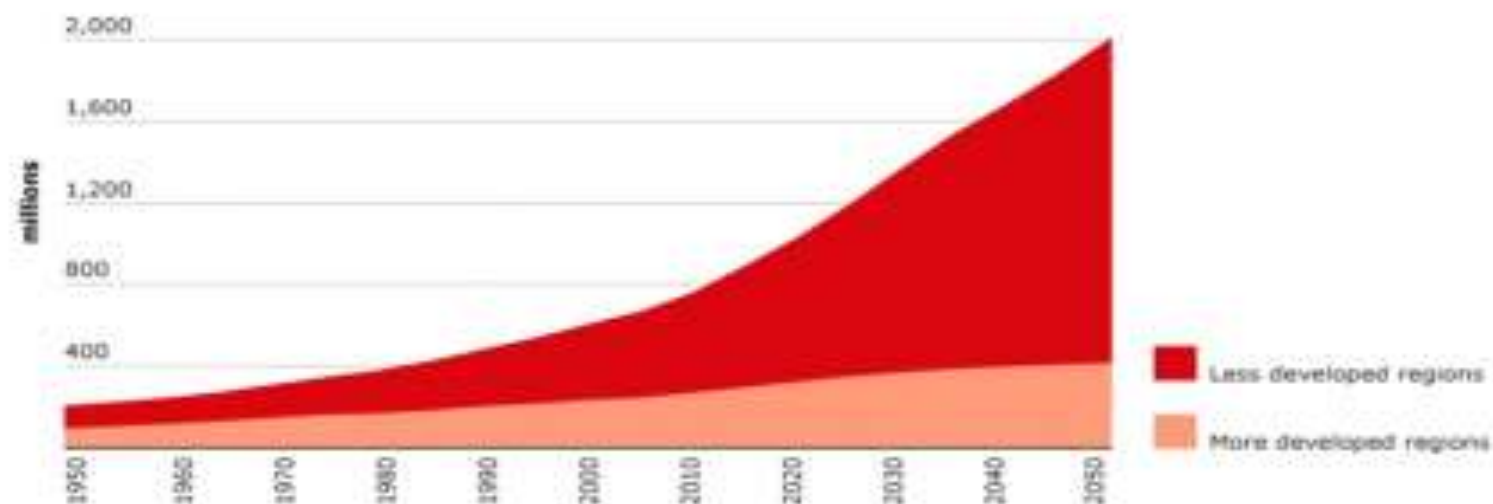


# Metabolic Syndrome Cognitive Decline

Zahra Vahabi MD

2022

the worldwide prevalence of dementia is expected to grow in the next 30 years by 92% in high and 176% in low-to-middle-income countries.



- Midlife Metabolic Dysfunction and Cardiovascular disease have been proposed as mechanisms of degeneration of brain structure and function in middle age

- Obesity on brain structure have documented late-life atrophy in older adults who were obese at midlife
- Increased white matter lesions in older age for individuals with higher BMI almost two decades earlier

# Obesity



- Midlife hypertension and Diabetes have also been identified as risk factors for later life dementia

- Metabolic syndrome :  
Abdominal obesity,  
High Triglyceride levels,  
Low High-Density Lipoprotein (HDL) cholesterol,  
Above normal blood pressure (prehypertension)  
Above normal blood sugar (prediabetes)

- MetS, defined by the co-occurrence of at least three of the five components within a single individual, has been associated with increased risk for Vascular Dementia



- Frontal lobe pathology and Executive Dysfunction are thought to be the earliest markers for brain changes resulting from Cardiovascular disease.
- While initial interest in cognitive impairment had focused on the Temporal Lobe and Memory functions as the primary area of Attention

- Frontal Lobe regions as the most susceptible early cognitive changes



## Executive Function Paradigm:

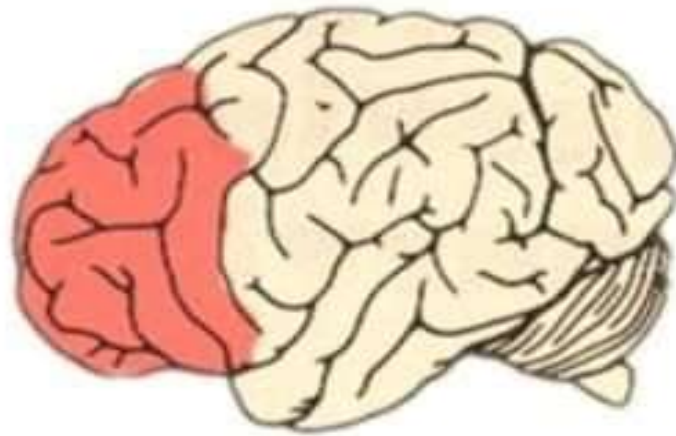
- Goal Setting
- Cognitive Flexibility/Shifting
- Organizing
- Accessing Working Memory
- Self-Monitoring



