Number 28, Summer 2016

Reeve-Irvine Research Center Publication

Spinal Connections

The RIRC Welcomes New Faculty Members

The Reeve-Irvine Research Center is pleased to introduce the newest members of our research team.

Dr. Melanie Cocco is an Associate Professor of Molecular Biology and Biochemistry and Pharmaceutical Sciences. Dr. Cocco has a Ph.D. in Organic Chemistry and received her postdoctoral training in structure determination of cell-surface membrane proteins. Her research involves defining the structures of neuronal proteins with atomic-level detail. These structures are then used to design drugs that will affect protein function. The Cocco laboratory solved the structure of the neurite outgrowth inhibitor, Nogo, in a cell-membrane environment. The structure of Nogo was then used to develop a library of compounds that could block the growth inhibitor and promote neuronal regeneration. Experiments to test these compounds are ongoing.

Dr. Melanie Cocco

Dr. Steve Cramer is a Professor of Neurology, Anatomy & Neurobiology, and Physical Medicine & Rehabilitation at the University of California, Irvine. He is also the Clinical Director of the Sue & Bill Gross Stem Cell Research Center, and the Associate Director of the UC Irvine Institute for Clinical & Translational Science. Dr. Cramer graduated with Highest Honors from University of California, Berkeley; received his medical degree from University of Southern California; did a residency in internal medicine at UCLA; and did a residency in neurology and a fellowship in cerebrovascular disease at Massachusetts General Hospital. He also earned a Masters Degree in Clinical Investigation from Harvard Medical School. His research focuses on neural repair after central nervous system injury in humans, with an emphasis on stroke and recovery of movement. Treatments under examination include robotic, stem cell, brain stimulation, pharmacologic, and telehealth methods. A major emphasis is on translating new drugs and devices to reduce disability after stroke, and on individualizing therapy for each person's needs. Dr. Cramer co-edited the book "Brain Repair After Stroke" and is the author of over 250 articles and chapters.

Dr. Steve Cramer

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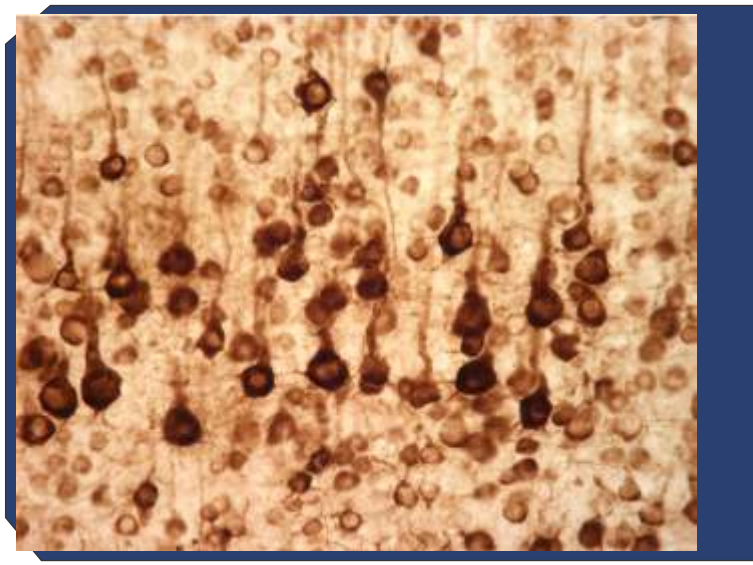
University of California, Irvine

PTEN Deletion makes healthy, happy neurons. One more step along the path.

We've been reporting regularly on our progress in the CST/PTEN project to develop interventions to regenerate nerve connections (axons) after spinal cord injury (SCI). The latest advance is described in a paper by Erin Gutilla, an M.D./Ph.D. student in Os Steward's lab, reporting that long-term deletion of PTEN in neurons not only isn't harmful; it causes neurons to grow and…well, look young again.

PTEN negatively regulates an intracellular signaling pathway called AKT/mTOR. In early development, the pathway is turned on by growth factors acting through receptors, which stimulates cell division and cell growth. As organisms mature to adulthood, PTEN turns on and shuts down AKT/mTOR. So, deleting PTEN takes the brakes off of the growth-promoting AKT/mTOR pathway, which enables nerve cells to regenerate their axons after spinal cord injury. In essence, what PTEN deletion seems to do is turn back the developmental clock to make neurons into early teenagers in a growth spurt.



