Controlling High Blood Pressure

John Schutz, MD, FACC

Boulder Heart
303-622-3490

Boulder Community Health

What is "high blood pressure"

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- ***Hypertension*** **is the medical term for high blood pressure.**
- **The pressure against the walls of arteries is how blood pressure is generated.**
- **There are two numbers measured:**
  - **<u>Systolic</u> blood pressure (pressure in arteries when heart beats)**
  - **<u>Diastolic</u> blood pressure (pressure in arteries when heart rests)**

Hypertension

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- Normal blood pressure is <120/<80 mm Hg [1]
- Elevated blood pressure 120-129/<80 mm Hg
  - Stage I - 130-139/80-89 mm Hg
  - Stage II - >140/>90 mm Hg
- International deviation from this definition with acceptance of blood pressures to <140/<90 [2]
- Why did United States go with a more aggressive measurement?
  - Meta-analysis of adults >115/>75 mm Hg, risk begins to rise
  - For every 20 mm Hg higher systolic and 10 mm Hg higher diastolic, risk of death from heart disease or strokes *doubles*

Motivation and Prevalence

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- **Hypertension is a leading cause of death globally with 10.4 millions deaths per year [3]**
- **Even larger problem globally when we look at high-income countries (HIC) and low-to-middle income countries (LMIC)**
- **HICs have over 349 million with HTN and LMICs have over 1 billion with HTN**
- **Differences in understanding and education as well as access to medical therapies**
- **Attempts to elevate awareness with May Measurement Month initiative**

May Measure Month 2022

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- **www.maymeasure.org**

May Measure Month

Boulder Community Health

- **May Measure Month App**
  - **A wonderful way for you to track information on your hypertension management.**

Motivation and Prevalence

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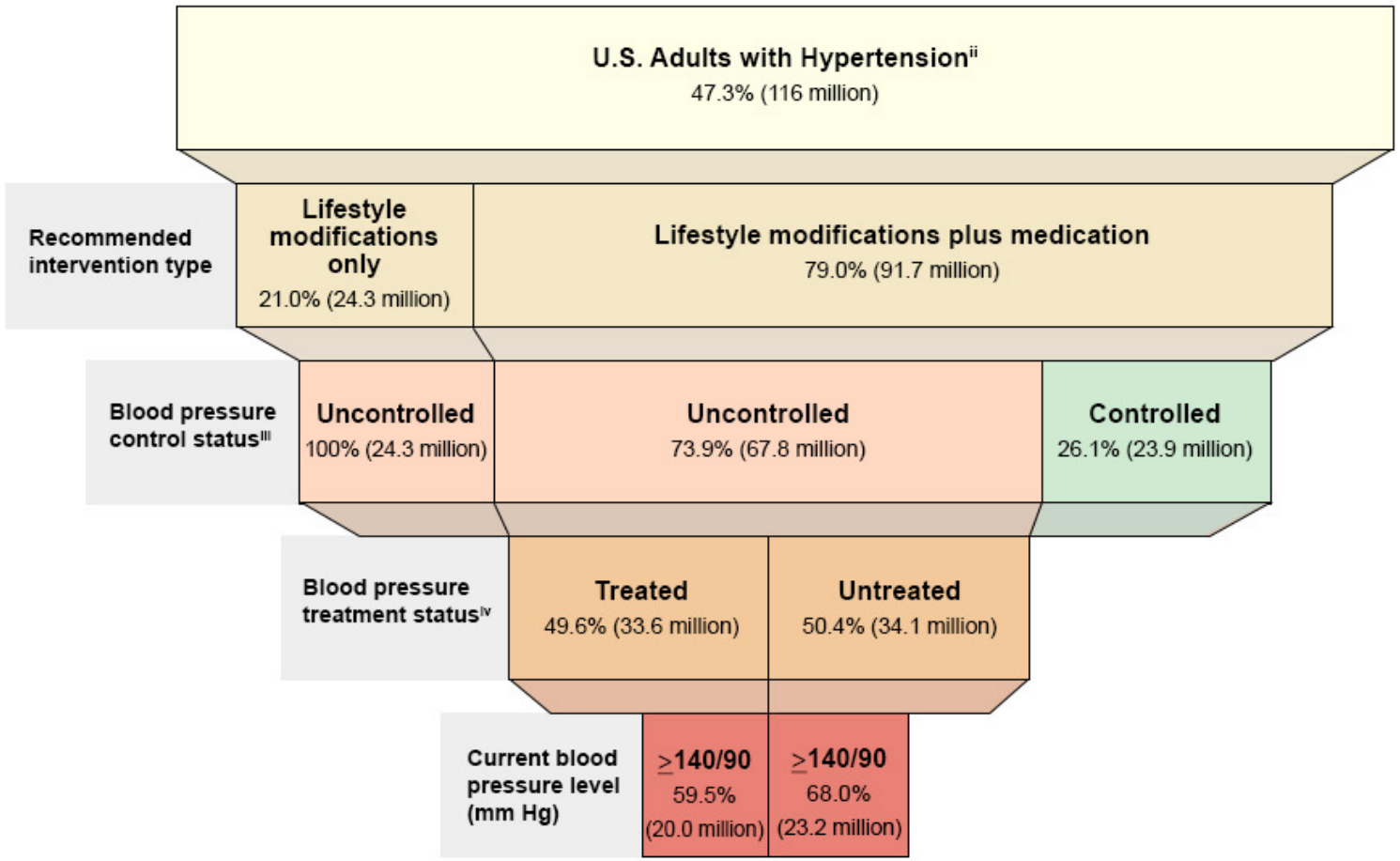
- **In the US, over half a million deaths had hypertension as primary or contributing cause in 2019. [4]**
- **Treatment of hypertension is the most common reason for office visits and the use of chronic prescriptions in the U.S. [5]**
- **Nearly 50% of adult patients in the United States have hypertension or are on medical therapy for hypertension.**
- **Only 1 patient in 4, with the diagnosis of hypertension, has hypertension under control. [6]**

