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Green Tea and Tai Chi Enhance Bone Health and Reduce Inflammation in Postmenopausal Women

Washington, DC—C.S. Lewis, the famous author and Oxford academic, once proclaimed "You can't get a cup of tea big enough or a book long enough to suit me." We sip it with toast in the morning, enjoy it with sweets and biscuits in the afternoon, and relax with it at the end of the day. Tea has for generations been an integral infusion worldwide, carrying both epicurean and economic significance. But, does it impart honest-to-goodness health benefits? In other words, is its persistence in the human diet perhaps coincident with enhanced quality (or quantity) of life?

Dr. Chwan-Li (Leslie) Shen, an associate professor and a researcher at the Laura W. Bush Institute for Women's Health at the Texas Tech University Health Sciences Center, is convinced that the answer to this question is a resounding *yes* – especially if the tea is of the "green" variety. Green tea, historically consumed in the Orient and now an international mainstay, is chock full of compounds called polyphenols known for their potent antioxidant activity. Dozens of epidemiological (observational) studies have shown that people who consume the highest levels of green tea polyphenols (GTP) tend to have lower risks of several chronic degenerative diseases such as cardiovascular disease and osteoporosis. These findings have been followed up with animal studies, including some conducted by Shen, suggesting that the mechanism behind this correlation may have to do with lowering chronic levels of inflammation.

Originally from Taiwan, Dr. Shen has now spent over 2 decades studying how and why some Eastern lifestyle norms (such as drinking green tea) might be beneficial for Westerners as well. For instance, she has developed an animal model (the ovariectomized, middle-aged female rat). With this model Dr. Shen and her team can effectively study the effects of green tea consumption on protection against breakdown of the bone's microarchitecture. In humans, this can lead to osteoporosis, a condition common to older women. It is Dr Shen's hope that what she learns from her animal models might also be applicable to postmenopausal women.

In Shen's most recent research, she focused on postmenopausal women and investigated the potential for green tea to work synergistically with tai chi – a traditional Chinese form of moderately intense aerobic fitness activity grounded in mind-body philosophy – in enhancing bone strength. The results of this work, which was funded by the National Institutes of Health/National Center for Complementary and Alternative Medicine, will be presented as a poster at the Experimental Biology meetings on April 10. Carried out as a double-blind, placebo-controlled, intervention trial (the "holy grail" of scientific studies), this experiment involved 171 postmenopausal women (mean age: ~57 y) who had weak bones but not full-fledged osteoporosis. Subjects were divided into 4 groups:

- Placebo: starch pill (placebo) and no tai chi
- GTP: green tea polyphenols (500 mg/day) and no tai chi
- Placebo+TC: starch pill and tai chi (3 times/week)
- GTP+TC: green tea polyphenols and tai chi

The study lasted for 6 months, during which time blood and urine samples were collected and muscle strength assessed.

The results show that consumption of GTP (at a level equivalent to about 4-6 cups of steeped green tea daily) and participation in tai chi independently enhanced markers of bone health by 3 and 6 months, respectively. A similar effect was found for muscle strength at the 6-month time point. Participants taking tai chi classes also reported significant beneficial effects in quality of life in terms of improving their emotional and mental health. Perhaps most remarkable, however, was the substantial effect that both GTP and tai chi had on biological markers of oxidative stress. Because oxidative stress is a main precursor to inflammation, this finding suggests that green tea and tai chi may help reduce the underlying etiology of not only osteoporosis, but other inflammatory diseases as well.

Dr. Shen and colleagues concluded that there is a "favorable effect of modest green tea consumption on bone remodeling in this pre-osteoporotic population" and hope to soon complete a more long-term study utilizing more technically savvy measures of bone density.

Perhaps C.S. Lewis was correct – it's tea time!

Dr. Chwan-Li Shen (Texas Tech University), Dr. Ming-Chien Chyu (Texas Tech University), Dr. James K. Yeh, Dr. Yan Zhang (Texas Tech University), Dr. Barbara Pence (Texas Tech University), Dr. Carol Felton (Texas Tech University), Dr. Jean-Michel Brismee (Texas Tech University), Mr. Raul Dagda (Texas Tech University), Mrs. Susan Doctolero (Texas Tech University), Mrs. Mary Flores (Texas Tech University), and Dr. Jai-Sheng Wang (University of Georgia) were coauthors on this paper.

About Experimental Biology 2011

Experimental Biology is an annual gathering of six scientific societies that this year is expected to draw 13,000-plus independent scientists and exhibitors. The American Society for Nutrition

(ASN) is a co-sponsor of the meeting along with the American Association of Anatomists (AAA), American Society for Biochemistry and Molecular Biology (ASBMB), American Society for Investigative Pathology (ASIP), American Physiological Society (APS) and the American Society for Pharmacology and Experimental Therapeutics (ASPET).

About the American Society for Nutrition

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