Hypertension in Women

- Kathleen Drinan DO, FACC, FACOI
Hypertension Increases With Age, Faster for Women

NHANES 1999–2000

Heart Disease Is the Leading Cause of Death in Women


CVD = cardiovascular disease; COPD = chronic obstructive pulmonary disease.
Blood Pressure Patterns in the General Population (NHANES III)

In Women, the CV Risk Gradient Extends Down Even to 120/80 mmHg

CV death, MI, Stroke, and HF Among 3,892 Women in the Framingham Cohort

CV=cardiovascular; MI=myocardial infarction; HF=heart failure.
Optimal=<120/<80 mmHg.
Normal=120–129/80–84 mmHg.
High Normal=130–139/85–89 mmHg.

**PERCEPTION:** Women perceive hypertension as a minor health threat\(^1\)

<table>
<thead>
<tr>
<th>Top Perceived Threats to Women’s Health in the U.S.</th>
<th>Total (n=820)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer (Net)</td>
<td></td>
</tr>
<tr>
<td>Breast cancer</td>
<td>90%</td>
</tr>
<tr>
<td>Cancer (unspecified)</td>
<td>54%</td>
</tr>
<tr>
<td>Ovarian cancer</td>
<td>33%</td>
</tr>
<tr>
<td>Cervical cancer</td>
<td>9%</td>
</tr>
<tr>
<td>Lung cancer</td>
<td>9%</td>
</tr>
<tr>
<td>Cardiovascular-Related Diseases/Conditions (Net)</td>
<td></td>
</tr>
<tr>
<td>Heart disease (unspecified)/Heart conditions (unspecified)</td>
<td>69%</td>
</tr>
<tr>
<td>Heart attack</td>
<td>16%</td>
</tr>
<tr>
<td>Hypertension, or high BP</td>
<td>5%</td>
</tr>
<tr>
<td>Hypercholesterolemia, or high blood cholesterol</td>
<td>1%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>19%</td>
</tr>
<tr>
<td>Stroke (unspecified)</td>
<td>12%</td>
</tr>
<tr>
<td>Obesity</td>
<td>11%</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>9%</td>
</tr>
</tbody>
</table>

**REALITY:** 39% of the women surveyed said they have been diagnosed with hypertension by a physician or other health professional

In a survey of 820 women >40, only 5% cite hypertension or high BP as one of the top threats to women’s health.

\(^1\)Harris Interactive. *Quick Query Dealing With Women’s Top Health Concerns.* August 2006;1–3.
SBP Is a Strong Predictor of CVD Events Among Middle-aged and Older Women

The Women’s Antioxidant Cardiovascular Study (WACS) 6-Year Results

N=5,218

RR* of CVD Events According to SBP

*Adjusted for age, randomization, body mass index, smoking, alcohol use, exercise frequency, diabetes, history of elevated cholesterol, antihypertensive therapy, prior myocardial infarction, prior stroke, and prior revascularization.

Post-MI Risks Are Substantial for Women

38% of women will die within one year post-MI

- MI=myocardial infarction.
- Adapted from Thom T et al. *Circulation*. 2006;113:e85–e151.
CV Risks Remain Higher in Women After Acute MI

- Substantially more women developed HF
- **Significant differences in the treatment of women and men persist after MI**—women less often received standard drug therapy or coronary procedures

VALIANT=Valsartan in Acute Myocardial Infarction Trial; Mortality=3 year rates.

Cardiovascular Disease Deaths in the United States (1980-2007)

Hypertension Mortality Is Greater for African American Women*

Overall Mortality Rates From Causes Related to Hypertension

<table>
<thead>
<tr>
<th>Overall Mortality Rate, %</th>
<th>White Women</th>
<th>African American Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>14.5</td>
<td>40.8</td>
</tr>
</tbody>
</table>

*Compared to whites.

