LOUISIANA DEPARTMENT OF HEALTH

Dementia & Chronic Disease
Part 2: Vascular Disease & Dementia

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Objectives

1. To understand dementia risk factors due to chronic diseases of the vascular system.
2. To understand how hypertension can predispose to multiple chronic diseases and cognitive decline.
3. To understand how heart health is linked to brain health.

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Dr. Foundas has nothing to disclose. All figures included are referenced/source material acknowledged.

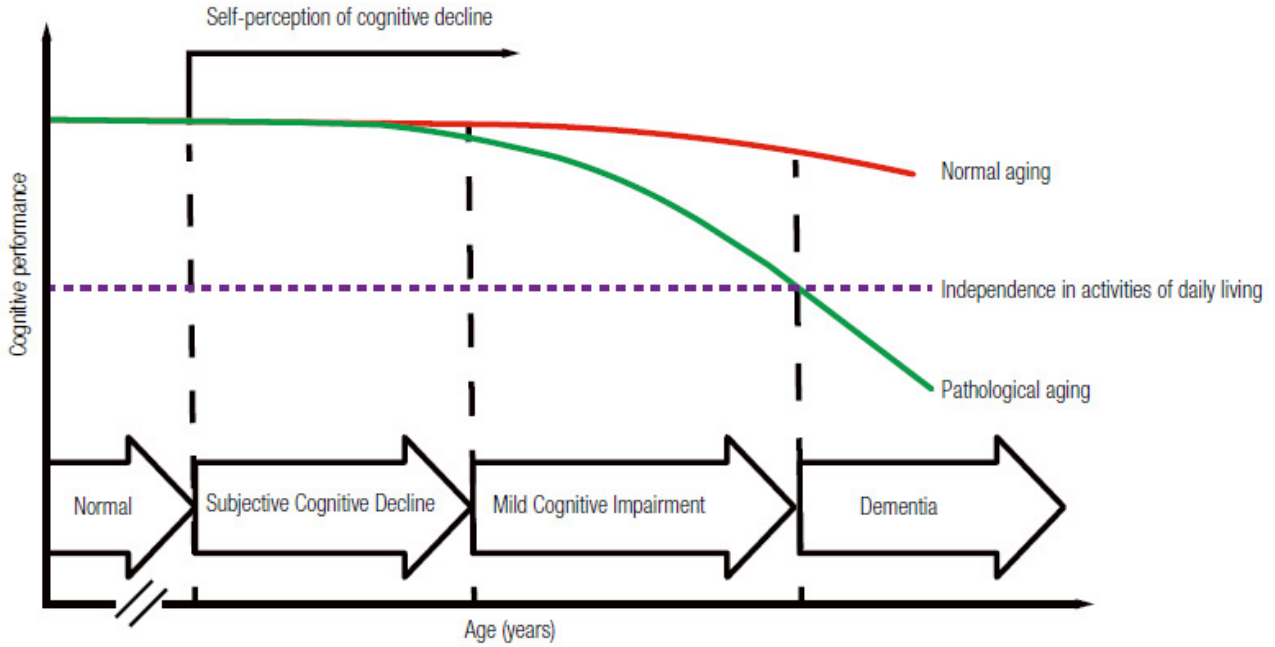
Statement of the Problem

- **Lifetime risk estimates indicate that about 42% of adults aged >55 will develop dementia**
- **Cerebrovascular damage due to vascular risk factors directly leads to vascular dementia, the 2nd to most common cause of dementia**
- **Vascular risk factors also increase Alzheimer's disease risk.**
- **Vascular risk factors are among the most important modifiable contributors to this burden**
  - up to 40% of dementia cases may be preventable by targeting these factors.
  - Data has shown that the decline of new-onset dementia in some countries may be associated with improved treatment of vascular risks [hypertension, hyperlipidemia, heart disease, & diabetes]

Takeda S, Rakugi H, Morishita R. Roles of vascular risk factors in the pathogenesis of dementia. Hypertens Res. 2020 Mar;43(3):162-167.

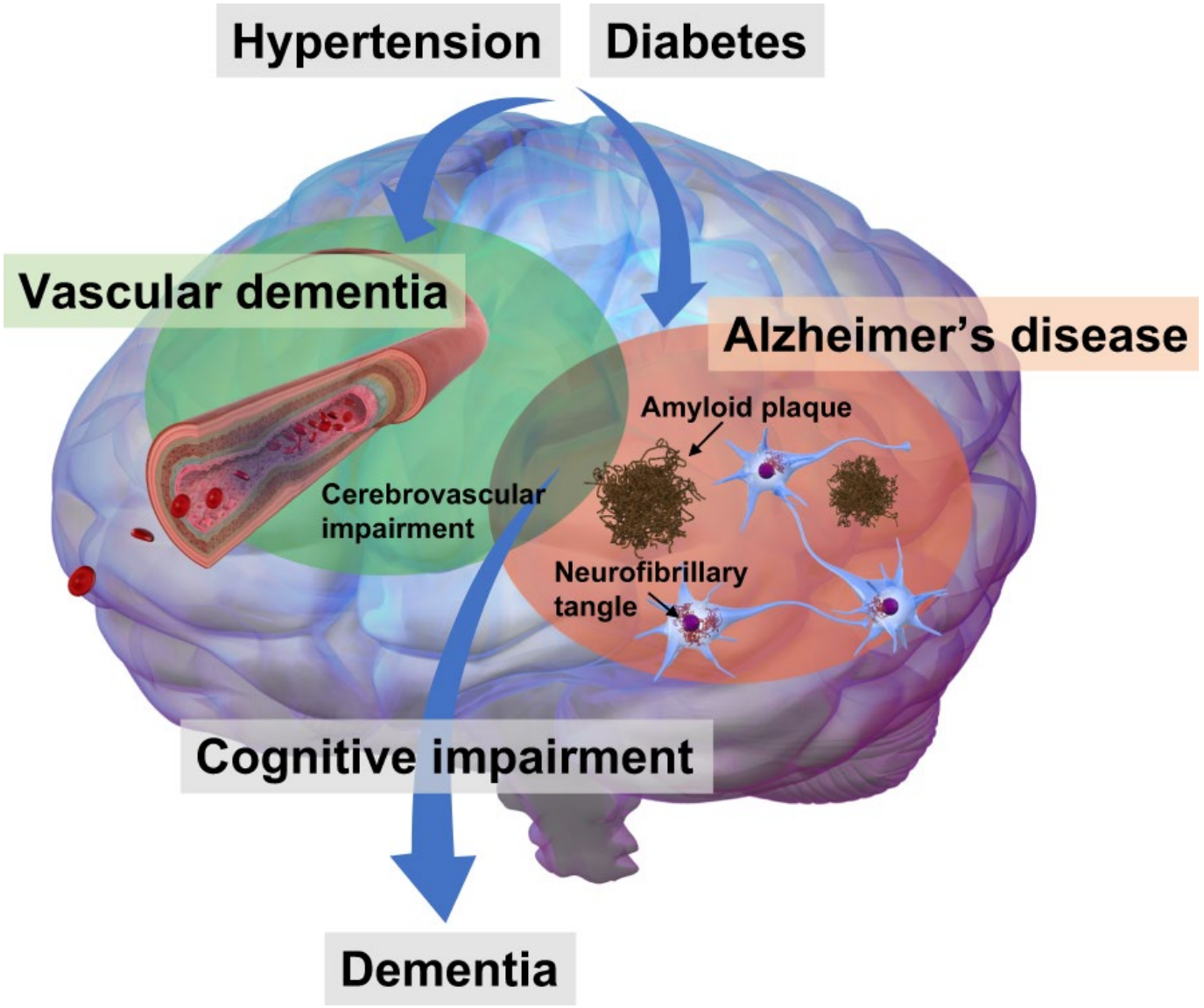
What are cerebrovascular risk factors?