Estimated Hypertension Prevalence, Treatment, and Control Among U.S. Adults[i]

Applying the Criteria From the American College of Cardiology and American Heart Association's (ACC/AHA) 2017 Hypertension Clinical Practice Guideline—NHANES 2015–2018



Data Source: National Center for Health Statistics, Centers for Disease Control and Prevention. National Health and Nutrition Examination Survey (NHANES), 2015–2018. Definitions: ACC/AHA criteria adapted from Ritchey MD, Gillespie C, Wozniak G, et al. Potential need for expanded pharmacologic treatment and lifestyle modification services under the 2017 ACC/AHA Hypertension Guideline. *J Clin Hypertens*. 2018;20:1377–1391. https://doi.org/10.1111/jch.13364

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[i] Among adults aged 18 years and older; estimates may not equal 100% due to rounding.

[ii] Blood pressure ≥ 130/80 mm Hg or currently using prescription medication to lower blood pressure.

[iii] Controlled is defined as having a blood pressure <130/80 mm Hg.

[iv] Treatment status refers to current use of prescription medication to lower blood pressure.

Prevalence in United States

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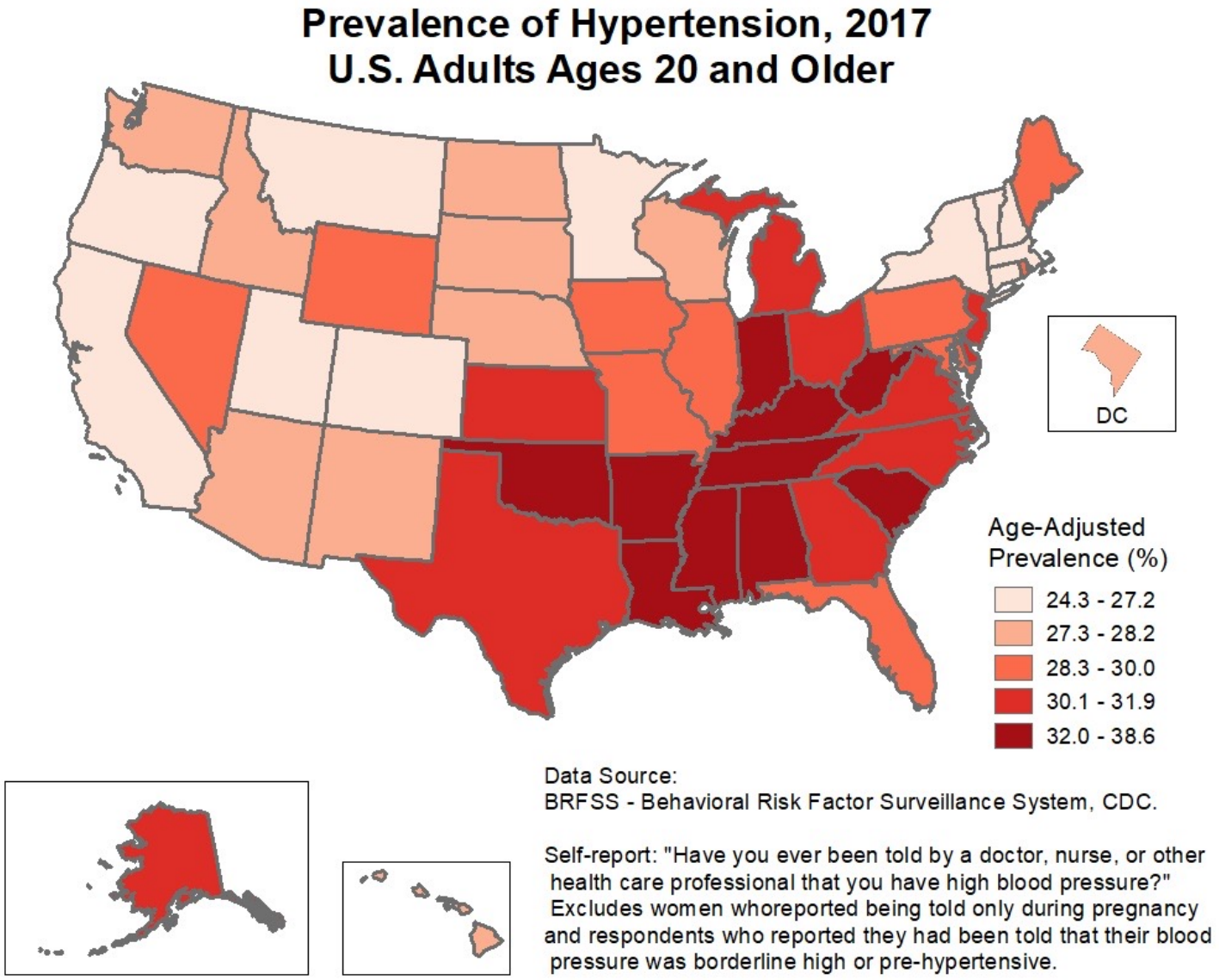

