

# Antihypertensive Agents

# Blood Pressure Classification

| <b>Classification</b>       | <b>SBP (mmHg)</b> |            | <b>DBP (mmHg)</b> |
|-----------------------------|-------------------|------------|-------------------|
| <b>Normal</b>               | <b>&lt;120</b>    | <b>and</b> | <b>&lt;80</b>     |
| <b>Prehypertension</b>      | <b>120–139</b>    | <b>or</b>  | <b>80–89</b>      |
| <b>Hypertension</b>         | <b>&gt;140/90</b> |            |                   |
| <b>Stage 1 Hypertension</b> | <b>140–159</b>    | <b>or</b>  | <b>90–99</b>      |
| <b>Stage 2 Hypertension</b> | <b>≥160</b>       | <b>or</b>  | <b>≥100</b>       |

# Essential Hypertension

**In 90–95% of cases the cause isn't known = ESSENTIAL HYPERTENSION**

**Symptomatic treatment, i.e. reduce blood pressure. No real cure yet.**

# Identifiable Causes of Secondary Hypertension

- Sleep apnea
- Drug-induced or related causes
- Chronic kidney disease
- Primary aldosteronism
- Renovascular disease
- Chronic steroid therapy and Cushing's syndrome
- Pheochromocytoma
- Coarctation of the aorta
- Thyroid or parathyroid disease

# Prevalence

- **High in this country: 50% of adults, 60% of whites, 71% of African Americans, 61% Mexican Americans over the age of 60**
- **More prevalent in men than in women**
- **Highest prevalence in elderly African-American females**

# Complications

- **Cardiovascular system**
- **CNS**
- **Renal system**
- **Retinal damage**

# Target Organ Damage

- **Heart**

- **Left ventricular hypertrophy**
- **Coronary artery disease**
- **Myocardial infarcts**
- **Heart failure**

- **Brain**

- **Stroke or transient ischemic attacks**

- **Chronic kidney disease, kidney failure**

- **Retinopathy**

# Contributing Factors

- **Obesity**
- **Stress**
- **Lack of exercise**
- **Diet (excess dietary salt)**
- **Alcohol intake**
- **Cigarette smoking**

# **Why Guidelines for Hypertension?**

**50 million people with hypertension in USA 10 years ago (Currently 31 %), Only 1 in 2 on drug treatment to lower BP**

**Only 1 in 4 age 18-74 controlled to <140/<90 in USA**

# New BP Goals

- **<140/<90 and lower if tolerated**
- **<130/<80 in diabetics**
- **<130/<85 in cardiac failure**
- **<130/<85 in renal failure**
- **<125/<75 in renal failure with  
proteinuria > 1.0 g/24 hours**

# Highlights of Current Guidelines

**JNC, WHO/ISH, BHS,  
Canada, and More**

- **New aggressive treatment strategies based on a patient's medical profile**
- **Treat to goal and hit the target, not to be satisfied with less**

# Treatment Overview

- **Goals of therapy**
- **Lifestyle modification**
- **Pharmacologic treatment**
  - **Algorithm for treatment of hypertension**
- **Classification and management of BP for adults**
- **Follow-up and monitoring**

# Lifestyle Modifications

- Reduce weight to normal BMI (<math><25\text{kg/m}^2</math>): 5-20 mmHg/10kg loss
- DASH eating plan: 8-14 mmHg
- Dietary sodium reduction: 2-8 mmHg
- Increase physical activity: 4-9 mmHg
- Reduce alcohol consumption: 2- 4 mmHg

# DASH Diet

***Dietary***

***Approaches***

***to***

***Stop***

***Hypertension***

- **Emphasizes: Fruits, vegetables, low fat dairy foods, and reduced sodium intake**
- **Includes whole grains, poultry, fish, nuts**
- **Reduced amounts of red meat, sugar, total and saturated fat, and cholesterol**

# Treatment of Hypertension

Lifestyle Modifications

Not at Goal Blood Pressure (<140/90 mmHg)  
(<130/80 mmHg for those with diabetes or chronic kidney disease)

Initial Drug Choices

Without Compelling Indications

With Compelling Indications

## Stage 1 Hypertension

(SBP 140–159 or DBP 90–99 mmHg)  
Thiazide-type diuretics for most.  
May consider ACEI, ARB, BB, CCB,  
or combination.

