

ACE INHIBITORS

STILL THE GOLD-STANDARD OF CARE

Presentation by:

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Mentor:

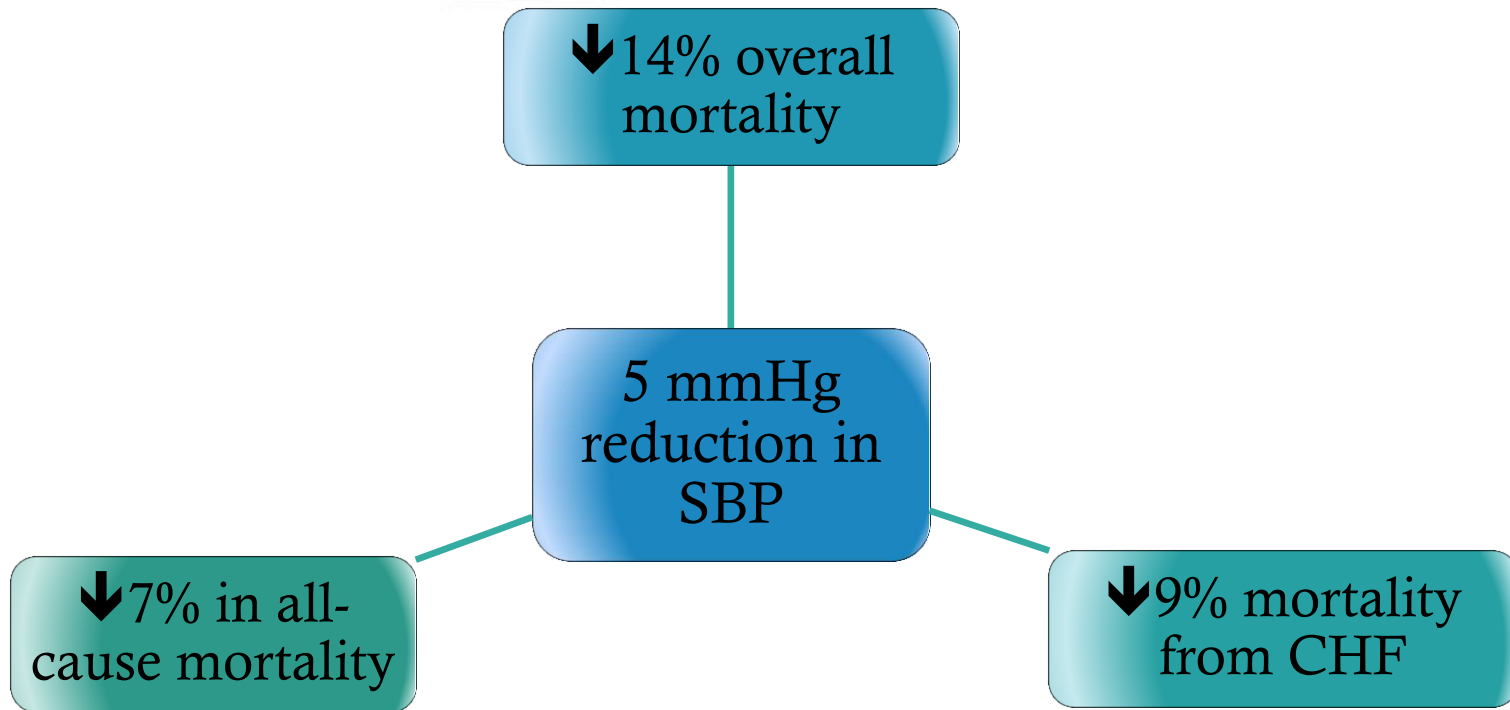
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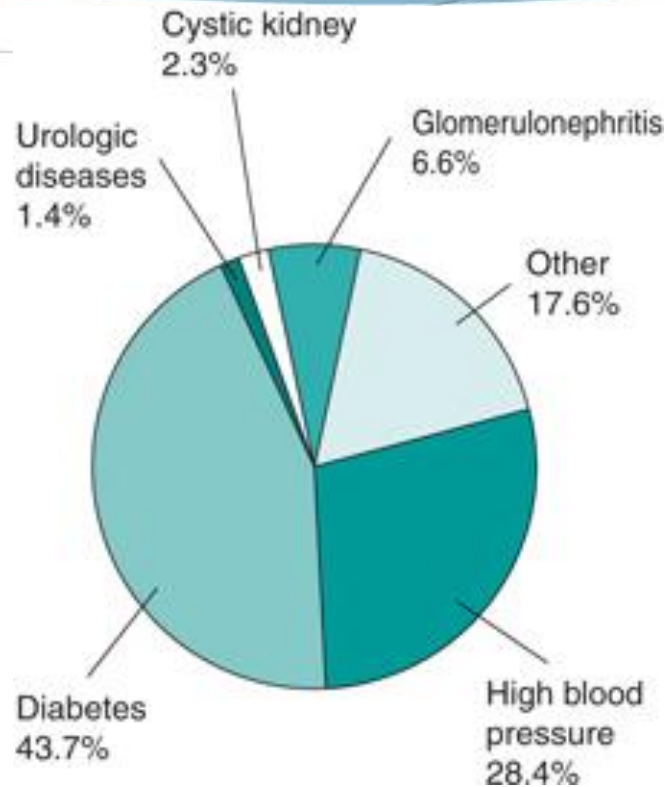
HYPERTENSION PATIENT POPULATION

