News

Registration Open - IEM Annual Conference & Retreat, November 6th; Program Announced & Call for Abstracts
Registration is now open for the 6th Annual Institute for Engineering in Medicine (IEM) Conference & Retreat, to be held from 11:30 A.M. to 5:00 P.M. on Monday, November 6th at the McNamara Alumni Center on the University of Minnesota's Twin Cities Campus. The event will begin with a networking lunch that will include Plenary Keynote Talks. Immediately following the lunch talks, and new this year, will be a Collaboration Session at which IEM Member faculty will proactively work with one another to initiate or further develop biomedical research through collaborations between health sciences and engineering participants and form teams of collaborators responding to federal and industry funding opportunities. From mid-afternoon, there will be a poster/networking session that will highlight the research of IEM faculty members and their groups.

John Bischof Named IEM Interim Director
Dr. John C. Bischof, Professor of Mechanical and Biomedical Engineering, has been named Interim Director of IEM. Dr. Bischof previously served as IEM Associate Director for Development, and has served as Chair of the IEM Annual Conference & Retreat and Director of the IEM Cancer Animal Core. A joint announcement by Dr. Brooks Jackson, Dean of the Medical School, and Dr. Samuel B. Mukasa, Dean of the College of Science and Engineering, states that Dr. Bischof “is a renowned researcher in thermal bioengineering having contributed to applications in therapeutics, regenerative medicine, and diagnostics. More recently, Bischof received international attention for his research in the area of nanomedicine focusing on biodistribution and heating properties of gold and iron oxide nanoparticles for cryopreservation of zebrafish embryos and tissues for transplantation.”

Dr. Bischof is taking over IEM’s leadership from Dr. Bin He, Professor of Biomedical Engineering, who is leaving the University to become the head of Biomedical Engineering at Carnegie Mellon University in Pittsburgh. During Dr. He’s 5 years of leadership, IEM membership increased by more than 60% and the overall per-member funding of investigators supported by IEM increased by 83%, as IEM Seed Grants helped to stimulate new research that has led to large federal grants. Also under Dr. He’s leadership, IEM established and developed its Industrial Fellows and Clinical Immersion Programs to forge stronger ties and spur greater collaboration between industry and the University of Minnesota.

Michael Kyba Leads Research Team Achieving Breakthrough in Effort to Develop Treatment for Muscular Dystrophy
IEM Member Michael Kyba, Professor of Pediatrics, is the Principal Investigator of a team of researchers that has made a breakthrough in the path toward a treatment for facioscapulohumeral muscular dystrophy (FSHD), a form of the debilitating disease that affects approximately 38,000 people, nationally, and for which there is no approved treatment. As reported by the journal Nature Communications, which has published the research, Dr. Kyba’s team successfully developed a mouse model in which FSHD was re-produced, a key step toward the testing of therapies that can treat it. “In genetic diseases for which therapies have been developed, like Duchenne muscular dystrophy, mouse models like the one we discovered were essential to the development and testing of potential therapies,” says Dr. Kyba, “now that this hurdle has been overcome for FSHD, we have great hope for therapy development.” - University of Minnesota Researchers Replicate FSH Muscular Dystrophy in Mice

Rita Perlingeiro Awarded Grant to Investigate Gene Editing Therapy to Treat Muscular Dystrophy
IEM Member Dr. Rita Perlingeiro, Professor of Medicine/Cardiology, has been awarded a research grant by the C3 Foundation for “Gene editing of Calpain 3 in LGMD2A iPS cells,” which aims to treat LGMD2A, a form of Muscular Dystrophy that receives less research funding than more prevalent and severe forms of the disease. “We are thrilled to receive the support from the C3
foundation on this important project. Gene editing technologies combined with the derivation of skeletal muscle progenitors from patient-specific pluripotent stem cells hold great therapeutic potential, and we hope to make an impact in the lives of LGMD2A patients,” says Dr. Perlingeiro. The C3 Foundation is focused upon LGMD2A because it lacks a cure or treatment, is not well-understood, has little awareness among the general public and has lacked a workshop specifically for researchers of the disease. C3 Awards Research Grant to Dr. Rita Perlingeiro to Develop Gene Editing Strategy for LGMD2A

NIPTE, a Pharmaceutical Technology and Education Consortium Directed by Vadim Gurvich, Awarded up to $35 Million by FDA

