

CLINICAL NEUROSCIENCES CENTER  
**Convergence**

**2014  
REPORT**  
to the Community

**AMONG  
THE ELITE**

CNC's Unique Position  
as a Home to StrokeNet  
& NeuroNEXT

**OUT OF  
THE BOX**

TeleStroke Program is  
Changing the Face of Stroke Care

**DEEP BRAIN  
STIMULATION**

What Makes the CNC One of the  
Best in the Nation for DBS



UNIVERSITY OF UTAH  
HEALTH CARE

Clinical Neurosciences Center



# TOP 10 5 YEARS

## IN CARING, QUALITY, VALUE.

For *five years in a row* University of Utah Health Care has been recognized by the University HealthSystem Consortium as one of the Top 10 academic medical centers in the country for quality\* and as one of the top health systems for improving quality while reducing costs.

What does this mean for you? When you choose University of Utah Health Care you are selecting quality, safety, and value from a team devoted to providing each individual patient with an exceptional experience. Learn more at [quality.uofuhealth.org](http://quality.uofuhealth.org)



**Your Choice.** Our Experts.

\*University HealthSystem Consortium 2014 Quality Leadership Award and 2014 UHC Supply Chain Performance Excellence Award

### CONVERGENCE 2014

# ANNUAL REPORT TO THE COMMUNITY

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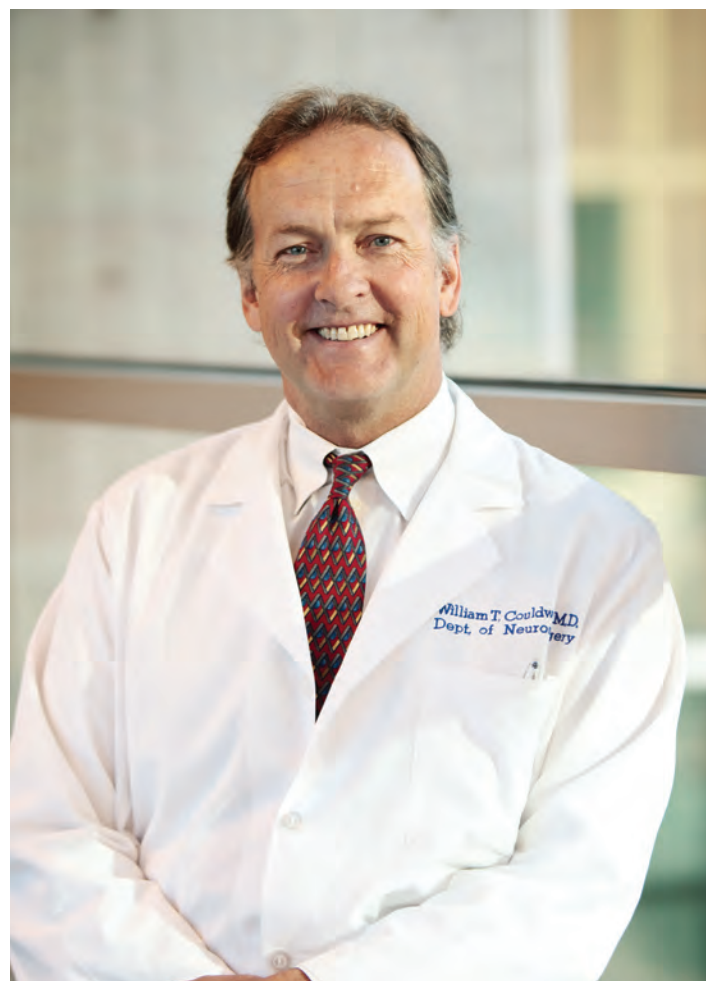
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Clinical Neurosciences Center Leadership Clockwise from top left:  
William T. Couldwell, MD, PhD, Neurosurgery; Stefan-M. Pulst, MD,  
Dr med, Neurology; Satoshi Minoshima, MD, PhD, Radiology;  
Richard Shumway, MHA, Administrative Director

## A MESSAGE FROM THE CHAIRS

In this year's issue, we have chosen to highlight a small sample of the unique stories housed within our walls — stories that set the Clinical Neurosciences Center apart from any other medical facility of its kind in the region. For example:

[How the Clinical Neurosciences Center became one of only a handful of centers in the country to take part in two of the nation's most prestigious research programs.](#)

[How one neurosurgeon is affecting the lives of patients through peripheral nerve transplant surgery.](#)

[Why University of Utah Health Care is one of the top Deep Brain Stimulation centers in the nation.](#)

[How one physician has made University of Utah Health Care home to the region's only autonomic lab.](#)

[How a popular neuroradiology conference has managed to grow and become one of the premier neuroradiology conferences in the world.](#)

As one of the top neurosciences centers in the country, and part of the only academic medical system in the Intermountain Region, we are proud of our team and its history of discovery, innovation, and service to our patients and their families.

In the following pages, you will get a brief glimpse of the amazing things we are doing for patients with today's technology. On behalf of everyone at the Clinical Neurosciences Center, we hope you enjoy this year's edition of *Convergence*.

During the 2013 State of the Union address, President Obama said, "Every dollar we invested to map the human genome returned \$140 to our economy — every dollar. Today our scientists are mapping the human brain to unlock the answers to Alzheimer's. They're developing drugs to regenerate damaged organs, devising new materials to make batteries 10 times more powerful. Now is not the time to gut these job-creating investments in science and innovation."

The president's words sound a non-debatable message — that exploration and innovation are necessary and crucial to enhancing the lives of Americans and individuals throughout the world.

The search for innovative new therapies for patients with neurological disease is a core mission of the University of Utah's Clinical Neurosciences Center. Our physician researchers have a proud history of discovery and continue to seek a better understanding of the causes of neurological disorders and to develop and test novel treatments.

It is with this spirit of exploration and innovation that we present to you the 2014 edition of *Convergence*.



2014 CLINICAL  
NEUROSCIENCES  
CENTER

# Highlights

## CONTINUED INVOLVEMENT WITH A VARIETY OF COMMUNITY EVENTS

- ARTILEPSY
- BE WELL UTAH HEALTH FAIR
- SEIZE THE NIGHT 5K WALK/RUN
- SAVING STROKES
- CARS FOR A CURE GOLF CHALLENGE
- TEAM BRAIN CYCLING TEAM

## RE-CERTIFIED AS, AND REMAINED, THE INTERMOUNTAIN WEST'S FIRST AND ONLY COMPREHENSIVE STROKE CENTER



For the 5th year in a row,  
received the American  
Heart/American Stroke  
Association's Gold Plus Award  
for Stroke Excellence



NAMED BY NEUSTRATEGY, INC. AS THE TOP  
PERFORMER FOR ITS 2014 NEUROSCIENCE  
CENTER OF EXCELLENCE SURVEY

## PLANNED AND EXECUTED A NUMBER OF REGIONAL AND NATIONAL NEUROSCIENCE CONFERENCES

- 12TH INTENSIVE INTERACTIVE HEAD & NECK IMAGING CONFERENCE
- 11TH ANNUAL UTAH STROKE SYMPOSIUM
- 2014 BRAINSTORM NEUROSCIENCES CONFERENCE
- 43RD WESTERN INTERMOUNTAIN NEUROLOGICAL ORGANIZATION (WINO) CONFERENCE

WELCOMED A NEW CHAIRMAN OF  
RADIOLOGY, SATOSHI MINOSHIMA, MD, PHD

**RECIPIENT OF**  
the Platinum Award at the 2014  
Healthcare Internet Conference as  
the top marketing campaign for our  
Stroke Awareness Month campaign

**BECAME THE ONLY**  
medical facility in the Intermountain  
West to have two Pipeline-certified  
neurosurgeons for the treatment of  
brain aneurysms

**REMAINED AMONG**  
the top 20 hospitals in the country  
in terms of the number of  
Deep Brain Stimulation (DBS)  
evaluations and implantations

**CONTINUED TO**  
participate in the National  
Neurosurgery Quality and  
Outcomes Database (N2QOD)  
for spine surgery

**WELCOMED ELEVEN**  
new physicians to the Clinical  
Neurosciences Center – three in  
Neurosurgery and eight in Neurology

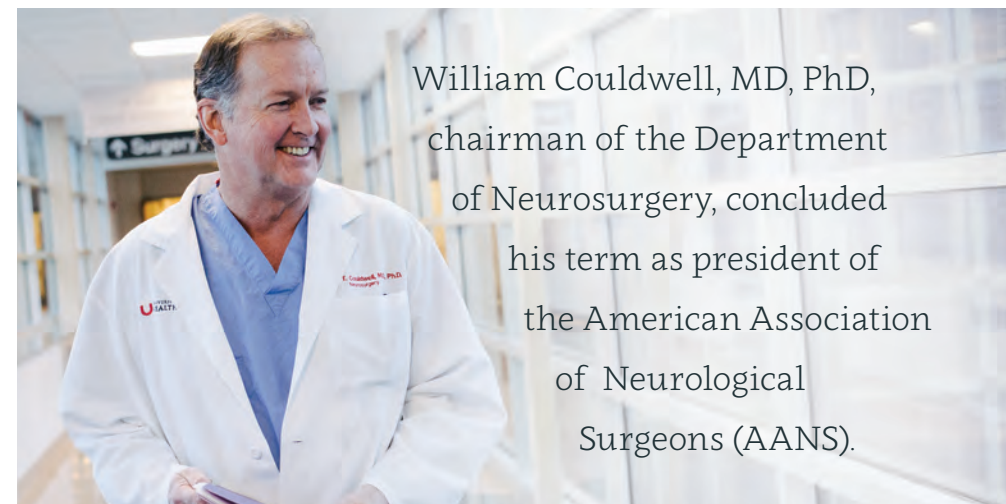
**OVER THE PAST YEAR,**  
added eight new sites to our growing  
TeleStroke Network

**STEFAN M. PULST, MD, DR MED,**  
CHAIR OF THE DEPARTMENT OF NEUROLOGY  
received the George C. Cotzias Award for Neurosci-  
ence from the American Academy of Neurology.

He was also honored by the  
National Institutes of Health with the Senator  
Jacob Javits Award in Neuroscience in 2014.



William Couldwell, MD, PhD,  
chairman of the Department  
of Neurosurgery, concluded  
his term as president of  
the American Association  
of Neurological  
Surgeons (AANS).





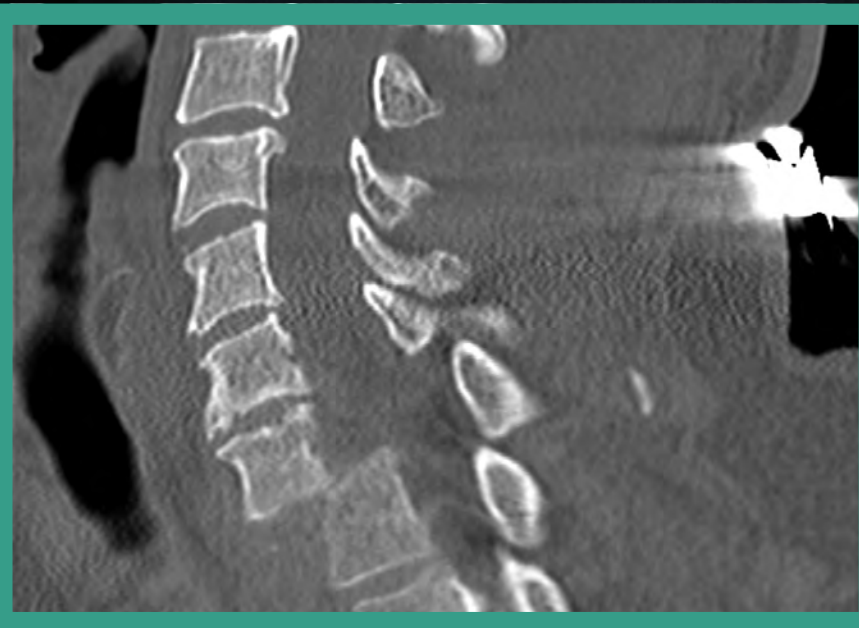


“BECAUSE OF THE RESEARCH THAT GOES ON HERE WE CAN HAVE A BIG IMPACT, IMMEDIATELY AND DIRECTLY.”

DR. MEIC SCHMIDT



Top: Dr. Meic Schmidt. Left: CT scan of Michael Pruet following his accident. Above: Michael and his wife, Dawn, during Michael's recovery.



## TEN DAYS GONE

A DEADLY ACCIDENT TURNS INTO A MIRACULOUS RECOVERY FOR WYOMING MAN

BY JEREMY PUGH

Michael Pruet is missing ten days. The ten days from the moment a truck pulled out in front of his motorcycle on a quiet road in Jackson Hole, Wyo. and he had no other choice but to lay the bike down and die.

Ten days before he discovered he was still alive. Ten days before he learned he'd been literally put back together by a top-notch team at University of Utah Health Care. It was ten days after that moment, the moment he skidded under the wheels of the truck and thought he was dead and gone, that Michael Pruet came out of the fog.

“My wife told me that suddenly I had a clarity in my eyes that I hadn't had before,” the 48-year-old realtor says. “And she told for me the 1,000th time that I had been in a motorcycle accident and I was alive. I started crying. It sunk in. I should be paralyzed, or dead. That moment it became clear to me that this really was a miracle.”

Pruett had been conscious and awake during those 10 days, but the severity of his injuries kept him in a fog he still can't pierce. But in the years since, he has painstakingly worked to reconstruct his missing days. And no, he should not be walking, much less alive.

On the afternoon of July 15, 2012, Jackson Hole Fire paramedics arrived on the scene to find a man in pieces. His head was split open and he was lying on the asphalt in a way that emergency responders know is never good. Pruet was taken to St. John's Medical Center, where an MRI showed his spine was completely dislocated just below his neck and his care was beyond the regional hospital's capabilities. He was immediately flown via AirMed to University of Utah Hospital in Salt Lake City.

Enter Meic Schmidt, MD. A taciturn physician of German descent, Schmidt was called into consult because despite the alarmingly damaged spine, Pruet was still neurologically intact, a rare occurrence. Dr. Schmidt felt there was a chance, a slight chance based on the

rarity of Pruet's condition, that he could intervene.

“It would have been very risky for the doctors [at St. John's Medical Center] to try and realign his spine, but they were able to transfer him to an academic hospital where we have experience with difficult and complex cases,” Dr. Schmidt says. “I've probably seen only one or two cases like it, but I knew the chances were good.”

Dr. Schmidt and his team went into a seven-hour surgery on Pruet. They used a specialized titanium plating system, developed by Ronald Apfelbaum, MD, at University of Utah Health Care over a 20-year period, to reassemble Pruet's broken spine.

“Because of the research that goes on here we can have a big impact, immediately and directly,” Dr. Schmidt says. “And because we are an academic medical center, we have the opportunity to teach these complicated procedures so they can be done in the future.”

Pruett's recovery was difficult. But today he is a walking, talking testament to the combination of research and clinical application at University of Utah Health Care. To him, it is nothing short of divine intervention.

“This really was a miracle,” he says. “Being able to walk out of the hospital because Dr. Schmidt was in the right place at the right time with his training is proof to me that God was watching over me.”

Dr. Schmidt, however, prefers to focus on the literal nuts and bolts of the case.

“This is the reason why I'm in this profession,” he says. “The fact that we can fix such a problem that, 20 years ago, would have left a patient dead or in a nursing home is the main reason we do this kind of work. Every doctor dreams of seeing a patient doing so well after such a severe injury.”

Today, Pruet has sold his motorcycle and is anxiously awaiting the release of a new book detailing his experience. *The Hard Road: What if Almost Dying Was the Very Thing That Saved Your Life?* will be available April 2015.





Right: Dr. Richard Wiggins

# GIVING THEM WHAT THEY WANT

PRACTICAL APPROACH TO NEURORADIOLOGY CONFERENCE  
CREATES INTERNATIONAL REPUTATION

BY JEREMY PUGH

Sometimes it's all about the basics. In the vast world of international medical conferences, there is a wide range of knowledge out there. Much of it, says Richard Wiggins, MD, is focused on cutting-edge research that, while fascinating, is not always much use in the day-to-day clinical setting. Therefore, for the last 12 years, Dr. Wiggins has built two reputable neuroradiology conferences around intensive fundamental case studies that provide attending physicians with knowledge they can take home to their practices and use right away.

"So often we go to societal conferences and see some interesting, high-tech methods to image our patients," Wiggins says. "But it often turns out that these techniques are highly specialized, and nobody else can do it. At our conferences, we stress clinically relevant, basic topics that can be implemented immediately in the clinical practice."

The conferences, titled the Intensive Interactive Brain and Spine Imaging Conference (odd years) and the Intensive Interactive Head and Neck Imaging Conference (even years), take place every year in March. Dr. Wiggins took over and expanded the Head and Neck Conference first created by Ric

Harnsberger MD, and created the Brain and Spine conference in 2009.

And they are intense. During the weeklong events, attendees are at it for eight hours a day, seeing hundreds of case studies. Dr. Wiggins, a neuroradiologist and professor with University of Utah Health Sciences, selects his speakers carefully with an eye for those who are not only stellar physicians but excellent teachers as well.

"We are a unique academic hospital," Wiggins says, "in that we have a lot of great teachers. Residents and fellows come to University of Utah Health Care because of the emphasis on teaching, and this conference is an opportunity to share all these great lecturers with the world."

Harish S. Jhaveri, MD, a radiologist originally from India who practices in Charleston, NC, attended the conference last year and says that the emphasis on pedagogy and instruction helped his experience stand out.

"Dr. Wiggins is a very smart and articulate professor," Dr. Jhaveri says. "He is enthusiastic to teach and he pulls together a very talented, educated group. What I learned has made a difference in diagnoses and helped patients."



"IT'S A GREAT  
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TO GET THIS EDUCATION."

DR. RICHARD WIGGINS

Wiggins says he likes to keep things casual and conversational. To that end, another pillar the conference is built on is interactivity between attendees and speakers.

"We want people to not only be able to reach our speakers on breaks or at lunch to ask them questions," he says. "But, we find that passing a microphone in the audience doesn't always lead to the best questions and answers."

So Wiggins uses a unique interactive Q&A system. Attendees can text questions at any time during the conference week for the next Q&A session.

"The speakers can then put those questions directly into their presentations," he says. "And

it gives them time to consider their answers and put together additional materials in advance. It's an interesting dynamic that contributes to the conference's success."

The two conferences continue to grow and attendees come from all over the world. Last year more than 250 physicians from 18 countries attended. Dr. Wiggins expects a similar turnout at the next Intensive Interactive Brain and Spine Imaging Conference, which will take place March 2015.

