



University of Colorado **Anschutz Medical Campus**



HEADlines

TIMELY NEWS FROM THE DEPARTMENT OF NEUROSURGERY

Spring 2021





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MESSAGE FROM THE CHAIR OF NEUROSURGERY:

Spring is over and summer is upon us! We hope you have continued to stay well, and that you are as anxious as we are to start meeting in person again, gathering for events, and begin celebrating the end of the global COVID 19 pandemic.

In that theme, this edition of “HEADlines” is about celebration; as well as collaboration and exciting new technology. We bid farewell to some of our amazing residents, fellows and researchers, and we welcome new faces. We have featured an article on “COVID & the Brain,” from two very collaborative Neuroscience researchers in the community, Dr. Lotta Granholm-Bentley and Dr. Barbara Adams. When strong collaboration exists, some amazing things can happen. Our feature on Dr. John Thompson is an example of one of our neuroscience researchers who has forged new frontiers by working cooperatively with others.

And when strong collaboration and communication exist, the patients are the winners. In this edition, you will read a heartwarming story about one of our patients with Parkinson’s Disease who underwent placement of Deep Brain Stimulation (DBS) to control his symptoms. You will also learn of the exciting work expanding the use of DBS and focused brain stimulation, to treat other medical conditions, including mental health disorders and even the movement of robotic limbs in a patient with spinal cord dysfunction.



In just a few short months, on the Anschutz campus, we will be one of only a handful of facilities in the United States with focused ultrasound (fUS) capability inside our MRI. Read on! Indeed, we have much to look forward to in the coming months and we are glad you have chosen to join us on our journey to make Colorado the “healthiest brain state in the country!”

Kevin O. Lillehei, MD
Professor & Ogsbury-Kindt Chair
Department of Neurosurgery

FAREWELL



Ros Whelan, MD



Jeremy Hosein, MD

Ros Whelan and Jeremy Hosein are our graduating chief residents! Dr. Whelan is on his way to Atlanta for a pediatric neurosurgery fellowship. Dr. Hosein will be joining a private practice group in his hometown of Lincoln, Nebraska. We wish them both well and thank them for their wonderful service.

We also want to say a fond farewell to our fellows. Although we do not know where they are all headed, we do know that Dr. Yas Nagahama will be going to Rutgers to work in the Robert Wood Johnson Medical School in New Jersey (congrats, Yas!) and Dr. Fabio Grassia has accepted a position at Denver Health and will be an Assistant Professor here in our department! Best of luck to all of these dedicated neurosurgeons in their chosen specialties!



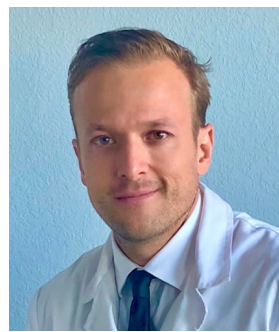
*Andrius Anuzis, MD
Outgoing Neurosurgical
Neuroncology Fellow*



*Hemn Abdulrahim, MD
Outgoing Pediatric
Neurosurgery Fellow*



*Yasunori Nagahama, MD
Outgoing Pediatric
Neurosurgery Fellow*



*Rafael Martinez-Perez, MD
Outgoing Skull Base
Neurosurgery Fellow*



*Fabio Grassia, MD
Outgoing Stereotactic/
Functional Neurosurgery
Fellow*

FAREWELL



Sean Hansen completed his BS in Bioengineering from the CU College of Engineering, Design and Computing this May. Sean was also recognized as the first Bioengineering student to win the prestigious Colorado Silver Award presented by the Colorado Engineering Council. Sean will continue his studies in Bioengineering as a Master's student conducting research on transcutaneous auricular vagus nerve stimulation in the lab of Dr. Cristin Welle, our Vice Chair of Neurosurgery Research.



Andy Tekriwal has just completed the first part of his Neuroscience Graduate Program and will now move onto medical school. He is part of the CU Anschutz Medical Science Training Program (MD/PhD). He has done extensive research in Dr. Thompson's lab and will now go to medical school. He will then finish his PhD following his medical school studies. Thanks for all your hard work, Andy!

Congratulations to Kim Thies and Caleb Fiebig, who both just finished their MS degrees through the Modern Human Anatomy Program. Their capstone mentor was Dr. John Thompson (neurosurgery).



WELCOME!