Prevalence in United States

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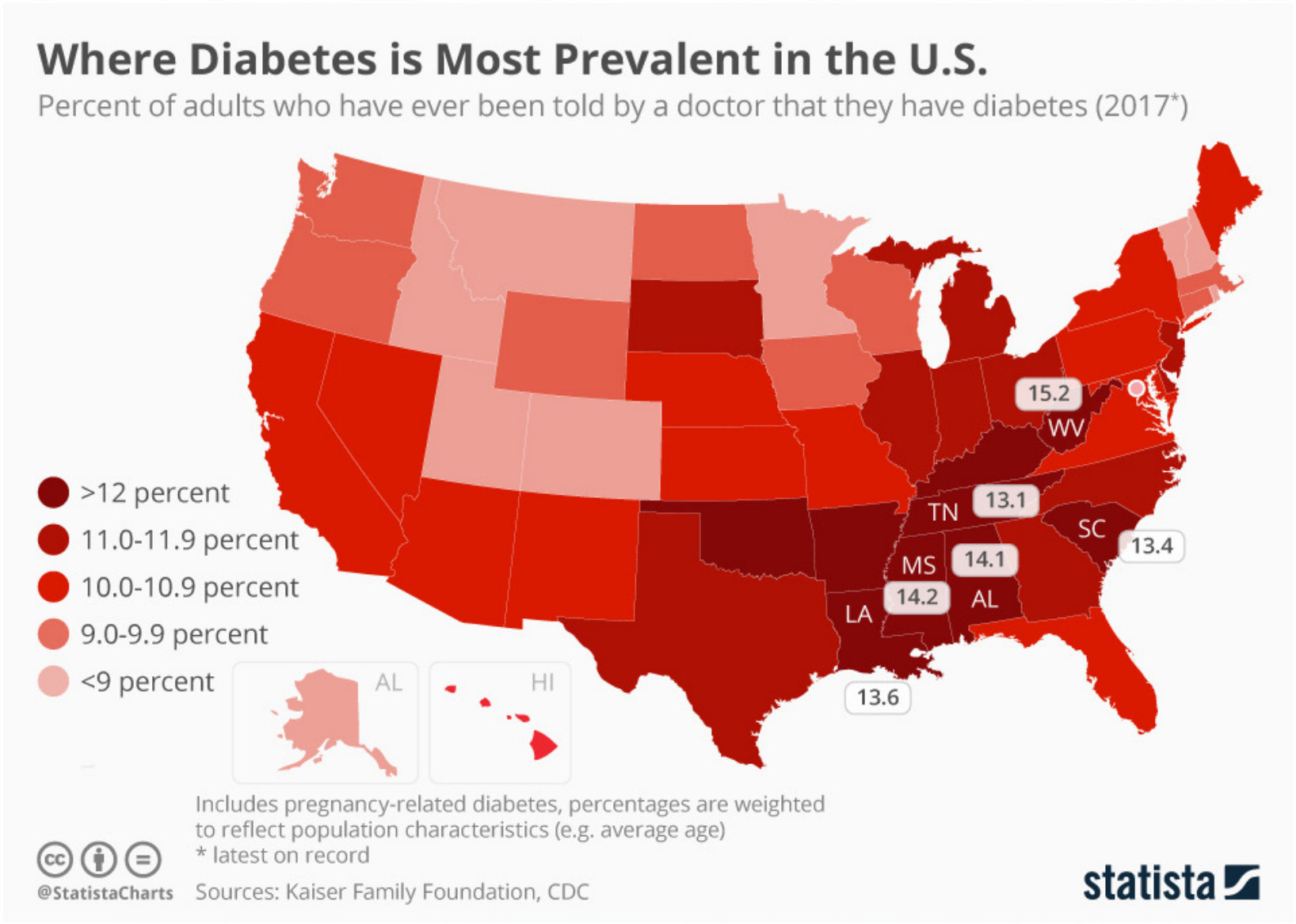