"It's a great statement for our academic institution that people will fly from the other side of the Earth to Salt Lake City to get this education," Dr. Wiggins says.



TWO TRIAL NETWORKS ALLOW PHYSICIANS AND RESEARCHERS OPPORTUNITY TO SPEED UP TESTING OF NEW TREATMENTS



**“OUR LEADERSHIP IS STRONG AND EFFICIENT. WE HAVE ALL THE RIGHT PIECES IN PLACE.”**  
DR. GORDON SMITH

# BRIDGING THE GAP ACROSS THE VALLEY OF DEATH

BY JENNIFER DOBNER

In the world of medical research, physician researchers often refer to early-phase clinical trials (Phase II) as the “valley of death.” That’s when, for a myriad of reasons including methodology, trial design, and inefficiencies, potentially effective therapies fail to make the transition from the laboratory to the clinic.

To help build a better bridge over the valley between scientific discovery and treatment for both adults and children with neurological diseases, the Clinical Neurosciences Center at University of Utah Health Care (UUHC) is participating in two trial networks funded through an ambitious, innovative pair of grants from the National Institutes of Health (NIH): the Network for Excellence in Neuroscience Clinical Trials (NeuroNEXT) and StrokeNet.

NeuroNEXT and StrokeNet aim to improve and streamline clinical trials to accelerate testing of innovative treatments for brain diseases and stroke so that successful therapies can reach the public more

quickly. To do that, both networks have centralized institutional ethics review, contracting, trial design and statistical support, and other aspects of initiation and performance of clinical trials that up to now have dramatically slowed development of new treatments.

NeuroNEXT and StrokeNet each comprise 25 medical centers across the country. All, including University of Utah Hospital, comprise a network of participating “spoke” hospitals also engaged in trial performance. UUHC is one of just nine institutions nationwide to have secured grants from both programs, for which the

combined grant award was \$2.7 million.

“Competition for these grants was fierce,” says Gordon Smith, MD, chief of the Division of Neuromuscular Medicine, professor and vice chair of research in the Department of Neurology, and the NeuroNEXT principal investigator. “To have one of them is a real feather in your cap. To have both at a single institution...that puts us in quite an elite group.”

The accomplishment reflects the strength of the UUHC comprehensive neurological programs, its long history of conducting clinical trials, and the overall quality of the department’s neurologists, neurosurgeons, and researchers, Dr. Smith says.

“We are one of the best neurosciences centers in the country,” he says, “with very strong neurology, neurosurgery, and neurocritical care groups, an outstanding stroke group, and a leading children’s hospital. Our leadership is strong and efficient. We have all the right pieces in place.”

Under the NeuroNEXT umbrella, UUHC physicians are currently conducting research studies involving patients with spinal muscular atrophy, multiple sclerosis, myasthenia gravis, and stroke, says Sandra Reyna, MD, director of the clinical trials office and the project director on both grants.

Eight protocol trial proposals are currently being considered within StrokeNet and final funding decisions are expected soon, says Jennifer Majersik, MD, director of the Utah Stroke Center and TeleStroke services, and the principal investigator for StrokeNet. The focus of StrokeNet trials, she notes, is not only on

stroke treatment, but also on prevention and recovery.

“We’re really excited about the breadth of trials being proposed right now in StrokeNet,” says Dr. Majersik, who is one of three principal investigators to serve on the StrokeNet Executive Council. “Prior stroke trials networks have only focused on hyper-acute therapies. But in StrokeNet, trials of stroke prevention and recovery (or rehabilitation) are just as critical. This means that we are touching on all aspects of the continuum of stroke care.” She adds that although stroke is the number one cause of adult disability in the U.S., the dissemination of critical therapies to patients has often been slow.

“In the past, physicians and patients were fatalistic about the chances for recovery after stroke. The thinking was that the brain is dead and you’re not going to get it back,” Dr. Majersik says. “We now know that’s not true. The brain has a lot of plasticity and there is tremendous potential for recovery.”

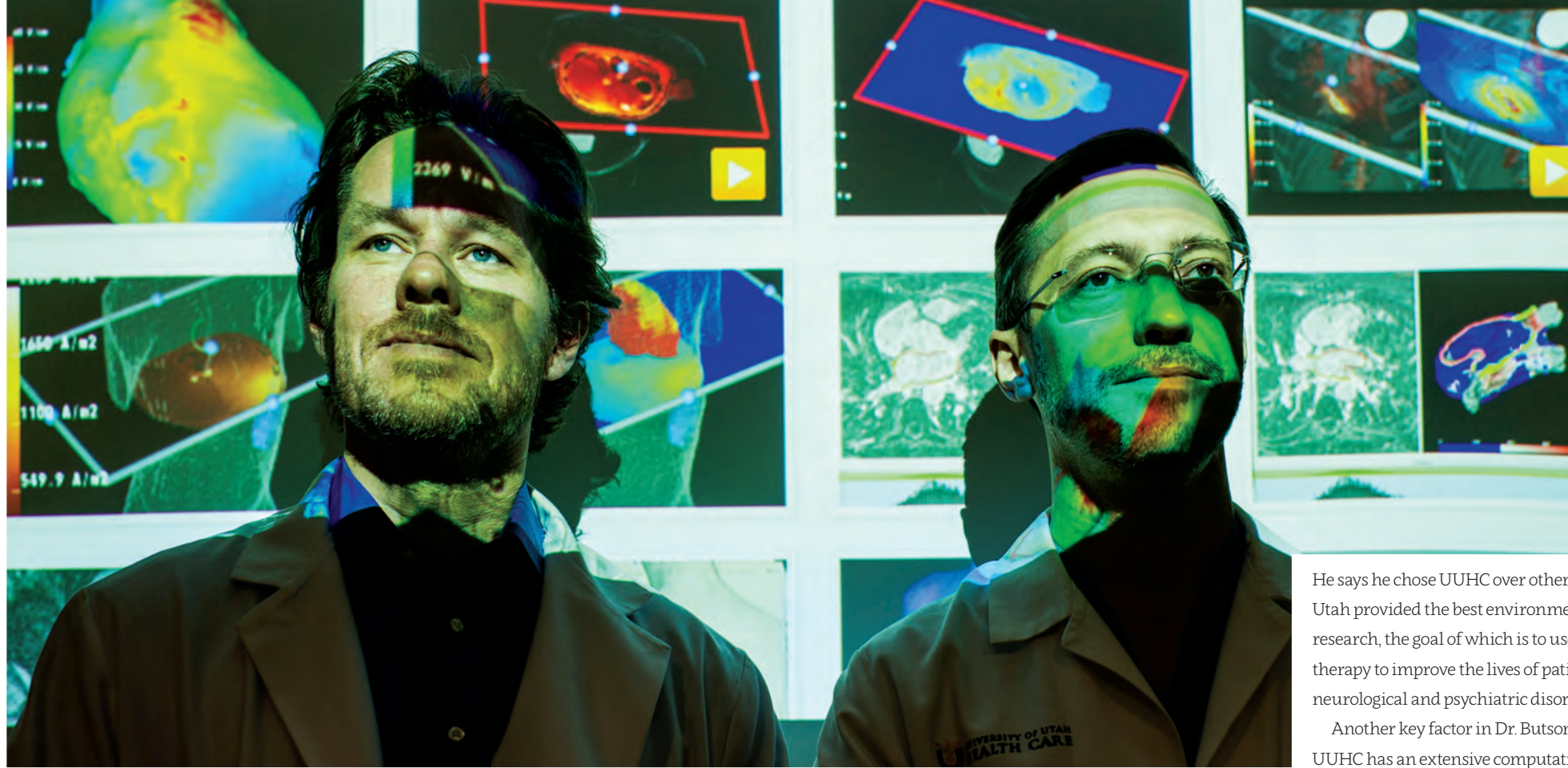
NeuroNEXT and StrokeNet bring numerous direct and indirect benefits to UUHC and its patients, Dr. Smith says. First and foremost, patients from across the Intermountain West now have access to innovative therapies. The grants also help attract other top-notch faculty and researchers to UUHC. The development of trials networks also fosters collaboration throughout our large region and in improvement of systems of care. “Ultimately, this will benefit patients, whether they live in Salt Lake City, Idaho, Montana, Nevada, Wyoming, or elsewhere in our region,” says Dr. Smith.

Clockwise from left: Dr. Sandra Reyna, Dr. Jennifer Majersik, Dr. Gordon Smith





Left: Dr Christopher Butson  
Right: Dr. Paul House



B O T H  
S I D E S  
O F  
T H E  
B R A I N

HOW  
UNIVERSITY  
OF UTAH  
HEALTH CARE  
REMAINS  
AMONG  
THE NATION'S  
BEST  
IN DEEP BRAIN  
STIMULATION  
(DBS)

BY JENNIFER DOBNER

It sounds like something straight from a scene in a science fiction film: Surgery that places a set of wires under the skull so that electrical signals can be transmitted to different areas of the brain. It's called DBS, or deep brain stimulation. And if the idea of it seems a bit wince-inducing or scary, then understanding the power of what it can do — quiet the tremors associated with Parkinson's disease and other brain disorders — will likely wash away any patient's fears.

"What I tell patients about the fear part is this: This is not new or experimental brain surgery...more than 100,000 of these procedures have been done," says Paul House, MD, a neurosurgeon and the surgical director of University of Utah Health Care's Movement Disorders Program.

"We know DBS does not change the progression of Parkinson's disease, but it does improve people's quality of life after they have it," says House, who himself has done more than 400 of the surgeries here at University of Utah Health Care (UUHC). "They get more years of doing better."

Over the past eight years, an interdisciplinary team led by neurologist Lauren Schrock, MD, and Dr. House, have worked to set UUHC's Movement Disorders Program apart as one of the nation's premier DBS clinical treatment centers. It's the largest program of its kind in

the Intermountain West, with some of the best patient outcomes, says Dr. House. Nationally, UUHC ranks in the top 15 for number of annual DBS procedures.

FDA approved in 1997, DBS involves the surgical implantation of a neurostimulator device — a sort of brain pacemaker — into the chest along with a set of wires, known as leads, which together send electrical impulses to various parts of the brain in order to activate brain circuits. This can alleviate the symptoms associated with movement disorders, most commonly Parkinson's, essential tremor, and dystonia.

The device is programmable, so the level of electrical stimulation can be controlled and optimized for individual patient needs both after the initial surgery and as the disease progresses. And unlike other, more traditional forms of brain surgery, DBS causes no injury to the brain, which in the future may allow for expanded applications to other types of movement disorders, House says.

While DBS cannot cure Parkinson's disease or other disorders, the improved quality of life in well-selected patients is profound. Outcomes are so good, in fact, that the word-of-mouth patient experience has become a major source of referrals, he says.

Dr. House is particularly proud of the interdisciplinary approach to diagnosis and treatment, which has developed so that patients get the right screen-

ing ahead of surgery to ensure that those who get the procedure are the best possible candidates.

After surgery, the same is true. A team of health care professionals — from neurosurgeons and neurologists to nurses and physical therapists — work with patients to determine how they feel and whether their DBS stimulation level is on target and producing the maximum benefit.

"This is really translational medicine at its best," Dr. House says. "We are building on well-established clinical therapies that are still relatively new and trying to get to the next step with researching new ideas for therapies."

"Because we have that team together, we get to talk about new ideas, nuances and limitations that frankly we might not be fully aware of without each other," says Dr. House.

The program has also sought to enhance the University of Utah's clinical work with research that breaks new ground both in understanding movement disorders and exploring ways in which technology and science can improve disease treatment.

To that end, in summer 2014, the program hired Christopher Butson, PhD, as its director of neuromodulation research. An expert in neurostimulation devices and neuromodulation therapy, Dr. Butson came to Utah from the Biotechnology and Bioengineering Center at the Medical College of Wisconsin in Milwaukee.

He says he chose UUHC over others because he believed Utah provided the best environment for advancing his research, the goal of which is to use neurostimulation therapy to improve the lives of patients with a range of neurological and psychiatric disorders.

Another key factor in Dr. Butson's decision: data. UUHC has an extensive computational infrastructure that is the raw material for much of his work. Much of those rich details were not — but now will be — mined for contributions to new discovery and innovation.

"The one thing we aspire to do in my lab is create and achieve insights that would be difficult to achieve otherwise," he says.

One of Dr. Butson's most promising ideas: an iPad-based interactive computer program that creates a three-dimensional picture of the brain. This provides clinicians with a better look at a patient's brain and helps them make better predictions about DBS lead placements, stimulation settings and effects. It also saves time. Clinicians who used the program in a small study reduced their patient evaluation time by 99 percent.

The program, which allows for simulated stimulation of the brain's circuits, may eventually help enhance the precision of surgical targets and DBS treatment for a multitude of disorders and diseases. It's something that until recently couldn't really be done, but has been made possible by advances in medical imaging technology — another area of research that UUHC helped advance.

"Where the field is going is toward circuit-based therapy...and we hope that 3D modeling will allow us to see this in a totally different way," Dr. Butson says. "So integrating the best information we can get from all different types of imaging and incorporating that into predictive models...this is the bleeding edge of DBS research."

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DR. CHRISTOPHER BUTSON





# WHEN TIME IS NOT ALWAYS ON YOUR SIDE

BY JENNIFER DOBNER

## REGION'S ONLY TELESTROKE PROGRAM CONTINUES PAVING WAYS FOR PATIENTS TO GET HELP FAST

**T**wenty-eight-year-old Trey Orsak was on the telephone with a co-worker when it happened.

"My eyes went crossed and the computer screen just doubled," he says, recalling the events of June 13, 2013.

In the emergency room at Timpanogos Regional Medical Center in Orem, Utah, the double vision persisted. Trey couldn't focus his eyes or move because of weakness throughout his body.

He was having a stroke — a surprising diagnosis for someone Trey's age and one that might have been missed if emergency room doctors hadn't consulted with neurologists at University of Utah Health Care (UUHC) via its TeleStroke program.

TeleStroke is a video medical service which, for more than a decade, has been putting experts from UUHC at the virtual bedside of patients in 23 rural and small urban community hospitals

across the Intermountain West — from as near as Orem and Tooele to sites as far away as Ely, Nev. and Jackson, Wyo.

From her video viewpoint, UUHC vascular neurologist Jana Wold, MD, who is one of seven physicians that provide TeleStroke consultations, could see Trey's eyes were not moving properly. She suspected a stroke and recommended he be treated in Orem with t-PA, an intravenous drug that breaks up blood clots, and transported via AirMed to University of Utah Hospital. The treatment came just in time — right before the critical three-hour-from-onset window that t-PA has to be effective.

If TeleStroke hadn't been available, Dr. Wold says she would have offered an opinion via phone, but might not have ordered the medicine.

"I probably would have said, 'Gosh, he's so young. I don't know if this is a stroke,' she says. "I probably would have transferred him to our hospital, but I



“TELESTROKE  
ALLOWS US TO PROVIDE  
STROKE CARE  
COMPARABLE TO WHAT  
PATIENTS WOULD RECEIVE  
IF THEY CAME DIRECTLY  
TO OUR HOSPITAL.”

JILL AUSTIN

wouldn't have treated him over the phone.”

Just over one year since his stroke, Trey has made a full recovery and is preparing for the arrival of his third child with his wife, Rachelle, who considers the TeleStroke program to literally be a lifesaver.

“We were really lucky that we got the medicine in time,” Rachelle says. “It's frightening to think how close we were to having things go really poorly.”

Part of the comprehensive stroke care offered by UUHC, TeleStroke served some 103 patients in 2013, and has served another 98 through October of 2014, says Jill Austin, clinical manager of University of Utah's Comprehensive Stroke Center. The program is in such high demand that eight new hospitals joined the network in 2014.

“What sets UUHC's TeleStroke program apart from other telemedicine-driven consultation programs is its continuum of care,” Austin adds. “TeleStroke allows us to provide stroke care comparable to what patients would receive if they came directly to our hospital,” says Austin. “We focus on quality and developing the resources and programming they need to provide acute stroke care for their community. Whenever we contract with these hospitals, we really do look at these relationships as partnerships, from beginning to end.”

That's exactly the kind of partnership that 78-bed Grand Junction Community Hospital in Grand Junction, Colo., was seeking when it joined the network six months ago, says Tami Honnen, clinical education director for the hospital's emergency department.

“We are in an isolated area and we don't have a University of Utah Hospital down the street,” says Honnen. “When we have someone come in with a possible stroke, we have limited neurology coverage, so we need the additional help that TeleStroke provides. It allows us to offer a much higher level of care for our patients.”

Left: Jill Austin  
Right: Dr. Jana Wold





# A NEW KIND OF RESTORATION

In the wake of the 9-11 attacks, Mark Mahan, MD, made a choice. The Princeton graduate walked away from his high-powered job as an investment banker and enrolled in the nearby Columbia School of Medicine.

"The building I worked in was destroyed during the attacks," the now Dr. Mahan says. "It was a key moment for me. I wasn't directly helping others and I wanted to do something where I could."

And now years later, serving as a neurosurgeon at the Clinical Neurosciences Center at University of Utah Health Care (UUHC), Dr. Mahan is one of only a few national practitioners of specialized surgical procedures that can restore movement and motor skills in patients who once would have had limited or no motion after suffering nerve damage.

Surgical neurorehabilitation techniques allow surgeons like Dr. Mahan to move nerves from uninjured areas of a patient's body and transplant them in damaged areas. It is incredibly versatile, Mahan says, and he and his colleagues are still discovering its range of possible applications.

"We are starting to realize all the possibilities with this major breakthrough," he says. "One of the powerful functions of nerves is that they can regrow. We can use that capability to recreate functions that may have previously been lost for a patient." Alternatively, with other surgical techniques, he can modulate the function of nerves. "We can take a patient who has post-stroke spasticity or someone who has cerebral palsy and dramatically improve their quality of life."

*SURGICAL  
NEUROREHABILITATION  
GIVES NEW HOPE TO PATIENTS,  
NEW OPTIONS FOR DOCTORS*

BY JEREMY PUGH

While many of his colleagues focus their practice on dramatic interventions like removing malignant brain tumors, which no doubt prolongs lives, Dr. Mahan says he was drawn to this area of neurosurgery because he can see its direct impact on a patient's life *after* surviving a life-threatening illness, accident or event.

"We are trying to give somebody something back that they are missing," he says. "It's what drew me to this area of study. I want to help that kid who was in the car accident ride his bike again."

And although Mahan only began his work at UUHC last summer, his patient list is growing. Recovery, however, takes time (nerves don't regrow over night, after all) but he is already seeing promising progress in the patients he has treated. And the area of study also has applications beyond just repairing injury. It may be of use in areas like diabetes treatment, for example.

