Movement Disorders Center
SCHOOL OF MEDICINE
UNIVERSITY OF COLORADO **ANSCHUTZ MEDICAL CAMPUS**

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On The Move!

The official newsletter for the University of Colorado Movement Disorders Center

In This Issue

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MR-Guided Focused Ultrasound (MRgFUS)

Ashley Madera. MD *Neurology Resident*

In January 2022, the University of Colorado Movement Disorders Center began offering MR-guided focused ultrasound (MRgFUS) as a new treatment option for patients with advanced movement disorders—specifically essential tremor and Parkinson disease. The goal of this treatment is to provide a safe, effective, and non-invasive therapeutic option for patients with tremor resistant to medication and who may not be eligible for other surgical treatments.

What is MR guided focused ultrasound?

Focused ultrasound is a non-invasive procedure that combines two technologies—magnetic resonance (MR) imaging and ultrasound (soundwaves). MR imaging creates highly detailed pictures to allow doctors to visualize structures of the brain. Guided by these images, ultrasound beams are focused on the specific area of interest.

For tremor, the area of interest is the ventral intermediate (VIM) nucleus of the thalamus, which is a relay center of the brain's motor and sensory signals. Patients with essential tremor and Parkinson's disease have an abnormal thalamic circuit causing tremors.

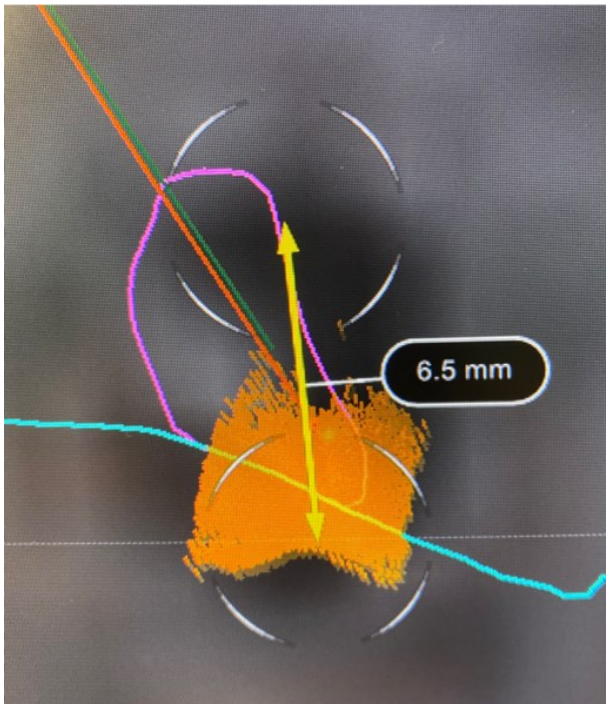
The focused beams increase the temperature of this target area and the heat causes a precise burn that destroys the targeted tissue, but not the surrounding area. Think of it like a magnifying glass focusing rays of sunlight on a leaf to create a hole.

This tiny burn or lesion interrupts the abnormal circuit and relieves tremor.

What conditions can be treated with MR-guided focused ultrasound?

MRgFUS was approved as a treatment for essential tremor in 2016 and tremor-predominant Parkinson disease in 2018. MRgFUS has only been approved for one side of the brain only.

Patients report improvement in tremor severity and related disability, often immediately, although benefits have been reported up to three years after treatment. Improvement from baseline scores



MR Tractography

(Continued on page 2)

ranged from 38-50% in hand tremor, 43-56% in disability, and 27-42% in quality of life. Though symptoms may improve, it is important to know that the procedure does not treat the underlying disease nor does it prevent progression.

How is a patient referred for MR-guided focused ultrasound?

All patients who are referred for MRgFUS evaluation may not be eligible to receive the procedure. The University of Colorado Advanced Therapies for Movement Disorders (ATMD) program has a highly-detailed screening process. This process ensures only patients who will truly benefit will receive the procedure. Patients must first be referred to ATMD by their neurologist or primary care provider. This group of providers focuses on the treatment of advanced movement disorders - specifically on non-pharmacological treatments. During the initial visit, patients will discuss the available treatment options, including MRgFUS. If the procedure is determined to be a good option for the patient and coincides with their goals of care, then the process is started to determine treatment eligibility. This process involves specialized imaging (CT scan of the head and MR with tractopgraphy), in addition to referrals to specialized providers including neurosurgery (to discuss the procedure itself), palliative care (to review diagnosis, evaluate for social support, and identify other non-motor symptoms), and neuropsychology (to determine cognitive profile).

