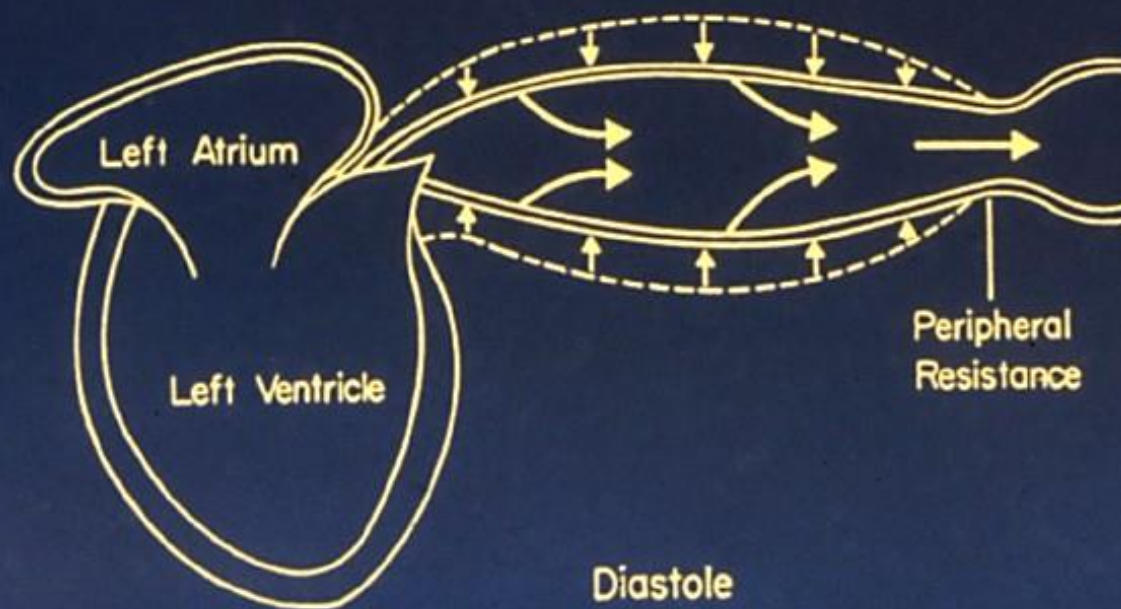
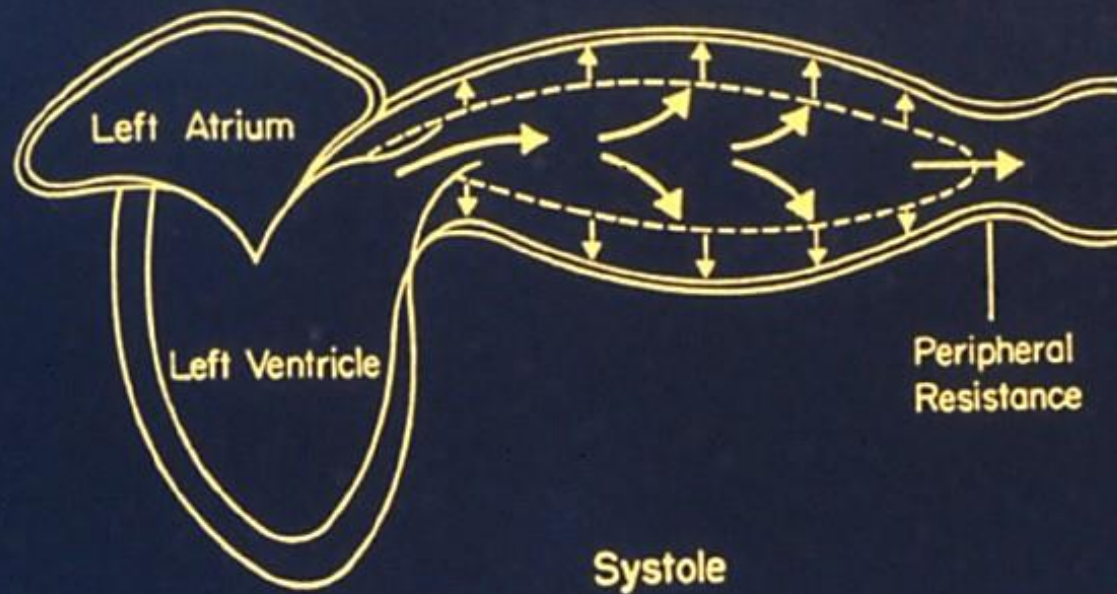


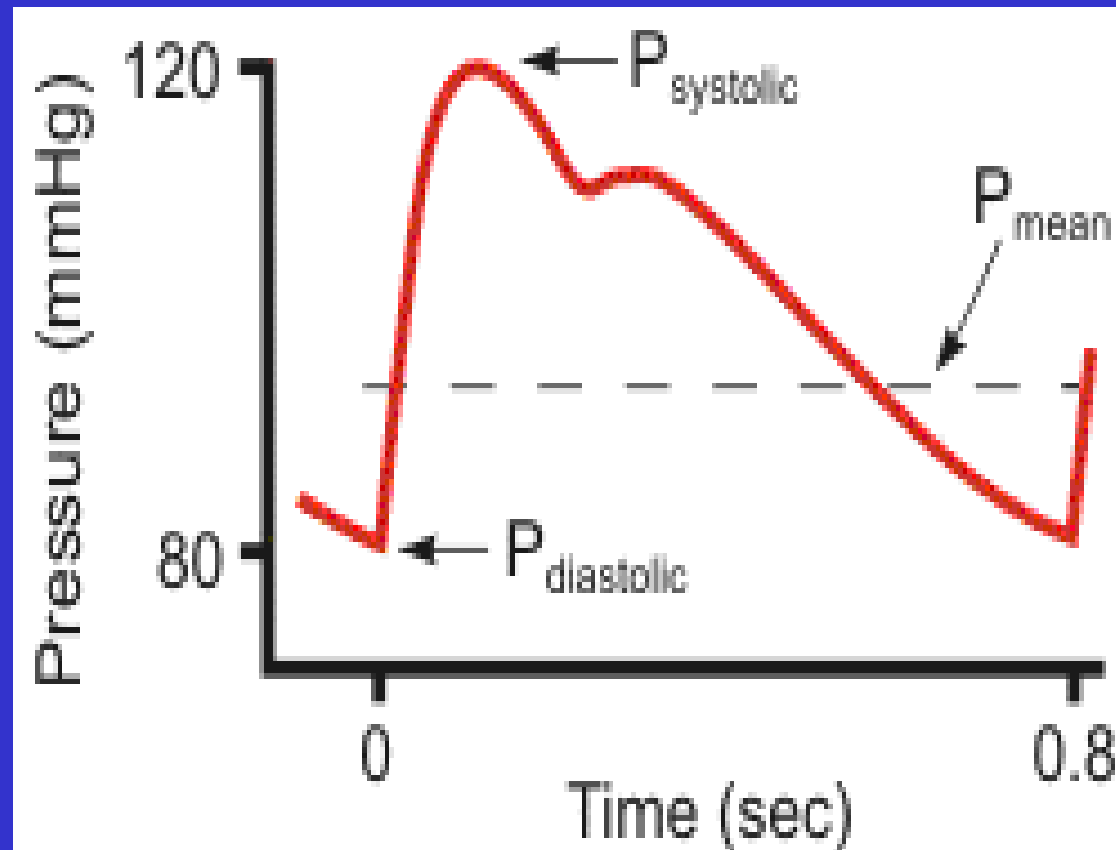
Hypertension
or
DOWN WITH HIGH BLOOD PRESSURE

