



# Diabetes and Dementia



**BRAIN HEALTH  
ACADEMY**  
*UsAgainstAlzheimer's*

**June 21, 2023**

# Acknowledgements

This course is presented and developed in collaboration with the Academy of Nutrition and Dietetics.





# Presenter



Constance Brown-Riggs—an award-winning registered dietitian nutritionist, certified diabetes care and education specialist is the author of several diabetes books. Two of which received Hermès Gold Creative Awards: *Living Well with Diabetes 14 Day Devotional* and *The Diabetes Guide to Enjoying Foods of the World*.

Over the course of her career, Constance has established herself as an expert in nutrition, diabetes, and the cultural issues that impact the health and health care of people of color. Her work has appeared in books for health professionals and health care consumers. Constance is a former member of the board of directors for the Association of Diabetes Care and Education Specialist and a past chair of the Diabetes Dietetic Practice Group of the Academy of Nutrition and Dietetics. You can learn more about her at [www.eatingsoulfully.com](http://www.eatingsoulfully.com)



# Diabetes and Dementia

## Course Description

Diabetes is a chronic, metabolic disease characterized by elevated levels of blood sugar, which leads over time to serious damage to the heart, blood vessels, eyes, kidneys, nerves - and brain. In fact, it is among the top risk factors for dementia. This course provides strategies to address diabetes and build cognitive resilience.

## Learning Objectives

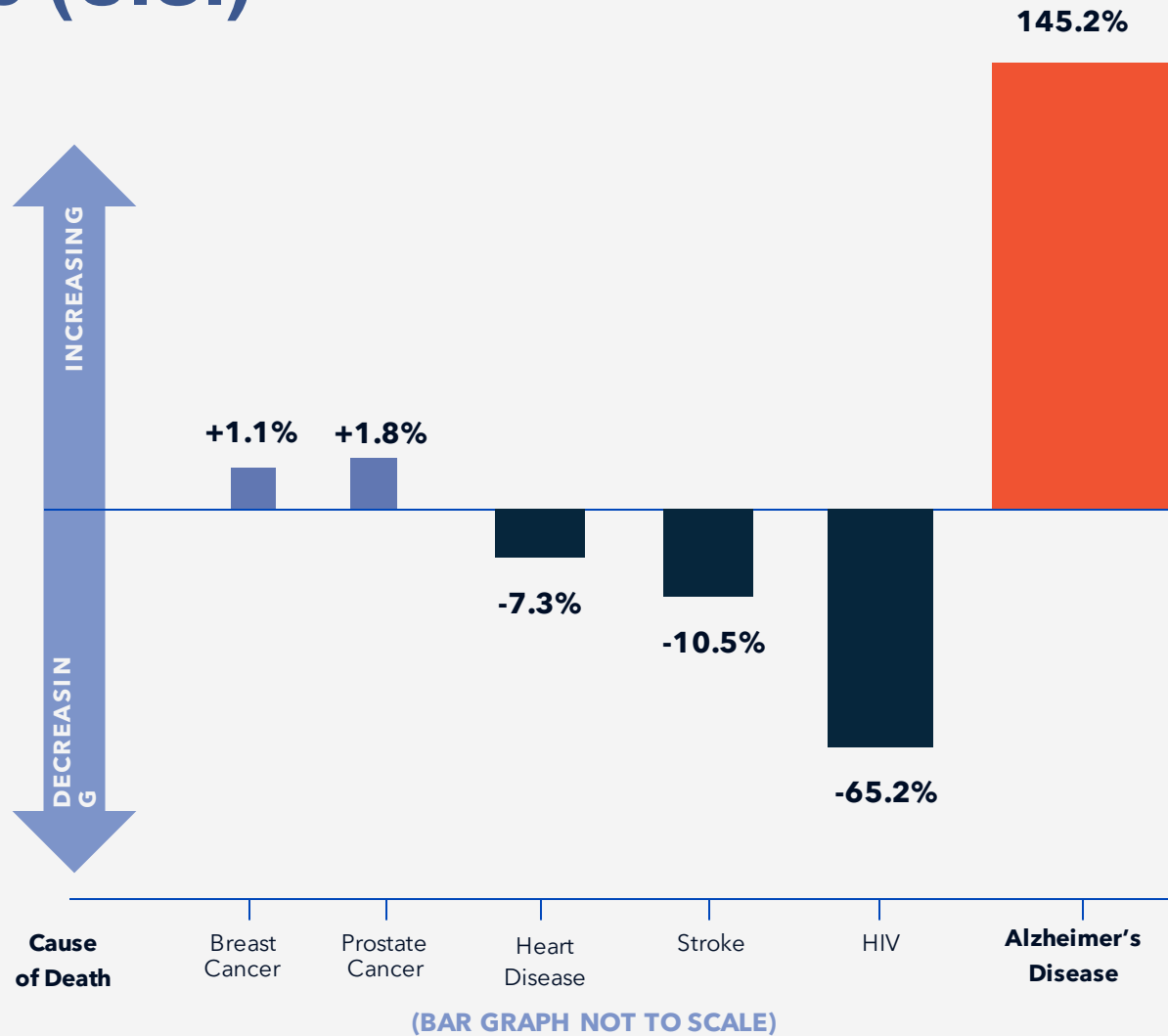
- Participants will be able to list 6 or more modifiable risk factors for dementia.
- Participants will be able to summarize the link between diabetes and dementia.
- Participants will be able to identify effective interventions and strategies to address diabetes.
- Participants will be able to identify special considerations for high-risk populations.



