Multicultural Healthy Diet to Reduce Cognitive Decline & Alzheimer's Disease Risk

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POLLING QUESTION

WHAT IS LEAST LIKELY TO HELP PREVENT MEMORY DECLINE?

A. Being physically active

B. Keeping blood sugar levels under control

C. Avoiding gluten

D. Eating colorful fruits and vegetables

E. Controlling blood pressure

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AGENDA

1.Burden of dementia/Alzheimer's Disease in US

2. Why Nutrition?

- Evidence from animal studies & epidemiological & clinical trials in humans
- Dietary patterns, nutrients and foods associated with brain health
- Role of Inflammation, the Dietary Inflammatory Index

3. What can be done?

- Design clinical trials that tests dietary patterns
  - World-wide FINGERS
  - Multicultural healthy dietary pattern to reduce cognitive decline & Alzheimer's Disease Risk

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US BURDEN OF DEMENTIA

- Alzheimer's Disease is the sixth leading cause of death.
- In 2021 direct costs for caring for individuals with Alzheimer's Disease (AD) & other dementias in the USA estimated to be over $355 billion. Costs to increase to $1.1 trillion (in today's dollars) by 2050.
- Today 6.2 million Americans 65 or older live with AD. In 2050 it is estimated that 12.7 million will have AD with Black and Hispanic adults particularly at risk.
- One in 10 people age 65 and older (10 percent) has Alzheimer's dementia.

*Source: https://www.alz.org/alzheimers-dementia/facts-figures 2022

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EVIDENCE BASE FOR DIET & COGNITION

- **ANIMAL STUDIES**: Rat studies indicate a high fat and sucrose diet, as a model of a Western diet, leads to impairments in neuronal plasticity, learning and behavior.
- **EPIDEMIOLOGICAL STUDIES: indicate association, not causation**
  - Brain imaging: lower intakes of nutrient-dense foods and higher intakes of unhealthy foods independently associated with smaller **left hippocampal volume**.
  - Dietary patterns: **Anti-inflammatory: Mediterranean, MIND (Mediterranean plus DASH), Nordic.**
  - Nutrients: carotenoids (lutein- most prominent carotenoid in the brain associated with vision- highly available in avocado), folate, vitamin D, n-3 fatty acids.
  - Foods: ***Lutein*: broccoli, spinach, kale, kiwi fruit, grapes, oranges, zucchini, and squash. *Folate*: Green leafy, avocado, eggs, fruits; *Vitamin D*: vitamin D fortified products, sardines; *n-3 fatty acids*: Fish, nuts.**

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NORDIC DIET

The Baltic Sea Diet Pyramid (created by the Finnish Heart Association, the Finnish Diabetes Association and the University of Eastern Finland)

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CLINICAL TRIAL: Multimodal versus Single Focus At Risk versus Healthy

FINGER TRIAL (Finland)

- For **at-risk adults**: 2 yr multi-modal intervention targeted physical inactivity, cognitive inactivity, depression, overweight and obesity, diabetes (type 2), high blood pressure and smoking.
- **Diet advice- Nordic Diet**:
  - High consumption of fruit & vegetables,
  - Wholegrain cereal products,
  - Low-fat milk and meat products,
  - Sucrose intake <50 g/day, or <10 tsp/day (one 12 fl oz can of soda has 9.5 tsp. of sugar)
  - Vegetable margarine & rapeseed oil instead of butter,
  - Fish at least two portions per week.
- After 2 years, the neuropsychological test battery scores in the intervention group were 25% higher than in the control group. For some cognitive domains, the impact of the intervention was even larger.

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CLINICAL TRIALS: Multimodal vs. Single Focus; At risk or healthy?

WORLDWIDE FINGERS- ongoing or in planning stages**:**

- MIND-CHINA;SINGER (SINGAPORE);US POINTER: Five sites in US (California, North Carolina);MYB- Maintain Your Brain (AUSTRALIA): computerized multi-modal: 55- 75 yr- non-demented

MULTICULTURAL HEALTHY DIET TO REDUCE COGNITIVE DECLINE & ALZHEIMER'S DISEASE RISK:

- ambulatory cognitive assessment
- anti-inflammatory diet trial with group and individual sessions
- 40-65 yr diverse Bronx Co-op City **healthy** adults

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MOTIVATION FOR MULTICULTURAL HEALTHY DIET STUDY

- MIND diet associated with reduced incidence of Alzheimer's Disease in a primarily Euro-American cohort in Chicago (n=923.)[1]
- Anti-inflammatory diet based on the DII associated with higher cognitive status in a middle-aged cohort in France (n= 3,080).[2]
- Anti-inflammatory diet based on the DII associated with lower risk of mild cognitive impairment and dementia onset among 7,109 participants from the Women's Health Initiative.[3]

[1]Morris MC, Tangney CC, Wang Y, Sacks FM, Bennett DA, Aggarwal NT. MIND diet associated with reduced incidence of Alzheimer's disease. Alzheimers Dement. 2015;11(9):1007-14. Epub 2015/02/15.