Harold Smulyan MD
Emeritus Professor of Medicine
Division of Cardiology
Upstate Medical University

Oasis HealthLink

February 24, 2020





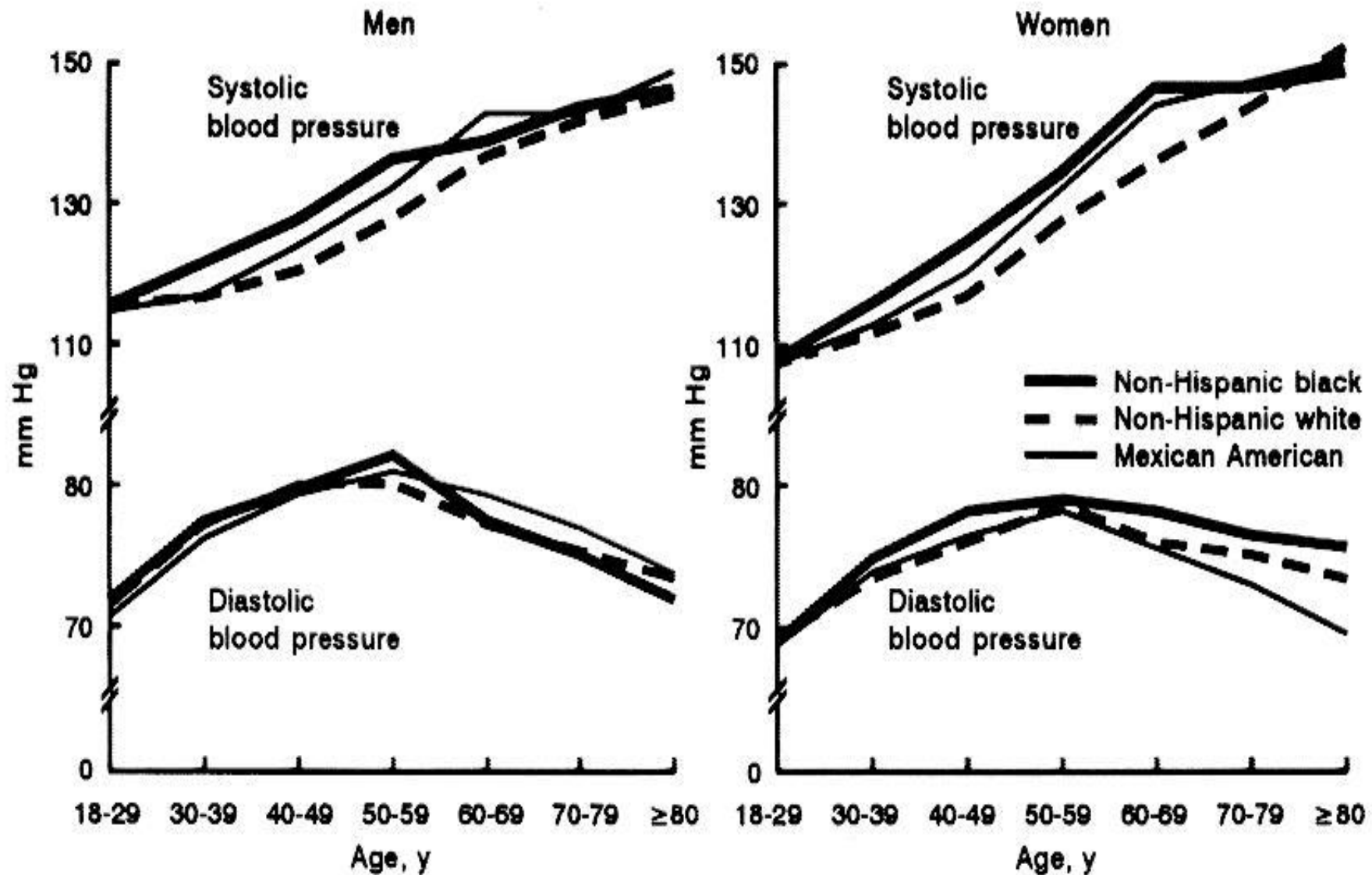
Hypertension

Causes

- In Mid-Life (40 – 60 years)
Increased peripheral resistance
- In Later Life – a consequence of aging
Increased aortic stiffness

Prevalence of Hypertension in the US Adult Population

NHANES III Burt VL. Hypertension 1995;25: 305



HYPERTENSION

Basic facts

- **Prevalence – 50 million Americans (1 in 3 adults)**
- **Prevalence increases with aging (4 out of 5 – over age 75)**
- **African Americans – more common & more severe**
- **Runs in families**
- **Cause – unknown in 95%**
- **Symptoms – none**

Hypertension

Differences between men and women

1. Less prevalent in women until the menopause – age 51
2. More prevalent in women among the aged
3. Risks
 - More strokes in women
 - More heart attacks and heart failure in men
4. Treatment goals and results the same