Once all of the assessments are complete, the case is presented at the weekly multidisciplinary patient care conference. All of the providers who evaluated and care for the patient will be involved. If all providers are in agreement, the patient will be notified of the decision usually within 24 hours. If the providers determined the patient was a good candidate, he or she will be scheduled.

What should be expected on the day of the procedure? How long does the procedure take?

Before the procedure

The movement disorders neurologist will obtain baseline measurements of the tremor and balance. Pain medication and anti-nausea treatment are administered before the procedure to make sure the patient is comfortable. Next, the entire scalp is shaved to allow adequate cooling of the scalp. Then a frame is placed on the head to prevent movement during the procedure. The shaved scalp is then placed in a tub of continuously circulating cool water to further ensure a cool scalp during the procedure. While in this setup, the patient is then placed in a specialized MR scanner and more pictures of the brain are taken. The newer images are combined with prior scans and together allow the surgeon and neurologist to line up the ultrasound appropriately and precisely.

During the procedure

A total of the 154 ultrasound beams are arranged around the head, all coming together at a single point on a person's head. A test sonication (beam of ultrasound energy) with a temperature lest than 54°C is sent and an MR picture is taken immediately after. Based on the image, further adjustments are made to ensure the beams are focusing on the target area. Additional test sonications are sent and with each trial, the patient is examined for tremor reduction and side-effects, such as tingling. If any side effects occur, the beams are further adjusted. Once the best target area is located, the surgeon proceeds with brief bursts of high-temperature sonication, between 56-60°C. It is normal to feel a warming sensation during the procedure, but if the warming becomes concerning, the patient can alert the medical team.

After the procedure

Once complete, the water is drained and the frame is removed. The patients is taken to a recovery room and evaluated once more by the movement disorder neurologist. After a short observation period, the patient is able to return home.

The entire procedure lasts between two to four hours.

Over the following days, the patient will meet again with the movement disorder neurologist and have post-procedure MR images taken. These pictures help visualize the final lesion or burn.

What are the benefits of MR-guided focused ultrasound? What are common side-effects?

Benefits of the procedure: no incisions needed; no holes made in the skull, no hardware/device(s) implanted; no radiation used; no general anesthesia used; quick recovery time allowing return to daily activity within days; can see immediate improvement during the procedure; does not require adjustments, programming, or additional procedures.

Side-effects may include: nausea; headache during procedure; temporary numbness and tingling in fingertips or lips (may be permanent in 10-15% of cases); temporary unsteadiness with walking or balance problems

(may be permanent in up to 10% of patients)

Side effects can start several days or weeks after treatment. There is a chance that tremor may return after some months or years after treatment.

Focused Ultrasound vs Deep Brain Simulation (DBS)

Similarities

- Both are surgical procedures to treat movement symptoms
- Both are good options for patients with Parkinson disease who respond to levodopa but have complications, such as dyskinesia or “off” time
- Both are good options for patients with Essential tremor than cannot be controlled with medications

Differences

- MRgFUS destroys cells or tissues with focused ultrasound beams. DBS delivers small electrical pulses to cells. Both methods interrupt abnormal signaling.
- MRgFUS is permanent and irreversible. DBS may be reversed by removing the system or turning it off.
- MRgFUS does not require incisions or hardware placed in the body. DBS surgery requires thin wires to be inserted into the brain and a battery below the collarbone.
- MRgFUS is a one-time procedure and does not require adjustments. DBS needs regular programming to find the right settings for maximum benefit and minimal side effects.

Who is a candidate for MR-guided focused ultrasound?

Patients must have a confirmed diagnosis of essential tremor or Parkinson disease. The patient must be a least 22 years old for essential tremor and 30 years old for parkinsonian tremor.

Patients should consider this option if tremors have not been relieved by medications, tremors affect quality of life, they have a unilateral tremor that is unlikely to progress or need bilateral procedure, or the patient is not eligible for DBS.

Patients may not be eligible for treatment if they have any metal implants (eg pacemaker, neurostimulator, spine/bone fixation device, total joint replacement that is not MRI compatible), have certain heart conditions, have skull tumors, are on dialysis, are pregnant, are claustrophobic, are allergic to contrast dye used during MR imaging, or are unable to tolerate lying still on a table for up to four hours.

To learn more about MRgFUS, visit https://www.michaeljfox.org/news/focused-ultrasound or scan the QR code. Contact the ATMD navigator if you have further questions about this treatment option (ATMD@uchealth.org or DBS@uchealth.org).

Stay In-the-Know About Upcoming Events!

This year the Movement Disorders Center hosted its annual education events for Parkinson’s disease and Huntington’s Disease. More information about these events can be found on page 5.