- ◆ 67 million have hypertension (HTN) and only 47% have their high blood pressure (BP) under control
 - ◆ Eighth Joint National Committee (JNC8): SBP \geq 140 or DBP \geq 90
- ◆ The higher the BP, the greater the risk of:
 - ◆ Myocardial infarction (MI)
 - ◆ Heart failure (HF)
 - ◆ Stroke
 - ◆ Chronic kidney disease (CKD)

IMPORTANCE OF BP CONTROL



HTN AND RENAL INJURY



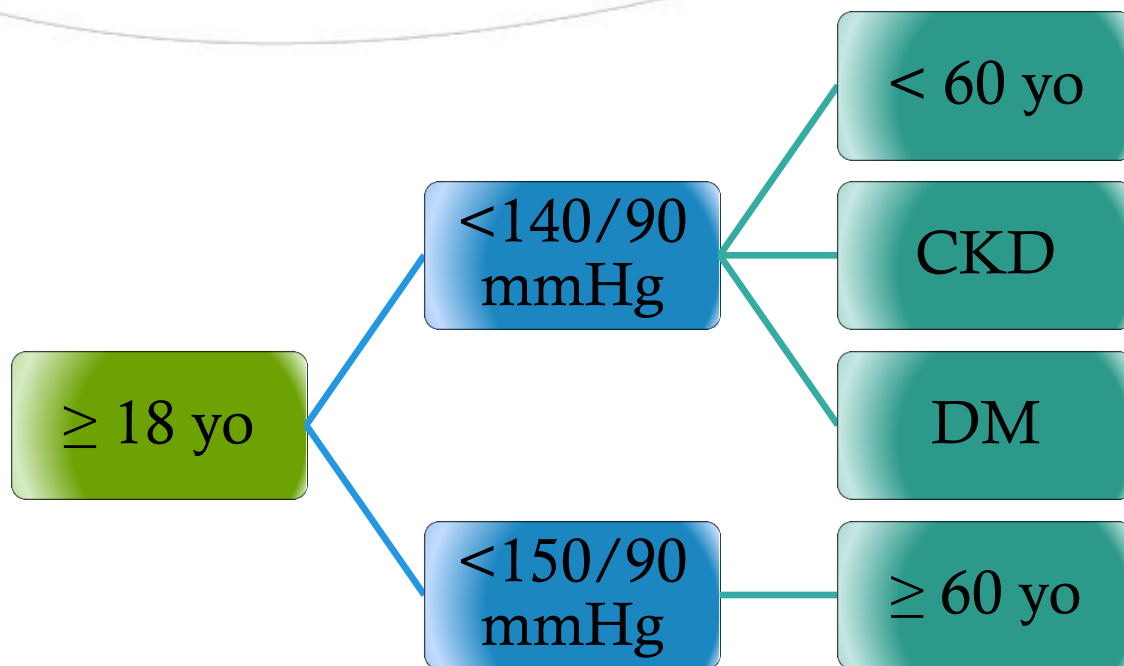
HISTORY OF HTN TREATMENT

1950s
**Thiazide
diuretics**

1960s
**Beta blockers
CCBs**

1970s
ACE inhibitors

JNC 8 GOALS



Ultimate goal: Reduction of cardiovascular and renal morbidity and mortality

JNC8 FIRST-LINE TREATMENTS

LIFESTYLE MODIFICATIONS

DASH diet
Weight reduction
Physical activity
Moderate alcohol

BLACK POPULATION

Thiazide or
Calcium channel
blocker

NON-BLACK

ACEI/ARB or
Thiazide or
Calcium channel
blocker

ACE INHIBITORS

Prodrugs

enalapril/Vasotec

benazepril/Lotensin

ramipril/Altace

quinapril/Accupril

fosinopril/Monopril

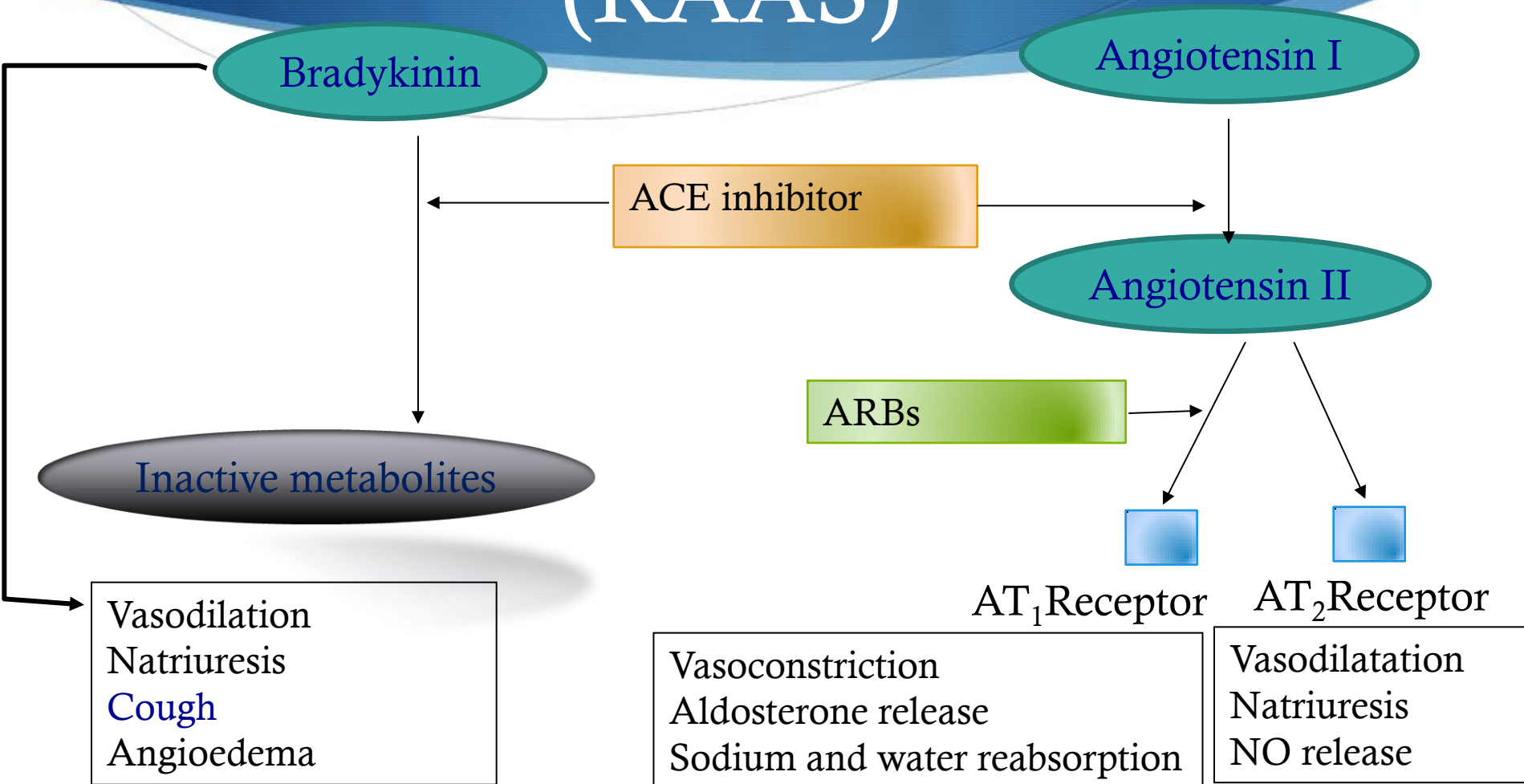
Active drugs

captopril/Capoten

lisinopril/
Prinivil, Zestril

enalaprilat/Vasotec IV

RENIN-ANGIOTENSIN-ALDOSTERONE SYSTEM (RAAS)



ADVERSE EFFECTS

Dry cough

Angioedema

Hyperkalemia

Dizziness

Headache

GI

ACEI COUGH

A dry (nonproductive) and persistent cough, occurring within hours up to months after initiation of therapy. Resolves 1-4 weeks after discontinuation.

Prevalence	Population most affected	Severity of the cough	Rate of discontinuation of ACEI
<ul style="list-style-type: none">• 5-20%• ARBs: up to 4%	<ul style="list-style-type: none">• Women• Black• Chinese• COPD	<ul style="list-style-type: none">• Tickling sensation• Nighttime cough	<ul style="list-style-type: none">• 5.1%

Sato A, Fukata S. A prospective study of frequency and characteristics of cough during ACE inhibitor treatment. *Clin Exp Hypertension*. 2015;37(7):563-8.

Woo KS, Nicholls MG. High prevalence of persistent cough with angiotensin converting enzyme inhibitors in Chinese. *Br J Clin Pharmacol* 1995; 40:141-144

