

Spinal Connections

Reeve-Irvine Research Center Publication

This year marked the 11th anniversary of the Reeve-Irvine Research Center's "Meet the Scientists Forum", which provides an opportunity for the public to hear about progress and promise in spinal cord injury research. The event is an opportunity for people living with SCI and their families to meet directly with our researchers and clinicians and see what's going on in our labs.

There was much news to share this year as Dr. Steward remarked: "There have been more major advances in the field of spinal cord injury research than in any other year I can remember, from new discoveries to two new clinical trials including one based on research conducted by RIRC researcher Hans Keirstead and another based on research by Aileen Anderson and Brian Cummings".

This year, RIRC was pleased to include special guest Dr. Jerry Silver, Professor in the Department of Neurosciences at Case Western Reserve University, Cleveland, Ohio. Dr. Silver is world renowned for studies of cellular and molecular interactions that occur between regenerating axonal growth cones and glial cells in the injured spinal cord. He was co-recipient of the Reeve-Irvine Medal in 2003. His recent studies have focused on

recovery of breathing function after injuries at the cervical level. Dr. Silver remarked on how impressed he was at the level of knowledge of the participants and the energy of the event.

In addition to the presentations, there were breakout sessions with visits to the labs in the Gillespie Building and the new Sue and Bill Gross Stem Cell Building. One of the highlights of this year's laboratory tours was the newly established iMOVE laboratory, which now includes projects from of an aerospace engineer, a neurologist, an electrical engineer and a science gaming expert. These four forces collaborated to create "iMOVE," a grant-funded endeavor that combines information technology and robotics to improve human mobility.

Continued on page 3...

Dr. Aileen Anderson
Dr. Brian Cummings
Dr. Hans Keirstead
Dr. Leif Havton
Dr. David Reinkensmeyer
Dr. Jerry Silver
Dr. Oswald Steward

Meet the Scientists Forum



In this issue...

From the Director	Page 2
Anatomy 101: PTEN	Page 4
Keirstead Lab Update	Page 5
Anatomy 101: The CST	Page 6
Going Full Circle	Page 7
Fundraising	Pages 9 - 10



Promising results from a phase I/IIa clinical trial of a drug to enhance regeneration after spinal cord injury.



Dr. Oswald Steward

In an article published in the May issue of the *Journal of Neurotrauma*, Dr. Michael Fehlings and colleagues including Dr. Lisa McKerracher published a report of the results of a clinical trial to test a drug called "Cethrin[®]", which blocks activation of the Rho pathway. This trial was based on earlier discoveries by Dr. McKerracher that Rho antagonists promoted regeneration of axons after spinal cord injury in rats. This original work was based on findings that various growth inhibitors that exist in the mature nervous system work by activating Rho A in injured nerve cells, shutting down attempts to regenerate (See previous newsletters for explanations of growth inhibitors in myelin like Nogo, MAG, and OMGP as well as chondroitin sulphate proteoglycans expressed by astrocytes at the glial scar).

The phase I/IIa clinical trial tested the safety of the drug in 48 patients with complete thoracic or cervical spinal cord injuries (ASIA A). The ASIA motor score is a clinical tool used to assess function; it ranges from letters A to E where a patient with an A score has no motor or sensory function and one with an E score has normal function. In addition to testing safety, the study also assessed neurological status in all treated patients (this is the Phase IIa part of the trial).

The trial was preceded by extensive preclinical experiments involving 400 rats, followed up by experiments to test safety in larger animals (24 dogs). In the trial, patients received Cethrin[®] that was combined with a fibrin sealant; the material was placed directly on the dura mater of the spinal cord during surgical procedures that were being carried out to stabilize the spine. The trial involved dose escalation starting with 0.3mg, then 1, 2, 3, 6, and 9mg of Cethrin[®]. Patients were tested neurologically at 3, 6, and 12 months post-injury. This was a multi-center trial involving 9 sites in Canada and the USA including The University of Toronto, Barrow Neurological Institute in Phoenix AZ, Thomas Jefferson University in Philadelphia PA, The University of Montreal, the Mayfield Clinic in Cincinnati OH, the University of Virginia, the University of British Columbia, and the University of Washington.

The patients experienced no more adverse events than is typical for a population of patients with complete injuries, and there were no serious adverse events that were attributable to the drug. So, from the safety standpoint, the Phase I portion of the trial was a success.

Better yet, there was evidence that Cethrin[®] improved function in people with cervical injuries. The largest change in motor score was observed at 12 months post-injury in the cervical patients treated with 3 mg of Cethrin[®], where a 27.3 ± 13.3 point improvement in the American Spinal Injury Association (ASIA) motor score was observed. Overall, changes in motor function were observed in 6% of people with thoracic injuries, 31% of the people with cervical injuries, and 66% of the people with cervical injuries that received the 3 mg dose. The indicated percentage of people experienced a change in function from ASIA A to ASIA C or D. This means that this percentage of people went from having no motor or sensory function to having partial motor and sensory function. This is actually a very promising result, especially for the people with injuries at the cervical level.