Newest Class Of Neurosurgical Fellows



Tareeq Yaseen, MD
Incoming Stereotactic/
Functional Neurosurgery Fellow



Alejandro Mercado, MD
Incoming Neurosurgical
Spine Fellow



Dominico Gattozzi, MD
Incoming Skull Base
Neurosurgery Fellow



Sarah Travers, MD
Incoming Neurosurgical
Neuroncology Fellow



Noor Malik, MD
Incoming Pediatric
Neurosurgery Fellow

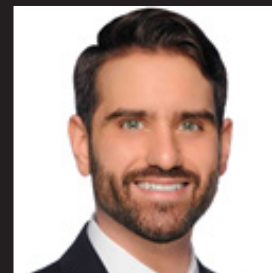


Derek Samples, MD
Incoming Pediatric
Neurosurgery Fellow



Brent Morel, MD
Incoming Neurosurgical
Critical Care Fellow

New Interns



Reinier Alvarez, MD
Coming from: Florida
International University School
of Medicine



William Harris, MD
Coming from: University of Hawaii
School of Medicine

Summer Research Student Workers

Sydnei Lewis, an undergrad at CU Boulder, will be working with Dr. John Thompson.

Gabrielle Hovis, a medical student from UC Irvine, will be working with Dr. Todd Hankinson.

Jack DuFacuchard, an undergrad at University of Minnesota, will be working with Dr. Allyson Alexander.

Zoe Zizzo, an undergrad at Colorado College, will be working with Dr. Michael Graner and Dr. Xiaoli Yu.

Sunderland Baker, an undergrad at Colorado College, will be working with Dr. John Thompson

COVID & THE BRAIN

With thanks to local researchers & contributors

Lotta Granholm-Bentley, PhD, and Barbara Adams, PhD

As we are all hearing, four out of five COVID-19 patients have experienced acute and chronic neurological symptoms. In some cases, these patients are called “long haulers” because they continue to have these symptoms long after they are feeling physically recovered (three months or more after contracting the virus).

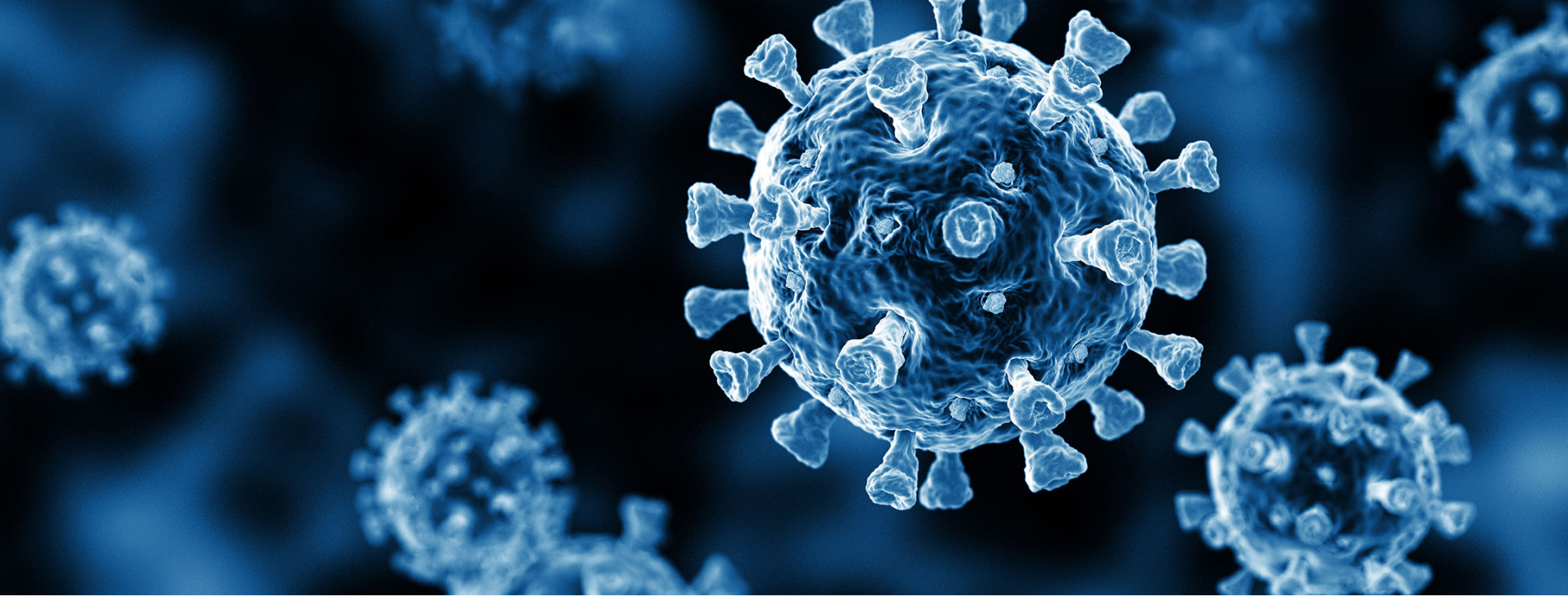
So what do we know? We know that the symptoms include balance issues, distortion of vision, headaches, memory loss, “brain fog,” confusion, fatigue, disturbed sleep, changes in taste and smell, and sometimes strokes. We know that these are very similar symptoms associated with concussion and some traumatic brain injuries. “Long haulers” report having trouble problem solving, short term memory issues, trouble forming words, difficulty focusing, absent-mindedness, and severe physical and mental fatigue after any kind of exertion.