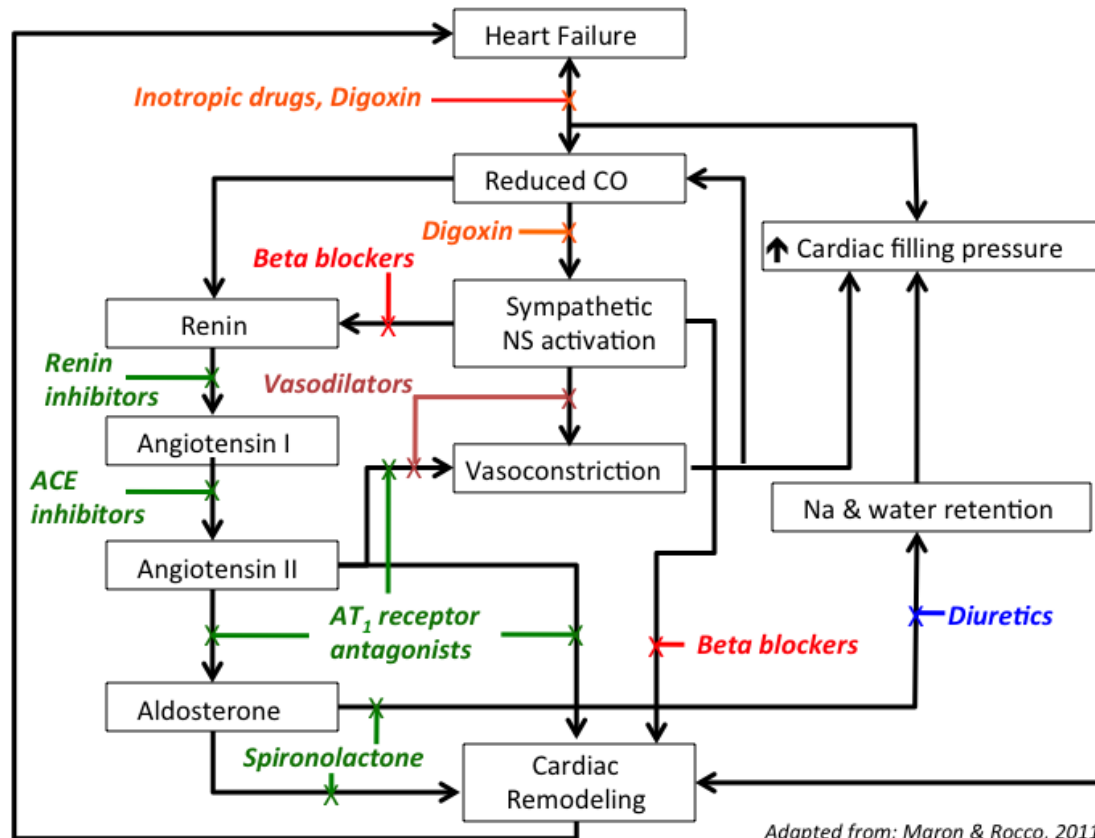
GOOD FOR THE HEART

- ◆ 2 main reasons for starting with ACEI in heart failure (HF) patients
 1. First agent to demonstrate reduction in mortality
 - ◆ Lowers both mortality and hospitalizations¹
 2. HF is both a hemodynamic and neurohormonal condition that improves with vasodilation²

¹ Garg R, Yusuf S. Overview of randomized trials of angiotensin-converting enzyme inhibitors on mortality and morbidity in patients with heart failure. Collaborative Group on ACE Inhibitor Trials. *JAMA*. 1995; 273: 1450–1456.

² Cohn JN, Archibald DG, Ziesche S, Francis JA, Harston WE, Tristani FE, Dunkman WB, Jacobs W, Francis GS, Flohr KH, et al. Effect of vasodilator therapy on mortality in chronic congestive heart failure. Results of a Veterans Administration Cooperative Study. *N Engl J Med*. 1986; 314: 1547–1552.

MECHANISM OF HEART FAILURE



Adapted from: Maron & Rocca, 2011

GOOD FOR THE KIDNEYS

- ◆ Ramipril Efficacy in Nephropathy (REIN) study
 - ◆ Nondiabetic chronic nephropathy patients
 - ◆ Rapid and sustained reduction in proteinuria prevented or limited long-term glomerular filtration rate (GFR) decline¹
- ◆ Kshirsagar meta-analysis² on efficacy of ACEi in slowing the progression of renal disease
 - ◆ Diabetic and nondiabetic chronic nephropathy patients