Although the patient numbers are small, the observed motor recovery in this open-label trial suggests that Cethrin[®] may increase neurological recovery after complete SCI. Further clinical trials in SCI with Cethrin[®] are planned to establish the efficacy of this drug.

**Better yet,
there was evidence that Cethrin[®]
improved function in people
with cervical injuries.**

M. G. Fehlings, N. Theodore, J. Harrop, G. Muraish, C. Kuntz 4th, C. I. Shaffrey, B. K. Kwon, J. Chapman, A. Yee, A. Tighe, L. McKerracher (2011). A phase I/IIa clinical trial of a recombinant Rho protein antagonist in acute spinal cord injury. *J. Neurotrauma* 28, 787-796.

Meet the Scientists - Continued from Cover

David Reinkensmeyer, professor of mechanical and aerospace engineering, anatomy and neurobiology, and mechanical engineering, is a principal investigator for this laboratory and an RIRC associate. His research focuses on whether training in robotic environments can improve motor skill performance outside of the training environment. Guests of the Meet the Scientists event toured the lab and received a special demonstration of equipment utilized for this research project.

Please join us for our next Meet the Scientists event in March 2012. We will be sure to update you on our website for upcoming events!

If you or your business are interested in making a donation to support the Meet the Scientists Forum, please contact Tania Cusack.
(949) 824-5925 or tcusack@uci.edu.



UPCOMING EVENTS TO BENEFIT RIRC

September 24-25, 2011
Tara Lanes Classic - Mountain Bike Race
Northstar Resort at Tahoe
For more info please contact Tara at (604) 566-2479



October 12-16, 2011
Raise money for spinal cord research and the Reeve-Irvine Research Center by throwing yourself out of a perfectly good airplane!
skydiveperris.com or (951) 657-1664



Thanksgiving Morning
2011 Plymouth Rock N' Run Annual Turkey Trot
Yorba Linda, CA. For more information contact:
Kathy Johnson (714) 779-7803 or visit plymouthrocknrun.com



New this year:
A video of this year's
Meet the Scientists Forum
is available on our website.
www.reeve.uci.edu.

Anatomy 101: The Story of PTEN

- Rafer Willenberg

There has been quite a buzz about PTEN for the past year, following our discovery that manipulating PTEN can result in profound regeneration past a spinal cord injury. This discovery was published as the cover story in *Nature Neuroscience* for Sept 2010*, and is the result of collaborative work between the labs of Dr. Steward at the RIRC, Dr. Binhai Zheng at UCSD, and Dr. Zhigang He at Harvard.

So what is PTEN? What does it do?

PTEN is a "phosphatase and tensin homolog" gene, and what's important to understand is that it functions to regulate progression through the cell cycle. All cells have a cell cycle, including stages of growth, division, or a resting state. Molecular signals drive a cell and its progression through the cell cycle, and PTEN acts as a brake on the system, keeping a cell out of its full stage of growth. Specifically, a receptor (of a tyrosine-kinase type) is stimulated by a factor such as one of numerous growth factors to signal a cell to grow, initiating a molecular signal and cascade within a cell, and PTEN works to stop this molecular signal from proceeding.

In the big picture, you can imagine that through childhood and development, PTEN is "turned off" much of the time, so that growth can proceed. Babies are growing, children are developing, and cells are growing and dividing in the process. However, once you become an adult, you don't grow much anymore. Thus, PTEN is more active, putting the brakes on and keeping cells from proceeding in the growth-state.

You can imagine that in the adult spinal cord, PTEN is active, keeping the axons in the spinal cord from doing a lot of growth. Manipulation by removing PTEN would be to remove this brake from the system, allowing more growth and regeneration to occur. And that is exactly the strategy we took in gaining long-axon regeneration of the corticospinal tract (CST) beyond a spinal cord injury.

What's a kinase? What's a phosphatase?

Okay, so in the cell there are some forms of molecular communication, and one of these is a molecular switch called phosphorylation. Phosphorylation is the adding of a phosphate group (PO_4^{3-}) to a protein, typically by a kinase, and a phosphatase generally acts to remove a phosphate group. Now, it's not as simple as that a kinase *always* adds a phosphate group and a phosphatase always takes one away, nor that phosphorylation always acts as a molecular switch but for our simple example it can be thought of that way.

PTEN is a phosphatase, and in the example pathway included, it removes a phosphate group from PIP3, a signaling molecule with 3 phosphate groups. In this pathway, the effect of this is to flip the "off" switch—PTEN just put the brakes on. Working in opposition of PTEN is PI3K, which is a kinase. This kinase can add a phosphate group to bring back PIP3, flipping back the "on" switch, and allowing the signal to continue in the cell. Thus, by eliminating PTEN, the growth signal can just continue. And, as we found in mice, this works to allow axons to regenerate.