Healthy, happy neurons with PTEN deletion. The image shows neurons that give rise to the corticospinal tract (CST) immunostained for a molecule that reflects activation of a growth-promoting pathway (the phosphorylated form of ribosomal protein S6).

Like almost every powerful therapy, however, there are potential concerns. Turning nerve cells into early teenagers primes them for a growth spurt, but as we all know, teenagers can be difficult. Parents sometimes may wonder whether an alien has taken over a teenager's body. I could go on, but enough on that…

One concern was that deleting PTEN might increase the risk of tumors. PTEN is a tumor suppressor gene. Mutations in PTEN have been identified in many cancers, and mutating PTEN in early development can cause overgrowth of the brain, called macrocephaly. For these reasons, it was important to determine whether there were negative consequences of deleting PTEN in nerve cells in the way that was needed to induce regeneration.

In the study that just came out (Gutilla et al., 2016) we deleted PTEN in 1 day old mice and then examined their brains when they were up to 1.5 years old. The lifespan of mice is a bit over 2 years, so 1.5 years is the equivalent of retirement age. Importantly, there was no evidence of any neuropathology or tumors. Instead, the neurons lacking PTEN actually were larger and more healthy-looking than neurons in other parts of the brain (Figure), and looked like neurons in young adult mice. It was as if the aging clock had been turned back.

The lack of any detectable neuropathology due to PTEN deletion is very good news, suggesting that long-term deletion of PTEN selectively in neurons may have relatively low risk. Of course, there will need to be more safety testing but this is an encouraging assessment.

The broader implication of these findings is that targeting PTEN may be a way to reduce neuronal atrophy and death in neurodegenerative diseases like Parkinson's disease, Alzheimer's Disease, and ALS and even reverse "normal" age-related deterioration of neurons. Erin Gutilla will be completing her dissertation research in the next year by exploring these questions.

In this issue...

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REEVE–IRVINE RESEARCH CENTER

Mark Tuszynski Awarded Reeve-Irvine Research Medal

Dr. Oswald Steward (left) RIRC Director and James Swinden (right) of the Joan Irvine Smith & Athalie R. Clarke Foundation award Mark Tuszynski the Reeve-Irvine Research Medal.

The Reeve-Irvine Medal Symposium celebrated Mark Tuszynski as the recipient of the Reeve-Irvine Research Medal. In 1996 well known philanthropist Joan Irvine Smith established an annual award originally named the "Christopher Reeve Research Medal", with Christopher's blessing became the "Reeve-Irvine Research Medal". The medal recognizes an individual who has made highly meritorious scientific contributions in the area of spinal cord repair, and whose research has stood the test of time and scrutiny. The medal and a $50,000 cash award is provided through the generosity of the Joan Irvine Smith and Athalie R. Clarke Foundation, whose kindness has made it possible to continue to recognize the work of pioneering investigators whose research has brought us closer to cures for afflictions affecting the spinal cord.

Mark Tuszynski is a physician-scientist exploring the topics of spinal cord injury, degenerative disorders of the nervous system, and fundamental mechanisms underlying learning and memory. Dr. Tuszynski obtained his bachelor of science and M.D. degrees at the University of Minnesota, and completed residency training in neurology at Cornell University Medical Center / The New York Hospital. He then earned a Ph.D. in neuroscience at the University of California-San Diego. He has been a faculty member at the University of California-San Diego since 1991, and is currently the Director of the Center for Neural Repair and Founding Director of the UCSD Translational Neuroscience Institute.

Dr. Tuszynski has published over 190 research articles and 3 books. The overarching goal of his research is to develop effective therapies for untreatable neurological disorders. Dr. Tuszynski performed the first human clinical trial of gene delivery in the adult central nervous system: Nerve Growth Factor gene therapy for Alzheimer's disease. Additional clinical trials of growth factor gene therapy followed in Parkinson's disease. He has received 15 awards for his research. His research is supported by the NIH, the Veterans Administration and several foundations.

