Diet and Cognitive Function

“Scientists unlock the secret of staving off dementia - and it's all in your diet”

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Conflict of Interest

I have no conflict of interest
Scientists unlock the secret of staving off dementia - and it's all in your diet

Here's how to prevent dementia, according to new world health guidelines
Questions We’ll Try to Answer

• Do particular diets reduce the risk of cognitive decline/dementia?

• What evidence do we have for these dietary approaches?
Name that Diet!

Dietary Approaches to Stop Hypertension (DASH) Diet

Mediterranean Diet
DASH Diet

• Higher intake of:
  – Fruits
  – Vegetables
  – Low-fat dairy products
  – Whole grains
  – Poultry
  – Fish
  – Nuts

• Lower intake of:
  – Fats
  – Red meat
  – Sweets
  – Sugar-containing beverages
DASH Diet and Cognition

• Cache County Study (2013)
  – Older men and women in the highest quintile of DASH score had higher scores on cognitive function tests over an 11 year period
  – Those in the higher quintiles were more educated, physically active, take vitamin/supplement, consume less fat, and less likely to smoke or drink
  – Difference persisted even after accounting for education, BMI, smoking and drinking, physical activity; and for diseases such as stroke, myocardial infarction, and diabetes
DASH Diet and Cognition

• Memory and Aging Project (2014)
  – Participants were grouped by tertiles based on DASH score
  – Detailed cognitive testing
  – Higher DASH score was associated with slower rates of cognitive decline
  – Effect was not modified even after adjusting for age, sex, presence of ApoE4, stroke, hypertension, or diabetes
DASH Diet and Cognition

• Nurses Health Study (2016)
  – Examined the association of long-term adherence to DASH and cognitive function and decline
  – Greater adherence to DASH long term was associated with better cognitive function over 6 years
  – Adherence resulted in unchanged cognitive function over 6 years
  – After adjusting for age, education, BMI, caloric intake, physical activity, smoking, alcohol intake, and high blood pressure, hypercholesterolemia, diabetes, and myocardial infarction, effect persisted in the highest quintile
Mediterranean Diet

• What’s in the Mediterranean diet?
  – Abundant plant foods (fruit, vegetables, breads, other forms of cereals, potatoes, beans, nuts, and seeds)
  – Fresh fruit as the typical daily dessert
  – Olive oil as the principal source of fat
  – Dairy products (principally cheese and yogurt)
  – Fish and poultry in low to moderate amounts
  – Eggs-zero to four consumed weekly
  – Red meat consumed in low amounts
  – Wine in low to moderate amounts
Mediterranean Diet (MedDiet) and Cognition

• PREDIMED-NAVARRA (2013)
  – Randomized prevention trial comparing MedDiet to low fat diet
  – As it was a cardiovascular disease (CVD) study initially, participants has significant cardiovascular risk
  • Two arms of the MedDiet intervention:
    – Supplemented with extra-virgin olive oil (EVOO)
    – Supplemented with nuts (walnuts, almonds, hazel nuts)
Mediterranean Diet (MedDiet) and Cognition

• PREDIMED-NAVARRA results
  – Higher Mean Mini-Mental State Exam (MMSE) and Clock Drawing Test (CDT) Scores in the MedDiet + EVOOO group vs. control after 6.5 years
    • Difference persisted even after adjusting for sex, age, education, ApoE, family history of cognitive impairment/dementia, BMI, caloric intake, physical activity, smoking, and alcohol intake; diabetes, hypertension, and dyslipidemia; and incident depression
  – Adjusted Mean Mini-Mental State Exam (MMSE) and Clock Drawing Test (CDT) Scores were higher in the MedDiet + nuts group vs. control
Mediterranean Diet (MedDiet) and Cognition

• Barcelona North-PREDIMED
  – Similar design to PREDIMED-NAVARRA but participants underwent more cognitive tests
  – Results:
    • Global composite cognitive scores better in MedDiet groups (EVOO or nuts) vs. control
    • Memory composite cognitive scores better in MedDiet groups vs. control
    • Frontal composite cognitive scores better in MedDiet groups vs. control
Mediterranean Diet (MedDiet) and Cognition

- **Cache Study (MedDiet arm)**
  - Those in the highest quintile of MedDiet had higher scores on cognitive function tests over an 11 year period
- **Memory and Aging Study (MAP)**
  - The higher the MedDiet score, the slower the rate of cognitive decline
Mediterranean Diet (MedDiet) and Cognition

