Hypertension and Diabetes

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Cardiovascular Disease and Diabetes

Approximately 80% of people with diabetes die from cardiovascular disease[1]

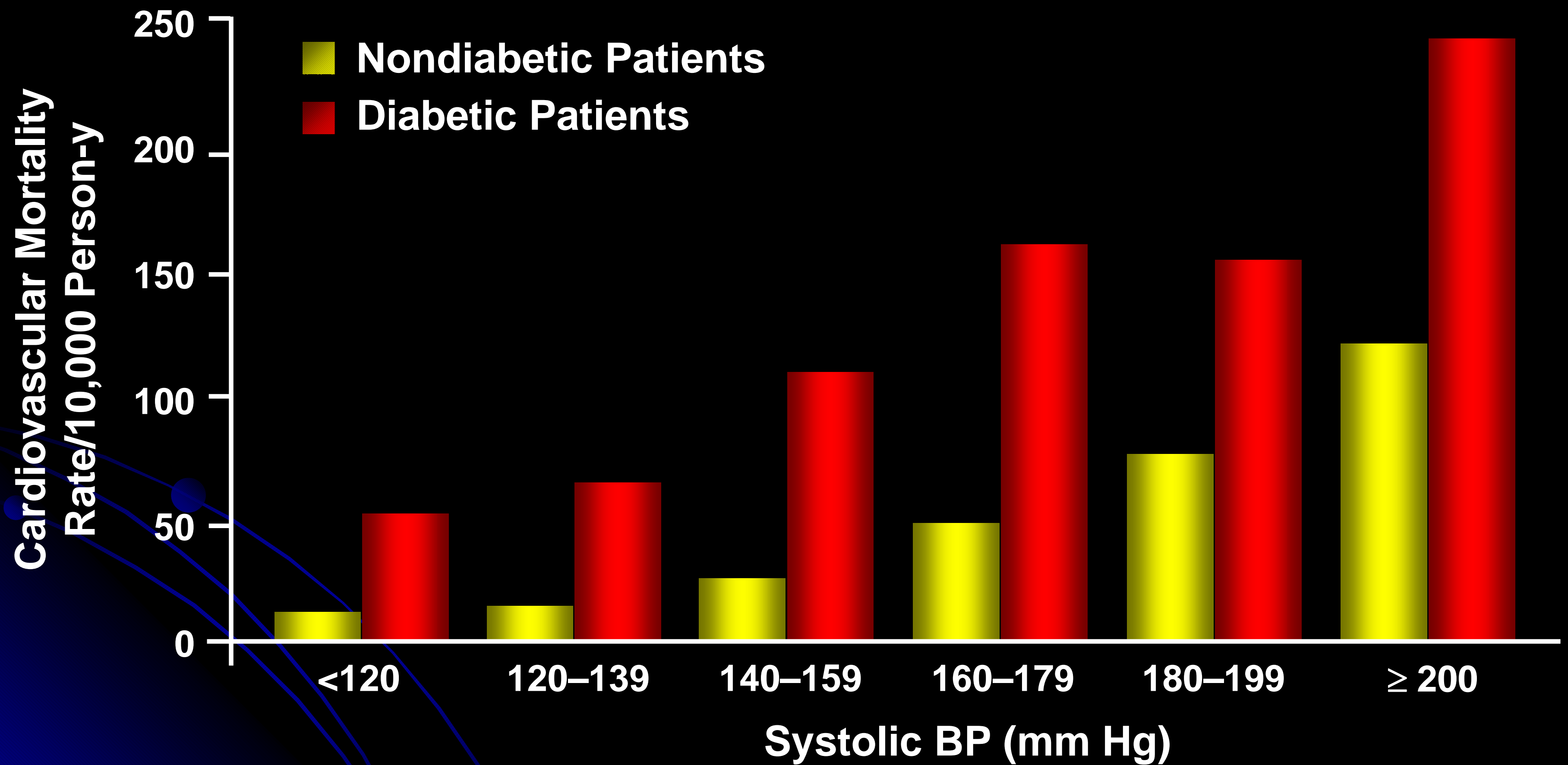
The role of glycemic control in reducing macrovascular complications has been difficult to demonstrate[2-5]

