BP Goals in Type 2 Diabetes

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JNC 7 BP Goals

- Most <140/90 mmHg
- Diabetes <130/80 mmHg
- Chronic Kidney Disease <130/80 mmHg
Key NHLBI Sponsored Studies

ACCORD – Intensive vs Conventional BP control in diabetes (relatively low CV risk)

SPRINT – Intensive vs Conventional BP control in high cardiovascular risk (non-diabetic)
In middle-aged or older men and women with type 2 diabetes who are at high risk for having a CVD event, in the context of good glycemic control, does a therapeutic strategy that targets a systolic blood pressure \(<120\text{mm Hg}\) reduce the rate of a composite of CVD events more than a strategy that targets a systolic blood pressure of \(<140\text{ mmHg}\)?
Standard Regimens including ACEI or ARB with CCBs, diuretics and others as needed
Event rate 2%/year was only 50% of predicted and used on power calculations

### Table 3. Primary and Secondary Outcomes.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Intensive Therapy (N=2363)</th>
<th>Standard Therapy (N=2371)</th>
<th>Hazard Ratio (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary outcome</strong></td>
<td>208 (1.87%)</td>
<td>237 (2.09%)</td>
<td>0.88 (0.73–1.06)</td>
<td>0.20</td>
</tr>
<tr>
<td>Prespecified secondary outcomes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonfatal myocardial infarction</td>
<td>126 (1.13%)</td>
<td>146 (1.28%)</td>
<td>0.87 (0.68–1.10)</td>
<td>0.25</td>
</tr>
<tr>
<td><em>Stroke</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any</td>
<td>36 (0.32%)</td>
<td>62 (0.53%)</td>
<td>0.59 (0.39–0.89)</td>
<td>0.01</td>
</tr>
<tr>
<td>Nonfatal</td>
<td>34 (0.30%)</td>
<td>55 (0.47%)</td>
<td>0.63 (0.41–0.96)</td>
<td>0.03</td>
</tr>
<tr>
<td>Death</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>From any cause</td>
<td>150 (1.28%)</td>
<td>144 (1.19%)</td>
<td>1.07 (0.85–1.35)</td>
<td>0.55</td>
</tr>
<tr>
<td>From cardiovascular cause</td>
<td>60 (0.52%)</td>
<td>58 (0.49%)</td>
<td>1.06 (0.74–1.52)</td>
<td>0.74</td>
</tr>
<tr>
<td>Primary outcome plus revascularization or nonfatal heart failure</td>
<td>521 (5.10%)</td>
<td>551 (5.31%)</td>
<td>0.95 (0.84–1.07)</td>
<td>0.40</td>
</tr>
<tr>
<td>Major coronary disease event†</td>
<td>253 (2.31%)</td>
<td>270 (2.41%)</td>
<td>0.94 (0.79–1.12)</td>
<td>0.50</td>
</tr>
<tr>
<td>Fatal or nonfatal heart failure†</td>
<td>83 (0.73%)</td>
<td>90 (0.78%)</td>
<td>0.94 (0.70–1.26)</td>
<td>0.67</td>
</tr>
</tbody>
</table>

*The primary outcome was a composite of nonfatal myocardial infarction, nonfatal stroke, or death from cardiovascular causes.
†Major coronary disease events, as defined in the protocol, included fatal coronary events, nonfatal myocardial infarction, and unstable angina.

Initiation of Therapy and BP Goals

- 140/90 for most
- 150/90 if >60 years of age and no Chronic Kidney Disease or Diabetes

Choice of Initial Medications:

- Blacks: CCB or thiazide type diuretic
- Non-Blacks: CCB, thiazide, ACEI, or ARB
- CKD: ACEI or ARB

CCB = Calcium Channel Blocker
ACEI = ACE inhibitor
ARB = Angiotensin Receptor Blocker
Systolic Blood Pressure Intervention Trial (SPRINT) – High CV Risk Patients

US government sponsored (NHLBI)

- Objective: Evaluate whether treating to a systolic BP < 120 mmHg reduces the risk of cardiovascular disease (CVD), kidney disease, or cognitive decline more than <140 mmHg