• Not all studies show a positive outcome
• Women’s Health Study (2013)
  – Cardiovascular study that looked also at diet and cognition
  – After 5 years:
    • Adherence to the MedDiet did not have an effect on the trajectories of repeated cognitive scores, nor averaged cognition in older age
    • Association between whole grains and monounsaturated-to-saturated fats ratio to averaged cognition in older age
Dietary Patterns and Cognitive Decline

- Women’s Health Initiative Memory Study (2016)
  - Looked at association of alternative MedDiet (aMED), DASH, and 2 other diet scores and cognitive decline (mild cognitive impairment or MCI, probable dementia or PD)
  - Over a median period of 9 years, there was no association between the quintile scores on the aMED, DASH, and the other diets and MCI or PD
  - Also looked at diet scores in hypertensive participants, and it did not modify the risk of MCI or PD
What if we combine DASH and MedDiet?

- Does it exist?
- Mediterranean-DASH Intervention for Neurodegenerative Delay (MIND)
MIND Study (2015)

- Participants were in the Memory and Aging Project (MAP)
- Compared MIND, MedDiet, and DASH
- After an average follow-up of 4.5 years, moderate to high adherence to the MIND diet was associated with a lower hazard ratio of Alzheimer’s disease (AD)
- Only the highest tertiles of DASH and MedDiet were associated with lower risk of AD
Anti-inflammatory Diet

- Polyunsaturated fatty acids (PUFA)
- Curcumin
- Resveratrol
- Vitamin D3
- Caffeine/coffee
- Probiotics

Diet and Inflammation

• Women’s Health Initiative Memory Study (2017)
  – Association of higher Diet Inflammation Index (DII) scores with greater cognitive decline and earlier onset of cognitive impairment
  – Slightly higher risk of mild cognitive impairment (MCI) and probable dementia
Nutritional patterns and cognition/dementia

• Review Article: “Nutritional patterns associated with the maintenance of neurocognitive functions and the risk of dementia and Alzheimer’s disease: A focus on human studies” [https://doi.org/10.1016/j.phrs.2018.03.012]

• Association of some dietary patterns with lower rates of cognitive decline and risk of dementia
  – High intake of plant-based products, low intake of red meat, sweets

• Limited or contradictory evidence on single nutrients (folic acid, curcumin/turmeric, vitamin B12, resveratrol, etc.) or multicomponent supplements (Souvenaid)
Nutrients and nutritional patterns in neurocognition and Alzheimer’s disease risk

**Neuroprotective foods:**
- Vegetables
- Fruits
- Whole grains
- Soy beans
- Nuts
- Moderate fish intake
- Reduced caloric intake or caloric restriction mimetics (e.g., resveratrol)
- Extra virgin olive oil
- Legumes
- Berries
- Dark green leafy vegetables
- Probiotics

**Supplementation of neuroprotective nutrients:**
- B vitamins
- n-3 PUFAs
- Vitamin E
- Vitamin D
- Curcumin/turmeric
- Sulforaphane
- Genistein
- Fortasyn Connect and other multi-component supplementations

**High evidence**

**Controversial evidence**

**High evidence**

- Foods detrimental for neurocognition:
  - Saturated or trans-unsaturated fats
  - Red meat
  - Poultry
  - High-fat dairy products
  - Processed foods
  - Refined sugars (e.g., sweets, sugar-sweetened soft drinks)
  - Pastries
  - Fructose- and purine-rich foods

- Other factors:
  - Impaired systemic availability of certain nutrients (e.g., DHA, EPA, choline, B vitamins (e.g., B1, B12, folate), vitamin C, vitamin E, vitamin D, uridine, choline, minerals)
  - MetS-related risk factors (e.g., hyperhomocysteinemia, insulin resistance)
  - Decrease of plasmatic phosphatidylcholine species
  - Increase of plasmatic carbonyl proteins
  - Nutritional deficiencies in early life
What we now so far…

• Do particular diets reduce the risk of cognitive decline/dementia?
  – Maybe.

• What evidence do we have for these dietary approaches?
  – DASH
    • Positive: CACHE, MAP, Nurses Health Study
    • Null: Women’s Health Initiative Memory Study (WHIMS)
  – MedDiet
    • Positive: PREDIMED, CACHE, MAP
    • Null: Women’s Health Study, WHIMS
  – MIND Diet
    • Positive: MAP
  – Inflammation
    • Positive: WHIMS
What’s on the horizon?

• Ongoing or studies that are recruiting:
  – DASH diet
  – MedDiet
  – MIND diet
  – HIGH diet (high in saturated fat and high glycemic index foods)
  – Ketogenic diet
  – Supplements