose of antihypertensive medications
- Followed for 3 years, using claims data to track fall injuries
- 446 (9%) had a serious fall; 837 (16.9%) died during f/u
- In multivariate analysis, patients with more antihypertensive medication had more serious falls compared to patients without antihypertensive medications
  - hazard ratio 1.4 for high intensity antihypertensive therapy
  - hazard ratio 1.28 for moderate intensity antihypertensive therapy
  - Among the 503 participants with a prior serious fall, the hazard ratios was 2.31

Postural Changes in Blood Pressure are more common as we Age.

The graph compares blood pressure (SBP) over time (in hours) for elderly and young individuals. The elderly group (red line) shows greater fluctuations in SBP compared to the young group (blue line). The graph highlights the importance of considering postural changes in blood pressure when monitoring elderly patients.

Source: www.gerontologyindia.com/ppt/presentation-htn-elderly.ppt
Hypertension in the Elderly

- But not everyone (on JNC 8) agreed!
  - The minority view
  - 5 / 17 panel members

Recommendations #2 and #3

2. In patients aged <60 years, initiate pharmacologic treatment at DIASTOLIC BP ≥90mmHg and treat to a goal <90mmHg.

For ages 30–59 years, Strong Recommendation–Grade A
For ages 18–29 years, Expert Opinion–Grade E

3. In patients aged <60 years, initiate pharmacologic treatment at SYSTOLIC BP ≥140mmHg and treat to a goal <140mmHg.

Expert Opinion–Grade E

For Adults under 60 years of age

Treat if BP >140/90; Aim for <140/90

There’s strong evidence for treating high diastolic BP in patients 30–59 years of age. Everything else is “Expert Opinion”
What????? You mean treating SBP ≥ 140 mm Hg is only “Expert Opinion”?  

- Prior guidelines relied on epidemiologic evidence and observational studies that noted that the risks for cardiovascular events in untreated adults increased rapidly as SBP increased above 140 mm Hg.
- Older trials actually used a DBP goal rather than a SBP goal.
- The older trials that did use a SBP goal, targeted < 160 mm Hg.
- So, direct RCT evidence to support this threshold is limited. JNC 8 acknowledges this limitation.
Recommendations # 4 & 5

5. In patients aged ≥18 years with diabetes mellitus, initiate pharmacologic treatment at systolic BP ≥140mmHg or diastolic BP ≥90mmHg and treat to goal systolic BP <140mmHg and goal diastolic BP <90mmHg. (Expert Opinion–Grade E)

Earlier HTN guidelines lowered treatment goals for adults with CKD and DM; but JNC 8 gives the same BP goals in these patients as in the general population. BP goal <140/90
Hypertension in CKD

Modification of Diet in Renal Disease (MDRD)

- Randomized to a MAP < 93 (120/80) vs MAP < 107 (140/90)
- **RESULT:** No CV or renal benefit

African American Study of Kidney Disease

- randomized to a MAP < 93 vs MAP 102-107; Achieved BP 130/78 vs 141/86
- **RESULT:** No CV or renal benefit

Action to Control Cardiovascular Risk in Diabetes (ACCORD) Trial

- NHLBI 10,251 Type 2 diabetics
- Three Trial arms
  - Glycemic control
  - BP
  - Lipids
- BP arm 4,773 randomized to SBP<120 or <140

## ACCORD Trial: Adverse Events

<table>
<thead>
<tr>
<th>Event</th>
<th>Intensive N (%)</th>
<th>Standard N (%)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serious AE</td>
<td>77 (3.3)</td>
<td>30 (1.3)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Hypotension</td>
<td>17 (0.7)</td>
<td>1 (0.04)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Syncope</td>
<td>12 (0.5)</td>
<td>5 (0.2)</td>
<td>0.10</td>
</tr>
<tr>
<td>Bradycardia or Arrhythmia</td>
<td>12 (0.5)</td>
<td>3 (0.1)</td>
<td>0.02</td>
</tr>
<tr>
<td>Hyperkalemia</td>
<td>9 (0.4)</td>
<td>1 (0.04)</td>
<td>0.01</td>
</tr>
<tr>
<td>Renal Failure</td>
<td>5 (0.2)</td>
<td>1 (0.04)</td>
<td>0.12</td>
</tr>
<tr>
<td>eGFR ever &lt;30 mL/min/1.73m²</td>
<td>99 (4.2)</td>
<td>52 (2.2)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Any Dialysis or ESRD</td>
<td>59 (2.5)</td>
<td>58 (2.4)</td>
<td>0.93</td>
</tr>
<tr>
<td>Dizziness on Standing</td>
<td>217 (44)</td>
<td>188 (40)</td>
<td>0.36</td>
</tr>
</tbody>
</table>

