



Shaking up the aging process: Formula could help seniors keep their muscle

By Jeff Richardson

*Above: **Ron Woolf '91**, a research subject in an ongoing nutrition study at UAF, reviews plastic food models that display possible meal choices with the help of clinical coordinator Sheri Coker. UAF photos by Jeff Richardson and JR Ancheta unless otherwise noted.*

Robert “Trey” Coker was flat on his back in the Arkansas wilderness, his L4 vertebra cracked by a rock. He’d just failed to make a curve in the trail, hitting a tree with his ATV and tumbling to the ground.

Struggling to stay conscious through the pain, Coker managed to get back on his four-wheeler and endure a 45-minute ride to his truck, feeling like a cowboy “in a western where they’re riding a horse kind of half keeled over.”

At the time of his accident, Coker figured he was in the best shape of his life. He lifted weights regularly and ran up to 10 miles a day, and that fitness seemed to pay off with a smooth return from a potentially devastating injury.

But six months later, he began experiencing searing pain in his back and right leg. Diagnosed with several tears in his lumbar discs that were leaking gelatin-like fluid onto his nerves, Coker spent a month in bed during a slow, excruciating recovery.

He only realized the toll it had taken on him after looking in shock at himself in a mirror. That bed rest had rapidly withered away his once-fit frame.



Photo caption: Robert "Trey" Coker. UAF photo by Leif Van Cise.

Coker, who has a Ph.D. in exercise physiology, worked at the time at the University of Arkansas for Medical Sciences' Department of Geriatrics. He was familiar with the effects of inactivity on aging bodies but was experiencing it for the first time himself.

"That was an inflection point for me," he said of the 2010 crash and his subsequent recovery. "I remember thinking that I had to do something."

That effort went beyond just his own rehabilitation. A researcher at the University of Alaska Fairbanks Institute of Arctic Biology since 2013, Coker has spent the last 10 years addressing a vexing problem: How can people maintain their muscle mass in the face of physical inactivity or aging?

It's a particular problem for elderly people who are overweight and might want to improve their health. Cutting calories is the most effective way for them to drop pounds, but, unless accompanied by exercise, they lose muscle along with fat.

"In the scenario I was in, activity wasn't on the table," Coker said. "That's especially true for a lot of older individuals, and especially obese older individuals. It's kind of a catch-22 for them."

To develop the best nutritional strategy for this scenario, Coker used stable isotopes of common elements to track and monitor feeding-induced changes in muscle growth. That effort provided definitive evidence that a specific set of essential amino acids might just win the battle against muscle atrophy.



Graduate student **Brandon Putuuqti Kowalski '16**, left, and Coker prepare a treadmill for a volunteer at the Arctic Health Research Building.

With the help of a group of Fairbanks-area seniors and an \$11.8 million grant from the National Institutes of Health, Coker is exploring whether his proprietary meal replacement enriched with essential amino acids will eliminate the loss of skeletal muscle, even during weight loss in older obese individuals.

That, in turn, could offer a key to helping people stay active and functional in their later years.

“A lot of older individuals want to be active, but it’s hard for them without that muscle,” Coker said. “This whole thing is about maintaining independence as we age.”

Keeping muscle, losing fat

After downing more than 100 meal-replacement shakes in just four weeks, Ron Woolf reported with a hint of surprise that he was enjoying his vastly simplified diet.

“I think they taste good,” Woolf said with a smile. “I like it.”

Woolf, 64, began drinking five of them a day in July when he enrolled in Coker’s nutrition study. They’re the basis for a 1,200-calorie daily diet that research participants are asked to consume for 12 weeks.

Woolf, the chief financial officer at Golden Valley Electric Association, said his goal when he joined the study was to hit his “retirement weight” by the time he ends his career at the utility in December. In just a month he was down 17 pounds, but the study has also offered a fascinating picture of his fitness level and overall health, he said.

“This whole thing is about maintaining independence as we age.”

Melynda “Sheri” Coker, who is the clinical coordinator for the senior nutrition project and Coker’s wife, is gathering vast amounts of data from Woolf and other volunteers to help gauge whether the diet is having its intended effect.

