

New Guidelines for Hypertension from the Lens of PA/LTC Medicine

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ACC/AHA 2017 HTN guidelines:

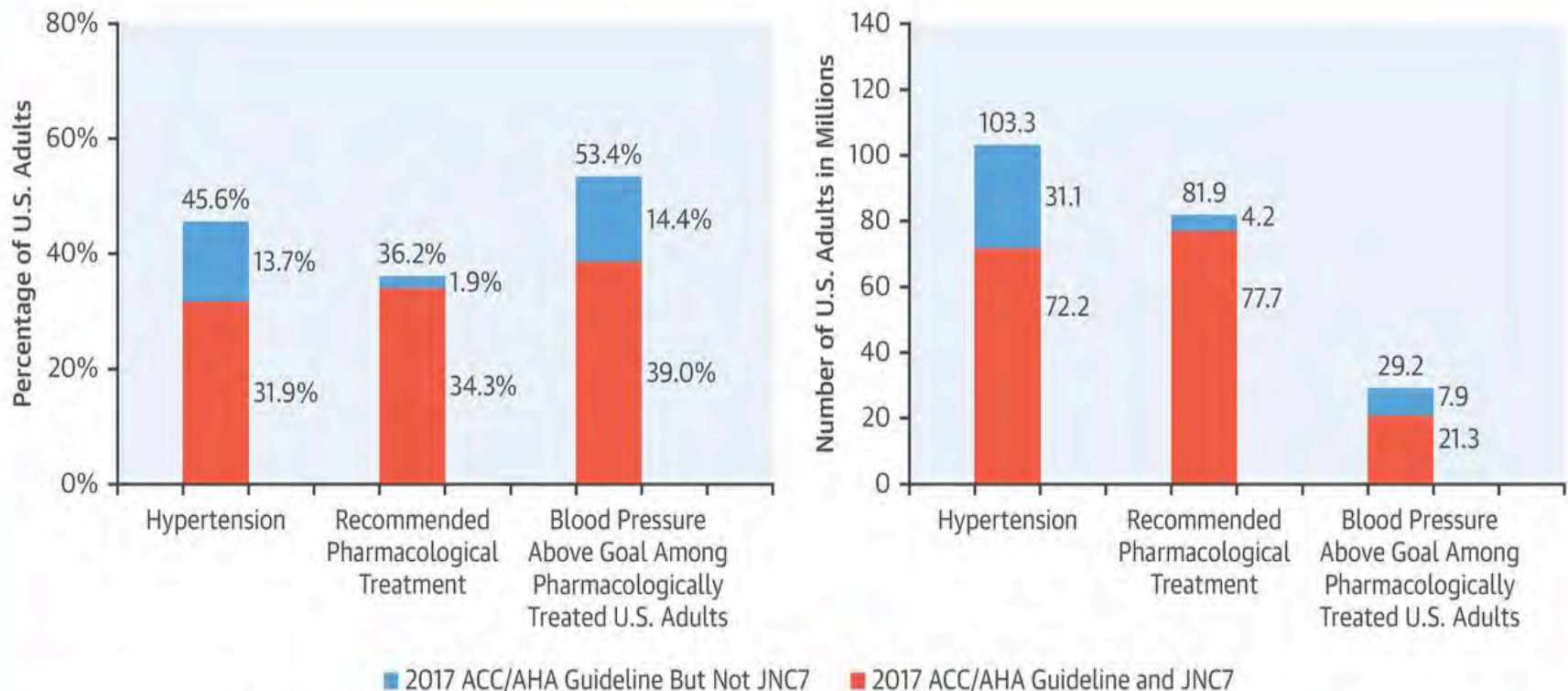
New Definitions

- **The definitions of HTN have changed:**
Normal < 120/80 mmHg
- **Elevated BP (previously normal): 120-129/<80 mmHg**
- **Stage 1 HTN (previously pre-HTN): 130-139/ 80-89 mmHg**
- **Stage 2 HTN: ≥ 140 or ≥ 90 mmHg**

Pharmacologic RX and follow-up

- **Stage 1: Non-pharm Rx and reassess in 3-6 mo**
- **Stage 1 + ASCVD risk >10%: Rx with meds; follow-up in 1 month**
- **Stage 2: Rx with meds from 2 drug classes; followup in 1 month**

CENTRAL ILLUSTRATION: Prevalence of Hypertension, Recommendation for Pharmacological Antihypertensive Treatment, and Blood Pressure Above Goal Among U.S. Adults According to the 2017 ACC/AHA and the JNC7 Guidelines



Muntner, P. et al. *J Am Coll Cardiol.* 2018;71(2):109-18.

Question #1:

Consequences of HTN may include:

- a) LVH or LA enlargement**
- b) Atrial fibrillation, CVA, TIA**
- c) AMI, Elevated BNP, HF**
- d) All of the above**

Question #2:

True or False:

Hypertension occurs more often in persons over 65 yrs of age, and more often in older men vs older women

a) True

b) False

Question #3:

Treatment of Hypertension may include:

- a) Lifestyle modification**
- b) Raising the afterload**
- c) Increasing the preload**
- d) All of the above**

Question #4:

When should inotropic agents be considered in treating Hypertension?

- a) When beta blockers cannot be tolerated**
- b) When the heart rate needs to be increased**
- c) Inotropic agents are not indicated in
Hypertension**

Case Presentation

84 yo woman, independent, at home, with HTN, was D/C'd from hosp for pneumon to PA-LTC; she had new onset AF, and was dc'd on amiod 100 bid, digoxin 0.125 mg/d, diltiazem CD 240 mg, warfarin, colace.

PE - Pale, thin, BP 108/58mmHg, pulse reg, 58/min, RR 14/min, afebrile;

JVD – negative;

Chest –reduced BS at bases;

CVS – reg rhythm, S2 loud, 2/6 SEM;

Abdomen –benign;

Ext- Trace ankle edema, pulses 2+ bilat;

Neuro- A & O x 3; No focal deficits. Power 4/5 bilat, mild sarcopenia.

Pertinent labs: H/H 10.5/32, normal WBCs. Chemistry normal. BNP was 155.

Phys Therapy not able to motivate her. She walked 10 feet and c/o SOB.

What should we do next?

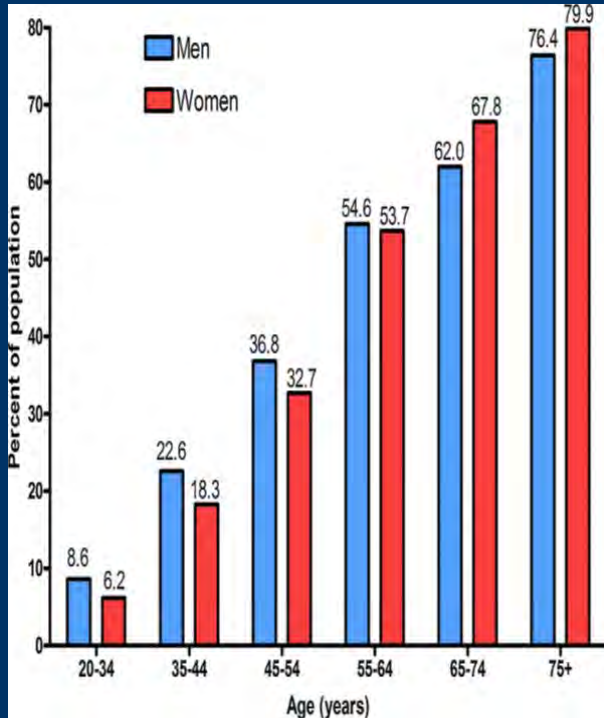
Why is Hypertension (HTN) important?