Providing education to our Movement community is truly a privilege. The faculty and staff of the Movement Disorders Center firmly believe in giving patients, care partners, and families the resources they need to advocate for the best healthcare possible.

We encourage you to sign up for our monthly e-newsletter so that you will be the first to know about our upcoming educational events and news from our center. You’ll stay in the know about our center, current research, and what’s going on in the Movement Disorders Community. We will never share your sell your personal information and you can expect about one email per month.

To join our mailing list, visit our website (www.cumovement.org) or scan the code to the right with your smart phone. We do not share your sell you information.

THE MICHAEL J. FOX FOUNDATION
FOR PARKINSON'S RESEARCH

Your Nose Knows
Smell Loss and Brain Health

A simple scratch-and-sniff test could help scientists learn more about risk of brain disease.

Smell loss can be a risk factor for brain diseases such as Parkinson's. A new study is exploring this link toward prevention. The Michael J. Fox Foundation is asking everyone age 60 and older without Parkinson's disease to take a smell test.

Scan the QR code with your smartphone or visit our website.

Answer a few brief questions to receive your scratch-and-sniff test in the mail.

Take the test and enter your answers online.

Help scientists learn more about disease risk and develop new treatments.

https:direct.pdnex.us/?t=m&s=uc02

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Are you interested in participating in research?

We have many ongoing clinical trials and investigator-initiated studies. Available studies include observational, pharmacological, and surgical trials to help slow, stop, or reverse disease progression.

Did you know that all current treatments came through clinical trials. But, 90% of clinical trials do not finish on time because there is not enough participation. People who participate in clinical trials often have better outcomes. Participating in clinical trials is a gift you can give to the movement disorders community.

Our research recruitment team is ready to help you find a study that fits you. Resources are available in English and Spanish via phone and email. Contact us today at **303-724-4644** or **neuroresearch@cuanschutz.edu.**

Save the Dates!

9th Annual Parkinson Disease Symposium

Saturday, October 8, 2022

Topics will include: Advanced Therapies for Parkinson Disease, Medications, Research Updates, Genetics of Parkinson disease, the demographics of Parkinson's Disease, and Pseudoscience: How to Decipher the Good Information from the Bad.

This event will be offered in a hybrid format with limited in-person capacity. Registration and additional details are forthcoming. Please stay tuned to our event page or subscribe to our newsletter to learn more.

Parkinson's 101: What You and Your Family Should Know

Wednesday, October 19, 2022, 1:00-2:00 PM

This program is part of the Parkinson's Foundation PD Health @ Home Wellness Wednesday. This is a virtual program and will provide a basic overview of Parkinson's disease. Learn about what Parkinson's is, what causes it, common symptoms, treatments, and strategies for managing symptoms.

Annual Huntington's Disease Education Day

Saturday, October 29, 2022

Topics will include: Current Research, Mindfulness, Genetic Testing, and Financial and Insurance Planning

This will be a live event and masking and COVID-19 safety protocols may be required. The event will be recorded and available for viewing after the event. Registration and additional details are forthcoming. Please stay tuned to our event page or subscribe to our newsletter to learn more.

Welcome 2022-2024 Fellows!

The Movement Disorders Center is excited to welcome our two new movement disorders fellows. Dr. Brooke Heffernan and Dr. Matthew Woodward will be training with our faculty for the next two years. Once doctors complete their residency training, and nationally recognized board exams, they are eligible to obtain their full medical license and can start seeing patients.

Fellows still obtain their medical license, but have opted to receive an additional one to two years of training. Their training with the movement disorders group focuses specifically on neurological illnesses that cause too much movement or slowness or too little movement.

Brooke Heffernan, MD grew up in Kansas City and received her bachelor's degree in Biology at Bethel College in Central Kansas. There she met her husband, BJ, when they were both on the soccer teams. She went to medical school at the University of Kansas and completed her residency training at the University of Colorado, serving as chief resident in her fourth year. In her free time, she enjoys gardening, cooking, trying new restaurants, and hiking with her chocolate lab, Olive.

Matthew Woodward, MD raised in Pennsylvania, attending Penn State for college and then Drexel for medical school. He then did his neurology residency in Baltimore. He now finds his way to Colorado to continue his neurology training with a fellowship in movement disorders. In his free time, Dr. Woodward likes to do pub trivia, rock climb, box, and try new restaurants.

Dr. Heather Heiser and **Dr. Antonia Pusso** will continue their fellowship training this year and will have their own clinics.

Dr. Alex Baumgartner and **Dr. Mike Korsmo** graduated from the movement disorders fellowship program in June 2022. The faculty and staff are very excited that both Dr. Baumgartner and Dr. Korsmo will be staying at the University of Colorado Movement Disorders Center as faculty.