[2]Kesse-Guyot E, Assmann KE, Andreeva VA, Touvier M, Neufcourt L, Shivappa N, Hebert JR, Wirth MD, Hercberg S, Galan P, Julia C. Long-term association between the dietary inflammatory index and cognitive functioning: findings from the SU.VI.MAX study. Eur J Nutr. 2016. Epub 2016/04/09.

[3]Hayden KM, Beavers DP, Steck SE, Hebert JR, Tabung FK, Shivappa N, Casanova R, Manson JE, Padula CB, Salmoirago-Blotcher E, Snetselaar LG, Zaslavsky O, Rapp SR. The association between an inflammatory diet and global cognitive function and incident dementia in older women: The Women's Health Initiative Memory Study. Alzheimers Dement. 2017. Epub 2017/05/23

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Multicultural Healthy Diet is based on the Dietary Inflammatory Index

- An index that assesses diets based on their effect on six inflammatory biomarkers: IL-1β, IL-4, IL-6, IL-10, TNF-α and C-reactive protein.[1]
- Population-based index based on published data that compares populations worldwide on the inflammatory potential of their diets. Overall score takes into account the whole diet, not just the individual nutrients or foods and does not depend on specific population means or recommendations of intake.
- DII is based on 45 food parameters; includes whole foods, nutrients and other bioactive compounds such as vitamins B12 to garlic, ginger, n-3 fatty acids, onions, green tea, flavonones, thyme, and oregano each of which is rated according to its inflammatory potential.

[1]Shivappa N, Steck SE, Hurley TG, Hussey JR, Hebert JR. Designing and developing a literature-derived, population-based dietary inflammatory index. Public Health Nutr. 2014;17(8):1689-96.

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Multicultural Healthy Diet in Bronx, New York

- 290 participants 40-65 yrs of age are participating in this ongoing study of diet and cognition
- Participants represent diversity of the Bronx (45% Black, 41% Hispanic/Latino, 23% White and 79% female adults.)
- Primarily from Co-op City and surrounding areas

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Co-op City, Bronx, New York

https://en.wikipedia.org/wiki/Co-op_City,_Bronx

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Multicultural Healthy Diet Research Study

- Are you a man or woman between 40-65 years of age?
- Do you live, work or attend school in Co-Op City?
- Are you interested in making a difference?

If so, you may be eligible for a research study that examines whether changes in eating patterns can reduce memory loss and risk for Alzheimer's Disease.

If eligible for the study, you will:

- Be invited to the Albert Einstein College of Medicine clinical site for a visit.
- Play brain games on a smartphone.
- Attend four health education sessions on diet or aging topics, which will be held here in Co-Op City.
- Receive monthly phone calls on health topics from us.
- Be compensated for your time.
- Meet your neighbors and have fun!

For more information please call the Multicultural Healthy Diet Study team at: 718-430- 3823 or email: healthydiet326@gmail.com

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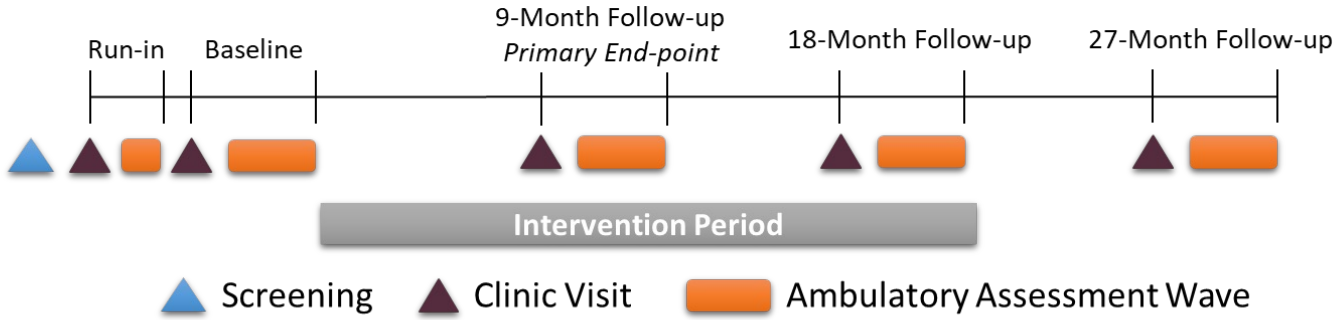
Study Activities

