

EMORY *extension*

Division of Physical Therapy ■ Emory University School of Medicine

EXERCISE, AGING, AND THE IMMUNE SYSTEM

If exercise were a pill, it would be the most widely prescribed medication in the world. From helping prevent heart disease, cancer, and diabetes to warding off depression and cognitive impairments, the documented health benefits of physical activity are vast and growing.

Less is known about the interaction between exercise and the immune system, particularly in older people. As a physical therapist, Zoher Kapasi routinely uses exercise in rehabilitation therapy, so he wanted to find out more. Kapasi, associate director of the Emory Division of Physical Therapy, wanted to know if exercise could be detrimental to the health of very frail seniors and if it could boost seniors' response to vaccines.

"Typically, physical therapists have focused on the effect of exercise on the muscles, bones, heart, and lungs," he says. "But exercise really affects all the systems in the body. I'm particularly interested in how it affects the immune system."

Kapasi's work builds upon previous research showing that intense exercise to exhaustion suppressed the immune system in young adults. "A few weeks after you run a marathon, for example, you are more likely to come down with a cold infection than someone who trains for the marathon but doesn't run it," he says. "We

think this is because your body releases a lot of stress hormones when you exercise intensely, and those hormones suppress the immune response."

No studies have examined the effect of exhaustive exercise on seniors. "As physical therapists, we try to get people out of bed and moving independently," says Kapasi. "But we see some very frail patients for whom getting out of bed and walking to the bathroom is exhaustive. To them, it's intense exercise. Older people have weaker immune systems to begin with, and I started wondering if we

OLDER PEOPLE HAVE WEAKER IMMUNE SYSTEMS TO BEGIN WITH, AND I STARTED WONDERING IF WE WERE FURTHER COMPROMISING THEM AND PREDISPOSING THEM TO INFECTIONS.

were further compromising them and predisposing them to infections."

To find out, Kapasi studied a group of mice, young and old. He put them on a treadmill and gradually increased the speed until they could no longer keep up with the pace.

Once the mice reached this point of exhaustion, the researchers injected them with a lymphocytic choriomeningitis virus. "We chose this virus because immune response to it has been widely studied in mice and because it doesn't actually kill them," explains Kapasi. "The last thing you want is your mice dying on you in the middle of your study."

He found that the immune response in the young mice (comparable in age to

Continued on page 3



Fall into physical therapy



FALL IS SPECIAL IN OUR SOUTHERN CITY, the time when everyone says, “this is why I moved to Atlanta.” This fall is a special time in the Division of Physical Therapy as well.

We welcomed five new faculty members, with another to join us in January. These talented new faculty have diverse areas of expertise, from constraint-induced therapy in children, to activity-based interventions for individuals with spinal cord injury, to the kinesiological analysis of walking. I’m excited about the wealth of knowledge these new faculty bring to the program and the increased opportunities they offer our students. Our “old” faculty members were busy this summer, completing papers, giving presentations, and teaching overseas. And of course, many have made great progress in research. In this issue of *Extension*, you’ll find several articles describing those research efforts—in exercise, aging, the immune system, arthritis, and neuroplasticity. It’s clear our faculty take evidence-based practice very seriously, both in teaching and research.

In June, the faculty welcomed a class of 42 students to the doctor of physical therapy program. As usual, we started them off with a strong basis in anatomy and membrane physiology, and now they’re learning assessment techniques such as manual muscle testing, evidence-based practice, and neuroscience. Our second-year students are immersed in adult and pediatric neuro-rehabilitation and research. Our third-year students are busy with the last of their three internships and excited to be so near graduation. Their futures are bright: Never have the opportunities in physical therapy been better.

I hope you enjoy this issue of *Extension*, and I invite you to send letters. We’d love to hear from you.

Best wishes,

Susan J. Herdman, PhD, FAPTA, Professor and Director

Extension is published biannually for faculty, staff, students, and friends of the Division of Physical Therapy at Emory University School of Medicine.

Susan J. Herdman Professor and Director, Division of Physical Therapy

Terri McIntosh Editor, **Martha Nolan McKenzie** Writer, **Peta Westmaas** Designer, **Jack Kearsse** Photographer

Comments or questions?

Contact Brook Brown, Health Sciences Development, 404.727.3989, brook.brown@emory.edu, or 1440 Clifton Road, Suite 112, Atlanta, GA 30322.

Please write to us if you wish to have your name removed from the list to receive fundraising requests supporting the Emory Division of Physical Therapy.