- HTN in >50% of HF cases, 70% of AMIs and 80% of CVAs; the prevalence continues to rise, esp in the elderly
- HTN's prevalence increases with advancing age, much more in women vs men over age 65 yrs,
- HTN increases risks of CV disease, systemic inflammation & endothelial dysfunction,
- Multiple clinical drug trials have reached a positive outcome for HTN and comorbidities; However,
- HTN Rx may have benefits &/or harms in frail elderly

Observations

1. Why are seniors so vulnerable to hemodynamic decompensation after **stress** of any kind?
2. Why are seniors so prone to develop HTN and HF?
 - a) ?**Disease** (CAD, ASCVD, DM, A fib, valvular, thyroid, infection, renal)
 - b) ?**Aging** (↓'d endothelial, coronary, &/or beta-adrenergic response, or ↑'d relaxation time, vascular & myocardial stiffness, pulse pressure, conduction delay)

Observations



- **HTN, TIA and CVA increase with age;**
- **LVH, AMI and HF increase with age;**

Q: Common mechanisms?

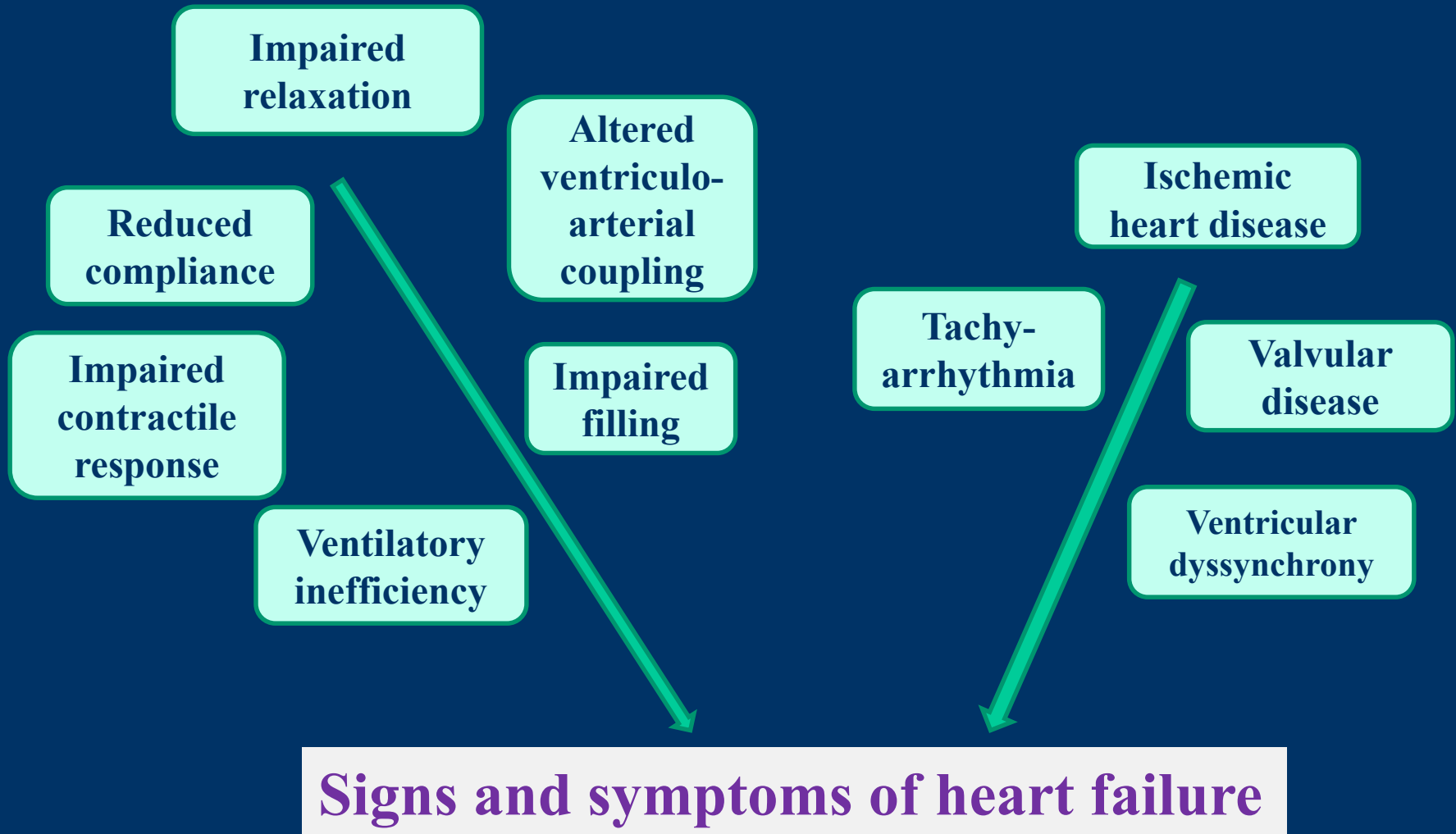
- 1) **Chronic, low-grade inflammation;**
- 2) **Increased cellular oxidative stress;**
- 3) **Vascular endothelial dysfunction**

Table 2. ADJUSTED ODD RATIOS (OR) FOR CHF WITH PRESERVED SYSTOLIC FUNCTION

| <i>Independent Risk Factor</i> | <i>Adjusted OR</i> | <i>95% CI</i> | <i>P Value</i> |
|--------------------------------|--------------------|---------------|----------------|
| Left ventricular hypertrophy | 2.6 | 1.8–3.8 | .001 |
| Gender (women) | 2.5 | 1.8–3.6 | .001 |
| Hypertension | 1.6 | 1.1–2.3 | .010 |
| Age (10 y)* | 1.2 | 1.1–1.4 | .003 |
| Diabetes | 0.6 | 0.4–0.9 | .024 |
| Mitral regurgitation | 0.4 | 0.3–0.5 | .001 |
| CAD | 0.3 | 0.2–0.5 | .001 |

*The odds ratio for age is determined for a 1 decade (10 year) increment in age, e.g., a 70-year-old is 20% more likely to have CHF with preserved systolic function compared with a 60-year-old after adjusting for other factors.