Prevalence in United States

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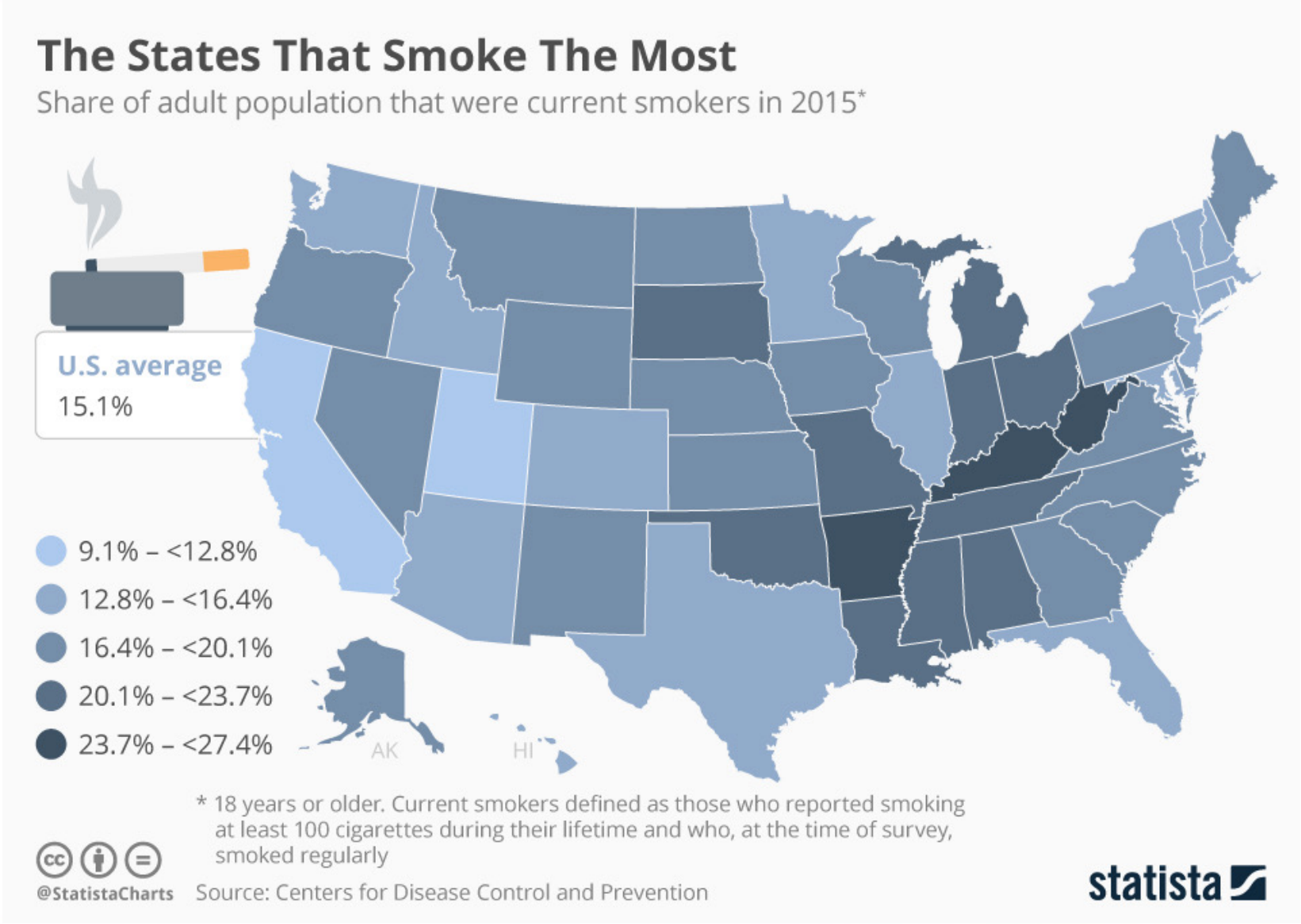

Prevalence in United States

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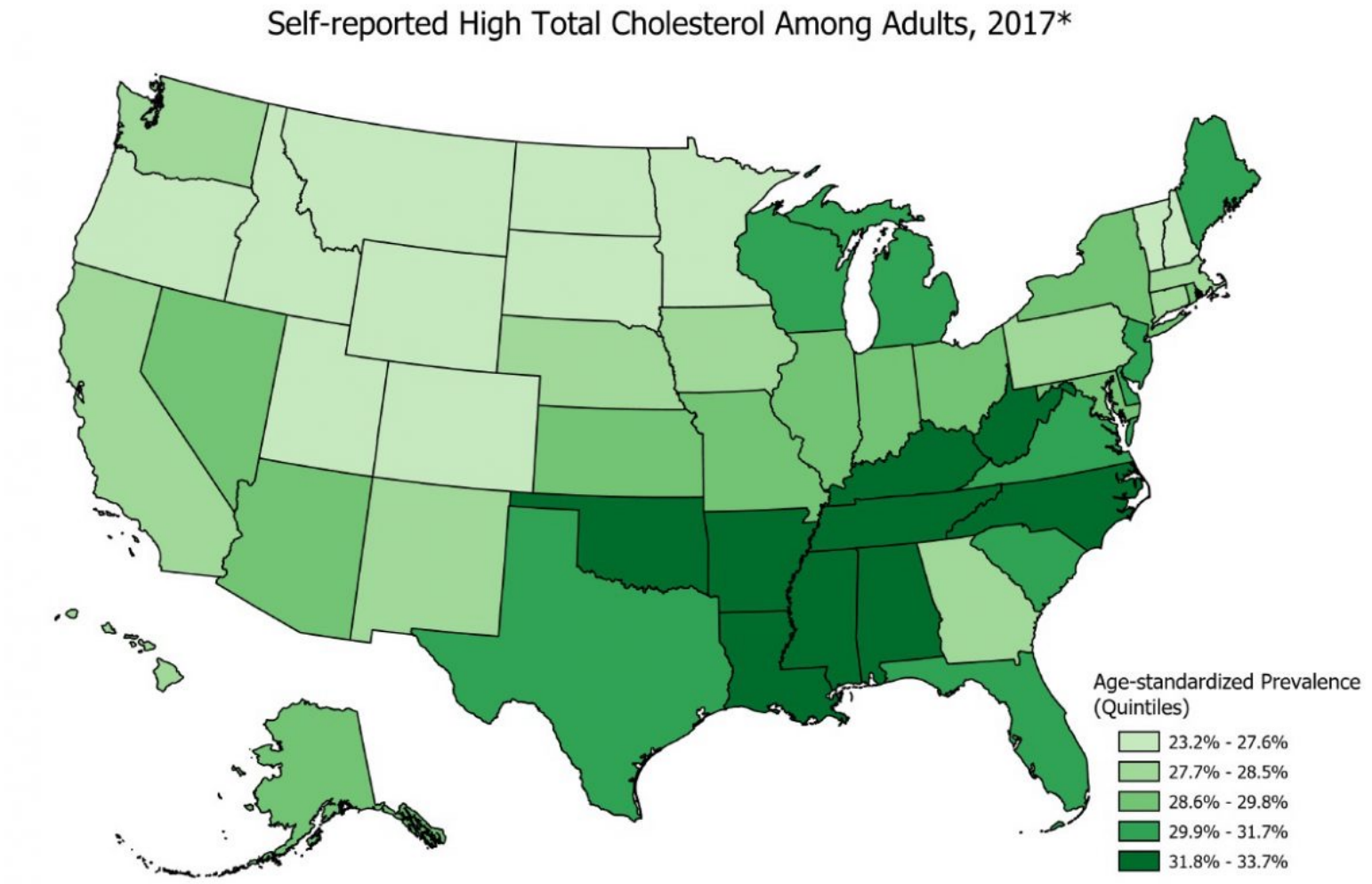

*Data Source: BRFSS, Adults (20+) who answered "yes" to the question, "Have you ever been told by a doctor, nurse or other health professional that your blood cholesterol is high?"

