UNIVERSITY of WASHINGTON SCHOOL of MEDICINE

The Montlake Cut



A Newsletter from the Department of Neurological Surgery April 2011, Volume 3, Number 2

Instant Synapses In a Can?



Dr. Eberhard Fetz (Photo and original story by Leila Gray)

Will tiny, implantable computers restore brain function lost to disease or trauma?

The W.M. Keck Foundation, with a \$1 million, three-year grant to four UW researchers, including Professors Eberhard Fetz and Jeff Ojemann, is betting yes.

This UW team has already made significant progress in neural engineering – the study of communication and control between biological and machine systems.

The Keck project is the next step in advancing the technology of miniature devices developed here to record from and stimulate the brain, spinal cord and muscles.

Eb Fetz is the project PI, and UW professor of physiology and biophysics, as well as a core staff researcher at the Washington National Primate Research Center.

He and his colleagues have already successfully deployed tiny, battery-powered implantable brain-computer interfaces called neurochips in animals.

Such chips record neuronal activity in one part of the brain, process it, and stimulate cells in another brain region.

The battery-powered device operates continuously in freely behaving animals, making one potential clinical application the creation of artificial recurrent connections to bridge those that have been lost biologically.

For example, the researchers have shown that monkeys can learn to bypass an anesthetic block in the brachial plexus and activate temporarily paralyzed muscles with signals from cortical neurons. In some ways the device acts as a "volition processor," tapping into signals representing the will to move and using them to animate the paralyzed muscles.

Dr. Fetz notes that, "Using an implantable computer interface to implement novel interactions between brain sites opens many fundamentally new research directions, depending on the site of recording and stimulation, and how these signals are processed and transformed."

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Team SPI: Skull Base Robotics

Spi Surgical Inc, co-founded by a multi-disciplinary group of scientists, entrepreneurs, and surgeons, including department faculty members Laligam Sekhar and Louis Kim, is developing a neurosurgical robot capable of minimal access surgery at the skull base.

Spi recently received a \$750,000 small business technology transfer award from the Department of Defense as part of a phase 2-continuation grant. This project focuses on the surgeonrobot interface, including the working console, surgical cockpit, and robotic superstructure. The devices are all used to deliver relevant instruments to the skull base.

Dr. Kim says that the team's goal is to have a working prototype ready for preclinical testing at the conclusion of the grant work in early 2012.

An Important Lesson Learned From Patient HA

HA, my patient since 1993 lives in Chicago and is now 93. HA came to me when an MRI revealed a "dumb-bell" tumor arising from his left 6th cervical spinal nerve root, slightly compressing his spinal cord and extending out the neural foramen (see figure 1).

This type of tumor is almost always a benign nerve sheath tumor: either a Schwannoma or Neurofibroma.

We discussed treatment options, both medical and surgical, and HA decided to wait and watch. So began his annual trips to Seattle for cervical MRI and clinical evaluation. Fortunately from 1993 to 2009, the tumor demonstrated no growth and his neurological exam was stable.

In 2009 there was a small amount of growth but no change in HA's clinical exam or symptoms. We therefore decided to repeat the MRI every 6 months, but no additional growth occurred or has occurred since then.

What makes this case so interesting is that over a 17year time span, this tumor has grown so little. I have seen

in other patients that many, if not most peripheral nerve sheath tumors actually stop growing for

very long periods of time. Because tumors by definition are abnormal collections of growing cells, this observation may seem counter-intuitive. What is much less appreciated is that many tumors do stop growing, often for long periods of time. Eventually, as the aging process kicks in, many tissues and organs begin to show an actual reduction in size.

In addition to clinical and imaging data, autopsy series show many more tumors than ever come to clinical attention. This is especially true for such tumors as pituitary adenomas, meningiomas, and even carcinoma of the prostate. Some tumors, such as hemangiomas are known to regress.

So maybe our impression of tumor growth is skewed by the fact that those that do grow rapidly are more likely to become symptomatic and eventually imaged.

Patient HA illustrates an important principle: that many tumors either stop growing or grow so slowly as to pose little risk. His case taught me the benefit of following many peripheral nerve sheath tumors with serial imaging and clinical examinations, especially when they produce minimal or no symptoms. The challenge for us as clinical investigators will be to understand why some tumors continue to grow while others stop.