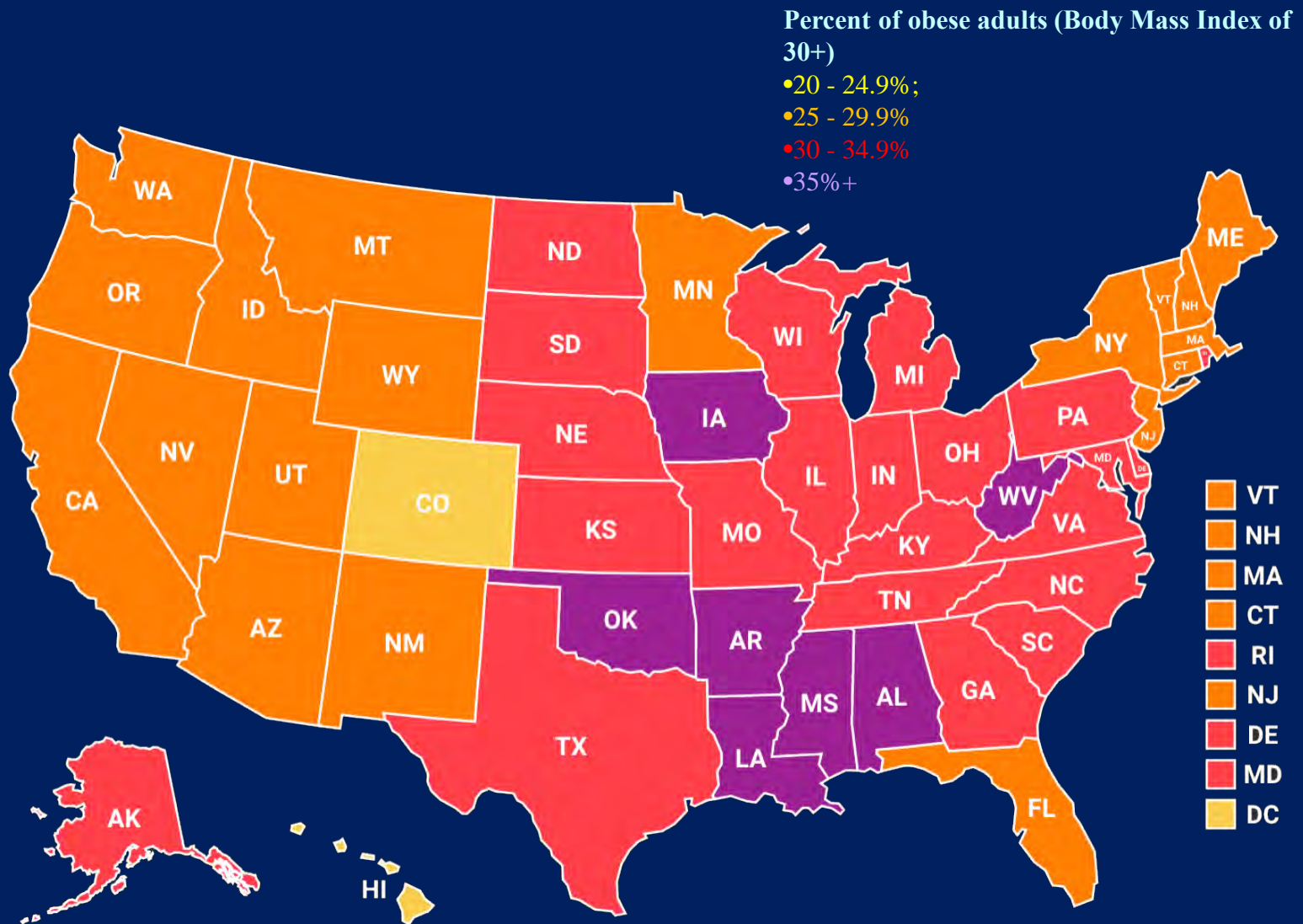
Age-related continuum from HTN to HFPEF



Secondary HTN

- New onset HTN despite 3 meds
- HTN uncontrolled
- Target organ damage
- Diastolic HTN in elderly
- Hypokalemia
- Other causes of secondary HTN: **Obesity**, OSA, renovascular, **drugs**, Cushings, pheochromocytoma, hyperaldosteronism

US Adult Obesity Rate by State, 2017



Drugs that may contribute to HTN

- Etoh
- Corticosteroids
- Erythropoetin-stimulating drugs
- Herbal supplements (e.g., ephedra)
- NSAIDS
- Stimulants (e.g., caffeine)
- Sympathomimetics

Signs & Symptoms of HTN

- **HTN, often asymptomatic, is the “silent killer”**
- **If BP over 180/120 but no symptoms, it’s a HTN Urgency; if with symptoms, it’s a HTN Emergency**
- **Symptoms of BP >180/120:**
 - headaches, back pain, facial flushing, nosebleeds, numbness, weakness, anxiety, dyspnea, vision changes**
- **If headache, may need to go to ED for IV Rx**

Non-pharmacologic treatment

- **Weight loss (~ 1 mmHg for each kg)**
- **DASH-type diet (11 mmHg)**
- **Supplement low Na, K**
- **Exercise (aerobic or dynamic)**
- **Reduce Etoh intake**
- **Reduce stress**
- **Meditation**

Nutritional needs change with age

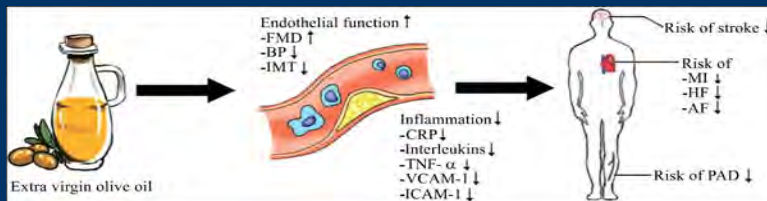
Feed the body, mind
and soul with
5 colors on the plate



1. Aging may be associated with:
 - reduced appetite,
 - inadequate protein intake and inappropriate low caloric intake with weight loss;
 - Decreased energy requirements ~8% /decade , 55 -75;
2. Lean muscle mass is lost at ~ 1% per yr, after age 30 yrs;
3. Muscle fibers gradually decrease in size and number.
4. Sarcopenia, in > 50% of those > age 80yrs, increases disability & healthcare costs;

Dietary Recommendations

- **Water:** The body's water content declines with age; dehydration often. Should drink daily **0.5 – 1.0 oz** of water for every **2 lbs** weight.
- **Protein:** Needed for immune system, muscle mass & strength, etc. Daily **protein** intake should be **0.50-.70 gm/lb**.
- **Vitamin D & Calcium:** most elderly need vita D. Should take daily **vitamin D of > 800 IU** with calc supp > 600mg.
- **Nutritionally-dense:** vegetables & fruits; Protein-rich (beans, leg-umes, meat, fish, eggs and dairy products); Whole grains (brown rice; oats & whole grain cereals); Healthy Fats (nut butters, nuts, seeds, olive oil, fish oil).



BP Thresholds for and Goals of Pharmacological Therapy in Patients With Hypertension According to Clinical Conditions

| Clinical Condition(s) | BP Threshold, mm Hg | BP Goal, mm Hg |
|----------------------------------------------------------------------------------------------------|---------------------|----------------|
| General | | |
| Clinical CVD or 10-year ASCVD risk $\geq 10\%$ | $\geq 130/80$ | $< 130/80$ |
| No clinical CVD and 10-year ASCVD risk $< 10\%$ | $\geq 140/90$ | $< 130/80$ |
| Older persons (≥ 65 years of age; noninstitutionalized, ambulatory, community-living adults) | ≥ 130 (SBP) | < 130 (SBP) |
| Specific comorbidities | | |
| Diabetes mellitus | $\geq 130/80$ | $< 130/80$ |
| Chronic kidney disease | $\geq 130/80$ | $< 130/80$ |
| Chronic kidney disease after renal transplantation | $\geq 130/80$ | $< 130/80$ |
| Heart failure | $\geq 130/80$ | $< 130/80$ |
| Stable ischemic heart disease | $\geq 130/80$ | $< 130/80$ |
| Secondary stroke prevention | $\geq 140/90$ | $< 130/80$ |
| Secondary stroke prevention (lacunar) | $\geq 130/80$ | $< 130/80$ |
| Peripheral arterial disease | $\geq 130/80$ | $< 130/80$ |

ASCVD indicates atherosclerotic cardiovascular disease; BP, blood pressure; CVD, cardiovascular disease; and SBP, systolic blood pressure.

Balancing the risks of HTN Rx in elderly

| Population | Blood Pressure Goal, mm Hg | | |
|-----------------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| | Age <50 y | Age 50-74 y | Age ≥75 y |
| General population | <120/80 | <130 ^b | <140 ^c |
| High-risk population ^a | <130 | <130 in presence of CVD or increased CVD risk or chronic kidney disease ^b <140 in presence of type 2 diabetes ^c | <140 ^c |

^a Presence of cardiovascular disease (CVD) or increased CVD risk, chronic kidney disease, or diabetes.

