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**FROM THE ALZHEIMER'S ASSOCIATION INTERNATIONAL CONFERENCE 2017**

**HEALTHY EATING HABITS MAY PRESERVE COGNITIVE FUNCTION  
AND REDUCE THE RISK OF DEMENTIA**

*– Mediterranean and MIND diets may lower risk of cognitive impairment up to 35 percent –*

**LONDON, July 17, 2017** – Results from four large population-based studies support a connection between good dietary practices and better cognition in old age. Study results were reported at the 2017 Alzheimer's Association International Conference (AAIC 2017) in London.

A group of U.S. scientists found that, among nearly 6,000 older adults in the Health and Retirement Study, those who consistently followed diets long known to contribute to cardiovascular health were also more likely to maintain strong cognitive function in old age. They found that sticking to the specially designed MIND diet and Mediterranean diet was associated with 30 to 35 percent lower risk of cognitive impairment in healthy older adults. In fact, the investigators discovered that those with healthier diets exhibited meaningful preservation of cognitive function.

- The Mediterranean and DASH (Dietary Approaches to Stop Hypertension) diets were originally developed or codified to help improve cardiovascular health.
- A hybrid of these diets, called the Mediterranean-DASH Intervention for Neurodegenerative Delay, or MIND diet, is gaining attention for its potential positive effects on preserving cognitive function and reducing dementia risk in older individuals. A 2015 study found that individuals adhering to this diet exhibited less cognitive decline as they aged (Morris et al. *Alzheimer's Dement.* 2015; 11:1015-22).

Other diet-related studies reported at AAIC 2017 included:

- Researchers from the Karolinska Institute in Sweden found that - in a group of more than 2,200 older adults - people sticking to a Healthy Nordic Diet (including non-root vegetables, certain fruits, fish and poultry) enjoyed better cognitive status than individuals who ate a less healthy diet.
- From more than 7,000 participants in the U.S.-based Women's Health Initiative Memory Study, researchers found that older women who ate diets traditionally thought of as heart-healthy, in particular the MIND Diet, were less likely to develop dementia.
- A team of researchers at Columbia University presented data suggesting that poor diet may promote premature signs of brain aging through inflammatory mechanisms, which were also associated with smaller brain volume.

“Although the idea that a healthy diet can help protect against cognitive decline as we age is not new, the size and length of these four studies demonstrate how powerful good dietary practices may be in maintaining brain health and function,” said Keith Fargo, PhD, Alzheimer's Association Director of Scientific Programs and Outreach. “That said, we must understand that what we eat is just one part of the puzzle. Adapting our lifestyles as we get older – for example by exercising regularly, watching what we eat and engaging in lifelong learning – is important in order to maximize the potential to reduce risk of cognitive decline and dementia.”

The Alzheimer's Association offers [10 Ways to Love Your Brain](#), including broad dietary guidance, based on the latest research.

### **Heart Healthy is Brain Healthy**

Claire McEvoy, Ph.D. at the University of California, San Francisco, and colleagues examined the association between adherence to the Mediterranean and MIND diets and cognitive performance in a large, nationally representative population of 5,907 older, community-dwelling adults in the Health and Retirement Study. The researchers found that the more healthfully people ate, the better they functioned cognitively. After controlling for demographic, lifestyle and health variables, participants who were highly adherent to these diets were 30 to 35 percent less likely to exhibit poor performance on a measure of cognitive function. Study participants who were moderately adherent to either diet were 18 percent less likely to exhibit signs of cognitive impairment.

### **Benefits of a Healthy Nordic Diet**

Weili Xu, M.D., Ph.D., at the Karolinska Institute, Stockholm, and colleagues sought to identify dietary habits associated with preserved cognitive function in 2,223 community-dwelling, dementia-free adults in Sweden. The investigators found during six years of follow-up that even moderate adherence to a healthy diet known as the Nordic Prudent Dietary Pattern (NPDP) resulted in better cognitive status than individuals who ate a less healthy diet that included fatty foods, sweets and processed foods. In this population, NPDP was found to be a better predictor of preserved cognitive function than the MIND diet, Mediterranean diet, DASH diet and Baltic Sea Diet.

The NPDP included:

- More frequent consumption of non-root vegetables, apple/pears/peaches, pasta/rice, poultry, fish, vegetable oils, tea and water, and light to moderate wine intake.
- Less frequent intake of root vegetables, refined grains/cereals, butter/margarine, sugar/sweets/pastries, and fruit juice.