It is believed that many COVID-19 complications may be caused by a condition known as cytokine release syndrome or a “cytokine storm.” This is when an infection triggers the immune system to flood the bloodstream with inflammatory proteins called cytokines. They can kill tissue and damage organs, including the brain. The science is complex, but we know that this hyperinflammatory response can result in neuroinflammation, and sometimes oxygen deprivation.

We know that the frontal cortex of the brain is affected and those with a history of hypertension or dementia are more at risk of developing these kinds of symptoms, possibly because they already have vascular impairments. Those with Down Syndrome have ten times the mortality rate of the general population.

What do we know about treatment for these neurological symptoms following COVID infections? For now, patients are encouraged to get plenty of physical and mental rest. Pain relief and anti-inflammatory medications are often prescribed.



Current studies on the Anschutz campus are numerous and being conducted by many departments including infectious disease, pulmonary science, emergency medicine, clinical immunology and pharmacology. This is a small list of the many ongoing studies:

- COVID-19: Lung ultrasound implementation in the management of patients with COVID-19
- STARS (“Study of Alteplase for Respiratory failure in SARS-Cov2 (COVID-19)”, a Phase IIa Clinical Trial
- COVID-19 Prospective Observational Cohort Study and Biobank of Health Care Workers and Other Populations
- Trial of Early Antiviral Therapies during Non-hospitalized Outpatient Window (TREAT NOW) for COVID-19
- I-SPY COVID TRIAL: An Adaptive Platform Trial to Reduce Mortality and Ventilator Requirements for Critically Ill Patients
- Myocardial Virus and Gene Expression in SARS CoV-2 Positive Patients with Clinically Important Myocardial Dysfunction
- Biology and Longitudinal Epidemiology of PETAL COVID-19 Observational Study
- Monitoring hospital patients through wearable digital device sensor data

For a full list of all the trials being conducted at CU Anschutz, including those that are still enrolling patients, visit: <https://research.cuanschutz.edu/university-research/covid-19-clinical-research/covid-19-active-studies>

COLLABORATION AT WORK

How One Researcher Brings Together Numerous Teams!