"Diseases like diabetes have their origins in nerves that affect a patient's metabolism," he says. "If we can selectively stimulate those autonomic nerves in a beneficial way, we may be able to control things like diabetes or even asthma. We really are thinking about things in new ways and that's amazing stuff for a physician."

"ONE  
OF THE  
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OF NERVES  
IS THAT  
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REGROW."

DR. MARK MAHAN





Dr. Melissa Cortez monitors a patient on a tilt table.

“THE SOONER WE CAN PUT OUR FINGER ON THE PATTERN, THE BETTER CHANCE WE HAVE IN IDENTIFYING THE RIGHT TREATMENT

APPROACH.”

DR. MELISSA CORTEZ

A UUHC LAB SHEDS LIGHT ON THE AUTONOMIC NERVOUS SYSTEM BY JEREMY PUGH

THE QUIET SYSTEM

Hearts beat, eyes water, bodies sweat or shiver — all based on the quiet work of the autonomic nervous system (ANS). This complex system works behind the scenes — running the automatic workings of the body.

The ANS helps integrate and maintain balance in the essential systems that allow us to adapt to our environment, including sweat, tears, digestion, and breathing. Yet only within the last few decades has the neurophysiology and interconnections of the ANS become better understood. In fact, access to testing and experts continues to be limited.

At University of Utah Health Care (UUHC), the Clinical Neurosciences Center is working to meet this need by establishing a comprehensive autonomic laboratory — one of only a handful of such labs in the western United States and the only lab of its kind in the Intermountain West. Sitting at the

helm of this unique research and clinical service is Melissa Cortez, DO, founder and director of the lab.

In her specially designed lab, Dr. Cortez is able to measure autonomic physiology, expanding the toolbox of neurologists beyond the central and peripheral nervous systems, and providing diagnostic, prognostic, and treatment-guiding information for the care of a wide array of neurological conditions.

Problems with the ANS often affect more than one of the body's organs and can lead to irregular and confusing symptoms, including dizziness, excessive fatigue, rapid heart rate, difficulty adjusting eyesight from light to dark, sweating changes, constipation, stomach pain and vomiting.

“Since these types of symptoms are not specific to one medical condition, the pattern seen on autonomic testing can often help measure the abnormalities and shed light on the pattern of dysfunction relative

to other neurological changes,” says Dr. Cortez.

Because symptoms of autonomic disorders can be complex, many patients are often seen in multiple subspecialties before finally receiving a diagnosis. “It is my hope that this testing laboratory can help provide answers sooner for patients suffering from autonomic dysfunction,” she says. “The sooner we can put our finger on the pattern, the better chance we have in identifying the right treatment approach.”

While the ANS and its inner workings may seem mysterious, disordered autonomic function is now recognized across the whole spectrum of neurologic disease.

“We see it in neurodegenerative diseases, such as dementia and variants of Parkinson's disease, where the presence and pattern of autonomic symptoms can guide diagnosis. And, while auto-

nomic disorders can manifest as unusual autoimmune or idiopathic syndromes, we are discovering that these disorders are not as rare as once thought,” says Dr. Cortez. “We also see autonomic problems in fairly common disorders, such as diabetic neuropathy, multiple sclerosis and headache, and having the tools to measure the dysfunction will go a long way in increasing awareness of autonomic problems in these diseases.”

Dr. Cortez credits this unique resource to her organization's commitment to providing advanced patient care and support of education and discovery in the neurosciences. “This lab is an investment in advancing the scope of our diagnostic resources and level of care, and I hope to contribute not only by expanding the availability of these tools, but also continuing to work towards better identification and treatment of these life-changing disorders.”





# A LEGACY REALIZED

RADIOLOGY CHAIRMAN DR. STEVE STEVENS MOVES ON TO WORK WITH TECHNOLOGY HE HELPED BRING TO UNIVERSITY OF UTAH HEALTH CARE

BY JEREMY PUGH

It was an idea more than a decade in the making: Bring the imaging power of the MRI machine into the surgical theater and examination room. It's called interventional neuroradiology, and under the leadership of Edwin "Steve" Stevens, MD, surgeons and clinicians at University of Utah Health Care (UUHC) are now able to use MRI technology in real time during complicated surgical interventions and clinical diagnoses, which is leading to new discoveries, new techniques and new insight into the way the human brain works.

Flash back to 1997. Dr. Steve Stevens stepped in as a vice chairman of radiology and looked toward the future. It was an exciting time in MRI advances; soaring computer-processing power and new magnetic resonance technology was opening up a brave new imaging world. But the trick when embracing any evolving technology, Dr. Stevens says, is to take the long view.

"We knew we wanted to get on board with this new technology to take care of patients, but we needed to do it in a wise fashion that would temper obsolescence," Dr. Stevens says. "So we worked closely with Siemens (and other medical-tech companies) to look at what was going to be created. These are million-dollar machines, so the key is to see what was coming and anticipate it. We were careful not to box ourselves out of new technology."

In 2001, Stevens assumed the department's chairmanship, a post he'll move on from this year, satisfied that he's built a sustainable model that can continue to grow with technology, improving the quality of education, research and patient care in UUHC's system.

Colleague Karen Salzman, MD, underscores Stevens' focus on patient care in the educational setting, saying, "He is an amazing professional role model for our trainees, especially in regard to patient care. He goes to great lengths to ensure patients receive exceptional care. He is a wonderful educator and has contributed immensely to the education of each and every neuroradiology fellow who has spent time at UUHC."

"He's a very good example of a player manager," adds colleague H. Christian Davidson, MD. "He has been a great leader, but because he's in the trenches working with patients, he gets what needs to happen. He has a very practical perspective."

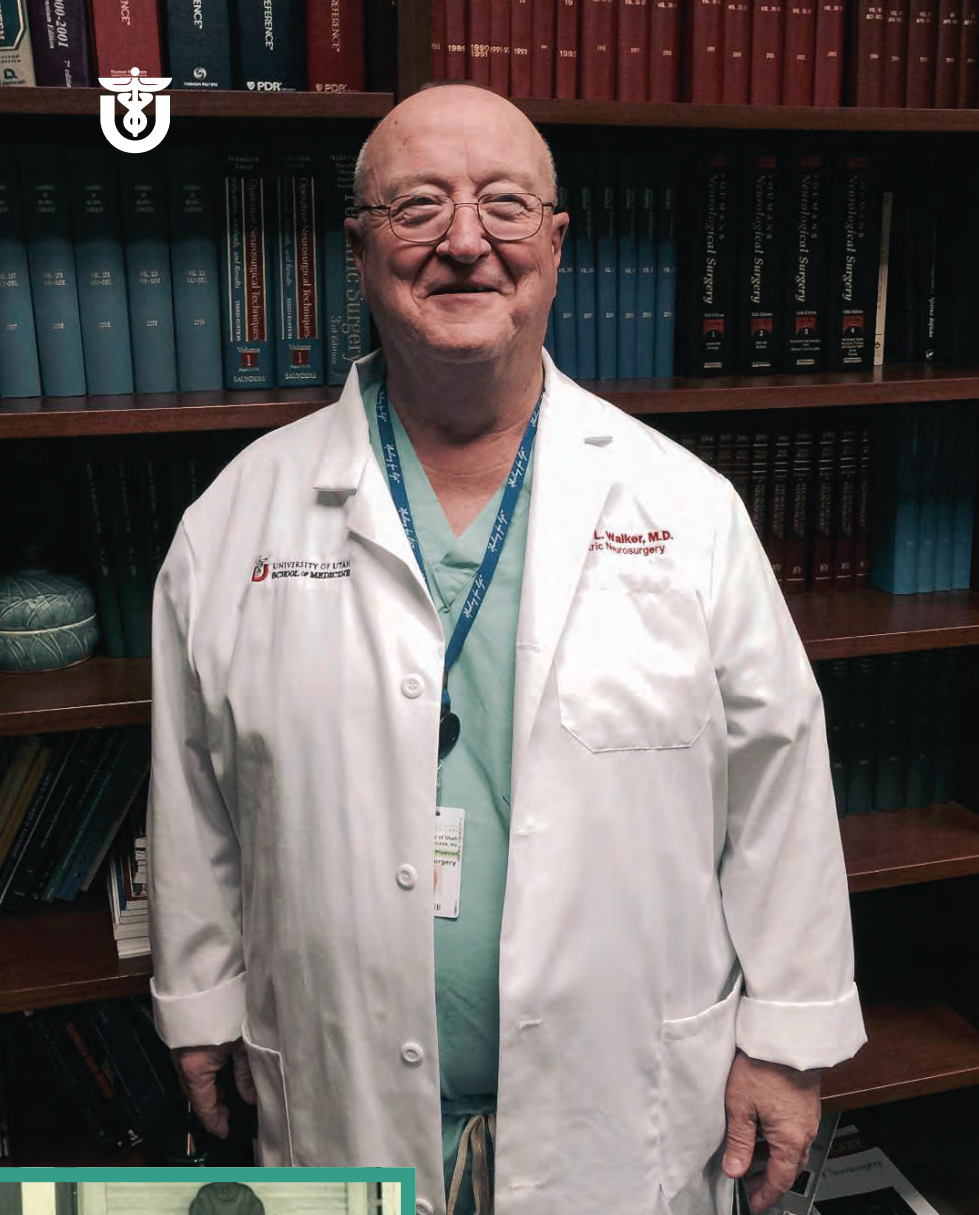
Via the interventional radiology suite he helped design and fund, doctors are now able to bring MRI technology to bear in the examination room. After his years of administrative work, Stevens says he is excited to finally "drive the machine." He is looking forward to focusing on the clinical setting and working with teams to find new and novel ways to implement the imaging technology at their disposal.

"I'm looking forward to seeing if we can work with patients undergoing an acute stroke," Stevens says. "With stroke we always say 'time is brain.' Can we decrease the time to get to treatment? Can we do it faster? Can we choose patients better? This tool will help us do that. We can see what is happening in the brain without delaying treatment. In stepping down, one of my goals is to drive this machine and use it as a tool to improve the outcomes of patients."

“HE IS AN  
AMAZING  
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ROLE MODEL FOR  
OUR TRAINEES,  
ESPECIALLY IN REGARD  
TO PATIENT CARE.”

DR. KAREN SALZMAN





Above: Marion "Jack" Walker, then and now. Opposite page, top right: Dr. Walker with Dr. John Kestle. bottom right: Dr. Walker and Dr. Doug Brockmeyer

S H O E S  
T O O  
B I G  
T O  
F I L L

HONORING THE CAREER  
OF PEDIATRIC  
NEUROSURGERY PIONEER  
DR. MARION "JACK" WALKER

BY PETA OWENS-LISTON

As surgical specialties go, neurosurgery is relatively young. It was not formally recognized until the early 1920s. And, for many decades after that, every neurosurgeon treated patients of all ages. However, in the 1980s there was a group of neurosurgeons that believed children with neurosurgical problems should be treated by pediatric subspecialists...and Marion "Jack" Walker, MD, helped lead that charge. As Dr. Walker enters retirement, University of Utah Health Care (UUHC) pays tribute to a true pioneer who helped put pediatric neurosurgery on the map.

Dr. Walker grew up in Clinton, Miss. — a town with less than 20,000 people — during the 1940s and 1950s. He was the oldest and only son of three children. His father, Dr. Elmo Walker, was the quintessential family doctor, making house calls and getting paid in pies rather than cash at times. Seeing Elmo Walker's devotion to his patients, and

hearing the accompanying life-saving stories, likely influenced Jack Walker and his two siblings to pursue medicine.

"When I started off in my career, I wanted to be just like Dr. Jack Walker," admits Doug Brockmeyer, MD, who currently holds the Marion L. Walker, MD, Endowed Chair in Pediatric Neurosurgery and is chief of the Department of Pediatric Neurosurgery at UUHC. "All the residents at Utah who went into pediatric neurosurgery did, in part, because of Jack."

"Jack was part of the initial group that really got things rolling in pediatric neurosurgery," says longtime friend and fellow pediatric neurosurgeon Dave McLone, MD. "If you look at all the major pediatric neurosurgery organizations, each of which he has been the head of at some point, those are the organizations that led to the recognition of us as a subspecialty."

"We have one of the strongest pediatric neurosurgery programs in the world," confirms William Couldwell, MD, PhD, chairman of the UUHC Department of Neurosurgery. He points out that Dr. Walker alone was responsible for establishing Pediatric Neurosurgery here in Utah, turning it from nothing into a world-class training institute for surgeons.

"He is Obi-Wan Kenobi," says Dr. Couldwell with a grin. "His advice is incredibly valued and he is a master surgeon."

In a profession where there is plenty of tragedy and sadness, the easy thing to do is to shut a part of yourself off — to function without feeling too deeply. Dr. Walker taught those around him how to *not* let this happen, and how to convey hope and compassion to patients and their families.

"I have watched him as he has worked with families and children, and in my 44 years of practicing medicine, he is among the very small handful of physicians and surgeons that have that extraordinary touch," says Edward Clark, MD, chair of the University of Utah Department of Pediatrics and chief medical officer at Primary Children's Hospital. "The way that he delivers bad news is gentle, caring, and so sensitive to the needs of the family. Jack possesses true equipoise."

While Dr. Walker is known far and wide for being a pediatric neurosurgical pioneer, he is also widely recognized for advancing techniques.

Dr. Walker was the first person in North America to do selective dorsal rhizotomy surgery, a treatment especially effective for children with spastic cerebral palsy. In 1985, to learn the procedure, he traveled to Cape Town, South Africa, to learn from Dr. Warwick Peacock. Today, the operation is common practice.

With a growing number of patients suffering from hydrocephalus, Dr. Walker began looking for more effective ways to treat the condition. He used urological endoscopes to perform neuroendoscopy, thus becoming one of the first pediatric neurosurgeons to use the technique for hydrocephalus. Furthermore, he spearheaded bringing together basic scientists and pediatric neurosurgeons to accelerate research in hydrocephalus,

helping form the Hydrocephalus Clinical Research Network.

Dr. Walker is perhaps best known for his expertise in separating conjoined twins. He was one of the first to promote multi-stage operations to begin the separations, tying off a few veins at a time to re-route the circulation. In that way, each twin would wind up with an adequate network of veins to drain blood away from the brain. Throughout his career, he helped separate three sets of twins, all conjoined at the head. As conjoined twin operations happened around the world, Dr. Walker became the go-to surgeon for advice as others emulated his approach. He once told a reporter, "I think one of the secrets is patience. You have to take your time, take small steps rather than big ones."

Dr. Walker's professional experience has resulted in numerous honors and opportunities to serve in every significant pediatric neurosurgery organization. Past roles include chair and founding member of the American Board of Pediatric Neurological Surgery (ABPNS), chair of the Pediatric Section of the American Association of Neurological Surgeons, American Society of Pediatric Neurosurgeons, president of the International Society of Pediatric Neurosurgery, and editor for the *Journal of Neurosurgery: Pediatrics*, to name a few.

Today, Dr. Walker still receives birthday cards, graduation announcements, and letters from patients and their families, reminding him of their deep-felt gratitude or how he inspired them to go into medicine because of what he had done for them.

Despite the inevitable trials and sadness that are a part of his profession, Dr. Walker knew how to play and keep situations positive...both as a teacher and as a doctor. His upbeat, encouraging attitude drew people to him and to the profession. A big country music fan, Dr. Walker played George Strait music in the operating room because, he said, "It helps stop the bleeding." Outside the hospital, he is an avid golfer — commenting after a particular trying shot to a fellow golfer that "brain surgery's easy; it's golf that's tough."



"HIS  
ADVICE IS  
INCREDIBLY  
VALUED  
AND HE IS  
A MASTER  
SURGEON."

DR. WILLIAM COULDWELL



B Y T H E R S  
N U M B E R S

# Neurology

## ABOUT THE NUMBERS

Data throughout this report contain comparisons of the University of Utah Health Care Clinical Neurosciences Center's performance to the "UHC National Compare Group," which consists of all hospitals in the University HealthSystem Consortium database. This includes 116 academic medical centers across the United States and 260 affiliated hospitals, representing approximately 90 percent of the nation's non-profit academic medical centers.

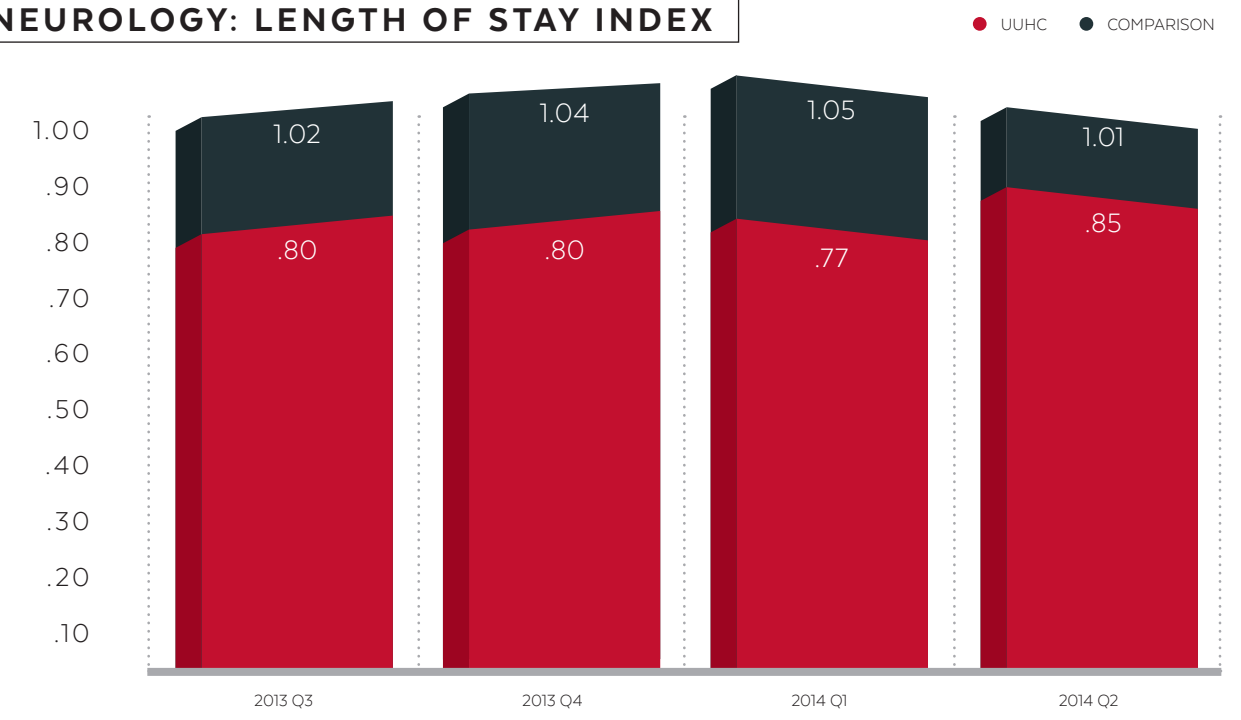
For Length of Stay (LOS) and Mortality indexes, a score of less than one indicates better than expected outcomes for the patient population compared to the 376 UHC hospitals.