Dr. Baumgartner will be joining the CU Advanced Therapies for Movement Disorders team. He will be an integral part of our deep brain stimulation (DBS) team. He has concentrated his training on DBS with Dr. Kern and will be serving as the movement disorders neurologist in the operating room. With two movement neurologists and two functional neurosurgeons, access to the Advanced Therapies team should improve.

Dr. Korsmo will focus on providing movement disorders care to underserved communities. He will be spearheading efforts at Denver Health. He is working towards providing care with specific communities that are less likely to receive specialty or subspeciality care—like movement disorders.

We are grateful to all who ask "How Can I Help?"

We are thankful for the generosity of our donors this past year to elevate our work and progress in the field of Movement Disorders. With the help of our donors we have funded Movement Disorders Center's Pilot Grant Program for early-career clinician and bench researchers; expanded our outreach of Deep Brain Stimulation to surrounding states; provided additional training to staff in specialized care; trained neurologists to become the next generation fo Movement Disorders research and clinical care through funded fellowships, increased support for patients in Huntington's Disease clinics, and advanced complex research projects.

If you are interested in supporting the University of Colorado Movement Disorders Center, you can contact our CU Advancement colleague, Marti Laule at marti.laule@cuanschutz.edu or by phone at 720-2-2-7845 to learn more about how your gift can make an impact. You can also visit our website www.cumovement.org and click on the "Donate" button to give today.

Neurologic physical therapist here to help you with your healthcare

By: Kathryn (Katie) Nathan, PT, DPT, NCS

Looking for medical practitioners to help you with your healthcare can be overwhelming at times. When your care provider recommends skilled physical therapy, some common concerns are who is equipped to help me with my movement and mobility goals? Just like you found your movement neurologist that specializes in movement disorder care, there are Doctors of Physical Therapy that further specialize in neurologic care that can treat your movement disorder.

Neurologic trained physical therapists have specialized training and expertise working with those with nervous system injuries and movement disorders. We focus on helping improve your mobility, movement control, balance to reduce your falls risk, coordination, endurance, activity tolerance, energy pacing, strength, flexibility, and even dizziness if applicable. Additionally, we will provide you with individualized exercise and education while appreciating specific features of your neurologic diagnosis. It is advised to see a physical therapist annually for a mobility and movement checkup as well as screen for falls risk.

To find a physical therapist that specializes in neurological care, check out these website resources:

Look for a Neurologic Clinical Specialist (NCS) physical therapist.

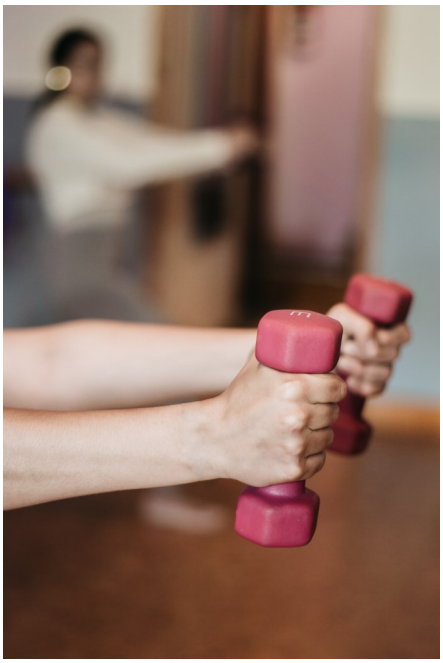
A Neurologic Clinical Specialist (NCS) physical therapist is someone who has had advanced training and clinical practice in neurologic physical therapy. These physical therapists have passed a specialty examination of the American Board of Physical Therapist Specialists.
https://aptaapps.apta.org/APTAPTDirectory/FindAPTDirectory.aspx

Look for a LSVT BIG certified physical therapist.

A LSVT BIG certified clinician is a physical or occupational therapist that has completed advanced training for Parkinson's specific rehabilitation and exercise.
https://www.lsvtglobal.com/LSVTFindClinicians

Look for a PWR! (Parkinson's Wellness Recovery) certified physical therapist.

A PWR! certified provider is someone that has completed advanced training for Parkinson's specific exercise.
https://www.pwr4life.org/professional-directory/



Alternatively, you can ask your local physical therapy clinic if they have physical therapist that specializes in neurologic care, movement disorders or your specific diagnosis like Parkinson's disease or dystonia to name a couple.

Being informed of your options for healthcare is important. Don't hesitate to ask questions and research.

If you have questions, please contact Dr. Nathan
Katie@movedbymovementpt.com.

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