Careful progress

Manipulating PTEN is a powerful advance for neural regeneration, by allowing an increase in responsiveness of axons to growth signals. With great power, however, comes great responsibility. Because we want to increase growth in regenerating axons, and not growth in, say, the liver or skin, the manipulation of PTEN should be targeted to be within the brain and spinal cord. Previously, in our mouse model, we achieved this by restricting our manipulation of PTEN to the cortex of the brain, and our manipulation of PTEN was deletion of the gene. For a potential therapy in humans, we are going to need a more therapeutically-applicable approach. This includes delivering a treatment after injury, and using an approach that does not change or delete a gene. Both of these approaches are included in experiments that follow-up on our exciting initial finding.

* Liu K, Lu Y, Lee JK, Samara R, Willenberg R, Sears-Kraxberger I, Tedeschi A, Park KK, Jin D, Cai B, Xu B, Connolly L, Steward O, Zheng B, He Z.

PTEN deletion enhances the regenerative ability of adult corticospinal neurons.

Nature Neuroscience. 2010 Sep; 13(9):1075-83. (Cover)

Update from the Keirstead Lab

The RIRC and the Keirstead Research Group are pleased to host visiting Ph.D. student Katja Stahl. Katja is a Fulbright Ph.D student from Norway, where she is working with Dr. Reidun Torp at the Center for Molecular Biology and Neuroscience,



Katja Stahl

a Norwegian Center of Excellence at the University of Oslo. Stem cell research is prohibited in Norway, so Norwegian researchers must rely on scientists in other nations to provide training and research facilities. Katja has spent the past year in Dr. Hans Keirstead's laboratory at the RIRC. Together with Ph.D student Michelle Wedemeyer, she is studying the potential of new patient-specific stem cells to treat spinal cord injury (SCI).

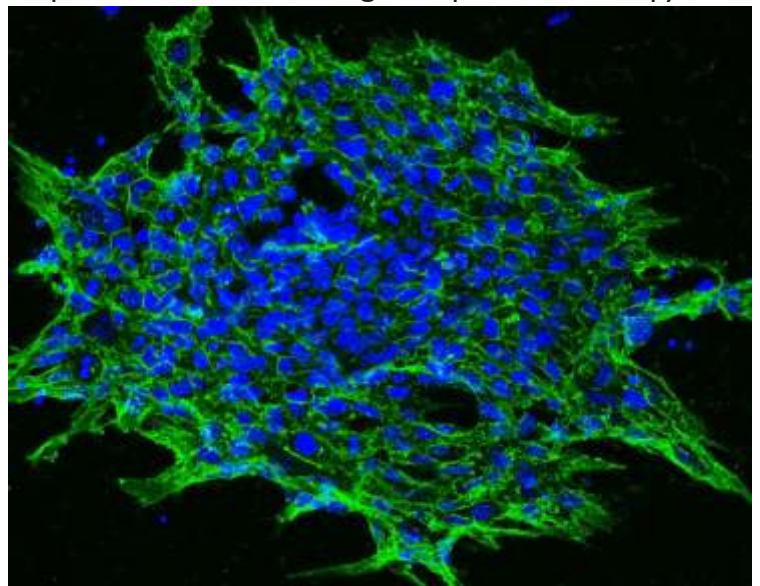
As an adult, the fate of one's cells is determined; a skin cell will never do the job of an intestinal cell. However, Japanese researchers have recently found a way to revert the process of development, in one of the most promising breakthroughs in recent biomedical research. In 2006, Shinya Yamanaka and his team showed that adult skin cells can be reversed into an embryonic stem (ES) cell-like state through forced expression of genetic factors important for maintaining stemness, giving rise to induced pluripotent stem (iPS) cells. This technique offers tremendous opportunities within the field of regenerative medicine. First of all, it enables generation of patient-specific cells that circumvent immune rejection, as the iPS cells are genetically identical to the cell donor. Second, iPS cell technology provides researchers with a unique tool to derive disease-specific stem cells for the study of degenerative disorders. These advantages have made iPS cells one of the most useful tools in biomedical research.

Although iPS cells offer much hope for regenerative medicine, it is not known if they

differ in more subtle but clinically important ways from other stem cell types. One of the factors used for genetic programming is a well-known oncogene, and is thus associated with tumors. Further, it has been reported that iPS cells entail an "epigenetic memory" of the donor tissue from which they were derived, thereby questioning whether these cells are fully reprogrammed and fit for experimental, diagnostic or therapeutic purposes.

In collaboration with Dr. Yamanaka, Dr. Keirstead's group is studying the equivalence between human iPS cells and ES cells in a model of spinal cord injury. Dr. Keirstead's laboratory is a pioneer in the development of high-purity populations of spinal cord progenitor cells derived from embryonic stem cells, and these cells have been shown to restore locomotion in rodent models of SCI. One of these cell types is currently being tested in a Phase I clinical trial in humans, sponsored by Geron Corporation. Based on these studies, visiting Ph.D. student Katja Stahl and colleagues are comparing human iPS cells generated by Dr. Yamanaka to ES cells; they are looking into their characteristics, their potential to become spinal cord progenitor cells, and their ability to restore locomotion in animal models of SCI.