I am grateful for having had the opportunity and pleasure to treat HA. Over the past 17 years, he has aged less than I. He remains as sharp and funny as when I first met him, and combines wisdom and compassion that even the Dalai Lama would admire.

He has changed the way I look at and treat many tumors. If we can understand the molecular mechanisms that normally arrest tumor growth, then perhaps we will be able to induce it on demand. - Bv Michel Kliot, MD



Fig. 1: Patient HA's tumor

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Instant Synapses in a Can?: *Continued* . . .

He explained that a second application is to promote neural plasticity to facilitate recovery and exploit the brain's innate talent for re-organizing itself as it heals.

"We expect that the recurrent type of brain computer interface we are trying to develop," he added, "will eventually have numerous clinical applications for bridging damaged biological pathways and strengthening weak neural connections."

For example, signals from the motor cortex can be used to stimulate parts of the spinal cord to produce coordinated movements.

This would create connections that could replace lost pathways between the brain and spinal cord, a loss now un-remediable following some strokes and spinal cord injuries.

Many labs around the world are working on brain-computer interfaces that convert neural activity to control external devices such as prosthetic limbs or computer cursors.

What makes the Keck project unusual is that UW scientists are developing an implantable device that would interact bi-directionally.

By operating autonomously and continuously, without the need for connection to external instrumentation, such a system would facilitate long-term behavioral adaptation and plasticity.

To overcome the many technical problems in creating safe, effective devices of this nature, the project depends on a team of UW experts in different fields.



Dr. Babak Parviz:

He is the UW McMorrow Innovation Assoc. Professor of Electrical Engineering, and has skill in the fabrication of micro- and nano-scale tools, self-assembled biocompatible machinery, and sensors for detecting very faint signals. His group will create the

specialized electrode arrays for recording and stimulation, and will help integrate the miniature electronic systems used in the project.

Dr. Jeffrey Ojemann:

As a UW Professor of Neurological Surgery, he has expanded on his father's original studies mapping the human brain to identify critical areas for movement, language, memory and other functions during surgery to treat epilepsy.



Dr. Ojemann brings his extensive knowledge of

functional brain mapping and clinical recording of signals from the human brain to the project, and will help design and test the custom computerenabled electrode arrays for potential clinical applications.

The Rest of Team Keck Includes:

Dr. Brian Otis:

As a UW assistant professor of electrical engineering, hehas extensive experience in wireless sensors and in designing extremely small radios that can be incorporated into other devices.

He is also an expert in bioelectronics and the processing of signals with minimal power.

His group will design and miniaturize the low power circuitry for the computer and the signal amplifiers, and will work toward harvesting energy to operate the device, perhaps from the body's own heat or muscle activity.

For more information, please see the websites below:

Dr. Eberhard Fetz: http://depts.washington.edu/pbiopage/people_ fac_page.php?fac_ID=12

Dr. Jeffrey Ojemann:

http://depts.washington.edu/chdd/iddrc/res_aff/ ojemann.html

Dr. Brian Otis: http://wireless.ee.washington.edu/

Dr. Babak Parviz:

http://www.ee.washington.edu/faculty/parviz_ babak/

New Brain Teaser:

Question: What was the date of the first craniotomy done at Queen Square Hospital?

Who did it?

How old was he?

Former Resident Richard Wohns Honored

Last year, Becker's Orthopedic and Spine Review named Richard Wohns one of the nations top spine surgeons.

The citation notes that Dr. Wohns was one of the earliest physicians to be involved in the development of ambulatory spine practices. He is the founder and president of South Sound Neurosurgery in Puyallup.

Following medical school at Yale, Dr. Wohns completed his neurosurgery residency at the University of Washington in 1983. He holds an executive MBA from the University of Washington and is currently back in class earning a degree from Seattle University School of Law.

Congratulations, Rich.

Brain Teaser:

Former resident Minku Chowdhary, now a fellow in neurovascular surgery at Cedars in LA, is a thoroughly modern man and so he consulted Wikipedia in searching for an answer to the last puzzler: where did Arab physicians of the Middle Ages place the soul? Minku's (Wiki's) answer is a good one.