ALL CAUSE READMISSIONS			EFFECTIVE DATES
			JULY 2013-JUNE 2014
<b>%7 DAY READMIT</b> <b>2.86%</b> UNIVERSITY OF UTAH	<b>%14 DAY READMIT</b> <b>4.48%</b> UNIVERSITY OF UTAH	<b>%30 DAY READMIT</b> <b>7.82%</b> UNIVERSITY OF UTAH	
<b>3.70%</b> UHC COMP	<b>5.92%</b> UHC COMP	<b>9.59%</b> UHC COMP	

Excludes: chemotherapy, rehabilitation, dialysis, delivery/birth, and mental diseases/alcohol and drug use encounters

INPATIENT OUTCOMES		EFFECTIVE DATES
		JULY 2013-JUNE 2014
<b>LENGTH OF STAY</b> <b>MEAN LOS OBSERVED</b> <small>Mean # of days patients stay at the Hospital</small> <b>4.12</b> / <small>COMPARISON 4.61</small> UNIVERSITY OF UTAH	<b>MORTALITY</b> <b>% OF DEATHS OBSERVED</b> <small>Percent of deaths of defined patient population</small> <b>4.20</b> / <small>COMPARISON 3.17</small> UNIVERSITY OF UTAH	
<b>MEAN LOS EXPECTED</b> <small>Number of expected days in the hospital based on DRG</small> <b>5.01</b> / <small>COMPARISON 4.45</small> UNIVERSITY OF UTAH	<b>% OF DEATHS EXPECTED</b> <small>Of the defined patient population the number of deaths expected based on DRG</small> <b>5.42</b> / <small>COMPARISON 3.73</small> UNIVERSITY OF UTAH	
<b>LOS INDEX (O/E)</b> <small>Observed LOS/Expected LOS</small> <b>0.82</b> / <small>COMPARISON 1.04</small> UNIVERSITY OF UTAH	<b>MORTALITY INDEX (O/E)</b> <small>Deaths observed/Deaths Expected</small> <b>0.77</b> / <small>COMPARISON 0.85</small> UNIVERSITY OF UTAH	

## NEUROLOGY: LENGTH OF STAY INDEX



Friendliness & Courtesy of Care Provider **96.7**      Patient's Confidence in Care Provider **96.0**

N=2359 Source: Press Ganey Medical Practice Survey. All scores are mean score by receive date.

RELATED READMISSIONS			EFFECTIVE DATES
			JULY 2013-JUNE 2014
<b>%7 DAY READMIT</b> <b>1.53%</b> UNIVERSITY OF UTAH	<b>%14 DAY READMIT</b> <b>2.19%</b> UNIVERSITY OF UTAH	<b>%30 DAY READMIT</b> <b>3.91%</b> UNIVERSITY OF UTAH	
<b>1.60%</b> UHC COMP	<b>2.54%</b> UHC COMP	<b>4.08%</b> UHC COMP	

Excludes: chemotherapy, rehabilitation, dialysis, delivery/birth, and mental diseases/alcohol and drug use encounters



# Stroke

B Y T H E  
N U M B E R S

## ABOUT THE NUMBERS

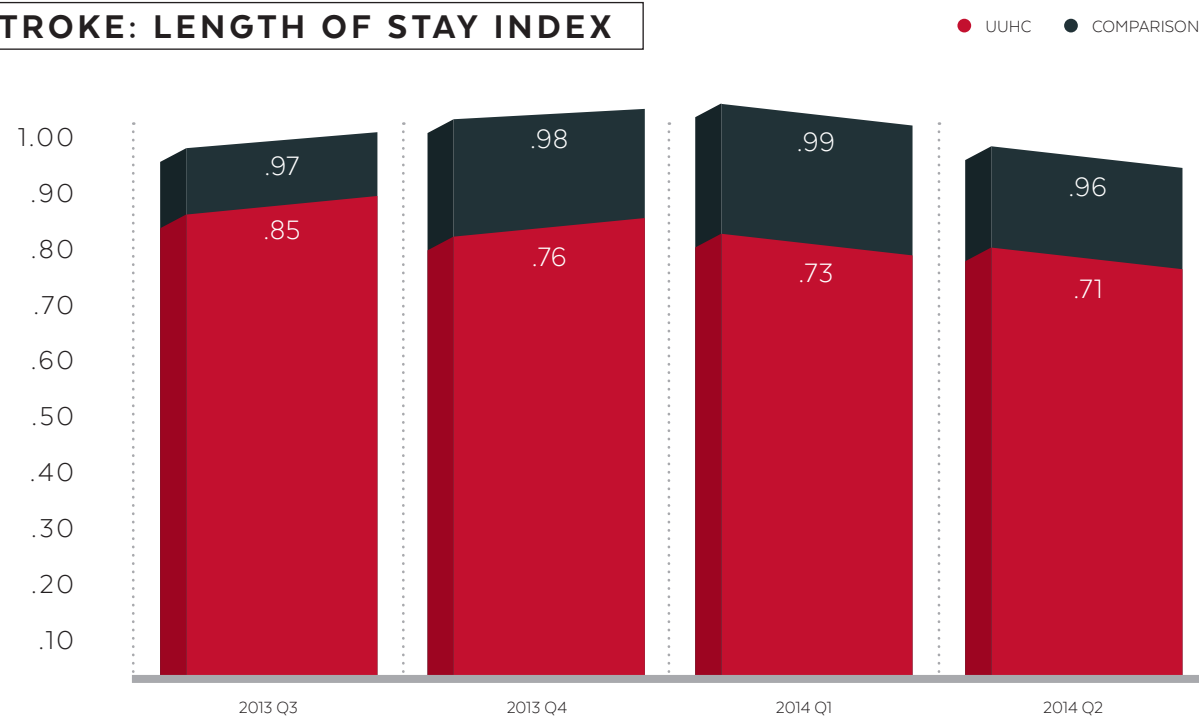
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For Length of Stay (LOS) and Mortality indexes, a score of less than one indicates better than expected outcomes for the patient population compared to the 376 UHC hospitals.

ALL CAUSE READMISSIONS			EFFECTIVE DATES
			JULY 2013-JUNE 2014
<b>%7 DAY READMIT</b> <b>2.58%</b> UNIVERSITY OF UTAH	<b>%14 DAY READMIT</b> <b>4.06%</b> UNIVERSITY OF UTAH	<b>%30 DAY READMIT</b> <b>6.64%</b> UNIVERSITY OF UTAH	
<b>3.56%</b> UHC COMP	<b>5.53%</b> UHC COMP	<b>8.41%</b> UHC COMP	

Excludes: chemotherapy, rehabilitation, dialysis, delivery/birth, and mental diseases/alcohol and drug use encounters

## STROKE: LENGTH OF STAY INDEX



RELATED READMISSIONS			EFFECTIVE DATES
			JULY 2013-JUNE 2014
<b>%7 DAY READMIT</b> <b>1.29%</b> UNIVERSITY OF UTAH	<b>%14 DAY READMIT</b> <b>2.03%</b> UNIVERSITY OF UTAH	<b>%30 DAY READMIT</b> <b>2.77%</b> UNIVERSITY OF UTAH	
<b>1.35%</b> UHC COMP	<b>2.01%</b> UHC COMP	<b>2.88%</b> UHC COMP	

Excludes: chemotherapy, rehabilitation, dialysis, delivery/birth, and mental diseases/alcohol and drug use encounters

## INPATIENT OUTCOMES

### LENGTH OF STAY

**MEAN LOS OBSERVED**  
Mean # of days patients stay at the Hospital  
**5.88** / **6.73**  
UNIVERSITY OF UTAH / COMPARISON

**MEAN LOS EXPECTED**  
Number of expected days in the hospital based on DRG  
**7.53** / **6.76**  
UNIVERSITY OF UTAH / COMPARISON

**LOS INDEX (O/E)**  
Observed LOS/Expected LOS  
**0.78** / **1.00**  
UNIVERSITY OF UTAH / COMPARISON

### MORTALITY

**% OF DEATHS OBSERVED**  
Percent of deaths of defined patient population  
**10.86** / **8.15**  
UNIVERSITY OF UTAH / COMPARISON

**% OF DEATHS EXPECTED**  
Of the defined patient population the number of deaths expected based on DRG  
**11.55** / **9.45**  
UNIVERSITY OF UTAH / COMPARISON

**MORTALITY INDEX (O/E)**  
Deaths observed/Deaths Expected  
**0.94** / **0.86**  
UNIVERSITY OF UTAH / COMPARISON

## PERFORMANCE MEASURES

### ISCHEMIC ONLY

**IVtPA**  
patient arrived by 2 hour, treated by 3 hour  
**100%**

### ISCHEMIC & TIA

**Early Antithrombotics**  
hospital day 1-2  
**98.8%**

**Antithrombotics at discharge**  
**99.7%**

**Statin at discharge, LDL>99 or on statin on admission**  
**99.5%**

**Anticoag for Afib/Flutter at discharge**  
**100%**

### ISCHEMIC & HEMORRHAGIC

**Dysphagia Screen**  
before meds, food, drink PO  
**87.3%**

**VTE Prophylaxis**  
hospital day 1-2, SCDs/SQ Hep/Coumadin  
**100%**

**Rehab Considered**  
**100%**

### ISCHEMIC, HEMORRHAGIC & TIA

**Stroke Education**  
patient discharged to home  
**83.8%**

**Smoking Cessation**  
**87.3%**



# Neurosurgery

## ABOUT THE NUMBERS

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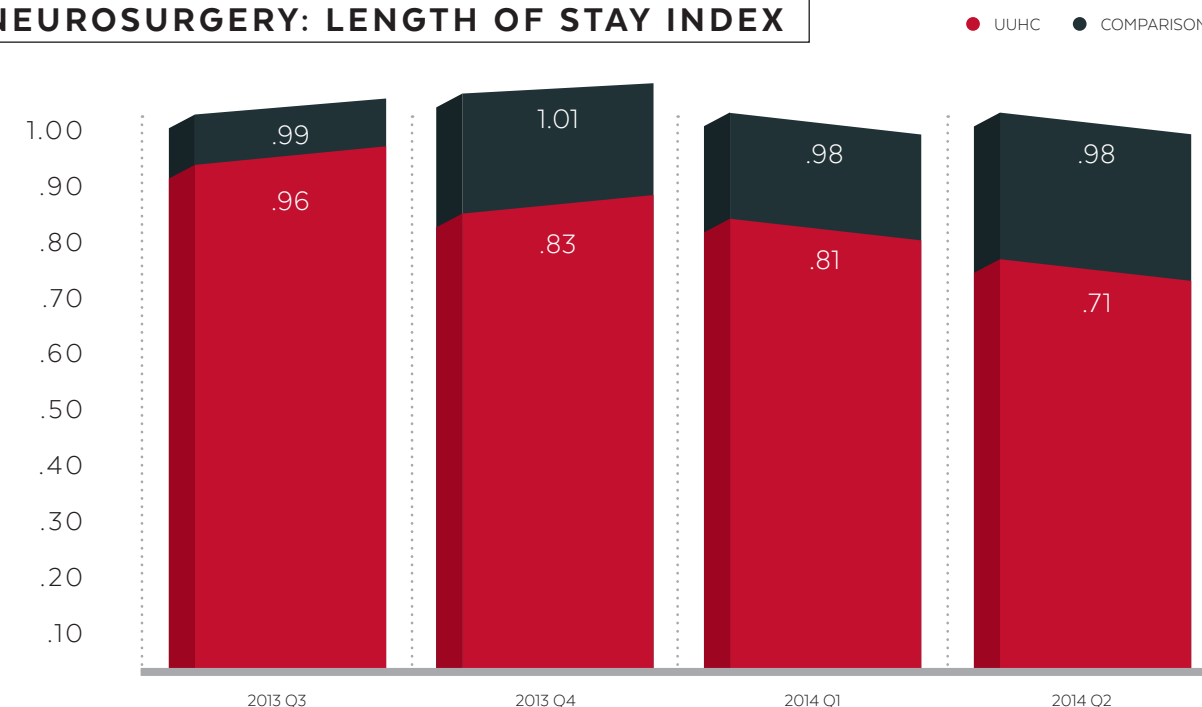
ALL CAUSE READMISSIONS			EFFECTIVE DATES
			JULY 2013-JUNE 2014
<b>%7 DAY READMIT</b> <b>3.03%</b> UNIVERSITY OF UTAH	<b>%14 DAY READMIT</b> <b>4.70%</b> UNIVERSITY OF UTAH	<b>%30 DAY READMIT</b> <b>8.03%</b> UNIVERSITY OF UTAH	
<b>4.43%</b> UHC COMP	<b>7.33%</b> UHC COMP	<b>11.34%</b> UHC COMP	

Excludes: chemotherapy, rehabilitation, dialysis, delivery/birth, and mental diseases/alcohol and drug use encounters

INPATIENT OUTCOMES		EFFECTIVE DATES
		JULY 2013-JUNE 2014
<b>LENGTH OF STAY</b> <b>MEAN LOS OBSERVED</b> <small>Mean # of days patients stay at the Hospital</small> <b>5.78</b> / COMPARISON 7.90 UNIVERSITY OF UTAH	<b>MORTALITY</b> <b>% OF DEATHS OBSERVED</b> <small>Percent of deaths of defined patient population</small> <b>3.93%</b> / COMPARISON 4.07% UNIVERSITY OF UTAH	
<b>MEAN LOS EXPECTED</b> <small>Number of expected days in the hospital based on DRG</small> <b>6.97</b> / COMPARISON 7.86 UNIVERSITY OF UTAH	<b>% OF DEATHS EXPECTED</b> <small>Of the defined patient population the number of deaths expected based on DRG</small> <b>4.41%</b> / COMPARISON 4.78% UNIVERSITY OF UTAH	
<b>LOS INDEX (O/E)</b> <small>Observed LOS/Expected LOS</small> <b>0.83</b> / COMPARISON 1.01 UNIVERSITY OF UTAH	<b>MORTALITY INDEX (O/E)</b> <small>Deaths observed/Deaths Expected</small> <b>0.89</b> / COMPARISON 0.85 UNIVERSITY OF UTAH	

# B Y T H E R N U M B E R S

## NEUROSURGERY: LENGTH OF STAY INDEX



Friendliness & Courtesy of Care Provider

95.2

Patient's Confidence in Care Provider

94.5


N=1085 Source: Press Ganey Medical Practice Survey. All scores are mean score by receive date.

RELATED READMISSIONS			EFFECTIVE DATES
			JULY 2013-JUNE 2014
<b>%7 DAY READMIT</b> <b>1.36%</b> UNIVERSITY OF UTAH	<b>%14 DAY READMIT</b> <b>2.42%</b> UNIVERSITY OF UTAH	<b>%30 DAY READMIT</b> <b>4.39%</b> UNIVERSITY OF UTAH	
<b>2.16%</b> UHC COMP	<b>3.69%</b> UHC COMP	<b>5.88%</b> UHC COMP	

Excludes: chemotherapy, rehabilitation, dialysis, delivery/birth, and mental diseases/alcohol and drug use encounters



University of Utah Health Care's spine division is participating in the National Neurosurgery Quality and Outcomes Database (N2QOD). N2QOD serves as a continuous national clinical registry for neurosurgical procedures and practice patterns. Its primary purpose is to track quality of surgical care for the most common neurosurgical procedures, as well as provide practice groups and hospitals with an immediate infrastructure for analyzing and reporting the quality of their neurosurgical care.



# Spine

# B Y T H E N U M B E R S

## ABOUT THE NUMBERS

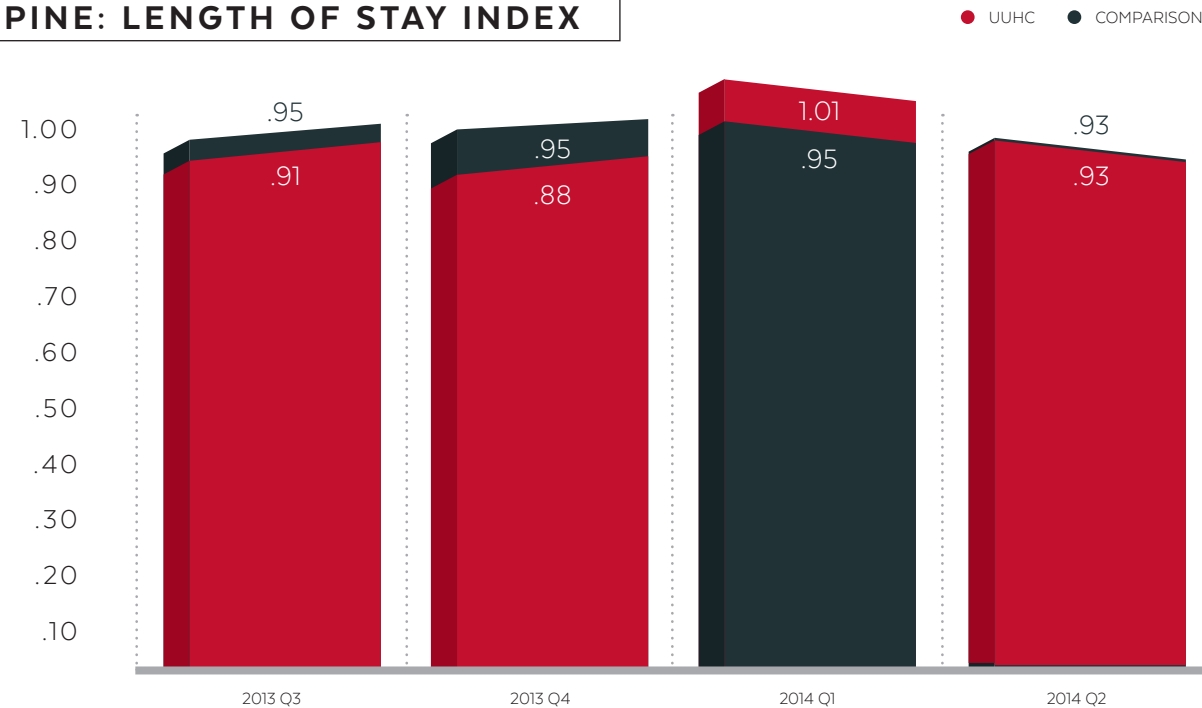
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For Length of Stay (LOS) and Mortality indexes, a score of less than one indicates better than expected outcomes for the patient population compared to the 376 UHC hospitals.