**Facts: Alzheimer's  
and related  
dementias (ADRD)**

# Scope of the Epidemic (U.S.)<sup>1</sup>

6.5 million adults  
1 in 9 adults age ≥65  
1 in 3 adults age ≥85  
2/3 are women  
Alzheimer's deaths  
increased 145% from  
2000-2019, while other  
top causes of death  
have declined



# Inequities in Brain Health<sup>2, 3, 4</sup>

African American people are  
**2X AS LIKELY**  
to have Alzheimer's

Latino people are  
**1.5X AS LIKELY**  
to have Alzheimer's



**Less likely** than White patients to receive a timely diagnosis;



**More likely** to report experiencing racial discrimination along their patient and caregiver journeys;



**Less likely** to be enrolled in cutting-edge Alzheimer's and brain health research.



# Health Disparities & Comorbidities for Alzheimer's in the African American Community <sup>5</sup>

44% More Likely to have a stroke.

23% More Likely to live with obesity.

25% More Likely to die from heart disease.

72% More Likely to be diabetic.

**2X AS LIKELY**  
TO HAVE ALZHEIMER'S







**Modifiable risk factors for Dementia**

# Alzheimer's: Non-Modifiable Risk Factors<sup>6, 1, 7, 8</sup>

## Age

Number one risk factor is advancing age.  
Risk doubles every 5 years after age 65.

## Family History

Genetics vs environmental factors.

## Education

Fewer years of formal education and lower levels of cognitive engagement may be risk factors.

## Gender

2/3 of those with Alzheimer's are women.  
16% of women age  $\geq 71$  (11% of men).  
After age 65, have more than 1 in 5 chance (1 in 11 for men).

# Modifiable Risk Factors<sup>9</sup>

**40%**  
of dementia cases  
could be prevented  
by addressing these  
lifestyle factors

## INCREASE

- Healthy Diet
- Physical Activity
- Mental Activity
- Cognitive and social activity

## DECREASE

- Hypertension
- High cholesterol
- Uncontrolled diabetes
- Obesity
- Smoking
- Depression
- Excessive Alcohol Intake
- Head Injury
- Air Pollution
- Hearing Loss





# What Matters Most Insights Survey: Diabetes

- **85%** believe that diabetes affects the brain and brain health with **42%** saying the impact is significant
- **9%** say they have diabetes (**8.5%** T2D)
- **32%** say they are concerned about developing diabetes
- **82%** would change their behavior if they knew having diabetes is a risk factor for dementia

Respondents largely over age 50, Caucasian, female (77%), college educated or greater (89%)



N=871 (ADRD/MCI diagnosis: 47; high risk for ADRD: 213; current caregivers: 104; former caregivers: 225; general interest in brain health: 228)



# The Link Between Diabetes and Dementia

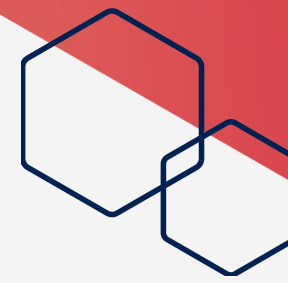
# Diabetes Prevalence <sup>10</sup>



Diabetes is caused by the body's inability to create or effectively use its own insulin, which is produced by islet cells found in the pancreas. Insulin helps regulate blood sugar (glucose) levels – providing energy to body cells and tissues.