^b Treat initially to systolic blood pressure of <140 mm Hg. If treatment is well tolerated, proceed to target goal of <130 mm Hg.

^c Treat to target systolic blood pressure goal of <140 mm Hg. If treatment is well tolerated, proceed to lower target of <130 mm Hg.

Even mild HTN increases Dementia risk later

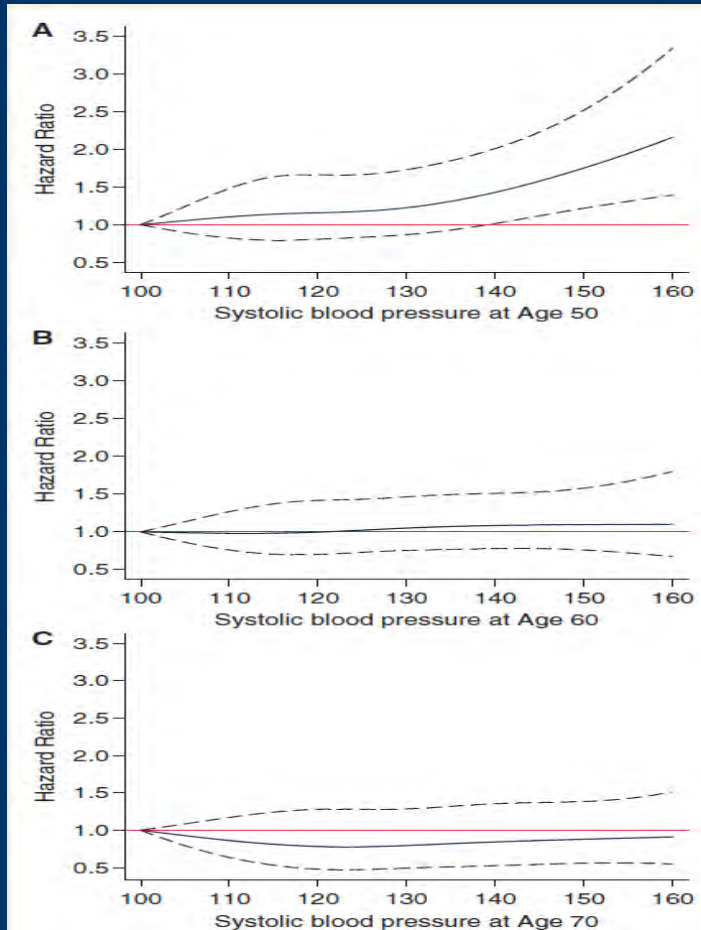


Figure 1 Threshold: association of systolic blood pressure^{a,b} at age 50 (A), 60 (B), and 70 years (C) with dementia. ^aSystolic blood pressure was modelled by both tail restricted cubic splines with four age-specific Harrell knots in a Cox regression model adjusted for age, sex, education, ethnicity, marital status, and occupational position. ^bHazard ratios calculated with systolic blood pressure 100 mmHg as reference.

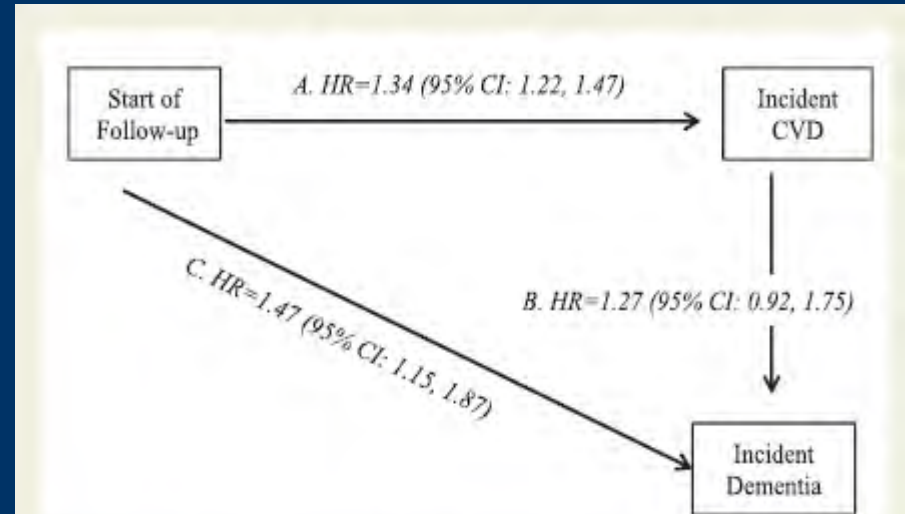
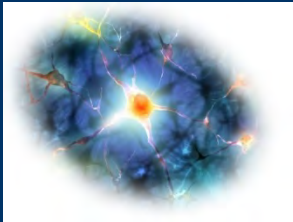


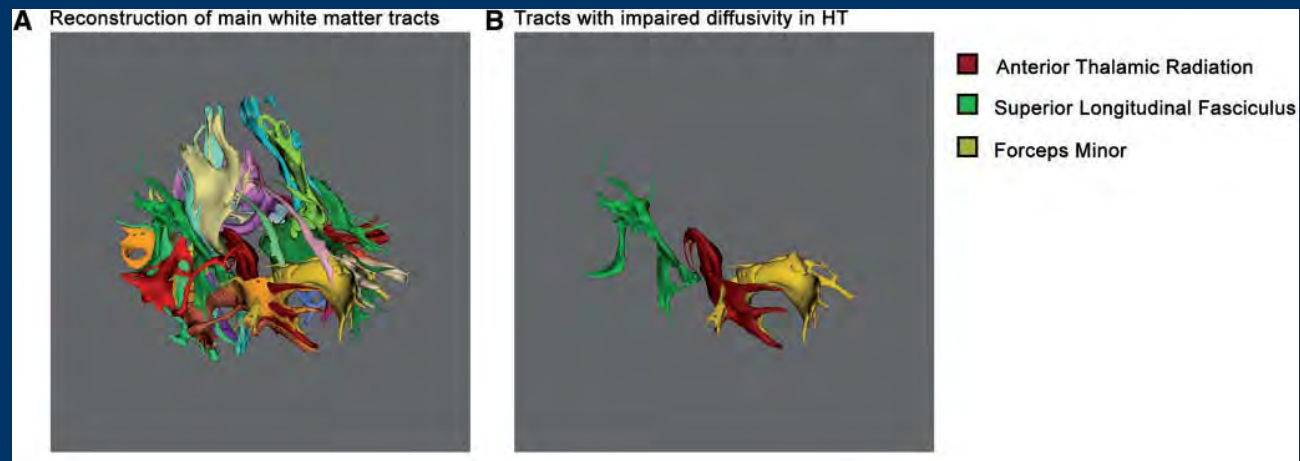
Figure 2 Multi-state models for the role of hypertension at age 50 in transition to cardiovascular disease (stroke or coronary heart disease) and dementia. Role of hypertension (systolic blood pressure ≥ 130 mmHg) at age 50 years in the risk of transitions from: (A) healthy state to incident cardiovascular disease; (B) cardiovascular disease (stroke or coronary heart disease) to incident dementia; (C) healthy to incident dementia in those free of cardiovascular disease (stroke or coronary heart disease). Analyses with age as time-scale and adjusted for sex, education, ethnicity, marital status at age 50, occupation position at age 50, and birth cohort.