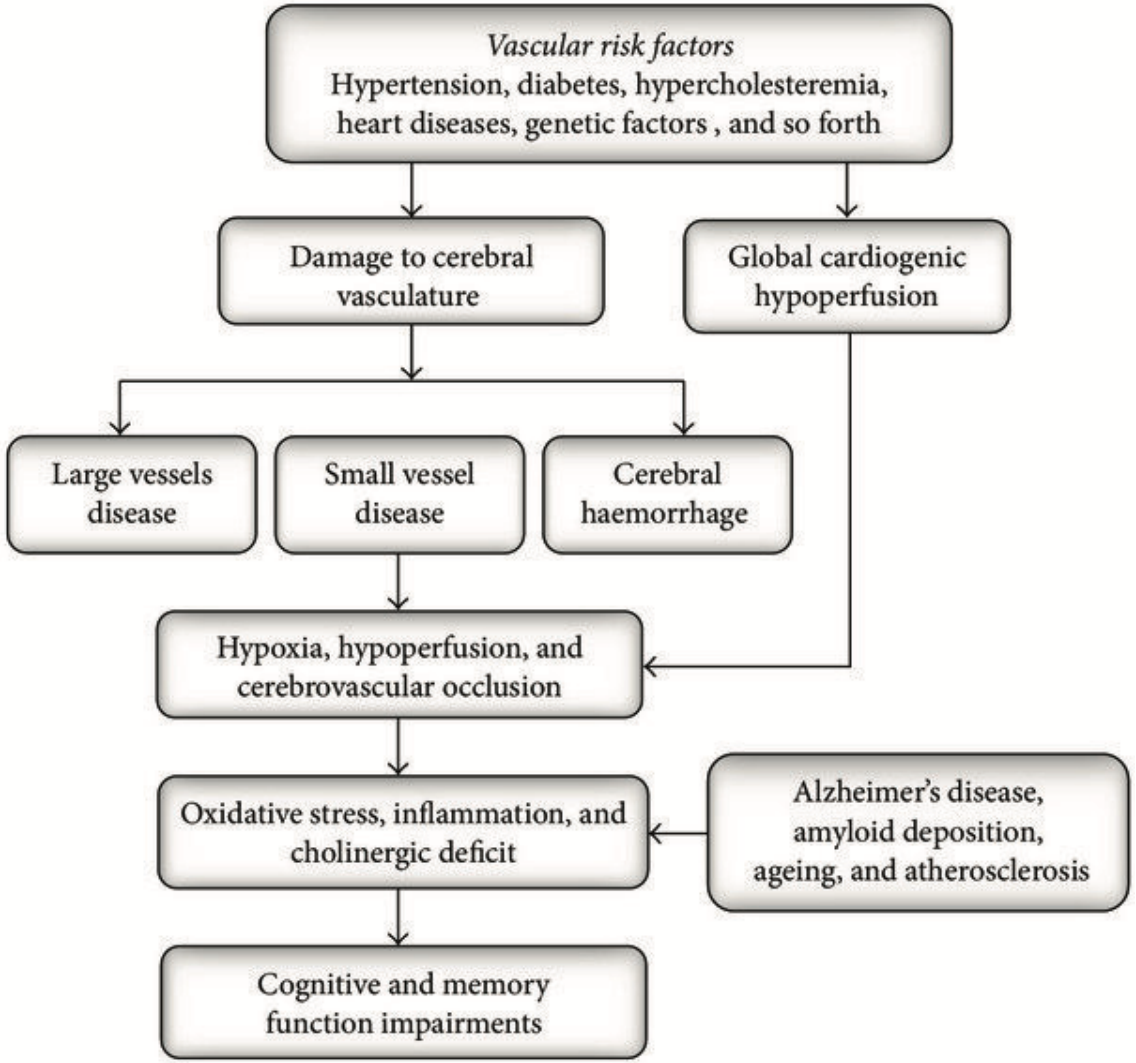
- **Hypertension [Hyperlipidemia]**
- **Heart disease**
- **Diabetes**



These chronic diseases are associated with increased stroke risk, and pathological changes in the brain such as chronic microvascular disease, microbleeds, chronic inflammation & reduced brain volume

These pathophysiological brain changes can lead to cognitive decline





Takeda S, Rakugi H, Morishita R. Roles of vascular risk factors in the pathogenesis of dementia. Hypertens Res. 2020 43:162-167.