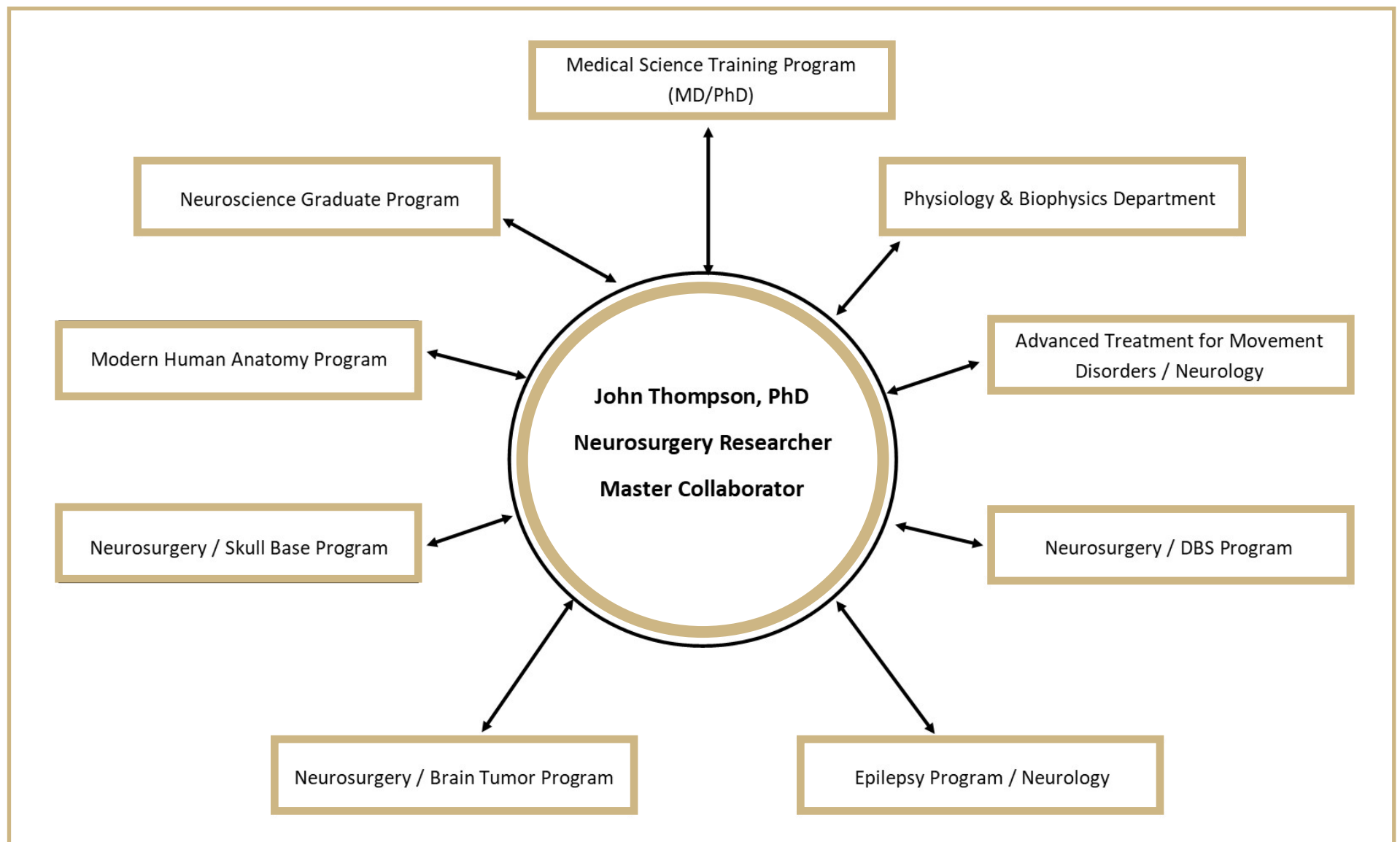
John Thompson grew up in Florida and attended Florida State University, ultimately obtaining his PhD in Neuroscience. Following a productive 10-year period of research using animal models to study the basal ganglia (a region of the brain critical for movement), in February 2014, John joined the Department of Neurosurgery as an Assistant Professor and Clinical Neurophysiologist for our DBS (Deep Brain Stimulation) surgery program. John's initial role in the operating room was to manage the neurophysiological equipment, provide interpretation of the microelectrode recordings, as they pertained to mapping the structures of the basal ganglia en route to the DBS target, and assist in selecting the optimal trajectory and depth for DBS implantation. John's early research studies focused on exploring neuroscience research opportunities in the operating room during DBS surgeries – supported by a Boettcher Early Investigator Award (2017), working with both the functional neurosurgeons at that time (Drs. Aviva Abosch and Steve Ojemann) and a basic science collaborator (Dr. Gidon Felsen). However, over time, many novel robust collaborations were established in the Neurosurgery as well as Neurology departments with clinicians interested in human neuroscience combining neurophysiology, neuroimaging, and behavior. He now works with numerous clinicians, has a second appointment in Neurology and is an affiliate instructor in Bioengineering.