Hypertension Linked to Early Brain Changes

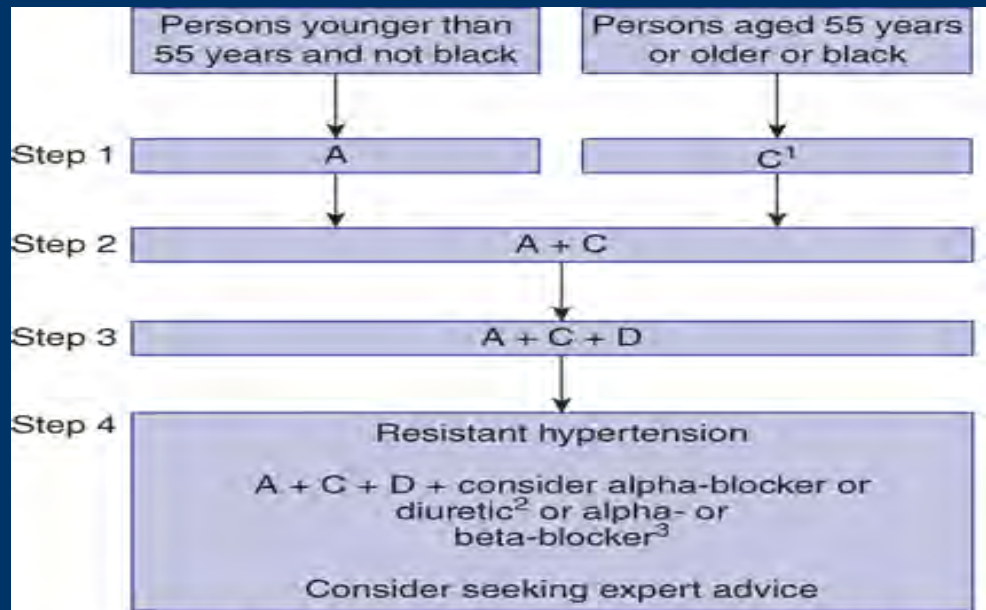


Brain MRI fiber-tracking reveals white matter alterations in hypertensive patients without damage under conventional neuroimaging

This approach could identify patients at initial stages of brain damage and could gain benefit of therapies aimed at limiting the transition to dementia and neurodegeneration.



Medications for HTN Rx



A, ACE inhibitor or ARB; C, calcium-channel blocker; D, diuretic, thiazide-like.

¹A CCB is preferred, but consider a thiazide-like diuretic if a CCB is not tolerated or the person has edema, evidence of heart failure, or a high risk of heart failure.

²Consider a low dose of spironolactone or higher doses of a thiazide-like diuretic.

³Consider an alpha- or beta-blocker if further diuretic therapy is not tolerated, or is contraindicated or ineffective.

Source: Maxine A. Papadakis, Stephen J. McPhee, Michael W. Rabow
Current Medical Diagnosis & Treatment 2019
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Stage 1 or Stage 2 HTN:

a) ACEI or ARB, CCB, &/or Diuretic

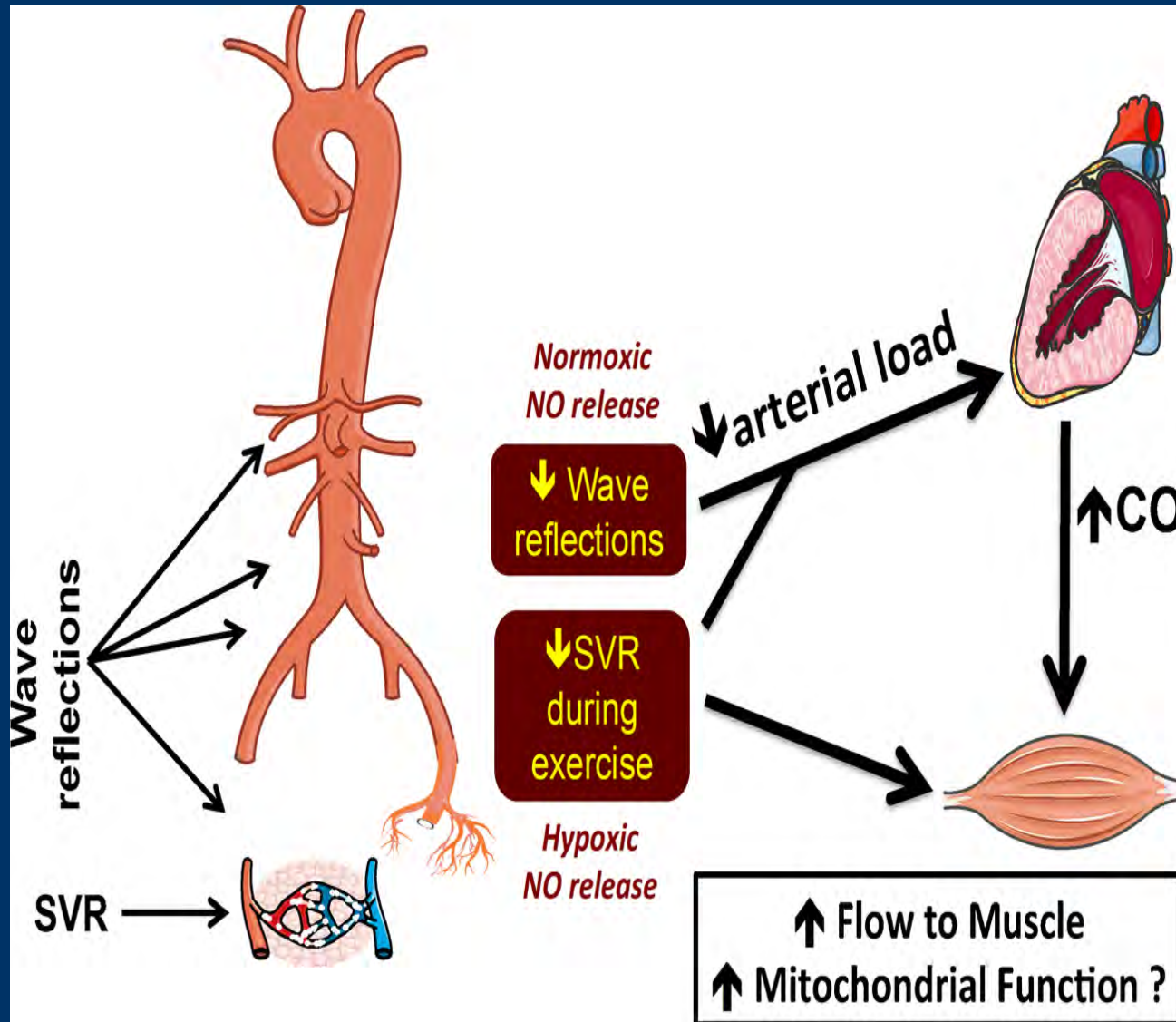
b) Resistant HTN:

ACEI or ARB, CCB, &/or Diuretic, &/or AB, BB nitrate, ARNI

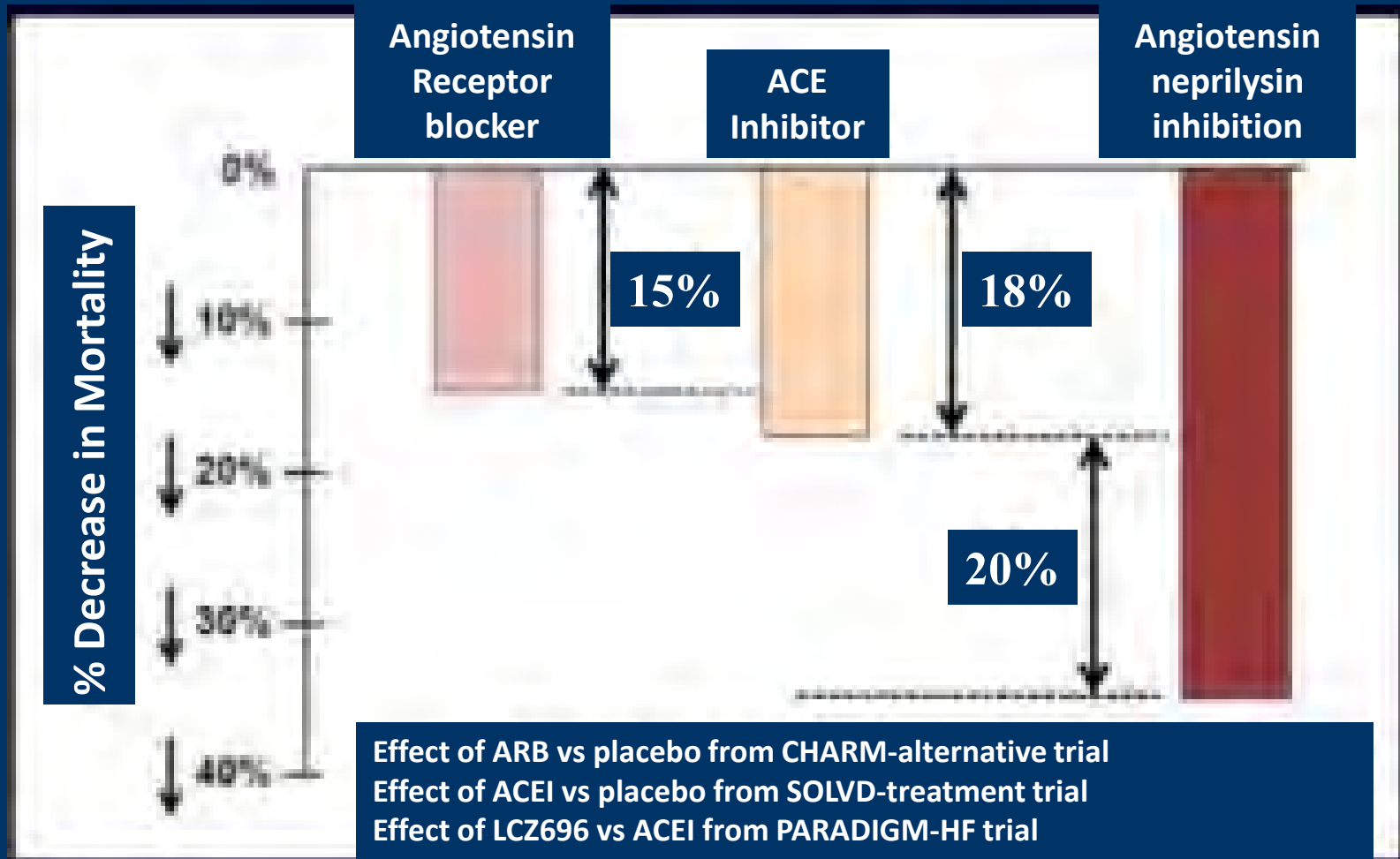
c) Prevent fibrosis -

Spironolactone, ACEI, ARNI

Nitrates lower BP, increase aerobic capacity

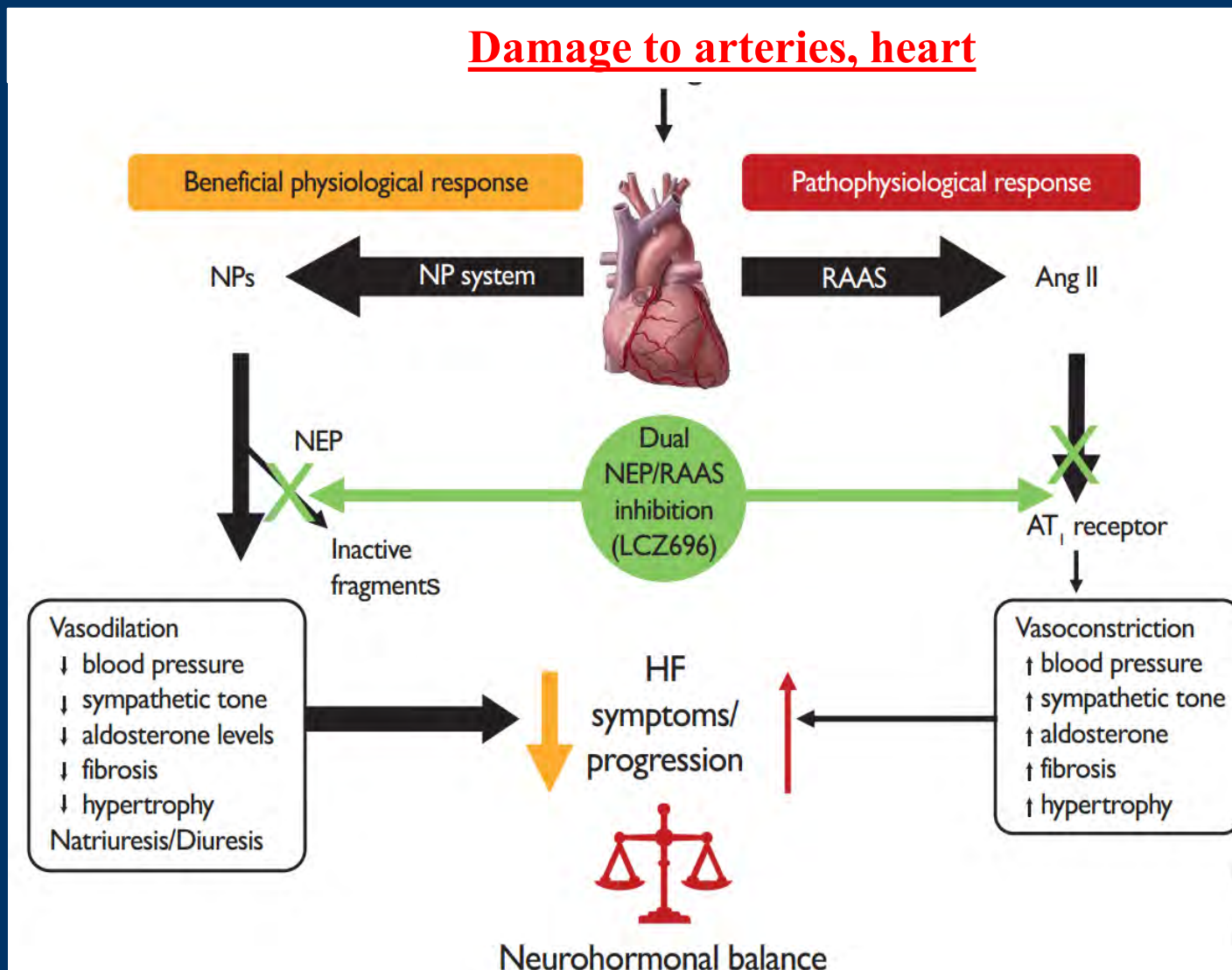


Angiotensin Neprilysin inhibition vs current inhibitors of renin-angiotensin system