Chang et. al. (2016)

Pathophysiology of Vascular Dementia – Vascular Risks

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Cerebral large vessel disease

- Multiple infarcts
- Strategic infarcts
- Cerebral hemorrhage

Cerebral small vessel disease

- Multiple lacunar infarcts
- Strategic lacunar infarcts
- White matter ischemia
- Microinfarcts
- Microbleeds/Macrobleeds

Post-stroke dementia

Multi-infarct dementia

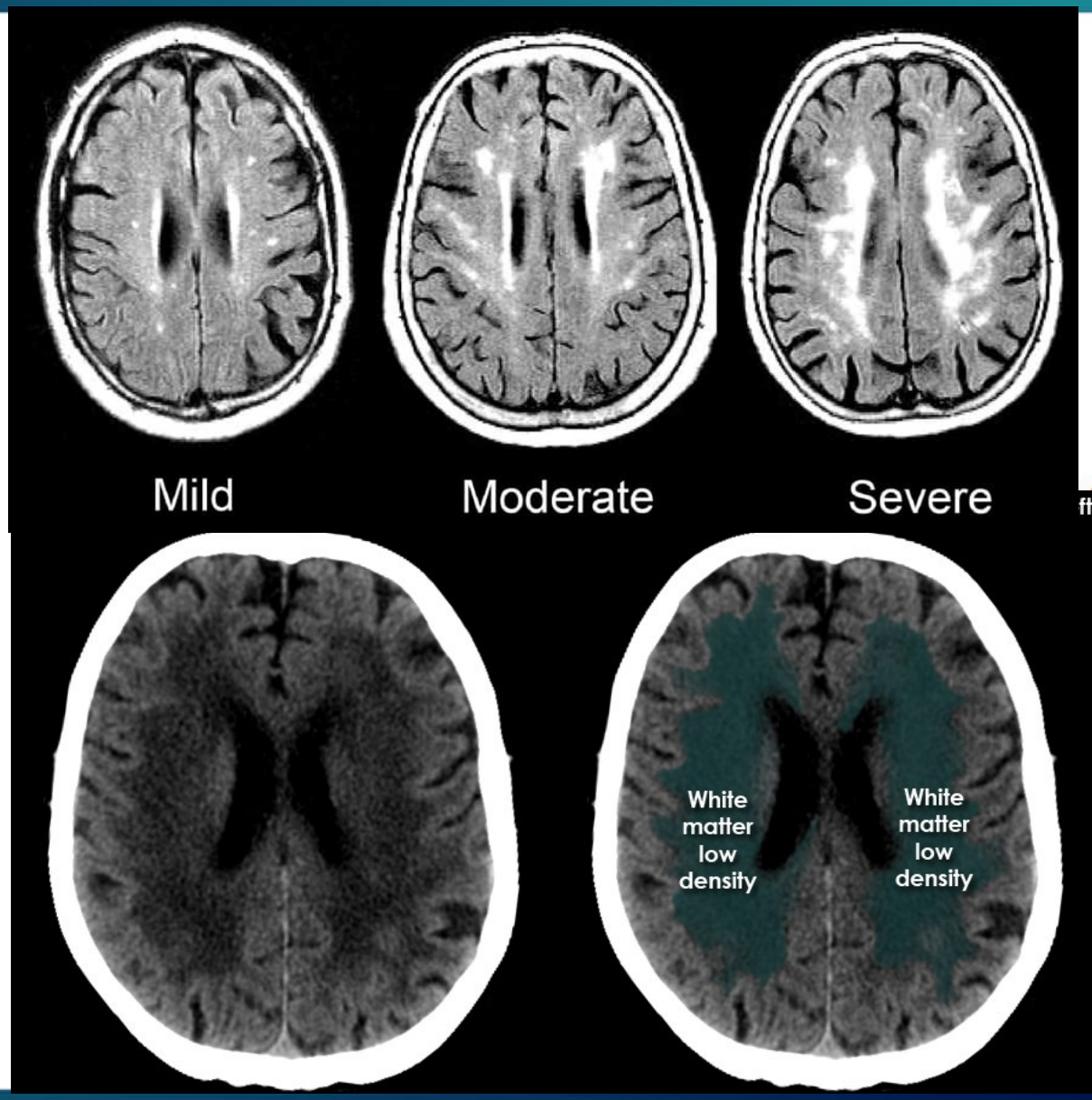
Subcortical ischemic vascular dementia

Vascular cognitive impairment and dementia (VCID)

Mixed dementia

Neurodegenerative diseases

- Alzheimer's disease
- Dementia with Lewy bodies



Inoue, Y., Shue, F., Bu, G. et al. Pathophysiology and probable etiology of cerebral small vessel disease in vascular dementia and Alzheimer's disease. Mol Neurodegeneration 18, 46 (2023).

Vascular Contribution to Alzheimer's disease

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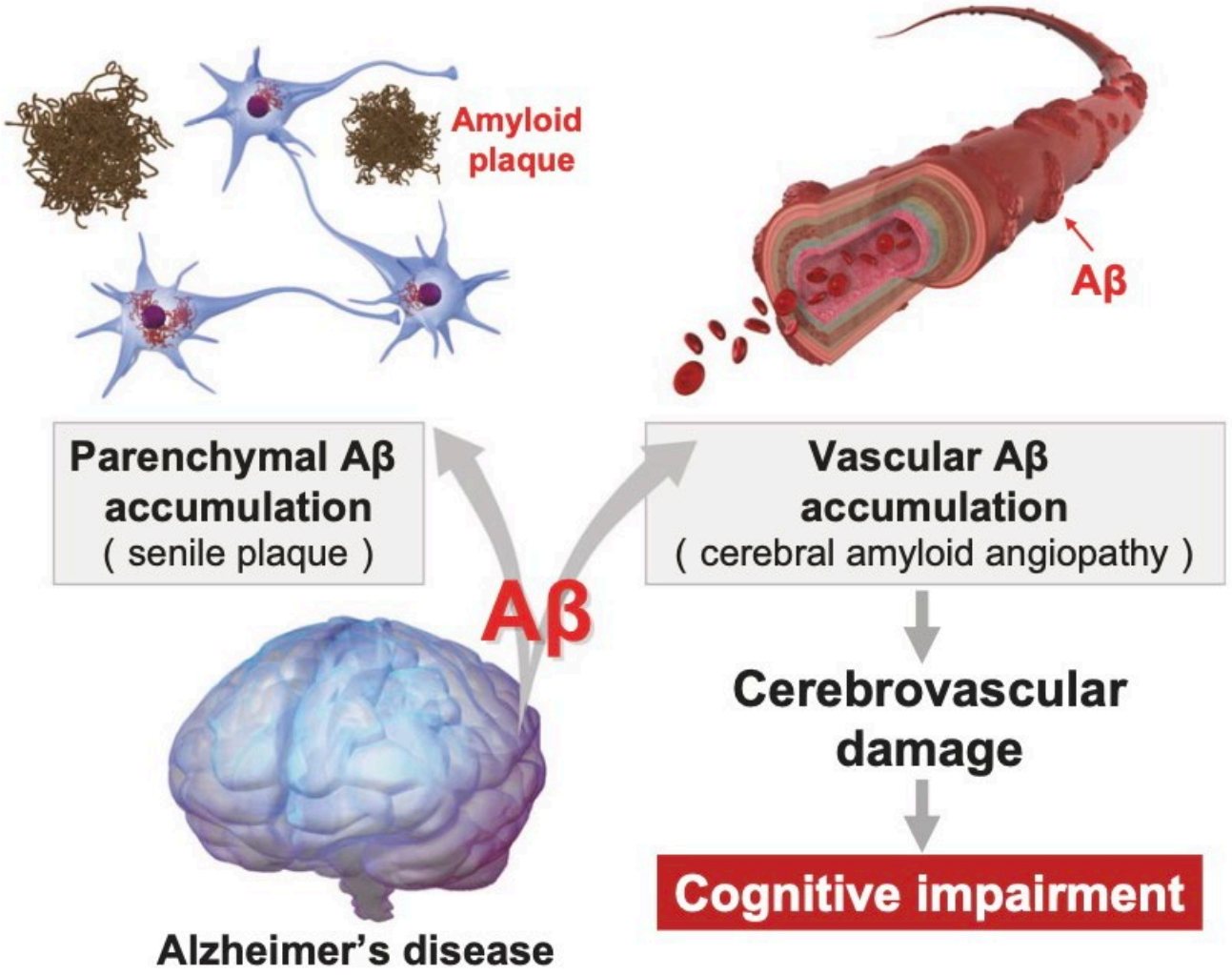