Adapted from American Heart Association. *Heart Disease and Stroke Statistics—2006 Update.* Dallas, TX: American Heart Association; 2006.
We Are Facing a Heart Failure Epidemic

Hospital Discharges for HF, 1979–2003: 174% Increase

HF Is A Major Concern for Women

- 75% of HF cases have antecedent hypertension
- At age 40, the lifetime risk of developing HF for women is 1 in 5
- 46% of female MI victims will be disabled with HF within 6 years
- After HF is diagnosed:
  - the one year mortality rate is 1 in 5
  - 70% of women under age 65 will die within 8 years
  - fewer than 15% of women will survive more than 8–12 years

Adapted from American Heart Association. *Heart Disease and Stroke Statistics—2006 Update.* Dallas, TX: American Heart Association; 2006.
Heart Failure Mortality* by Gender: 2000 vs 2004

*Listed as "underlying cause."
Differences in Heart Failure by Gender

- Underlying cause of heart failure in women may differ
  - Older
  - More diabetes
  - More hypertension
- Survival with heart failure may be better for women
- Pathophysiologic differences: same ejection fraction but more heart failure symptoms
  - Response of left ventricle to pressure overload may be modified by gender: smaller left ventricle volumes per level of end-diastolic pressure
  - More diastolic abnormalities despite preserved LVEF

LVEF = left ventricular ejection fraction.
Differences in Heart Failure by Gender

- Differences in heart rate variability in nonischemic heart failure
  - Sympathetic activation advantage?
- Less apoptosis and myocyte necrosis
- Gender hormone effect on renin-angiotensin system
- Overall, <25% of participants in trials of left ventricular systolic function were female

Gender-Related Survival Rates: A Theory

Less ectopy?

Concentric LVH

Myocardial Insult

LV Performance

Wall stress

↓ Activation of RAS and SNS

Women

↓ Apoptosis and cell death

Later onset of cardiac decompensation

Men

↑ Apoptosis and cell death

Early onset of cardiac decompensation

Eccentric hypertrophy, Chamber dilatation

LVH=left ventricular hypertrophy, SNS=sympathetic nervous system.
Some Factors Contributing to Hypertension Among Women
BP Rises After Menopause—Risk of Hypertension Triples

Changes in SBP From Baseline to Follow-up (Mean 5.2 Years)

Women

<table>
<thead>
<tr>
<th>Group</th>
<th>Δ From Baseline SBP (mmHg)</th>
<th>Mean (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premenopausal</td>
<td>0.4 ± 1.3</td>
<td>166</td>
</tr>
<tr>
<td>Perimenopausal</td>
<td>3.3 ± 1.8</td>
<td>44</td>
</tr>
<tr>
<td>Postmenopausal</td>
<td>3.8 ± 1.7</td>
<td></td>
</tr>
</tbody>
</table>

Controls

<table>
<thead>
<tr>
<th>Group</th>
<th>Δ From Baseline SBP (mmHg)</th>
<th>Mean (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>-1.9 ± 0.1</td>
<td></td>
</tr>
<tr>
<td>Peri</td>
<td>0.2 ± 0.3</td>
<td></td>
</tr>
<tr>
<td>Post</td>
<td>-0.1 ± 0.1</td>
<td>105</td>
</tr>
</tbody>
</table>

* $p \leq 0.05$.
† $p = 0.07$.

Baseline SBP: Pre = 121.4 ± 1.3 mmHg; Peri = 122.0 ± 1.8 mmHg; Post = 126.5 ± 1.7 mmHg; Controls: men matched by age and BMI.

Differences by Gender: Hypertension

- By age 65, more than 50% of all women have hypertension
- Gender-specific variables for hypertension in women
  - Polycystic ovary syndrome
  - Oral contraceptives
  - Pregnancy
- Young women are more likely to have labile BPs and “white coat” hypertension

Differences by Gender: Hypertension

- Response to isolated SBP
  - Women develop LVH without chamber enlargement
  - Men develop LV dilation and increased LV mass without an increase in wall thickness
  - Obesity increases the incidence of LVH in women
  - Relative risk of LVH and mortality is higher in women

LVH = left ventricular hypertrophy; LV = left ventricular; SBP = systolic blood pressure.
Hypertension Increases With Weight Gain in Women

Nurses’ Health Study: Hypertension† According to Weight Change

Weight Status in Women

CDC Statistics: 1999–2002‡

<table>
<thead>
<tr>
<th>Weight Status</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obese</td>
<td>34.0%</td>
</tr>
<tr>
<td>Overweight</td>
<td>61.7%</td>
</tr>
<tr>
<td>Healthy weight</td>
<td>35.6%</td>
</tr>
</tbody>
</table>

Multivariate RR*

Weight Change After 18 Years, kg

Overweight=BMI ≥25 kg/m²; obese=BMI ≥30 kg/m²; healthy=18.5 to <25 kg/m².