### **Women Who Eat Well Less Likely to Develop Dementia**

Research published in 2015 found that the MIND diet was associated with a reduced incidence of Alzheimer's disease in a sample of 923 older individuals (Morris et al. *Alzheimer's Dement.* 2015; 11:1007-1014). Kathleen Hayden, Ph.D., Wake Forest School of Medicine in Winston-Salem, North Carolina, and colleagues sought to replicate these findings in 7,057 women participating in the Women's Health Initiative Memory Study (WHIMS). Using data from WHIMS, they categorized the participants (mean age 71) into quartiles based on level of adherence to the MIND diet, with the 1<sup>st</sup> quartile being least adherent and the 4<sup>th</sup> being the most adherent. There were 615 incident cases of Alzheimer's during a mean follow-up of 9.7 years.

Compared with women in the first (lowest) quartile of MIND adherence, WHIMS participants in the 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> quartiles had 24 percent, 21 percent, and 34 percent reductions in the risk of developing Alzheimer's. It is noteworthy that the largest share of the risk reduction occurred from the poorest dietary habits to the modestly adherent diet. These results corroborate results from previous research in smaller populations, and suggest that it may not require wholesale diet changes to help preserve the aging brain.

### **Poor Diet Linked to Inflammation**

Building on solid evidence that eating well is brain healthy, researchers are beginning to explore mechanisms through which dietary mechanisms may influence cognitive status and dementia risk. Yian Gu, Ph.D., at Columbia University, New York, and colleagues examined whether an inflammation-related nutrient pattern (INP) was associated with cognitive function and structural MRI findings in the brain.

Using data on 330 community-dwelling, nondemented elderly individuals (mean age 79.7), the investigators found that an INP characterized by high intake of cholesterol, beta-carotene and lutein, and low intake of omega-3 polyunsaturated fatty acids, calcium, folate and vitamins (B1, B2, B5, B6, D, E), was positively associated with levels of inflammatory markers (C-reactive protein and interleukin-6). In addition, closer adherence to this INP was associated with smaller total brain gray matter volume and worse performance in executive function. Additional research in larger populations is needed to confirm the role of inflammation-related dietary components in brain and cognitive health, and help elucidate inflammatory or other mechanisms through which eating habits may alter brain function and structure.

While the U.S. Congress has recently provided additional funding for Alzheimer's research at the National Institutes of Health, the commitment falls far short of the need. Congress must continue its commitment to the fight against Alzheimer's and other dementias by increasing funding for Alzheimer's research by at least an additional \$414 million in fiscal year 2018.

#### **About Alzheimer's Association International Conference**

The Alzheimer's Association International Conference (AAIC) is the world's largest gathering of researchers from around the world focused on Alzheimer's and other dementias. As a part of the Alzheimer's Association's research program, AAIC serves as a catalyst for generating new knowledge about dementia and fostering a vital, collegial research community.

AAIC 2017 home page: [www.alz.org/aaic](http://www.alz.org/aaic)

AAIC 2017 newsroom: [www.alz.org/aaic/pressroom.asp](http://www.alz.org/aaic/pressroom.asp)

#### **About the Alzheimer's Association**

The Alzheimer's Association is the leading voluntary health organization in Alzheimer's care, support and research. Our mission is to eliminate Alzheimer's disease through the advancement of research, provide and enhance care and support for all affected and reduce the risk of dementia through the promotion of brain health. Our vision is a world without Alzheimer's. Visit [alz.org](http://alz.org) or call +1 800.272.3900.

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- Claire McEvoy, Ph.D., et al. Neuroprotective Dietary Patterns Are Associated with Better Cognitive Performance in Older US Adults: The Health and Retirement Study. (Funder(s): The Wellcome Trust)
- Weili Xu, MD, Ph.D., et al. Which Dietary Index May Predict Preserved Cognitive Function in Nordic Older Adults? (Funder(s): CoSTREAM project; EU's Horizon 2020 Research & Innovation Programme)
- Kathleen Hayden, Ph.D., et al. The Mind Diet and Incident Dementia, Findings from the Women's Health Initiative Memory Study. (Funder(s): National Institutes on Aging)
- Yian Gu, Ph.D., et al. An Inflammatory Nutrient Pattern Is Associated Both Structural and Cognitive Measures of Brain Aging in the Elderly. (Funder(s): U.S. National Institute on Aging)

**Abstract 16094 / Proposal ID P2-546**

Public Health and Psychosocial: Epidemiology  
Posters Monday, July 17, 2017: 9:30 AM

**Neuroprotective Dietary Patterns Are Associated with Better Cognitive Performance in Older US Adults: The Health and Retirement Study**

**Claire T McEvoy, PhD<sup>1</sup>**(c.mcevoy@qub.ac.uk), Heidi Guyer, MPH<sup>2</sup>, Kenneth M Langa, MD, PhD<sup>2</sup> and Kristine Yaffe, MD<sup>3,4</sup>  
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**Background:** Adherence to the traditional Mediterranean (MedDiet) and MIND (Mediterranean-DASH Intervention for Neurodegeneration Delay) diets are shown to be neuroprotective, but study findings to date are limited and inconsistent. We examined the cross-sectional association between adherence to these dietary patterns and cognitive performance among 5,907 older community dwelling adults from the nationally representative Health and Retirement Study.