"Mind set"

Hypertension → Stroke
Hyperlipidemia → MI

[1]National Diabetes Data Group. *Diabetes in America.* 2nd ed. NIH;1995
[2]UKPDS Group. Lancet 1998;352:837
[3]ACCORD. N Engl J Med 2008;358:2545
[4]ADVANCE N Engl J Med 2008;358:2560
[5]Duckworth W, et al. N Engl J Med *2009;*360(2):129

Association of Systolic BP and Type 2 Diabetes on Cardiovascular Death



Stamler J et al. *Diabetes Care*. 1993;16:434-444

UKPDS Risk Reduction

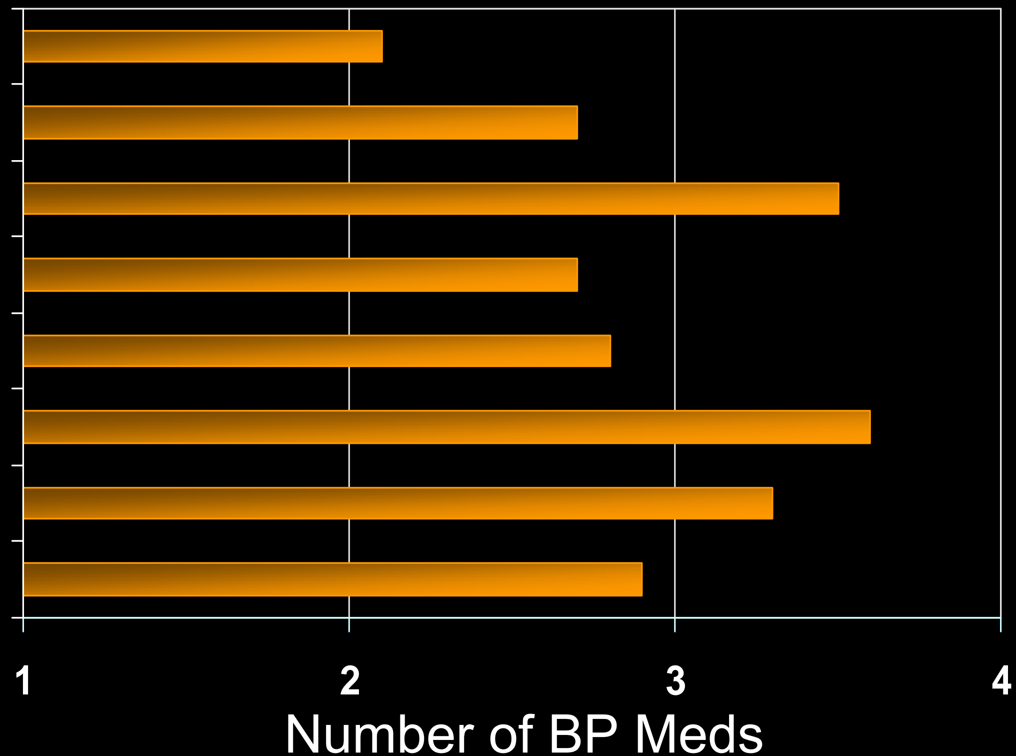
Control of Hypertension

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

Turner RC, et al. BMJ 1998;317:703

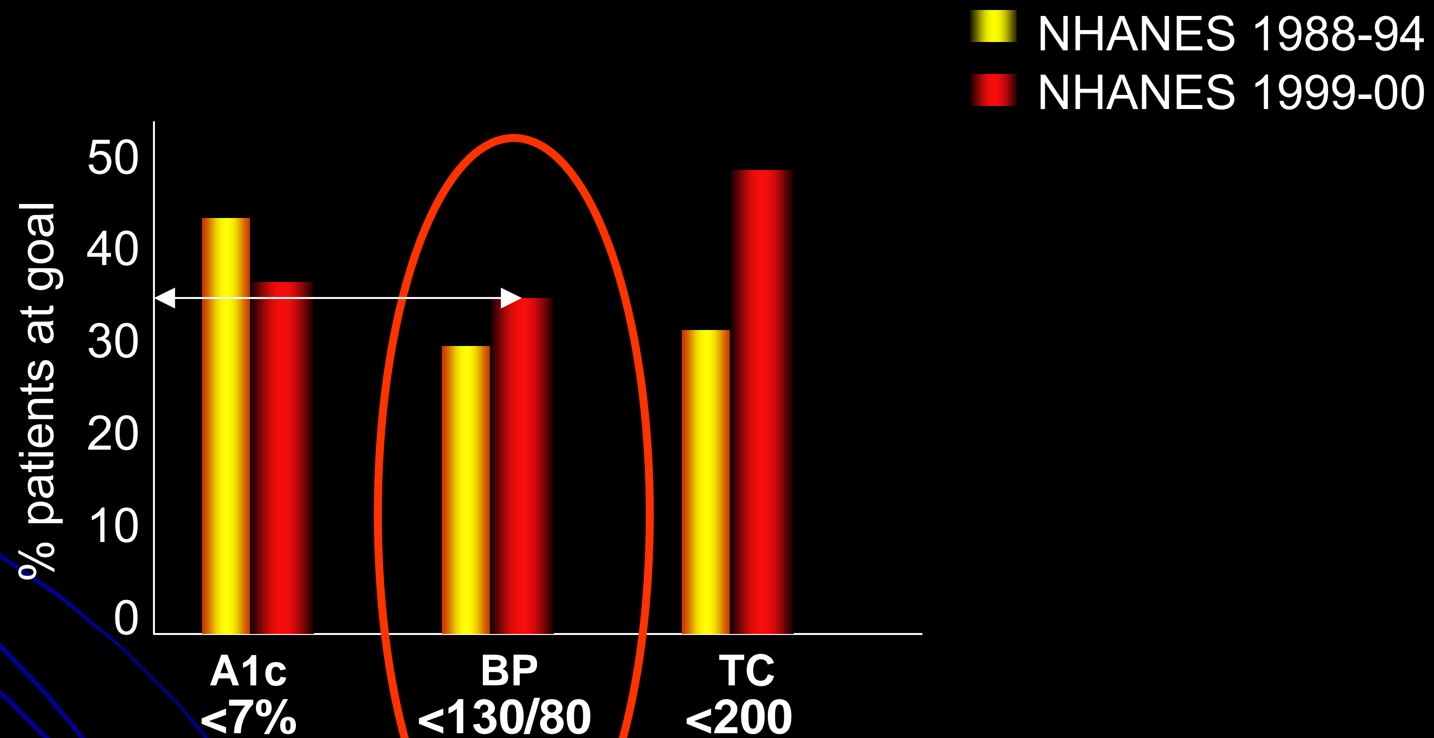
Average Number of Antihypertensive Agents Needed per Patient to Achieve Target Systolic Blood Pressure Goals

