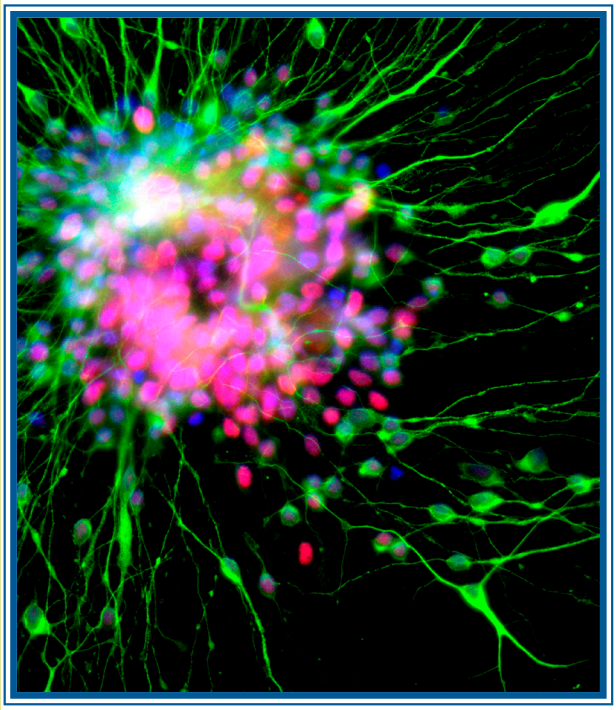
The mission of the UW Stem Cell and Regenerative Medicine Center is to advance the science of stem cell biology and foster breakthroughs in regenerative medicine through faculty interactions, research support and education.

Spring 2010

SCRMC Notes



Microscopic view of neural cells generated from iPS cells. *(Photo: Su-Chun Zhang/Baoyang Hu)*

Inside this issue:

Featured Researcher: Wan-Ju Li	2
Milestones	3
2010 Fellowship Winners	4
SSSCR Update	4
Tuesday Seminar Series	5
Regenerative Biology Scholars	5
News Highlights	6
PACT Grant Update	7
ICTR/SCRMC Pilot Grants	8
WISC Bank Cell Lines	8
WID/MIR Highlight—Bionates	9
Core Services	10

FROM THE DIRECTOR

Welcome to our second SCRMC newsletter. We hope you find our Spring issue informative and interesting and, as always, we welcome suggestions on how to improve this newsletter and center communication overall. We continue to update news, seminars, events and other information on our website, http://stemcells.wisc.edu.

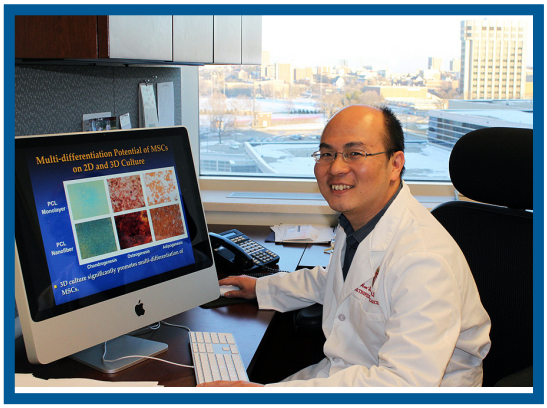
Don't forget to register for the 5th Annual Wisconsin Stem Cell Symposium to be held on the Promega campus at the BioPharmacetical Technology Center Institute (BTCI), this year on April 21. **Derek Hei** and **Linda Hogle** have assembled a fantastic group of speakers from around the world and around campus for the symposium—The Road to Stem Cell Applications: Bioprocessing Safety and Preclinical Evaluation. Also, please save the date, Sept. 30, for our second annual SCRMC Retreat at the UW Arboretum.

March 9 was the one-year anniversary of President Obama signing the Executive Order—Removing Barriers to the Responsible Scientific Research Involving Human Stem Cells. Although most in the research community hailed this change in policy, implementation of the new guidelines has provided some challenges. Many of us have expressed our concerns to the NIH about the logistics of establishing the new NIH registry and the status of previous National Stem Cell Bank ES cell lines. Certainly important 'barriers' to research remain with the lack of availability of many previously approved lines which provide the key standards for the field. The availability of various human ES cell lines for federally funded research continues to rapidly change. If you are confused with which ES cells you can use with which grants and where—you're not alone. Please see the UW SCRO website or contact Heather McFadden hnmcfadden@bascom.wisc.edu for the latest information on federal and UW policies. Careful adherence to these new federal guidelines remains important for individual investigators as well as the UW as a whole.