*Adjusted for age, BMI at age 18 years, height, family history of myocardial infarction, parity, oral contraceptive use, menopausal status, postmenopausal use of hormones, and smoking.

†>140/90 mmHg.

‡Percents do not sum to 100 because the percent of persons with BMI <18.5 is not shown and the percent of persons with obesity is a subset of the percent with overweight.

Obesity Prevalence in Women
1991 to 2007*

*Data collected using the Behavioral Risk Factor Surveillance System. Obesity=\text{BMI} \geq 30 \text{ kg/m}^2.
Blanck H et al. MMWR Weekly. 2006;55(36):965-966;
Smoking and Physical Inactivity Are Risk Factors for Cardiovascular Disease

- Smoking has been associated with 50% of all coronary events in women
- Coronary risk is elevated even in women with minimal use (relative risk 2.4 for 1–4 cigarettes/day)
- 66% of women reported never engaging in vigorous physical activity lasting ≥10 minutes per week
- Another 12% reported minimal (<2 times per week) participation in vigorous physical activity lasting ≥10 minutes

Smoking Cessation in High-Risk Women

- Women more concerned about weight gain
- Women may need greater support to quit
- Women may smoke more when stressed
- Female smokers are more likely to be diagnosed with depression than men

Hypertension Control Among Women
## Evolution of Antihypertensive Agents

<table>
<thead>
<tr>
<th>Decade</th>
<th>Agents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950s</td>
<td>Vasodilators</td>
</tr>
<tr>
<td></td>
<td>Central $\alpha_2$-agonists</td>
</tr>
<tr>
<td></td>
<td>Aldosterone receptor blockers</td>
</tr>
<tr>
<td></td>
<td>Diuretics</td>
</tr>
<tr>
<td>1960s</td>
<td>$\beta$-adrenergic blockers</td>
</tr>
<tr>
<td></td>
<td>Calcium channel blockers (nondihydropyridines)</td>
</tr>
<tr>
<td>1970s</td>
<td>$\alpha_1$-blockers</td>
</tr>
<tr>
<td></td>
<td>$\alpha$- $\beta$-blockers</td>
</tr>
<tr>
<td>1980s</td>
<td>Calcium channel blockers (dihydropyridines)</td>
</tr>
<tr>
<td></td>
<td>Angiotensin-converting enzyme inhibitors</td>
</tr>
<tr>
<td>1990s</td>
<td>Angiotensin receptor blockers</td>
</tr>
</tbody>
</table>

Control of Hypertension Low in Women  
About Half Are Treated; About a Quarter Are Controlled*

*Percentage of hypertensive patients controlled. Control=treatment with antihypertensive medication and a measured BP of <140/90 mmHg or <130/85 mmHg if diabetic.

Today, we have:

- increased knowledge about the prevalence of hypertension among women
- a better understanding of CV risks in women
- more aggressive hypertension treatment guidelines
- more effective drug options

So why are BP control rates among women as low as they were nearly 20 years ago?
Why Are So Many Women Unaware of Their Hypertension?

- Hypertension rarely causes noticeable symptoms — recognized as “the silent killer”
- Usually detected during routine physical exam

The Women Take Heart Project

Unacknowledged or unaware hypertensive women were significantly younger as a group, had a lower mean BMI, and a lower waist-to-hip ratio than women who reported a history of hypertension.

However, their BP measures were similar:

- unaware hypertensive women (146/89 mmHg) vs.
- aware hypertensive women (147/88 mmHg).


AWARENESS

- WTH – over one half of the hypertensive women were either undiagnosed or unaware or did not acknowledge their hypertension.
“I walked into my doctor’s office complaining of heart palpitations. My blood pressure was 180/90.”
“My doctor gave me a grave look and said,

“you need to lose weight”.