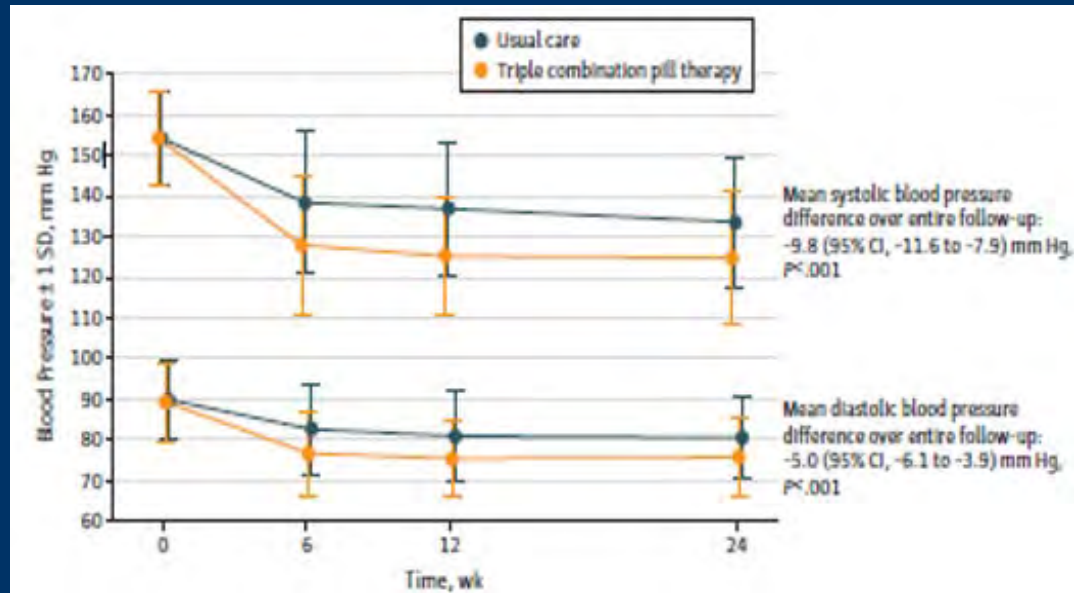


Mechanism of Action of ARNi in age-related HTN, HF

- Reduces BP, fibrosis & LVH;
- Improves LV relaxation & LV filling;
- Reduces LV &/or vascular stiffness;
- Reduces LVEDP



Could the New 'Triple Pill' Eliminate HTN?



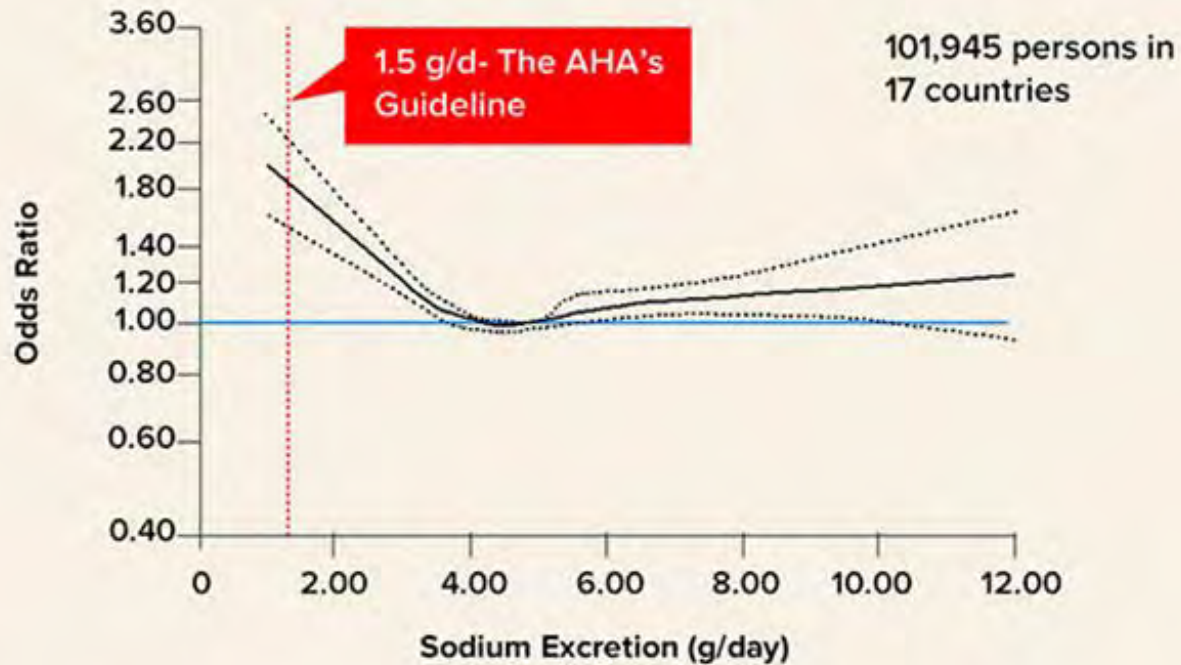
- telmisartan (20 mg), amlodipine (2.5 mg), & chlorthalidone (12.5 mg)
- 70% of those taking "triple pill" achieved target BP, vs 50% of those who continued on traditional hypertension therapy.

Reducing HTN & HF Hosp Readmissions From Skilled Nursing Facilities

- Follow-up provider visit in 1-3 days after AH discharge;
- Daily morning weights;
- Surveillance and early treatment for:
 - **Weight gain or loss** of 3 lbs in 1 day or 5 lbs in 1 week
 - Heart failure **exacerbation; hypotension,**
 - **Infections:** Respiratory; Urinary tract; Sepsis
 - **Electrolyte** imbalance
 - **Depression**
 - Poor **physical** health
 - Poor **cognitive** health
 - **Insufficient nutrition** or *unintentional* weight loss