(continued on page 5)

Number 2

FEATURED RESEARCHER



Wan-Ju Li compares images of 2D and 3D culture in his office at WIMR. Cartilage and bone cells grow better in the 3D induction stimulation, producing more matrix proteins than in the 2D culture dish. *(Photo by J. Lenon)*

Wan-Ju Li makes musculoskeletal tissues on the bench

By Jordana Lenon

Although he is a young assistant professor, **Wan-Ju Li** says he is excited about beginning the second half of his research career.

Much of that excitement stems from having a new research lab on WIMR's sunny and spacious fifth floor. The new UW-Madison Musculoskeletal Biology and Regenerative Medicine Lab, under Li's leadership, is ready to test new uses for bioengineering techniques that he has studied for several years and apply them to regenerating bioengineered cartilage, bone, ligaments and other tissues.

Li joined the School of Medicine and Public Health in spring 2008 as an asst. professor of orthopedics & rehabilitation and biomedical engineering. He now leads a research team of 11 people focusing on three major directions.

These three directions—weaving together basic stem cell biology, musculoskeletal biology and musculoskeletal tissue engineering—are all related to Li's ultimate goal to fight degenerative musculoskeletal disease: the wear and tear of cartilage in knee joints, squeezed disks between spinal vertebrae, osteoarthritis and other degenerative bone and cartilage disorders that affect at least 20 million people in the U.S.

"These conditions are often the result of stresses on bones and cartilage from obesity, occupational hazards and aging. Once these areas are damaged, they don't repair themselves very well," Li says. This is due to the hypocellular nature of cartilage, he adds. Only 5 percent of this tissue is cell, versus water or collagen protein, sugars and other extracellular matrix. "There is no large army, or working force trying to repair these defects. The cartilage is injured and there are not enough cells to fight back and regenerate the tissues."

The holy grail of tissue engineering, says Li, who won the North American Spine Society (NASS) Young Investigator Research Award 2008, is to try and use a patient's own adult stem cells to fill in and fuse together bone, cartilage and other damaged or diseased tissue. "You harvest tissue from a non-weight-bearing area and transfer it to the defective part of the joint," he explains. "But this approach, which we've done so far clinically, has its problems. One problem is that you create another defect, or weak spot, at the tissue harvesting site in the body when you take something out. Another problem is that, in reality, there is a limited amount



A bioengineered cartilage plug glows translucently in the late afternoon light in Wan-Ju Li's lab at WIMR. *(Photo by J. Lenon)*

of the autologus tissue that can be harvested from the body."

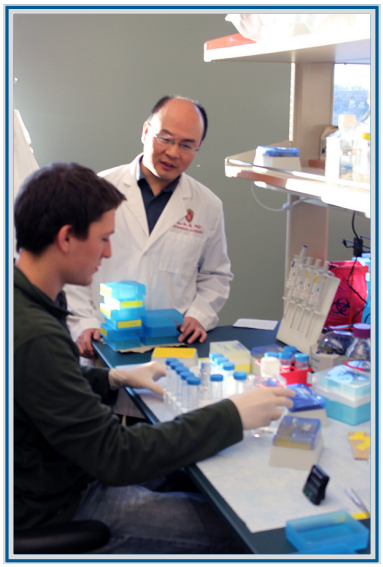
In addition to the NASS funding, Li has an AO Foundation Grant—this is the European Orthopedic Foundation—supporting his efforts to develop a bioengineered osteochondral plug for potential clinical application. This is where his three research directions converge toward the common goal of treating musculoskeletal degradation.

His newest goal is to work on hES cells, to understand and direct the progression of embryonic stem cells to mesenchymal adult stem cells to joint tissues. "MSCs themselves are only halfway down the stream to become bone and cartilage, so there is a lot of work to do to optimize MSC growth potentials from hES cells versus directly from patient donor tissue," Li says.

Li is newly collaborating with Igor Slukvin, an assistant professor of pathology and laboratory medicine based at the Wisconsin National Primate Research Center, to obtain MSCs derived straight from hES cells. Li wants to see how musculoskeletal tissue is developed and then try to use the knowledge learned from the developmental process to regenerate tissues through bioengineering techniques. For example, gene expression could be analyzed to compare the similarity between bioengineered and native cartilage, before any of this comes close to candidacy for transplant into human patients versus pigs or sheep. To this end, he has cultured stem cells in both 2-D and 3-D scaffolds, then extracted the cells and globally profiled 65,000 genes in microarrays to learn which genes are turned on and off in each culture system.