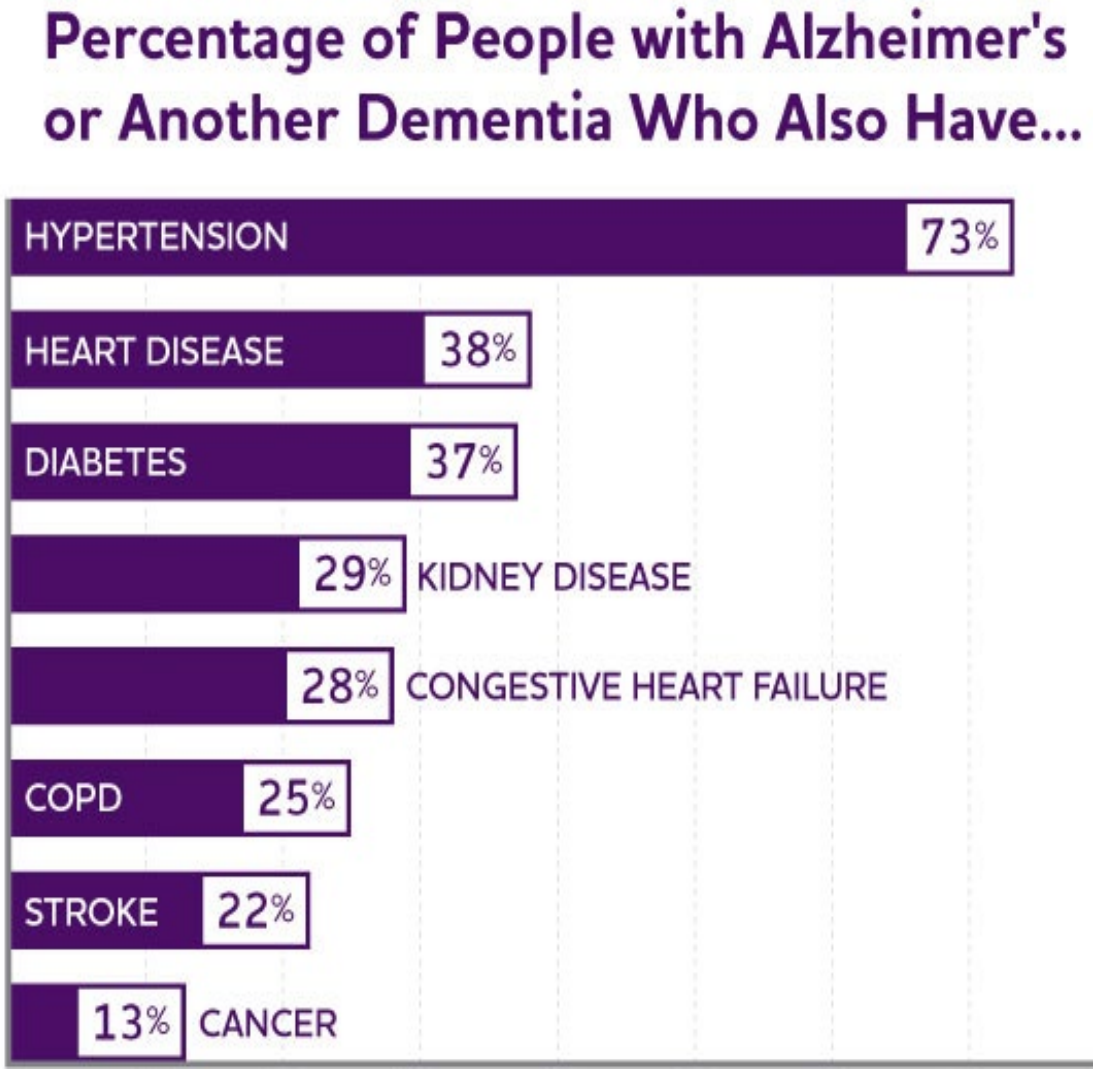

What is the risk of hypertension & dementia?

- **Midlife hypertension (typically defined as ages 40–65) is consistently associated with a *significantly increased risk of developing dementia,* both vascular dementia & Alzheimer disease, later in life.**
  - A systematic review and meta-analysis of 209 prospective studies found that midlife systolic blood pressure (SBP) >130 mm Hg was associated with a 19–55% excess risk of cognitive disorders
  - Each 10 mm Hg increase in SBP in midlife conferred a 22% higher risk of dementia in individuals aged 40–59 years.

- KA, Sharrett AR, Wu A, et al. JAMA. 2019;322(6):535-545.
- Ou YN, Tan CC, Shen XN, et al. Hypertension (Dallas, Tex. : 1979). 2020;76(1):217-225.
- Jung H, Yang PS, Kim D, et al. Scientific Reports. 2021;11(1):12291.
- Lyon M, Fullerton JL, Kennedy S, Work LM. Pharmacology & Therapeutics. 2024;253:108575.
- Walker KA, Sharrett AR, Wu A, et al. JAMA. 2019;322(6):535-545.
- Lennon MJ, Lam BCP, Lipnicki DM, et al. JAMA Network Open. 2023;6(9):e2333353.