The FDA has awarded a grant of up to $35 million for its ongoing support of the National Institute for Pharmaceutical Technology and Education, Inc. (NIPTE), led by IEM Member Dr. Vadim J. Gurvich, Research Associate Professor in the Department of Medicinal Chemistry. Dr. Gurvich serves as the Executive Director of the NIPTE, a consortium of 17 leading schools of pharmacy and engineering, which assists the FDA in the creation of policies in areas including quality, characterization of pharmaceutical materials and opioid abuse. “We are very excited about the opportunity to continue this collaboration with the US FDA,” says Dr. Gurvich. “This brings our decade-long collaboration with the FDA to the next level, allowing us to make a bigger impact on quality, safety, and affordability of pharmaceutical products.” NIPTE is Awarded up to $35 Million for “Manufacturing Sector Research Initiative” FDA Grant

Emil Lou Discusses the “Internet of Cells” in the Journal Nature

IEM Member Dr. Emil Lou, Assistant Professor of Medicine, Division of Hematology, Oncology and Transplantation, and Graduate Faculty in Integrative Biology and Physiology, was among scientists interviewed for an article in the journal Nature about the “Internet of Cells.” This principle is based on the concept of cell interconnectivity with membrane tubes that are often referred to as “tunneling nanotubes.” Cells form these nanotubes to traffic cell contents directly from cell to cell. This finding has led to a lot of debate among scientists due to the lack of understanding of the underlying mechanisms and specific roles these tubes play in intercellular connectivity, and uniform methods for identifying them in vivo. However, criticism of the field has softened with new studies over the past several years, including from Dr. Lou’s lab, that have addressed their potential role in human diseases. According to Dr. Lou, investigation of tunneling nanotubes and similar cell extensions making up this “Internet of Cells” represents a fast-emerging field of biology, especially pertaining to cancer cell biology, specifically. Dr. Lou states, “I think we have to take it seriously as a therapeutic target. I couldn’t have said that five years ago.” How the Internet of Cells has Biologists Buzzing

Walter Low Discusses with KARE 11 Using the Zika Virus to Attack Brain Tumors

IEM Member Dr. Walter C. Low, Professor of Neurosurgery, the Masonic Cancer Center, and the Stem Cell Institute, discussed his research on the use of the Zika virus to treat brain tumor stem cellswith KARE 11. The concept evolved from news coverage of the 2015 outbreak of the Zika virus, which attacks neural stem cells. These cells share the same receptors with brain tumor stem cells, a discovery made by Dr. Low and his team. As a result, Dr. Low theorized that the virus could be used to attack brain tumors. His team achieved this by incubating the brain tumor cells with the virus, which then infected those cells. The approach is promising enough that testing it in humans may not be very far into the future. “I would say within two years —if everything goes well, hopefully we’d be able to apply to the FDA for clinical trial and test this out on patients,” says Dr. Low. Tackle Cancer’s Research Making a Big Difference

State-Funded Research by Malgorzata Marjanska & Kamil Ugurbil Featured in Twin Cities Business

Research by IEM Members Dr. Malgorzata Marjanska, Associate Professor of Radiology-CMRR and Dr. Kamil Ugurbil, Director of the Center for Magnetic Resonance Research (CMRR) and Professor of Radiology, was cited in Twin Cities Business among projects supported by the Minnesota Partnership for Biotechnology and Medical Genomics. This state-funded collaborative venture between the University of Minnesota and the Mayo Clinic seeks to increase Minnesota’s stature in global biomedical research by building a “pipeline for dynamic new businesses and quality jobs.”

Dr. Marjanska’s research, “Preventing pancreatic cancer with magnetic resonance spectroscopy imaging,” which she is conducting with Dr. Stephanie Carlson of the Mayo Clinic, seeks to detect high-risk cystic pancreatic lesions before they progress to cancerous tumors, by using magnetic resonance spectroscopy, a technique the research team has tested on mice, and for which the next step would be human clinical trials. Dr. Ugurbil’s research “Finding new biomarkers for a broad spectrum of degenerative brain diseases,” which he is performing with Dr. Essa Yacoub of CMRR and Dr. David Jones of the Mayo Clinic, is utilizing resources at the CMRR to develop “the most advanced tests possible for examining the health of brain networks or ‘connectomes’” throughout the progression of medical conditions such as dementia and Alzheimer’s, from before symptoms occur to their later stages, thus providing clinically-relevant data for the entire process of these diseases. Alzheimer’s, Cancer Research is Focus in Latest Round of State-Funded Research Grants