ALL CAUSE READMISSIONS			EFFECTIVE DATES
			JULY 2013-JUNE 2014
<b>%7 DAY READMIT</b> <b>1.22%</b> UNIVERSITY OF UTAH	<b>%14 DAY READMIT</b> <b>2.08%</b> UNIVERSITY OF UTAH	<b>%30 DAY READMIT</b> <b>3.91%</b> UNIVERSITY OF UTAH	
<b>2.11%</b> UHC COMP	<b>3.60%</b> UHC COMP	<b>5.68%</b> UHC COMP	

Excludes: chemotherapy, rehabilitation, dialysis, delivery/birth, and mental diseases/alcohol and drug use encounters

## SPINE: LENGTH OF STAY INDEX



RELATED READMISSIONS			EFFECTIVE DATES
			JULY 2013-JUNE 2014
<b>%7 DAY READMIT</b> <b>0.61%</b> UNIVERSITY OF UTAH	<b>%14 DAY READMIT</b> <b>0.98%</b> UNIVERSITY OF UTAH	<b>%30 DAY READMIT</b> <b>1.83%</b> UNIVERSITY OF UTAH	
<b>1.01%</b> UHC COMP	<b>1.92%</b> UHC COMP	<b>3.24%</b> UHC COMP	

Excludes: chemotherapy, rehabilitation, dialysis, delivery/birth, and mental diseases/alcohol and drug use encounters

## INPATIENT OUTCOMES

LENGTH OF STAY		MORTALITY	
<b>MEAN LOS OBSERVED</b> <i>Mean # of days patients stay at the Hospital</i>	<b>4.04</b> / COMPARISON 4.10 UNIVERSITY OF UTAH	<b>% OF DEATHS OBSERVED</b> <i>Percent of deaths of defined patient population</i>	<b>0.00</b> / COMPARISON 0.09 UNIVERSITY OF UTAH
<b>MEAN LOS EXPECTED</b> <i>Number of expected days in the hospital based on DRG</i>	<b>4.39</b> / COMPARISON 4.21 UNIVERSITY OF UTAH	<b>% OF DEATHS EXPECTED</b> <i>Of the defined patient population the number of deaths expected based on DRG</i>	<b>0.15</b> / COMPARISON 0.16 UNIVERSITY OF UTAH
<b>LOS INDEX (O/E)</b> <i>Observed LOS/Expected LOS</i>	<b>0.92</b> / COMPARISON 0.97 UNIVERSITY OF UTAH	<b>MORTALITY INDEX (O/E)</b> <i>Deaths observed/Deaths Expected</i>	<b>0.00</b> / COMPARISON 0.55 UNIVERSITY OF UTAH

## LEVEL OF NECK PAIN (VAS NECK)

	Before spine surgery	3 mo. after surgery
Disc Herniation	5.76	2.43
Foraminal Stenosis	4.89	2.27
Central Stenosis	4.89	2.73

## LEVEL OF ARM PAIN (VAS ARM)

	Before spine surgery	3 mo. after surgery
Disc Herniation	5.52	1.38
Foraminal Stenosis	4.68	1.79
Central Stenosis	4.78	2.76

## OVERALL HEALTHINESS (EQVAS)

	Before spine surgery	3 mo. after surgery
Disc Herniation	53.10	65.90
Foraminal Stenosis	62.73	72.59
Central Stenosis	55.60	67.58

## NECK DISABILITY INDEX (NDI)

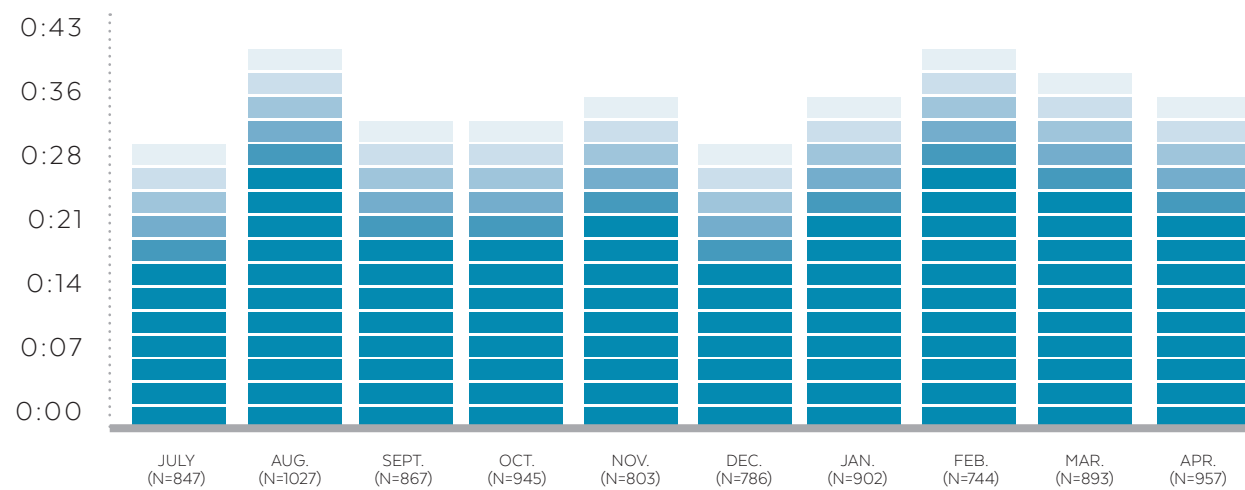
	Before spine surgery	3 mo. after surgery
Disc Herniation	20.81	11.48
Foraminal Stenosis	19.27	9.66
Central Stenosis	22.00	13.69



BY THE  
NUMBERS

# Neuroradiology

## FY14 ED TURNAROUND NEURO MRI/CT EXAMS



\*TAT=Turnaround Times computed for Fiscal Year 2014 through April 2014 (May and June Complete to Preliminary TAT unavailable due to Epic implementation.)

## SUMMARY OF PEER REVIEW DATA

	TOTAL	EFFECTIVE DATES				CLINICALLY SIGNIFICANT
		1 TOTALLY AGREE	2 MOSTLY AGREE	3 MINOR MISS	4 MAJOR MISS	
PLAIN FILMS:	1370	87.15%	11.75%	0.95%	0.15%	1.09%
		1194	161	13	2	15
ULTRASOUND:	108	90.74%	8.33%	0.93%	0.00%	0.93%
		98	9	1	0	1
CT SCANS:	1100	81.91%	16.36%	1.27%	0.45%	1.73%
		901	180	14	5	19
MRI SCANS:	638	59.87%	39.18%	0.78%	0.16%	0.94%
		382	250	5	1	6
NUCLEAR MEDICINE:	61	96.72%	3.28%	0.00%	0.00%	0.00%
		59	2	0	0	0
INTERVENTIONAL:	31	93.54%	7.41%	0.00%	0.00%	0.00%
		29	2	0	0	0
PET:	149	95.30%	4.70%	0.00%	0.00%	0.00%
		142	7	0	0	0
<b>TOTAL:</b>	<b>3458</b>	<b>81.11%</b>	<b>17.69%</b>	<b>0.95%</b>	<b>0.23%</b>	<b>1.19%</b>
		<b>2805</b>	<b>612</b>	<b>33</b>	<b>8</b>	<b>41</b>

\*Total number of studies peer reviews in FY2014 = 3458

\*Scale definitions: 1=Totally Agree, 2=Mostly Agree, 3=Minor Miss, 4=Major Miss

\*Clinically significant identifies the percentage of the total number of 3s and 4s given in relation to the total number of studies reviews.

# SELECTED PUBLICATION LIST

## DEPARTMENT OF NEUROLOGY

### PEGAH AFRA, MD

Afra, P. (2014). Chapter 23 Auditory Synesthesias. *The Human Auditory System: Fundamental Organization and Clinical Disorders*.

Afra, P, Adamolekun B. (2014). Update on once daily zonisamide monotherapy in partial seizures. *Neuropsychiatric Disease and Treatment*, 2014(10), 493-498.

### SAFDAR A. ANSARI, MD

Adam de Havenon, Kris French and Safdar Ansari. (04/25/2014). Extensive Cortical Diffusion Restriction in a 50-Year-Old Female with Hyperammonemic Encephalopathy and Status Epilepticus. *Case Rep Neurol Med*, 2014.

Tim Delgado, Brianne Wolfe, Julie Martinez, Gary Davis, Safdar Ansari. (09/10/2014). Safety of Peripherally Administered Low-concentration Phenylephrine in a Neurocritical Care Unit. Poster session presented at Neurocritical Care Conference Annual Meeting, Seattle, WA.

Alicia Bennett, Julie Martinez, Safdar Ansari. (08/16/2014). Therapeutic Hypothermia for Refractory Status Epilepticus. Poster session presented at 3rd Neurocritical Care Research Conference, Houston, TX.

De Havenon A, Joos Z, Longenecker L, Shah L, Ansari S, Digre K. (02/2015). A Hypertensive Reversible Encephalomyelitis Syndrome (HyRES). Poster session presented at International Stroke Conference, San Diego, CA.

Alicia E. Bennett, Robert E. Hoesch, L. Dana DeWitt, Pegah Afra, Safdar A. Ansari. (09/04/2014). Therapeutic hypothermia for status epilepticus: A report, historical perspective, and review. *Clin Neurol Neurosurg*, 126C, 103-109.

### K.C. BRENNAN, MD

Tang YT, Mendez J M, Theriot JJ, Sawant PM, Lopez-Valdes HE, Ju YS, Brennan K. (2014). Minimum Conditions for the Induction of Cortical Spreading Depression in Brain Slices. LID - jn.00205.2014 [pii]. *J Neurophysiol*.

### MARK B. BROMBERG, MD, PHD

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Bromberg MB. (2013). An electrodiagnostic approach to the evaluation of peripheral neuropathies. *Phys Med Rehabil Clin N Am*, 24(1), 153-68.

### GORDON J. CHELUNE, PHD

Sink KM, Chelune G, Coker L, Gassoin A, Lerner A, Nichols L, et al. (2014). The Montreal Cognitive Assessment (MoCA) in 8,724 SPRINT

participants [Abstract]. The Montreal Cognitive Assessment (MoCA) in 8,724 SPRINT participants. *Proceedings of the American Geriatrics Society Scientific Meeting*.

### MELISSA CORTEZ, DO

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Quantitative characterization of craniofacial autonomic function in migraine [Abstract]. Quantitative characterization of craniofacial autonomic function in migraine. *Headache*, 54(S1), P34.

Peterson J, Hunter L, Cortez M, Theriot J, Brennan KC. (April 8, 2014). Optical imaging of facial perfusion in migraine [Abstract]. Optical imaging of facial perfusion in migraine. *Neurology*, 82(10), I9-1.002.

Wingerchuk D, Keegan M, Shuster E, Carter J, Hentz J, Thaera G, Cortez M, Rodriguez M. (April 2014). Aspirin is unlikely to have a clinically meaningful effect on multiple sclerosis-related fatigue: data from a randomized controlled trial [Abstract]. Aspirin is unlikely to have a clinically meaningful effect on multiple sclerosis-related fatigue: data from a randomized controlled trial. *neurology*, 82(10), P7.245.

Hunter L, Peterson J, Cortez M, Theriot J, Brennan KC. (April 2014). Characterization of photosensitivity and pupil oscillation rate in migraine [Abstract]. Characterization of photosensitivity and pupil oscillation rate in migraine. *Neurology*, 82(10), I9-2.003.

Cortez MM, Wilder M, McFadden M, Majersik JM. (7 May 2014). Quality of Life after Intra-arterial Therapy for Acute Ischemic Stroke. *Journal of Stroke and Cerebrovascular Diseases*.

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### ADAM DE HAVENON, MD

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### L. DANA DEWITT, MD

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M, Smith SM, Wilder M, Rassner UA, Kircher JC, Dewitt LD, Wold JJ, Hoesch RE. (2014). Reproducibility of ABC/2 method to determine infarct volume and mismatch percentage with CT perfusion. *J Neuroimaging*, 24(3), 232-7.

## KATHLEEN B. DIGRE, MD

The NORDIC Idiopathic Intracranial Hypertension Study Group Writing Committee. (2014). Effect of acetazolamide on visual function in patients with idiopathic intracranial hypertension and mild visual loss: the idiopathic intracranial hypertension treatment trial. *JAMA*, 10(1), 2014-3312.

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## KEVIN DUFF, PHD

Duff K. (2014). One-week practice effects in older adults: tools for assessing cognitive change. *Clin Neuropsychol*, 1-12.

Duff K, Foster NL, Hoffman JM. (2014). Practice effects and amyloid deposition: preliminary data on a method for enriching samples in clinical trials. *Alzheimer Dis Assoc Disord*.

Thaler NS, O'Rourke JJ, Scott JG, Duff K, Mold J, Adams RL. (2014). Longitudinal stability of RBANS profiles in a geriatric community-dwelling sample. *Clin Neuropsychol*, 28(2), 269-80.

## ANGELA D. EASTVOLD, PHD

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## NORMAN L. FOSTER, MD

Ganz M, Tawah A, Chitnis A, Pharm M, Silies H, Schauble B, Foster NL. (07/12/2014). Expected impact of amyloid B positron emission tomography on diagnostic and treatment decisions for suspected Alzheimer's disease patients [Abstract]. Expected impact of amyloid B positron emission tomography on diagnostic and treatment decisions for suspected Alzheimer's disease patients. *Alzheimer's and Dementia*, 10(4), 556-557.

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Foster NL. (3/28/14).What do we know about the initial triggers for Alzheimer's disease? [Video]. Salt Lake City: ABC.

## SUMMER GIBSON, MD

Gibson SB, Figueroa KP, Bromberg MB, Pulst SM, Cannon-Albright L. (2014). Familial clustering of ALS in a population-based resource. *Neurology*, 82(1), 17-22.

Gibson SB, Figueroa KP, Huynh LP, Bromberg MB, Pulst SM. (April 29, 2014). Regional Variation of Causative ALS Genes. Poster session presented at 66th AAN Annual Meeting, Philadelphia.

## JOHN E. GREENLEE, MD

Greenlee, JE. (07/01/2014). The Equine Encephalitides. *Handbook of Clinical Neurology, Bacterial Infections of the Central Nervous System*.

## DUSTIN B. HAMMERS, PHD

Kristina Grim, MS, Dustin Hammers, PhD, Angela Wang, PhD, Norman Foster, MD. (May, 2014). Neuropsychological Test Performance Predicts Abnormal FDG-PET Metabolism [Abstract]. Neuropsychological Test Performance Predicts Abnormal FDG-PET Metabolism. *American Geriatric Society Annual Scientific Meeting*.

## PETER M. HANNON, MD

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## NICHOLAS E. JOHNSON, MD

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## RICHARD D. KING, MD, PHD

Singh N, Thomas Fletcher P, Samuel Preston J, King RD, Marron JS, Weiner MW, Joshi S. (2014). Quantifying anatomical shape variations in neurological disorders. *Med Image Anal*, 18(3), 616-633

King, RD. (4/23/14).Video interview: "Ask the Expert-4 Ways to Exercise Your Brain" (tips for maximizing brain function) [Video]. University of Utah Healthcare HealthFeed.

## HOLLY K. LEDYARD, MD, MS

Williams BT, Schlein SM, Caravati EM, Ledyard H, Fix ML. (2014). Emergency Department Identification and Critical Care Management of a Utah Prison Botulism Outbreak. *Ann Emerg Med*, 64(1), 26-31.

## JENNIFER J. MAJERSIK, MD, MS, FAHA

Tkach A, Fox L, Shepard W, Majersik JJ. (June 2014). Diagnostic Accuracy at a Distance: A Quality of Care Assessment of TeleStroke in the Intermountain West, Abstract #377 [Abstract]. Diagnostic Accuracy at a Distance: A Quality of Care Assessment of TeleStroke in the Intermountain West, Abstract #377. *American Heart Association Quality of Care and Outcomes Research 2014 Scientific Sessions, June 2-4, 2014, Baltimore, MD*.

Hannon P, Austin J, Smith G, Majersik JJ. (June 2014). TeleStroke: Expanding Access and Coordination of Care from Acute Stroke to Follow-up, Abstract #193 [Abstract]. TeleStroke: Expanding Access and Coordination of Care from Acute Stroke to Follow-up, Abstract #193. *American Heart Association Quality of Care and Outcomes Research 2014 Scientific Sessions, June 2-4, 2014, Baltimore, MD*.

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## M. MATEO PAZ SOLDÁN, MD, PHD

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## STEFAN M. PULST, MD, DR MED

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Matilla-Duenas A, Ashizawa T, Brice A, Magri S, McFarland KN, Pandolfo M, Pulst SM, Riess O, Rubinsztein DC, Schmidt J, Schmidt T, Scoles DR, Stevanin G, Taroni F, Underwood BR, Sanchez I. (2014). Consensus paper: pathological mechanisms underlying neurodegeneration in spinocerebellar ataxias. *Cerebellum*, 13(2), 269-302.

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Gibson S, Figueroa KP, Bromberg M, Pulst SM, Cannon-Albright L. (2014). Familial clustering of ALS in a population-based resource. *Neurology*, 82(1), 17-22.

## SANDRA P. REYNA, MD

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## AWAIS RIAZ, MD, PHD

Carl L. Faingold, Awais Riaz and James Stittsworth. (2014). Neuronal Network plasticity and network interactions are critically dependent on conditional multireceptive (CMR) brain regions. *Neuronal Networks in Brain Function: CNS Disorders and Therapeutics*.

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## JOHN W. ROSE, MD

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## RODOLFO SAVICA, MD

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## DANIEL R. SCOLES, PHD

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## DAVID R. SHPRECHER, DO, MS

D. Shprecher, J. Bautista, A. Davis, R. Savica. (2014). Understanding risk of parkinsonian disorders [Abstract]. Understanding risk of parkinsonian disorders. *18th International Congress of Parkinson Disease and Movement Disorders*.

D.R. Shprecher, L. Huynh, P. Wall, S. Tripp, K. Boynton, J. Fang, J.B. Leverenz, J. Sonnen. (2014). Colonoscopic screening for enteric nervous system pathology in Parkinson's disease [Abstract]. Colonoscopic screening for enteric nervous system pathology in Parkinson's disease. *18th International Congress of Parkinson Disease and Movement Disorders*.