Mercury Sphygmomanometer



Aneroid Manometer

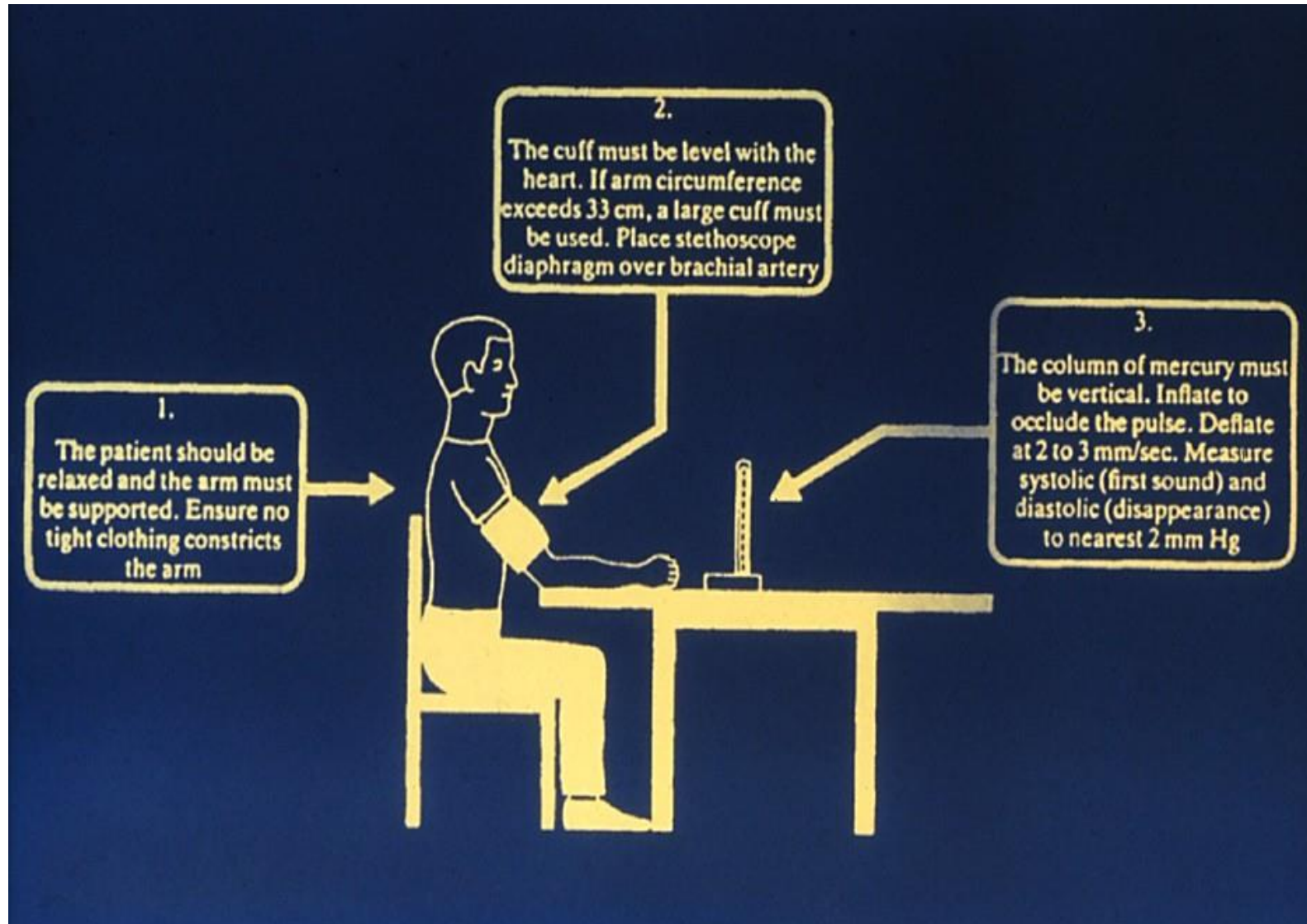


Automatic Oscillometric Manometer

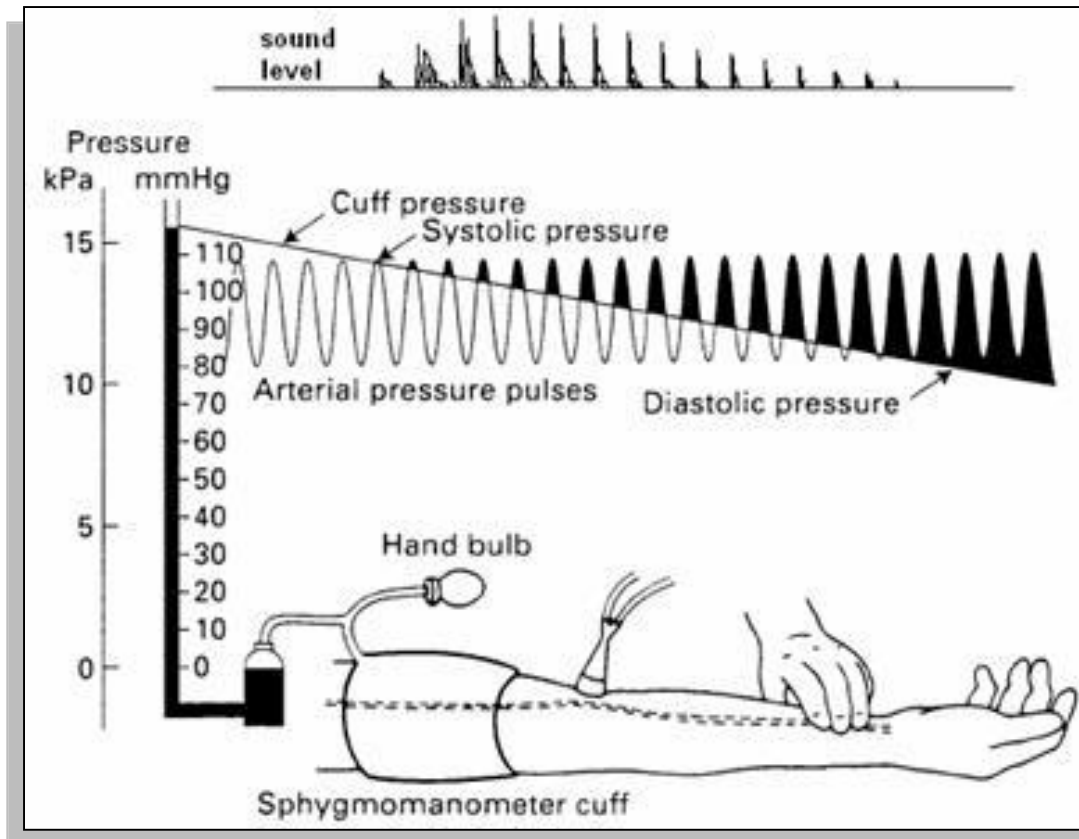


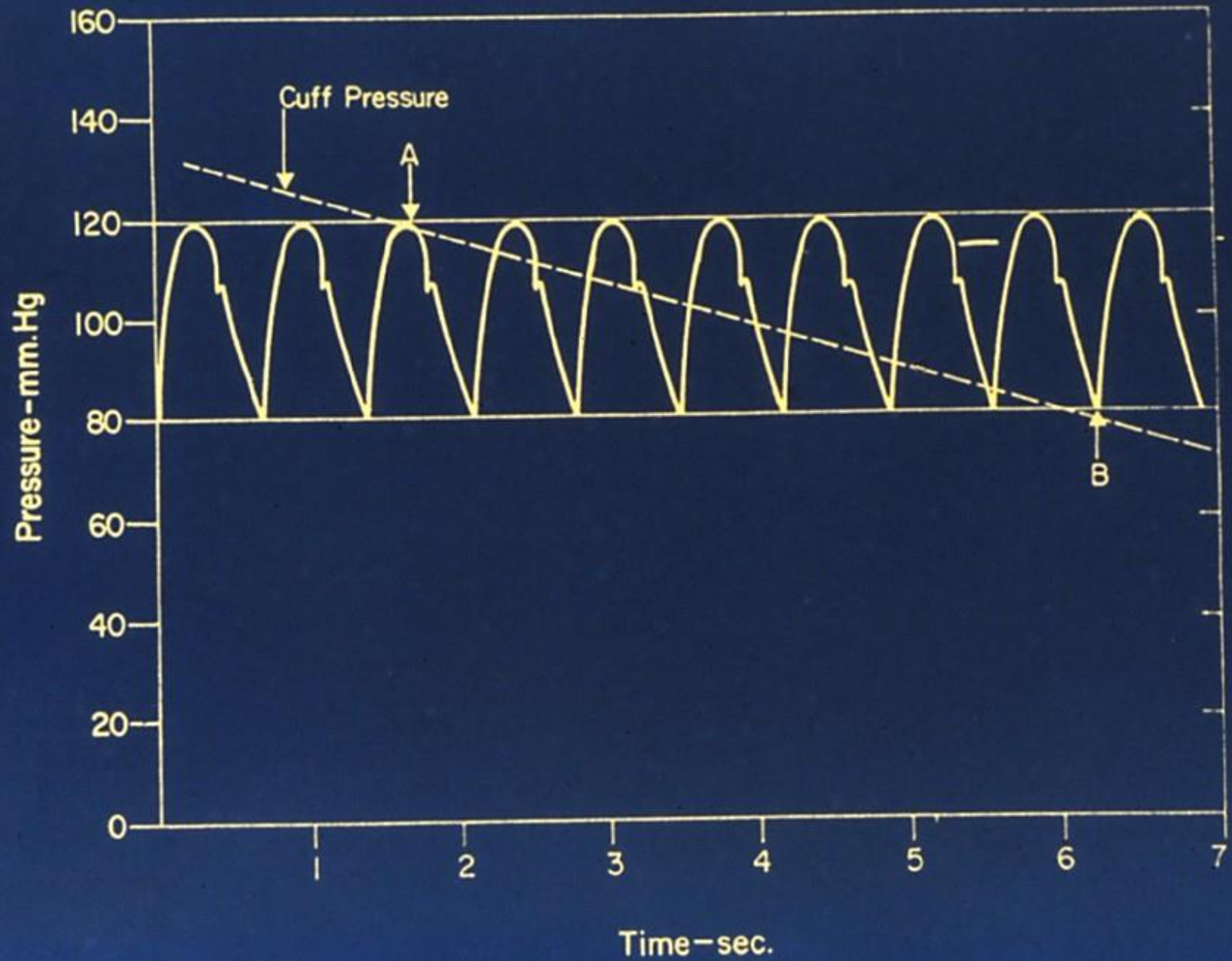
Blood Pressure Measurement