Mo Li Awarded NSF Grant for Development of Glucose Monitoring Sensors

IEM Member Dr. Mo Li, Associate Professor of Electrical and Computer Engineering, has been awarded an NSF grant to develop infrared spectroscopic sensors for glucose monitoring in a collaboration with MIT. In his abstract, Dr. Li, who is a 2016 recipient of the IEM Faculty Career Development Award, states that the aim of the program is to pioneer a sensor that can conformably attach to human skin, so that it can continuously monitor glucose while having a “tattoo-like form factor.” Dr. Li says that this minimally-invasive sensor would be a significant improvement compared to conventional optical sensors because it would result in “state-of-
the-art nanophotonic devices that can provide more accurate and fast measurement of glucose level and also mechanically compliant.” In addition, these devices would eliminate a patient’s reliance on intermittent fingertip pricking. The research is expected to last approximately 3 years.

**NSF Award: “Collaborative Research: Conformal and Robust Integrated Infrared Spectroscopic Sensors”**

Joseph Metzger Among Chief Inventors Issued Patent for Novel DNA-Based Treatment for Heart Failure

IEM Member Dr. Joseph M. Metzger, Professor, Department Head and Chair, Department of Integrative Biology and Physiology (IBP), is one of the chief inventors at the University of Minnesota of a patent issued for a novel therapy that uses synthetic DNA to treat chronic heart failure, a condition that, in developed nations, is among the leading causes of sudden death. Dr. Bowser developed the treatment with the other chief inventors, Dr. Michael Bowser, Professor of Chemistry, and Dr. Gianluigi Veglia, a professor at the College of Biological Sciences, and research associates, Meng Jing, Raffaelo Verardi and Brian Thompson. If the treatment succeeds in clinical trials and is ultimately commercialized, it would treat the subcellular contributors to the condition, going beyond current therapies, which only mitigate its symptoms. It would also be among the early applications of synthetic DNA in medicine.

**U. of M. Lands Patent for Using Synthetic DNA to Target Heart Failure**

Team Led by Jürgen Konczak Receives NSF I-Corps Award for Physical Rehabilitation Robotics System

A team led by IEM Member Jürgen Konczak, Professor and Director of the School of Kinesiology, has received a National Science Foundation (NSF) I-Corps to determine the commercial potential of a robotic system for neurological rehabilitation that has been tested on more than 300 human users between the ages of 18 and 82. Dr. Konczak is the Principal Investigator on the grant and has collaborated with partners in Italy and Singapore to develop the technology. It would be an advance compared to currently available rehabilitation robots, which restrict patients to a single plane of motion and are used primarily to recover a patient’s motor function following stroke. This new technology instead allows patients to have unrestricted 3 dimensional movement, incorporates the somatosensory system, along with motor training methods, and can be used to rehabilitate a broader range of patients, beyond those recovering from stroke, including those with Parkinson’s disease, dystonia, and traumatic brain injuries.

**Konczak Lab Receives NSF I-Corps Award**

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**Announcements**

**The UMN Physical Sciences in Oncology Center Seeking Proposals**

**Program Description**

The University of Minnesota Physical Sciences in Oncology Center is seeking proposals for highly innovative and potentially transformative ideas to advance fundamental research or the translation of discoveries to significant clinical applications in understanding and controlling cell migration in cancer. The awards are part of the University of Minnesota Physical Sciences in Oncology Center funded through the National Cancer Institute’s Office for Physical Sciences in Oncology, which seek to develop a cell migration simulator to aid in predicting patient outcomes and developing new therapeutic strategies.

Proposals can be in any area of research related to the role of cell migration in cancer (ex. growth, stromal and immune function, mechanotransduction, stromal re-engineering, immune engineering) with emphasis on physical sciences-based approaches. Priority will be given to projects that explore novel ideas with collaborative efforts by faculty and junior investigators from AHC/CBS/CVM and CSE, and to projects that are likely to lead to external funding (e.g. NIH R01, U01, or R21). The project period will be from Nov. 1, 2017 to July 31, 2018, with an opportunity to apply for additional funding beyond this initial period. We expect to make awards as follows:

- Faculty – up to two awards up to $35,000
- PSOC Junior Investigators – up to 2 awards up to $10,000

Please direct questions and applications to connelly@umn.edu by 5 PM Oct. 15, 2017.