Demonstrating equivalence between these cell types would be an important step towards a patient-specific cell replacement therapy for SCI. As properly differentiated cells from human iPS cells can be directly made from the patients' tissues in unlimited quantities, they offer the highest probability of bypassing immune rejection, and therefore have the potential of revolutionizing cell replacement therapy.



Induced pluripotent stem cells expressing SSEA4, a pluripotent marker also found in embryonic stem cells.

Anatomy 101: The Corticospinal Tract

- Rafer Willenberg

What's in a name?

The spinal cord is compartmentalized to an extent, as is the brain, with regions being dedicated to certain functions. The regionalization within the spinal cord, however, includes specific tracts, which are bundles of axons that send communicating signals between the brain and the body. These tracts have their own starting points and end points, and have their own characteristic function. For instance, the spino-cerebellar tract originates in the spinal cord (spino-) and ends in the cerebellum (-cerebellar). It's convenient that the tracts are named this way, as the name also tells you the direction of the flow of information. For the spino-cerebellar tract, information of limb and body positioning is relayed to the spinal cord and then sent via the spinocerebellar tract to the cerebellum of the brain, which processes this information for a sense of balance.

Hence, for the corticospinal tract, the name also tells you the starting and endpoints of the tract, and the direction of the flow of information. The corticospinal tract sends information from the cortex of the brain (cortico-) down to the spinal cord (-spinal).

What does the CST do?

Quite simply, the corticospinal tract (CST) controls voluntary motor movement. When you pick up a cup of coffee, first your brain has the thought, then this thought goes from the brain (the part called the "motor cortex") through the CST in your spinal cord, sending a signal to outstretch your arm and grab the cup of coffee. The signal from the CST is passed on to the motor neurons at specific levels of your spinal cord, which then tell the specific muscles to contract. For grabbing a cup of coffee, these motor neurons are in the lower cervical and upper-most thoracic levels.

In the simplest sense, two sets of neurons are needed for one signal in this pathway. The first set are the neurons in the cortex of the brain (called cortical motor neurons). These send a connection (the axon) down the CST into the spinal cord to make a connection on lower motor neurons; the lower motor neurons then tell a muscle to contract. Hence, because the axons of this fairly simple system have such a long way to go, the CST axons are pretty long. The cell body of a CST neuron in a human is less than a 1/100th of a centimeter, and its axon travels over 6000 times that length to reach the lower part of the spinal cord.

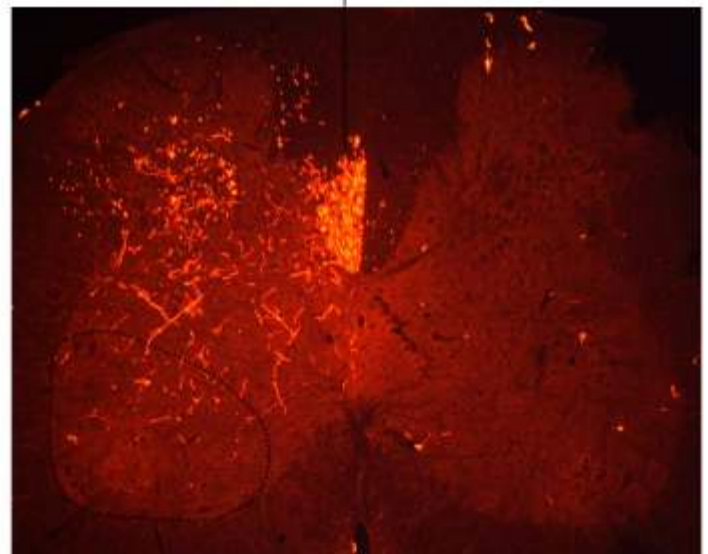
Why focus studies on the CST?

There are 2 main reasons to focus on studying the CST in spinal cord injury. One is that the CST is critical for all forms of voluntary movement, so regenerating this tract could reverse paralysis. [Note that walking is not exclusively a voluntary movement, but the CST plays a role in initiating the first steps. For continued walking, other tracts and circuitry controlling balance and rhythmic stepping are most important.]

The other reason to focus research on getting the CST to regenerate is that... it's hard to do. Gaining regeneration in the spinal cord is a challenge in the first place, and the CST is one of the most refractory tracts to regeneration. This is one reason why it was so significant that we gained substantial regeneration of the CST in our PTEN-deleted mice*—we had finally achieved substantial regeneration following SCI, and we had shown it to work in a tract that is one of the most difficult for gaining regeneration.

* Liu K, Lu Y, Lee JK, Samara R, Willenberg R, Sears-Kraxberger I, Tedeschi A, Park KK, Jin D, Cai B, Xu B, Connolly L, Steward O, Zheng B, He Z. □TEN deletion enhances the regenerative ability of adult corticospinal neurons. *Nature Neuroscience*. 2010 Sep;13(9):1075-83. (Cover)

main CST



motor neurons found here

Translational Research on Spinal Cord Injury and Repair – Going Full Circle

This spring, Leif Havton, M.D. moved his lab from UCLA to the Reeve-Irvine Research Center. He joins the faculty as Professor of Anesthesiology & Perioperative Care and Neurology and will also be Vice Chair for Research in the Department of Anesthesiology & Perioperative Care.