Trial/SBP Achieved



Bakris GL. *Am J Kidney Dis.* 2000

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



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

1st Line Therapy for Hypertension

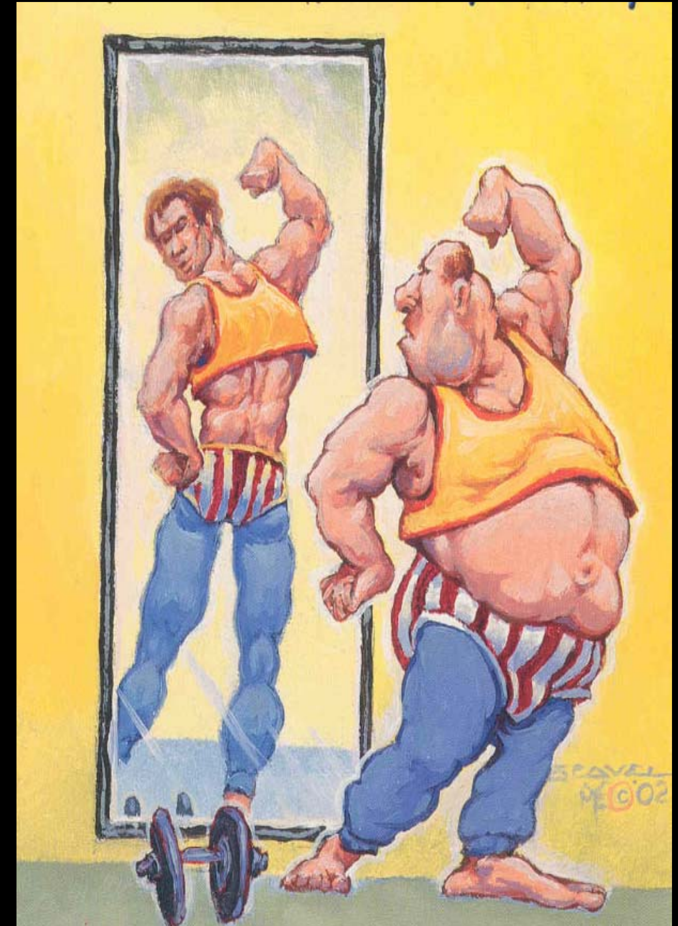
Weight loss of 5 to 10 kilograms

Sodium restriction to 2 grams/d

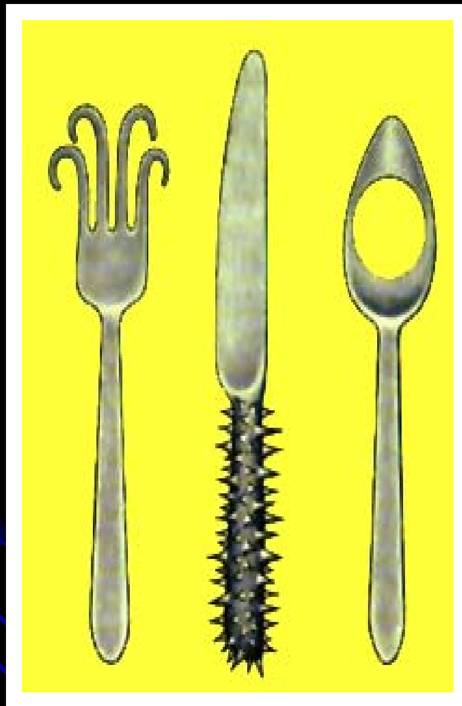
Potassium intake 3.5 grams/d

1 oz alcohol max/d

Exercise ≥30 min/d



Useful Tools for Life Style Behavior Modification

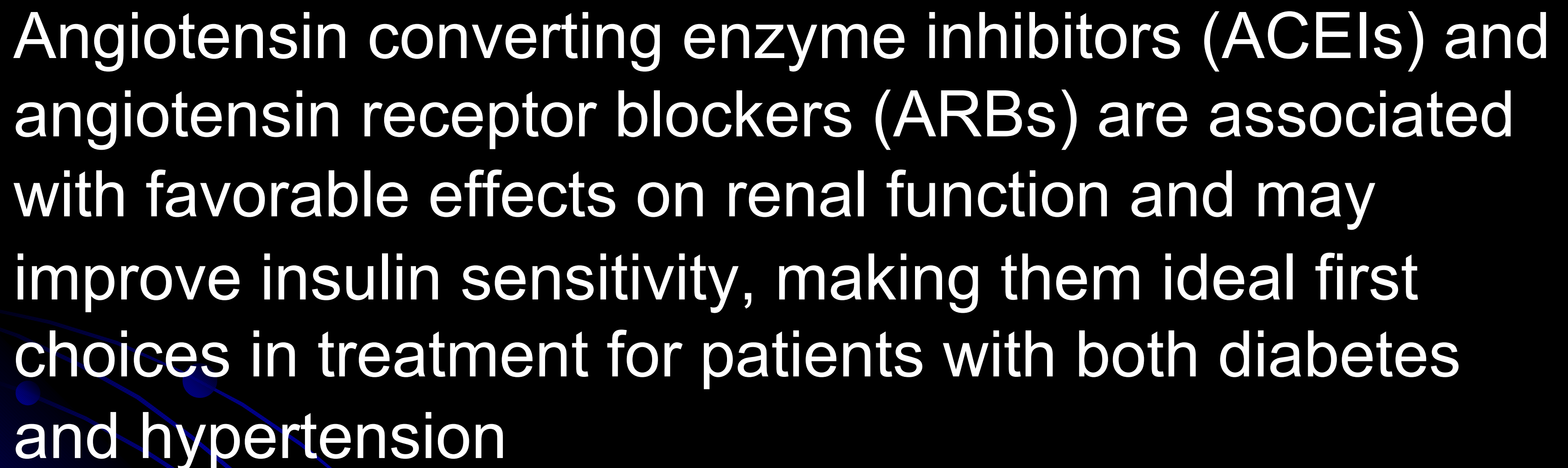


Dining accoutrements

Good equipment and a trainer

DIABETES AND HYPERTENSION

AACE Consensus



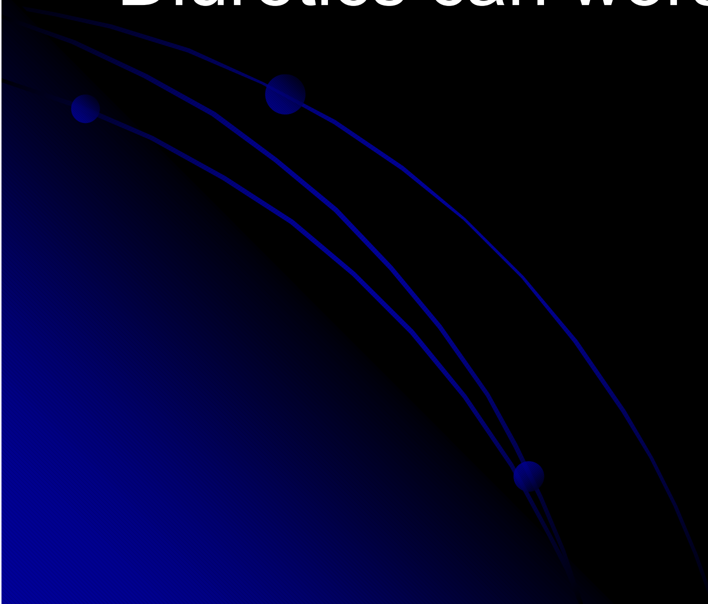
Angiotensin converting enzyme inhibitors (ACEIs) and angiotensin receptor blockers (ARBs) are associated with favorable effects on renal function and may improve insulin sensitivity, making them ideal first choices in treatment for patients with both diabetes and hypertension

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

DIABETES AND HYPERTENSION

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?

ADA Clinical Practice Guidelines. Diabetes Care 2009;32(Suppl 1):S8
Peterson JC, et al. Ann Intern Med 1995;123:754

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

ADA Clinical Practice Guidelines. Diabetes Care 2009;32(Suppl 1):S8