When Li was a masters student at Drexel University in Philadelphia, he studied electrospinning with Materials Engineering Professor Frank Ko. Later, while further developing the technology from a cell and tissue engineering standpoint with Rocky Tuan, now chair of the Center of Cellular and Molecular Bioengineering at the University of Pittsburgh, he spun a very small fiber, 50-1,000 nanometers in diameter.

A self-described "hybrid" scientist, combining biology and engineering, Li uses this technique, called electrospinning, to create artificial biomimetic extracellular matrix. These intricate lattices, which mimic the size and layout of human collagen, enable him to culture stem cells and grow cartilage and bone tissue in the lab. Nanofibers for the matrix can be made of natural or synthetic polymers. Li uses poly(alpha-hydroxy esters) such as poly(lactic acid) or poly(glycolic acid). Scaffold materials are expected to dissolved and replaced by natural newly synthesized matrix during tissue regeneration.



Wan-Ju Li stops by a bench in his new lab where Zach Pflum, a junior from Little Chute, Wisconsin, majoring in biochemistry, is working on cell cultures. *(Photo by J. Lenon)*

"We need to maintain the right cell culture conditions and improve the quality of MSCs in vitro for cell or tissue therapy," Li affirms. "Why do MSCs stop growing in vitro after the cells are released from their native niches, such as bone marrow? How can we maintain the quality of the cell ex vivo before we can put it back into the patient?" This isn't just about preparing effectively functioning cells ex vivo and directing them into a bioengineered musculoskeletal tissue, but it could also be about putting it back into patients with leukemia or lymphoma as well, through cell injection or cell therapy."

Li hypothesizes that oxidization could be one of the culprits causing substandard culture conditions. Cultured in an environment with 20% oxygen, the cells become senescent after a few passages. But in his lab's hypoxia chamber, which exposes cells to less than 5 % oxygen, the MSCs do a whole lot better.

Using a bioreactor is also critical to improve functional musculoskeletal tissues, Li says. Medium diffusion can only reach 200 microns below a tissue surface, so cells in a thick bioengineered tissue need facilitated medium diffusion to ensure that this occurs. Therefore, he cultures engineered tissues in bioreactors—with their dynamic medium circulation—to enhance regeneration. Comparing these tissues to those prepared in conical tubes with

(continued from page 3)

static culture media, he has found that the dynamic cultures produce larger, heavier, stronger tissues.

Animal models will continue to be important in this research, Li says. Collaborating with Mark Markel from the School of Veterinary Medicine, he tests the bioengineered tissue in animals. Just as he and Markel use sheep to test engineered cartilage growth and function, they also plan to use the same animal model for testing engineered tendon and intervertebral disk transplants.

Li's research career, we hope, enjoys many more "halves." He has a protected patent with WARF related to his work and is also submitting a manuscript on how glucose levels regulate TGF-beta receptors and affect chondrogenesis, the process by which cartilage is developed, which may explain osteoarthritis in people with diabetes. Li has artistic talents, too, having designed the logo for the Musculoskeletal Biology and Regenerative Medicine Lab depicted on his Orthopedics Departmental website. He explains that the lines represent the body's skeletal support structure and the leaf in the middle means something growing, or regenerating.

More on Wan-Ju Li:

http://www.stemcells.wisc.edu/faculty/li.html

http://ortho.wisc.edu/Ortho/research/wanjulilab

From NIH to UW-Madison:

http://www.engr.wisc.edu/bme/newsletter/2008/article04_new_faculty.html

Selected References:

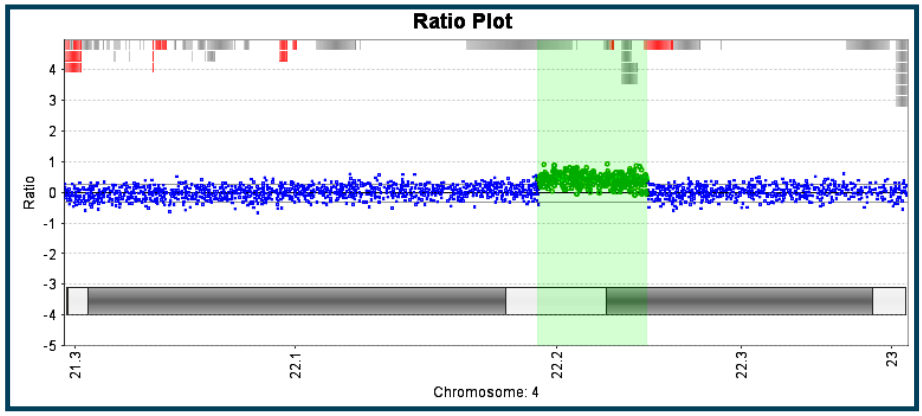
Li WJ, Chiang H, Kuo TF, Lee HS, Jiang CC, Tuan RS. **Evaluation of articular cartilage repair using biodegradable nanofibrous scaffolds in a swine model: a pilot study.** J Tissue Eng Regen Med 2009; 3:1-10.

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Li WJ, Tuli R, Huang X, Laquerriere P, Tuan RS. **Multilineage differentiation of human mesenchymal stem cells in a three-dimensional nanofibrous scaffold.** Biomaterials 2005; 26:5158-5166.

Li WJ, Tuli R, Okafor C, Derfoul A, Danielson KG, Hall DJ, Tuan RS. **A three-dimensional nanofibrous scaffold for cartilage tissue engineering using human mesenchymal stem cells.** Biomaterials 2005; 26:599-609.

This array comparative genomic hybridization (aCGH) image depicts a 1.4Mb abnormality (shown in green) on chromosome 4 that is not detectable by karyotyping. The WiCell® Research Institute is happy to now offer this service, in addition to karyotyping, to SCRMC members as well as others in the UW research community (www.wicell.org/cytogenetics; email cytogenetics@wicell.org).



Register Now

April 21, 2010
5th Annual Wisconsin Stem Cell Symposium
The Road to Stem Cell Applications: Bioprocessing, Safety and Preclinical Evaluation

April 22-23, 2010
9th Annual International Bioethics Forum
Taking the Measure of the Magic Measure: Toward a Science of Consciousness

BioPharmaceutical Technology Center (BTCI), Fitchburg WI

(continued from page 1)

High quality banks of ES and iPS cells are critical for research to efficiently move forward by providing all researchers access to the same starting material which is carefully qualified and characterized. The National Stem Cell Bank led by **Derek Hei** and hosted at the The WiCell® Research Institute in partnership with UW has been the world leader in banking and distributing human ES cell lines. However, with changing federal policies, the NIH ended the contract February 28, and there is, at the time of this writing, no NIH-supported future banking efforts described. We are hopeful that with continued input from SCRMC members and others around the country that new federally funded banking strategies will emerge. Fortunately, the WiCell® Research Institute will continue banking with the Wisconsin International Stem Cell (WISC) Bank, which you can read about in this newsletter.

The SCRMC continues to promote research and education efforts on campus with the resources available. After considering an excellent pool of candidates, the SCRMC training committee selected two outstanding trainees for the SCRMC Fellowship awards this year, Maria Mikedis from **Karen Downs**' laboratory in the Department of Anatomy and Wei Shen from **David Gamm**'s laboratory in the Department of Ophthalmology and Visual Sciences. In addition, this year in partnership with the Institute for Clinical and Translational Research (ICTR), we initiated a pilot grant program for Type I translational research described later.

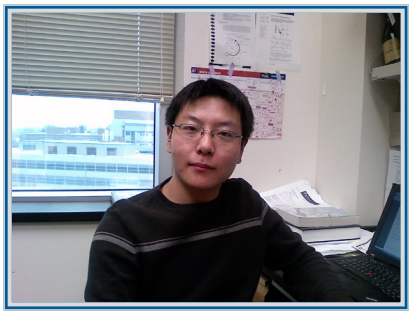
Finally, the newsletter highlights just a fraction of the outstanding research and accomplishments that SCRMC members have made in recent months. Also, new research facilities and new programs are coming online soon with the Wisconsin Institute for Discovery (WID) and the Morgridge Institute for Research (MIR) rapidly being completed. The BIONATES program led by **Tom Turng** will be one of the thematic areas in WID focused on novel concepts of tissue engineering (featured in this issue on page 9). These are exciting times, and the SCRMC is here to help in whatever ways possible to advance stem cell and regenerative medicine research, education and clinical applications.

