Published in final edited form as:

Am J Geriatr Psychiatry. 2016 October ; 24(10): 890–892. doi:10.1016/j.jagp.2016.08.002.

Lifestyle Medicine for Prevention of Cognitive Decline: Focus on Green Tea

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Global population aging along with rapidly increasing numbers of individuals at risk for cognitive decline and dementia demand urgent solutions. This high rate of progression to dementia is concerning, because mild cognitive impairment is estimated to affect between 14% and 18% of elderly adults.¹ Over 5 million cases of Alzheimer disease occur in the United States alone, and more than 36 million dementia cases are reported worldwide.² Current treatments for Alzheimer disease and vascular dementia are largely ineffective, because they fail to slow disease progression.³ As a result of disappointment in existing treatment options, the general public often turns to complementary and integrative medicine (CIM), spending billions of dollars in out-of-pocket expenses on the multitude of supplements and other alternative methods to help treat and prevent cognitive decline.⁴ In recent years the use of CIM has increased worldwide over the past two decades, and surveys have estimated that 36% of adults over 18 and 33% of elderly persons in the United States now use at least one CIM treatment.⁵

Lifestyle medicine is a new emerging field of integrative medicine that offers relatively simple and often low-cost solutions to treatment and prevention of aging-related mental and physical disorders. Lifestyle interventions include but are not limited to nutrition and supplements, conventional and mindful physical exercise, stress reduction, intermittent fasting, and smoking cessation.⁶ There is a large body of literature on primary prevention strategies for cognitive decline using known modifiable risk factors for Alzheimer disease, mostly targeting known vascular risk factors such as smoking, hypertension, high homocysteine levels, type 2 diabetes, insulin resistance, hypercholesterolemia, and obesity. Higher education, physical exercise, and mental exercise are well established as important precognitive attributes and behaviors. Dietary measures, such as high intake of fish, fruits, and vegetables, suggest a positive role for omega-3 fatty acids (docosahexaenoic acid and eicosapentaenoic acid), antioxidants (vitamin E and flavonoids), and B group vitamins such as folate, B6, and B12.⁶

Unfortunately, the scientific evidence supporting the use of supplements for prevention of cognitive decline remains limited. The National Center for Complementary and Integrative Health offers information on the up-to-date evidence for the use of supplements,⁷ for the most part dispelling or finding insufficient evidence for the use of the commonly used herbs

and supplements (e.g., vitamins B and E, ginkgo biloba, grape seed extract, curcumin, omega-3 fatty acids); however, the information on green tea extract use is not presently included in this review. The National Center for Complementary and Integrative Health supports trials of green tea use for cancer, diabetes, and heart disease.⁸

Green tea is consumed around the world and has been extensively studied for many diseases of aging, and the Natural Medicines Comprehensive Database cites likely and possible efficacy for such conditions as hyperlipidemia, coronary heart disease, some types of cancer, Parkinson disease and osteoporosis.⁹

Among the various types of tea, green tea and the polyphenols it contains have been extensively studied in connection with the prevention of neurodegenerative diseases. With respect to prevention of cognitive decline, there are a number of studies and emerging evidence, including the report of the Japanese epidemiologic study in this issue of the Journal, that offer success with the use of green tea for treatment and prevention of cognitive decline. In a recent meta-analysis, 24 trials met inclusion criteria (six omega-3 fatty acids, seven B vitamins, three vitamin E, eight other interventions).¹⁰ According to this meta-analysis, omega-3 fatty acids, B vitamins, and vitamin E supplementation did not affect cognition in nondemented middle-aged and older adults. Among the other nutritional interventions, statistically significant differences between the intervention and control groups on at least one cognitive domain were found in single studies of green tea extract, Concord grape juice, chromium picolinate, beta-carotene, two different combinations of multiple vitamins, and a dietary approach developed for the control of hypertension. In a Korean 16-week randomized, double-blind, placebo-controlled trial, the effect of a combination of green tea extract and l-theanine (LGNC-07) on memory and attention in subjects with mild cognitive impairment was investigated in 91 subjects with mild cognitive impairment.¹¹ The treatment group took 1,680 mg of LGNC-07 and was compared with the placebo group. LGNC-07 led to improvements in memory by marginally increasing delayed recognition in the Rey-Kim memory test. Stratified analyses showed that LGNC-07 improved memory and selective attention by significantly increasing the Rey-Kim memory quotient and word reading in the subjects with MMSE-K scores of 21-23. In addition, electroencephalograms administered in a subsample found increased levels of theta waves, interpreted to be an indicator of cognitive alertness, in the temporal, frontal, parietal, and occipital areas after 3 hours in the eye-open and reading states. This study suggested that LGNC-07 has potential as an intervention for cognitive improvement.

Despite growing evidence from in vitro and animal and some clinical studies, the possible preventive effect of green tea consumption against incident dementia in humans has remained unclear because of the paucity of epidemiologic studies. Therefore, the study by Tomata et al.¹² in this issue of the Journal represents the first step in documenting the association between green tea consumption and incident dementia in a large epidemiologic cohort of 13,645 participants followed for 5.7 years with a documented rate of incident dementia of 8.7%. The study reports significant inverse associations between green (but not oolong or black) tea consumption and incident dementia (hazard ratio for 5 cups/day versus <1 cup/day: 0.76; 95% confidence interval: 0.64-0.91). The lower risk of incident dementia was consistent even after selecting participants who did not have subjective memory

complaints at the baseline and after controlling for a large number of potentially confounding variables, including those describing good health and healthy lifestyle. The advantages of this study include a large sample size with high levels of green tea consumption, long follow-up of almost 100% of the sample, and a rigorous analytical strategy.

In conclusion, given the global green tea consumption and the emerging evidence of benefits for cognitive decline and for other common disorders of aging, clinicians should consider recommending green tea to older adults, especially because of its relative safety. However, it is important to remember that green tea can cause stomach upset and constipation in some people. Green tea extracts have been reported to cause liver problems. Two cups of green tea a day provides about 200 mg of caffeine. Five cups of green tea per day, which may reduce risk for dementia as documented in this study, can also cause significant side effects because of the increased caffeine content. These side effects can range from mild to serious and include headache, nervousness, sleep problems, vomiting, diarrhea, irritability, irregular heartbeat, tremor, heartburn, dizziness, ringing in the ears, convulsions, and confusion. Caution should be used in individuals who are sensitive or are intolerant of larger amounts of caffeine. Overall, a study like this offers hope for people at risk for dementia and cognitive decline globally and offers an easy target for the multicomponent lifestyle intervention development for prevention of cognitive decline.

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