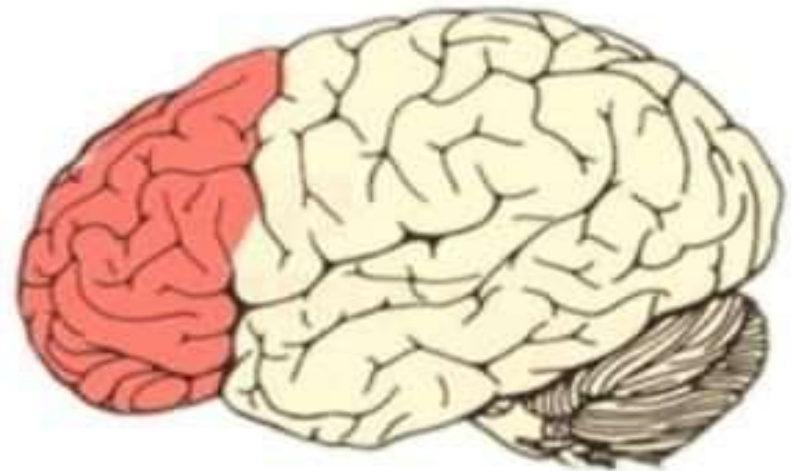
PFC Cat



PFC Macaque

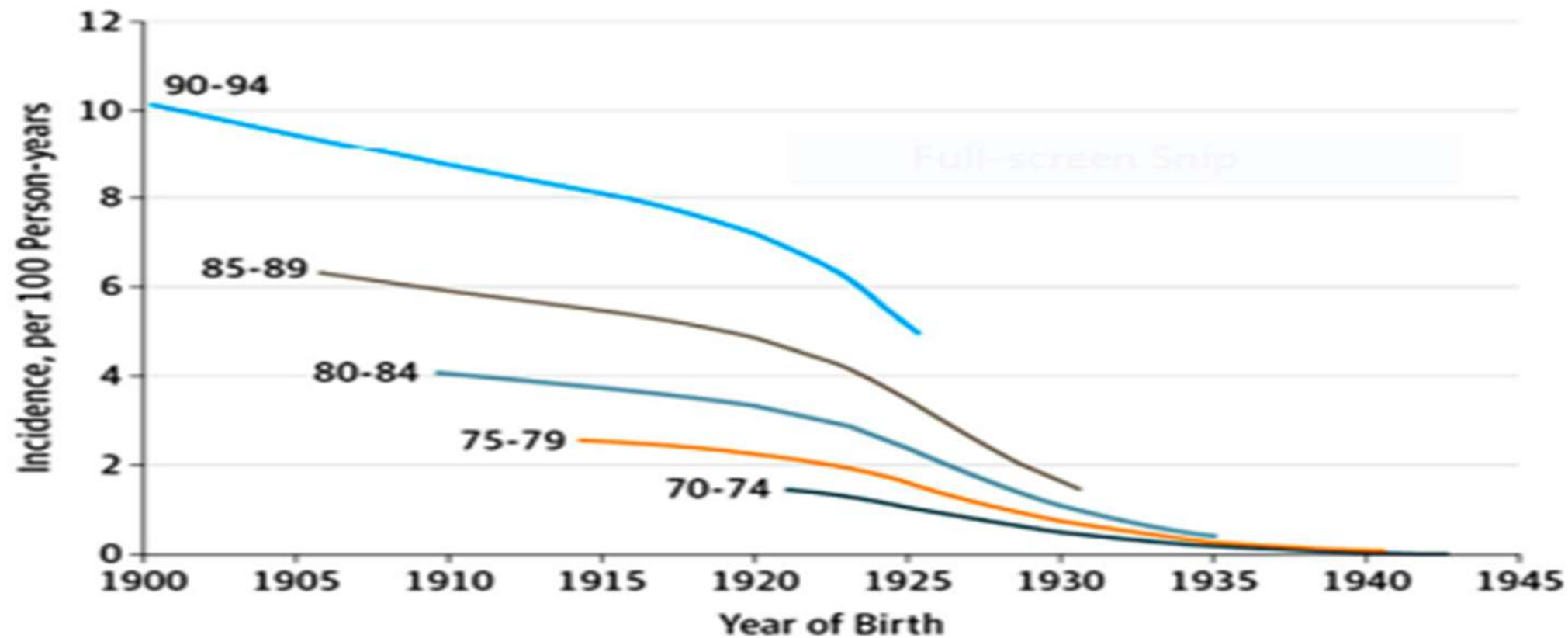


PFC Chimpanzee



PFC Human

- White matter hyperintensities, commonly seen in older adults, are significantly associated with executive dysfunction specific to attention and speed in a clinical sample with Vascular Dementia