- ❧ 37.3 million people, or 11.3% of the U.S. population, have diabetes.
- ❧ An estimated 28.7 million people – or 28.5% of the population – had diagnosed diabetes. Approximately 8.5 million people have diabetes but have not yet been diagnosed (2022).
- ❧ 1.45 million Americans are living with T1D, which accounts for about 3.75% of all diagnosed cases of diabetes.
- ❧ 25% of people aged 65 and older in the United States have diabetes (diagnosed and undiagnosed), and about half have prediabetes.
- ❧ Diabetes impacts all social, economic, and ethnic backgrounds.





# Types of Diabetes <sup>11</sup>

## ☼☼ Type 1

- B-cell destruction
- Complete lack of insulin

## ☼☼ Type 2

- B-cell dysfunction
- Insulin resistance

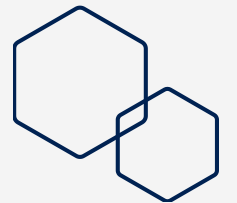
## ☼☼ Gestational

- B-cell dysfunction and insulin resistance during pregnancy

# Diabetes Risk Factors <sup>12</sup>

## Risk factors for diabetes include:

- ⌘ Hypertension  
HDL < 35 mg/dL or TG > 250 mg/dL
- ⌘ First-degree relative with diabetes
- ⌘ High-risk race/ethnicity (African American, Latino, Native American, Asian American, Pacific Islander)  
Asian Americans with a BMI of greater than or equal to 23 kg/m
- ⌘ Women who have delivered child greater than 9 lbs (4 kg) or with gestational diabetes
- ⌘ HbA1c = 5.7%, impaired fasting glucose (IFG) or impaired glucose tolerance (IGT)



# Diabetes and Dementia Link <sup>9</sup>



- ❧ Both type 1 and type 2 diabetes are clear risk factors for development of future dementia.
- ❧ The risk of dementia increases with the duration and severity of diabetes.
- ❧ The effect of different diabetic medications on cognition or dementia outcomes remains unclear.
- ❧ The earlier you develop diabetes, the greater your risk is for developing dementia.



# Diabetes and Dementia Link <sup>13, 14</sup>

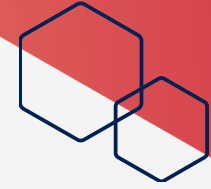


- ❁ Blood sugar and insulin can harm the brain in several ways:
- Diabetes raises the risk of heart disease and stroke, which hurt the heart and blood vessels. Damaged blood vessels in the brain may contribute to cognitive decline.
  - The brain depends on many different chemicals, which may be unbalanced by high levels of insulin resistance. Some of these changes may help trigger cognitive decline.
  - High blood sugar causes inflammation. This may damage brain cells and cause dementia to develop.
  - Low blood sugars—hypoglycemia—damage the hippocampus, which is the memory center of the brain.



**Diabetes  
disparities and the  
impact of social  
determinates of health**

# Health Disparity



## Health disparities:

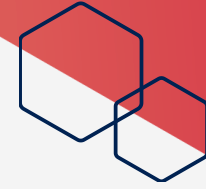
- Occur when certain groups of people face more health problems
- Linked to social, economic, and/or environmental disadvantage
- Adversely affect groups based on factors such as: race or ethnicity, religion, socioeconomic status, sex, age, mental health; cognitive, sensory, or physical disability; sexual orientation or gender identity; geographic location.



## Health disparities mean that:

- Some groups are more likely to experience obstacles to good health
- Unfair treatment in the past can lead to greater health problems

# Social Determinants of Health <sup>15</sup>



## Social determinants of health:

- Conditions during birth, growth, living, work, and aging
- Shaped by distribution of money, power, and resources
- Impact health outcomes

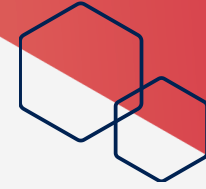


## Health inequities:

- Unfair and avoidable differences in health status
- Seen within and between countries



