Antihypertensives

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Blood Pressure

- Blood pressure is the force that circulating blood exerts on walls of arteries.
- Two blood pressures are measured, systolic blood pressure and diastolic blood pressure.
- Systole occurs while the heart contracts. Diastole occurs while the heart rests between beats.
- **Blood pressure=Cardiac output x Peripheral vascular resistance(CO x PVR)**

Definition: Hypertension

Elevation of arterial blood pressure above 140/90 mm Hg

Introduction

- Thirty percent of people with high blood pressure don't know they have it.
- Of all people with high blood pressure, 11 percent aren't on therapy (special diet or drugs), 25 percent are on inadequate therapy, and 34 percent are on adequate therapy.

Average 14 readings: two per session, taken morning and evening for 7 days.

Classification of Hypertension

A classification of hypertension is based on the impact on risk.

Category	Systolic (mm Hg)	Diastolic (mm Hg)
Normal	<120	<80
Prehypertensive	120-139	or 80-89
Hypertensive		
Stage 1	140-159	or 90-99
Stage 2	≥160	≥100

Primary (Essential) Hypertension

90% of cases have no specific cause

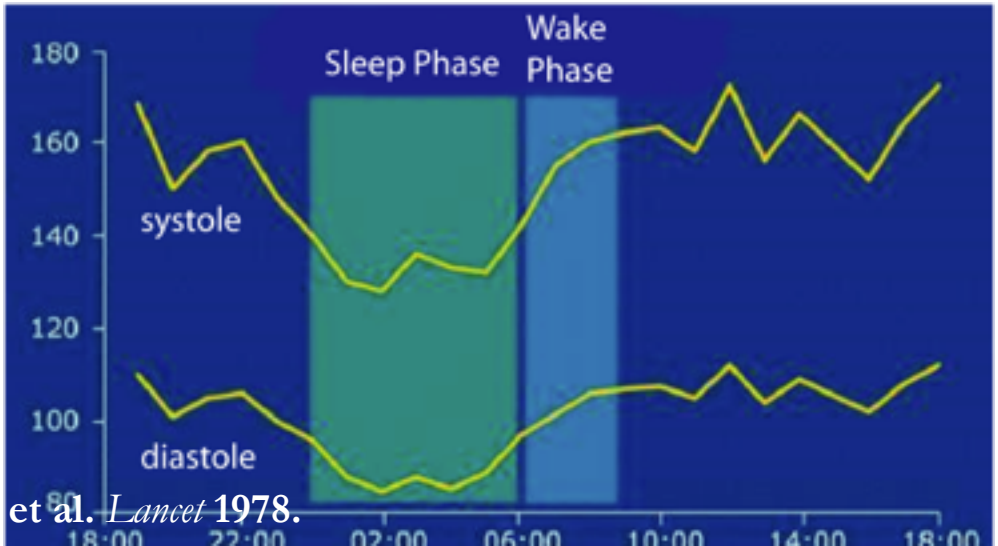
High blood pressure associated with increased peripheral vascular resistance

Multifactorial abnormalities

- **Genetics**
- **Stress**
- **Environment and diet (Smoking/High salt diet)**

Clinical Presentation

- **Most times asymptomatic (a 'silent' disease)**
- **Headache**
  - **Coincides with morning surge in BP**
  - **Circadian variation of blood pressure**