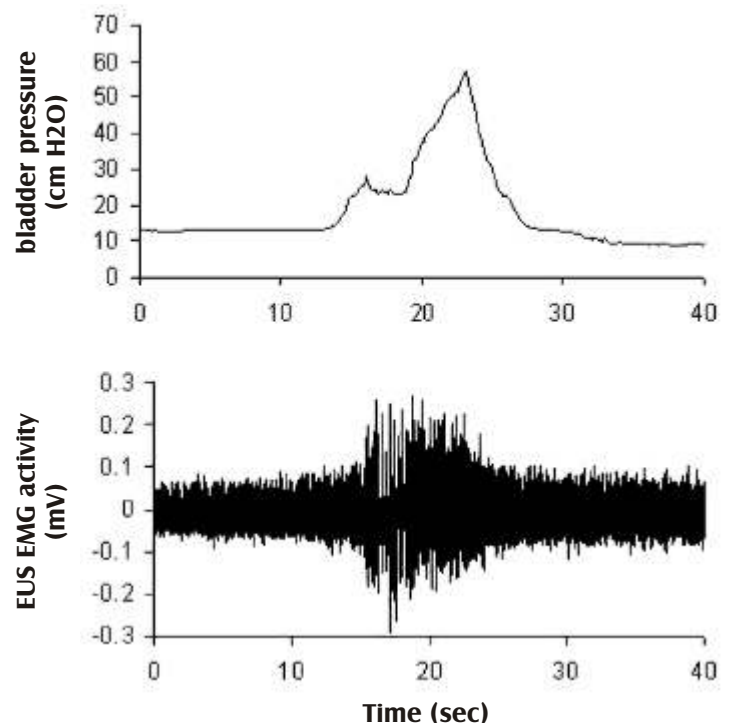
The Havton laboratory specializes in translational research. For this purpose, important clinical problems are first identified based on the needs of patients with a spinal cord injury. Based on these considerations, the Havton laboratory chose to focus on injuries to the lower part of the spinal cord including the nerve roots (called conus medullaris and cauda equina). These injuries result from trauma to the lumbar spine and cause paralysis of the legs, pain, and bladder dysfunction.

To address the special issues resulting from conus medullaris and cauda equina injuries, the Havton laboratory has developed clinically relevant animal models that take into account the symptoms and neurological deficits experienced by people. One model involves a nerve root injury, which mimics the effects of a combined injury to the spinal cord and cauda equina. These injuries cause paralysis, pain, and bladder dysfunction in rodents that is quite similar to what is seen in people. Critically, Dr. Havton's research group has developed a strategy to repair these injuries involving surgical re-implantation of the injured nerve roots back into the spinal cord to re-establish a bridging connection with the peripheral targets, such as leg muscles and pelvic organs. This approach to repair has been very promising, restoring reflex emptying of the bladder, muscle reinnervation and decreasing pain in rats.

Although the above results are encouraging, additional experimental studies are needed to establish whether the promising results in rodents can be reproduced and shown to be similarly effective when longer distances of nerve regeneration is needed as in people. Taking into account that the interpretation of experimental studies also need to be translated into clinical use, the Havton laboratory is developing criteria for the interpretation of human-like outcome measures already in the research laboratory. For this purpose, the effects of injury and repair are assessed in laboratory models using behavioral measurements of pain, treadmill locomotion testing, urodynamic studies, and magnetic resonance imaging (MRI).

The Havton laboratory is also developing new methods for the treatment of both acute and chronic spinal cord injuries. However, the approaches are by necessity different for the two different patient populations. An acute surgical repair of severed nerve roots may be a future option for acute conus medullaris and cauda equina injuries, but for chronic injuries, the challenges are different. It is likely that a cell replacement strategy will be needed to overcome the nerve cell loss in the spinal cord that develops over time after a conus medullaris and cauda equina injury. For this purpose, the Havton laboratory is studying the use of stem cells to replace the lost neurons that are important for motor and autonomic functions such as walking and bladder control. Surgical re-implantation of nerve roots is also included in these studies to provide a bridge for transplanted nerve cells to extend their processes from the spinal cord to the peripheral targets.

Dr. Havton's lab is supported by grants from the National Institutes of Health and the California Institute of Regenerative Medicine. The RIRC is pleased to have another member focusing on translational approaches for spinal cord injury.



Intravesicle pressure of bladder and electromyogram (EMG) of external urethral sphincter (EUS) activity during filling and voiding phases were obtained from the rat.