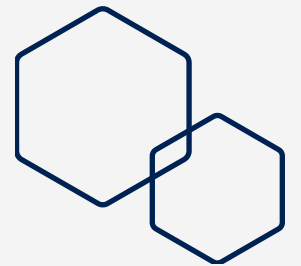
# Social Determinants of Health <sup>15</sup>

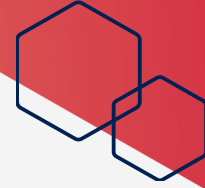


- ❧ Socioeconomic status (education, income, and occupation)
- ❧ Neighborhood and physical environment (housing, the build environment, and environmental and toxic exposures)
- ❧ The food environment (food insecurity and food access)
- ❧ Health care (access to affordable, quality care)
- ❧ Social cohesion and social capital (how inclusive a society is versus how it might alienate, isolate, or discriminate against its members, and whether all members of the society have equal leverage).

# Social Determinants of Health and Diabetes Risk <sup>15</sup>

- Diabetes affects racial and ethnic minority and low-income adult populations in the U.S. disproportionately
- Factors influencing diabetes risk:
  - Education level (completion of high school)
  - Income level
  - Historical discrimination against certain groups (e.g., Native Americans, indigenous people, African Americans, and people of Latinx heritage)
  - Access to affordable and quality healthcare





# Social Determinants of Health and Diabetes Risk

- ⌘ There is SDOH evidence supporting association of SES, neighborhood and physical environment, food environment, health care, and social context with diabetes-related outcomes.
  
- ⌘ Full continuum of diabetes outcomes affected:
  - Likelihood of prediabetes
  - Risk of type 2 diabetes
  - Prospect of gestational diabetes evolving into type 2 diabetes
  - Prevalence of diabetes complications
  - Premature mortality from diabetes

# Diabetes Disparities <sup>10</sup>

- ⌘ Black, non-Hispanic: 16.4%
- ⌘ Asian, non-Hispanic: 14.9%
- ⌘ Hispanic: 14.7%
- ⌘ White, non-Hispanic: 11.9%

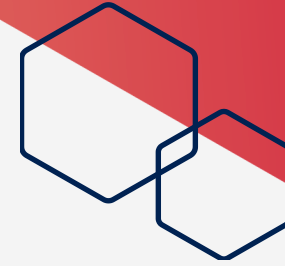




# African American Disparities <sup>16</sup>

- ⌘ In 2018, African Americans were twice as likely as whites to die from diabetes.
- ⌘ African American adults are 60% more likely than white adults to be diagnosed with diabetes by a physician.
- ⌘ In 2017, African Americans were 3.2 times more likely to be diagnosed with end stage renal disease as compared to whites.  
In 2017, African Americans were 2.3 times more likely to be hospitalized for lower limb amputations as compared whites.

# African American Disparities <sup>17</sup>



## Lower educational attainment:

High school diploma: in 2019, 87.2% African Americans compared to 93.3% of the white population

Bachelor's degree: 22.6% of African Americans compared with 36.9% of whites

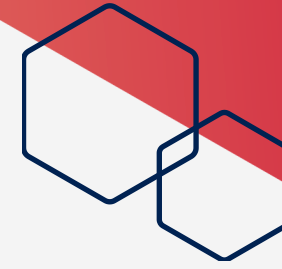
## Poverty level:

In 2019, 21.2% of African Americans compared to 9.0% of whites

## Uninsured:

10.1% of African Americans in compared to 6.3% of whites

# African American Disparities <sup>18</sup>



## ❧ About 4 out of 5 African American women are overweight or obese

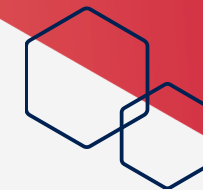
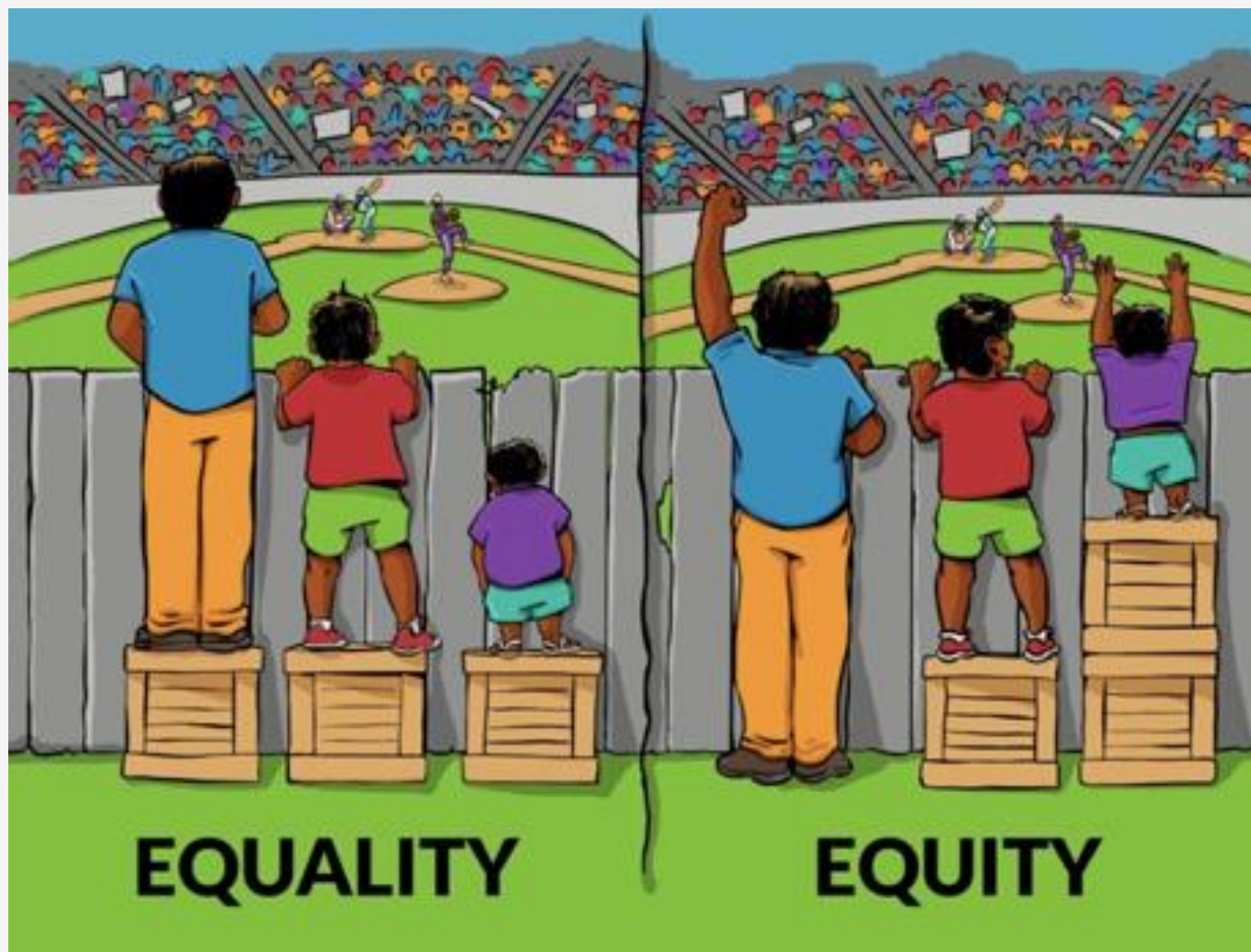
- Perceptions of health, body image, and attractiveness
- Limited access to affordable, healthy food
- Limited culturally-appropriate support

## ❧ In 2018, African Americans were 20% less likely to engage in physical activity compared to whites

- Lack of safe areas to exercise
- Limited culturally appropriate support

# Health Equity <sup>19</sup>

No One-Size-Fits-All







**Diabetes  
intervention  
recommendations**

# Diabetes Interventions <sup>20</sup>

⌘ Screening

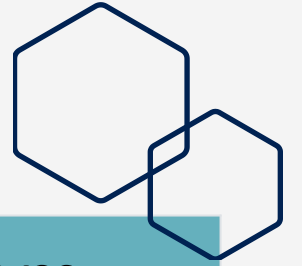
⌘ Monitoring

⌘ Lifestyle

⌘ Pharmacological Interventions

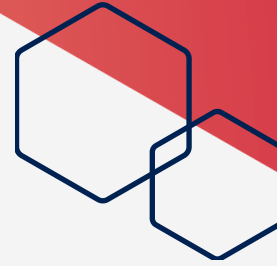


# Screening and Monitoring <sup>21</sup>



Result*	A1C Test	Fasting Blood Sugar Test	Glucose Tolerance Test	Random Blood Sugar Test
Diabetes	6.5% or above	126 mg/dL or above	200 mg/dL or above	200 mg/dL or above
Prediabetes	5.7 – 6.4%	100 – 125 mg/dL	140 – 199 mg/dL	N/A
Normal	Below 5.7%	99 mg/dL or below	140 mg/dL or below	N/A