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 Jope, Director of Community Development
(949) 824-5925 or email tania.jope@uci.edu

REEVE–IRVINE RESEARCH CENTER

2015 Annual Symposium held November 5, 2015

Nervous System Regeneration: Molecular & Cellular Mechanisms

On November 5th the RIRC hosted the Reeve-Irvine Research Medal symposium titled "Nervous System Regeneration: Molecular and Cellular Mechanisms" focused in axonal regeneration, neural repair and plasticity. We brought in experts who have made significant contributions in these areas. Many of our speakers have been involved in pre-clinical trials that have great potential for clinical applications in the very near future. The target audience for the symposium consisted of MD's and RN's in Neurological Surgery, Emergency Medicine, Physical Medicine and Rehabilitation and Orthopedic Surgery. Additionally the target audience included Ph.D.'s in Neurology, Anatomy & Neurobiology, Bioengineering and Translational Sciences.

The objective of the symposium:

- Identify terminology related to axonal growth and the limitations of experimental methods.
- Determine the benefits and issues with the study of central nervous system regeneration.
- Describe the biological phenomena of regeneration and how this research can be applied to regeneration-based therapies.

Course Director

Dr. Oswald Steward
Director, Reeve-Irvine Research Center
Professor, Anatomy and Neurobiology,
University of California, Irvine

Distinguished Speakers

Mark Tuszynski, M.D., Ph.D
Director, Center for Neural Repair
Professor, Department of Neurosciences
University of California, San Diego

Regeneration after spinal cord injury

Simone di Giovanni, Ph.D
Chair, Restorative Neuroscience
Brain Sciences
Imperial College London

Axonal injury signaling and epigenietic cross talk for nerve regeneration

Daniel Geschwind, M.D., Ph.D
Gordon and Virginia McDonald Distinguished Professor
Department of Neurology, Psychiatry and Human Genetics
University of California, Los Angeles

Integrative genomic investigation of neural repair

Murray Blackmore, Ph.D
Assistant Professor
Department of Biomedical Sciences
Marquette University

Transcriptional interventions to promote axon regeneration in the injured spinal cord

Continued on facing page

James Fawcett, Ph.D

Head of Department of Neuroscience
John van Geest Centre for Brain Repair
University of Cambridge

How can we enhance the regerative ability of CNS axons?

Armin Blesch, Ph.D

Stark Neuroscience Research Institute
Department of Neurological Surgery
Indiana University, School of Medicine

Neural activity, regeneration and pain in spinal cord injury

Paul Lu, Ph.D

Associate Research Scientist
Center for Neural Repair
University of California, San Diego

Long-term human neural stem cell transplant after spinal cord injury: neurogenesis, gliogenesis and axon persistence

Reeve-Irvine Research Center

For questions regarding our educational and scientific programs, fundraising or donation opportunities, or general information on the Reeve-Irvine Research Center,

please contact:

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University of California, Irvine

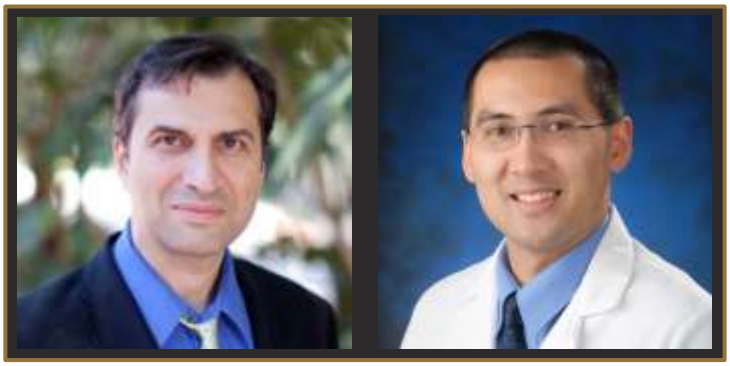
RIRC undergraduate research stars present at UCI's Undergraduate Research Opportunity Symposium

Undergraduate researchers are an important part of our RIRC team, and two of them presented posters on their research in the Undergraduate Research Opportunity Symposium on May 14. Sara Jahangiri has been working with Erin Gutilla on a study of whether it is possible to activate the AKT/mTOR pathway by electrical stimulation of the cortex. The AKT/mTOR pathway is the one activated by deleting PTEN, and the idea here is that it might be possible to enhance regeneration of cortical axons by stimulation. Walter Guerrero has been working with Zach Gallaher on a study demonstrating that deleting PTEN and another gene called SOCS3 enhances regeneration of peripheral nerve axons. Walter is graduating in June and is applying for graduate programs. Congratulations to Sara and Walter and their excellent mentors Erin Gutilla and Zach Gallaher.