Building upon the research infrastructure that had been established in DBS, today the current DBS research program centers on the collaborative team efforts of John, Dr. Drew Kern (Director of the Advanced Therapies of Movement Disorders Program and Co-director

of the DBS program), Dr. Steven Ojemann (Co-director of DBS program) and, our newest functional neurosurgeon, Dr. Daniel Kramer. This research team has on-going projects exploring DBS for Parkinson's disease related to cognitive outcomes, sensory-motor processing, novel targets, improved intraoperative targeting, and impact on sleep. As a natural outgrowth of the clinical overlap between Neurosurgery and Neurology, John has established active collaborations with many members of the Epilepsy program in the Neurology department – primarily focused on advanced treatments for drug-resistant epilepsy: application of machine learning approaches to the chronic stereo-electroencephalographic intracortical data acquired for seizure localization, and assessment of functional



Dr. John Thompson



outcomes following laser ablation. Currently, he and Dr. Danielle McDermott and Dr. Sam DeStefano (neurologist & epileptologist), Drs. Steven Ojemann and Dan Kramer are researching outcome measures for recently developed treatment technologies for refractory epilepsy, including responsive neural stimulation (RNS), laser ablation, and now even DBS.

The third area of John's research involves developing quantitative neuro imaging tools to assist in surgical planning, functional outcomes, and predict recurrence treatment of brain and skull-based tumors working with Dr. Ryan Ormand and Dr. Samy Youssef.

John has been involved for years with the Modern Human Anatomy Program on campus, where he

has mentored many students. He is now Chair of Admissions for this program, serves on various committees, and is very involved with students who want a clinical focus to their research. In addition to taking graduate students from this program, he also teaches within the Neuroscience Graduate Program and has had students from the Medical Science Training Program (a combined MD/PhD program) work in the lab. In 2021, Kim Thies and Caleb Fiebig both completed their Capstone projects with John in MSMHA program, and both had a clinic co-mentor in either DBS or epilepsy. Andy Tekriwal, an MD/PhD is set to finish his PhD work in the labs of John and Dr. Gidon Felsen (Physiology and Biophysics) in Spring 2022.

RESULTS OF COLLABORATION: THE PATIENT WINS!

Meet Grateful Patient, Tim Black

Tim Black is 72 and has owned his own roofing company since 1978. Although he started with residential homes, he worked into commercial roofing in 1990 and has loved every minute. He has completed huge projects such as the Denver Art Museum and over 50 buildings across all the CU campuses. His company is widely respected throughout the front range.

Tim lives in Erie with his wife, Mary. They have a recently married daughter and hope to someday have grandchildren. But, in 2009 he was diagnosed with Parkinson's Disease. Unlike many other patients, Tim didn't have the tremors associated with the condition, but he had dyskinesia, an abnormality or impairment of voluntary movement. These twitches and spasms were mostly in his jaw, mouth and shoulders and impacted his entire life, particularly his work life.

Not being able to work effectively became really difficult for Tim. He loved his job and his company. But, due to the progression of the



Tim Black

***“Trust these doctors and surgeons.
They know what they are doing!”***

condition, he ultimately decided to give up the reigns to his business partner and try to “semi-retire.” Unfortunately, a year ago, his trusted business partner died of brain cancer. “It was obviously a very rough year,” Tim stated. “I lost my partner and dear friend, and my business was at risk again. I had tried every Parkinson’s medication available – until I felt like I had no choice but to try Deep Brain Stimulation (DBS) surgery. I needed to get back to work and keep my company afloat. DBS was my last hope.”

Due to a detached retina, Tim was not sleeping well and when he went for his neuropsychological testing to qualify for the surgery, he did poorly on some of the cognitive pieces and was rejected as a candidate for surgery. He knew it was just due to the lack of sleep, so he convinced his doctors, Lauren Seeberger (movement disorders), Drew Kern (advanced therapeutics in Movement Disorders) and Steve Ojemann (functional neurosurgeon), to let him try the cognitive testing again. He did fine the second time and had the surgery in April of this year.

The results were almost immediate. After the very first session of programming, the stimulator (which is similar to a cardiac pace maker placed

in the chest, but regulates the firing of the electrodes implanted in the brain), he felt almost normal. “If I don’t think about it, I can sometimes forget that I even have Parkinson’s Disease!” Although this is not the outcome that everyone has, Tim could not be more pleased with the results.

“I can’t say enough about all the of the doctors, especially those in the OR. The operating room was loud and scary, and it was awkward to be awake through the procedure, but they talked me through it. Everyone in that operating room did a fantastic job. Within a couple of weeks, after the very first programming session, my dyskinesia drastically improved, I slept better and I’m now down to half of the pills I was taking. It’s not perfect, but it’s almost like it used to be!”

When asked what Tim would say to others considering this surgery, he says, “Trust these doctors and surgeons. They know what they are doing!”