Announcing faculty

Deborah Backus: BS, physical therapy, Boston University; PhD, neuroscience, Emory. Director of spinal cord injury research at the Shepherd Center in Atlanta for the past two years, Backus has served on the clinical faculty of Emory and Georgia State University. She will teach the neuroscience series and pursue research in activity-based interventions for spinal cord injury.

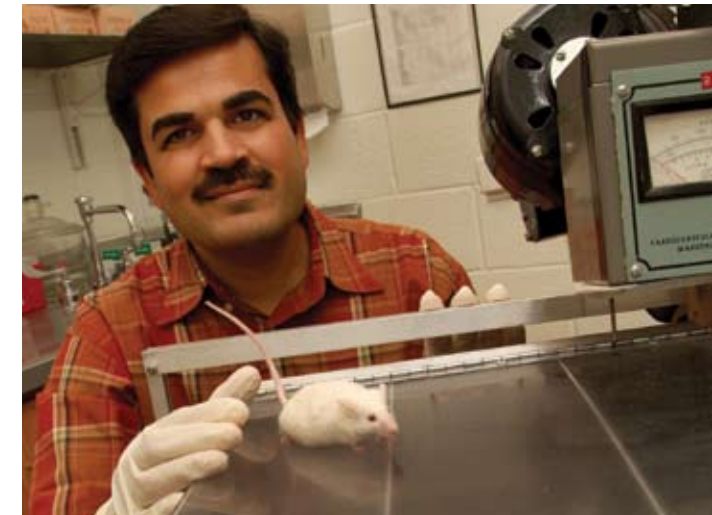
Sarah Blanton: BA, biology, University of Virginia; MS, DPT, Emory. Blanton received clinical specialty certification in neurology through the American Board of Physical Therapy Specialists in 2003. She will teach neuro-rehabilitation and continue her involvement in constraint-induced therapy for adults with stroke.

Patricia H. Bridges: BS, physical therapy, University of Florida; MMSc, Emory; EdD, University of Georgia. Former academic coordinator of clinical education (ACCE) at Georgia State University, Bridges is a certified trainer through the American Physical Therapy Association’s clinical instructor education and credentialing program. She will serve as our new ACCE.

Jeanne Charles: BS, physical therapy, MS, social work, State University of New York; PhD, kinesiology, Columbia University. Charles has published nine peer-reviewed articles on constraint-induced therapy. She will teach neuro-rehabilitation and share her considerable expertise with Emory’s Constraint-Induced Therapy Lab.

Jeffrey Hoder: BA, theatre arts, Rutgers University; MS, DPT, University of Medicine and Dentistry of New Jersey. Hoder received clinical specialty certification in neurology through the American Board of Physical Therapy Specialists in 2003. He will teach, see patients, and participate in clinical research through the Movement Disorders Clinic at Emory.

Exercise *continued from cover*



Zohar Kapasi uses mouse models and human studies to measure the effects of intense exercise on the immune system.

humans in their early 20s) was suppressed after the intense exercise session, but the immune response in the old mice (comparable to humans in their early to mid 70s), already low due to aging, was not suppressed further.

Next, Kapasi studied nursing home residents. One group of residents was led through exercises four times a day, five days a week for eight months. On average they completed 3.2 sessions per day; the most common reason for not completing the four sessions was fatigue. Another group did no exercise. Kapasi evaluated immune response in both groups by looking at blood samples and discovered no difference between the two.

“You might say, ‘What does that really mean in terms of actual infections?’” he says. “Well, we monitored the rate of infection over eight months, and again the rate was the same in the group that did exercise and the group that did not.

the immune system in young adults but not seniors. “That is what I’m going to look at next,” he says. “If we understand the ‘why’ of it, we may be able to design strategies to prevent suppression of the immune function in young people after intense exercise.”

Kapasi also wants to find out if moderate exercise can boost seniors’ response to vaccines. “Older people don’t respond to vaccines that well,” he says. “For example, about 30% to 35% of seniors do not respond to the flu vaccine. They simply do not make protective antibodies in response to the vaccine.”

Kapasi would like to see whether a session of exercise before getting a vaccine could boost seniors’ immune response. “We are in the initial phase right now, but I have a novel approach in mind and I’m quite excited about it,” he says. “Hopefully I’ll have more to report on that soon.” **e**

“That’s good news from a physical therapy standpoint,” Kapasi explains. “That tells me I can push older patients to work as hard as they can so they can become stronger and more independent and yet not predispose these patients to an infection.”