“Tell me something I don’t know”, I thought smugly. I didn’t take her advice seriously. After all, I’d been heavier and never felt my heart racing. “I’d had perfect blood pressure – 110/70 for years, even at my heaviest.
Blood Pressure Patterns in the General Population (NHANES III)

Men

Women

JNC 7*: Need for Prompt Aggressive Action

- Current control rates unacceptable
- Most patients can achieve goal (the majority will require >2 drugs)
- Adjust therapy monthly or more frequently until goal is reached

"Action to control BP is needed now and is a challenge that all must accept."
—Kottke T et al. *JAMA*. 2003


Aggressively Lowering BP Prevents Clinical Events

Each 5 mmHg reduction in DBP reduces*

0

Stroke by 34%

Ischemic heart disease by 21%

IMPORTANT NOTE: The medicines discussed are approved to treat high BP and are not approved to prevent ischemic heart disease or stroke resulting from high BP.

Each 10 mmHg reduction in DBP reduces*

Stroke by 56%

Ischemic heart disease by 38%

*From any pretreatment level; no threshold. Estimated from 9 large cohort studies.

**JNC 7: Management of BP**

**Lifestyle Modification:** JNC 7 encourages lifestyle modification for patients who have normal BP, and recommends lifestyle modification for patients who are prehypertensive, or are stage 1 or stage 2 hypertensive.

<table>
<thead>
<tr>
<th>Therapeutic Options</th>
<th>Without Compelling Indications</th>
<th>With Compelling Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>No antihypertensive drug indicated.</td>
<td>Drug(s) for compelling indications†</td>
</tr>
<tr>
<td>Prehypertension</td>
<td>Thiazide-type diuretics for most. May consider ACEI, ARB, BB, CCB, or combo.**</td>
<td>Drug(s) for the compelling indications† Other antihypertensive drugs (diuretics, ACEI, ARB, BB, CCB) as needed</td>
</tr>
<tr>
<td>Hypertension Stage 1</td>
<td>2-drug combo for most (usually thiazide-type diuretic and ACEI or ARB or BB or CCB).**</td>
<td></td>
</tr>
<tr>
<td>Hypertension Stage 2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SBP=systolic blood pressure; DBP=diastolic blood pressure; ACEI=angiotensin-converting enzyme inhibitor; ARB=angiotensin receptor blocker; BB=beta blocker; CCB=calcium channel blocker.

*Treatment determined by highest BP category.

**Initial combined therapy should be used cautiously in those at risk for orthostatic hypotension.

†Treat patients with chronic kidney disease or diabetes to BP goal of <130/80 mmHg.

AHA Evidence-Based Guidelines for CVD Prevention in Women

- Update of the original evidence-rated guidelines for prevention of CVD in adult women ≥20 years of age
- Collaborative effort representing many organizations including the AHA, American College of Cardiology, NHLBI, Centers for Disease Control (CDC), American Medical Women’s Association, American College of Obstetricians and Gynecologists, and the World Heart Federation
- Clinical recommendations to assist providers and the public to avoid initial and recurrent events

Updated Guidelines 2007

- Risk stratification of women places greater emphasis on lifetime risk than on short-term absolute risk
  - Nearly all women are at risk for CVD
  - Some women are at high risk of future events because of established CVD and/or multiple risk factors
- More definitive data about menopausal therapy, aspirin therapy, and folic acid therapy are available
  - Aspirin therapy should be considered for all women for stroke prevention, depending on the balance between risks and benefits
- A new algorithm is provided to assist health care providers in evaluating CVD risk in women and prioritizing preventive interventions

## ATP-III: Estimate of 10-Year Risk for Women (Framingham Point Scores)

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-34</td>
<td>-7</td>
</tr>
<tr>
<td>35-39</td>
<td>-3</td>
</tr>
<tr>
<td>40-44</td>
<td>0</td>
</tr>
<tr>
<td>45-49</td>
<td>3</td>
</tr>
<tr>
<td>50-54</td>
<td>6</td>
</tr>
<tr>
<td>55-59</td>
<td>8</td>
</tr>
<tr>
<td>60-64</td>
<td>10</td>
</tr>
<tr>
<td>65-69</td>
<td>12</td>
</tr>
<tr>
<td>70-74</td>
<td>14</td>
</tr>
<tr>
<td>75-79</td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Systolic BP (mm Hg)</th>
<th>If Untreated</th>
<th>If Treated</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;120</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>120-129</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>130-139</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>140-159</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>≥160</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HDL (mg/dL)</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥60</td>
<td>-1</td>
</tr>
<tr>
<td>50-59</td>
<td>0</td>
</tr>
<tr>
<td>40-49</td>
<td>1</td>
</tr>
<tr>
<td>&lt;40</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Cholesterol (mg/dL)</th>
<th>Age 20-39 Years</th>
<th>Age 40-49 Years</th>
<th>Age 60-69 Years</th>
<th>Age 70-79 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;160</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>160-199</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>200-239</td>
<td>8</td>
<td>6</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>240-279</td>
<td>11</td>
<td>8</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>≥250</td>
<td>13</td>
<td>10</td>
<td>7</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age 70.39 Years</th>
<th>Age 40-49 Years</th>
<th>Age 50-59 Years</th>
<th>Age 60-69 Years</th>
<th>Age 70-79 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonsmoker</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Smoker</td>
<td>9</td>
<td>7</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