Auscultatory Method



Auscultatory Blood Pressure Measurement

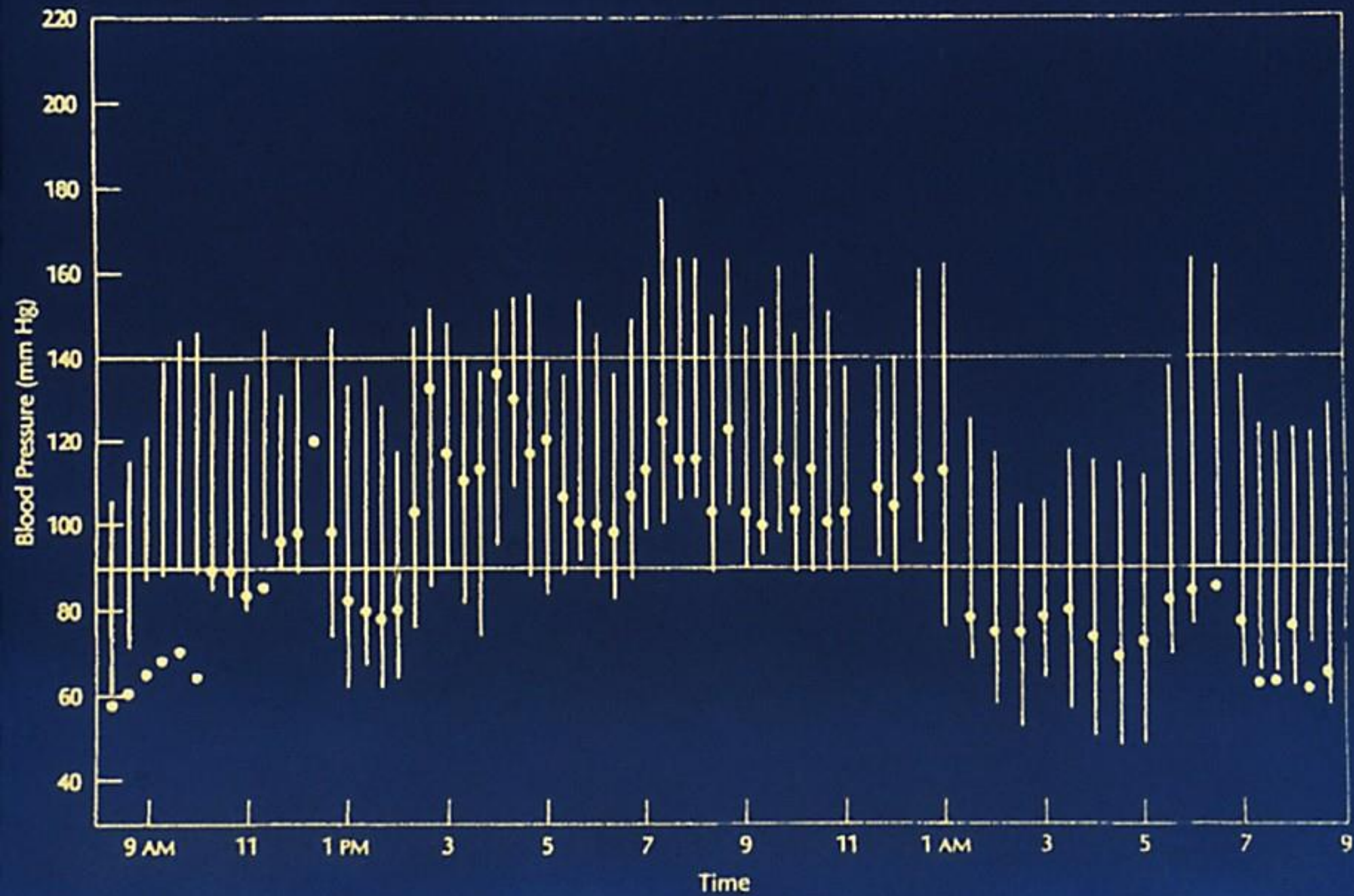




HYPERTENSION

Where to take the blood pressure

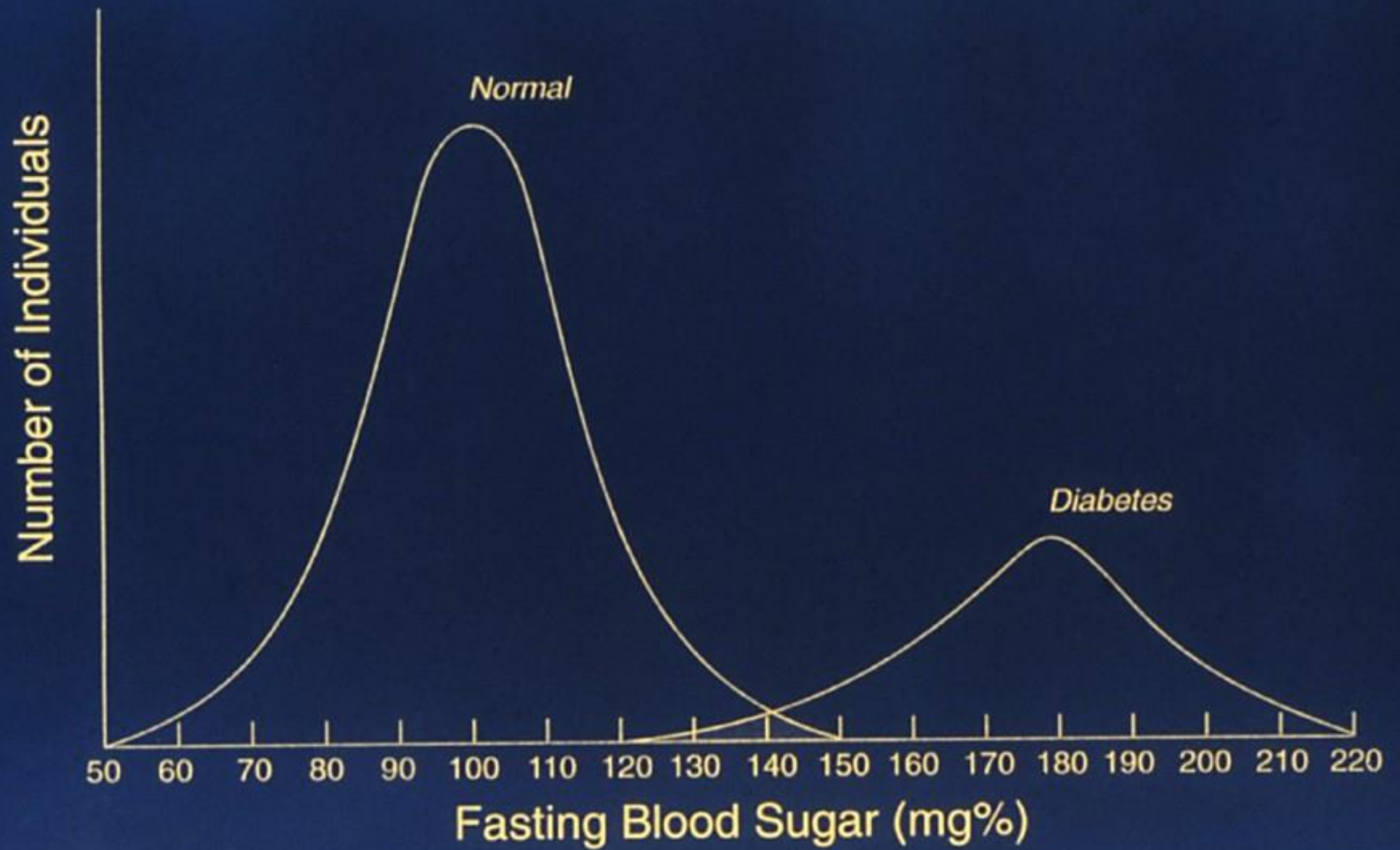
- Doctor's office - **good**
 - “white coat hypertension”
 - “masked hypertension”
- Home – **better** - arm - not wrist or finger
 - Electronic device - \$40-70
 - Stethoscope & cuff
 - Pharmacy – free
- Ambulatory – **best** - 24 hour record