What Kapasi doesn’t know yet is why intense exercise suppresses

Doctoral transition: last call

The Division of Physical Therapy stopped granting master’s degrees in 2003 in favor of a doctorate-only program. Master’s-level graduates, as well as alumni of the certificate program that predated the master’s program, are eligible to complete additional courses and earn a doctor of physical therapy degree.

This doctoral transition program, which has been offered for the past four years, is coming to an end. The final semester to matriculate is summer 2007, and applications must be received by March 1, 2007. If you have questions, contact Brenda Greene at brenda.greene@emory.edu.

A chance to contribute

Whether you’re a graduate, a former patient, or a friend of the Emory Division of Physical Therapy, take the opportunity to give something back to the program. Emory’s Physical Therapy Scholarship Fund provides scholarships for physical therapy students who need financial assistance. Such a fund is critical to Emory’s ability to attract top-notch PT students.

Send your contributions to: Emory Physical Therapy Scholarship Fund, Emory University School of Medicine, Development and Alumni Relations, 1440 Clifton Road NE, Suite 112, Atlanta, Georgia, 30322, or call Brook Brown at 404.727.3989.

The department also is recruiting mentors to share their experience, relay job opportunities, and provide a support system to current students. To volunteer as a mentor, contact Barbara Jones, admission coordinator, at 404.727.4002 or bjone07@emory.edu.

From pain to gain

When Sarah Jones first showed up in assistant professor Brenda Greene's exercise class, she couldn't walk the 100 yards from the parking lot to the gym without sitting down to rest three or four times. She suffered from extreme stiffness and pain in her leg due to arthritis. When not in the class, she spent most of her day on the couch.

Nine weeks later, Jones had lost seven pounds and could walk to the gym without resting. She reported almost no pain or stiffness in her leg, and she was able to cook meals and clean her home. The 17 other class participants mirrored her success.

Part of a research study Greene was conducting, the class was designed to measure the effectiveness of group exercise interventions for people with knee osteoarthritis, a disease affecting more than one in three adults. In fact, arthritis is the nation's leading cause of disability in people over age 50. It affects women more than men, and African-American women more than Caucasian women. African-Americans report significantly higher instances of activity limitations, work limitations, and severe joint pain from arthritis than do Caucasians, but little research has been done on racial differences in arthritis and treatments.

Greene has focused her research on this void. In an earlier study published in the April 2006 issue of *Physical Therapy*, Greene and a research team of physical therapy students interviewed African-American patients with osteoarthritis and rheumatoid arthritis at the rheumatology clinic at Grady Memorial Hospital in Atlanta. Her goal was to uncover the factors that affect physical activity and exercise, because activity plays a critical role in managing the disease.

Greene interviewed 72 patients, mostly women, to determine their level of disability, intensity of pain, body mass index, expectations, self-efficacy (confidence in their ability to control their arthritis symptoms), social support, time per day spent sitting or lying down, and time per week spent in physical activity.

She found the most consistent factor in determining physical activity was self-efficacy. "Those who believed they could control their own symptoms tended to be more physically active," explains Greene. "However, this group—urban African-American women—had a pretty low activity level overall. The average daily total activity time was just over three hours."

Greene also found a good deal of misunderstanding about physical activity and arthritis. "The participants would say things like, 'Exercise is good, but not for me,'" she says. "They believed



An Emory study concludes that strength and function can be increased and pain decreased in osteoarthritis patients through a program of education and progressive exercise.

they were unable to exercise because of their arthritis. But that's not the case. Physical therapists can find the right exercise level for them, and it can help them manage the disease."

Those findings led Greene to her recent study involving the group exercise program, which she and her research team conducted at the Helene S. Mills Senior Center in Atlanta. She targeted knee osteoarthritis because it is a common debilitating condition. The exercise intervention she devised was unique in two ways: It included an education component, and it increased the exercise intensity over the nine-week course.

"The education component was critical," says Greene. "We taught the patients about the disease—what makes it worse, what can make it better. A nutritionist taught a diet component, and we talked in general about a lot of health behaviors. I felt if people understood what the pain meant, whether it was the normal pain from starting an exercise program or joint pain, which is a warning sign, then they'd be more likely to stick with the exercise."

The research team led the group through an exercise routine focusing on improving flexibility, strength, and balance. Resistance and repetitions increased as the class progressed.