Management of Hypertension in Type 2 Diabetes

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?

ADA Clinical Practice Guidelines. Diabetes Care 2004;27(Suppl 1):S65
Lewis EJ, et al. NEJM 2001;345:851. Brenner BM, et al. NEJM 2001;345:861

Management of Hypertension in Type 2 Diabetes

Qu #4

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

Wright JT, et al. JAMA 2005;293:1595. Wright JT, et al. JAMA 2002;288:2421

Management of Hypertension in Type 2 Diabetes

Qu #5

What should be the initial therapy if:

SBP ≥145 mmHg *and/or*

DBP ≥ 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?

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?

JNC 7. JAMA 2003;289(19):2560. UKPDS 39. BMJ 1998;713:13
Hansson L. et al. Lancet 2000;356:359. Bakris GL, et al. Kidney Int 1996;50:1641
Tuomilehto J, et al. NEJM 1999;340:677. Dahlof B, et al. Lancet 2005;366:895
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
ONTARGET investigators. *N Engl J Med* 2008: 358:1547-1559
ONTARGET study. *Lancet* 2008; 372:547-553

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?

Parving et al. N Eng J Med 2008;358(23):2433

Bakris GL, Sowers JR. J Clin Hypertens 2008;15(5):505

Management of Hypertension in Type 2 Diabetes

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?