 - ◆ 40% risk reduction for ESRD or doubling serum creatinine compared with placebo
- ◆ Jafar meta-analysis³
 - ◆ ACEIs slow the progression of renal disease
- ◆ Lewis study
 - ◆ ACEIs have efficacy in reducing risk of serum creatinine doubling
- ◆ Fuchs study⁴
 - ◆ Major clinical trials with ARBs (mostly controlled by placebo)
 - ◆ No cardiovascular protection
 - ◆ Harmful renal outcomes

1 The GISEN Group (Gruppo Italiano di Studi Epidemiologici in Nefrologia): Randomised placebo-controlled trial of effect of ramipril on decline in glomerular filtration rate and risk of terminal renal failure in proteinuric, non-diabetic nephropathy. *Lancet* 1997;**349** : 1857 –1863.

2 Kshirsagar AV, Joy MS, Hogan SL, Falk RJ, Colindres RE: Effect of ACE inhibitors in diabetic and nondiabetic chronic renal disease: A systematic overview of randomized placebo-controlled trials. *Am J Kidney Dis.* 2000; **35** :695 –707.

3 Jafar TH, Schmid CH, Landa M, et al. Angiotensin-converting enzyme inhibitors and progression of nondiabetic renal disease: a meta-analysis of patient-level data. *Ann Intern Med.* 2001;**135**:73-87.

4 Fuchs FD. The Role of Angiotensin Receptor Blockers in the Prevention of Cardiovascular and Renal Disease: Time for Reassessment? *Evid Based Med.* 2013;**18**(2):44-47.

SUMMARY

ARBs

ACEIs

More literature

CHF

Less cough

Renoprotective



THANK YOU

◆ Questions?