# Lifestyle <sup>10</sup>



## A Variety of Eating Patterns are Acceptable for the Management of Diabetes

- Mediterranean
- DASH
- Vegetarian
- Vegan
- Low fat
- Very low fat
- Low carb
- Very low carb

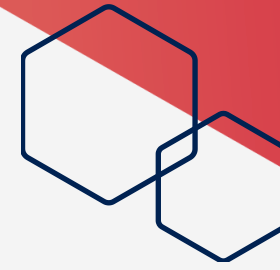


# Lifestyle <sup>10</sup>



**Individual** nutrition needs should be addressed based on personal and **cultural preferences**, health literacy and numeracy, **access** to healthful food choices, **willingness and ability** to make behavioral changes, as well as barriers to change.

- ❧ To maintain the pleasure of eating by providing **positive messages** about food choices, while **limiting food choices only when indicated by scientific evidence**
- ❧ To provide the individual with diabetes with **practical tools** for day-to-day meal planning



# Lifestyle <sup>10</sup>

- ❧ 150 minutes or more of moderate- to vigorous-intensity aerobic activity per week, spread over at least 3 days/week, with no more than 2 consecutive days without activity.
- ❧ 2–3 sessions/week of resistance exercise on nonconsecutive days.

# Pharmacological Interventions <sup>10</sup>



## **Type 1 diabetes**

- Insulin (syringe, insulin pen, insulin pump)

## **Type 2 diabetes**

- Diet and physical activity
- Oral
- Injectables
- Insulin

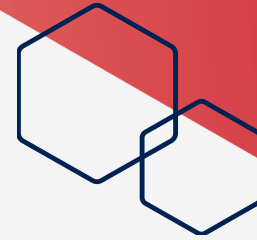




**Other benefits of  
addressing Diabetes**

# Diabetes Complications <sup>10</sup>

- Cardiovascular disease
- Retinopathy
- Neuropathy
- Foot ulceration and amputation
- Gum disease
- Hearing loss
- Sexual Dysfunction







# Diabetes and Dementia



## Summary

- Diabetes is a major risk factor for dementia
- Keeping blood glucose within range can help reduce diabetes complications
- African Americans bear a disproportionate diabetes and dementia burden
- SDOH must be integrated into health care delivery
- There are a variety of eating patterns acceptable for diabetes management



**Tools and  
resources for health  
professionals**

# Resources

## Books and Educational Materials

- [Standards of Care in Diabetes – 2023](#)
- [Academy of Nutrition and Dietetics Find a Dietitian](#)
- [Association of Diabetes Care and Education Specialist](#)
- [Oldways Preservative Trust](#)
- [Diabetes Guide to Enjoying Foods of the World](#)
- [Cultural Food Practices](#)
- Information about brain health, dementia and Alzheimer's: <https://mybrainguide.org/>

# Presenter Contact



**Website:**  
[www.eatingsoulfully.com](http://www.eatingsoulfully.com)

**Facebook:**  
[@livingwellwithdiabetes](https://www.facebook.com/livingwellwithdiabetes)

**Instagram:**  
[@yourdiabetesnutritionexpert](https://www.instagram.com/yourdiabetesnutritionexpert)

**Email:**  
[constance@eatingsoulfully.com](mailto:constance@eatingsoulfully.com)

# Thank you!



This presentation and related resources are available at:  
<https://www.usagainstalzhaimers.org/diabetes-and-dementia>

Please register for additional courses at:  
<https://www.usagainstalzhaimers.org/brain-health-academy>

For more information, contact:

Kelly O'Brien

UsAgainstAlzhaimers

[kobrien@usagainstalzhaimers.org](mailto:kobrien@usagainstalzhaimers.org)

© 2023, UsAgainstAlzhaimers or used with permission. All rights reserved. Please note that the materials used in connection with this course may be subject to copyright protection. Materials may include, but are not limited to: documents, slides, images, audio, and video. Unauthorized retention, duplication, distribution, or modification of copyrighted materials is strictly prohibited by law.