The 2016 Meet the Scientists Forum...

Highlighted by Special Guests Dr. Zoran Nenadic and An Do

For 16 years the Reeve-Irvine Research Center (RIRC) has been holding an annual "Meet the Scientists" forum, where community members and the public can come to hear about the progress RIRC members are making in spinal cord injury (SCI) research. The goal of this forum is to help educate and inform the community on new discoveries relevant to SCI. It is also an opportunity for people living with SCI and their family members to talk directly with our researchers and clinicians. This event is also important to our researchers as it has helped us target research toward the needs of the spinal cord injury population. What many may not realize is that the forum initially stemmed from a special request from Christopher Reeve to meet with SCI researchers to hear scientific updates. After his passing the event has continued on and is now opened up to the public and has been a valuable exchange of information.



Dr. Zoran Nenadic **An Do**

This year, Drs. Zoran Nenadic and An Do demonstrated their Brain Computer interface study, a novel brain-computer-interface (BCI) technology created by the University of California, Irvine researchers that has allowed a man with paraplegia to walk for a short distance, with body weight support. This study received much attention from the media. We were excited to have them here in the iMOVE laboratory to personally talk to our guests at the event. For more information regarding this study see page 7.

Dr. David Reinkesmeyer also demonstrated his music glove study to help improve hand and arm function. Drs. Reinkensmeyer and Sharp are recruiting volunteers for this study. Please see the ad on the back cover of this issue of Spinal Connections for more information on enrolling as a participant.

Other Reeve-Irvine Faculty members were also present to discuss areas of research including regeneration of connections in the injured spinal cord (Dr. Os Steward), pain following SCI (Drs. David Luo and Catherine Cahill) and exciting new ways to manipulate molecules that block regeneration (Dr. Melanie Cocco). Look for information on next year's Meet the Scientists on our website www.reeve.uci.edu make sure to join our Facebook too for more details, and for additional information, contact Tania Jope at (949) 824-5925 or tania.jope@uci.edu

UCI Brain-Computer Interface Enables Paralyzed Man to Walk

Proof-of-concept study shows possibilities for mind-controlled technology.

A novel brain-computer interface technology created by University of California, Irvine researchers has allowed a paraplegic man to walk for a short distance.

In the preliminary proof-of-concept study, led by UCI biomedical engineer Zoran Nenadic and neurologist An Do, a person with complete paralysis in both legs due to spinal cord injury was able – for the first time – to take steps without relying on manually controlled robotic limbs.

The male participant, whose legs had been paralyzed for five years, walked along a 12-foot course using an electroencephalogram-based system that lets the brain bypass the spinal cord to send messages to the legs. It takes electrical signals from the subject's brain, processes them through a computer algorithm, and fires them off to electrodes placed around the knees that trigger movement in the leg muscles.

Study results appear in the open-access Journal of NeuroEngineering & Rehabilitation. See the YouTube video. News.uci.edu/feature/to-walk-again/

Even after years of paralysis, the brain can still generate robust brain waves that can be harnessed to enable basic walking," said Nenadic, an associate professor of biomedical engineering. "We showed that you can restore intuitive, brain-controlled walking after a complete spinal cord injury. This noninvasive system for leg muscle stimulation is a promising method and is an advance of our current brain-controlled systems that use virtual reality or a robotic exoskeleton.

Months of mental training to reactivate the brain's walking ability and physical therapy were needed for the study participant to reach the stage where he could take steps. Wearing an EEG cap to read his brain waves, he was first asked to think about moving his legs. The brain waves this created were processed through a computer algorithm Nenadic had formulated to isolate those related to leg movement. The subject later was trained to control an avatar in a virtual reality environment, which validated the specific brain wave signals produced by the algorithm.

"We showed that you can restore intuitive, brain-controlled walking after a complete spinal cord injury." -Zoran Nenadic

This training process yielded a custom-made system, Nenadic said, so that when the participant sought to initiate leg movement, the computer algorithm could process the brain waves into signals that could stimulate his leg muscles.

To make this work, the subject required extensive physical therapy to recondition and strengthen his leg muscles. Then, with the EEG cap on, he practiced walking while suspended 5 centimeters above the floor, so he could freely move his legs without having to support himself. Finally, he translated these skills to the ground, wearing a body-weight support system and pausing to prevent falls. Since this proof-of-concept study involved a single patient, Do said, further research is needed to establish whether the results can be duplicated in a larger population of individuals with paraplegia.