Recommendations #6

6. In the general nonblack population, including those with diabetes, initial antihypertensive treatment should include a thiazide-type diuretic, CCB, ACE inhibitor, or ARB. (Moderate Recommendation–Grade B) This recommendation is different from the JNC 7 in which the panel recommended thiazide-type diuretics as initial therapy for most patients.

While JNC 7 recommended thiazide-type diuretics as the initial antihypertensive choice for all, JNC 8 broadens the choices to also include CCB, ACE-I, and ARBs along with thiazide-type diuretics.

*NOTE:* β-blockers are OUT
ALLHAT Hypertension Trial

42,418 high-risk hypertensive patients

90% previously treated
10% untreated

<table>
<thead>
<tr>
<th>Step 1 Agents (Double-blind)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorthalidone 12.5-25 mg</td>
<td>15,255</td>
</tr>
<tr>
<td>Amlodipine 2.5-10 mg</td>
<td>9,048</td>
</tr>
<tr>
<td>Lisinopril 10-40 mg</td>
<td>9,054</td>
</tr>
<tr>
<td>Doxazosin 1-8 mg</td>
<td>9,061</td>
</tr>
</tbody>
</table>

Step 1 agents titrated and atenolol, clonidine, reserpine, and/or hydralazine added as needed to achieve BP goal

JAMA 2002; 288: 2981-2997
Cumulative Event Rates for the Primary Outcome (Fatal CHD or Nonfatal MI) by ALLHAT Treatment Group

<table>
<thead>
<tr>
<th>Treatment Group</th>
<th>RR (95% CI)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/C</td>
<td>0.98 (0.90-1.07)</td>
<td>0.65</td>
</tr>
<tr>
<td>L/C</td>
<td>0.99 (0.91-1.08)</td>
<td>0.81</td>
</tr>
</tbody>
</table>

Years to CHD Event

- Chlorthalidone
- Amlodipine
- Lisinopril

Cumulative CHD Event Rate

Years to CHD Event

JAMA 2002; 288: 2981-2997
..β blockers should not remain first choice in the treatment of primary hypertension..."  The Lancet 2005; 366:1545-1553
Comparison of Diuretics and β-Blockers and Their Effects on CV Events

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Relative Risk (95% CI)</th>
<th>P Value</th>
<th>Favors Diuretics</th>
<th>Favors β-Blockers</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHD</td>
<td>0.87 (0.74-1.03)</td>
<td>0.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHF</td>
<td>0.83 (0.68-1.01)</td>
<td>0.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stroke</td>
<td>0.90 (0.76-1.06)</td>
<td>0.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CVD Events</td>
<td>0.89 (0.80-0.98)</td>
<td>0.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CVD Mortality</td>
<td>0.93 (0.81-1.07)</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Mortality</td>
<td>0.99 (0.91-1.07)</td>
<td>0.73</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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)

JNC 8 recommends a thiazide-type diuretic or CCB as the initial choice in African Americans, but there's less certainty about African Americans with diabetes due to lack of data (they were torn about not including ACE/ARB)
BP Results by Treatment Group in Black Participants

Blacks
Lisinopril/Chlorthalidone
Relative Risk and 95% Confidence Interval

<table>
<thead>
<tr>
<th>Condition</th>
<th>Relative Risk</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonfatal MI + CHD Death</td>
<td>1.10</td>
<td>(0.94 - 1.28)</td>
</tr>
<tr>
<td>All-Cause Mortality</td>
<td>1.06</td>
<td>(0.95 - 1.18)</td>
</tr>
<tr>
<td>Combined CHD</td>
<td>1.15</td>
<td>(1.02 - 1.30)</td>
</tr>
<tr>
<td>Combined CVD</td>
<td>1.19</td>
<td>(1.09 - 1.30)</td>
</tr>
<tr>
<td>Stroke</td>
<td>1.40</td>
<td>(1.17 - 1.68)</td>
</tr>
<tr>
<td>Heart Failure</td>
<td>1.30</td>
<td>(1.10 - 1.54)</td>
</tr>
<tr>
<td>End Stage Renal Disease</td>
<td>1.29</td>
<td>(0.94 - 1.75)</td>
</tr>
</tbody>
</table>