## Stage 2 Hypertension

(SBP  $\geq$ 160 or DBP  $\geq$ 100 mmHg)  
2-drug combination for most (usually  
thiazide-type diuretic and  
ACEI, or ARB, or BB, or CCB)

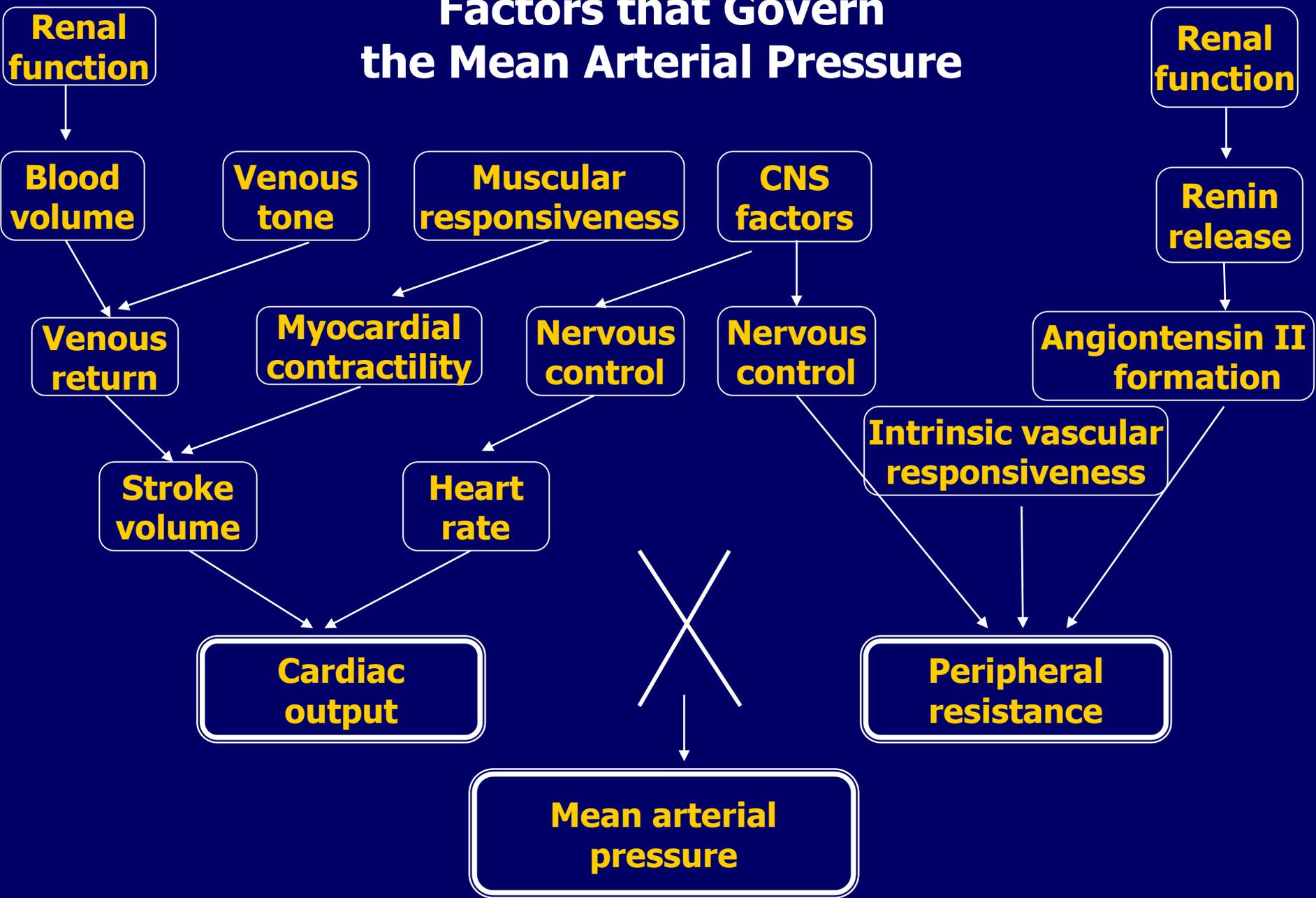
## Drug(s) for the compelling indications

Other antihypertensive drugs  
(diuretics, ACEI, ARB, BB, CCB)  
as needed.

Not at Goal  
Blood Pressure

Optimize dosages or add additional drugs  
until goal blood pressure is achieved.  
Consider consultation with hypertension specialist.

# Factors that Govern the Mean Arterial Pressure



# Mean Arterial Pressure

$$\text{MAP} = \text{CO} \times \text{PVR}$$

$$\text{CO} = \text{HR} \times \text{SV}$$

SNS

Blood volume  
Heart contractility  
Venous tone

myogenic tone  
vascular responsiveness  
nervous control

vasoactive metabolites  
endothelial factors  
circulating hormones

# Antihypertensive Drugs Classification

- **Diuretics**
- **Agents affecting adrenergic function**
- **Vasodilators**
- **Agents affecting Renin Angiotensin System (RAS)**

# Diuretics

Used as initial therapy alone or in combination with drugs from other groups

**Adverse effects: renin secretion due to volume and Na depletion**

- **Thiazides:** chlorothiazide, hydrochlorothiazide
- **Loop Diuretics:** furosemide, bumetanide, ethacrynic acid
- **Potassium sparing diuretics:** spironolactone, triamterene, amiloride