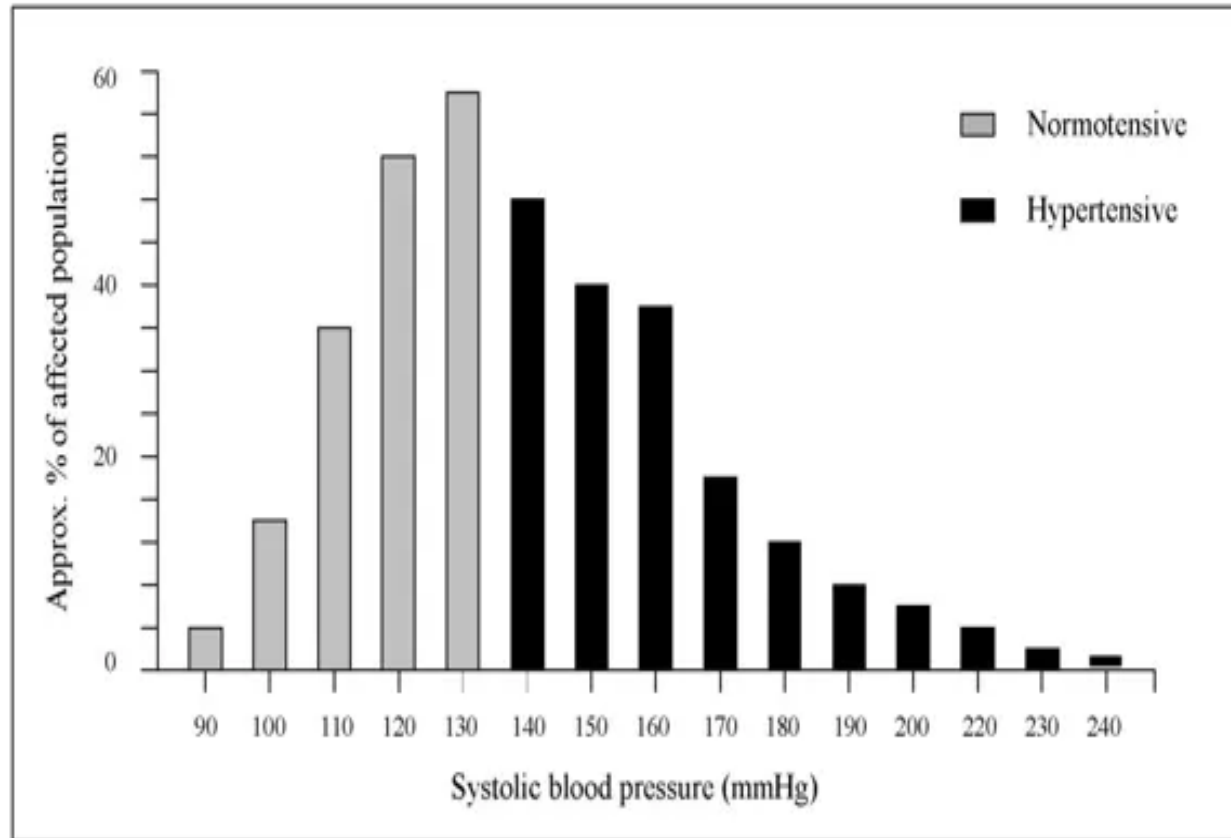
Definition of Hypertension

How High is High?

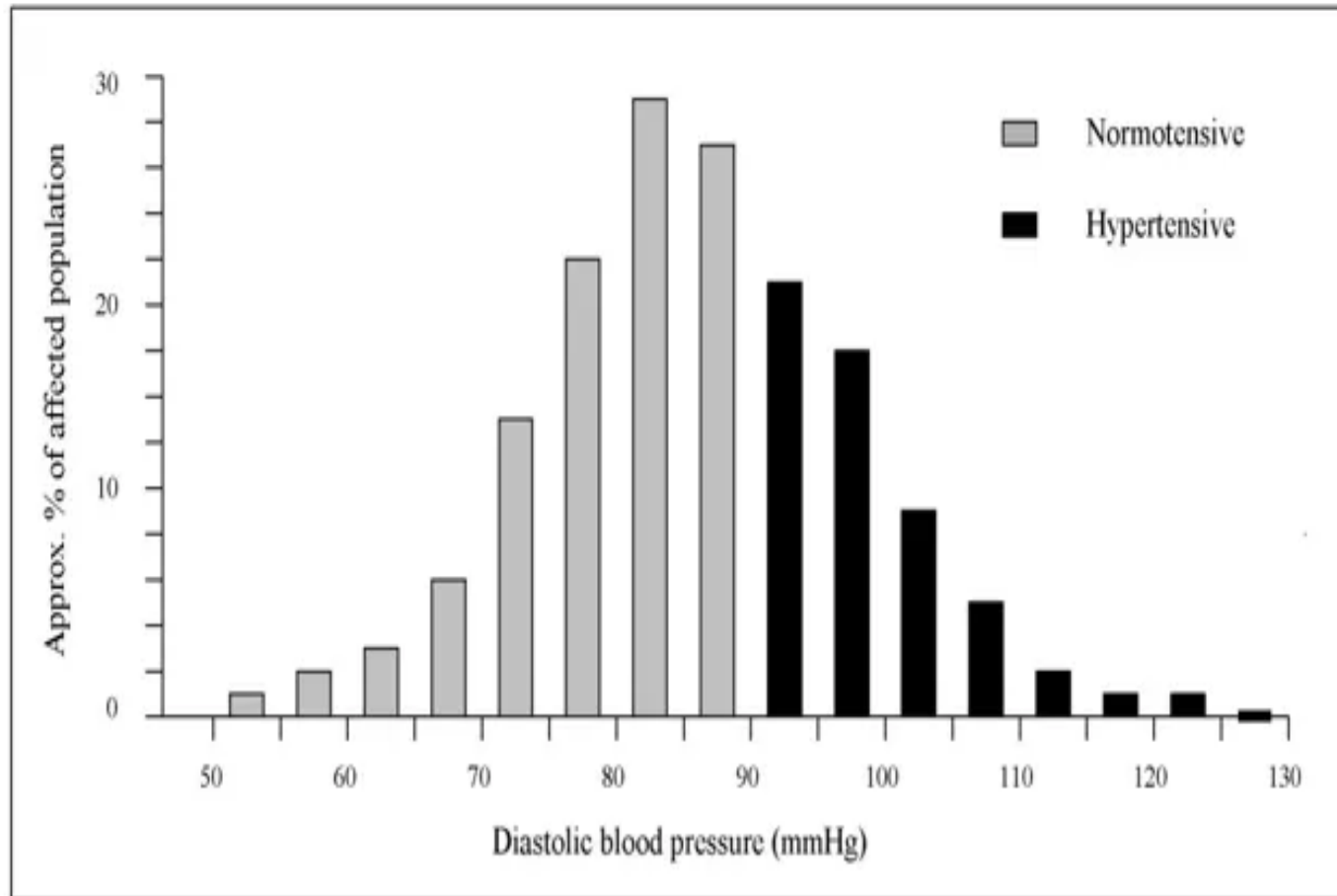
Upper Limit of Normal?



Normal distribution of SBP values in the general population.



Normal distribution of DBP values in the general population.



Categories of BP in Adults*

BP Category	SBP		DBP
Normal	<120 mm Hg	and	<80 mm Hg
Elevated	120–129 mm Hg	and	<80 mm Hg
Hypertension			
Stage 1	130–139 mm Hg	or	80–89 mm Hg
Stage 2	≥140 mm Hg	or	≥90 mm Hg

*Individuals with SBP and DBP in 2 categories should be designated to the higher BP category.

American and European Definitions and Guidelines

Guideline Differences	 American College of Cardiology/American Heart Association (ACC/AHA)	 European Society of Cardiology/European Society of Hypertension (ESC/ESH)
Level of blood pressure (BP) defining hypertension	Systolic (mm Hg) and/or Diastolic (mm Hg)	Systolic (mm Hg) and/or Diastolic (mm Hg)
Office/Clinic BP	≥ 130 ≥ 80	≥ 140 ≥ 90
Daytime mean	≥ 130 ≥ 80	≥ 135 ≥ 85
Nighttime mean	≥ 110 ≥ 65	≥ 120 ≥ 70
24-hour mean	≥ 125 ≥ 75	≥ 130 ≥ 80
Home BP mean	≥ 130 ≥ 80	≥ 135 ≥ 85
BP targets for treatment	$< 130/80$ mm Hg	Systolic targets < 140 mm Hg and close to 130 mm Hg
Initial Combination Therapy	Initial single-pill combination therapy in patients $> 20/10$ mm Hg above BP goal	Initial single-pill combination therapy in patients $\geq 140/90$ mm Hg
Hypertensive requiring intervention	$> 130/80$ mm Hg	$\geq 140/90$ mm Hg

Table 7. Prevalence of Hypertension Based on 2 SBP/DBP Thresholds*†

	SBP/DBP \geq 130/80 mm Hg or Self-Reported Antihypertensive Medication†		SBP/DBP \geq 140/90 mm Hg or Self-Reported Antihypertensive Medication‡	
Overall, crude	46%		32%	
	Men (n=4717)	Women (n=4906)	Men (n=4717)	Women (n=4906)
Overall, age-sex adjusted	48%	43%	31%	32%
Age group, y				
20–44	30%	19%	11%	10%
45–54	50%	44%	33%	27%
55–64	70%	63%	53%	52%
65–74	77%	75%	64%	63%
75+	79%	85%	71%	78%
Race-ethnicity§				
Non-Hispanic white	47%	41%	31%	30%
Non-Hispanic black	59%	56%	42%	46%
Non-Hispanic Asian	45%	36%	29%	27%
Hispanic	44%	42%	27%	32%

The prevalence estimates have been rounded to the nearest full percentage.