Trials and Tribulations: Update on Stem Cell Trials for Spinal Cord Injury

Recent news for stem cell trials for spinal cord injury is decidedly mixed. On the one hand, the trials have proceeded without any reports of serious adverse effects, and there have been encouraging reports of improvements. On the other, it's sad to report that the "Pathway" trial by the company Stem Cells Inc. has been terminated and the company announced it would wind down its operations. Also, another company sponsoring a stem cell trial for SCI (Neuralstem) announced a strategic reorganization to re-focus its priorities on small molecule therapies.

As background, most readers of "Spinal Connections" know there have been 3 ongoing trials of stem cell therapies for spinal cord injury. The first to be launched was the trial of oligodendrocyte precursor cells (OPCs) by the company Geron. The OPC trial was based on research by Hans Keirstead at the RIRC. Geron discontinued the trial but it was re-launched by the company Asterias. Next was the trial by the company "Stem Cells Inc," which began in Switzerland, and was later extended to the United States and Canada. This trial involved transplantation of neural stem cells (NSCs) that differentiate into nerve cells, and glial cells. The foundation for the trial was research by Aileen Anderson and Brian Cummings at the RIRC. A third trial was launched by the company "Neuralstem" and is being run out of the University of California San Diego. This is an extension to spinal cord injury of an approach initially tested for amyotrophic lateral sclerosis (ALS). This trial involves a different type of proprietary neural stem cell. The OPC product of Asterias is derived by differentiating human embryonic stem cells (HESCs), whereas both of the NSC products were originally derived from cells harvested from aborted human fetuses.

The Asterias "SCiStar" trial-OPCs: In the Phase 1 clinical trial launched by Geron, five patients with neurologically complete, thoracic spinal cord injury received two million AST-OPC1 cells at the spinal cord injury site 7-14 days post-injury. Based on the lack of serious adverse events in this safety trial, Asterias launched the SCiStar trial, which will test three sequential escalating doses of "AST-OPC1" cells (20 million cells in the final cohort). Subjects are individuals who have suffered SCI at cervical level 5-7 and are neurologically complete (Asia A). Subjects will receive OPC transplants 14 to 30 days post-injury and will be followed by neurological exams and imaging procedures. A news release in October, 2015 announced a positive safety profile and absence of serious adverse events for the first 3 subjects who received the low dose, so the next cohort of 5 subjects will receive 10 million cells. According to the press release, the first patient who received OPCs at Shepherd Center in Atlanta exhibited neurological improvement from ASIA Impairment Scale (AIS) A to an AIS C at the 3 month assessment.

The Stem Cells Inc "Pathway Study", NSCs: This was a trial involving the company's proprietary human NSC line "HuCNS-SC®" for subjects with cervical SCI. Things seemed to be going well for this trial earlier in the spring of 2016. At the 2016 American Spinal Injury Association (ASIA) annual meeting in Philadelphia in April, Dr. Stephen Huhn, Chief Medical Officer and VP of Clinical Research at Stem Cells Inc. gave an update. The 6-month results from Cohort I (6 subjects) revealed improved muscle strength in 5/6 subjects, improved dexterity and fine motor skill in 4/6 patients and no serious side effects. On this basis, Cohort II had been launched, which was to be a randomized, single-blinded study of 40 AIS-B subjects. By late May, 11 subjects had received transplants in Cohort II.

But then suddenly on May 31 Stem Cells Inc. announced that it would terminate the study and close out operations. The 6,9, and 12-month results from Cohort I revealed encouraging patterns of improvements, but the effect was smaller at the 12 month time point. Because of this, the Company conducted an interim analysis of data from Cohort II. There were differences in motor strength that favored the treatment group, but the effect size was small and the company concluded that the study would be unlikely to achieve the primary endpoint objective.