Prevalence in United States

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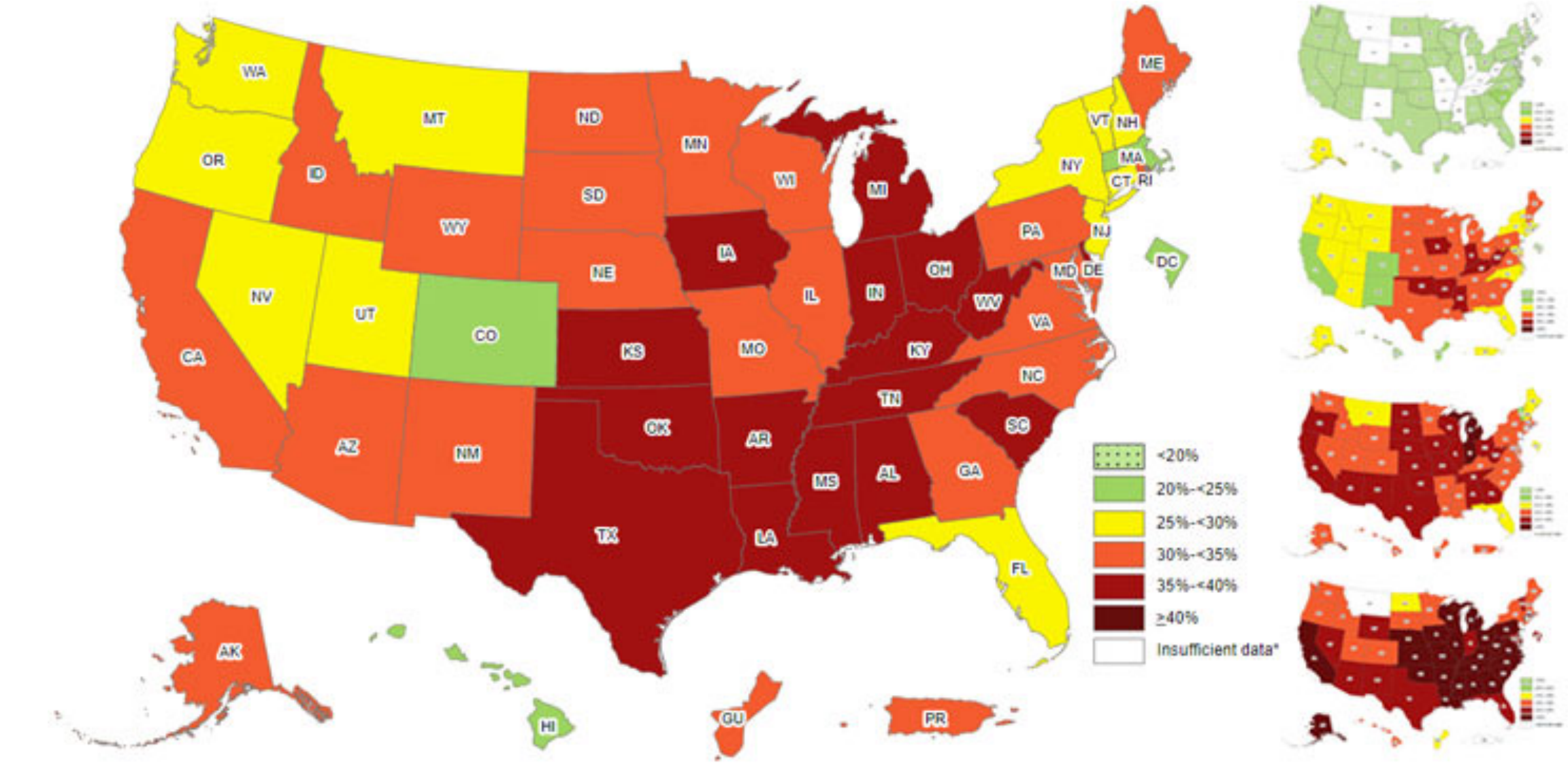

Diagnosis

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- **What symptoms come to mind with hypertension?**

Diagnosis

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- **Generally, there are three manners of obtaining blood pressure:**
  - **Office based blood pressure assessments**
  - **Ambulatory blood pressure assessments**
  - **Home based blood pressure assessments**

Diagnosis

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- **Office based blood pressure assessment:**
  - **The key to accurate measurement is technique**
  - **Allowing patient to sit, quietly, for greater than five minutes**
  - **No talking - even to the medical assistant or physician**
  - **No caffeine, exercise, or smoking**
  - **Empty bladder**
  - **No clothing to the blood pressure assessment site**
  - **Sitting in chair with feet on floor (not sitting or lying on the exam table!)**
  - **Proper cuff size is crucial**
  - **Repeated assessments, both arms, and documentation for patient**

Diagnosis

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- **Ambulatory blood pressure assessment:**
  - **Preferred method of diagnosis of hypertension and “white coat” hypertension**
  - **Limited availability**
  - **Only method to obtain nocturnal measurements**

Diagnosis

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- **Home based blood pressure measurements:**
  - **Proper technique is again, crucial**
  - **No "wrist" monitoring!**
  - **Many patients will require a large cuff (not a standard issue with blood pressure monitors obtained)**
  - **Greater than five minutes, in a quite room, sitting in chair with feet on the floor**
  - **Twelve to fourteen measurements, over period of one week per month with both morning and evening measurements obtained**
  - **Home measurements should *complement* office measurements**

Tortoise.