It starts with a physical screening to see which volunteers are eligible to participate. Since then, Woolf has had scans to measure his body composition and bone density. Blood tests are monitoring his body functions, and on his wrist he wears an ActiGraph, a device that tracks his activity levels and sleep patterns.



Clockwise from top: Volunteer Ron Woolf checks out a display that models various 400-calorie meals at the Coker lab in the basement of UAF's Murie Building; Sheri Coker measures a volunteer's abdomen at the Arctic Health Research Building. A set of measurements records body changes for research subjects; Coker attaches an ActiGraph monitor to Woolf's wrist. The device records his sleep patterns and activity levels during the study.

A series of physical benchmarks through the study are recording his fitness level, including tests that measure grip strength, fitness levels during a six-minute walk, and how quickly he can get up from a lying-down position on the floor.

On top of that, Woolf's grocery bill has shrunk considerably. The shakes are provided as part of the study, along with a vitamin supplement. He figured the simplest way to consume the other 400 calories he was allowed each day was to eat a healthy frozen meal.

"It's fun to come in every week, and it's not just about losing weight," Woolf said of his regular testing sessions in the basement of UAF's Murie Building. "I've done everything, and being able to get these other benefits is really an attractive part of this."

The powder used to make the shakes is stored in dozens of containers locked up in Coker's lab. They include either an enriched formula of essential amino acids or a

commercial protein — only an independent lab knows which one Woolf is getting.



A collection of plastic jugs contain powdered shake mixes. Half include a special blend of essential amino acids, while the others contain a commercial protein shake. The study is determining whether Coker's formula will help seniors maintain muscle mass while losing weight.

That's true of everyone in the current research cohort, which consists of people aged 60-80 who have a body-mass index that classifies them as obese. Lab results from the patients in the clinical trial will offer an early indication of whether the specially formulated shake offers benefits that the protein shake doesn't.

Animal and human studies have shown that a serving of the proprietary amino-acid formula is at least 2½ times more effective in preserving muscle than a high-quality protein source alone, Coker said. The data being collected from Woolf and other participants will determine whether the same is true for human research subjects over a longer period of time, even under the conditions of intentional weight loss.

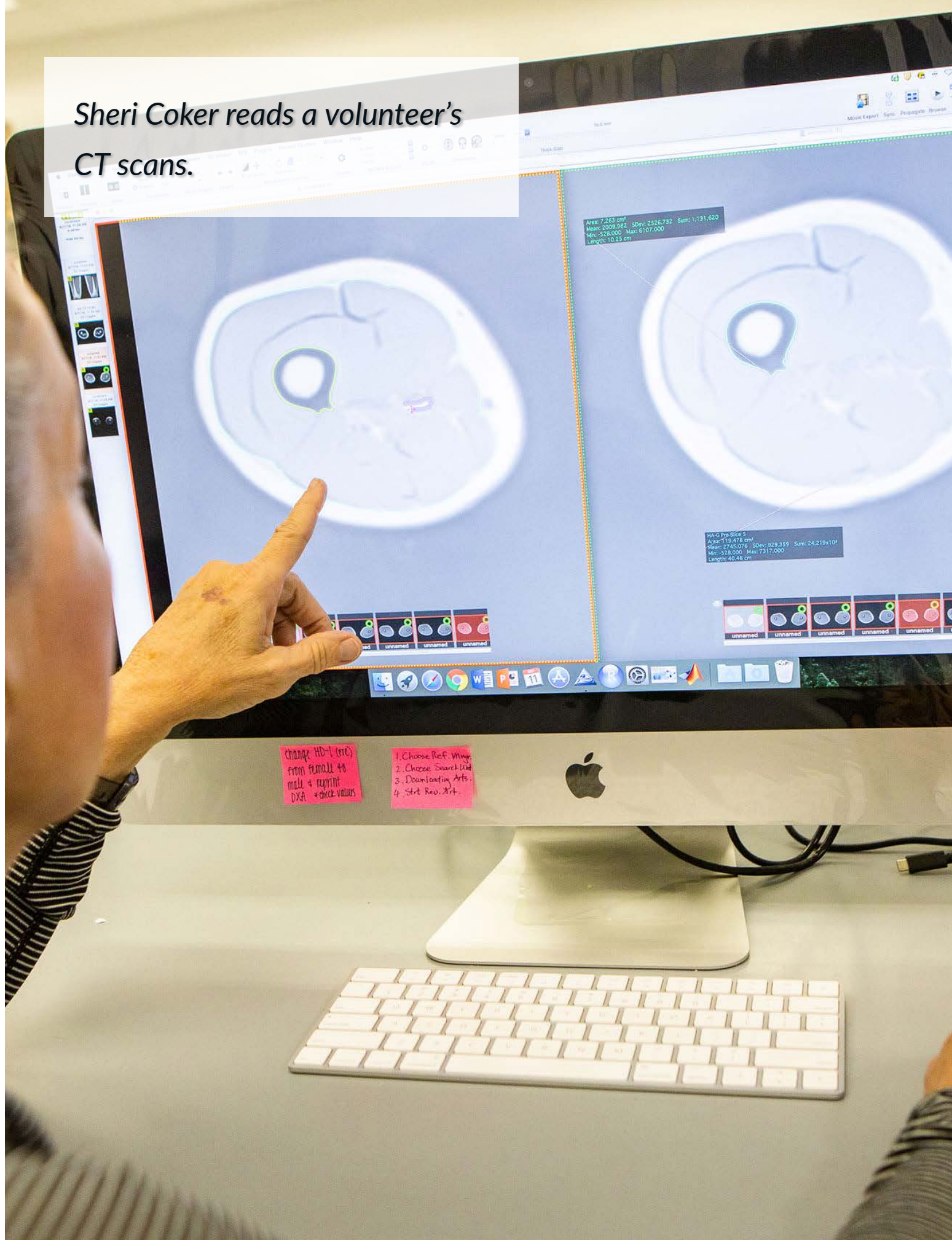
The formula is meant to address one of the primary barriers to muscle maintenance in aging bodies. The muscle breakdown that older people naturally face is amplified by the increasing struggles that they have making use of the nutrition in their food. Over time, the digestive system simply becomes less efficient at transporting, absorbing and recognizing those nutrients.

