Rarely does a 72-year-old avoid an IV. But Gerri Elder, director of development at Georgia Tech's Alumni Association, doesn’t mind that much. Her studies are helping patients with spinal injuries, stroke, amputation and other conditions.

By Kimberly Link-Wills

Minoru Shinohara’s lab is housed in one crowded room of the Centennial Research Building, where he and three doctoral students monitor the neuromuscular functions of healthy older adults.

Finding study volunteers in their late 60s and older with no medical issues is difficult. Finding funding is harder.

A National Institutes of Health grant has expired, although Shinohara’s lab still receives some funding from Veterans Affairs and the Department of Defense.

The lab sometimes studies individuals with clinical issues, including spinal cord injury, stroke peripheral neuropathy and amputation. But Shinohara emphasizes the need to understand the physiological mechanisms in healthy people so they may be applied to the clinical population.

“We are mostly dealing with the healthy population. The government is not that interested in giving money for real healthy aging,” Shinohara said. “And we do more basic science than clinical.”

An associate professor in the School of Applied Physiology for four years, Shinohara noted that it was easier to find healthy seniors when he was at the University of Colorado at Boulder than in Atlanta, where he believes there are fewer bike trails, walking paths and organic food stores.

An article in a local newsletter for seniors did bring volunteers — the oldest healthy enough for testing was 86 — and attention to Shinohara’s lab. The clipped-out article is taped to the door to the lab.

Inside, Shinohara and his students press on, conducting hand function studies to look at how the association between brain and muscle activity changes as people age.

Another study examines posture control.

“Older adults usually have greater sway.”
Shinohara said. “We’re trying to see if that might be improved by applying some kind of stimulation to the foot. If it works, it might eventually lead to the development of special shoes.”

With both the feet and the hands, “our hypothesis is that stimulation, like a subsensory vibration, may enhance tactile sensation.”

Bringing those vibrating shoes or gloves to market again depends on funding, said Shinohara, who smiled as he suggested, “If there are some Georgia Tech alumni who are interested in donating to us for a particular study to enhance motor functions, then we can hire more students or researchers so that we can make rapid advances.”

In his native Japan, which has the most rapidly aging population on the planet, Shinohara said research-to-market initiatives focus on assistive technology.

“My interest is in humans. I want to use other systems to facilitate or maximize the body’s adaptability,” Shinohara said. “Our bodies have a lot of unused adaptability at any age.”

On one side of the lab, in a contraption that looks like a hollowed-out water heater, a volunteer’s lower body is sealed and the air sucked out.

“Then we stimulate the autonomic nervous system to constrict the blood vessels to maintain blood pressure. In this study we look at the effect of heightened sympathetic nerve activity on motor function. There is the possibility that hypertensive adults may have problems manipulating, not just because of their muscle control, but their autonomic nervous system may be interfering with their motor system,” Shinohara said. “Counterintuitively, we are trying to utilize a positive interference between the autonomic and motor systems to improve motor functions.”

In another area, the volunteer undergoes an electroencephalogram while exercising a finger to document the correlation between brain activity and muscle movement.

“What we usually see is older people use more muscles” to perform functions than young people do as they become more rigid, he said, and thus, “brain activity will be heightened.”

Shinohara also tests muscle function and stiffness through micro-vibration. “Interestingly, the muscular function in older adults is similar to that of young kids. Kids, when they move, use more muscles than necessary. Then they fine-tune their movements as they age. But then after age 65, in a way they come back, not as much as in young kids, but the observation is similar. It gets difficult to isolate those movements.”

It’s all very intriguing to Shinohara.

“The human system is very complicated,” he said, “and so attractive for research.”

To volunteer for a study in the Neuromuscular Physiology Laboratory, telephone (404) 894-9985, e-mail shinohara@gatech.edu or visit the researcher’s Web site ap.gatech.edu/shinohara.