NEW EQUIPMENT – GAME CHANGING!

Transcranial MR-Guided Focused Ultrasound Comes to CU Anschutz

CU Department of Neurosurgery is happy to announce that this exciting new surgical technology is coming to our Anschutz campus this coming fall!

Magnetic resonance guided focused ultrasound (MRgFUS) is an early-stage, non-invasive and incision-free therapeutic technology with the potential to transform the treatment of many medical disorders, including many Neurosurgical procedures. Ultrasonic energy targets tissue deep within the skull (or body) without incisions or radiation.

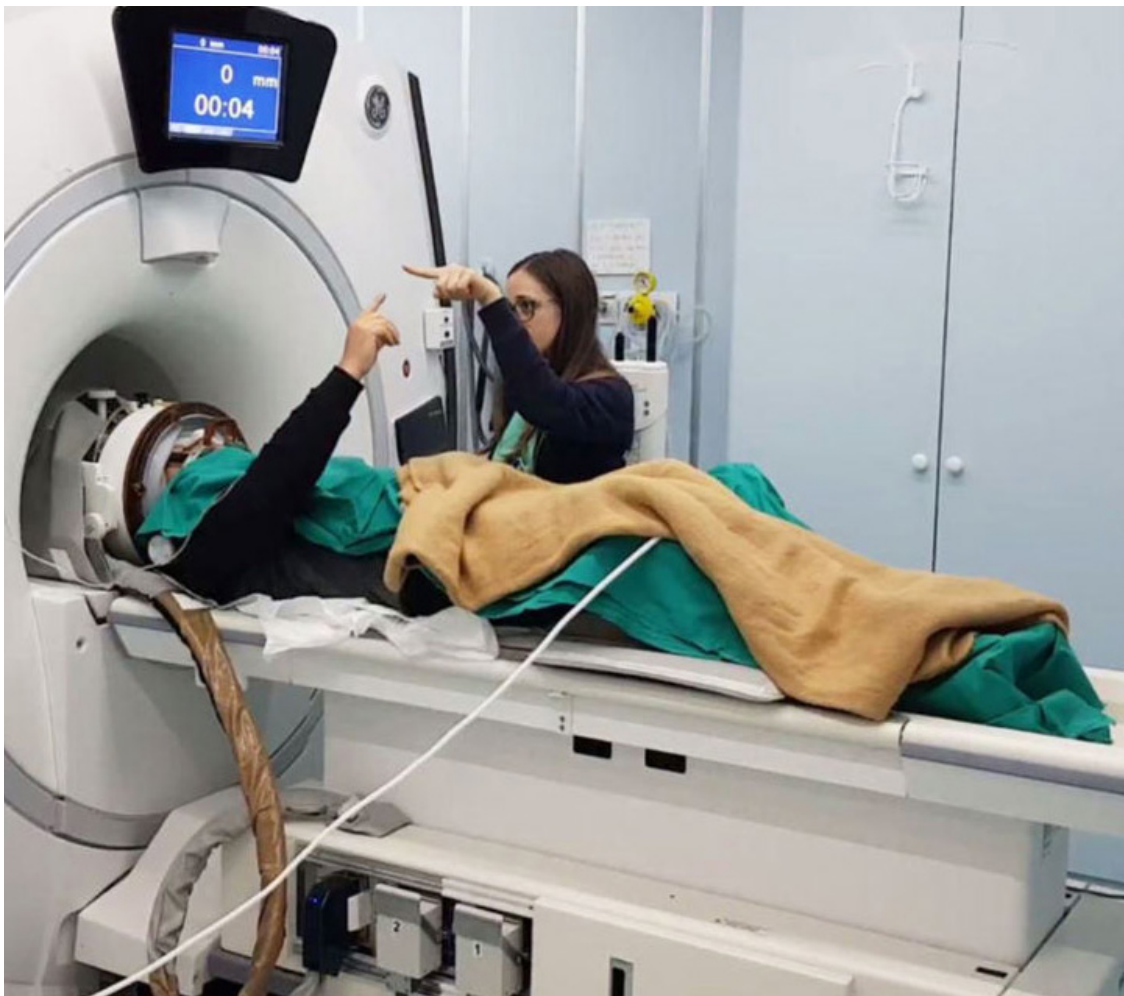
The technology is currently approved for the treatment of essential tremor, tremor dominant Parkinson's Disease, uterine fibroid tumor ablation, and pain palliation for bone cancers. But many other indications are coming soon, including the treatment of benign and malignant brain tumors.