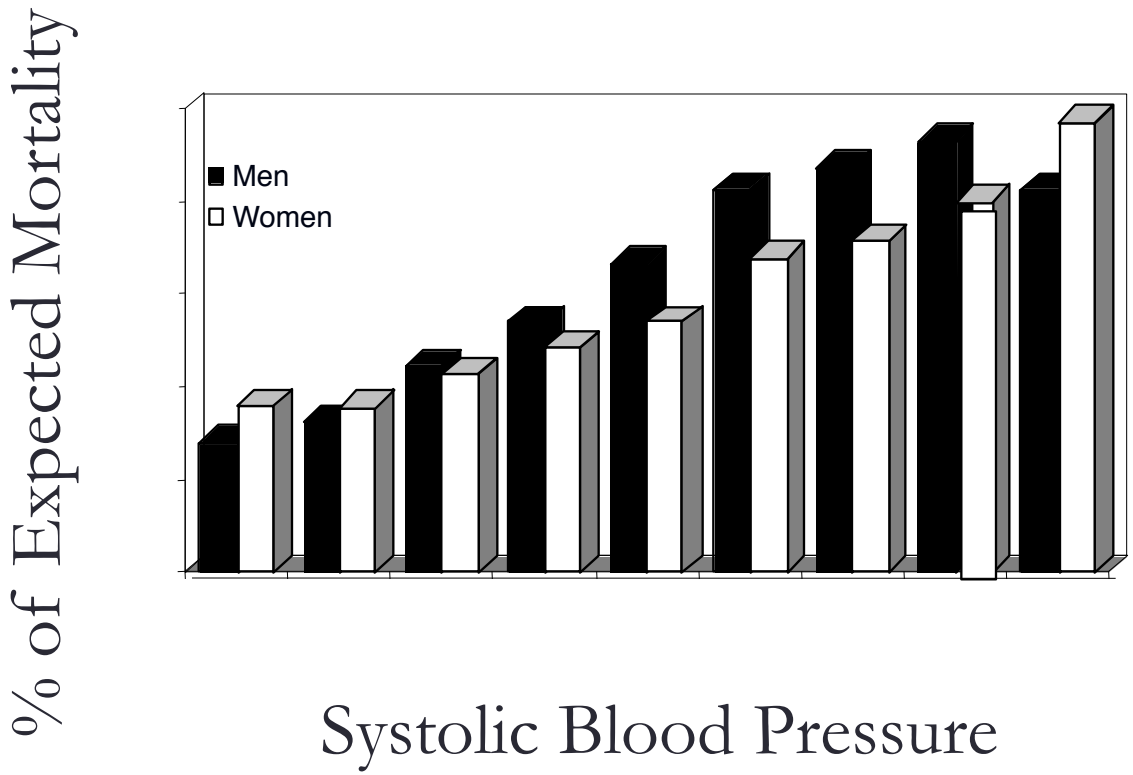
et al. *Lancet* 1978.

BP variations

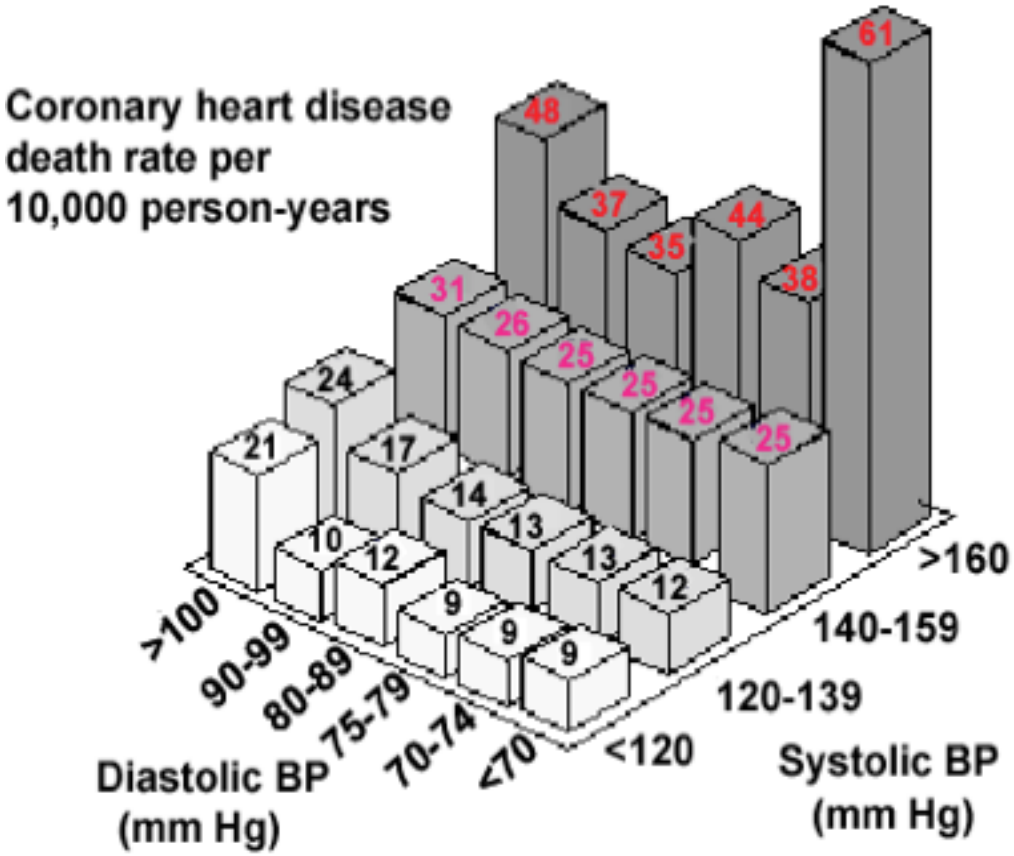
Increased BP variability is associated with increased organ damage and cardiovascular morbidity.