Hypertension in Louisiana

- Hypertension, or high blood pressure, is prevalent in Louisiana, with rates significantly higher than the national average.
- Around 40% of Louisiana adults have been diagnosed with high blood pressure.
- This rate that is higher among older adults, Black & American Indian/Alaska Native populations, and those with lower income or education levels.
- Studies show a clear and well-documented link between hypertension and overweight/obesity in Louisiana.
- Data from the Louisiana Department of Health & other public health reports identify *excess weight as a major contributing factor to the state's significant burden of high blood pressure*.

Dementia Risk & Chronic Disease

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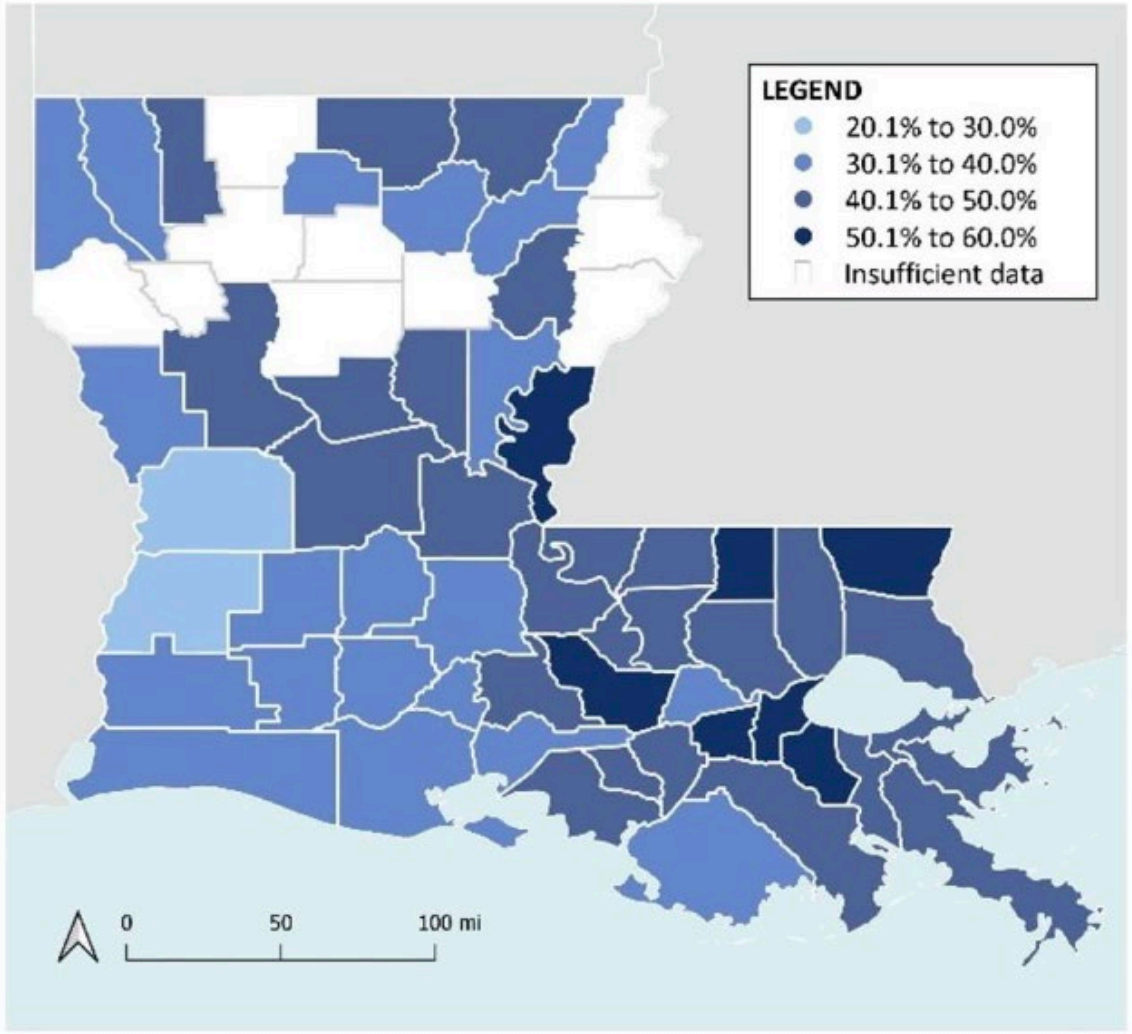
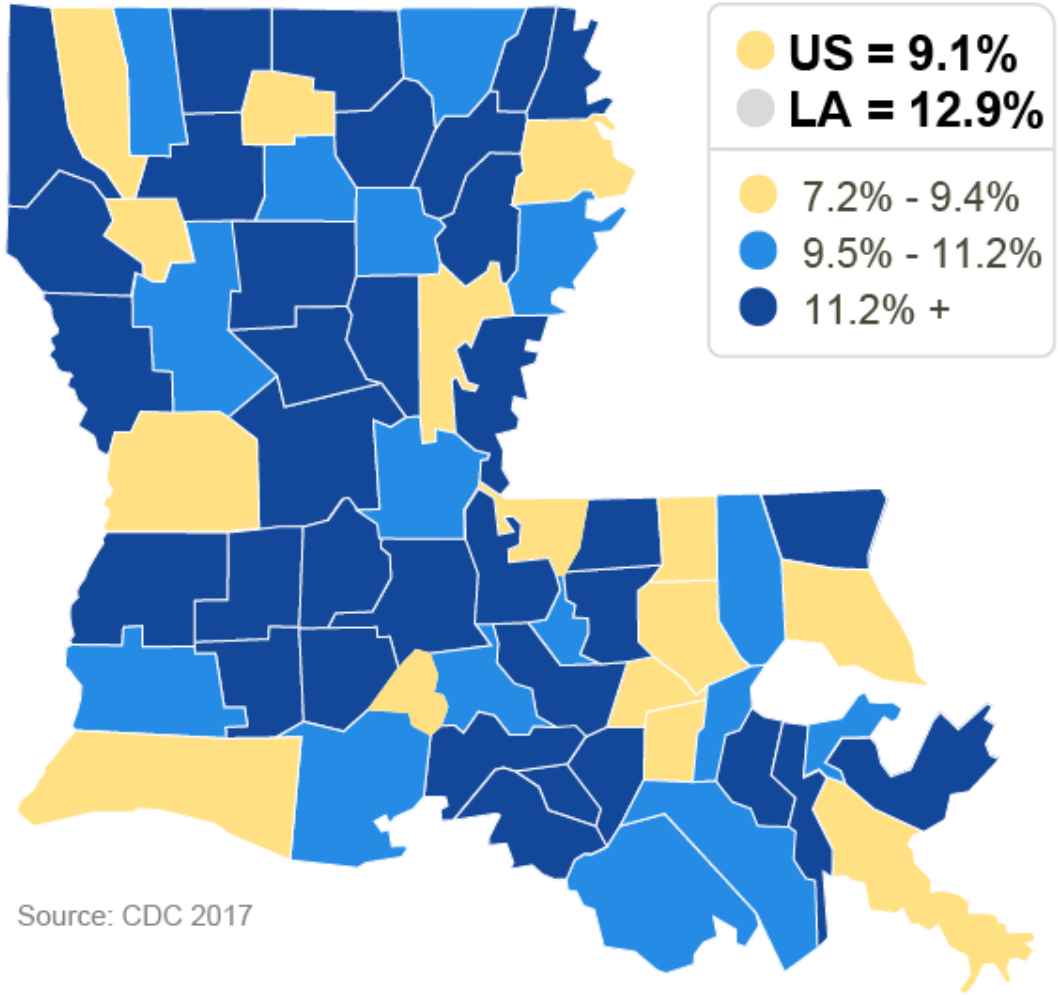
a. MENDS Hypertension Prevalence (2023)