After nine weeks of two classes per week, the results were promising. "We found the program was both safe and effective," says Greene. "It was well-tolerated from a physical standpoint, and of the people who started the program, few dropped out. It was a very popular class."

Greene found that quadriceps muscle strength increased significantly, while self-reported pain and stiffness decreased. Function, gauged by the number of times patients could sit in a chair and stand up again, improved as well.

The participant's name in this article has been changed. e

ALUM PROFILE

Kathryn Smith: Making a splash in aquatic therapy

Kathryn Smith has always loved the water, but she never dreamed she would make it her career. Then, while completing prerequisites to enter Emory's physical therapy program, Smith assisted spinal injury patients in aquatic therapy

very functional way. And for some of your more disabled patients, such as quadriplegics, the pool is sometimes the only place they can truly self-propel and exercise with minimal equipment. There are so many benefits to aquatic therapy, yet it is often underutilized."

Smith aims to fill that void. She has served as the aquatic section delegate to the American Physical Therapy Association as well as the aquatic section vice president. She works part-time at Roosevelt Warm Springs Institute for Rehabilitation in Georgia but plans to open her own aquatic therapy practice around the first of the year.



Kathryn Smith, combining her love of water with her passion for physical therapy, uses aquatic therapy to help patients with neurologic impairments.

PHOTO BY ROBIN NELSON

sessions at Atlanta's Shepherd Center. She knew then what she would do with her life.

"I realized the aquatic environment offers so many things to patients that they can't get on land," she says. "Patients with neurologic impairment—such as those with head injuries, stroke, or MS—can practice standing, walking, and high-level coordination tasks that they can't safely practice on land. The water gives them external support so they can practice balance reactions more independently and safely. These patients can strengthen weak limbs and practice motor movements in a

turn of events for Smith. A self-described "water bug," she started swimming at age 4. She received a swimming scholarship at the University of Nebraska at Kearney, graduating with a degree in exercise science.

By the time Smith earned her MPT from Emory in 1998, she knew she wanted to specialize in aquatic physical therapy. When she joined the staff of Warm Springs, the rehabilitation center founded by Franklin Delano Roosevelt in 1927, the facility had a rich history of aquatic

therapy dating back to the polio epidemic but no organized aquatic therapy program.

In short order, Smith became the director of aquatic therapy at Warm Springs. During her tenure, she worked with inpatient, outpatient, vocational rehab, and brain injury patients. She provided aquatic therapy education to students and professionals through the institute's education department.

Smith also received training in advanced treatment techniques such as Watsu (short for water shiatsu, a form of aquatic massage used for pain) and the Bad Ragaz Ring Method (aquatic exercises in functional movement patterns).

After an extended leave following the birth of her third child, Smith is ready to strike out on her own.

"People often don't think of using aquatic therapy to help people with balance problems," she says. "But I've found it really useful. I've had many stroke patients who are rightfully fearful of walking on land, but get them in the pool and it starts clicking for them."

Smith also wants to work with pediatric patients. "I think all children should be given the opportunity to learn to swim," she says. "But many people don't know how to teach a child with sensory or neurologic dysfunction to swim, so these kids may never get the chance.

"Plus, with aquatic physical therapy, swimming skills are used to teach and reinforce more functional ways for the child to move on land," she continues. "I really enjoy working with kids, and I think there is a niche there for me because there aren't many people in my area doing it, especially in a way which emphasizes patient independence." e

STUDENT PROFILE

Expanding the pool of knowledge for swimmers

Atlanta-area swimmers, as well as their coaches and parents, have a resource to help improve performance and reduce sports-related injuries, thanks to third-year Emory physical therapy student Elizabeth Lane.

Lane was tapped to provide health content for AtlantaSwimming.com, the official website for four of the six summer swim leagues in the Atlanta area, as well as the city's two major charity swimming events.

The assignment brought together Lane's two passions—swimming and physical therapy. She swam on a neighborhood team while growing up and went on to coach that team as well as another. She still helps run local meets and officiates as a starter referee.

Unlike most in the profession, Lane decided she wanted to be a physical therapist while still in junior high. At the time, her aunt was fighting advanced breast cancer. "She was in pain and not moving around a lot," recalls Lane. "The only one who was able to get her up and out of bed was her therapist. Her therapist was the only one who could make her smile in the midst of everything that was going on."