Ultrasound is a form of energy that can pass through skin, muscle, fat and other soft tissue so no incisions or inserted probes are needed. High intensity focused ultrasound (HIFU) pinpoints

a small target and provides a therapeutic effect by raising the temperature high enough to destroy the target with no damage to surrounding tissue.

Magnetic resonance imaging (MRI) is used to guide and control the treatment, which is performed while the patient lies within an MR scanner. Guided by detailed images of the anatomy and the tumor or target area, the physician is able to pinpoint, direct and continuously monitor the treatment.

By offering these two technologies, focused ultrasound and magnetic-resonance imaging (MRI), we will be offering next generation neurosurgical procedures without the risks or potential readmissions associated with anesthesia and open craniotomies. In many cases, no anesthesia is needed, so the patient remains awake, providing feedback during the treatment, and most patients demonstrate immediate post-treatment relief.



The purchase is being made by UCHHealth for the UC Hospital at Anschutz and will benefit many departments, particularly Neurosurgery. Dr. Steve Ojemann, long time functional neurosurgeon in our department states, *"We have been wanting this technology for a long time, so we are excited that the hospital has made this investment. It truly is a marker for Excellence in the Surgical Treatment of Movement Disorders, but it also has great promise for brain tumors. We are now one of the few pioneering hospitals globally to participate in groundbreaking neuro oncology research and we are part of a leading group of US and international investigators that will define the priorities of investigations for using this technology in the treatment of various neurosurgical disorders."*

Dr. Daniel Kramer, new functional neurosurgeon, is also anxious to get this technology going. *"After being trained at Stanford, one of the leaders in focused ultrasound, I've seen first hand just how beneficial this can be for the right patients. This is the next wave in surgical technology and allows us to treat patients without opening their skulls or implanting devices. Pretty amazing!"*

Pretty amazing, indeed...!

CONGRATULATIONS

Children's Hospital Neurosurgery Team!

Each year, Children's Hospital Colorado recognizes providers and hospital units/clinics for achieving outstanding ratings on Patient-Family Experience surveys. Last year, CHCO Neurosurgery was one of the top-rated teams based on the 2020 Patient-Family Experience survey results.



RESIDENT OF THE QUARTER

Congratulations to **Dr. Will McKay**, named Resident of the Quarter in April. Chief Residents, Ros Whelan and Jeremy Hosien state, "without compromise, Will leans into the job and has shown remarkable growth as a surgeon on the spine service with multiple residents and attendings who have commented on his skill and patient care."



Daniel Kramer, MD

Winner of the 2021 Neurosurgery Research Innovation Award - \$30,000
"Human thalamic activity in Essential Tremor as part of a braking mechanism"



Dr. Jason Weedman,

voted "Teacher of the Year" by the Anesthesiology Critical Care Medicine Fellows, a significant honor!



Michael Graner, PhD

\$40,000 award from Michele Plachy-Rubin Fund for Brain Cancer Research to study “Targeting Thymidine Salvage and Evaluation of Temozolomide Potentiation in Glioblastoma”



Cristin Welle, PhD

\$54,572 award from the Defense Advanced Research Projects Agency to study “How GABAergic Neurons Contribute to VNS-Accelerated Cortical Plasticity (Optional Task).”



John Thompson, PhD

\$5,000 award from the Boettcher Foundation for “Identifying neurophysiological biomarkers of motor impairment in Parkinson’s disease.”



Steve Ojemann, MD

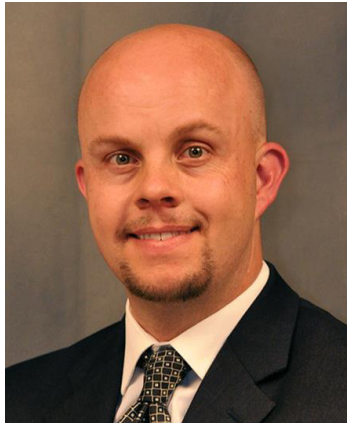
\$45,000 award, Medtronic, Abbott and Boston Scientific for years 21-22 Stereotactic & Functional Neurosurgical Fellowship Program.