Tim Kamp
Director

MILESTONES

- 15 years ago: **Jamie Thomson** reported the successful derivation and culture of rhesus macaque embryonic stem cells.
- 10 years ago: **Su-Chun Zhang** reported the first-time differentiation of neurons and neural precursors; Dan Kaufman reported the first red blood cell differentiation; WiCell began distributing the first ES cell lines.
- 5 years ago: WiCell received $16 million from the NIH grant to create the first US National Stem Cell Bank; **Tenneille Ludwig** developed the first ESC culture free of animal cells.





FELLOWSHIP WINNERS

Two individuals have received the SCRMC Fellowship for 2010. The awards provide two years of funding for the winners.

The postdoctoral fellowship awardee was Wei Shen from **David Gamm**'s laboratory, Ophthalmology.

The graduate fellowship awardee was Maria Mikedis from **Karen Downs**' laboratory, Anatomy.

Applicants had to have either be accepted into a graduate program on campus, or identify an SCRMC faculty member with whom they would like to do post doctoral training. More information on this award can be found at http://stemcells.wisc.edu/training/index.html.

Thank you to **Bill Murphy** for continuing to coordinate the fellowships program.

Photos above (from left to right): Karen Downs & Maria Mikedis. David Gamm, and Wei Shen. *Photos courtesy of Departments of Ophthalmology and Anatomy.*

SSSCR UPDATE

Membership in the UW-Madison chapter of the Student Society for Stem Cell Research has been steadily growing since the chapter began in 2008, now standing at 25. The SSSCR committee has been very busy, according to reports from President Stephanie Hazelbauer and Vice-President Melissa Breunig. Events SSSCR members have been involved with include assisting at WiCell Summer Science camp (slated for July 26-29 this year), assisting with and running sessions in the Stem Cell Learning Lab at Genetics-Biotechnology Center, and hosting invited speakers at SSSCR meetings: Dr. **Peiman Hematti** and Dr. **Amish Raval** gave presentations this semester. For the rest of the semester, the society is participating in CALS week and will have a booth at CALS Day for Kids. They are also hosting Dr. **Linda Hogle** and Dr. **Wan Ju-Li** as speakers. Finally, the SSSCR is planning a meeting where members can give short presentations on their own research endeavors. Great work, everyone, and thank you to Dr. **Jayne Squirrell**, who is the group's new advisor, succeeding **Clive Svendsen**, who departed for Cedars Sinai in Los Angeles in December. Enjoy the group's new web site at http://ssscrwisc.weebly.com/.

Save the Date

September 30, 2010

2nd SCRMC Faculty & Staff Retreat

UW Arboretum
1207 Seminole Highway

After the success of our first retreat last September, we want to build on the momentum. Please plan on joining us again at the Arboretum to continue the brainstorming and discussions.



TUESDAY SEMINAR SERIES PACKS THE HOUSE

Thank you to all of our speakers and all those who attend the Campus Stem Cell Lab meeting each week to make this series so successful. The spring semester schedule appears at: http://stemcells.wisc.edu/training/lab-meetings.spring10.html. Late-breaking science news packed the room on Feb. 16 when Baoyang Hu, Ph.D. assistant scientists in **Su-Chun Zhang**'s lab, presented, "Will human iPSCs replace ESCs?" Hu et al reported on the lab's findings in PNAS Feb. 15. *(Photos: J. Lenon)*



REGENERATIVE BIOLOGY SCHOLARS

The SCRMC Executive Committee has begun selecting Regenerative Biology Scholars from award applications submitted in March. The committee's goal is to identify exceptional applicants who plan to train in the general area of stem cells and regenerative medicine, and to aid in their recruitment into the Ph.D. program of their choice at UW-Madison. Students who fit the criteria established by the committee have been informed of the award with the hope that it will help them choose UW-Madison. After acceptance into their respective programs, they and will receive $2,500 each upon arrival in Madison. In addition, each recipient will have the opportunity to apply for additional funds once they have joined a laboratory for thesis research. For more information on this ongoing program, please contact Sue Gilbert, sggilber@wisc.edu.