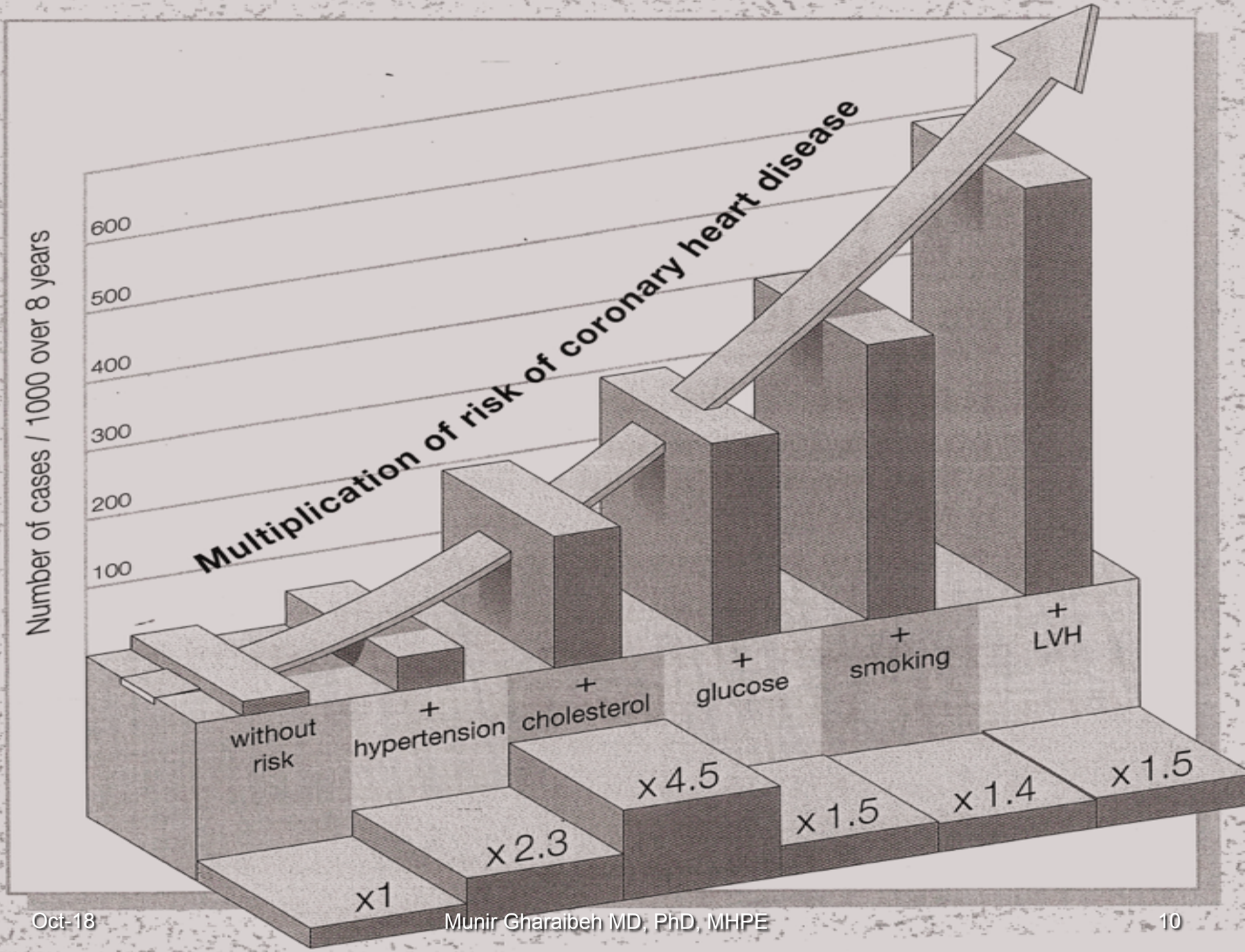
- **“White Coat” or isolated office hypertension.**
- **Masked hypertension.**
- **Morning surge of BP.**
- **During Sleep: “Non dipping’ and “extreme dipping”.**