# References

- <sup>1</sup> Alzheimer's Association. (2022). *2022 Alzheimer's Disease Facts and Figures*. Alzheimer's Association. <https://www.alz.org/media/Documents/alzheimers-facts-and-figures.pdf>
- <sup>2</sup> Aranda, Maria P., Vega, William A., Richardson, Jason R., Resendez, Jason. (2019). *Priorities for Optimizing Brain Health Interventions Across the Life Course in Socially Disadvantaged Groups*. Florida International University and UsAgainstAlzheimer's.
- <sup>3</sup> Tsoy E, Kiekhoefer R.E., Guterman E.L., et al. (2021). Assessment of Racial/Ethnic Disparities in Timeliness and Comprehensiveness of Dementia Diagnosis in California. *JAMA Neurol.* <https://doi.org/10.1001/jamaneurol.2021.0399>
- <sup>4</sup> Development. of an NIA Practice-Based Research Network to Conduct Alzheimer's and Related Dementias Clinical Research. (2021). National Institute on Aging
- <sup>5</sup> Mudrazija, S., Vega, W., Resendez, J., & Monroe, S. (2020, November 15). *Place & Brain Health Equity: Understanding the County-Level Impacts of Alzheimer's*. UsAgainstAlzheimer's. [www.usagainstalzheimer.org/sites/default/files/2020-11/Urban\\_UsA2%20Brain%20Health%20Equity%20Report\\_11-15-20\\_FINAL.pdf](http://www.usagainstalzheimer.org/sites/default/files/2020-11/Urban_UsA2%20Brain%20Health%20Equity%20Report_11-15-20_FINAL.pdf)
- <sup>6</sup> Alzheimer's Association. (2022). *Causes and Risk Factors for Alzheimer's Disease*. Alzheimer's Association. <https://www.alz.org/alzheimers-dementia/what-is-alzheimers/causes-and-risk-factors>
- <sup>7</sup> Alzheimer's Association. (2022). *Younger/Early-Onset Alzheimer's*. Alzheimer's Association. <https://www.alz.org/alzheimers-dementia/what-is-alzheimers/younger-early-onset>
- <sup>8</sup> Podcasy, J. L., & Epperson, C. N. (2016). Considering sex and gender in Alzheimer disease and other dementias. *Dialogues in clinical neuroscience*, 18(4), 437.
- <sup>9</sup> Livingston, G., Huntley, J., Sommerlad, A., Ames, D., Ballard, C., Banerjee, S., ... & Mukadam, N. (2020). Dementia prevention, intervention, and care: 2020 report of the Lancet Commission. *The Lancet*, 396(10248), 413-446.
- <sup>10</sup> Centers for Disease Control and Prevention, National Diabetes Statistics Report (2020).
- <sup>11</sup> Standards of Care in Diabetes—2023 Abridged for Primary Care Providers. (2023). *Clinical Diabetes*, 41(1), 4–31. <https://doi.org/10.2337/cd23-as01>
- <sup>12</sup> Vasavada, A., & Taub, L. F. M. (2023). *Diabetes Mellitus Screening*. NIH National Library of Medicine National Center for Biotechnology Information. StarPeals Publishing. Retrieved May 31, 2023, from <https://www.ncbi.nlm.nih.gov/books/NBK554615/>.
- <sup>13</sup> Barbiellini Amidei, C., Fayosse, A., Dumurgier, J., Machado-Fragua, M. D., Tabak, A. G., van Sloten, T., Kivimäki, M., Dugravot, A., Sabia, S., & Singh-Manoux, A. (2021). Association Between Age at Diabetes Onset and Subsequent Risk of Dementia. *JAMA*, 325(16), 1640–1649. <https://doi.org/10.1001/jama.2021.4001>
- <sup>14</sup> *Diabetes and cognitive decline*. Alzheimer's Association. (2023). <https://alz.org/media/Documents/alzheimers-dementia-diabetes-cognitive-decline-ts.pdf>
- <sup>15</sup> Hill-Briggs, F., Adler, N. E., Berkowitz, S. A., Chin, M. H., Gary-Webb, T. L., Navas-Acien, A., Thornton, P. L., & Haire-Joshu, D. (2020). Social Determinants of Health and Diabetes: A Scientific Review. *Diabetes Care*, 44(1), 258–279. <https://doi.org/10.2337/dci20-0053>
- <sup>16</sup> *Diabetes and African Americans*. The Office of Minority Health. (2023, February 12). <https://minorityhealth.hhs.gov/omh/browse.aspx?lvl=4&lvlid=18>
- <sup>17</sup> *Profile: Black/African Americans*. The Office of Minority Health. (2023c, February 24). <https://www.minorityhealth.hhs.gov/omh/browse.aspx?lvl=3&lvlid=61>
- <sup>18</sup> *Obesity and African Americans*. The Office of Minority Health. (2023b, February 17). <https://www.minorityhealth.hhs.gov/omh/browse.aspx?lvl=4&lvlid=25>
- <sup>19</sup> Maguire, A. (2016). *Illustrating Equality VS Equity*. Interaction Institute for Social Change. Retrieved June 1, 2023, from <https://interactioninstitute.org/illustrating-equality-vs-equity/>.
- <sup>20</sup> *Standards of Care in Diabetes*. American Diabetes Association. (2023). <https://professional.diabetes.org/content-page/practice-guidelines-resources>
- <sup>21</sup> Centers for Disease Control and Prevention. (2023, February 28). *Diabetes Tests*. Centers for Disease Control and Prevention. <https://www.cdc.gov/diabetes/basics/getting-tested.html>