Lane lost her aunt, but not her desire to follow in the therapist's footsteps. After majoring in exercise science at the University of Georgia, she enrolled in the Emory physical therapy program.

When the AtlantaSwimming.com webmaster approached her about writing a series of articles for the website, she dove right in. Lane wrote four articles targeting young swimmers who compete in the summer. "The pieces are not as much for the intense, year-round swimmers, but for the kids in summer leagues," she says. "Moms, dads, and kids get real pumped up

at the beginning of swim season, but they don't have a lot of resources available. Now that I've got physical therapy school on top of an exercise science degree, I can help them find the best ways to stretch, the best ways to strengthen. And it's not just anecdotal—it's based on what I've learned."

Lane's first article discusses weight training, detailing exercises that can strengthen the rotator cuff muscles, four small muscles that form a cuff around



Elizabeth Lane

the shoulder joint. These muscles control shoulder rotation and stabilize the shoulder joint during all swimming strokes. The article also details ways to prevent injury.

Her second piece discusses what to eat before a swim meet for peak performance. It also includes tips for preventing and treating "pool toes" (a unique skin irritation on the bottoms of the feet and toes) and swimmer's ear ("avoid excessive cleaning of ears because ear wax provides a natural barrier to the external environment that prevents bacteria from growing").

Lane's third article focuses on shoulder injuries, which plague many swimmers. She discusses proper technique as the best means of prevention as well as treatments for injured shoulders.

Finally, Lane tackles the female athlete triad: decreased bone mineral density, eating disorders, and amenorrhea (the absence of menstrual periods). These conditions result from inadequate nutrition and the high caloric expenditure associated with exercise training. "In swimming, a sport in which weight and body type are hard to disguise, pressure from parents, coaches, and peers can result in dieting at too early an age, and thus medical complications such as the triad begin," she writes.

She hopes the information will not just create better swimmers, but healthier children and young adults.

"Summer swimming is supposed to be fun, and injuries can make it much less so," she says. "A little education can go a long way toward ensuring a fun summer for swimmers, parents, and coaches." e

Lane's articles can be viewed at: atlantaswimming.com/healthindex.htm.

What's in a name? \$200!

Swimming tips aren't the only ideas to spring from Elizabeth Lane's pen. She also wrote the winning entry for this publication's "Name the Newsletter" contest. Before the inaugural issue last spring, Emory PT faculty held a contest encouraging students to submit names. Lane walked away with \$200 for the winning entry, "Emory Extension." Other entries included Progress Notes, GaitWay, The Rehab Gab, and Emory Reflex.

STUDENT/ALUMNI NEWS

A national perspective

Second-year Emory physical therapy student Nate Thomas wanted to see the inner workings of the American Physical Therapy Association (APTA), so he applied—and was accepted—to be an usher at the annual House of Delegates meeting in June. As one of just a few ushers, Thomas carried messages from one delegate to another while the association's legislative body debated policy.

"At one point, I realized this is where the policy of how we practice our profession is made, and I was sitting there watching it," he says. "It was pretty awe-inspiring."

Thomas is no stranger to the APTA conference. He attended the student conclave last year, and he's on the ballot for the national treasurer's position, to be elected at the next conclave in October.

"I want to be involved with the APTA on a national level," he says. "Any time you attend a conference, you get to step back from your studies for a brief period and look at the big picture of the profession and where it is going as opposed to being so focused on the next test."

Speedy recovery from Sever's disease

While he was a physical therapy student at Emory, Rob White tried a novel treatment for an 8-year-old girl with Sever's disease. The results were so promising, he sent them to *Physical Therapy*, which published them in March.

Sever's disease is the most common cause of heel pain in athletic children. It results from repetitive micro-trauma to the area where the Achilles tendon joins the heel bone. It generally occurs during a growth spurt or at the beginning of a new sports season. "You see Sever's when the bones grow faster than the tendons and muscles, or when kids go from being inactive to very active," says White, who practices in an outpatient orthopedic sports medicine clinic in Atlanta.

When treating the girl with Sever's, White used traditional interventions (rest, hot and cold packs, heel lifts, calf stretching, and strengthening) but added the use of ketoprofen gel, a nonsteroidal anti-inflammatory. He was amazed by the gel's effectiveness. His patient was able to return to her normal activities after 18 days, a month sooner than typical recovery without the gel.

"I routinely use the gel in my practice," explains White. "And I've been asked to be part of a panel that is trying to get FDA approval for an over-the-counter version of the gel."

Fore!