Seniors can offset that problem by eating more protein, but that increases caloric intake. That combination creates a tough balance for many older people who struggle to maintain a healthy balance between weight and fitness.

After studying the problem for more than a decade, Coker believes that the right blend of essential amino acids could reduce the need for excess calories and allow seniors to both keep their muscle and lose fat.

“As you come into the world, you have this steep increase in physical function until 20,” Coker said. “Starting at about 35-40, you’re trying to keep that function, and at 45 to 60, you’re really just trying to hang on. This unique formula is designed to help them do it.”

Sheri Coker reads a volunteer's CT scans.



A long road ahead

Coker's fascination with nutritional therapies evolved into a business in 2013, when he and a former colleague at the University of Arkansas launched a company, Essential Blends, to develop nutritional products.

Beyond the ongoing senior nutrition study, Essential Blends research is also working on formulas that help patients suffering from congestive heart disease, and for individuals recovering from substance abuse to restore liver function. Coker has also worked with the “cool school” at Eielson Air Force Base, which focuses on Arctic winter survival training, evaluating how the body responds to environmental stress and altitude.

UAF's Office of Intellectual Property and Commercialization is working to evaluate and develop the research Coker is conducting at UAF. In return, the university will receive a portion of revenues if it translates into a successful product. OIPC Director Mark Billingsley said it's a good partnership, thanks in part to Coker's interest in using research to explore solutions to tangible problems.

