Hypertension and Diabetes

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Cardiovascular Disease and Diabetes

Approximately 80% of people with diabetes die from cardiovascular disease

The role of glycemic control in reducing macrovascular complications has been difficult to demonstrate

“Mind set”
- Hypertension → Stroke
- Hyperlipidemia → MI

1National Diabetes Data Group. *Diabetes in America*. 2nd ed. NIH;1995
3ACCORD. N Engl J Med 2008;358:2545
Association of Systolic BP and Type 2 Diabetes on Cardiovascular Death


Cardiovascular Mortality Rate/10,000 Person-y

<table>
<thead>
<tr>
<th>Systolic BP (mm Hg)</th>
<th>Nondiabetic Patients</th>
<th>Diabetic Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;120</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>120–139</td>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td>140–159</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>160–179</td>
<td>100</td>
<td>150</td>
</tr>
<tr>
<td>180–199</td>
<td>150</td>
<td>200</td>
</tr>
<tr>
<td>≥200</td>
<td>200</td>
<td>250</td>
</tr>
</tbody>
</table>

UKPDS Risk Reduction

Control of Hypertension

- Strokes by ~35%
- Deterioration of vision ~35%
- Death related to diabetes ~35%

Average Number of Antihypertensive Agents Needed per Patient to Achieve Target Systolic Blood Pressure Goals

Trial/SBP Achieved

- ALLHAT (138 mm Hg)
- IDNT (138 mm Hg)
- RENAAL (141 mm Hg)
- UKPDS (144 mm Hg)
- ABCD (132 mm Hg)
- MDRD (132 mm Hg)
- HOT (138 mm Hg)
- AASK (128 mm Hg)

How Well Are We Doing Controlling Hypertension in Type 2 Diabetes?

Saydah SH et al. *JAMA* 2004;291:335--342

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**Diagram:**

- **NHANES 1988-94**
- **NHANES 1999-00**

% patients at goal

- **A1c <7%**
- **BP <130/80**
- **TC <200**

Saydah SH et al. *JAMA* 2004;291:335-342
1st Line Therapy for Hypertension

- Weight loss of 5 to 10 kilograms
- Sodium restriction to 2 grams/d
- Potassium intake 3.5 grams/d
- 1 oz alcohol max/d
- Exercise ≥30 min/d
Useful Tools for Life Style Behavior Modification

Dining accoutrements

Good equipment and a trainer
DIABETES AND HYPERTENSION

AACE Consensus

Angiotensin converting enzyme inhibitors (ACEIs) and angiotensin receptor blockers (ARBs) are associated with favorable effects on renal function and may improve insulin sensitivity, making them ideal first choices in treatment for patients with both diabetes and hypertension.
AACE Consensus

Diuretics have been shown to be effective in the treatment of hypertension, both alone and in combination therapy.

Diuretics can worsen blood glucose control.
DIABETES AND HYPERTENSION

AACE Consensus

Beta blockers may precipitate or exacerbate type 2 diabetes mellitus and generally should not be used as first-line agents for treating hypertension in susceptible individuals.

Beta blockers that also produce alpha receptor blockade, such as carvedilol, cause vasodilatation and an increase in insulin sensitivity, and their use may prove to be particularly beneficial.
AACE Consensus

Calcium channel blockers (CCBs) are associated with both benefits and adverse outcomes in diabetes.

Nondihydropyridine CCBs (i.e., diltiazem, verapamil) may reduce microalbuminuria to an extent comparable to the ACEIs.

Dihydropyridine CCBs may increase microalbuminuria and are not considered optimal agents for first-line or monotherapy in patients with diabetes. However, all have proven safe and effective in combination with ACEIs, diuretics, and/or BBs.
Management of Hypertension in Type 2 Diabetes

Qu #1

What are the goals for blood pressure control in type 2 diabetes?

Management of Hypertension in Type 2 Diabetes

Qu #2

a. Do all persons with T2D need ACE or ARB therapy?

b. What are the physical and/or laboratory findings that indicate therapy should be started?

JNC 7. JAMA 2003;289(19):2560
Qu #3

Initial therapy is usually with an ACEi and if ACEi-intolerant, usually an ARB is prescribed.

What Rx would you select if the patient is ACEi and ARB intolerant?

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Qu #4

If the patient is African American, how would you start antihypertensive therapy?

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Qu #5

What should be the initial therapy if:

SBP $\geq 145$ mmHg  and/or
DBP $\geq 90$ mmHg

JNC 7. JAMA 2003;289(19):2560
Management of Hypertension in Type 2 Diabetes

Qu #6

How do you decide to select a thiazide versus a loop diuretic?

ALLHAT. JAMA 2002;288:2981
JNC 7. JAMA 2003;289(19):2560
Management of Hypertension in Type 2 Diabetes

Qu #7

a. A patient is taking an ACEi and a diuretic. The blood pressure is not at goal.

What considerations go into selecting a beta blocker?

b. A patient is taking a dual antihypertensive regimen and the blood pressure is not at goal.

What considerations go into selecting a calcium channel blocker?

Estacio RO, et al. NEJM 1998;338:645
Management of Hypertension in Type 2 Diabetes

Qu #8

When would you consider using Hydralazine? Minoxidil?

Is there a role for alpha blockers?

JNC 7. JAMA 2003;289(19):2560
ALLHAT. JAMA 2000;283:1967
Management of Hypertension in Type 2 Diabetes

Qu #9

Is there a role for an ACEi plus an ARB?

Messerli FH. *J Am Coll Cardiol* 2009;DOI:10.1016/j.jacc.2008.10.036
Management of Hypertension in Type 2 Diabetes

Qu #10

Where do direct renin inhibitors (DRI) fit into the antihypertensive regimen?

Is there a role for combining a DRI with an ACE or ARB?

When is spironolactone used?

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Qu #11

A patient with T2D and renal insufficiency stopped all BP meds, missed follow-up visits and returned to the clinic 9 months later

BP = 168/100
HR = 100
BUN = 45
Creatinine = 5.1
Ur microAlb = 2400 mcg/mg

What are your recommendations for BP control?
Management of Hypertension in Type 2 Diabetes

Qu #12

Are there new classes of antihypertensive drugs in development?