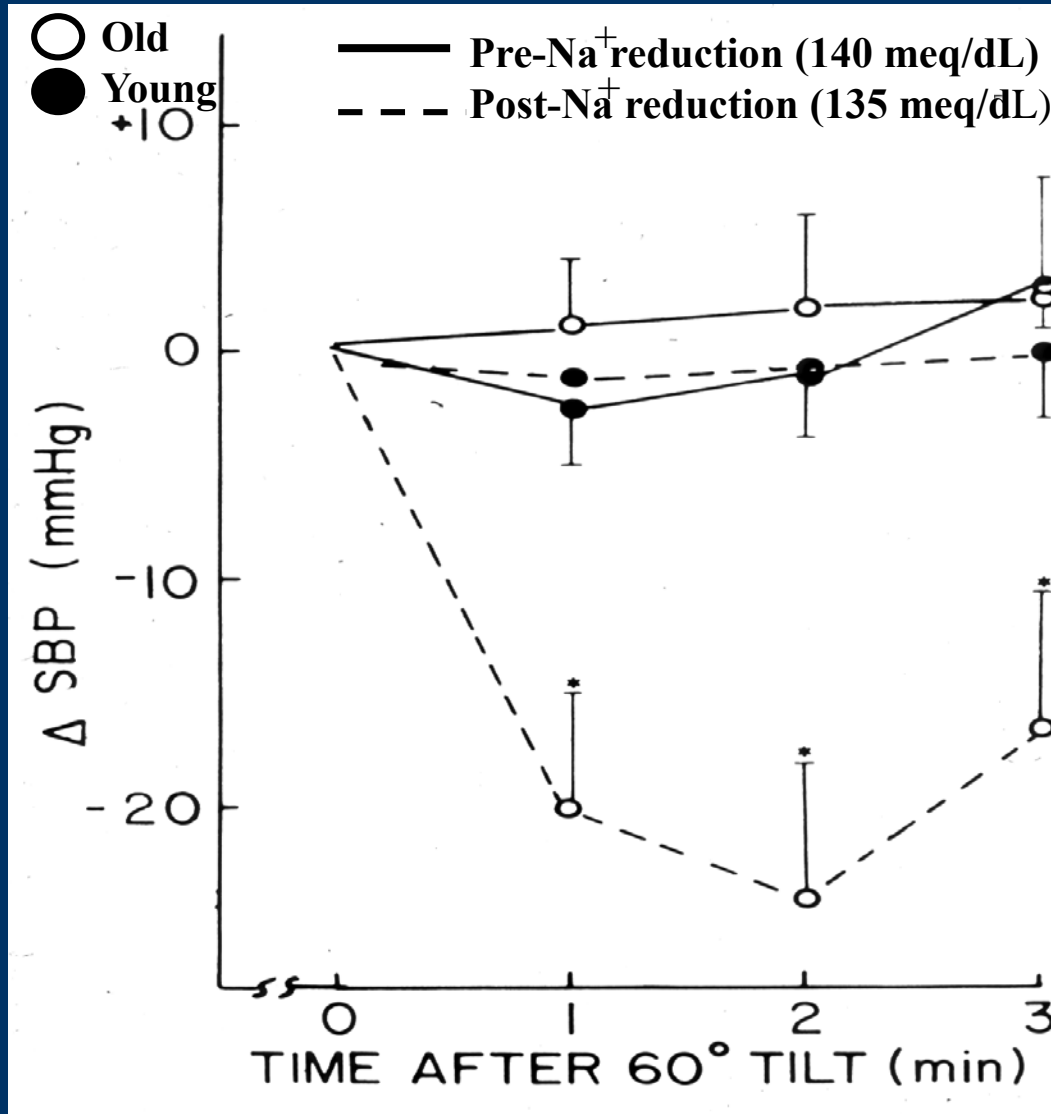
Sodium and Salt Intake

Estimated Sodium Excretion and Risk of Death or Cardiovascular Events



| | | | | | | |
|---------------|------|--------|--------|--------|------|-----|
| No. of Events | 101 | 1,023 | 1,437 | 597 | 126 | 25 |
| No. at Risk | 1817 | 30,124 | 46,663 | 18,395 | 3885 | 756 |

Neuro-Cardiovascular Interactions: BP Regulation & Baroreflex Response Decline with Age



After modest sodium reduction, SBP drops markedly in healthy Old following upright tilt.

Case Presentation

An 84 yo woman, independent, at home, with HTN, was D/C'd from hospital for pneumonia to the PA-LTC facility; She had new onset AF and is now on amiodarone 100 bid, digoxin 0.125 mg/d, diltiazem CD 240 mg, warfarin, & Colace.

PE - Pale, thin, BP 108/88mmHg, pulse 58/min, RR 14/min, afebrile;

JVD – negative;

Chest –reduced BS at bases;

CVS – reg rhythm, S2 loud, 2/6 SEM;

Abdomen –benign;

Ext- Trace ankle edema, pulses 2+ bilat;

Neuro- A & O x 3; No focal deficits. Power 4/5 bilat, mild sarcopenia.

Pertinent labs: H/H 10.5/32, normal WBCs. Chemistry normal. BNP was 155.

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What should we do next?

ACC/AHA 2017 HTN guidelines:

Key points

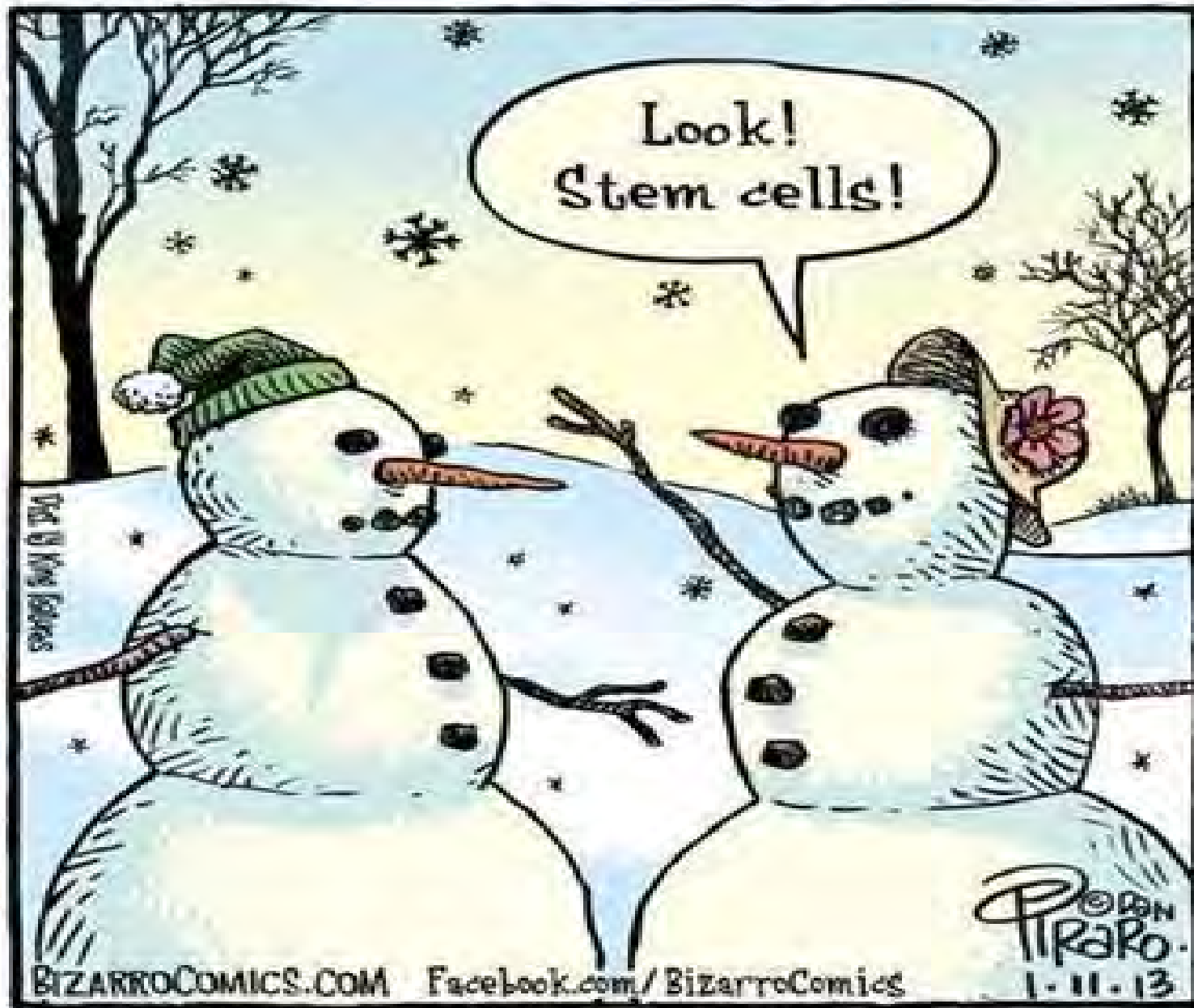
- **Get accurate BP measurements**
- **New BP classification system**
- **Lower BP targets for on-going management**
- **Decision making to include CV risk**
- **Improve BP control, refocus on lifestyle counseling**

Prevention of HTN

Lifestyle: Exercise, Diet & Weight mgmt



Sleep well, Eat well & Move well



Look!
Stem cells!

That is King Features

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