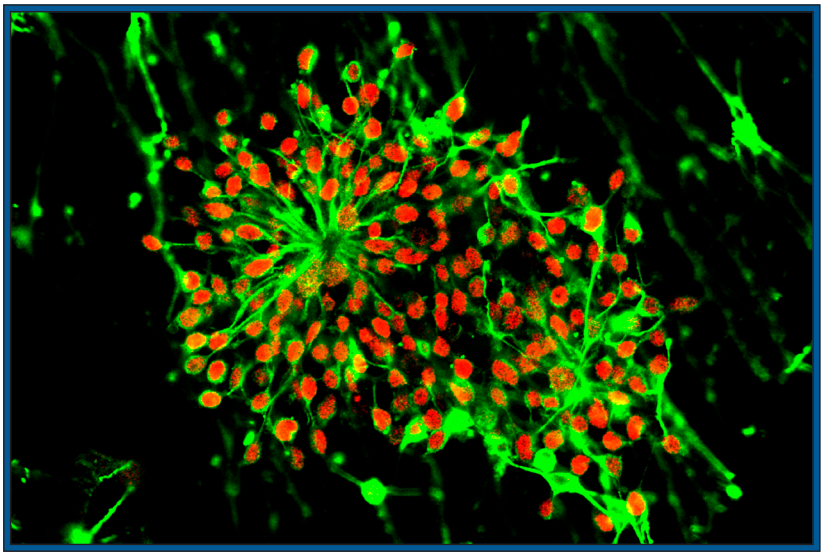
SCRMC NEWS HIGHLIGHTS

Regulatory Network Balances Stem Cell Maintenance, Differentiation

While much of the promise of stem cells springs from their ability to develop into any cell type in the body, the biological workings that control that maturation process are still largely unknown. Writing in the online edition of the Proceedings of the National Academy of Sciences on Jan. 11, scientists led by **Judith Kimble** at the University of Wisconsin-Madison, and collaborators from the University of California-Irvine presented a new model of stem cell regulation. More at: http://newsroom.stemcells.wisc.edu/17523.

Induced Neural Stem Cells: Not Quite Ready For Prime Time

MADISON - The great promise of induced pluripotent stem cells is that the all-purpose cells seem capable of performing all the same tricks as embryonic stem cells, but without the controversy. However, a new study from **Su-Chun Zhang**'s lab published Feb. 15 in the Proceedings of the National Academy of Sciences comparing the ability of induced cells and embryonic cells to morph into the cells of the brain has found that induced cells—even those free of the genetic factors used to program their all-purpose qualities—differentiate less efficiently and faithfully than their embryonic counterparts. More at: http://newsroom.stemcells.wisc.edu/17678.



Microscopic view of neural cells generated from iPS cells. *(Photo: Su-Chun Zhang/Baoyang Hu)*

Heart Stem Cell Study Among Top Research Advances

In 2009, a group of cardiovascular researchers at the University of Wisconsin School of Medicine and Public Health, including **Tim Kamp** and **Jamie Thomson** proved that functional human heart muscle cells can be produced from genetically reprogrammed skin cells. More at: http://www.uwhealth.org/newsletter/research-digest/26412.

SCRMC Bioengineers Win Awards

Brenda Ogle has received the 2009 National Science Foundation Career Award, **Weiyuan John Kao** has won a Vilas award, and **Krystyn Masters** has earned the UW-Madison Emil H. Steiger teaching award. More at: http://www.engr.wisc.edu/bme/newsletter/



Stem Cells: Science, Economy Edge Religion At The Polls

When it comes to stem cell research as a political issue, Wisconsin voters are more likely to be motivated by ideas of economic benefit and scientific progress than by religious objections, according to a Feb. 1 report in the International Journal of Public Opinion Research. More at: http://www.news.wisc.edu/17623



PACT GRANT UPDATE

The UW-Madison, through the Waisman Clinical Biomanufacturing Facility (WCBF), is one of five facilities nationwide serving as a Cell Processing Facility for **PACT** (Production Assistance for Cellular Therapies). This new program, funded by the National Heart, Lung, and Blood Institute (NHLBI), supports translational investigators involved in moving promising new cell therapeutics into human clinical trials for heart, lung, and blood-related diseases.

The WCBF has assembled a team of investigators to provide comprehensive support for cell therapy development:

- Production of cell therapeutics under current Good Manufacturing Practice (cGMP) guidelines for use in human clinical trials. (WCBF, **Derek Hei**, Ph.D.)
- Production of Master Cell Banks of both mesenchymal stem cells (Peiman Hematti, M.D.) and human embryonic stem cells (WiCell® Research Institute) under cGMPs.
- Collection and processing, including cell sorting, of bone marrow and peripheral blood hematopoietic stem cells (**Peiman Hematti**, M.D.) in a FACT- certified clinical hematopoietic stem cell lab.
- Pre-clinical animal testing including large animal disease models for cardiac (**Timothy Hacker**, Ph.D.) and pulmonary (**Marlowe Eldridge**, M.D.) indications – Cardiovascular Animal Surgery and Physiology Core http://www2.medicine.wisc.edu/home/cardiology/oscar
- Regulatory affairs support for filing of Investigational New Drug (IND) applications with the Food and Drug Administration. (**Amish Raval,** M.D.)