**FIGURE 1** Dementia prevention in action: secular trend of decreased incidence of dementia as a function of date of birth and age in the Einstein Aging Study. Figure taken from: Derby et al.<sup>7</sup>



# RISK FACTORS

Across the lifespan

- Unhealthy diet
- Alcohol misuse
- Smoking
- Diabetes

APOE, other genes

Familial aggregation

- Obesity
- Hypertension
- Dyslipidemia

- Neuronal damage
- Vascular insults



**DEMENTIA**

Across the lifespan

- Education
- Physical activity
- Cognitive & social activity

- Brain reserve
- Cognitive reserve

# PROTECTIVE FACTORS

**Non-modifiable protective factors**

- Genetics (i.e. *APOEε2*)

**Modifiable protective factors**

- Education attainment
- Mediterranean diet
- Moderate alcohol intake?
- Physical exercise
- Intellectual and social activities

**Non-modifiable risk factors**

- Aging
- Genetics (i.e. *APOEε4*)

**Modifiable risk factors**

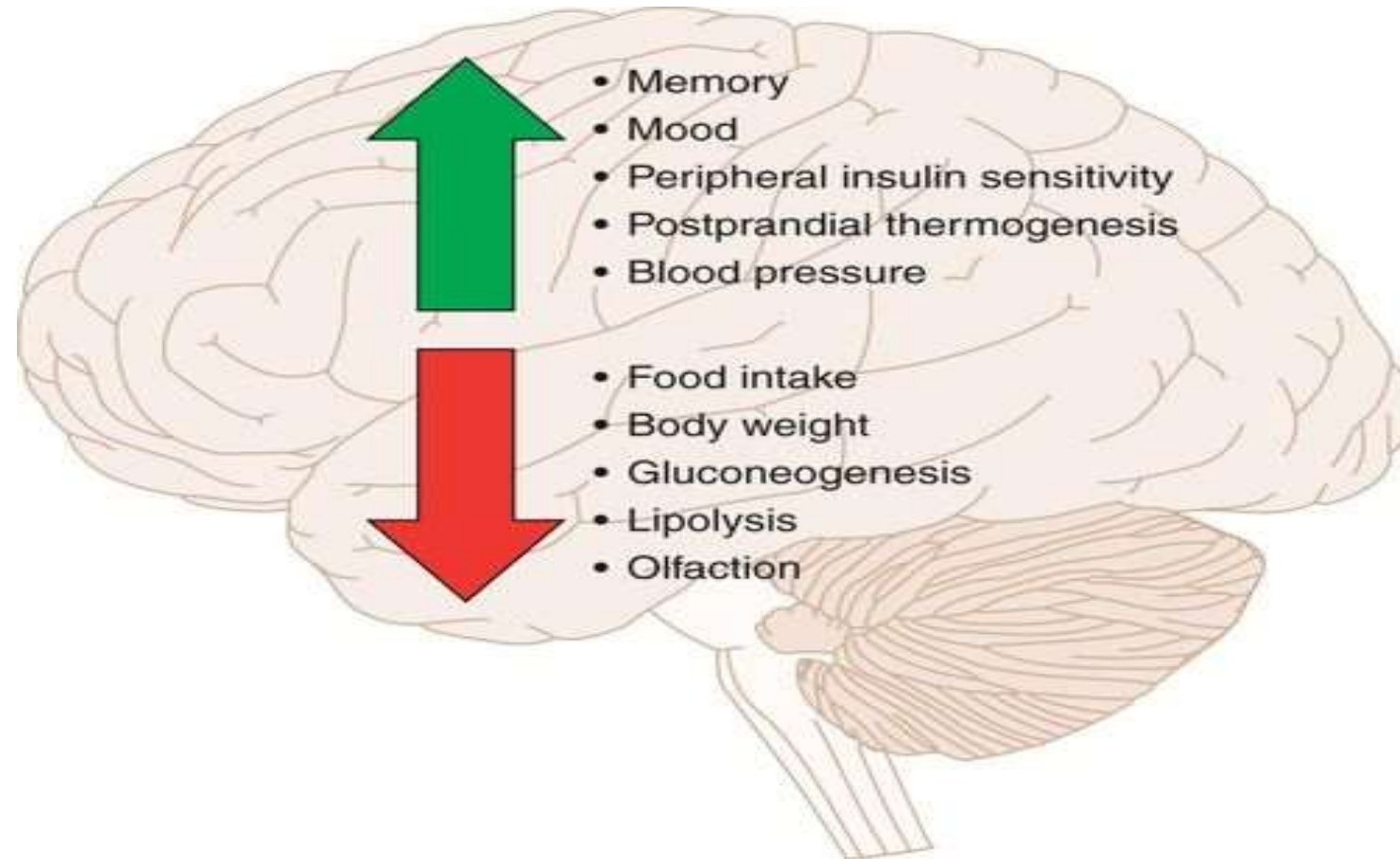
- Vascular risk factors:
  - Hypertension
  - Diabetes mellitus
  - Obesity
  - Hypercholesterolemia?
  - Smoking