For perspective regarding the issue of "effect size", it's important to emphasize the difference between preclinical studies in animals and human clinical trials. In most studies with animals, scientists make every effort to be sure that injuries are comparable and everything except the treatment is similar between groups. This practice of "minimizing variability" is so that it is possible to detect treatment effects. The problem is that

Continued on page 5

You Can Help Support the Reeve-Irvine Research Center by helping ResearchforCure

www.researchforcure.org

As many of you are aware, a huge obstacle in our ability to carry out cutting edge research in a timely manner is lack of funding. When we launch innovative projects, preliminary data is a pre-requisite to receiving federal funding. Where do the funds for these new ideas come from? They come from the private donor. Research for Cure is a non-profit 501c3 organization comprised of volunteers who dedicate their time and energy to raising funds that directly support the Reeve-Irvine Research Center. The Plymouth Rock & Run group is part of this team. Private gifts enable researchers to explore new ideas that would otherwise go undiscovered. Please consider supporting this group in their efforts as funding is vitally important to our research. Some ways you can help are listed below.
http://smile.amazon.com/ch/68-0478281

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You Shop. Amazon Gives.

DONATE WHEN YOU SHOP . . . Every time you place an order on Amazon.com with a participating merchant through the Amazon Smile program, .5% of the proceeds are donated directly to Research for Cure! It's painless and costs you nothing. Just use this direct link before you order -- it's as easy as that!

You can also send this link to your family and friends and ask them to support Research for Cure by doing the same. ☺

COME TROT WITH US . . . Do you like the idea of working off some of your Thanksgiving Day feast before you indulge? Then join us at our annual Plymouth Rock 'n' Run 5/10K Thanksgiving Day turkey trot! All event proceeds go to RIRC via Research for Cure. This is a wonderful, family-friendly event and tons of fun! Many participants dress up as turkeys, pilgrims, Indians . . . even pumpkin pie! The course is wheelchair accessible. You can register directly on at plymouthrocknrun.racewire.com

CREATE A TEAM AND FUNDRAISE . . . You can create your own Plymouth Rock 'n' Run run/walk team and raise funds to support the effort too! Grab a group of family members and friends and have your team send out messages to family and friends to support your efforts. The highest fundraising team even wins a prize!

DO A 'VIRTUAL RUN' . . . Can't make the race? You can still do 5k or 10k 'virtual run' anytime, anyplace. You get an event t-shirt and finisher medal and help to raise funds along with the rest of us to support important research efforts at RIRC. For more info visit plymouthrocknrun.com

RECRUIT EVENT SPONSORS/EXHIBITORS . . . The race needs sponsors willing to donate time, goods, services and/or services to support the event and its cause. Visit plymouthrocknrun.com for info on sponsorship/exhibitor opportunities.

RECRUIT VOLUNTEERS . . . Do you have family or friends who might be interested in volunteering at the Plymouth Rock 'n' Run turkey trot to support SCI research at RIRC? The race needs help on race day with registration, water stops, event setup/teardown, parking, course monitoring, etc. Every bit helps so please think of those who may want to support us. Contact us at
info@plymouthrocknrun.com for more info.

2015 Plymouth Rock 'n' Run turkey trot was a huge success!

This past year marked the 8th running of Research for Cure's Plymouth Rock 'n' Run (PRNR) "turkey trot," and it was the best one yet. The 5k/10k run/walk, held on Thanksgiving morning at Yorba Regional Park in Anaheim Hills, is a dedicated fundraiser to provide much-needed support for spinal-cord injury research at the Reeve-Irvine Research Center (RIRC) at UC Irvine.

This race, which is professionally managed by a passionate group of volunteers from the community, appeals to the serious runner as well as the casual walker, and everyone in between. The event is a blast with many participants arriving in costume and toeing the line dressed as pilgrims, turkeys, and chefs and even a few pumpkin pies! This year, our Center Director Os Steward and his family really got in the spirit and dressed the whole family up in tutus, including the family dogs! PRNR is truly a family affair; some participants ran with kids in strollers and others had dogs in tow (but NOT getting in the way of serious runners). The 10k race started early for those who enjoy more of a challenge, followed by the 5k with competitive runners at the front and families and groups of walkers bringing up the rear. In addition, there was an entertaining kids 1k fun run and the newly added 100ish-yard "tot trot," where all children who participate receive a medal.

