# Vital balance brought to elders by Tele-Tai Chi

November 18 2010, By Jennifer Nachbur

Imagine swaying to and fro, dancing to the rhythm of a slow love song. Then switch that image to maintaining balance while standing on one foot. How about standing straight with two feet on the ground and not moving? It's not as easy as one would think.

Posture experts refer to the ability to control body sway as functional balance. "People don't really stand still like a block, because we breathe, have a heartbeat, and have blood flowing in our bodies," explains Ge Wu, professor of rehabilitation and movement sciences. "All those kinds of dynamic movements disturb our balance, so we move, but we also constantly control our body sway," she adds. Keeping the body's center of gravity in a very small range comes easily to the young, but gets progressively more difficult to accomplish as we age. Consequently, with a larger range comes an increased risk of falls.

Unintentional falls are the leading cause of injurious death and nonfatal injury among the elderly, according to the National Safety Council. More than 30 percent of people over the age of 65 experience a fall each year, and as a result, suffer fractures, fear of falling, depression, and loss of independence. The risk is higher among the country's more than six million homebound elders, who are four to five times more likely to suffer serious injury as a result of a fall.

Wu, a UVM faculty member since 1996, had studied a variety of strengthening and balancing exercise approaches for her work on falls prevention and understanding falls in the elderly. Her study participants'

reluctance to lift weights or engage in strenuous exercises kept her on the lookout for alternatives.

## Why Tai Chi?

"I don't even remember how I noticed Tai Chi," admits Wu, who was intrigued by the practice's series of slow movements and minimal impact on the bones. "I'm always looking for opportunity, and when I see it, I just grab it!"

Wu dove in head-first, conducting a literature review, published in 2002, of the handful of studies that had been performed, most of which were based on single cases rather than a randomized controlled study design. Anxious to determine whether Tai Chi was beneficial when compared to other exercises in improving balance, and what mechanism made Tai Chi better, she embarked on her initial study. Conducted in collaboration with colleagues at the University of Sports Medicine in Beijing, China, the study compared a group of long-term Tai Chi practitioners in their 60s and older to another group of same-aged, matched individuals who were engaged in walking or other aerobic-type exercises. Among the long-term Tai Chi practitioners, the research team found greater muscle strength in the muscles integral to maintaining balance.

"Balance is a multi-factorial problem," says Wu. "It's not just muscle strength, not just your vision, not just one single part of your body." So, why, she wondered, does practicing Tai Chi -- regardless of an individual's potential problem -- tend to address almost everything? Examining the mechanism of Tai Chi through a series of biomechanical analyses, including movement patterns and neuromuscular control, she sought to quantify how Tai Chi differs from other types of movements. "There were a lot of studies done on human movement -- walking, running, all kinds of jumping, all kinds of sports-related activities, but no one had done any analysis of Tai Chi, so that was quite interesting," Wu

says. Her published results found that Tai Chi's attributes were unique in comparison to other types of exercises -- it specifically targets the muscles needed for balance, as well as the muscles that tend to atrophy as people age.

Tai Chi has four main families -- Yang style, Wu style, Woo style and Chen style. Traditional Tai Chi involves 108 movements. Wu relies on a simplified 24-form series of Yang style Tai Chi movements in her research, because "it is gentler, less stressful on the legs, not impulsive and involves more mental concentration," she says. She selected elderly appropriate movements that emphasize weight shift and involve turning of the body, both which target balance and are relatively easier to learn.

## Home delivered

Addressing compliance among her elderly Tai Chi research participants, who were often reluctant to drive anywhere, was challenging. "That's how I started thinking about using tele-communication technology to deliver exercise," says Wu, who in 2005 began researching available technologies that could distribute Tai Chi classes from a supervisor/instructor to multiple participants' homes. Telemedicine was available through Fletcher Allen, but was expensive and only offered one-to-one communications between hospitals, so she searched for collaborators. While time-consuming, the efforts paid off. She connected with Microdesign Consulting, Inc. in Colchester and Larry Keyes, who had previously worked at UVM.

"He was very interested in the idea, but told me he had done the telecommunications thing before, and it wasn't very easy," says Wu. But Keyes, driven by new ideas and challenges, agreed to work with her. Together, they secured funding from the National Institute on Aging and with that support, Keyes developed an Internet-based, senior-friendly system -- affordable and easy to operate -- that worked with a home

television.

Wu led two trials -- a Phase 1 to determine whether the interactive tele-communications technology was effective and acceptable by the elder population and a Phase 2 to determine if doing the tele-Tai Chi exercises had the same benefit as the traditional in-person class format. A single group of 17 individuals -- many of whom were homebound and did not drive --participated in the first trial, performing 15 weeks of Tai Chi three times per week. "At the end, everybody loved it, and they all wanted to continue," recalls Wu, who adds that everyone in the group improved their balance. Her second study, a randomized controlled trial, compared three types of delivery mechanisms -- an improved (from the Phase 1) interactive home television system, a traditional class at a community gym/health club, and a non-interactive Tai Chi exercise DVD.

Not surprisingly, the DVD group was the least effective, both in terms of compliance and balance improvement. The tele-interactive group and community exercise class group achieved remarkably similar results. According to Wu, the attendance and compliance was much higher in these groups and balance improved, while fear of falling and falls decreased. And there was another benefit -- improved social functioning.

Tai Chi's complicated set of movements are often difficult to learn, even face-to-face; you have to look at the instructor from the front, the back and the side. The tele-technology system -- available to seniors with a simple press of a power button -- provides effective instruction and allows not only real-time patient and instructor interaction, but also communication among the participants, who can all see each other at the same time. The program posts the name of each person on the screen, so participants recognize fellow/sister Tai Chi classmates by name, by face and by voice.

**More information:** The Phase 2 trial wrapped up earlier this year, and in June, the results were published in the *Archives of Physician Medicine and Rehabilitation*.

Provided by University of Vermont