Todd Hankinson, MD \$47,000 award from the Morgan Adams Foundation for “*Advancing Characterization of Epithelial-to-Mesenchymal Transition in ACP through Phospho-kinase Analysis, Preclinical testing of the Immunotherapeutics Nivolumab, Bevacizumab and Adecatumumab using ex vivo Adamantinomatous Craniopharyngioma Tissue, and Intelligent System Design for Interpretable Deep Learning Modeling of Rare Pediatric Brain Tumors from a Multi-disciplinary Perspective.*”



Kevin Lillehei, MD \$375,000 award from Neuraptive Therapeutics, Inc., for “A Phase 2a, Multicenter, Randomized, Patient and Evaluator Blinded, Controlled Study Evaluating the Safety and Efficacy of NTX-001 Compared to Standard of Care in the Treatment of Acute Single Transected Peripheral Nerve Injury Occurring below the Distal Border of the Brachial Plexus Requiring Surgical Repair.”



David Case, MD for \$223,000 award from Marinus Pharmaceuticals for “A double-blind, randomized, placebo-controlled study to evaluate the efficacy and safety of intravenous ganaxolone in status epilepticus.”



Paige and her father, Brian

Congratulations to **Dr. Corbett Wilkinson** at Children’s Hospital. 9 year old Paige thinks he’s her hero, and Paige’s Dad says “we think Dr. Wilkinson can walk on water!” This follows a tribute on Father’s Day, recently published by Children’s Hospital “celebrating heroes.” Dr. Wilkinson, a pediatric neurosurgeon, was celebrated for going “above and beyond” with emergency brain surgery on Paige. The surgery not only saved her life, but saved her long hair, which Dr. Wilkinson refused to shave off because he thought it would have traumatized Paige even further. He IS a true hero, and a great father, for knowing ALL the things that matter to kids and their parents!



Judith Gault, PhD and John Thompson, PhD for being quoted by the Brain & Behavior Research Foundation regarding their progress on DBS for psychosis and schizophrenia.
Link: <https://us3.campaign-archive.com/?u=c6e89b4de3dfd70e795490632&id=086a1f94ab&e=2e6a5ef7b6>



Judith Gault, PhD for being quoted in MedScape regarding her work in the ethics of Deep Brain Stimulation for the treatment of Schizophrenia.
Link: https://www.medscape.com/viewarticle/938534#vp_3

WELCOME LITTLE ONES & PARENTAL CONGRATS!



Connor Wales McNulty

Born to Liza Humes
(Physician Assistant)
& her husband
May 18, 2021
21 inches long
8 lbs 6 oz



Nehemia LeRoy Ormond

Born to
Dr. & Mrs. Ryan Ormond
May 30, 2021
21.5 inches long
8 lb 5 oz

GET INVOLVED

You can be involved in all the exciting programs and research innovations happening in the Department of Neurosurgery! Donations are currently needed for investigator initiated trials, new positions, and even some capital equipment! Recurring monthly donors are especially helpful – and you can give *any amount*! Follow these easy steps:

Directions for online giving:

1. Go to: giving.cu.edu/fund/write-fund
2. Select the amount or write in an amount you would like to give.
3. If you would like to give this amount monthly, check the recurring box and indicate “monthly.”
4. If you are giving the gift in honor or in memory of someone, select ‘yes’. In the comment section, you can add the name of the person, or just mark “no.”
5. In the comment section, write the fund name and number. (See fund names and numbers on the right side of this page).
6. Select ‘Give Now’ button.
7. Follow prompts to fill in personal, payroll deduction or credit card information for processing. You will be able to print a receipt of your donation.

FUND NAMES & NUMBERS:

General Neurosurgery Fund: #0223130

Neuro-oncology Research Funds:

General Neurosurgery-Oncology # 221101
(includes brain tumor tissue bank)
Meningioma Momma’s Research # 0223181
Brain Immunology Research # 222176
Functional Neurosurgery Research # 222277

Stroke, Aneurism & Neurovascular Funding:

Foreman Family Research Fund # 0223133
Stem Cell & Gene Therapy Research # 0222912

Radiology & Imaging Research:

Mannetti 3D Printer Fund # 0222672

Education and Scholarship Funds:

Neurosurgery Resident Education # 221955
Foreman Family Lectureship Fund # 0223134
VanderArk Lectureship Fund # 0230389

Ogsbury/Kindt Neurosurgery Chair
Endowment Fund # 0230133

Neurosurgery in Schizophrenia & Mental Illness
Research Fund # 0222913

Checks of any amount can be sent with a note in the memo about the fund to be supported, and mailed to:

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