- Participants – Diabetes excluded!
  - 9361 participants age 50 or older with history of CVD or at high risk of CVD and systolic BP 130-180 or on BP medications
    - 28.2% age 75 or greater
    - 28.4% with chronic kidney disease (CKD)
    - 20.1% with clinical or subclinical CVD
    - 39.3% African Americans or other minority

*Halted due to statistically significant benefit in more aggressively treated arm*
SPRINT BP ATTAINED –
Using Automated Office BP Measurement (AOBP)

Mean Number BP
Medications:
Standard – 1.8
Intensive – 2.8

SPRINT Study Results – High CV Risk Patients

• Serum sodium < 130 mmol/L
  3.8% vs 2.1%

• Serum potassium <3.0 mmol/L
  2.4% vs 1.6%

Serious adverse events (Intensive vs Standard):
• Hypotension 2.4% vs 1.4%
• Syncope 2.3% vs 1.7%
• Electrolyte abnormality 3.1 vs 2.3%
• Acute kidney 4.1% vs 2.5%

NNT = 61 for primary endpoint
NNT = 90 for death from any cause

SPRINT + ACCORD

Outcome | Event Rate per Year with Standard Treatment | Risk Ratio (95% CI) | P Value for Heterogeneity
--- | --- | --- | ---
Nonfatal myocardial infarction | SPRINT | 0.89 (0.74–1.07) | 0.8
| ACCORD trial | Combined | 0.75 (0.58–0.97) | 0.1
| SPRINT | Combined | 0.77 (0.62–0.95) | 0.07
| ACCORD trial | Combined | 0.81 (0.72–0.92) | 0.2
Stroke | SPRINT | 0.89 (0.74–1.07) | 0.8
| ACCORD trial | Combined | 0.75 (0.58–0.97) | 0.1
| SPRINT | Combined | 0.77 (0.62–0.95) | 0.07
| ACCORD trial | Combined | 0.81 (0.72–0.92) | 0.2
Heart failure | SPRINT | 0.89 (0.74–1.07) | 0.8
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Primary outcome as defined in each trial | SPRINT | 0.89 (0.74–1.07) | 0.8
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### Take Home Message: BP Goals in Diabetes - Individualize

<table>
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<tr>
<th></th>
<th>Systolic BP Goal (mmHg)</th>
<th>Strength of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most Patients with Diabetes</td>
<td>&lt;140</td>
<td>Strong, based on primary endpoint</td>
</tr>
<tr>
<td>Diabetes Patients with Higher CV Risk*</td>
<td>&lt;130 (perhaps &lt;120)#</td>
<td>Less Strength, based on secondary endpoint and post-hoc analysis</td>
</tr>
</tbody>
</table>

*Defined as personal or family history of TIA/stroke, ckd, smoker, unable to tolerate statin therapy or antiplatelet therapy when appropriate, LVH or poor glycemic control

#With close monitoring for symptoms of angina or hypotension, changes in electrolytes, and worsening renal function

Consider backing off on BP control with diastolic BP <60 in patients with established CHD
**Systolic Targets**

- People with diabetes and hypertension should be treated to a systolic blood pressure goal of $<140$ mmHg.  
  - *A*

- Lower systolic targets, such as $<130$ mmHg, may be appropriate for certain individuals with diabetes, such as younger patients, those with albuminuria, and/or those with hypertension and one or more additional atherosclerotic cardiovascular disease risk factors, if they can be achieved without undue treatment burden.  
  - *C*

**Diastolic Targets**

- Individuals with diabetes should be treated to a diastolic blood pressure goal of $<90$ mmHg.  
  - *A*

- Lower diastolic targets, such as $<80$ mmHg, may be appropriate for certain individuals with diabetes, such as younger patients, those with albuminuria, and/or those with hypertension and one or more additional atherosclerotic cardiovascular disease risk factors, if they can be achieved without undue treatment burden.  
  - *B*
“Not everything that counts can be counted and not everything that can be counted counts”

- Albert Einstein