Mortality is Related to Blood Pressure



Mortality is related to blood pressure




Number of cases / 1000 over 8 years
600
500
400
300
200
100
Multiplication of risk of coronary heart disease
without risk
+ hypertension
+ cholesterol
+ glucose
+ smoking
+ LVH
x1
x 2.3
x 4.5
x 1.5
x 1.4
x 1.5

Benefits of Lowering BP

Antihypertensive therapy has been associated with:

- **35% to 40% mean reduction in stroke incidence.**
- **20% to 25% reduction in myocardial infarction.**
- **More than 50% reduction in HF**

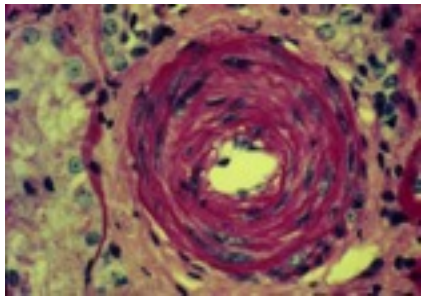
Epidemiology

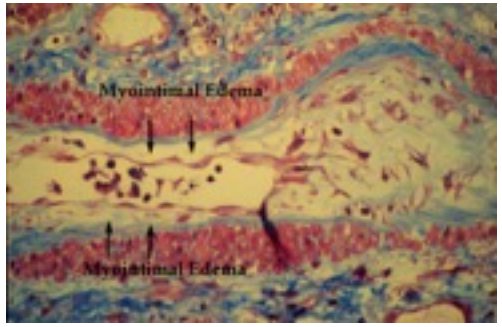
Currently, the prevalence of hypertension in the US age 35-45 years is as follows:

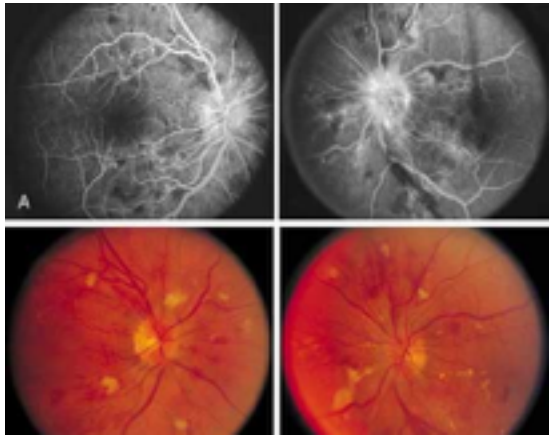
Category	Percentage
White Women	17%
White Men	26%
African American Women	37%
African American Men	44%

Uncomplicated to Complicated/Malignant Hypertension': End-Organ Damage

- Chronic hypertension alters blood vessel/cardiac muscle structure
  - Decreases blood vessel diameter
  - Diminishes distribution of oxygenated blood to tissue targets
  - Cardiac hypertrophy
  - High blood pressure ultimately leads to major end-organ damage i.e., heart attack, stroke, renal failure
- Need to diagnose and treat hypertension early







Treating Hypertension

Lifestyle Modification: Alterations in diet and exercise may reduce blood pressure in some patients.

Drug Treatments: There are many antihypertensive drugs, commonly used in combination therapy.