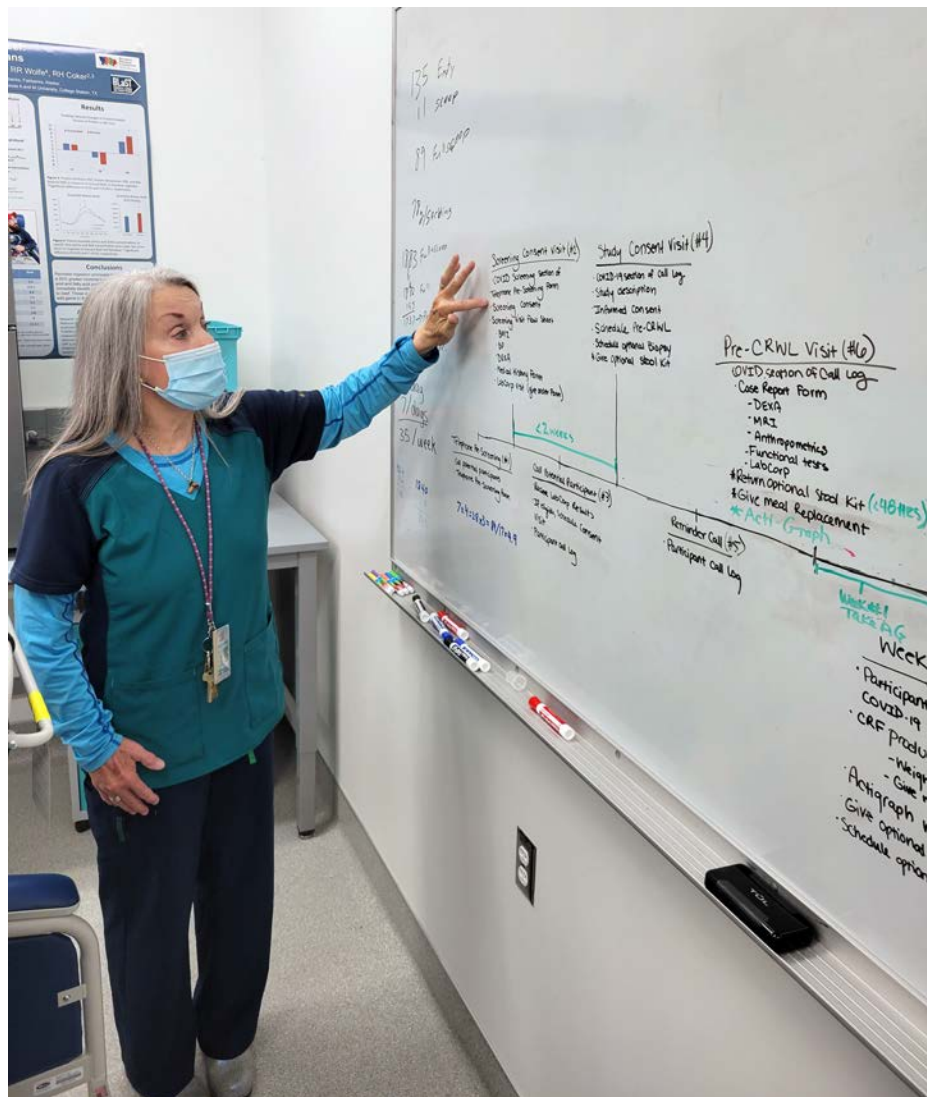
“Trey knows to go figure out what the world actually needs before he does his research,” Billingsley said. “That's

good for my office, because the end product of his research will enhance the likelihood of commercialization.”

Although the early returns are promising, there’s still a long road ahead for the senior nutrition study. The current cohort of the study attracted about 70 volunteers, but just four seniors advanced to the research stage after a stringent screening process removed candidates with underlying health conditions or other factors that made them ineligible.

Despite that low number, it’s an encouraging start as the Cokers look for more volunteers. The response from Fairbanks seniors has been outstanding, even if only a few have made it to the research phase so far, said Sheri Coker.

“It just proves our community is so interested in things like this,” she said. “The people in our town just want to better themselves.”



Sheri Coker discusses the steps that volunteers take throughout an ongoing nutrition study. The process includes a 12-week weight-loss phase followed by 12 weeks of weight maintenance.

Once the 12-week weight-loss portion of the study is complete, a 12-week maintenance phase will study the effects of drinking a single meal-replacement shake a day with an otherwise normal diet.

Not all of the participants will adhere strictly to the diet, but Trey Coker said it's important to note that the process "isn't a pass-fail exam." The research subjects' ability to follow the diet will be factored into whether it can be considered a realistic remedy for muscle loss.