Recommendation # 8

8. In the population aged ≥18 years with chronic kidney disease, initial (or add-on) antihypertensive treatment should include an ACE inhibitor or ARB to improve kidney outcomes. (Moderate Recommendation–Grade B)

In adult patients with CKD, make sure an ACE-I or an ARB is part of the antihypertensive regimen
ACE-I or ARB in CKD reduces progression of kidney disease

<table>
<thead>
<tr>
<th>Study</th>
<th>Pts</th>
<th>Design</th>
<th>RR for kidney disease progression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maschio et al 1996</td>
<td>583</td>
<td>Benazapril v. placebo</td>
<td>53%</td>
</tr>
<tr>
<td>Gisen group 1997</td>
<td>166</td>
<td>Ramipril v. placebo</td>
<td>48%</td>
</tr>
<tr>
<td>Hou et al 2006</td>
<td>224</td>
<td>Benazapril v placebo</td>
<td>43%</td>
</tr>
<tr>
<td>Brenner et al 2001</td>
<td>1513</td>
<td>Losartan v. placebo</td>
<td>22%</td>
</tr>
</tbody>
</table>
Recommendation # 9

9. **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. If goal BP cannot be reached with two 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 only the drugs in Recommendation 6 ... antihypertensive drugs from other classes can be used. (Expert Opinion–Grade E)

Don't dilly dally. If BP is not at goal within a month, use one of these 3 strategies:

1. Increase the dose of the initial drug
2. Add a 2nd, then a 3rd drug (Rec #6) (Not an ACE + ARB together)
3. Add a drug from other classes
Telmisartan vs. Telmisartan + Ramipril: Primary Outcome (MI, Stroke, CV death, CV hospitalization)

The ONTARGET Investigators N ENGL J MED 2008; 358:1547-1559 April 10, 2008
## Adverse Events with Ramipril + Telmisartan

<table>
<thead>
<tr>
<th></th>
<th>Ram N=8576</th>
<th>Ram + Tel N=8502</th>
<th>RR</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypotension</td>
<td>149</td>
<td>406</td>
<td>2.75</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Syncope</td>
<td>15</td>
<td>29</td>
<td>1.95</td>
<td>0.032</td>
</tr>
<tr>
<td>Cough</td>
<td>360</td>
<td>392</td>
<td>1.10</td>
<td>0.1885</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>12</td>
<td>39</td>
<td>3.28</td>
<td>0.0001</td>
</tr>
<tr>
<td>Angioedema</td>
<td>25</td>
<td>18</td>
<td>0.73</td>
<td>0.30</td>
</tr>
<tr>
<td>Renal Impairment</td>
<td>60</td>
<td>94</td>
<td>1.58</td>
<td>0.0050</td>
</tr>
<tr>
<td>Any Discontinuation</td>
<td>2099</td>
<td>2495</td>
<td>1.20</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>
JNC 8 in a nutshell

- Ease up on hypertension treatment in older adults (Adults over 60 years goal < 150/80)
- In all others blood pressure goal < 140/90
  - Including those with diabetes and CKD
- Initial antihypertensive therapy can be a thiazide-type diuretic, CCB, ACE inhibitor, or ARB
  - In black patients initial therapy should be with a CCB or ACE inhibitor
- In adults with CKD, make sure an ACE-I or an ARB is part of the antihypertensive regimen
- Don’t dilly dally
JNC 8 Algorithm

Adult (age ≥ 18 years)

Lifestyle Interventions to be applied throughout Treatment Algorithm

Set Blood Pressure Goal and Initiate Blood Pressure Lowering Medications

Age ≥ 60 years

Blood Pressure Goal
SBP <150 mm Hg
DBP <90 mm Hg

NON-BLACK
Initiate Thiazide-type diuretic, or ACEI or ARB or CCB alone or in combination

ALL RACES
Select a drug titration strategy
A. Maximize first drug
B. Add second drug before reaching max of first
C. Start with 2 meds

If goal BP not reached
A. Reinforce Adherence
B. Add or titrate drugs above
C. Add drugs from other classes

Age < 60 years

Blood Pressure Goal
SBP <140 mm Hg
DBP <90 mm Hg

ALL RACES
Select a drug titration strategy
A. Maximize first drug
B. Add second drug before reaching max of first
C. Start with 2 meds