B. ADULT DIABETES DIAGNOSED

Percentage



Source: CDC 2017

Li, W., Zhang, M., Cheng, J. *et al.* Weighted EHR-based prevalence estimates for hypertension at the state and local levels in Louisiana. *BMC Public Health* **25**, 432 (2025). https://doi.org/10.1186/s12889-

Heart disease & Dementia

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- **There are three main types of heart disease associated with cognitive impairment:**
  1. **Coronary artery disease** **2. Heart failure** **3. Atrial fibrillation**

- **Heart disease is brain disease**
  - Preventing dyslipidemia, unhealthy western-type diets, hypertension, diabetes, being overweight, physical inactivity, smoking, and high alcohol intake have the ***potential to diminish not only cardiovascular disease but also dementia.***

Kjeldsen EW & Frikke-Schmidt R (2025) Causal cardiovascular risk factors for dementia: insights from observational and genetic studies. Cardiovascular Research. 121: 537-549.

1. Coronary Artery Disease & dementia

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- **The risk of heart disease and dementia is elevated and interrelated, with shared genetic and lifestyle risk factors contributing to both conditions.**
  - Individuals with coronary artery disease (CAD) or other forms of cardiovascular disease (CVD) have a greater risk of developing Alzheimer's disease and Vascular Dementia.
  - Meta-analyses & large cohort studies consistently show that a history of CAD is associated with a 27–45% increased risk of dementia (relative risk or odds ratio ranging from 1.27 to 1.45) compared to those without heart disease (Deckers K, Schievink SHJ, Rodriquez MMF, et al., 2017; Wolters FJ, Segufa RA, Darweesh SKL, et al., 2018; Testai FD, Gorelick PB, Chuang PY, et al., 22024)
  - **Genetic predisposition to CAD** (measured by polygenic risk scores) & **adverse lifestyle factors** (such as hypertension, diabetes, smoking, physical inactivity, & poor diet) *further increase the risk of heart disease & dementia*.

Testai FD, et. al. (2024) Cardiac Contributions to Brain Health: A Scientific Statement From the American Heart Association. Stroke. 55(12):e425-e438.

2. Heart failure & Cognitive deficits

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It is well established that heart failure is associated with cognitive decline

- Profile includes disorder of: Attention, language and verbal fluency, Processing speed, working memory, and executive function

Studies have shown that 43% of people with heart failure have cognitive deficits

Limited data exist on the structural brain changes linked to the cognitive deficits in heart failure

- Some evidence that hypoperfusion can lead to increase WM hyperintensities on MRI and reduced GM volume

Mechanism of brain injury: likely multifactorial

Testai FD, et. al. (2024) Cardiac Contributions to Brain Health: A Scientific Statement From the American Heart Association. Stroke. 55(12):e425-e438.

3. Atrial fibrillation & Cognitive Decline

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- Atrial fibrillation (AF) is the most common cardiac arrythmia in adults
  - About 10% of adults > 65 years develop AF (1 in 22 Americans)
  - Rates are increasing globally
- A-fib is associated with cognitive decline via a variety of mechanisms
  - Stroke risk is a major factor
    - ➢Validated stroke risk stratification tool in AF is directly associated with risk of dementia
    - ➢Use of oral anticoagulation reduces the risk of cognitive decline by about 50%
  - Cerebral microhemorrhages
  - Chronic cardiac impact ⇨ heart failure & reduced cardiac output ⇨ cerebral hypoxia

Testai FD, et. al. (2024) Cardiac Contributions to Brain Health: A Scientific Statement From the American Heart Association. Stroke. 55(12):e425-e438.