Lowest mammalian mean arterial blood pressure

Hypertension

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- **There are generally two types of hypertension:**
  - **Primary (formally "essential") Hypertension** 95%
  - **Secondary Hypertension** 5%

Primary Hypertension

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- **The mechanism of primary hypertension is poorly understood**
- **Cardiovascular and Kidney function/structure are both impacted**
  - **Family history (genetics)**
  - **Race (African Americans in particular)**
  - **Age**
  - **Weight (obesity)**
  - **High sodium diet**
  - **Alcohol consumption**
  - **Inactivity**
  - **Stress**

Secondary Hypertension

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- **Cause is known**
- **Generally, secondary hypertension *and* primary hypertension coexist**
  - **Prescription and over the counter medications**
    - **Non Steroidal Anti Inflammatory Drugs (NSAIDs)**
    - **Steroids**
    - **Oral contraceptives with estrogen**
    - **Nasal decongestants**
    - **Anti depressant therapies**
    - **Stimulants (prescribed and illicit)**
    - **Chemotherapy agents**

Secondary Hypertension

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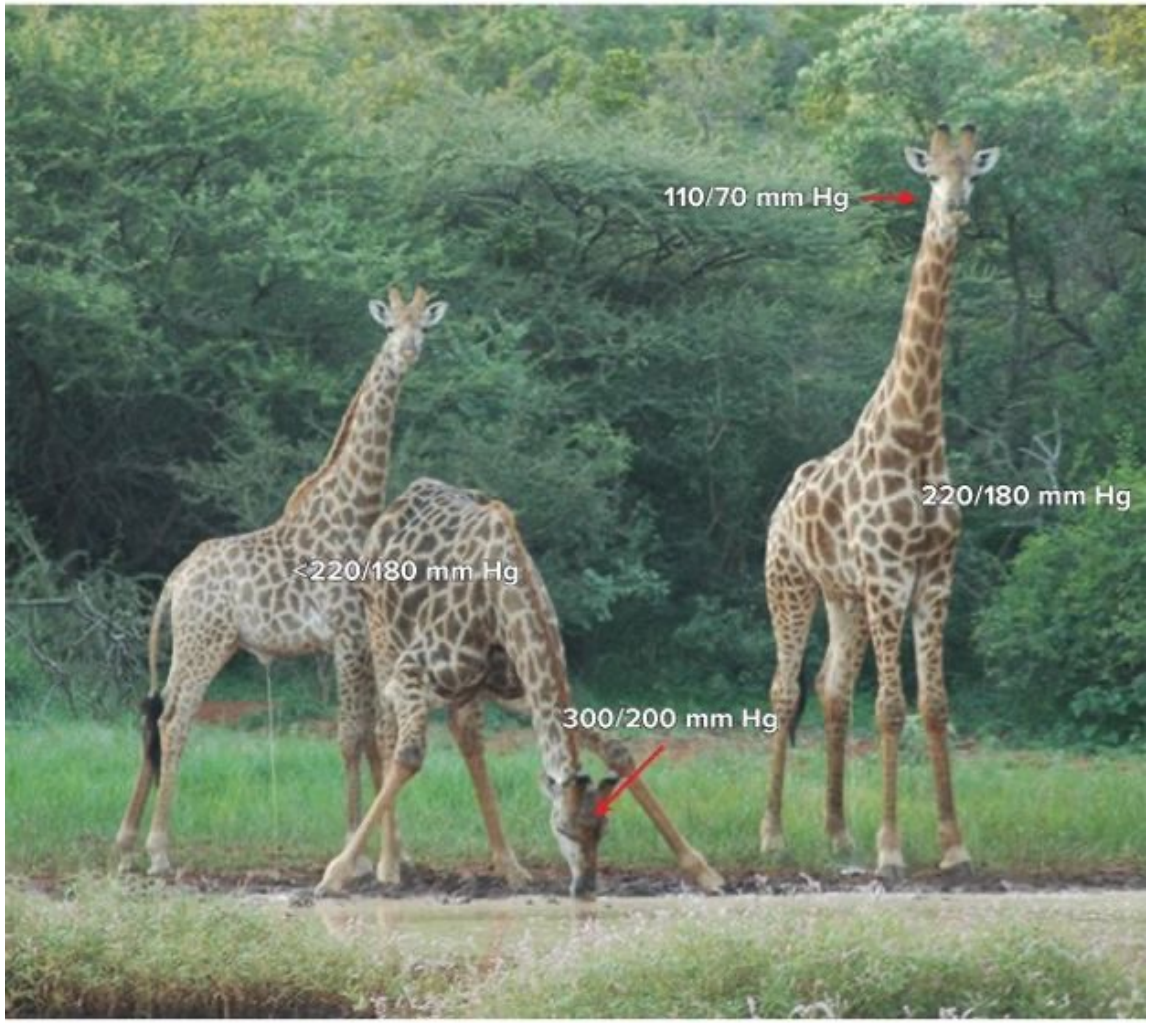
- **Known causes:**
  - **Sleep apnea**
  - **Primary kidney disease**
  - **Primary aldosteronism (mineralocorticoid excess)**
  - **Hypothyroidism or Hyperthyroidism**
  - **Cushing's Syndrome (excess glucocorticoids)**
  - **Pheochromocytoma (catecholamine secreting tumors)**
  - **Coarctation of the aorta (children and adults)**



Giraffe.