Although the UW PACT team will primarily focus on mesenchymal stem cell (MSC) and human embryonic/pluripotent stem cell-based therapeutics, investigators with other potential cell therapeutics are encouraged to contact the team via Derek Hei, hei@waisman.wisc.edu. NHLBI may provide support for translational efforts in other areas outside of the normal scope of NHLBI funding. For more information, visit www.pactgroup.net.



Questions about this newsletter? Please contact Sue Gilbert at sggilber@wisc.edu or Jordana Lenon at jlenon@primate.wisc.edu

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Pilot Grants Available

The SCRMC has partnered with the **UW Institute for Clinical and Translational Research (ICTR)** for its 2010 Clinical and Type 1 Translational Research Pilot funding. This partnership has enabled **ICTR** to offer two more of the $50,000 awards, which will focus on stem cells and regenerative medicine. The program is designed to support the following types of research: clinical research projects that define and develop novel clinical interventions; basic science or translational type I research components incorporated into an investigator initiated project; or novel technologies supporting such interdisciplinary collaborations. Funds are primarily intended to foster career development of junior to midlevel investigators. A mandatory letter of intent was due March 1, and final applications are being accepted now until April 19, with awards finalized in July.

WISC Bank Cell Lines Free to SCRMC Members

The WiCell® Research Institute established the Wisconsin International Stem Cell (WISC) Bank in 2008 to complement the NIH-funded National Stem Cell Bank (NSCB), which was restricted to the original 21 hES cell lines approved for federal funding.

The **WISC Bank** initially contained only iPS cell lines, but with the NSCB contract ending on February 28, 2010, all of the NSCB hES cell lines formerly available through the NSCB were moved to the **WISC Bank.** Now, the **WISC Bank** contains the original 21 NSCB hES cell lines plus 6 genetically engineered versions of two of these lines, as well as seven iPS cell lines. The **WISC Bank** also contains a cGMP (clinical grade) version of the H9 (WA09) hES cell line. WiCell is actively pursuing additional hES and iPS cell lines for inclusion in the **WISC Bank**.

You can order cell lines from the **WISC Bank**. All cell lines in the **WISC Bank** are provided to SCRMC investigators free of charge as part of WiCell's service to UW-Madison. Please contact Robert Drape (rdrape@wicell.org) if you are interested in a cGMP version of the H9 cell line.

You can find the story, **"WiCell marks stem cell anniversary with WISC Bank expansion"** on our news webpage.

For a snapshot of SCRMC research news, and Wisconsin and UW-Madison headline makers in the field, visit newsroom.stemcells.wisc.edu/news. Please send your highlights or those of your colleagues for consideration in this highlights column.

LAST CHANCE FOR ISSCR EARLY REGISTRATION IS MARCH 30

At the ISSCR 8th Annual Meeting, you'll find the researchers, physicians, clinicians, ethicists and industry leaders shaping stem cell science around the world. Register today and benefit from the wealth of professional and educational resources offered in San Francisco this year.

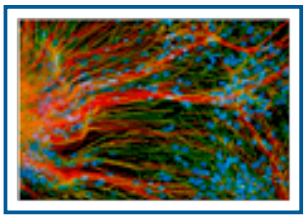


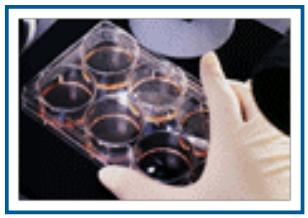
WID/MIR Highlights—Bionates

The Wisconsin Institute for Discovery's **Polymer Bio-Nanocomposite Scaffolds for Tissue Engineering (BIONATES)** is a new research team led by **Lih-Sheng "Tom" Turng**, professor in mechanical engineering at UW-Madison. The **BIONATES** team will build a library of scaffolding materials and cost-effective, mass-production methods that will work for a wide range of cell types in an array of in-body applications. The plan is to advance the science and engineering of manufacturing scaffolds with the aid of nanotechnology and using a wide range of materials (composites, polymers, metals, ceramics or organic materials), giving growing cells a place to adhere while dividing, communicating, taking in nutrients and disposing of waste. Creating viable tissues may also require the scaffolds to biodegrade in a predictable and controllable manner (once the new tissue has coalesced and become self-supporting) or to stimulate growing tissue through drug delivery or minute electric pulses. More at: http://discovery.wisc.edu/home/wisconsin/research.