Louisiana & Stroke Risk

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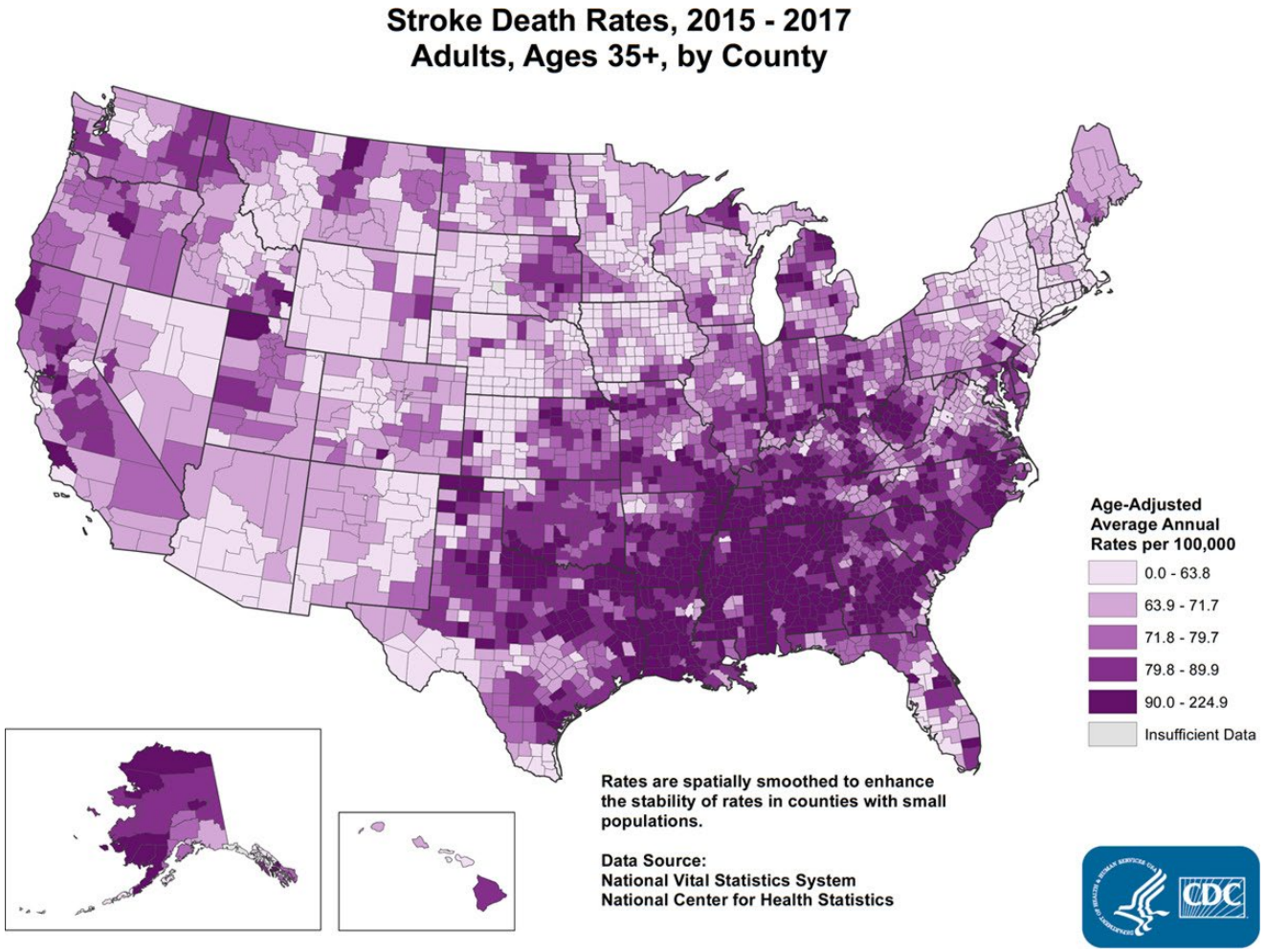
- Louisiana is part of the "Stroke Belt," a region with higher-than-average stroke death rates
- Louisiana has a statewide stroke care system that uses a hub-and-spoke model for better access to care, including telemedicine.
- Delaware has the highest rate of stroke deaths followed closely by Mississippi, Alabama, Louisiana & North Carolina
- There is a higher prevalence of hypertension & diabetes in the Stroke Belt.



Otite FO, Morris NA, Anikpezie N, et. al. (2025) Comparative Rates of Acute Ischemic Stroke Incidence, Neurology, 105, 6.

Howard G, & Howard VJ (2025) Twenty years of progress toward understanding the stroke belt. Stroke. 51: 742-750

Twenty years towards progress in Cerebrovascular disease.

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Howard & Howard (2025) *Stroke*. 51: 742-750.

- In 1968, the age-adjusted stroke mortality rate in the Stroke Belt was **582/100 000 compared with 433/100 000** for the rest of the United States.
- National declines in stroke mortality reduced these rates.
  - By 2016, the stroke mortality rates were **126/100 000 and 99/100 000, respectively.**
  - **The geographic disparity persisted…**
- **The Stroke Belt includes a higher proportion of rural residents**
  - Residents of rural regions have higher stroke incidence compared with residents living in more urban areas.
- The data suggest that contributors to the Stroke Belt may include:
  - Residents with higher prevalence of traditional stroke risk factors [HTN, HLD, Diabetes]
  - Higher prevalence of inflammation and infection
  - Lower socioeconomic status.
  - Larger proportion of minority populations
  - Lifestyle choices of diet & physical inactivity

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Vascular Disease & Dementia Risk

1. **Hypertension (HTN) is a well-established modifiable risk factor for the development of dementia and cognitive decline**.

2. **Elevated cholesterol – Hyperlipidemia (HLD) is associated with an increased risk of cognitive decline & dementia**

3. **HTN & HLD are associated with vascular disease & complications of atherosclerosis**

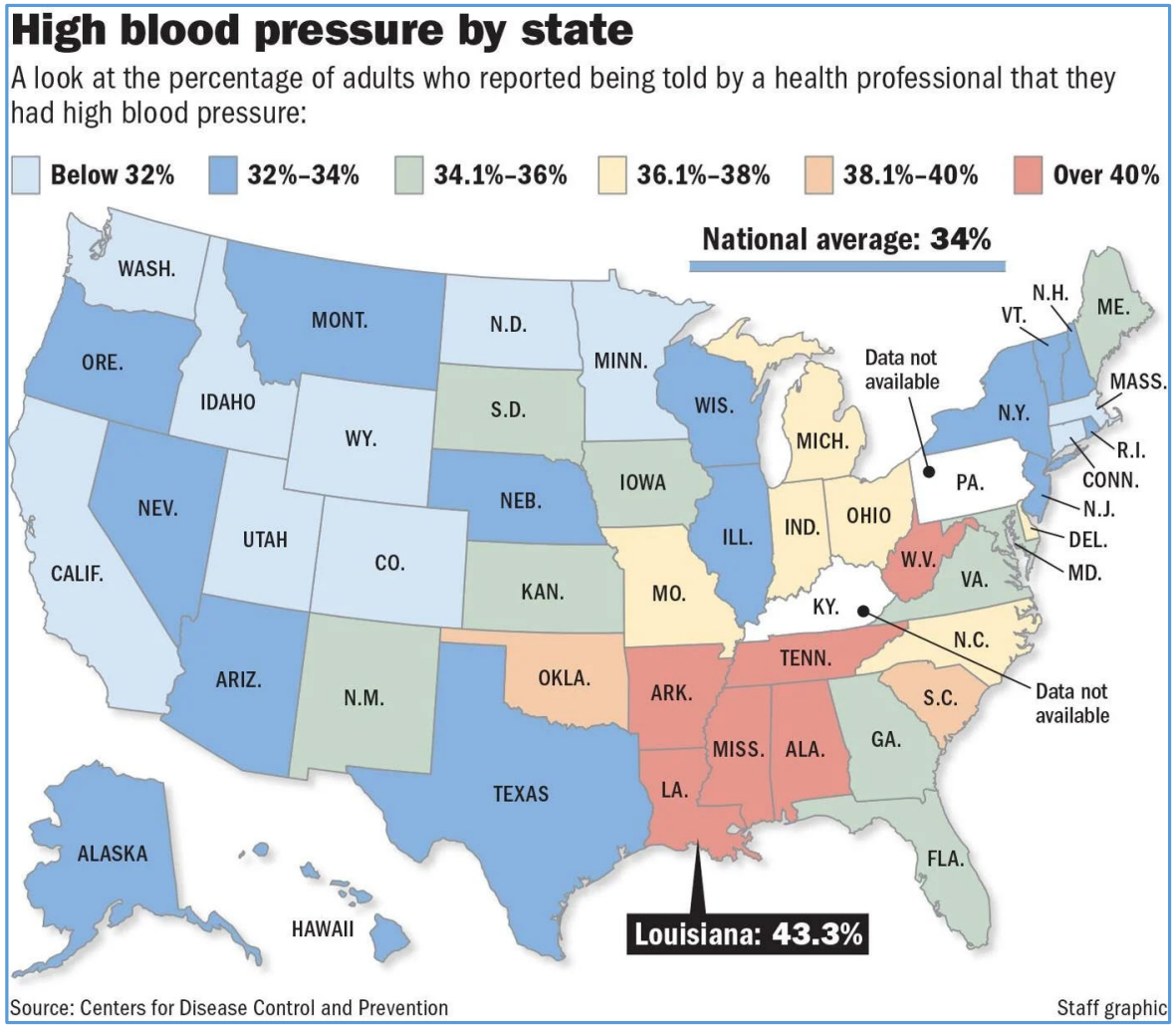
4. **Heart disease confers a significant risk for dementia – including Alzheimer's disease & Vascular dementia**