**Methods:** Dietary patterns were determined using *a priori* criteria to generate scores for MedDiet (range = 0-55) and MIND (range 0-15) with higher scores indicating better dietary adherence. Cognitive performance was measured using a composite test score of global cognitive function (range 0-27) with poor performance defined as < 1SD below the population mean. Regression models were used to investigate associations between dietary patterns and cognitive performance. Models were adjusted for age, gender, race, low educational attainment (less than high school) and other health (obesity, hypertension, diabetes, depression) and lifestyle (smoking, physical inactivity and energy intake) covariates.

**Results:** The mean age of study participants was  $68 \pm 10.8$  years. Compared to those with low MedDiet score, participants with mid and high score were significantly less likely to have poor cognitive performance (OR 0.82; 95% CI 0.68, 0.99:  $P = 0.03$ , and OR 0.60; 95% CI: 0.49, 0.75:  $P < 0.001$ , respectively) in fully adjusted models. Results for the MIND diet were similar. Compared with low MIND score, those with mid and high score had significantly lower odds of having poor cognitive performance (OR 0.82; 95% CI: 0.68, 0.99:  $P = 0.03$ , and OR 0.65; 95% CI: 0.53, 0.80:  $P < 0.001$ ). Higher score in each dietary pattern was independently associated with significantly better cognitive function ( $P < 0.001$ ) in a dose-response manner ( $P_{\text{TREND}} < 0.001$ ).

**Conclusions:** In a large, nationally representative population of older adults, greater adherence to the MIND and MedDiet diet was associated with 35-40% lower risk of cognitive impairment. However, even modest adherence to these dietary patterns may be neuroprotective. Further studies are required to elucidate the role of diet on change in cognition during aging.

**Abstract 17109 / Proposal ID P2-599**

Public Health and Psychosocial: Epidemiology

Posters Monday, July 17, 2017: 9:30 AM

**Which Dietary Index May Predict Preserved Cognitive Function in Nordic Older Adults?**

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**Background:** Appropriate dietary pattern for preserving cognitive function in northern Europe remains unknown. We aimed to identify a dietary pattern index that predicts preserved cognitive function in a Nordic country.

**Methods:** In a population-based cohort study, a total of 2223 dementia-free adult  $\geq 60$  were followed for 6 years. Baseline dietary intake was assessed with a 98-item semi-quantitative food frequency questionnaire. Cognitive function was assessed by MMSE at baseline and follow-ups. Using mixed-effects and parametric survival models, an index (the Nordic Prudent Dietary Pattern [NPDP]) associated with the lowest cognitive decline and risk of MMSE decline to  $\leq 24$  was identified. The NPDP includes more frequent consumption of non-root vegetables, apples/pears/peaches, pasta/rice, poultry, fish, vegetable oils (mainly rapeseed oil), tea, and water; light to moderate wine intake; and less frequent intake of root vegetables including potatoes, refined grains/cereals, butter/margarine, sugar/sweets/pastries, and fruit juice. Receiver operating characteristic curves were used to estimate and compare predictability of decline to MMSE  $\leq 24$  for the NPDP and four other indices, including the Mediterranean- DASH Intervention for Neurodegenerative Delay (MIND), Mediterranean Diet (MedDietScore), Dietary Approaches to Stop Hypertension (DASH), and Baltic Sea Diet (BSD).

**Results:** Moderate ( $\beta$ : 0.139, 95% CI: 0.077 to 0.201) and high ( $\beta$ : 0.238, 95% CI: 0.175 to 0.300) adherence to NPDP were associated with lower cognitive decline than low adherence. Among the other indices, moderate ( $\beta$ : 0.075, 95% CI: 0.012 to 0.138) and high ( $\beta$ : 0.126, 95% CI: 0.064 to 0.188) adherence to MIND and high adherence to MedDietScore ( $\beta$ : 0.099, 95% CI: 0.036 to 0.163) were related to lower cognitive decline. No significant associations between DASH or BSD and MMSE changes were shown. High adherence to NPDP was associated with the lowest risk for MMSE decline to  $\leq 24$  over 6 years (hazard ratio: 0.176, 95% CI: 0.080 to 0.386) and had the greatest ability to predict such decline (largest area under the curve—AUC=0.70).

**Conclusions:** In Nordic countries, moderate-to-high adherence to NPDP may be a better predictor of preserved cognitive function than adherence to other healthful dietary indices.