---

**RISK  
OF  
DEMENTIA/AD**

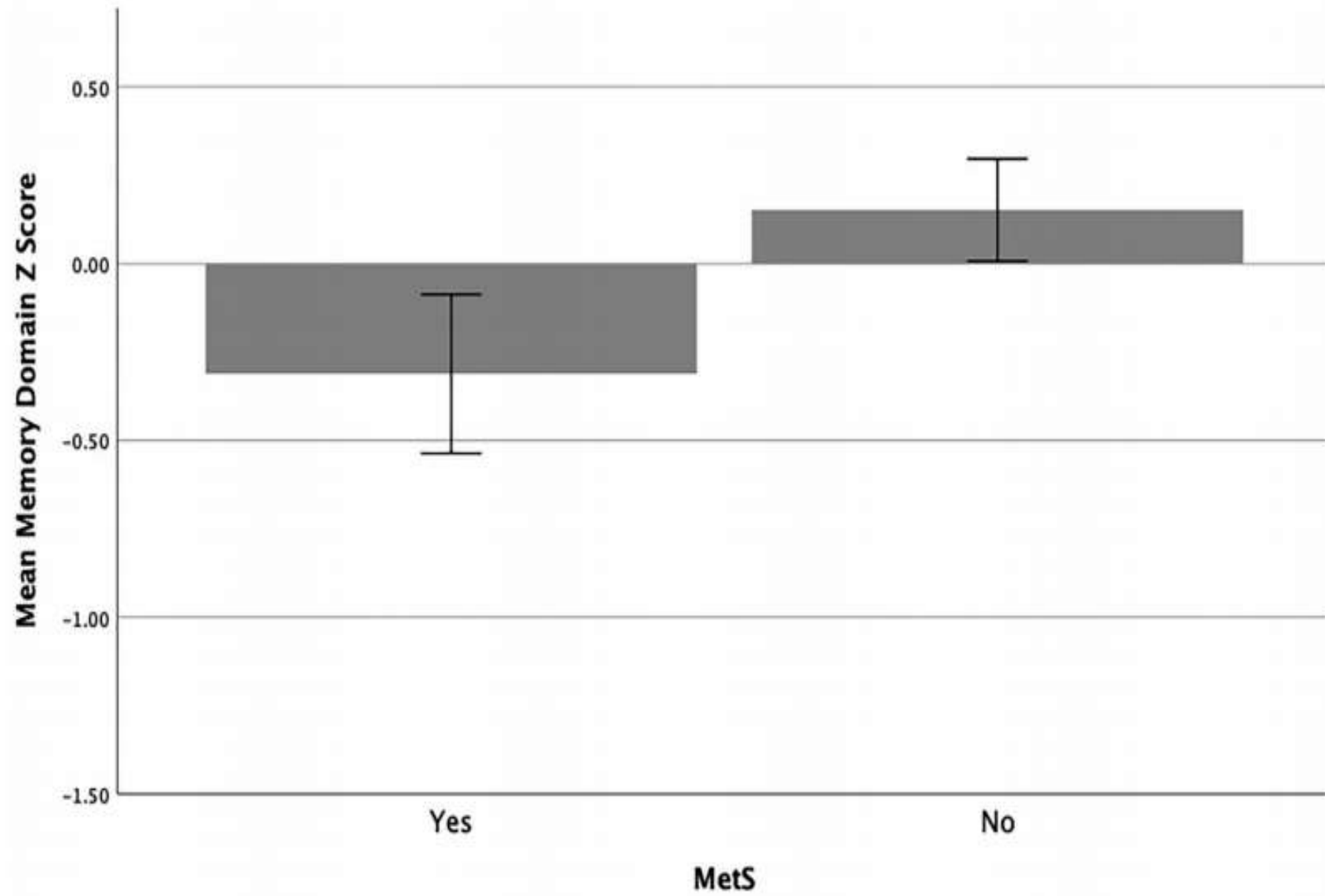


- Metabolic syndrome and Cognitive Domains



- 409 right-handed adults between the ages of 40 and 60
- Normal , metabolic syndrome ( number of met component )





What Is Best Way ?





#45546022