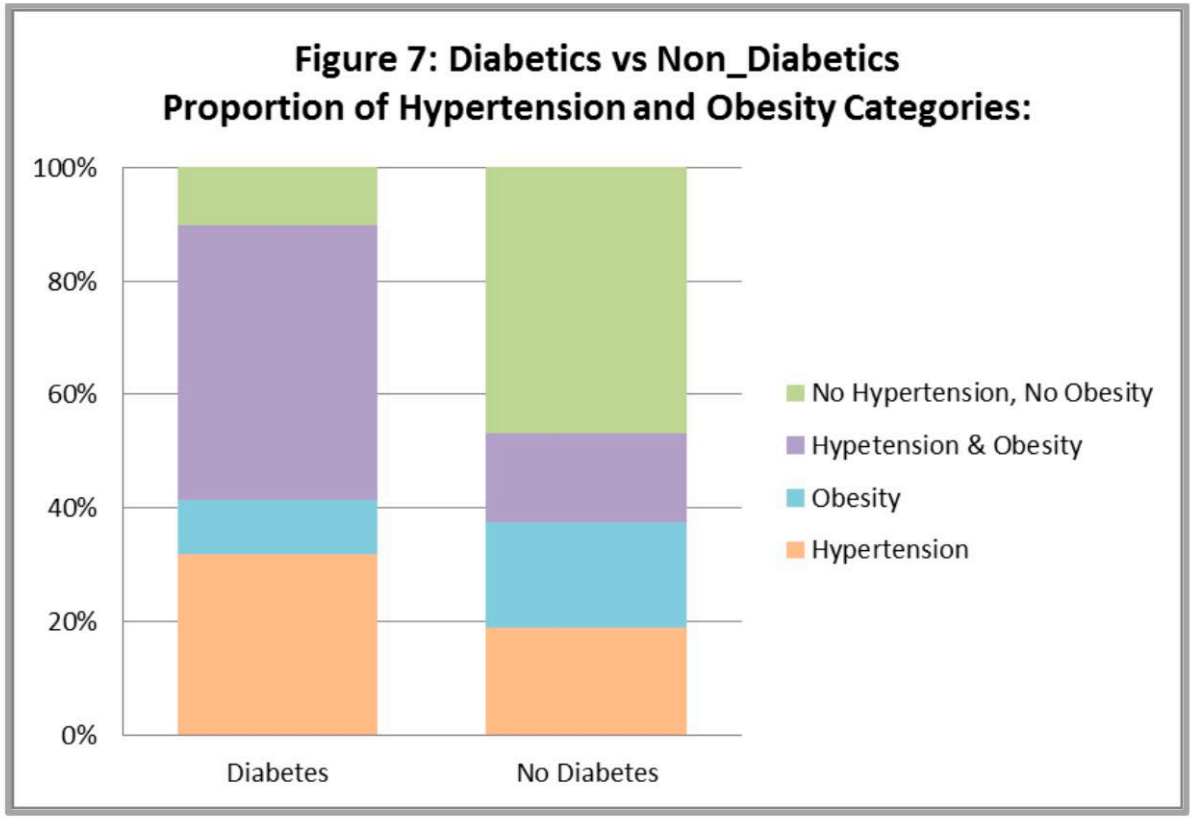
- The *American College of Cardiology* & *American Heart Association* recommend that blood pressure lowering can prevent cognitive decline & dementia in adults with HTN

- The strongest evidence for benefit is when blood pressure is controlled in **midlife rather than later in life**.
  - Whelton PK, Carey RM, Aronow WS, et al. (2018) Journal of the American College of Cardiology. 71:e127-e248.
  - Jones DW, Ferdinand KC, Taler SJ, et al. (2025) Circulation. doi:10.1161.

- HTN contributes to cognitive decline through a variety of mechanisms including:
  - microvascular injury, blood-brain barrier disruption, neuroinflammation, promotion of amyloid pathology,
  - All these mechanisms impair neurovascular coupling & impair cerebral perfusion

Louisiana has the 3rd highest rate for high blood pressure





SOURCE: Diabetes: Correlations with Hypertension and Obesity Louisiana 2015 Behavior Risk Factor Surveillance System. *Bureau of Health Informatics Office of Public Health Louisiana Department of Health, Behavioral Risk Factor Surveillance System* (BRFSS) April, 2017

Life Course Approach to Risk Reduction

EARLY LIFE

Less Education – 5%

MIDLIFE

Hearing loss – 7%
High LDH, Cholesterol - 7%**
Depression - 3%
TBI – 3%
Physical Inactivity - 2%
Diabetes - 2%
Smoking -2%
Hypertension – 2%
Obesity -1%
Excessive Alcohol -1%

LATE LIFE

Social Isolation – 5%
Air pollution – 3%
Visual Loss - 2%**

45% Potentially Modifiable

Percentage (%) reduction in cases of dementia if this risk factor eliminated

** Added in 2024

https://www.alzint.org/news-events/news/lancet-commission-identifies-two-new-risk-factors-for-dementia-and-suggests-45-of-cases-could-be-delayed-or-reduced/

Questions?

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THANK YOU

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Contact us: WellAhead@la.gov

Please also feel free to visit the Well-Ahead website at:

http://wellaheadla.com

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