Shprecher D, Rubenstein L, Gannon K, Frank S, Kurlan R. (2014). Temporal course of the Tourette syndrome clinical triad. *Tremor*

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## J. ROBINSON SINGLETON, MD

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## MEIC H. SCHMIDT, MD, MBA, FACS

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## RICHARD H. SCHMIDT, MD, PHD

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## MARION L. WALKER, MD

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## DEPARTMENT OF NEURORADIOLOGY

## JEFFREY S. ANDERSON, MD, PHD

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## H. RIC HARNBERGER, MD

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## J. SCOTT MCNALLY, MD, PHD

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## ANNE G. OSBORN, MD

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## EDWARD P. QUIGLEY III, MD, PHD

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## KAREN L. SALZMAN, MD

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## LUBDHA M. SHAH, MD

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## RICHARD H. WIGGINS, III, MD, CIIP, FSIIM

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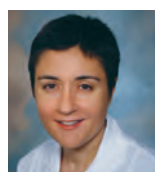


## DEPARTMENT OF NEUROLOGY



### STEFAN M. PULST, MD, DR MED

is Professor and Chair of Neurology. His research focuses on inherited diseases of the nervous system with an emphasis on spinocerebellar ataxias and Parkinson's diseases. In addition to molecular and cellular approaches in the laboratory, he has used the Utah Population Data Base to examine the genetic epidemiology of neurodegenerative diseases. Dr. Pulst was Past Editor of the international journal *Current Genomics* and is on the editorial board of several international journals, including *Nature Reviews of Neurology*. He serves on the American Academy of Neurology (AAN) Board of Directors and is a former chair of the AAN's Science Committee. In 2014, he was awarded the George C. Cotzias Prize from the American Academy of Neurology for his achievements in translational neuroscience and a Senator Jacob Javits Award in the Neurosciences from NINDS. **SPECIALTIES** SPINOCEREBELLAR ATAXIA, PARKINSON'S DISEASE, NEUROGENETICS, ION CHANNELS, TRANSLATIONAL NEUROSCIENCE



### PEGAH AFRA, MD

focuses her practice on the diagnosis and treatment of seizures and epilepsy. Her specific interests include diagnosis and management of intractable epilepsy, including presurgical evaluation and surgical treatment of intractable medication resistant epilepsies, invasive intracranial electroencephalography (EEG) monitoring, and magnetoencephalography (MEG). She also participates in intraoperative monitoring. Dr. Afra is currently investigating the role of new anti-epileptic drugs in treatment of epilepsy, as well as neurophysiology of intracranial EEG. She has had the honor of receiving the award of Neurologist of the Year from the Epilepsy Association of Utah. **SPECIALTIES** EPILEPSY, CLINICAL NEUROPHYSIOLOGY, EEG, MEG, INTRAOPERATIVE MONITORING



### JULIANN W. ALLRED, MD

a Utah native, specializes in general neurology, including the treatment of patients with multiple sclerosis, movement disorders, migraine/headache, stroke, and cognitive dysfunction. She also has an interest in neurogenetics and treats adult patients with neurofibromatosis. Dr. Allred enjoys teaching medical students and residents and is dedicated to education. **SPECIALTY** GENERAL NEUROLOGY



### SAFDAR A. ANSARI, MD

Is the Division Chief of Neurocritical care at the Department of Neurology. His clinical activities include managing critically ill patients in the hospitals state-of-the-art Neurocritical Care Unit, providing consultation services to other intensive care units, and covering the stroke service and telestroke network. He serves as co-chair of the Organ Donor Council, and as the site investigator for two large multinational clinical trials for brain hemorrhage as well as pursuing his own research interests in therapeutic hypothermia. He plays an integral role

in education for trainees at all levels in the neurocritical care unit. **SPECIALTY** NEUROCRITICAL CARE



### SUSAN K. BAGGALEY, MSN, FNP-C

is a certified nurse practitioner, seeing patients with complex headache disorders including migraine, cluster, and chronic daily headaches. Susan has over 20 years of specialty headache experience and has been involved in numerous research and clinical drug trials. She also directs all neurology outpatient clinics at the University of Utah. **SPECIALTY** HEADACHE



### JAMES F. BALE, JR., MD

is Vice Chair for Education in the Department of Pediatrics, the Program Director for the Categorical Pediatrics Residency, and a member of the Board of Trustees for Primary Children's Medical Center. Dr. Bale has published extensively regarding clinical child neurology, cytomegalovirus, and neurologic infections. With colleagues at the Universities of Utah and Nebraska, he recently published *Pediatric Neurology: A Color Handbook*. Dr. Bale served as President of the Child Neurology Society from 2003-2005 and as Chair of the Council of Pediatric Subspecialties from 2010-2012. **SPECIALTIES** PEDIATRIC NEUROLOGY, CONGENITAL INFECTIONS



### HELEN I. BARKAN, MD, PHD

joined the Department of Neurology as Associate Professor, coming from New York Upstate Medical University. Her expertise includes intractable epilepsy in both adult and pediatric patients, having a particular interest in surgical treatment for seizure disorders. Dr. Barkan has also written numerous publications on brain mapping and electroencephalography (EEG). **SPECIALTIES** EEG, EPILEPSY



### JOSHUA L. BONKOWSKY, MD, PHD

is Director of Pediatric Neurology Research and the recipient of the 2012 NIH New Innovator Award. His lab studies mechanisms and disease in the developing brain, including the formation of circuitry and their disruption by prematurity, and drug discovery for leukodystrophy treatment. He manages a specialty clinic for adults and children with leukodystrophies and other neurogenetic disorders. **SPECIALTIES** LEUKODYSTROPHIES, NEUROGENETICS



### K.C. BRENNAN, MD

is Assistant Professor and Division Chief for Translational Neuroscience in the Department of Neurology. His research and clinical care both focus on the headache disorders. His laboratory examines the basic mechanisms of migraine and post-traumatic headache. A particular interest is cortical spreading depression, a wave of massive excitation that is also relevant to stroke and traumatic brain injury. He and his colleagues also do focused physiological research on patients with migraine and post-traumatic headache. His clinical work involves seeing patients in the Headache Clinic and in the hospital in the Neurology Consult Service. **SPECIALTY** HEADACHE



### MARK B. BROMBERG, MD, PHD

directs both the Motor Neuron Disease/Amyotrophic Lateral Sclerosis (ALS) Clinic and the Muscular Dystrophy Association Clinic at the University of Utah. His research interests include clinical care of ALS patients and the development of new electrodiagnostic techniques. Dr. Bromberg is also very active researching issues related to the quality of life for ALS patients and caregivers. **SPECIALTIES** NEUROMUSCULAR, ELECTROMYOGRAPHY, ALS



### JAMES B. BURNS, MD

has a longstanding research interest in the possible role of T cell autoimmunity in multiple sclerosis (MS). He is also a regular participant in a variety of clinical trials for MS treatments. Dr. Burns currently sits on the Scientific Review Committee for the National MS Society. **SPECIALTY** MULTIPLE SCLEROSIS



### RUSSELL J. BUTTERFIELD, MD, PHD

is Assistant Professor in the Division of Pediatric Neurology and co-directs the Muscular Dystrophy Association Clinic. Dr. Butterfield sees patients with neurogenetics and neuromuscular disorders with a specific interest in congenital muscular dystrophies and myopathies. His research efforts are in genetic and genomic analysis of inherited neuromuscular disorders. **SPECIALTY** PEDIATRIC NEUROLOGY, NEUROMUSCULAR DISORDERS, MUSCULAR DYSTROPHY



### GORDON J. CHELUNE, PHD

is Professor of Neurology and Senior Neuropsychologist in the Center for Alzheimer's Care, Imaging and Research (CACIR) in the Division of Cognitive Neurology. Dr. Chelune is board certified in clinical neuropsychology and has over 35 years of experience in his field. His clinical interests include memory disorders, deficits of higher executive function and trajectories of cognitive change in aging. He has been actively involved in test development and outcomes research throughout his career. He is a Fellow of the American Psychological Association, National Academy of Neuropsychology and Society of Personality Assessment, and currently serves as the Executive Director of the International Neuropsychological Society. **SPECIALTIES** NEURODEGENERATIVE DISORDERS, MEMORY, NEUROCOGNITIVE OUTCOMES RESEARCH, NEUROPSYCHOLOGICAL ASSESSMENT



### STACEY L. CLARDY, MD, PHD

is both clinical and research faculty in the Division of Neuroimmunology within the Department of Neurology. Prior to joining the University of Utah, Dr. Clardy furthered her training with a fellowship in Autoimmune Neurology at the Mayo Clinic. Her training and experience focus on the evaluation and management of autoimmune and paraneoplastic disorders of the nervous system. Her main clinical interest is devoted to patients affected by antibody-mediated disorders of the nervous system, as well as demyelinating CNS disease, including neuromyelitis optica



### MELISSA CORTEZ, DO

Is an Assistant Professor within the Department of Neurology at University of Utah Health Care. Dr. Cortez is also the Director and Founder of the Autonomic Physiology Lab. Dr. Cortez is a board-certified physician and completed her neurology residency at the University of Utah School of Medicine. Before returning to University of Utah Health Care in 2014, she served as a Fellow at the Mayo School of Medical Education, receiving specialized training in Clinical Neurophysiology and the management of Multiple Sclerosis. **SPECIALTIES** NEUROLOGY, MULTIPLE SCLEROSIS, AUTOIMMUNE NEUROLOGY, NEUROPATHY, AUTONOMIC NEUROLOGY, EMG, ULTRASOUND



### ADAM De HAVENON, MD

is Assistant Professor of Neurology at the University of Utah, School of Medicine. After receiving his B.A. from Yale University in 2001, he received his medical degree from Brown University School of Medicine in 2009 and completed an internship and neurology residency at the University of Utah in 2013. He recently finished a vascular neurology fellowship at University of Washington, where he also pursued additional training and certification in carotid and transcranial Doppler (TCD) ultrasound. He has a particular clinical interest in stroke in the young, optimizing secondary stroke risk factor reduction, and evaluating patients for interventional procedures such as carotid endarterectomy or stenting. He also provides emergency consultation to stroke patients at community hospitals via the University of Utah telestroke network. Dr. de Havenon's independent research is focused on studying the application of advanced imaging modalities to better understand the physiology of large vessel atherosclerosis and pathways of collateral blood flow in stroke patients. **SPECIALTIES** VASCULAR NEUROLOGY, STROKE



### L. DANA DEWITT, MD

is Medical Director for inpatient Neuro Acute Care and head of the NeuroHospitalist group. She is board certified in Vascular Neurology and covers Brain Attacks and Telestrokes and interprets Transcranial Doppler Ultrasound. She has received awards as Best of Boston Top Docs for Women, Consumer Checkbook top Docs and Best Doctors in America 2005-2014. She is PI for a number of MS studies including a Neuro-NEXT study for primary progressive and secondary progressive MS, an acute stroke study of Multi-Stem, and a PFO study in stroke, REDUCE. **SPECIALTIES** STROKE, NEUROIMMUNOLOGY, WHITE MATTER DISEASE





**KATHLEEN B. DIGRE, MD** directs the Division of Headache and Neuro-Ophthalmology in Neurology as well as directs the Neuro-Ophthalmology Fellowship at the Moran Eye Center, along with the Headache Clinic at the Clinical Neurosciences Center. Her clinical research interests include the study of idiopathic intracranial hypertension, neuro-ophthalmic disorders in pregnancy, headache, photophobia and optic nerve disorders. Dr. Digre serves as treasurer of the American Headache Society and is Past President of the North American Neuro-ophthalmology Society. She is listed in the Best Doctors in America, and recently received the University of Utah's highest honor, the Rosenblatt Award. She has authored over 150 peer-reviewed articles, reviews, and abstracts, and was the first Hedi Fritz Guest Professor at the University of Zurich. **SPECIALTIES** NEURO-OPHTHALMOLOGY, HEADACHE, WOMEN'S HEALTH



**KEVIN DUFF, PHD** joined the University of Utah as Associate Professor of Neurology in 2009 and practices neuropsychology for the Center for Alzheimer's Care, Imaging and Research (CACIR). Dr. Duff is a board certified neuropsychologist with over 10 years experience working in dementia and other of neuropsychiatric illnesses. His research program examines the earliest cognitive changes in the development of dementia, practice effects as a marker of brain plasticity, and methods for improving cognitive functioning in late life. Finally, he frequently lectures in the community about brain fitness. **SPECIALTIES** DEMENTIA, ALZHEIMER'S DISEASE, HUNTINGTON'S DISEASE, OTHER NEUROPSYCHIATRIC CONDITIONS



**ANGELA D. EASTVOLD, PHD** joined the Department of Neurology in 2011 as Assistant Professor, after having completed her Clinical Neuropsychology Fellowship at the James A. Haley Veterans' Hospital in Tampa, FL and her Neuropsychology Internship at the University of Florida. Dr. Eastvold has extensive experience with all severity levels of brain injury and neurologic/psychiatric differential diagnosis. **SPECIALTY** CLINICAL AND FORENSIC NEUROPSYCHOLOGICAL ASSESSMENT, TBI, EPILEPSY



**FRANCIS M. FILLoux, MD** is Chief of the Division of Pediatric Neurology at the University of Utah School of Medicine and Primary Children's Medical Center, being responsible for administering the Division of Pediatric Neurology. Dr. Filloux is a general child neurologist who sees children with all forms of neurological disease, having special interest in tic disorders, Tourette's, and neurobehavioral problems. **SPECIALTY** PEDIATRIC NEUROLOGY



**NORMAN L. FOSTER, MD** is a board certified geriatric neurologist who has specialized in brain imaging and dementing and neurodegenerative diseases for over 30 years. He is Professor of Neurology, Chief of the Division of Cognitive Neurology, Senior Investigator in the Brain Institute, and Director of the Center for Alzheimer's

Care, Imaging and Research (CACIR), which he helped establish in 2005. His recent research has focused on pragmatic studies to improve evaluation, diagnosis and treatment of neurodegenerative disorders and the development and application of neuroimaging in clinical care. Dr. Foster is a Fellow of the American Academy of Neurology and the American Neurological Association, a member of the Alpha Omega Alpha Honorary Medical Society and the Amyloid PET Imaging Task Force of the Alzheimer's Association. He helped develop the Utah State Plan for Alzheimer's Disease and Related Disorders passed by the Utah State Legislature in January, 2012. He has served as an advisory for several international, federal and state agencies. **SPECIALTIES** ALZHEIMER'S DISEASE AND RELATED NEURODEGENERATIVE DISORDERS, POSITRON EMISSION TOMOGRAPHY, NEUROIMAGING



**SUMMER GIBSON, MD** is a Utah native. She attended Rice University where she earned her BA in biology. She received her MD from the University of Texas Health Science Center in San Antonio. She returned to Utah for her Neurology residency, in her last year she was nominated a co-chief. During her residency she developed a strong research and clinical interest in ALS. After completion of her residency she was elected as the first Petajan neurophysiology fellowship recipient. She completed epidemiologic studies on ALS using the Utah Population Data Base (UPDB) which was published in *Neurology*. With the mentorship of Dr. Stefan Pulst, she also started an ALS clinic tissue bank repository and received funding through the Utah Genome Project (UGP) in hopes of identifying and further expanding the understanding of ALS genes and explaining findings from her UPDB studies. **SPECIALTIES** NEUROMUSCULAR, ELECTROMYOGRAPHY



**JOHN, E. GREENLEE, MD** is Professor and Executive Vice Chair and former Interim Chair (2002-2007). His areas of specialty are central nervous system (CNS) infections and paraneoplastic and other autoimmune diseases of the CNS with particular emphasis on antibody-mediated syndromes of neurological injury. Dr. Greenlee is one of the first individuals to recognize that an immune response to neurons can cause CNS injury. **SPECIALTIES** CNS INFECTIONS, AUTOIMMUNE NEUROLOGICAL DISEASE, COMPLEX NEUROLOGICAL DIAGNOSIS



**DUSTIN B. HAMMERS, PHD, ABPP** joined the University of Utah in 2011 as Assistant Professor of Neurology, after having completed his Clinical Neuropsychology Fellowship at the University of Michigan. He completed Board Certification in Clinical Neuropsychology in 2014 and currently practices neuropsychology for the Center for Alzheimer's Care, Imaging and Research (CACIR). His clinical interests include memory and executive declines in the elderly, and assessment of adult Attention Deficit/Hyperactivity Disorder. **SPECIALTIES** NEUROPSYCHOLOGICAL ASSESSMENT, NEURODEGENERATIVE DISORDERS, OTHER NEUROPSYCHIATRIC CONDITIONS



**PETER M. HANNON, MD** is currently completing fellowship training at the University of Utah. His interest in neurology started prior to medical school during volunteer work with individuals with Parkinson's disease in water therapy sessions at a community center in his home town of Houston Texas. This interest continued on through his medical education at Baylor College of Medicine in the Houston Medical Center, and included research on the genetics of Alzheimer's Disease, active involvement as president of the BCM Chapter of the Student Interest Group in Neurology, teaching small groups for the core neuroscience course, and attendance to the 2008 AAN Conference in Chicago. **SPECIALTY** VASCULAR NEUROLOGY



**JOHN M. HOFFMAN, MD** is a professor of Radiology and Neurology and director of Nuclear Medicine in the Department of Radiology at the University of Utah. He is also director of the Center for Quantitative Cancer Imaging and is co-leader of the Experimental Therapeutics Program at Huntsman Cancer Institute. He holds the Willard Snow Hansen Presidential Endowed Chair in Cancer Research. **SPECIALITIES** NEUROIMAGING, NUCLEAR MEDICINE, NEUROLOGY



**DUONG P. HUYNH, PHD** is currently investigating neurodegenerative diseases such as Alzheimer's disease, Parkinson's disease, and spinocerebellar ataxia type 2. Currently, his group is focusing on the influence of environmental toxins on specific genes associated with Parkinson's disease. Dr. Huynh is a member of the Society for Neuroscience and the American Association for the Advancement of Science. He is also a faculty representative for the Intermountain Chapter of the Society for Neuroscience. **SPECIALTY** RESEARCH



**NICHOLAS E. JOHNSON, MD** has joined the Department of Neurology as Assistant Professor following completion of his residency and fellowship at The University of Rochester. His clinical interests include adult and pediatric inherited myopathies (muscular dystrophies) and acquired myopathies. His research focuses on the disease mechanism and progression of congenital myotonic dystrophy. **SPECIALTIES** ADULT AND PEDIATRIC NEUROMUSCULAR DISORDERS, MUSCULAR DYSTROPHIES



**CHRISTOPHER R. JONES, MD, PHD** retired from patient care at the Hospital Sleep-Wake Center in July 2011 to focus on sleep research. Dr Jones has two NIH subcontracts from UCSF geneticists Ying-Hui Fu & Louis J Ptacek to find, recruit, and phenotype families of short sleepers and of morning people. In 1999 Drs Ptacek, Jones, and others published a report of Familial Advanced Sleep Phase that led directly to the discovery of the first causative autosomal dominant FASP mutation. In 2009, Drs Fu, Ptacek, Jones and others discovered and published the first autosomal dominant human short sleeper mutation. **SPECIALTY** SLEEP MEDICINE RESEARCH (CLINICAL)