MOVE TO MOVE

In December 2008 while on vacation with his family, Zack Wentz woke in the morning with a stiff back, tingling legs, severe headache, and chest pain. After being airlifted by helicopter to Reno Hospital, doctors discovered a hematoma (hemorrhage and blood clot) pressing against his spinal cord. Doctors worked to drain the hematoma but it had already injured his spinal cord causing paralysis from the chest down. At that time, Zack was just 15 years old and an active student at Menlo-Atherton High School.

The Wentz family describes the following two years as "an emotional rollercoaster, from the shock of the life changing event to the heart-warming acts of friends and strangers". Once news spread of Zach's condition the entire Menlo Park community rallied around him and the family. The huge outpouring of support surprised everyone.

Like other families suddenly faced with spinal cord injury, the Wentz family began their quest for information. One of the people they contacted was Dr. Tessier-Lavigne, who was Senior Vice President at Genentech and a collaborator of Oswald Steward's on earlier studies of corticospinal tract (CST) regeneration. Dr. Tessier-Lavigne put Brad in touch with Os in early 2009. Brad attended the RIRC "Meet the Scientists" event in March, and later he and Zack visited the RIRC in person.

It happens that the Wentz family's first visit came just as Os Steward was launching the CST-PTEN project with Dr. Zhigang He from Children's Hospital, Harvard University (discussed in previous Newsletters, and see Anatomy 101 here). Drs. He and Steward have devised a way to induce regeneration of the pathway that controls voluntary motor function after a spinal cord injury. This is accomplished by blocking a naturally occurring human enzyme known as PTEN, which enables unprecedented nerve regeneration. Dr. Ben Barres, M.D., Ph.D., Stanford University was quoted in Science magazine as saying, "It's one of the most dramatic results in the history of this field". Dr. Wise Young, Director of W M Keck Center for Collaborative Neuroscience, Rutgers University stated that "This is a breakthrough. This study showed clearly that shutting off PTEN allows robust regeneration of the corticospinal tract, previously considered the most difficult spinal tract to regenerate."

After being introduced to Dr. Steward, learning of these advances, the Wentz family decided to establish the "Z Fund" to raise money for spinal cord injury research and especially the CST-PTEN project. In 2010, the family organized a fundraising event in conjunction with Stanford University that raised almost \$120,000 for the CST-PTEN project and another project on rehabilitation at Stanford University. This year's event in February entitled "The Move to Move" has raised over \$160,000. The funds provided by these events allowed Drs. Steward and He to carry out critical studies that generated preliminary data for two NIH grants to Drs. He and Steward respectively. Dr. He's grant was funded in late fall, 2010, and will provide about 1.25 million over a 5 year period for the CST-PTEN project; Dr. Steward's grant is pending. The preliminary data were also critical for proposals to two foundations, leading to funding totaling \$350,000. What a huge boost to SCI research!



**The Wentz Family: Brad, Ryan, Taylor, Darci
Zack - seated in front**

Hearing the news of paralysis is understandably a shock, but Zack's spirit remains unbroken. His positive outlook on life and his drive emanates not only within him but is evidenced by his family, friends, and so many in the community who truly love him. Zack and his family have shown that in a tough economic time, when research dollars are sparse, communities supporting their friends make a huge difference. According to Brad Wentz, Zack's father, "Like any research, the pace to achieve milestones is determined by the pace of fundraising". All of us at the Reeve-Irvine Research Center would like to thank Zack, his family and the entire Menlo Park community for all they have done to support research efforts conducted at the Reeve-Irvine Research Center.

There is an interesting "small world" story that goes with this. In fall, 2010, Brad attended a high school football game to watch a friend's son play. By chance, he struck up a conversation with the person standing next to him, who turned out to be Dr. Tessier-Lavigne, also attending to watch his son. They had never met in person previously, so it took a bit of conversation to put it all together. This chance meeting occurred just before Dr. Tessier-Lavigne moved to become President of the Rockefeller University in New York. Even more small world: Dr. He launched his career in regeneration research while he was a postdoctoral fellow in Dr. Tessier-Lavigne's lab, then at the University of California, San Francisco.

If you are interested in fundraising or would like to support important research projects conducted at the Reeve-Irvine Research Center by contacting Tania Cusack (949) 824-5925 tcusack@uci.edu or visiting our web site at www.reeve.uci.edu

Reeve-Irvine welcomes Dr. Alexander Vaccaro for the 3rd Annual Clinical Lectureship



Dr. Alexander R. Vaccaro

Neurosurgery at the Thomas Jefferson University Hospital of the Rothman Institute, in Philadelphia, Pennsylvania.

Dr. Vaccaro has done extensive research on a broad range of topics related to disorders of the spine and has over 500 publications in both peer and non-peer reviewed journals. He has published over 200 book chapters and is the editor of 28 textbooks. Dr. Vaccaro's research involves the timing of surgery after traumatic spinal cord injury, the use of alternative bone graft substitutes in spinal fusion surgery including recombinant tissue engineering, invasive methods to stabilize osteoporotic compression fractures, and the development of spinal implants for traumatic and degenerative disorders of the spine. He is also Co-Director of the Spine Fellowship program at TJUH and instructs fellows and residents in the diagnosis and treatment of various spinal problems and disorders.