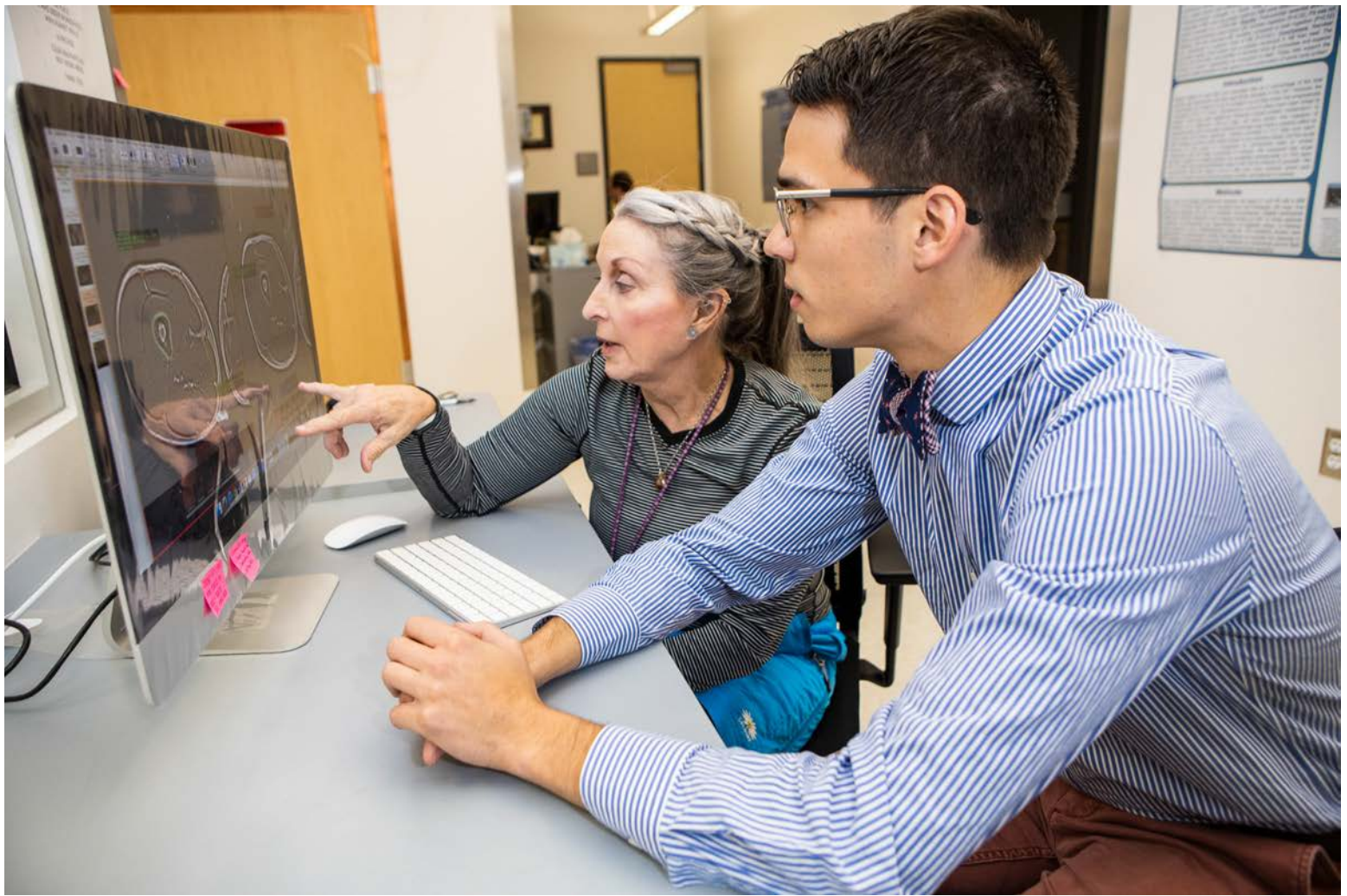
"If people can lose weight and keep muscle, that's great," Coker said. "But what then? The point is to maintain that or even improve it."

If the current trial is a success, it will eventually expand to become a multisite study with at least 300 participants. A larger cohort is needed to determine if the diet is effective for various demographic groups and to check for side effects.

The entire process could take a decade or more, Coker said, although a partnership with a larger business partner could add the financial muscle needed to move it more rapidly.

Coker said he's seen enough so far to believe he's on the right path. If things go according to plan, the years ahead will be about figuring out the details.

“We want to find the true answer to the question of whether this can work,” he said. “If it can’t, we’ve got to come up with something that will.”



Sheri Coker, left, and graduate student Brandon Putuuqti Kowalski read a volunteer's CT scans at the Arctic Health Research Building.