# Additional References

Risk reduction of cognitive decline and dementia: WHO guidelines. Geneva: World Health Organization; 2019. Licence: CC BY-NC-SA 3.0 IGO. <https://apps.who.int/iris/bitstream/handle/10665/312180/9789241550543-eng.pdf>

Iadecola, C., & Gottesman, R. F. (2019). Neurovascular and cognitive dysfunction in hypertension: epidemiology, pathobiology, and treatment. *Circulation research*, 124(7), 1025-1044.

Solomon, et al. (2009). *Dementia and Geriatric Cognitive Disorders*, 28(1), 75–80.

Kivipelto, M., Mangialasche, F., & Ngandu, T. (2018). Lifestyle interventions to prevent cognitive impairment, dementia and Alzheimer disease. *Nature Reviews Neurology*, 14(11), 653-666.

Okereke, Olivia I., et al. "Dietary fat types and 4-year cognitive change in community-dwelling older women." *Annals of neurology* 72.1 (2012): 124-134.

Morris, et al. (2015). *Alzheimer's & Dementia*, 11(9), 1007–1014.

Sabbagh, M. N., Perez, A., Holland, T. M., Boustani, M., Peabody, S. R., Yaffe, K., ... & Tanzi, R. E. (2022). Primary prevention recommendations to reduce the risk of cognitive decline. *Alzheimer's & Dementia*.

Office of Disease Prevention and Health Promotion. (n.d.). *Access to Foods that Support Healthy Dietary Patterns*. Healthy People 2030. <https://health.gov/healthypeople/priority-areas/social-determinants-health/literature-summaries/access-foods-support-healthy-dietary-patterns>

Diabetes Prevention Program (DPP) Research Group (2002). The Diabetes Prevention Program (DPP): description of lifestyle intervention. *Diabetes care*, 25(12), 2165–2171. <https://doi.org/10.2337/diacare.25.12.2165>

Tuomilehto J, et al, Finnish Diabetes Prevention Study Group. Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. *N Engl J Med*. 2001 May 3;344(18):1343-50. doi: 10.1056/NEJM200105033441801. PMID: 11333990.

Rees K, et al. 'Mediterranean' dietary pattern for the primary prevention of cardiovascular disease. *Cochrane Database of Systematic Reviews* 2013, Issue 8. Art. No.: CD009825. DOI: 10.1002/14651858.CD009825.pub2. Accessed 02 June 2022.

Christopher E. Zwilling, Tanveer Talukdar, Marta K. Zamroziewicz, Aron K. Barbey., Nutrient biomarker patterns, cognitive function, and fMRI measures of network efficiency in the aging brain, *NeuroImage*, Volume 188, 2019, Pages 239-251, ISSN 1053-8119

Ballarini et al, on behalf of the DELCODE Study Group, Mediterranean Diet, Alzheimer Disease Biomarkers, and Brain Atrophy in Old Age, *Neurology* Jun 2021, 96 (24) e2920-e2932; DOI: 10.1212/WNL.0000000000012067