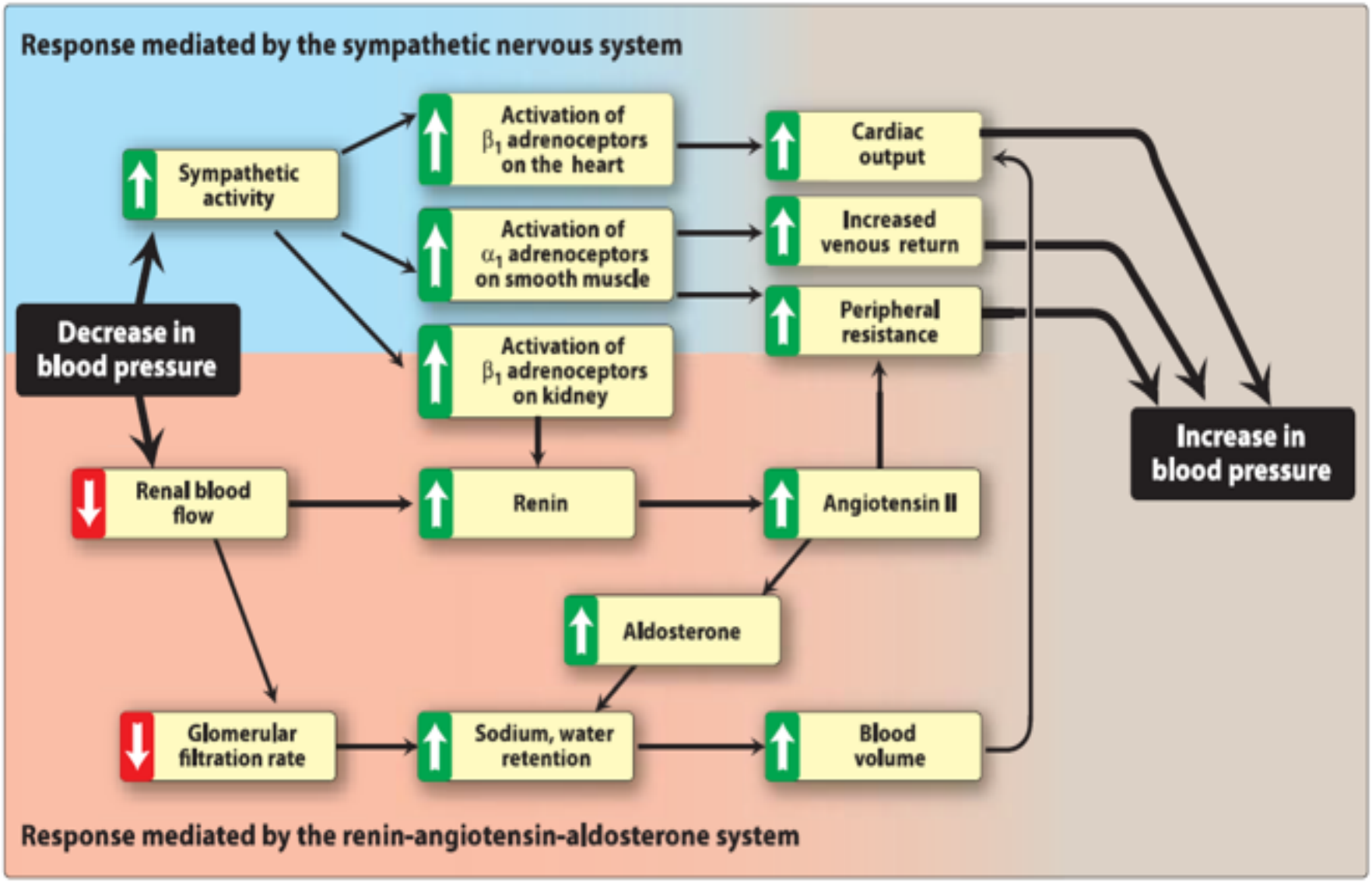
Tailor treatment according diagnostic exam

- Uncomplicated vs complicated disease
- Ethnicity
- Severity of hypertension
- Pregnancy
- Drug Interactions
- Patient compliance

Non-pharmacologic Treatment

Lifestyle Modifications:

- **Weight reduction**
- **Diet rich in potassium and calcium and sodium reduction.**
- **Dietary Approaches to Stop Hypertension (DASH) eating plan(1600-mg sodium) has effects similar to single drug therapy.**
- **Physical activity.**


Response mediated by the sympathetic nervous system
Sympathetic activity
Activation of β_1 adrenoceptors on the heart
Activation of α_1 adrenoceptors on smooth muscle
Activation of β_1 adrenoceptors on kidney
Cardiac output
Increased venous return
Peripheral resistance
Decrease in blood pressure
Increase in blood pressure
Renal blood flow
Renin
Angiotensin II
Aldosterone
Glomerular filtration rate
Sodium, water retention
Blood volume
Response mediated by the renin-angiotensin-aldosterone system