If goal BP not reached
A. Reinforce Adherence
B. Add or titrate drugs above
C. Add drugs from other classes

All ages with DM

Blood Pressure Goal
SBP <140 mm Hg
DBP <90 mm Hg

Initiate Thiazide-type diuretic, or CCB alone or in combination

All ages with CKD

Blood Pressure Goal
SBP <140 mm Hg
DBP <90 mm Hg

Initiate ACEI or ARB alone or in combination with other drug classes
CLINICAL PEARL # 1

Two main physiologic systems control blood pressure
Renin-Angiotensin-Aldosterone Regulation of Blood Pressure

Renin

Renin

Sodium & Water Reabsorption

Blood Pressure

Angiotensin I

Angiotensin II

Adrenal Cortex

Vasoconstriction

The role of aldosterone is to retain sodium in the face of chronic deficiency.

http://vasoactivetherapy.com/files/CORLOPAM.PPT
Sympathetic Nervous System Regulation of Blood Pressure

CNS → Adrenergic Tone → Arteries Resistance → Blood Pressure

Catecholamines → Renin secretion → Angiotensin → Aldosterone

Cardiac Output → Afterload → Blood Pressure

http://vasoactivetherapy.com/files/CORLOPAM.PPT
CLINICAL PEARL # 2

There is a characteristic circadian rhythm to blood pressure
Ambulatory BP Monitoring (ABPM)

- **Systolic blood pressure**
- **Diastolic blood pressure**

**Blood pressure threshold**
- While awake: 140/90 mm Hg
- While asleep: 120/80 mm Hg

Graph showing blood pressure trends over time with a highlighted sleep period.

http://www.drsarma.in/files/medicine/Hypertension/Resistant%20Hypertension.ppt
CLINICAL PEARL # 3

There is a characteristic life-cycle pattern to blood pressure
Blood Pressure Distribution in the Population According to Age

Men

Women

Adapted from: Third National Health and Nutrition Examination Survey, Hypertension 1995;25:305-13
CLINICAL PEARL # 4

Failure to use enough medication is a common cause of “resistant” hypertension
"Rule of TENS for SBP"

1 Additional Drug for Every Additional 10 mmHg Reduction in Blood Pressure

Cushman W and Basile J. of Clinical Hypertension
Diuretics and BP Control

- In states of sodium (and water) excess, diuretics are essential.
- Most classes of antihypertensive agents lead to sodium retention, as compensation for lower BP.
- JNC 8 recommends a thiazide-type diuretic, as one of four initial antihypertensive choices in the general population.
- JNC 8 recommends a thiazide-type diuretic, as one of two initial antihypertensive choices in the Black patients.
In many patients with HTN, adequate diuresis is ESSENTIAL for BP control.
Thiazide Diuretics Differ in Their Antihypertensive Effects

Change in Ambulatory Systolic Blood Pressure (mm Hg)

Week 8–Week 0

Ernst ME, et al. Hypertension. 2006;47:352-358,

<table>
<thead>
<tr>
<th>Office Blood Pressure*</th>
<th>Week 2</th>
<th>Week 4</th>
<th>Week 6</th>
<th>Week 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrochlorothiazide 50 mg daily</td>
<td>−4.5 ± 2.1</td>
<td>−7.6 ± 2.8</td>
<td>−9.3 ± 3.2</td>
<td>−10.8 ± 3.5</td>
</tr>
<tr>
<td>Chlorthalidone 25 mg daily</td>
<td>−15.7 ± 2.2</td>
<td>−17.4 ± 2.9</td>
<td>−19.6 ± 3.4</td>
<td>−17.1 ± 3.7</td>
</tr>
</tbody>
</table>

*p = 0.001

Ernst ME, et al. Hypertension. 2006;47:352-358,
In patients with Resistant Hypertension switching the diuretic from HCTZ to Chlorthalidone may improve BP control (but watch electrolytes!)
Hypertension 2015

- Hypertension is common and will likely affect most individuals at some point in their lifetime

- Guidelines on how best to treat hypertension are evolving and sometimes contradictory

- For information on prevention, detection and evaluation of hypertension, JNC 7 and international guidelines offer guidance

- Inadequate treatment is also a common cause of resistant HTN (rule of 10s)

- A diuretic is necessary in many patients with hypertension to control blood pressure
Questions?