### Point Total

<table>
<thead>
<tr>
<th>Point Total</th>
<th>10-Year Risk, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;9</td>
<td>&lt;1</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>2</td>
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<td>15</td>
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<tr>
<td>22</td>
<td>17</td>
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<tr>
<td>23</td>
<td>22</td>
</tr>
<tr>
<td>24</td>
<td>27</td>
</tr>
<tr>
<td>≥250</td>
<td>≥30</td>
</tr>
</tbody>
</table>

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ATP III= Adult-Treatment Panel III.
### AHA Evidence-Based Guidelines for Women: Spectrum of CVD Risk in Women

<table>
<thead>
<tr>
<th>Risk Group</th>
<th>Framingham Global Risk (10-Year Absolute CHD Risk)</th>
<th>Clinical Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>High risk</td>
<td>&gt;20%</td>
<td>Established CHD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cerebrovascular disease</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Peripheral arterial disease</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Abdominal aortic aneurysm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Diabetes mellitus</td>
</tr>
<tr>
<td></td>
<td></td>
<td>End-stage or chronic kidney disease*</td>
</tr>
</tbody>
</table>

* As chronic kidney disease deteriorates and progresses to end-stage kidney disease, the risk of CVD increases substantially. Mosca L et al. *Circulation*. 2007;115:1481-1501.
## AHA Evidence-Based Guidelines for Women: Spectrum of CVD Risk in Women

<table>
<thead>
<tr>
<th>Risk Group</th>
<th>Framingham Global Risk (10-Year Absolute CHD Risk)</th>
<th>Clinical Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>At Risk</td>
<td></td>
<td>≥1 major CVD risk factor including: cigarette smoking, poor diet, physical inactivity, obesity (especially central), family history (first degree relative[s] with onset of ASCVD at &lt;55 years in men and &lt;65 years in women), HTN, dyslipidemia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Evidence of subclinical vascular disease</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Metabolic syndrome</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Poor functional capacity or abnormal heart rate recovery after stopping exercise</td>
</tr>
</tbody>
</table>

## AHA Evidence-Based Guidelines for Women: Spectrum of CVD Risk in Women

<table>
<thead>
<tr>
<th>Risk Group</th>
<th>Framingham Global Risk (10-Year Absolute CHD Risk)</th>
<th>Clinical Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimal</td>
<td>&lt;10%</td>
<td>Optimal levels of risk factors and heart-healthy lifestyle</td>
</tr>
</tbody>
</table>

AHA Evidence-Based Guidelines for Women: Clinical Recommendations

- Lifestyle interventions
- Major risk-factor interventions
- Preventive drug interventions
- Class III interventions
AHA Evidence-Based Guidelines for CVD Prevention in Women
Algorithm for Prevention of CVD in Women

Evaluation of CVD Risk
- Medical/family history
- Symptoms of cardiovascular disease
- Physical examination including BP, BMI, waist size
- Labs including fasting lipoproteins and glucose
- Framingham risk assessment if no CVD or diabetes
- Depression screening in women with CVD

Implement Class I Lifestyle Recommendations
(Implement in Women at All Risk Levels):
- Smoking cessation
- Heart-healthy eating pattern
- Regular physical activity
- Weight management

Is Woman at High Risk of CVD?
- Established CHD
- Coronary artery disease
- Peripheral arterial disease
- Abdominal aortic aneurysm
- Diabetes mellitus
- Chronic renal disease
- Global 10-year risk >20%

Recent cardiovascular event, procedure, or CHF symptoms?
- Yes
- Refer to rehabilitation
- No