The purpose of the annual clinical lectureship event is to support the fundraising efforts for the Clinical Spinal Cord Initiative. The lecture provided an opportunity for members of the SCI community, emergency personnel, scientists and clinicians to gather and discuss traumatic spinal cord injury personally with Dr. Vaccaro. Dr. Vaccaro's talks provided a wealth of information on cutting edge clinical procedures and techniques to improve clinical outcomes for people who have suffered spinal cord injury.

March was a big month for the RIRC. In addition to our annual Meet the Scientists event, our Center was pleased to host our third annual clinical lectureship featuring special guest speaker Alexander R. Vaccaro, a world renowned spine surgeon, who is a Professor and Attending Surgeon of Orthopedics and

Reeve-Irvine Research Center

For questions regarding our educational and scientific programs or general information on the Reeve-Irvine Research Center, please contact:

Kelli Sharp, DPT

rirc@uci.edu
949-824-3993

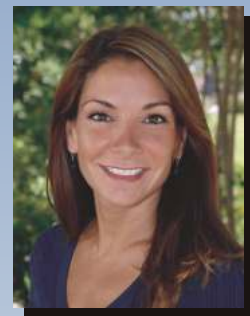


Interested in fundraising or making a donation?

Please contact:

Tania Cusack

tcusack@uci.edu
949-824-5925



Spinal Connections
is a publication of the

Reeve-Irvine Research Center

University of California, Irvine
2107 Gillespie Neuroscience Research Facility
Irvine, CA 92697-4292
945-824-5739
www.reeve.uci.edu



Jimmy Button

Road 2 Recovery-Jimmy Button's Ride

On February 20, 2011 former motocross champion Jimmy Button and his trainer Cory Worf started a cross country bicycle ride from San Diego CA to Daytona Beach FL to raise money for and awareness about spinal cord research. They rode 2,475 miles in a total of 167 hours and 45 minutes, burning an estimated 132,611 calories on the way. The trip was interrupted by a crash near Houston TX in which Jimmy broke his elbow. He flew back to California, had surgery to repair the break, and then flew back and picked up where he left off to finish the race. The "Miles for Miracles" team reached their goal on Sunday, April 17, 2011, crossing the finish line at Daytona International Speedway and taking a victory lap around the track.

Until 2000, Jimmy was a Factory Yamaha motocross racer and Cory was his personal trainer and best friend. On January 22nd, 2000 Jimmy suffered a paralyzing injury when he crashed during practice for the San Diego round of the AMA Supercross series. The injury sustained in the C-2 to C-6 region of his neck left him paralyzed from the neck down. After many months of rehabilitation he was able to regain movement and be one of the very fortunate few that recover from these types of injuries. During this time, Cory was ever present in the long rehab process.

Ten years later, Jimmy and Cory teamed up to ride bicycles from the place of his accident, Qualcomm Stadium in San Diego, to Daytona International Speedway to raise money for research that could improve the lives of people who were not so fortunate after suffering a spinal cord injury. Their goal-- to raise \$1 Million for spinal cord injury research. Jimmy recalls his experience riding the last leg of his trip. "I had just got back on my bike. We made it through Louisiana, Mississippi, Alabama, and Florida. This has been such a great experience and it is amazing to see how much the ride changed so many people's lives including my own. A lot of people that we rode with had never ridden a bike very far and this ride got them to take charge, buy bicycles, start training and get fit. I think a lot of people who came on this ride will continue to ride even after this is finished. I think in some respect it helped some people find a new hobby or a new passion."

"Meeting the people we had the opportunity to meet from the people who joined us to who we met on the road and hearing their stories about their family members who had battled with cancer or dealt with adversity and the stuff they had to go through with either a spouse or their child or mother or father were all very similar to me and my injury. All of these people had inspiring rides and stories to share. We had fun raising money and we hope to continue to raise more money before we present the check to the Reeve-Irvine Center."

"I think there was a point about 4 or 5 days from the end, like that feeling when you can almost see the finish line. It was no longer thousands of miles away. It was only a couple hundred miles. At that time you see a circle of completion and start to go back and think about all of the people that you have spoken to and ridden with. The places we went through and the



[Continued on page 11...](#)

PLANNED GIVING



Are you considering including Reeve-Irvine
in your estate plans?

Your planned gift can help create tomorrow's cures.

For information please contact:

Tania Cusack, Director of Community Development
(949) 824-5925 or email tcusack@uci.edu



A Fond Farewell to the Paralysis Project of America

Paralysis Project of America was founded in 1987 by a group of concerned parents whose children were injured in accidents. The mission of Paralysis Project is to accelerate progress toward finding a cure for paralysis caused by spinal cord injury (SCI). Each year, the lives of more than 14,000, mostly young individuals, are shattered by SCI resulting from sports injuries, motor vehicle accidents, falls, and acts of violence. Over its history, Paralysis Project has raised millions to fund cutting edge research on spinal cord repair and regeneration to bring cures closer to reality. The RIRC is especially grateful because the Paralysis Project supported our Summer Course In Spinal Cord Injury Research Techniques that launched over 100 young scientist's careers in spinal cord injury research. Some of these trainees have advanced to being the new research stars in our field. Scientists at the RIRC also received direct research support from the Paralysis Project over the years, especially when the Center was just getting off the ground.