Highest mean mammalian arterial blood pressures

Complications of Hypertension

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- **Why do we aggressively treat hypertension?**
  - **Hypertension is *the* most important risk factor for premature cardiovascular disease**
  - **More common than Diabetes, Hyperlipidemia, and tobacco use**
  - **Hypertension elevates risk for Coronary Artery Disease, Atrial fibrillation, Stroke, Heart failure, and Peripheral Artery Disease**
  - **Best evidence that treatment of Hypertension has beneficial effects is the improvement in outcomes in patients on therapy**

Complications of Hypertension

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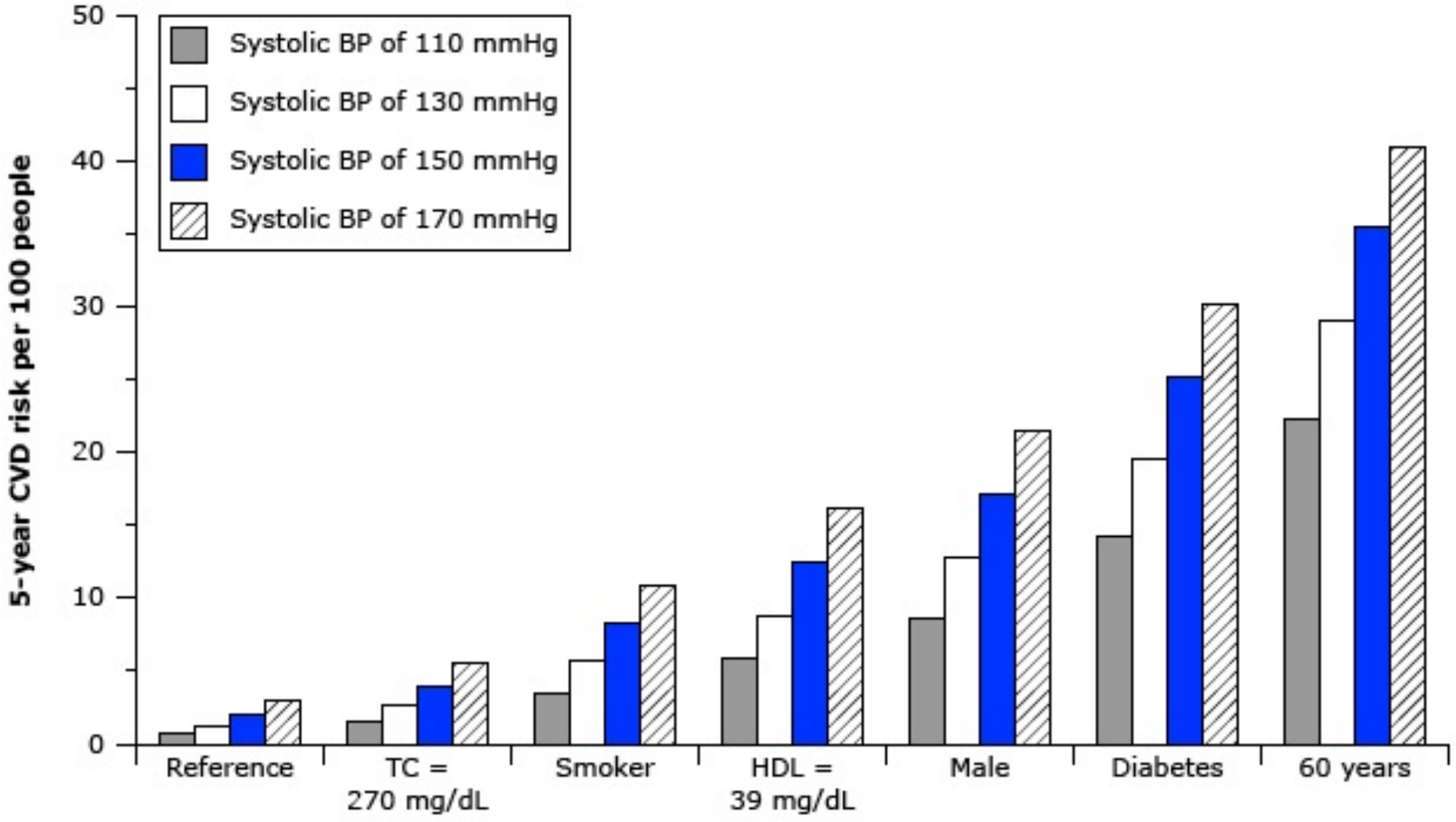

Diagnosis

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- **Surprisingly difficult given variable definitions as well as methodology of measurement.**

Diagnosis

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- History - listen to the story the patient provides!
  - Diet, alcohol, prescription drug use, illicit drug use, sleep, family history, pain history
- Physical Examination specifically looking for target organ damage, evidence of cardiovascular disease, and possible causes of secondary hypertension
- Lab assessment
  - CBC, lipids, electrolytes, urinalysis, ECG, TSH, glucose
- Perform a 10 year ASCVD risk assessment (atherosclerotic cardiovascular disease)