**RICHARD D. KING, MD, PHD** is Assistant Professor of Neurology in the Center for Alzheimer's Care, Imaging and Research (CACIR) and holds adjunct appointments in Bioengineering and Neuroscience. He directs the Alzheimer's Image Analysis Laboratory, which uses advanced neuroimaging analysis tools to study morphometric changes in the brain associated with neurodegenerative disease. He is currently funded by the Paul Beeson Career Development Award in Aging Research for his work examining cortical complexity changes in normal aging and Alzheimer's disease (NIA grant K23 AG03835). **SPECIALTIES** ALZHEIMER'S DISEASE AND RELATED NEURODEGENERATIVE DISORDERS, NEUROIMAGING



**NOAH KOLB, MD** studied biochemistry at Bowdoin College and attended medical school at the University of Massachusetts. He completed his Neurology Residency at the University of Virginia, where he served as Chief Resident during his final year. He completed his fellowship training at the University of Utah where he currently practices neuromuscular medicine, as well as teaches at the University of Utah School of Medicine. His research interest is currently focused on chemotherapy induced neuropathy. **SPECIALTIES** NEUROMUSCULAR, ELECTROMYOGRAPHY



**HOLLY K. LEDYARD, MD, MS** is Assistant Professor of Neurology, working between departments within University Hospital. Dr. Ledyard spends most of her time treating inpatients in the Neuro Critical Care Unit (NCCU), but can also be seen in the Emergency Department handling acute cases. **SPECIALTY** NEUROCRITICAL CARE



**JENNIFER J. MAJERSIK, MD, MS, FAHA** is an Associate Professor of Neurology and the Medical Director of the University of Utah Stroke Center. Her clinical practice includes evaluating and treating patients with acute stroke in the Emergency Department and in community hospitals throughout the region that participate in the TeleStroke Network (telemedicine). Under her leadership, the University of Utah Health Care TeleStroke Network has grown from 8 sites to 23 sites in 5 states. Dr. Majersik also manages patients on the Inpatient General Neurology Service, and provides outpatient consultation in the Stroke Clinic, including urgent referrals. She studies the genetic causes of stroke and how systems of care affect stroke outcomes. She is the Principal Investigator of the Utah StrokeNet, a regional coordinating center in the new NIH stroke trials network. **SPECIALTIES** STROKE, NEUROVASCULAR



**FUMISUKE MATSUO, MD** is a long-time faculty member of the Department of Neurology. Surgical treatment of medically refractory epilepsy has been an area of special interest for Dr. Matsuo. His main expertise as a clinical electroencephalographer is in the assessment of episodic neurobehavior symptoms, separating epileptic seizures from non-epileptic events. **SPECIALTIES** CLINICAL NEUROPHYSIOLOGY, INTRAOPERATIVE MONITORING, EPILEPSY





**DAVID R. RENNER, MD**

is formerly the Director of the University of Utah Neurology Residency Program. Under his leadership the program grew from four to six residents per year. He started the University of Utah's first HIV-Neurology Clinic, as well as the Department of Neurology's first outreach clinic in Jackson Hole, WY. He has been actively involved in practicing infectious and tropical neurology in the countries of Kenya and Ghana, where he also teaches residents (registrars) and medical students about the neurosciences. **SPECIALTIES** HIV-NEUROLOGY, INFECTIOUS AND TROPICAL NEUROLOGY, NEUROMUSCULAR, ELECTROMYOGRAPHY, VASCULAR, GENERAL NEUROLOGY



**SANDRA P. REYNA, MD**

is Assistant Professor of Neurology and Director of the Neurology Clinical Trials Unit at the University of Utah and Co-Director of the Pediatric Motor Disorders Research Program. A long-time researcher at the University of Utah, Dr. Reyna has specific interest in spinal muscular atrophy, including both natural history studies as well as studies that include drug interventions. She also has extensive experience in preparation of clinical trials and coordination of multiple team members as well as trials involving multiple sites. **SPECIALTY** NEUROMUSCULAR RESEARCH



**AWAIS RIAZ, MD, PHD**

is Director of Intraoperative Neurophysiologic Monitoring Services at the University of Utah. His interests include improving the existing protocols for intraoperative monitoring, incorporating evoked potentials, electroencephalography (EEG), and transcranial Doppler. He has also recently developed an epilepsy course geared towards basic scientists. **SPECIALTIES** CLINICAL NEUROPHYSIOLOGY, INTRAOPERATIVE MONITORING, EPILEPSY



**JOHN W. ROSE, MD**

is Professor of Neurology at the University of Utah and is Chief of Neurology at the Salt Lake City Veterans Administration Hospital. Dr. Rose and his colleagues investigate diverse aspects of multiple sclerosis (MS), including the immunopathology of MS and related models, the development of new treatments for MS, early disease detection with advanced magnetic resonance imaging (MRI), and the detection of susceptibility genes for MS. **SPECIALTIES** NEUROIMMUNOLOGY, MULTIPLE SCLEROSIS



**ISHWARA R. SANKARA, MPH, MBBS**

Is an Assistant Professor within the Department of Neurology at University of Utah Health Care. His research interests include: Quality improvement/practice management in the Neurocritical Care Unit; Sepsis; and Thromboelastometry in the Neurocritical Care Unit. Before arriving at University of Utah Health Care, Dr. Sankara attended medical school at Osmania Medical College in India, and completed his residency at University of Alabama Health Center Montgomery. **SPECIALTY** GENERAL NEUROLOGY



**RODOLFO SAVICA, MD**

is a clinical faculty of Sleep and Movement Disorders Division within the Department of Neurology. He completed a movement disorders fellowship, a behavioral fellowship and a DBS fellowship at the Mayo Clinic, Rochester. His training and experience have been focused on evaluation and management of movement disorders and dementias. His main clinical interest is devoted to patients affected by Parkinsonism, tremors and Dementia with Lewy Bodies. He is the director of the Dementia with Lewy Bodies/Parkinson disease Dementia clinic, one of the few clinics in the United States that are focused on this group of patients. **SPECIALTIES** MOVEMENT DISORDERS, BEHAVIORAL NEUROLOGY & NEUROPHYSIATRY



**THOMAS SCHENKENBERG, PHD**

conducts neuropsychological and psychological evaluations for patients with a variety of conditions. His research interests include dementia, head injury, various neuropsychological syndromes, and clinical ethics. He has been involved in the screening process for deep brain stimulation (DBS) for several years and consults regularly with the DBS team. **SPECIALTIES** CLINICAL NEUROPSYCHOLOGY, CLINICAL PSYCHOLOGY



**LAUREN E. SCHROCK, MD**

Lauren Schrock is the Medical Director of the Movement Disorders Surgery Program (e.g., Deep Brain Stimulation). During her tenure at University of Utah Health Care, the DBS Program has become a model multi-disciplinary Program at the institution and is now consistently one of the top 15 busiest DBS programs in country. Dr. Schrock conducts interventional clinical trials of novel DBS devices, and will be the site principal investigator for an upcoming multi-center NIH-CTSA funded study of DBS in early-stage Parkinson's disease. Her clinical expertise is in movement disorders, with a particular focus on DBS treatment of Parkinson's disease, tremors, and dystonia, intraoperative neurophysiological guidance for placement of DBS electrodes, as well as botulinum toxin injections for treatment of complex dystonias and hemifacial spasm. **SPECIALTIES** MOVEMENT DISORDERS, DEEP BRAIN STIMULATION, INTRAOPERATIVE NEUROPHYSIOLOGY, BOTULINUM TOXIN FOR DYSTONIAS



**DANIEL R. SCOLES, PHD**

is Associate Professor of Neurology. His scientific training includes biochemistry, genetics of natural populations, and neurology with emphasis on brain tumor research. Dr. Scoles's research objectives are centered on the identification of drugs for the treatment of spinocerebellar ataxia type 2 (SCA2) and Parkinson's disease. Drug discovery methodologies used by Dr. Scoles include quantitative high throughput screening (qHTS) and antisense oligonucleotide screening. His research is promoted by collaborative partnerships with industry and the National Institutes of Health (NCATS). Dr. Scoles also investigates molecular mechanisms of disease gene expression control aimed at identifying new therapeutic targets and understanding drug action. Dr. Scoles is currently supported by grants from the NINDS. **SPECIALTIES** DRUG DISCOVERY, MOLECULAR CELLULAR AND ORGANISMAL BIOLOGY.



**RUGGERO SERAFINI, MD, PHD**

is assistant professor of Neurology specializing in electroencephalography and epilepsy. Dr. Serafini recently came to University of Utah Health Care from Wayne State University in Detroit, MI, where he was affiliated with Detroit Receiving Hospital and Harper University Hospital. He received his medical degree from the Catholic University School of Medicine, in Rome, Italy and has a long standing career as a researcher in neurophysiology and in the basic mechanisms of epilepsy on which he has published several papers. A board-certified epileptologist, Dr. Serafini is a regular presenter to physician groups on a variety of epilepsy-related topics. He currently spends most of his clinical time caring for patients at the Neurology Clinic of the University of Utah and at the Epilepsy Clinic of the VA Hospital, located on the University of Utah campus. **SPECIALTIES** EPILEPSY, ELECTROENCEPHALOGRAPHY



**DAVID R. SHPRECHER, DO, MS**

is Chief of the Neurology Sleep and Movement Disorders Division. Dr. Shprecher conducts observational and interventional clinical trials in atypical parkinsonism, PD, Huntington disease, and Tourette syndrome. His collaborative research with our Departments of Psychiatry and Radiology is designed to clarify why many, but not all, patients with Tourette syndrome outgrow their symptoms. His work with our team of gastroenterologists explores whether routine colonoscopy may be useful in early diagnosis of Parkinson's disease. **SPECIALTIES** MOVEMENT DISORDERS, EXPERIMENTAL THERAPEUTICS



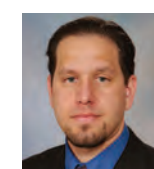
**J. ROBINSON SINGLETON, MD**

is Director of the Neurophysiology Laboratory at the Salt Lake City Veterans Administration Hospital. He teaches neuromuscular disease diagnosis and electrodiagnostic techniques to neurology, physical medicine, and rehabilitation residents, and has helped train many neuromuscular fellows. Dr. Singleton also serves on the Centers for Translational and Clinical Science Advisory Board, and is a grant review panelist for the National Institute of Neurological Disorders and Stroke and the American Diabetes Association. **SPECIALTIES** NEUROMUSCULAR, ELECTROMYOGRAPHY, DIABETIC NEUROPATHY



**A. GORDON SMITH, MD**

is Professor of Neurology and Chief of the Division of Neuromuscular Medicine and Director of the Jack H. Petajan EMG Laboratory at the University of Utah. He also directs the University of Utah's Peripheral Neuropathy Clinic and Cutaneous Innervation Laboratory. Dr. Smith's research focuses on peripheral neuropathy associated with early diabetes and metabolic syndrome. He is the Principal Investigator of the Utah Regional site for the NIH funded Network for Excellence in Neuroscience Clinical Trials (NeuroNEXT), and he co-directs the Neurology Clinical Trials Unit. His clinical expertise is in neuromuscular disorders, clinical neurophysiology and the therapeutic application of botulinum toxins. **SPECIALTIES** NEUROMUSCULAR, ELECTROMYOGRAPHY, BOTULINUM TOXIN, PERIPHERAL NEUROPATHY



**M. MATEO PAZ SOLDÁN, MD, PHD**

is an Assistant Professor within the Department of Neurology at University of Utah Health Care, where his primary focus is Neuroimmunology. Before arriving at University of Utah Health Care, Dr. Paz Soldán attended medical school at the Mayo Medical School, and completed a residency and fellowship at the Mayo School of Graduate Medical Education. **SPECIALTY** NEUROIMMUNOLOGY



**JOHN D. STEFFENS, MD**

is Director of the Division of Diagnostic and Clinical Neurology. He is currently reducing his outpatient practice in order to focus on clinical resident education and acute neurology as a neurohospitalist. In addition, Dr. Steffens maintains a part-time private practice in Twin Falls, ID. **SPECIALTIES** NEUROHOSPITALIST, NEUROMUSCULAR, GENERAL NEUROLOGY, ELECTROMYOGRAPHY



**MATTHEW T. SWEENEY, MD, MS**

is currently an Assistant Professor with joint appointment in Pediatrics and Neurology at the University of Utah. His specific clinical interests are in pediatric epilepsy and EEG, Intraoperative Neuromonitoring, movement disorders, and general child neurology. His research interests include investigation into the genetic basis for and treatment of Alternating Hemiplegia of Childhood, as well as ongoing participation in novel anti-epileptic drug trials. He will see patients with epilepsy, movement disorders, as well as general neurologic issues such as headaches and developmental delay. Dr. Sweney is board-certified in General Pediatrics and Neurology with special qualification in child and adolescent neurology, as well as with the American Board of Clinical Neurophysiology with qualification in Epilepsy Monitoring and Intraoperative Monitoring (IOM). **SPECIALTY** PEDIATRIC NEUROLOGY



**KATHRYN J. SWOBODA, MD**

is a professor of Neurology and Pediatrics at the University of Utah in Salt Lake City, Utah, where she directs the Pediatric Motor Disorders Research Program. Her clinical focus includes the diagnosis and treatment of children and adults with neuromuscular diseases, movement disorders and rare neurogenetic disorders. A major focus of her research efforts over the past decade includes genotype/phenotype studies in inherited neuromuscular diseases and movement disorders. She has directed or collaborated in numerous clinical trials and studies in children and adults with spinal muscular atrophy (SMA), alternating hemiplegia of childhood (AHC), and inherited disorders of neurotransmitter biosynthesis and metabolism. **SPECIALTIES** NEUROGENETICS, PEDIATRIC NEUROMUSCULAR, METABOLIC



**PERLA C. THULIN, MD**

has special expertise and training in the evaluation and treatment of movement disorders, including Parkinson's disease, tremor, chorea, hemifacial spasm, tics, and dystonia, including torticollis and blepharospasm, and is an expert in the use of Botox and Myobloc. Dr. Thulin also evaluates patients with Parkinson's disease and essential tremor for deep brain stimulation surgery. **SPECIALTY** MOVEMENT DISORDERS





**COLIN B. VAN ORMAN, MD**  
focuses his clinical practice on pediatric epilepsy, which also includes general pediatric neurology. He is involved in the Comprehensive Epilepsy Program at the University of Utah, which includes the use of standard anti-epilepsy medications, vagus nerve stimulation, dietary treatments, and evaluation for potential epilepsy surgery. Dr. Van Orman's research interests focus on the study of investigational medications, the ketogenic diet, and epilepsy surgery. **SPECIALTY** PEDIATRIC EPILEPSY



**JUDITH E. WARNER, MD**  
specializes in neuro-ophthalmology, the study of the eye as it relates to the brain. She evaluates complex visual complaints, which can be due to optic nerve or brain disease, and provides treatment for these disorders. Dr. Warner's interests include diplopia, giant cell arteritis, optic neuropathies, and idiopathic intracranial hypertension. **SPECIALTY** NEURO-OPHTHALMOLOGY



**JANA WOLD, MD**  
evaluates and treats acute stroke patients in the hospital and through use of the Telestroke Network (telemedicine). Dr. Wold provides outpatient consultation in the Stroke Clinic and in the General Neurology Clinic, as well as serves on the NeuroHospitalist Inpatient Service. She is the Director of the annual Utah Stroke Symposium, the Program Director for the Neurology Residency, and the Vice-Chair of the Utah Stroke Task Force. Her interests lie in inpatient neurology and education. **SPECIALTIES** STROKE, VASCULAR NEUROLOGY



**EDWARD Y. ZAMRINI, MD**  
is Professor of Neurology in the Center for Alzheimer's Care, Imaging and Research (CACIR). Dr. Zamrini is board certified in geriatric neurology and has more than 24 years of experience in the clinical care of Alzheimer's and related disorders. He has been an investigator on over 50 clinical research studies examining promising new treatments, PET and MEG imaging utility, and the clinical features and pathophysiology of neurodegenerative disorders. His clinical interests center on Alzheimer's disease and related memory disorders, especially dementia that is atypical, rapidly progressive, familial, or early-onset. **SPECIALTIES** ALZHEIMER'S DISEASE AND RELATED DISORDERS, MAGNETOENCEPHALOGRAPHY, POSITRON EMISSION TOMOGRAPHY, CLINICAL DRUG TRIALS



**BRANDON A. ZIELINSKI, MD, PHD**  
joined the Division of Pediatric Neurology after completing his subspecialty training at the University of California San Francisco. His focus on acute care fills a 'neurohospitalist' role, and his specific clinical interests include pediatric neurocritical care, stroke, and neurovascular disease. He studies large-scale brain network in children using advanced functional and structural neuroimaging techniques. He is also developing a functional MRI clinical service with the Department of Radiology. **SPECIALTIES** PEDIATRIC NEUROLOGY, STROKE, NEUROIMAGING



**GEORGE M. ZINKHAN, MD**  
obtained a medical degree from the University of Texas Southwestern with distinction in research, after which he completed a residency in neurology at the University of Utah in 2011. Dr. Zinkhan treats a variety of neurological conditions in General Neurology Clinic including headache, multiple sclerosis, movement disorders, stroke, etc. **SPECIALTY** GENERAL NEUROLOGY

## DEPARTMENT OF NEUROSURGERY



**WILLIAM T. COULDWELL, MD, PHD**  
Serves as Professor and Chair of the Department of Neurosurgery at the University of Utah. He also has served as Director for the American Board of Neurological Surgery and is currently the President of the American Association of Neurological Surgeons. Dr. Couldwell has over 300 peer-reviewed publications and has been the recipient of several federal (NIH) and other research grants. His clinical interests include surgical management of epilepsy, neuro-oncology, pituitary tumors, skull base and cerebrovascular neurosurgery. **SPECIALTIES** SKULL BASE SURGERY, NEUROSURGICAL, ONCOLOGY, NEUROVASCULAR SURGERY



**RONALD I. APFELBAUM, MD EMERITUS**  
is Professor Emeritus in the Department of Neurosurgery. Throughout his tenure with the University of Utah, Dr. Apfelbaum served as Neurosurgery Residency Training Program Director, Interim Chair for the Department of Neurosurgery, and also directed the Neurosurgery Spine Program and the neurosurgery portion of the Spine Fellowship Program. Since he retired in 2009, Dr. Apfelbaum continues to participate in an advisory and teaching role for the Department of Neurosurgery. **SPECIALTIES** CERVICAL SPINE SURGERY, CRANIAL NERVE AND SKULL BASE SURGERY, PITUITARY SURGERY