Unfortunately, the Paralysis Project of America was hit hard by the economic downturn, experiencing a substantial drop in donations and event revenue. On June 1, 2011 The Board of Directors of The Paralysis Project of America made the tough decision and voted to cease operations effective June 1, 2011, with the belief that this was the best option in support of overall spinal cord injury/disease research. We were thrilled to learn that the Board made the decision to donate their remaining funds to The Reeve Irvine Research Center at UC Irvine. We are grateful for their years of support and their belief in our vision and thank everyone who has been involved in the Paralysis Project of America for all you have accomplished.

Road 2 Recovery - Continued from Page 10

challenges we were faced with, especially for me breaking my elbow and having to leave to have surgery, all started to come back. I started to realize that in doing this ride and never giving up and continuing to fight through and all of the things we had to get through that we were going to inspire people that we had never met or may never meet. We wanted to tell people to put a good fight up in their own way with their own challenges. "

"The biggest joy was turning the corner and being able to see the speedway and the finish line. Knowing that we had pedaled from San Diego to Daytona Beach under our own power was such an accomplishment and such a great feeling."

You can still show your support by sending a donation, purchasing an official M4M t-shirt, wristband, watch, or M4M cycling gear at the official gear store at www.milesformiraclestoday.com.

Stay connected with Jimmy and Miles 4 Miracles:

Facebook: <http://www.facebook.com/pages/Miles-For-Miracles/298691006369>

Twitter: @Miles4Miracles <http://twitter.com/#!/Miles4Miracles>

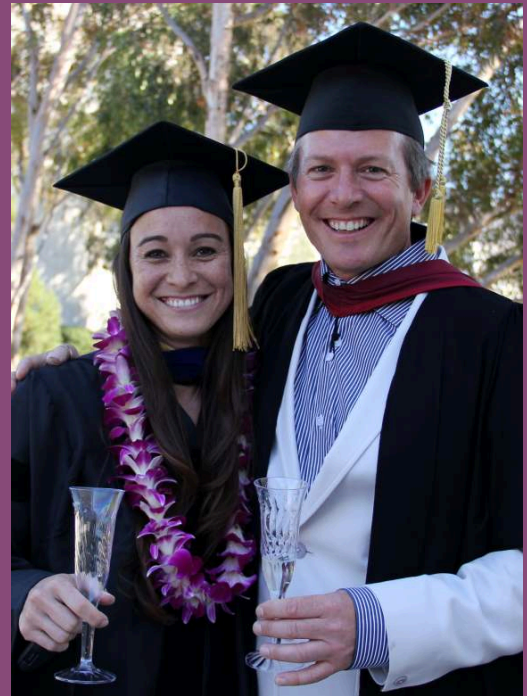
@BTNFLY <http://twitter.com/#!/BTNFLY>

Miles 4 Miracles Blog Spot: <http://miles-for-miracles.blogspot.com/>

Website: www.milesformiraclestoday.com

Check out the first day of Jimmy's ride here on YouTube: http://www.youtube.com/watch?v=y_E3h355hFc

Congrats Maya!



**Congratulations to Maya Hatch,
recent Reeve-Irvine Ph.D. graduate
from the Keirstead laboratory!**

Ways to Give....

Since there are a variety of ways one can support the Reeve-Irvine Research Center at the University of California, Irvine, it's important you choose the options that are most appropriate for you. Planned giving enables a donor to arrange charitable contributions in ways that maximize his or her personal objectives while minimizing the after-tax cost. Listed below are just a few ways to send your gift to support the critical spinal cord injury research happening today and in years to come.

Should you have questions or if you would like to receive more information on giving, please contact

Tania Cusack

(949) 824-5925 or tcusack@uci.edu.

Those wishing to make a donation directly may send checks payable to the UCI Foundation/Reeve-Irvine to the address below:

Tania Cusack,
Director of Community Development
Reeve-Irvine Research Center
University of California, Irvine
2107 GNRF
Irvine, CA 92620-4292



Or donate on line by visiting our website at
www.reeve.uci.edu

Check out our website!



We would like to say a special thanks to
Shad Davis a personal friend of Roman Reed
for donating his time to update our website!

Thank you Shad!

www.reeve.uci.edu

New at the RIRC!

Monthly Lab Tours



For more information
on touring the laboratories
and hearing more about our research programs
please contact

Kelli Sharp, DPT

ksharp@uci.edu or call (949) 824-5145



**Did you miss our recent
Meet the Scientists Forum?
Now you have a second chance.**



**A video of the talks
and lab demonstrations
is available for you to view
directly from our website!**