Implement Class I Recommendations:
- BP control
- LDL therapy (goal<100 mg/dL)
- Aspirin and antithrombotic agents
- β-Blocker
- ACE/ARB
- Glycemic control in diabetic women
- Aldosterone blocker in select women

Consider Class II Recommendations:
- LDL <70 mg/dL in very high-risk women
- HDL/Non-HDL therapy
- Omega-3 fatty acids
- Depression referral/treatment

Implement Class I Recommendations:
- BP control
- LDL therapy in select women

Consider Class II Recommendations:
- HDL, non-HDL, and triglyceride therapy
- Aspirin

ACE=angiotensin-converting enzyme; ARB=angiotensin receptor blocker.
AHA Evidence-Based Guidelines for BP Management in Women

- Lifestyle approaches to achieve optimal BP (<120/80 mm Hg; Class I, Level B)
- Pharmacotherapy when BP ≥140/90 mm Hg or lower with BP-related target-organ damage or diabetes. Thiazide diuretics for most patients unless contraindicated (Class I, Level A)
- For more specific recommendations, refer to JNC 7

## JNC 7: Classification and Management of BP in Adults

<table>
<thead>
<tr>
<th>BP Classification</th>
<th>SBP* (mm Hg)</th>
<th>DBP* (mm Hg)</th>
<th>Lifestyle Modification</th>
<th>Initial Drug Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;120</td>
<td>and &lt;80</td>
<td>Encourage</td>
<td></td>
</tr>
<tr>
<td>Prehypertension</td>
<td>120-139</td>
<td>or 80-89</td>
<td>Yes</td>
<td>No antihypertensive drug indicated</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Drug(s) for compelling indications**</td>
</tr>
<tr>
<td>Stage 1 Hypertension</td>
<td>140-159</td>
<td>or 90-99</td>
<td>Yes</td>
<td>Thiazide-type diuretics for most; may consider ACE inhibitor, ARB, β-blocker, CCB, or combination</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Drug(s) for compelling indications</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Other antihypertensive drugs (diuretics, ACE inhibitor, ARB, β-blocker, or CCB) as needed</td>
</tr>
<tr>
<td>Stage 2 Hypertension</td>
<td>≥160</td>
<td>or ≥100</td>
<td>Yes</td>
<td>2-drug combination for most (usually thiazide-type diuretic and ACE inhibitor or ARB or β-blocker or CCB)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Drug(s) for compelling indications</td>
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</tr>
</tbody>
</table>

CCB = calcium channel blocker.
* Treatment determined by highest BP category. Heart failure - diuretic, β-blocker, ACE I, ARB, Aldosterone Antag; Post MI - β-blocker, ACE I, Aldosterone Antag; High Coronary Risk - diuretic, β-blocker, ACEI, CCB, Aldosterone Antag; Diabetes - diuretic, β-blocker, ACEI, ARB, CCB;

** Treat patients with chronic kidney disease or diabetes to BP goal of <130/80 mm Hg; *Initial combined therapy should be used cautiously in those at risk for orthostatic hypotension.

† CKD – ACE I, ARB; Recurrent Stroke prevention - diuretic, ACE I

JNC 7 Algorithm for Treatment of Hypertension

Lifestyle Modifications

Not at Goal BP (<140/90 mm Hg)
(<130/80 mm Hg for those with diabetes or chronic kidney disease)

Initial Drug Choices

Without Compelling Indications

Stage 1 Hypertension
(SBP 140-159 or DBP 90-99 mm Hg)
Thiazide-type diuretics for most.
May consider ACE inhibitor, ARB, BB, CCB, or combination

Stage 2 Hypertension
(SBP ≥160 or DBP ≥100 mm Hg)
2-drug combination for most (usually thiazide-type diuretic and ACE inhibitor, ARB, BB, or CCB)

With Compelling Indications

Drug(s) for the Compelling Indications
Other antihypertensive drugs (diuretics, ACE inhibitor, ARB, BB, CCB) as needed

Not at Goal BP

Optimize Dosages or Add Additional Drugs Until Goal BP Is Achieved
Consider consultation with HTN specialist

BB = β-blockers, CCB = calcium channel blocker.
The prevalence of hypertension is very low in women <35yrs.

Primary prevention of htn may become a future goal.

- Kathleen Drinan DO, FACC, FACOI