**ERICA F. BISSON, MD**  
having completed her fellowship in spine surgery at the University of Utah in 2008, has returned to the University of Utah as Assistant Professor to provide comprehensive spine care. Her special interests include cervical spine disease, occipitocervical disease, spinal fusion techniques, and image-guided surgery. **SPECIALTY** COMPLEX SPINE SURGERY



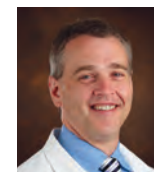
**ROBERT J. BOLLO, MD, MS**  
received his MD degree from Boston University School of Medicine in 2003. He then completed an internship as well as his neurosurgery residency at New York University Medical Center and Bellevue Hospital between 2003-2010. Following his residency he completed a one-year pediatric fellowship here at the University of Utah. Following his fellowship, he was appointed as an assistant professor of neurosurgery at Baylor College of Medicine in Houston, Texas until April 2013. In May 2013 he joined the Department of Neurosurgery at the University of Utah School of Medicine. **SPECIALTY** PEDIATRIC NEUROSURGERY



**DOUGLAS L. BROCKMEYER, MD, FAAP**  
practices pediatric neurosurgery with an emphasis on spinal and vascular disorders. He is also Assistant Program Director of the Neurosurgery Residency Training Program. **SPECIALTY** PEDIATRIC NEUROSURGERY



**HOWARD COLMAN, MD, PHD**  
is Associate Professor in the Department of Neurosurgery at the University of Utah, a member of the multidisciplinary Brain Tumor Research Team, and is Director of Medical Neuro-Oncology at Huntsman Cancer Institute. He specializes in the treatment of primary and metastatic brain tumors, and the diagnosis and management of neurologic complications of cancer. His clinical research is focused on the development and testing of new therapies for brain tumors. His laboratory interests include the identification of molecular markers of prognosis and treatment response in brain tumors. In addition, he is also working on identifying the role of tumor stem cells in the development and treatment resistances of tumors. **SPECIALTY** NEUROSURGICAL ONCOLOGY



**ANDREW T. DAILEY, MD**  
treats patients suffering from spinal cord injury, spine trauma, and cervical degenerative disease. Dr. Dailey originally came to the University of Utah in 1998, but left after five years to practice at the University of Washington in Seattle. He returned to the University of Utah in 2006 to be a part of the Comprehensive Spine Program, as well as for his love of the outdoors. **SPECIALTIES** SPINE AND PERIPHERAL NERVE



**F. EDWARD DUDEK, PHD**  
Is professor and vice-chair for research for the Department of Neurosurgery at the University of Utah School of Medicine. His research interests include mechanisms of seizure generation and acquired epilepsy, development of new therapies for epilepsy, the natural history of acquired epilepsy, long-term seizure monitoring, and status epilepticus. **SPECIALTY** EPILEPSY



**DANIEL W. FULTS III, MD**  
is Professor of Neurosurgery at the University of Utah and is a member of Huntsman Cancer Institute's Brain Tumor Program. As a physician-researcher, Dr. Fults' clinical practice is centered on brain tumor treatment. Malignant brain tumors found in children is the primary focus of his laboratory research. **SPECIALTY** NEUROSURGICAL ONCOLOGY



**EDGAR C. GOLDSTON, JR., MD**  
is actively involved with the development and implementation of the Comprehensive Spine Program at the University of Utah, which incorporates a multidisciplinary approach to spine care. His clinical interests are in interventional spinal medicine and spinal diagnostics, as well as the non-operative management of spinal and musculoskeletal disorders. He has strong interests in spine related science and research. **SPECIALTIES** SPINE, PAIN MEDICINE



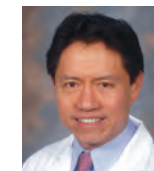
**GREGORY HAWRYLUK, MD, PHD, FRCS**  
is a neurosurgeon scientist who comes to University of Utah Health Care from the University of California San Francisco, where he recently completed subspecialty training in Neurotrauma and Complex Spinal Surgery. Dr. Hawryluk is a general neurosurgeon with a special interest in the management of patients with head and spine injuries. He contributes to the international guidelines that set the standard for how patients with severe brain injuries are managed and will be a crucial member of the Neurocritical Care Team at University of Utah Health Care. **SPECIALTIES** NEUROSURGERY, NEUROCRITICAL CARE



**ROBERT S. HOOD, MD**  
is the second-ever resident of the Department of Neurosurgery and has since returned as faculty in September 2010. Prior to joining the department, Dr. Hood built a reputable career in private practice and was well-known for his skill in minimally invasive spine surgery and overall patient care. Dr. Hood also developed a surgical procedure to treat far lateral lumbar herniated discs in the 1980s. **SPECIALTIES** COMPLEX AND MINIMALLY INVASIVE SPINE SURGERY



**PAUL A. HOUSE, MD**  
surgically treats patients who suffer from epilepsy and movement disorders, including tremor, Parkinson's disease, and dystonia. His research interests include improving the "decoding" of movement information from the brain, understanding epileptic activity across several orders of scale, and designing new devices to provide communication with the brain. **SPECIALTIES** EPILEPSY, MOVEMENT DISORDERS



**L. ERIC HUANG, MD, PHD**  
studies mechanisms of tumor progression by the microenvironment. His research focuses on the molecular basis of genetic alterations driven by tumor hypoxia, an area of research pioneered by his team and funded by the National Institutes of Health. Dr. Huang's interests include molecular mechanisms of tumor progression, brain tumors, and molecular targets. **SPECIALTIES** TUMOR HYPOXIA, BRAIN TUMORS



**RANDY J. JENSEN, MD, PHD**  
has a particular emphasis on the treatment of patients with brain tumors. He sees patients with malignant, benign, primary, and metastatic brain tumors. Dr. Jensen's clinical interests include neuro-oncology, stereotactic radiosurgery, general neurosurgery, intraoperative computer guided navigation, the use of intraoperative MRI for tumor resection, and cortical mapping of lesions in eloquent brain. He is also a member of the Brain Tumor Research Team at Huntsman Cancer Institute and has a laboratory that examines the role of hypoxia in brain tumor growth and development. He is the Director of the Neurosurgery Residency Program. He has served in leadership roles for a number of neurosurgery courses, as well as regional and national neurosurgical societies. **SPECIALTY** NEUROSURGICAL ONCOLOGY





**MARK A. MAHAN, MD**  
is a neurosurgeon who comes to University of Utah Health Care from the Barrow Neurological Institute in Phoenix. He completed fellowships in peripheral nerve surgery at the Mayo Clinic and UCSD. Dr. Mahan specializes in spine surgery and will be the only physician in the Inter mountain Region capable of providing complex peripheral nerve reconstruction and surgical neurorehabilitation. **SPECIALTIES** NEUROSURGERY, PERIPHERAL NERVE, SPINAL DISORDERS



**JAMES P. (PAT) MCALLISTER II, PHD**  
directs a multidisciplinary laboratory that investigates the pathophysiology of hydrocephalus with a particular emphasis on pharmacological treatments to prevent brain damage or promote repair, diagnostic imaging, and novel bioengineering applications to improve cerebrospinal fluid drainage devices. He is the recipient of the Robert H. Pudenz Prize for Excellence in Cerebrospinal Fluid Physiology and Hydrocephalus from the International Society for Pediatric Neurosurgery. **SPECIALTY** HYDROCEPHALUS RESEARCH



**MIN S. PARK, MD, FAANS**  
is a neurosurgeon who comes to University of Utah Health Care from the Barrow Neurological Institute in Phoenix, where he recently completed a fellowship in endovascular neurosurgery. With the ability to perform a comprehensive suite of endovascular neurosurgical procedures, Dr. Park's presence will help enable University of Utah Hospital to provide 24/7/365 coverage for patients requiring neurovascular treatment. **SPECIALTIES** ENDOVASCULAR NEUROSURGERY



**JAY K. RIVA-CAMBRIN, MD, MSC**  
joined the faculty of the University of Utah and Primary Children's Medical Center in 2006. Dr. Riva-Cambrin's clinical interests in pediatric neurosurgery include the treatment of hydrocephalus and clinical trials. He performs over 250 neurosurgeries per year, with 100 being hydrocephalus related. **SPECIALTIES** PEDIATRIC NEUROSURGERY, HYDROCEPHALUS, BRAIN TUMORS, ENDOSCOPIC SURGERY



**MEIC H. SCHMIDT, MD, MBA, FACS**  
Serves as Vice Chair of the Department of Neurosurgery at the University of Utah, and Chief of the Spinal Oncology Service at Huntsman Cancer Institute. His academic practice specializes in neurosurgical oncology, neurotrauma, minimally invasive and complex spinal surgery. He provides neurosurgery and spine care for patients with metastatic spine disease, traumatic spine injuries, brain and spinal cord tumors, and degenerative spine disease. **SPECIALTIES** NEUROSURGERY, SPINE, ONCOLOGY, TRAUMA



**RICHARD H. SCHMIDT, MD, PHD**  
joined the Department of Neurosurgery in 1993 and currently serves as Associate Professor. Dr. Schmidt has clinical and research interests that include cerebral aneurysms, Chiari malformation, hydrocephalus, trauma and critical care. **SPECIALTIES** CEREBRAL ANEURYSMS, VASCULAR MALFORMATION, CHIARI MALFORMATION, ENDOSCOPIC VENTRICULAR SURG



**PHIL TAUSSKY, MD**  
completed a Skull Base/Cerebrovascular Fellowship at the University of Utah and an Endovascular Fellowship at the Mayo Clinic focusing on minimally invasive techniques to treat stroke, aneurysms, AVMs and other vascular diseases. As a result of his dual training, he has a unique perspective offering his patients both microsurgical and minimally invasive endovascular treatment for vascular disease. His training also included extensive experience in the use of modern flow diverters, such as the Pipeline device. **SPECIALTIES** AVMS, ANEURYSMS, CAVERNOUS ANGIOMAS, MENINGIOMAS, MOYA-MOYA, STROKE, CAROTID DISEASE



**MARION L. WALKER, MD**  
is Professor of Neurosurgery in the Division of Pediatric Neurosurgery and Adjunct Professor of Pediatrics at the University of Utah and Primary Children's Medical Center. Dr. Walker is former Chair of the Pediatric Section of the American Association of Neurological Surgeons, the Section on Pediatric Neurosurgery of the American Academy of Pediatrics, and the American Society of Pediatric Neurosurgeons. He also served as President of the International Society of Pediatric Neurosurgery and was a Past Editor for the Journal of Neurosurgery: Pediatrics. **SPECIALTY** PEDIATRIC NEUROSURGERY

DIVISION OF NEURORADIOLOGY  
DEPARTMENT OF RADIOLOGY



**SATOSHI MINOSHIMA, MD, PHD**  
is Professor and Chair of the Department of Radiology at University at University of Utah Health Care. Dr. Minoshima is an internationally renowned clinician and scientist in the field of dementia and molecular imaging, and most recently held the position of Wil B. Nelp Endowed Professor in Radiology at University of Washington in Seattle. He is internationally recognized for his research, including the discovery of the posterior cingulate abnormality in Alzheimer's disease and invention and dissemination of diagnostic statistical mapping technology for brain PET and SPECT scan interpretation. **SPECIALTY:** NUCLEAR MEDICINE.



**KAREN L. SALZMAN, MD**  
is Chief of the Division of Neuroradiology. She has special interest in neuro-oncologic imaging and new imaging techniques including magnetic resonance (MR) perfusion, MR spectroscopy, and diffusion tensor imaging (DTI). Dr. Salzman's research interests include brain tumor perfusion imaging and DTI in an effort to help improve accurate pre-operative diagnosis, surgical planning, and predict prognosis. Other research interests include stroke imaging, along with head and neck neoplasms. **SPECIALTY** NEURORADIOLOGY



**JEFFREY S. ANDERSON, MD, PHD**  
directs the fMRI Neurosurgical Mapping Service and is Principal Investigator for the Utah Functional Neuroimaging Laboratory. Dr. Anderson's lab studies brain networks using functional imaging techniques such as fMRI, diffusion tensor imaging, and magnetoencephalography. Dr. Anderson also has particular interest in autism, multiple sclerosis, vision research, and dementia. **SPECIALTY** NEURORADIOLOGY



**H. CHRISTIAN DAVIDSON, MD**  
is a board-certified neuroradiologist with subspecialty interests in imaging of brain ischemia, imaging of the orbit, and imaging of the head and neck. Dr. Davidson has a background in medical informatics including clinical and educational computer systems. He is also Program Director for the Radiology Residency Program and has served in various leadership capacities in the University of Utah Medical Group for the past decade. **SPECIALTIES** NEURORADIOLOGY, MEDICAL INFORMATICS



**H. RIC HARNBERGER, MD**  
is Professor of Radiology and R.C. Willey Chair of Neuroradiology at the University of Utah. He is an internationally recognized expert in head and neck imaging, having published over 250 articles and 8 books in this area. Dr. Harnsberger is also Chair and CEO of AMIRSYS, Inc., a medical electronic decision support company. **SPECIALTY** NEURORADIOLOGY



**ANNE G. OSBORN, MD**  
is Distinguished Professor of Radiology at the University of Utah. She is recognized internationally for helping establish the field of neuroradiology, which deals with the head, neck, spine, and the central and peripheral nervous system. Dr. Osborn is also the author of numerous medical books and journal articles, and is the co-creator of the first comprehensive point-of-care electronic imaging reference system. **SPECIALTY** NEURORADIOLOGY



**EDWARD P. QUIGLEY III, MD, PHD**  
centers his research on improving detection, characterization, and the treatment of neurologic diseases through advanced imaging. Disease processes studied by Dr. Quigley include multiple sclerosis, optic neuritis, neoplasm, epilepsy imaging, dementia and aging brain, vascular anomalies and aneurysm. **SPECIALTY** NEURORADIOLOGY



**ULRICH A. RASSNER, MD**  
is Medical Director of Magnetic Resonance Imaging (MRI) and Computed Tomography (CT) at the University of Utah. Dr. Rassner also has specific research and clinical interest in MRI physics and MRI safety. **SPECIALTY** NEURORADIOLOGY



**LUBDHA M. SHAH, MD**  
has interests that include advanced magnetic resonance imaging (MRI) techniques such as functional MRI, diffusion tensor imaging, and perfusion MR for the brain and spine. In addition to diagnostic radiology, Dr. Shah performs spine interventional procedures such as epidural steroid injections and biopsies. **SPECIALTY** NEURORADIOLOGY



**EDWIN A. "STEVE" STEVENS, MD**  
is Professor and Chair of the Department of Radiology at the University of Utah. Dr. Stevens specializes in neurointerventional surgery, treating neurological diseases by endovascular and minimally invasive techniques guided by imaging. Dr. Stevens has given over 50 presentations, published over 30 articles and book chapters, and is a reviewer for the *American Journal of Neurology*. **SPECIALTY** NEUROINTERVENTIONAL SURGERY



**RICHARD H. WIGGINS III, MD, CIIP, FSIIM**  
Is Professor of Radiology, Director of Imaging Informatics and the Medical Administrator for the Picture Archiving Communication System (PACS) at the University of Utah. He is an internationally recognized expert in both head and neck imaging and imaging informatics. In 2008, the Department of Radiology awarded Dr. Wiggins with the Teacher of the Year Award. Dr. Wiggins' research interests include BioMedical informatics, head and neck and brain tumor perfusion imaging, and advanced head and neck imaging. Dr. Wiggins has published over 150 books, book chapters, and peer-reviewed publications, and has given over 250 invited presentation. **SPECIALTIES** HEAD AND NECK IMAGING, IMAGING INFORMATICS



# RESIDENTS & FELLOWS

NEUROLOGY	PEDIATRIC NEUROLOGY	NEURORADIOLOGY
<p><b>RESIDENTS</b></p> <p><b>PGY-4</b> Alicia Bennett, DO Tina Burton, MD Kelsey Juster-Switlyk, MD Marilyn McKasson, MD Faiz Rehmani, MD</p> <p><b>PGY-3</b> Daniel Abenroth, MD Ricky Chen, MD Patrick Nicholson, MD, MSC Gurjeet Singh, MD Victor Wang, MD, PHD</p> <p><b>PGY-2</b> Verena Haringer, MD Melissa Heiry, MD Kristin Mitrovich, MD Donald McCorquodale, MD, PHD DonRaphael Wynn, MD Steven O'Donnell, MD</p>	<p>Lizzie Doll, MD Gary Nelson, MD Carey Wilson, MD</p> <p><b>FELLOWS</b></p> <p><b>EMG</b> Chris Muth, MD</p> <p><b>EEG</b> Angela Peters, MD</p> <p><b>Vascular Neurology</b> Lee Chung, MD</p> <p><b>Neurocritical Care</b> Timothy Delgado, MD</p> <p><b>Neuromuscular</b> Ligia Onofrei, MD</p> <p><b>Movements Disorders</b> Behrang Saminejad, MD</p>	<p><b>FELLOWS</b></p> <p>Sarah Cantrell, MD Blair Winegar, MD Jason Ginos, MD Nic Pierson, MD Luke Ledbetter, MD Nick Koontz, MD Justin Cramer, MD</p>
NEUROSURGERY		
<p><b>RESIDENTS</b></p> <p><b>PGY-7</b> Sarah Garber, MD Khaled Krisht, MD</p> <p><b>PGY-6</b> Christian Bowers, MD Ricky Kalra, MD Andrew Tsen, MD</p> <p><b>PGY-5</b> Chih-Ta Lin, MD Marcus Mazur, MD Walavan Sivakumar, MD</p>	<p><b>PGY-4</b> Craig Kilburg, MD Vijay Ravindra, MD</p> <p><b>PGY-3</b> Jian Guan, MD Osama Jamil, MBBS</p> <p><b>PGY-2</b> Andrea Brock, MD, MSCI Michael Karsy, MD, PHD</p>	<p><b>PGY-1</b> Ilyas Eli, MD Farah Laiwalla, MD, PHD</p> <p><b>FELLOWS</b></p> <p><b>Pediatric Neurosurgery</b> Heather Spader, MD</p> <p><b>Skull Base</b> Jayson Neil, MD</p>





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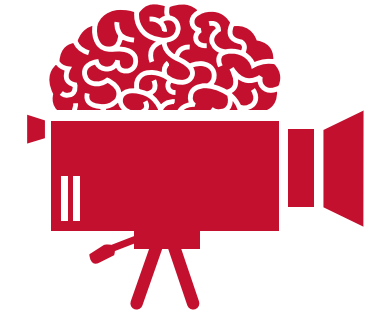
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