Diagnosis

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AMERICAN COLLEGE of CARDIOLOGY

ASCVD Risk Estimator Plus

Estimate Risk | Therapy Impact | Advice

Current Age *
Age must be between 20-79

Sex *
Male | Female

Race *
White | African American | Other

Systolic Blood Pressure (mm Hg) *
Value must be between 90-200

Diastolic Blood Pressure (mm Hg) *
Value must be between 60-130

Total Cholesterol (mg/dL) *
Value must be between 130 - 320

HDL Cholesterol (mg/dL) *
Value must be between 20 - 100

LDL Cholesterol (mg/dL)
Value must be between 30-300

History of Diabetes? *
Yes | No

Smoker? *
Current | Former | Never

On Hypertension Treatment? *
Yes | No

On a Statin?
Yes | No

On Aspirin Therapy?
Yes | No

Diagnosis

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- Tools.acc.org

Treatment

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- **Lifestyle modification should be “prescribed” to everyone.**

Treatment

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- **Non pharmacologic options:**
  - **Diet low in sodium but high in potassium**
  - **Reduction in alcohol consumption**
  - **Smoking cessation**
  - **Regular exercise (walk!) - moderate aerobic (40 min, four times/week)**
  - **Weight loss**
  - **DASH diet (Dietary Approach to Stop Hypertension)**
    - **More fruit, vegetables, whole grain, fish/chicken, nuts, and low fat dairy**
    - **Less red meat and processed sugars**

Treatment

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- **Randomized control trials with patients on medications -**
  - **50% relative risk reduction in incidence of heart failure**
  - **30-40% relative risk reduction in incidence of stroke**
  - **20-25% relative risk reduction in incidence of heart attack** [7]

Treatment

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- **Individualized treatment is crucial**
- **Out of office blood pressure of >135/>85 mm Hg without co-morbidities**
- **Out of office blood pressure of >130/>80 mm Hg with**
  - **>10% ten year ASCVD risk**
  - **Diabetes**
  - **Known CAD with PCI (stent) or CABG (bypass)**
  - **Kidney disease**
  - **Age >65**

Treatment

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- **Initial Pharmacologic Options:**
  - **Diuretics (thiazides)**
  - **Calcium Channel Blockers (CCB)**
  - **Angiotensin Converting Enzyme inhibitors (ACEi)**
  - **Angiotensin Receptor Blockers (ARB)**
- **Secondary Pharmacologic Options:**
  - **Beta Blockers**
  - **Mineralocorticoids receptor antagonists**
  - **Alpha Blockers/Alpha 2 receptor agonists**

References

[1] **Hypertension**. 2018;71(6):e13. Epub 2017 Nov 13.

[2] **Hypertension**. 2020;75:1334–1357

[3] **Lancet**. 2018; 392:1923–1994.

[4] **Centers for Disease Control and Prevention**, National Center for Health Statistics. About Multiple Cause of Death, 1999–2019. CDC WONDER Online Database website. Atlanta, GA: Centers for Disease Control and Prevention; 2019. Accessed February 1, 2021.

[5] **Circulation**. 2018;137(2):109. Epub 2017 Nov 13.

[6] **Centers for Disease Control and Prevention.** Hypertension Cascade: Hypertension Prevalence, Treatment and Control Estimates Among U.S. Adults Aged 18 Years and Older Applying the Criteria from the American College of Cardiology and American Heart Association's 2017 Hypertension Guideline—NHANES 2015–2018external icon
Atlanta, GA: U.S. Department of Health and Human Services; 2021. Accessed March 12, 2021.
Blood pressure prevalence, control, treatment graph from Million Hearts HHS website

[7]Effects of different regimens to lower blood pressure on major cardiovascular events in older and younger adults: meta-analysis of randomised trials.
Blood Pressure Lowering Treatment Trialists' Collaboration, Turnbull F, Neal B, Ninomiya T, Algert C, Arima H, Barzi F, Bulpitt C, Chalmers J, Fagard R, Gleason A, Heritier S, Li N, Perkovic V, Woodward M, MacMahon S
BMJ. 2008;336(7653):1121. Epub 2008 May 14.

A couple of "new" things…

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- **Wall Street Journal article from Saturday/Sunday of March 26—27**
  - **Tom Frieden (CEO of Resolve to Save Lives), and past director of CDC (2009-2017)**

Pandemic … which one?

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- **Covid-19 versus Cardiovascular Disease**
  - **USA**
    - **C19: 900,000 people in two years**
    - **CVD: 1.6 million people in same two years**
  - **Global**
    - **C19: 10 million people**
    - **CVA: 35 million people**
- **Causes of CVD?**
  - **Tobacco use, air pollution, and …. Hypertension**

Pandemic of CVD

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- **Hypertension is the only thing that kills more people than tobacco**
  - **Emphasis on sodium consumption in this article**
  - **The addition of table salt accounts for less than 10% of the sodium we consume**
  - **The sodium is in the food that we eat!**
    - **Walmart reduced sodium by 20% over 5 years in national brands and its own brands**

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Cereal!

10-14% of the daily allowance

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Right above the cereal…

Mac and Cheese (Organic!)

24% of the daily allowance

(Don’t eat the whole box - 2.5 servings)

A little more on sodium

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- **In late March 2022, ACC scientific sessions and the Lancet published a study on effects of sodium as it relates to heart failure**
  - **Did NOT lead to fewer ER visits, hospitalizations, or death, but did improve symptoms (swelling) and patients generally had a better quality of life**

Now get out there and do something!

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Thank you!!

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