(A)



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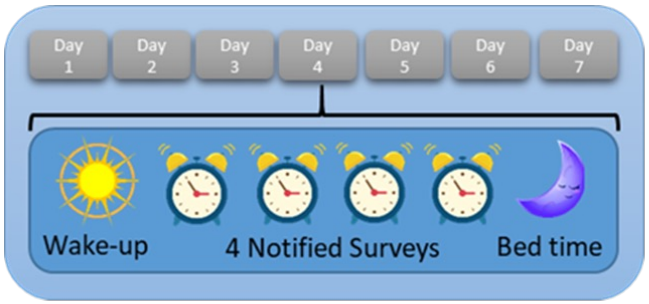

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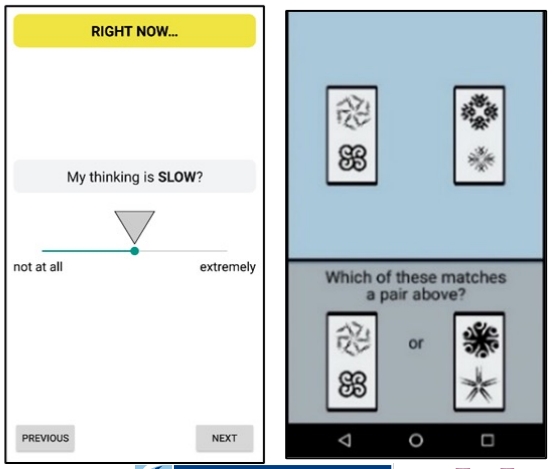

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Randomization

- To the Multicultural Healthy Diet
- OR
- To Sessions on Safety Topics (vaccinations, avoiding falls, etc.)

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MULTICULTURAL HEALTHY DIET

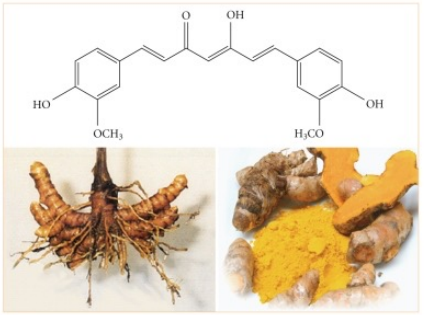

Photo of the curcumin plant (A) & rhizomes of Curcuma longa Linn plant and chemical structure of polyphenolic curcumin compound.

Source: Zebib B et al. Stabilization of curcumin by complexation with divalent cations in glycerol/water system. Bioinorganic Chemistry & Applications, 2010.
Source A: Parekh HS, Liu G, Wei MQ. A New Dawn for the use of Chinese Medicine in Cancer Therapy. Mol Cancer. 2009 Mar 20;8:21.

Ginger photo source: Environmental Health Perspectives; Vol. 115, #1: Nov. 2007.

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Multicultural Healthy Diet: Weekly Shopping List

Whole grain cereals 1/day

Vegetables such as broccoli 2/week

Mixed vegetables with carrots 2/week

Other vegetables such as sweet peppers, bok choy, eggplant, beets 1/day

Bananas 1/day

Cantaloupe or mango or papaya 1/day

Onions 1/day

Tomatoes or tomato juice 1/day

Garbanzo, kidney, red beans, black-eyed, pigeon peas (gandules), yellow split or Chinese peas 1/day

Lentils 2/week

Nuts/nut butters 1/day

Garlic, chives or scallions 1/day

Coffee or tea 2-3/day

Pumpkin pie or sweet potato pie limit to 1/week

Beef stew limit to 1/week

Ice cream 1/week

Total DII Score - 4.67
Highly Anti-Inflammatory*

Score ranges from -8.87 maximally anti-inflammatory to +7.98 maximally pro-inflammatory; Note all servings are medium.