Here's a summary of what he wrote:

"Following Aristotle, the Persian Muslim philosopher-physician, Avicenna, and the Arab philosopher, Ibn al-Nafis, further elaborated on the Aristotelian understanding of the soul. They both made a distinction between the soul and the spirit. In his theory of "The Ten Intellects", Avicenna viewed the human soul as the tenth and final intellect. While imprisoned [apparently, for irritating the Emir of Hamadan by looking for another job–Ed.], Avicenna wrote his famous "Floating Man" thought experiment to demonstrate human self-awareness and the substantiality of the soul. He told his readers to imagine themselves suspended in the air, isolated from all sensations, including no sensory contact even with their own bodies. He argues that one would still have self-consciousness, and thus concludes that the idea of the self is not logically dependent on any physical thing, and that the soul should not be seen in relative terms, but as a primary given–a substance. This argument was later refined and simplified by René Descartes: "Je pense, donc je suis." Avicenna generally supported Aristotle's idea of the soul originating from the heart, whereas Ibn al-Nafis argued that the soul "is related to the entirety and not to one or a few organs". He defined the soul as nothing other than "what a human indicates by saying 'I'."

Your older editor, however, looked in an actual book, Samuel Greenblatt's exhaustive (and sometimes exhausting) A History of Neurosurgery, and found references supporting a different view.

During the Middle Ages, Arab scholars were as perplexed about the soul as everyone else, and some curiously taught that the coccyx not only survives decomposition after burial, but is also the place a soul enters the body.

Although this idea is no more strange than Descartes' belief that the pineal body housed the soul, it must have seemed wise in medieval Islam to maintain body, soul, and especially the sacrum all in a piece. Reticence among Arabian physicians to dissect seeking an anatomic soul may have resulted from their interpretation of the Koran, but there is also scholarship suggesting that the major impediment was instead hot weather and rapid putrification of specimens. Even curious scientists wish to avoid bad smells.

Although there is support for both of these positions, Minku's answer is probably the better one. In any case, had Ibn al-Nafis' definition of the soul been widely adopted, much pointless bloodshed and just as pointless philosophy might have been avoided through the rest of the Middle Ages-and beyond.

What's The New Building at UWMC?



Skanska USA Building and the University of Washington Medical Center recently celebrated a major construction milestone as a new inpatient tower topped out in Montlake.

On February 7, UW Medical Center Board of Directors, UW Capital Projects, general contractor Skanska USA Building, architect NBBJ and community members signed a ceremonial beam that was put in place as the final piece to the building's superstructure (see photos).

The tower, scheduled for completion in 2012, will include a larger neo-natal intensive care unit with room for up to 50 newborns, and a 30-bed unit for bone marrow transplants and oncology.

Begun in 2009, the 253,587-square-foot expansion will house the most advanced diagnostic imaging technology, including additional magnetic resonance imaging machines, computed tomography scanners and new interventional radiology rooms.

"As a former NICU mom, the expansion is a big deal for patients," said Jennifer Glick, whose son spent five months in the NICU in 2004.

"It's great to see a world-class health-care team receive a world-class space in which to work. The improvements in the environment of care and the focus on the developmental needs of the babies will be appreciated by all."

The Larger Department

By day, Robert Lawson is the Patient Services Specialist for Dr. Sekhar in the department, but there's another interesting side of Robert: the one that co-founded the Seattle documentary production company Bus No. 8. Robert has received two individual artist grant awards from the City of Seattle Office of Arts and Cultural Affairs for "You Cannot Kill Us, We Are a Part of You", as well as a King County 4Culture grant.

He completed the Documentary Production certificate program at the University of Washington in 2005. His student film, "KL Shannon: My Fight Too", made with Kris Weber, has been screened in the 2006 Langston Hughes African American Film Festival, shows frequently on UWTV, and has been included in programming with Pepperspray Productions.

The new film now in production, "You Cannot Kill Us, We Are a Part of You", tells the story of the "free state" of Christiania, an anarchist squatter community occupying an abandoned military base in the heart of Denmark's capital.

Christiania was born in 1971, when youthful idealism and a severe housing shortage incited hundreds of young people to "storm the gates" at **Documentary link:** http://busno8.com/CA.html

the base, and claim eighty-five acres of deserted brick buildings, woods, ramparts and canals as their home.