*130/80 and 140/90 mm Hg in 9623 participants (\geq 20 years of age) in NHANES 2011–2014.

HYPERTENSION

Risks – target organs

- Heart – Heart failure

 - Heart attack

 - Abnormal rhythm – atrial fibrillation

- Brain – stroke

- Kidney – failure

- Other

Main complications of persistent High blood pressure

Brain:

- Cerebrovascular accident (*strokes*)
- Hypertensive encephalopathy:
 - confusion*
 - headache*
 - convulsion*

Blood:

- Elevated sugar levels

Retina of eye:

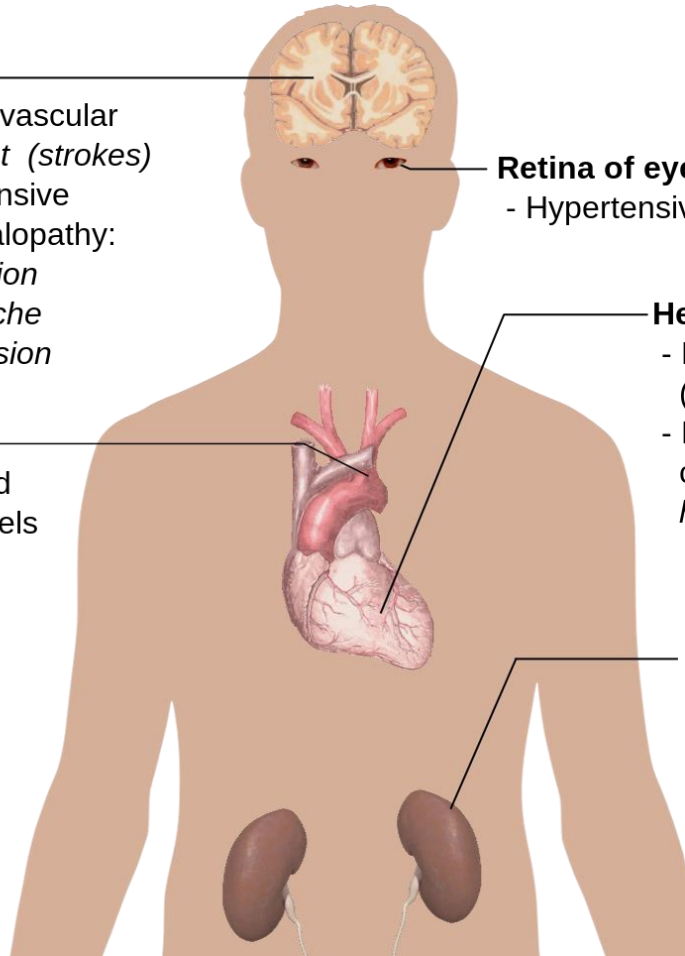
- Hypertensive retinopathy

Heart:

- Myocardial infarction (*heart attack*)
- Hypertensive cardiomyopathy:
heart failure

Kidneys:

- Hypertensive nephropathy:
chronic renal failure



HYPERTENSION

What you CAN'T do about it

- Family**
- Age**
- Gender**
- Where you live**
- Race**

HYPERTENSION

What you CAN do about it

- **Obesity – lose weight**
- **High salt (sodium) intake**
 < 2.0 grams per day
- **Sedentary style – exercise**
- **Alcohol – less than 2 drinks/day**
- **Smoking – stop!!**
- **Caffeine in large amounts**
 Coffee < 8 oz cup per day

ITEMS THAT RAISE BLOOD PRESSURE

- Nasal decongestants
- Cold Tablets
- Appetite suppressants
- Cocaine
- Caffeine
- Alcohol
- Oral contraceptives
- Steroids
- Antidepressants
- Non-steroidal
 - Anti-inflammatory agents (NSAIDS)

HYPERTENSION

Drugs – principles of use

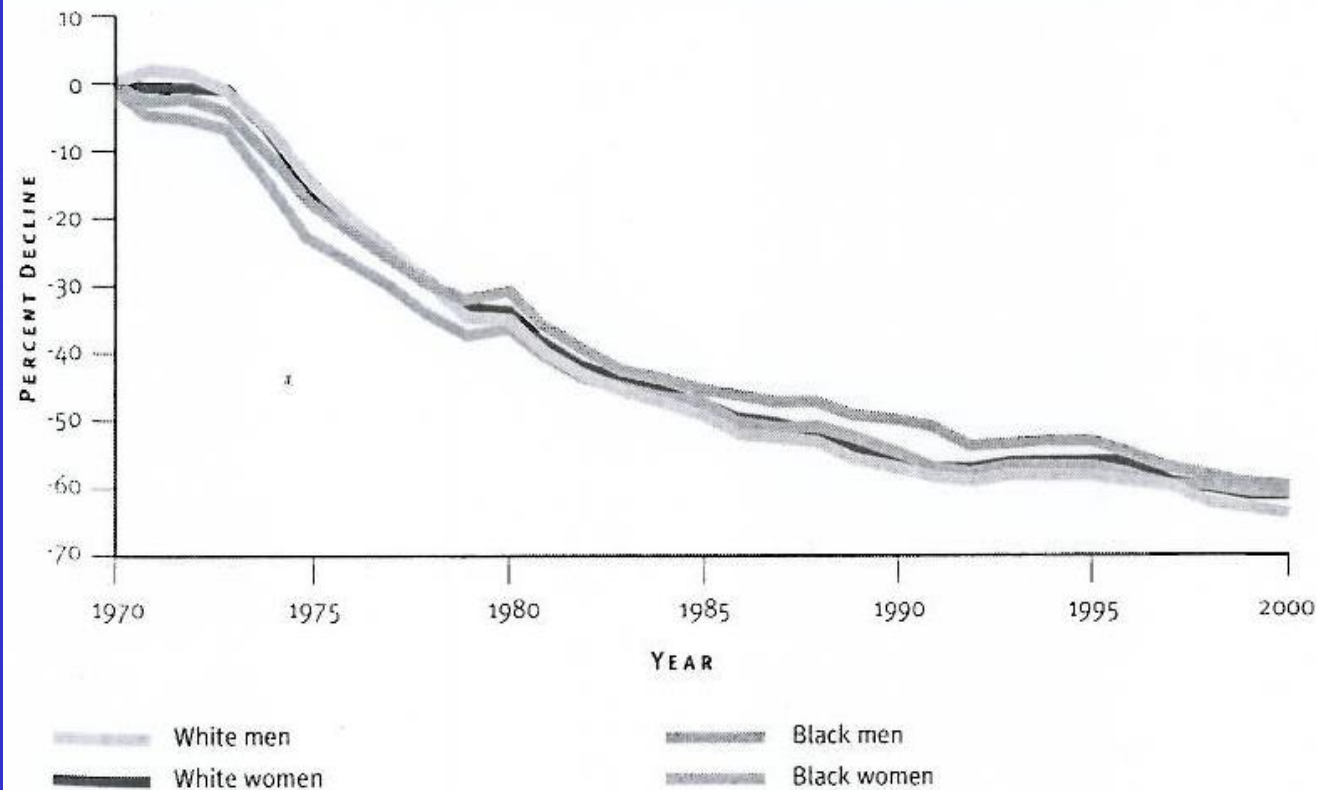
- Diuretics**
- ACE inhibitors & blockers**
- Calcium channel blockers**
- Vasodilators**
- Beta blockers**
- Nerve blockers**