***Per DII Screener**

Multicultural Healthy Diet: Hit List

Core Session Topic & Learning Objectives	MHD Component Targeted	Biomarker for assessment and/or monitoring method
#1 Key components of MHD Diet Understanding inflammation and role in cognitive health Identifying and preparing foods that reduce inflammation	**Embrace foods high in anti-inflammatory properties such as: cantaloupe, broccoli, green leafy vegetables, nuts, berries, beans, whole grains, fish, poultry, other vegetables, fish, water upon waking; seasonings/herbs such as ginger, turmeric, saffron, rosemary, thyme, oregano, cloves; vegetable/bean soups encouraged to increase hydration; choose healthy oils for salads, cooking (e.g. olive oil)**	Positive biomarker: Levels of serum B12, tocopherols/ carotenoids (for yellow, orange and green vegetables), levels of metabolized folate (for green leafy vegetables, beans, avocadoes, bananas, whole grains, fish) , fatty acid panel; Negative biomarkers: C-reactive protein, IL-6
Hit List	Limit red meats, butter/stick margarine, cheese, pastries/sweets, fried/fast food	
#2 Shopping Smart: Label Reading at Supermarket	Get to know the produce sections of your supermarket (fresh/frozen/canned); being savvy about nutrition facts labels	Self-monitoring via paper-based food diary or web-based method
Hit list	Limit processed foods	
#3: Power of Habits & Self-monitoring	Establish MHD habits and stay hydrated; adapt cooking techniques to add spices/herbs	Participant learns ways to add anti-inflammatory compounds such as herbs/spices in food preparation
Hit list	Limit butter, margarine, pastries, sweets, fast/fried foods, soda, hot dogs, sugar-sweetened beverages	
#4 Dealing skillfully with social situations & food selection	Behavioral strategies to deal with social situations and slips/setbacks	Self-monitoring via paper-based food diary or web-based method
Monthly calls to month 18	Tailored to participant using motivational interviewing	Motivational interviewing approach

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Multicultural Healthy Diet: A Typical Day

MHD Diet--A Typical Day--Based on the Dietary Inflammatory Index with adaptations to cultural context and emphasis on hydration. Drink a cup of water upon waking and water throughout the day

Breakfast: One cup whole grain cereal with ½ cup berries or sliced bananas and ¼ cup milk or whole grain bread with nut butter spread (e.g. almond, cashew) and fruit; green or regular tea or coffee with milk if desired and not more than 1 tsp sugar.

Snack: 1/3 cup cashews or almonds or fruit such as mango or banana and milk beverage (batida) made without sugar

Lunch: Sandwich with two slices whole wheat bread 1 oz low-fat mozzarella cheese or chicken slices and half an avocado mashed 1 or more cups of water or tea/coffee preferably without sugar

Salad: 1 cup romaine lettuce or baby kale or arugula; 1 cup fresh cucumber slices; ¼ cup chick peas;1/2 cup tomatoes; 1 Tbsp olive oil and vinegar dressing; 1 or more cups of water

Dinner: 4 oz broiled salmon or catfish or chicken or baked pork chops seasoned with chopped onions/tomatoes or turmeric, garlic, ginger or tarragon or vegetarian alternative: red beans or pigeon peas (gandules) and brown rice with chopped tomatoes, roasted peppers and green olives, cilantro, onions, bell peppers, and capers; ½ cup whole grain (quinoa, brown rice) and/or 1 cup lentils,½ cup squash or beets

Salad: ½ cup arugula or baby spinach, ½ cup tomatoes, ½ cup cucumbers, 1Tbsp olive oil & vinegar dressing

Dessert: Sweet potato custard made with evaporated skim milk with 6 grams of sugar per serving or fruit (orange, kiwi etc.)

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EXAMPLES OF AMBULATORY COGNITIVE MONITORING

Figure 3. Dot Memory Task

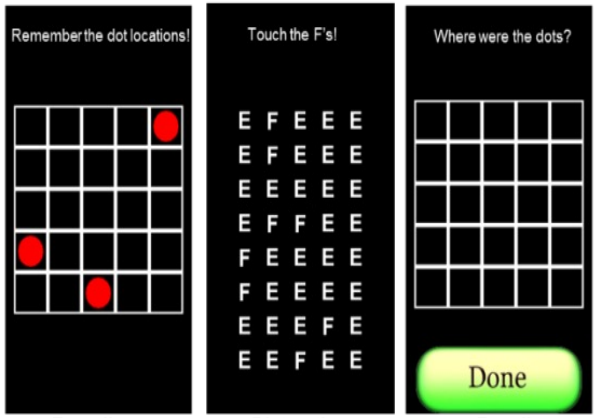
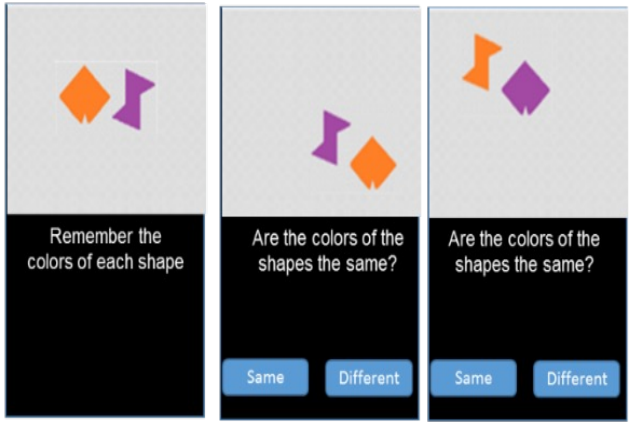