Finding it politically unpopular to evict the young settlers, the Danish government declared Christiania a short-term "social experiment."

Given freedom to experiment, the Christianites built a distinct culture based on group consensus, and a thriving economy of restaurants, bars, and cottage industries. In every respect, Christiania became an alternative that challenged, inspired, and frightened the society outside.

Thirty-nine years later, Christiania is still alive, despite increasingly uneasy relations with the Danish government, which plans to "normalize" Christiania.

After years of struggle and compromise, many say that the end is near for this famous "social experiment".

"You Cannot Kill Us, We Are a Part of You" is produced by Bus No. 8 in association with the Northwest Film Forum in Seattle, and Fabulab in Copenhagen, Denmark.

"Notes [of our Department] from the Century Before"

The old neurosurgery ward at University Hospital (well before local outposts of healing even in places like Forks became Medical Centers) occupied 4 North, along with neurology and occasionally some orthopedics.

Nancy Irvin was the Head Nurse, and she was good at it. In any case, from the perspective of the least residents in those days, she was fair, honest, saw to it that things ran as smoothly as possible, and that patients got good care while the nurses, other staff, and residents got along.

Chris Martin, now the Director of Airlift NW, was a tender new grad when she started out as a staff nurse there in 1975. Even then, she was bold.

One middle-of-the-night, a post-op patient with a tumor suddenly lost consciousness. In those days, residents still took call from home, so it was up to Chris-who discovered blood on the sheet, further opened the wound on the ward herself, letting out the clot, extended the patient's neck, and started CPR!

Even the young Assistant Professor Loeser was impressed. So, ultimately, was the patient, who woke up and survived.

Another of the other staff nurses, Bernice Brown (known as "Brownie" to centuries of people) once remarked, as a distinguished looking male visiting professor passed her in the hall, that he had suddenly given her an attack of a never before described illness-sexual seizures.

She said this a little too loudly and bridled slightly as the visitor peeked back over a tailored shoulder and straightened up, looking remarkably gratified.

The only surgical ICU was just around the corner, and the Pediatrics Ward up a few flights on 7 South. Those wards, and the ER, occupied everyone in the department clinically, except for the occasional hospital consult.

Helen (Schnell) Braun ran the outpatient clinic, and stayed there until George Ojemann retired, figuring that no one else could make it all work to his satisfaction. In this, her judgment was no doubt "spot on," as the British have it.

(...Edward Hoagland)

that clinic under her guidance, even when Basil Harris was late, and Bill Kelly had stopped off to shmooze, tell someone a joke, or visit a sick person along the way.

Occasionally, a junior was off taking a really, really, really long time to finish a twist-drill. Somehow, the drama of clinic isn't what residents think they're signing up to do, then or now.

The main departmental office at the University housed the entire clinical faculty: Drs. Ward, Kelly, Harris, Ojemann and Loeser. Eb Fetz had a lab there, and so did Bill Calvin, Joan Lockard, and the late Les Westrum, an excellent scientist and a truly kind, nice man.

Eileen Kjerulf (Terry's mother) and later Harvey Lewis nominally ran the office, but for the residents, anyhow, the real gueen of the show was Barbara Roberts.

Her job included all the department scheduling, but somehow through the decade of the 70's (when most of what is now remembered as the 60's actually occurred), and into the 80's, Barbara decided what was what.

In addition to everything else, she kept track of all the dictations. Outside her little office, more than one resident was heard to whimper, "But I dictated that 2 weeks ago." The imperial reply was always, "Maybe so; do it again." Like many tyrannical appearing people, inside she was a cupcake.

Ruth Ritter, then always called Mrs. Ritter by everyone, was the artful and dedicated Head Nurse on the in-patient service at HMC for as long as anyone could remember. She faithfully made rounds with Professor Ward and the residents every Monday after the conferences.

Even so, one day Arthur, in a startling collision of nonsequitur, bewilderment, and failed memory, called her Thelma. This rare abridgment to his dignity was no more alarming to us than the fact that he'd ever heard of Thelma Ritter in the first place.

And, of course, Harvey Cushing was still the final arbiter of the culture, at least until 1974 when the first CT scanner showed up, and showed us up.

A lot of patients moved efficiently through

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