Compliance

TREATMENT IN WOMEN vs **MEN**

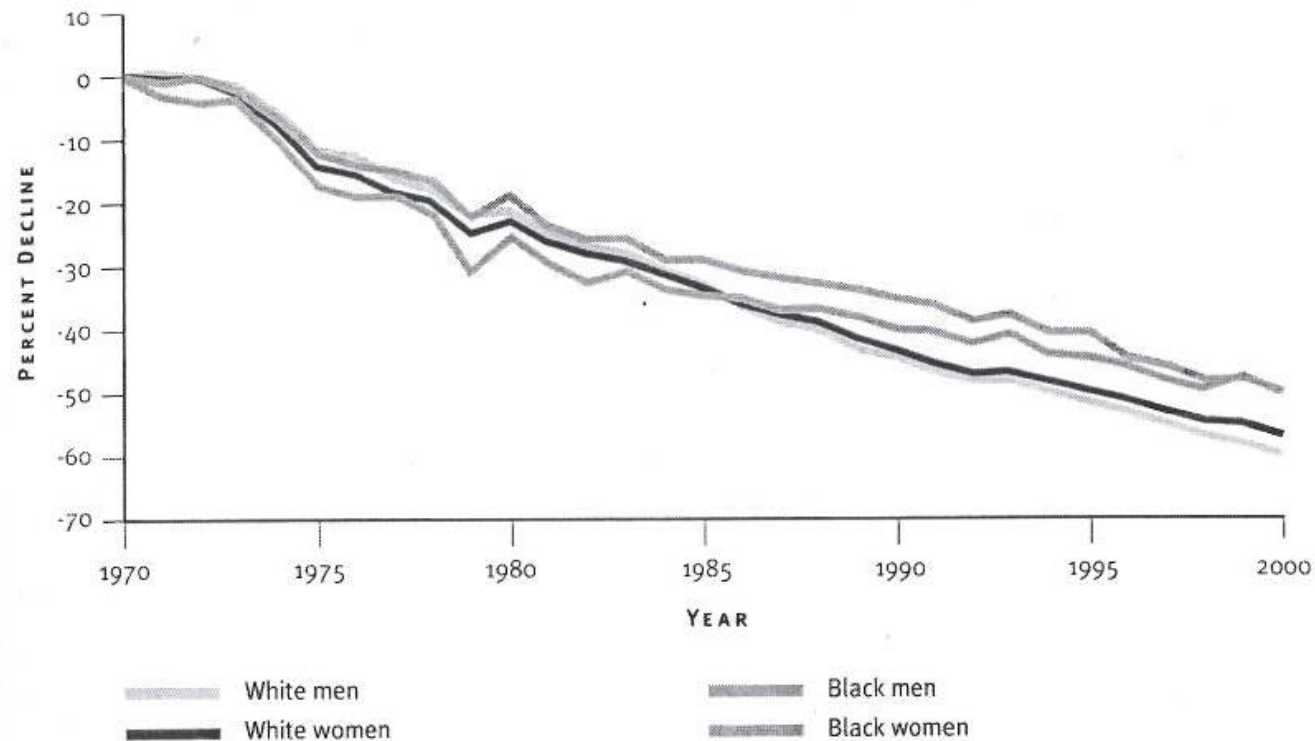
- **Combined study of 20,000 women vs 20,000 men**
- **Overall benefits – same**
- **Women – mostly stroke prevention**
- **Men – stroke & heart prevention**

Figure 2. Percent decline in age-adjusted mortality rates for stroke by gender and race: United States, 1970–2000



Source: Prepared by Thom T, National Heart, Lung, and Blood Institute from Vital Statistics of the United States, National Center for Health Statistics. Death rates are age-adjusted to the 2000 U.S. census population.

Figure 3. Percent decline in age-adjusted mortality rates for coronary heart disease by gender and race: United States, 1970–2000



Source: Prepared by Thom T, National Heart, Lung, and Blood Institute from Vital Statistics of the United States, National Center for Health Statistics. Death rates are age-adjusted to the 2000 U.S. census population.

Hypertension

Summary

1. Silent Killer – a thief in the night
2. Highly prevalent – especially among the elderly
3. Systolic pressure more important than diastolic pressure
 - especially with aging
4. Blood pressure measurements variable – not precise
5. Upper level of normal systolic blood pressure uncertain
 - approximately 130 mmHg
6. Treatment – get the blood pressure down – **it works!**
 - Life style changes
 - Medication

Pharmacologic Agents

1. Thiazide Diuretics
2. Angiotensin Converting Enzyme Inhibitors
3. Angiotensin Receptor Blockers
4. Calcium Channel Blockers
5. Aldosterone Receptor Antagonists
6. Vasodilators
7. Adrenergic Receptor Antagonists
(α , β , combined)
8. Renin Inhibitors
9. α_2 Adrenergic Receptor Agonists
10. Endothelin Receptor Blockers
11. Neprilysin Inhibitor (Sacubitril)

Where to take the Blood Pressure ?

1. Office/Clinic

“White Coat Hypertension”

“Masked Hypertension”

2. Home Blood Pressure

“Next Best”

3. Ambulatory Blood Pressure

“The Best”