More WID/MIR home and news: http://www.discovery.wisc.edu.





SCRMC Services for Members

The complexities and interdisciplinary nature of stem cell and regenerative medicine research necessitate collaboration and access to facilities outside the scope of any one investigator's laboratory. Thus, to facilitate stem cell and regenerative medicine research on campus, shared resources are an essential aspect of the SCRMC. These resources give individual investigators access to state-of-the-art technologies, with appropriate expertise to assist in training, experimental planning and data analysis. Members can apply for access to these services via an our website. We hope to significantly subsidize costs associated with these services, but this will depend on use over time and is subject to change.

Immunology and Pathology Services *(William Burlingham, Director) burlingham@surgery.wisc.edu 263-0119*

Immune rejection of transplanted allogeneic stem cells or derivatives is a major barrier to bringing such cell-based transplantation to clinics. The Immunology and Pathology Core will provide detailed immunologic testing and immunopathologic evaluation. These steps are essential for developing strategies to facilitate allogeneic transplants. The resources and services will provide a broad assessment of the humoral and cellular immune responses to transplantation of hES cells or their derivatives in a variety of contexts, e.g., across MHC barriers and using varying degrees of immunosuppression.

Nonhuman Primate Services *(Joseph Kemnitz, Director) kemnitz@primate.wisc.edu 263-3588*

Projects to develop cell replacement therapies may require that researchers implant stem cells into nonhuman primates to test efficacy and assess possible side effects before proceeding to human trials. In this context, nonhuman primates will be made available through the Nonhuman Primate Services core at the Wisconsin National Primate Research Center. Specific services include the provision of appropriate monkeys and primate tissue for projects, specialized animal husbandry, assistance with procedures such as surgeries and clinical assessments of monkeys, and appropriate terminal procedures and preparation of tissues for analysis.

Cellular and Molecular Imaging Services *(Ronald Kalil, Director) rekalil@wisc.edu 262-4903*

Understanding the ability of stem cells to differentiate in vitro or tracking the fate of transplanted stem cells requires advanced microscopic imaging techniques and analyses. This service will provide access to confocal and multiphoton microscopy imaging through the W.M. Keck Laboratory for Biological Imaging, as well as assistance with image analysis through discussions with qualified staff.

Small Animal Imaging Services *(Jamey Weichert, Director) jweichert@uwhealth.org 265-0835*

Serial tracking of transplanted stem cells in living animals will provide essential information regarding the fate and localization of the cells and their ability to repair damaged tissue. Service technicians will perform whole animal imaging that will enable tracking of cells with micro CT, PET, MRI and 3D fluorescent and bioluminescent optical imaging. They will use state-of-the-art equipment following transplantation in collaboration with the Department of Radiology and Medical Physics and will assess in vivo physiological effects of transplantation. Moreover advanced image reconstruction capability allowe 3-dimensional mapping of functional optical signals into anotomic frameworks provided my CT or MRI scanning. In addition, the core will provide imaging using one of the world's only small animal combined PET/CT scanner, which can provide functional information for precise anatomical localization studies.

The WiCell® Research Institute *(Erik Forsberg, Director) eforsberg@wicell.org 441-8043*

WiCell Research Institute is a non-profit organization established in 1999 to advance the science of stem cells at the University of Wisconsin-Madison and worldwide. WiCell hosts the National Stem Cell Bank as well as the WiCell International Stem Cell (WISC) Bank. In addition, WiCell offers pre-qualified core reagents including MEFs, cytogenetic services and training courses. As part of WiCell's mission to support stem cell research at the UW-Madison, SCRMC members may also apply for research support in the form of credit towards WiCell services and qualified reagents as well as WiCell facility us. This service includes Core Reagents (Matrigel, TeSR1, FBS, KOSR, antibodies, growth factors), Cytogenetic Services (karyotyping, FISH, SKY, aCGH, STR), Research Support (research space, financial credit), and Training Courses (culturing pluripotent stem cells, embryoid bodies).