**Abstract 18455 / Proposal ID P2-552**

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**An Inflammatory Nutrient Pattern Is Associated Both Structural and Cognitive Measures of Brain Aging in the Elderly**

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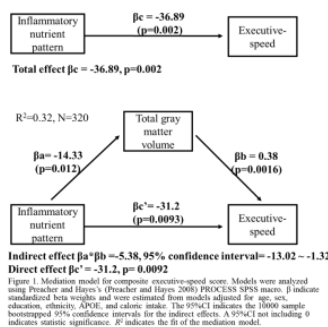
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**Background:** Accumulating evidence suggests that dietary factors are associated with Alzheimer's disease, as well as changes occurring during the preclinical stage of disease, including brain atrophy and cognitive decline. We investigated whether an inflammation-related nutrient pattern (INP) was associated with brain structural measures and cognition, as well as the mediating role of brain atrophy in the relationship of this INP and cognition.

**Methods:** Three hundred thirty non-demented elderly [mean (SD) age=79.7(5.7)] participants of a community-based, multiethnic cohort were included in the study. Dietary information was collected via a food frequency questionnaire. Circulating C-reactive protein (CRP) and interleukin-6 (IL6) were measured using ELISA. Brain measures were derived from MRI scans using FreeSurfer program. Cognition was assessed with a neuropsychological battery and four composite z-scores (memory, language, executive-speed, and visuospatial) were derived using exploratory factor analysis. We used a reduced rank regression model to derive INP based on its ability to explain the variations on CRP and IL6. Linear models were used to examine the association between the INP and cognition or brain measures. Mediation models were used to see whether the INP was associated with cognition via brain volumes. All models were adjusted for age, gender, ethnicity, education, caloric intake, and *APOE* genotype.

**Results:** The derived INP was characterized by high intake (loadings >0.15) of cholesterol, beta-carotene, and lutein, and low intake (loadings <-0.15) of omega-3 poly-unsaturated fatty acids, calcium, folate, and vitamins (B1, B2, B5, B6, D, E). This INP was negatively correlated with CRP ( $r=-0.15$ ,  $p<0.0001$ ) and IL-6 ( $r=-0.24$ ,  $p<0.0001$ ). Each unit increase in INP was associated with 14.3 milliliter smaller total gray matter volume ( $p=0.012$ ) and 36.9 lower executive-speed z-score ( $p=0.002$ ). The INP was not associated with white matter volume or other cognitive scores. The association between INP and executive-speed score was mediated by total gray matter volume (see figure).

**Conclusions:** Diet that is low in omega-3 fatty acids, calcium, folate, and vitamins (B, D, E) but high in cholesterol, beta-carotene, and lutein is associated with neuroimaging and cognitive measures of brain aging through inflammatory mechanisms. In addition, this inflammation-related nutrient pattern is associated with cognition via change in brain volumes.



**Abstract 14932 / Proposal P2-555**

Public Health and Psychosocial: Epidemiology

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**The Mind Diet and Incident Dementia, Findings from the Women's Health Initiative Memory Study**

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**Background:** The Mediterranean and Dash Diets, initially associated with better cardiovascular health, have also been associated with improved cognition in older adults. Drawing from both diets, Morris et al. developed the MIND Diet, which focuses on neuroprotective dietary factors and has been associated with reduced risk of incident Alzheimer's Disease in a community sample. To replicate this finding we evaluated associations between the MIND diet and dementia risk in the Women's Health Initiative Memory Study (WHIMS), a nationwide cohort of women who have been followed for up to 20 years. We hypothesized that WHIMS women who followed a diet more closely aligned with the MIND Diet would have a reduced risk for probable dementia.

**Methods:** We used baseline food frequency questionnaire data from 7,057 WHIMS participants (mean age 71 years) to calculate MIND Diet scores, which were then categorized into four quartiles. Cox regression models were used to evaluate the relative risk of probable dementia associated with quartiles of the MIND Diet, with the lowest MIND Diet quartile as referent. Models were adjusted for baseline age, race/ethnicity, education, hormone therapy treatment, diabetes, hypertension, high cholesterol requiring treatment, non-steroidal anti-inflammatory medication use, body mass index, physical activity, caloric intake, geographic region, smoking, and alcohol use. Probable dementia status was adjudicated centrally according to standard criteria based on longitudinal clinical data and annual neurocognitive assessments, supplemented with informant Dementia Questionnaires and health history.

**Results:** Over an average of 9.7 years of follow-up, there were 615 incident probable dementia cases. Participants with diets that were more closely aligned with the MIND Diet had a lower risk of probable dementia, adjusted for covariates. Compared to the reference group (lowest MIND scores), adjusted hazard ratios (95% confidence intervals) in order from low to high score quartile were: 0.76 (0.62-0.94); 0.79 (0.62-0.99); and 0.66 (0.50- 0.86); (*p* for trend=0.01).

**Conclusions:** Dietary patterns more closely aligned with the MIND Diet were associated with a lower risk of probable dementia in a large sample of postmenopausal women. The current study offers additional evidence in support of the MIND Diet as a potential method to reduce dementia risk.