Rounding out the event was PRNR's fabulous finish-line expo. Many local small businesses and even larger ones such as Sprouts were there as sponsors, sharing goodies with participants and spectators alike, before and after the race. Those with tight muscles could even take advantage of free massage services. The Esperanza High School Jazz Band performed live throughout the event as in previous years, and Allan Cason, APC Entertainment was again master of ceremonies and did a fantastic job singing The Star Spangled Banner before the race. The silent auction was also a great success, and prizes were given for best costume (the Steward family team didn't win though). Collectively this group put on a fun, festive, family-friendly event that was truly memorable. And the race was over in plenty of time to enjoy Thanksgiving day!

Research for Cure plans to put on the PRNR turkey trot again this year, so please consider participating. For the past two years, we had teams that registered for the race and collectively raised over $3,000. It was a fun and meaningful way for teams and families to get involved. We hope that you and your family will join us for the 2016 race and help support the Reeve-Irvine Research Center. If you cannot participate in the 2016 race please consider the new addition of the virtual run, join a team in fundraising on-line, or consider a sponsorship. Look for more information in our next newsletter. Research for Cure is always welcoming volunteers who want to help with the race in various ways too! With your help this team hopes to make a difference in the lives of those afflicted by spinal cord injuries and other neurological disorders by hosting another successful race!

For more information about the next Turkey Trot contact Tania Jope at tania.jope@uci.edu Call (949) 824-5925 or visit the PRNR website at http://plymouthrocknrun.com/wp/

www.reeve.uci.edu

Stem Cell Trials, Continued from page 8

human SCIs are highly variable, so if "effect size" is small, it's harder to achieve a statistically significant result in a clinical trial.

Of course there is major disappointment that the "Pathway" trial is terminated. There will be a lot to learn from the Stem Cells Inc. experience, both in terms of the science and the economics of developing therapies for SCI. This is another practical lesson that limited financial resources make it difficult for small companies to continue when it becomes clear that the path to a therapy is longer than expected.

Neuralstem NSI-566/cSCI: The trial by Neuralstem is a phase I trial in which 5 subjects received six injections in, or around, the injury site, using the same cells and similar procedure as the company's ALS trials. Subjects also receive physical therapy and immunosuppressive therapy. The 5th subject received the cells in July 2015. At the time of this writing, there are no updates on the results of the Neuralstem trial except that there have been no reports of adverse events.

However, on May 20, 2016 Neuralstem announced a "Plan of reorganization to further align business with strategic intent". According to the press release:

"The company's refocused strategy emphasizes its commitment to prioritize the small molecule platform, undertake business development efforts to secure alternative funding and partnerships for its stem cell assets.... Accordingly, the corporate reorganization includes a workforce reduction across all divisions that will result in significantly lower operating expenses while retaining the expertise needed to implement the company's refocused strategy".

It remains to be seen how this reorganization will affect any further trials of Neuralstem's product for spinal cord injury.

Brain-Computer Interface, Continued from page 7

Once we've confirmed the usability of this noninvasive system, we can look into invasive means, such as brain implants," said Do, an assistant clinical professor of neurology. "We hope that an implant could achieve an even greater level of prosthesis control because brain waves are recorded with higher quality. In addition, such an implant could deliver sensation back to the brain, enabling the user to feel his legs.

Christine King, Po Wang, Colin McCrimmon and Cathy Chou of UCI contributed to the study, which received support from the National Science Foundation (grant 1160200).

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 Jope
(949) 824-5925 or tania.jope@uci.edu.

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

Tania Jope,
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

Are you in the know?

The Reeve-Irvine Research Center now has the latest advances in spinal cord injury research published on our brand new website.

www.reeve.uci.edu

Hope is in research.
Ask yourself...how can I help?

Join us in the fight for cures today!

RRC
Reeve–Irvine Research Center
University of California, Irvine

Do you have hand or arm impairment after a stroke or spinal cord injury?

Volunteers needed for a study to improve hand and arm function after stroke and SCI

If interested, contact us at:
Phone #: 949-824-8423
Email: iMove@uci.edu
And ask about the "Music Glove Study"

NOW ENROLLING!

Purpose of Study:

- To investigate if therapy with simple rehabilitation devices can improve hand and arm function after stroke and SCI

About the Study:

- 4 visits to the University of California, Irvine over 8 weeks with trained therapists
- Therapy duration is 3 weeks and may occur at home or in the UCI Medical Center
- $20 compensation after each visit
- All equipment provided for your home therapy at no cost to you or insurance

Lead Researchers for this Phase III study:
An Do, MD; Department of Neurology and
Kelli Sharp, DPT; Department of Dance