In March, 57 duffers picked up their clubs and headed to the eighth annual Emory Physical Therapy Charity Golf Tournament in Stone Mountain, Georgia. Hosted by the school's second-year students, the tournament raises money for the Foundation of Physical Therapy.



The proceeds fund research grants and support studies in physical therapy. The tournament raised \$3,545, topping last year's \$2,000.

Be on the lookout for a mailing announcing next year's fundraiser. It may be another golf tournament or it may be something new, but proceeds will go to the same good cause.

And the winner is...

When Katie Hamilton started Emory's physical therapy program this fall, she assumed she would amass about \$150,000 in debt by the time she graduated in three years. Happily, that won't be the case. Hamilton was one of 77 students nationwide (out of 1,100 nominees) to receive a John Kent Cooke Graduate Scholarship. Covering tuition, room, board, fees, and books—up to \$50,000 annually for up to six years—the scholarship is among the most generous and competitive in the country.

Each university and college can nominate two undergraduates. Candidates undergo a rigorous assessment through essays and interviews. "They looked at your family's financial need, your academic performance, your participation in the community, and appreciation of the arts," Hamilton says.

She fit the bill on all counts. Her family could not afford the graduate tuition. Her grades at Hendrix College in Arkansas were stellar. As an undergrad, she participated in sports, community service, and volunteered as a camp counselor for children with disabilities. She had a small theater scholarship in college and has acted and danced since she was a young child.

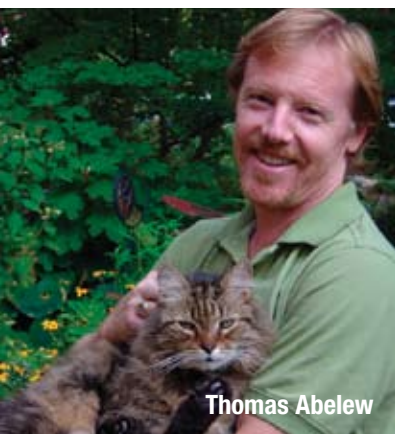
For Hamilton, the scholarship means the freedom to follow her dreams. "When I graduate, I won't have to choose a job based on what it pays," she says. "I'll be able to choose one because it's what I really want to do."

To support scholarships for Emory physical therapy students, see "A chance to contribute," page 3.

Kitty calisthenics

Scientists know relatively little about how nerves heal after an injury. To find out more, Assistant Professor Thomas Abelew turned to cats. Along with Emory physiologist Richard Nichols, Abelew is researching the effects of injury on long-term joint coordination. In the study, nerves in the felines' calf muscles have been cut and re-sutured; the research team is measuring recovery.

The study grew out of previous Emory research that found



Thomas Abelew

the motor component of nerve function returned to normal during recovery but the sensory component did not. "This discovery gave researchers a way of looking at how losing sensory feedback from a muscle could affect different aspects of movement," Abelew says.

Abelew's cats showed changes in coordination up to two years after the injury, but gait

was affected only when the cats walked down a ramp, which he says could relate to loss of the stretch reflex. He is putting a new group of recovering felines through a post-op exercise program similar to rehab. "We are hoping to find out if this exercise can bring the reflex back, or if the animals just learn to compensate using a different set of muscles or neural strategy," he says. "If we can find a way to bring the reflex back, this could be applied to humans."

A new standard for torticollis

Assistant Professor Susan Freed is leading a team of researchers from Emory and Children's Healthcare of Atlanta to improve outcomes for children with congenital muscular torticollis. Torticollis, or "twisted neck," in which the head tilts slightly to one side and rotates to the other, occurs because of tightened



neck muscles, often due to positioning in the womb or injuries suffered during delivery.

Torticollis has been around forever, but the number of infants needing physical therapy has increased since the National Institutes of Health's "Back to Sleep" campaign began in 1992. "Prior to 1992, babies were put to sleep on their tummies. Head turning in this prone position

allowed for a natural stretch of tight neck muscles," she says. "But when infants with torticollis are put to sleep on their backs, they generally turn their head only to one side."

A valid way to measure neck range of motion in babies is needed before research can determine the most effective treatments. Current measurement procedures are not standardized and often unreliable. Freed's research team has devised a new instrument and method to take range of motion measurements in young infants with no head control. "If the new method of measurement is proven to be reliable and valid, we should be able to compare interventions of different intensities and frequencies, hopefully finding effective ways to treat torticollis without hurting the baby," she says.