Figure 4. Symbol Comparison

Figure 5. Short-term Memory



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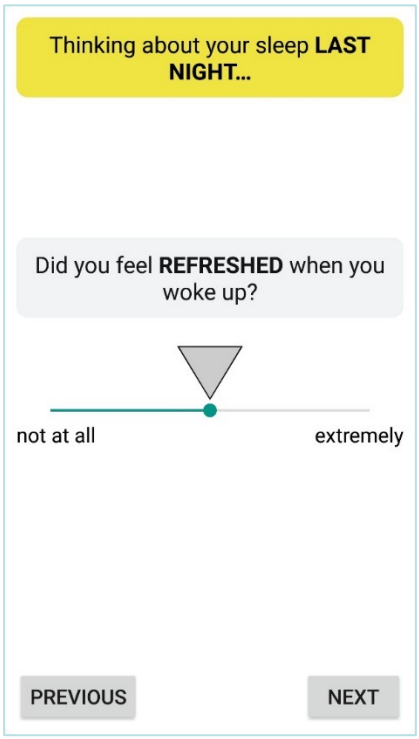
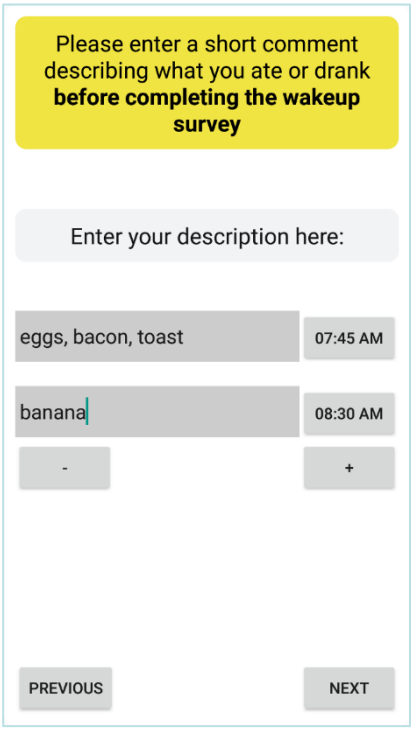
ECOLOGICAL MOMENTARY ASSESSMENT





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Outcomes

Primary Outcomes

Our primary outcomes are between arm comparisons of the global composite cognition scores of three cognitive tasks at 9 months post baseline. The primary outcome will consist of a z-score global composite measure of the three cognitive tasks relating to spatial memory, processing speed and detection of Early Alzheimer Disease.

Secondary Outcomes

Our secondary outcomes are between arm comparisons of MHD-related dietary intake based on self-report and biomarker measures of intake at 9 months post baseline. In addition, our secondary outcomes will consist of examining dietary effects on each of the three tasks (memory, processing speed, short term binding memory) to determine whether observed intervention effects are attributable to specific cognitive domains.

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Practice Applications

- 1. Consistent evidence from animal, epidemiological and clinical trials indicates that a life-long inflammatory diet high in sugar & refined foods and low in fruits and vegetables is associated with cognitive decline.
- 2. For individuals at risk e.g. who are physically or cognitively inactive, or are depressed, overweight and obese, have diabetes (type 2), or high blood pressure or smoke, evidence is emerging that a multi-modal intervention indicates benefit.
- 3. Research is ongoing as to whether for individuals with a pro-inflammatory diet, changing to an anti-inflammatory diet can potentially attenuate cognitive decline as early as mid-life.

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- Co-Investigators:

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  Study physician: Jelena Pavlovic, MD, Ph.D.

- Consultants: James Hebert, Sc.D., Nitin Shivappa, MBBS, MPH, Ph.D.
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