

F I F T H A N N U A L



REGENERATE
CONGREGATE
EDUCATE

S Y M P O S I U M
ON
R E G E N E R A T I V E
E H A B I L I T A T I O N

October 14-16
Emory University
Atlanta, GA

We gratefully acknowledge the extensive effort and contributions made by Emory University's Division of Physical Therapy, their faculty, staff and students. In particular we give a special thank you to Steve Wolf, Randy Trumbower and Jennifer Marley at Emory for all of their expertise and time devoted to making this a successful event.

TABLE OF CONTENTS

Course Directors and Scientific Program Committee	Page 1
Welcome.	Page 2
Organizers	Pages 3 - 4
Acknowledgements	Pages 5 -6
Overview, Objectives, and Continuing Education	Pages 7 - 8
Symposium Agenda	Pages 9 - 14
Biographies	Pages 16 - 28
Disclosures	Page 29
Poster Abstracts	Pages 31 - 33
Exhibitors	Page 34
Travel Awards	Pages 35 - 36
Maps	Pages 37 - 38

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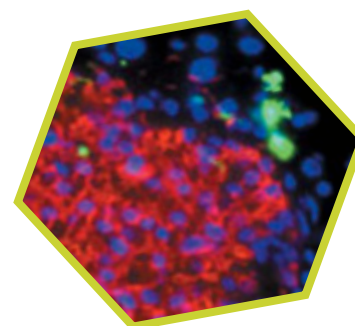
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Scientific Program Committee:

Co-Chairs:

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Randy D. Trumbower, PhD, Department of Rehabilitation Medicine, Emory University

Committee Members:

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Carmelo Chisari, MD, University Hospital of Pisa, Italy

George Christ, PhD, Biomedical Engineering and Orthopaedic Surgery, University of Virginia

Christopher H. Evans, PhD, Rehabilitation Medicine Research Center (RMRC), The Mayo Clinic

Hiroshi Kuroki, PT, PhD, Human Health Sciences, Kyoto University, Japan

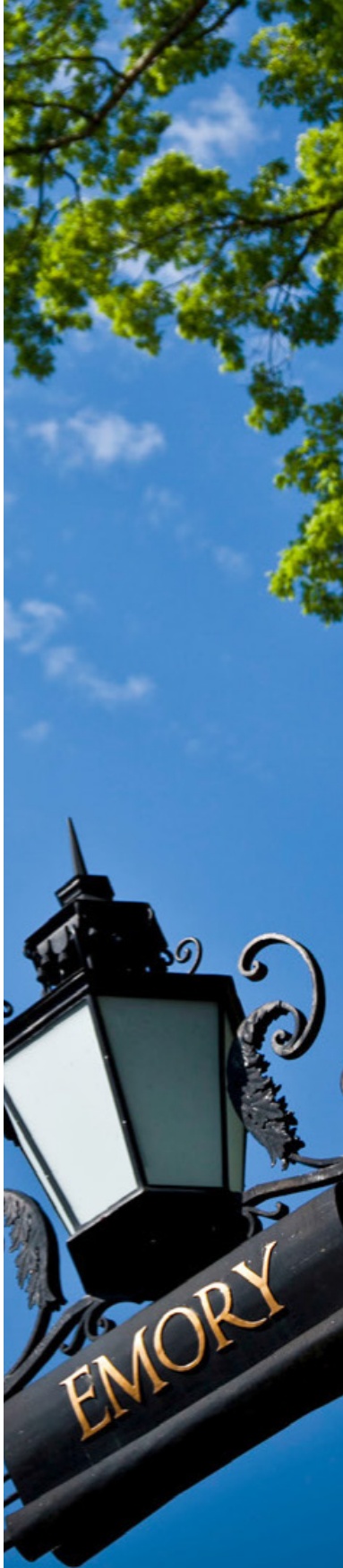
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Nick Willet, PhD, Department of Orthopaedics, Emory University

Steven L. Wolf, PhD, PT, FAPTA, FAHA, Department of Rehabilitation Medicine, Emory University



Welcome

We are thrilled to have you join us for the Fifth Annual Symposium on Regenerative Rehabilitation, held on October 14 - 16, 2016 at Emory University in the James B. Williams Medical Education Building/School of Medicine building (100 Woodruff Circle, NE Atlanta 30329). We are confident this will be a timely and exciting event.

The development of regenerative medicine technologies holds great potential to drive progress in the prevention and treatment of individuals with a host of acute and chronic pathologies resulting from injury, disease or aging. The long-term goal of regenerative medicine is to repair, replace, or regenerate cells, tissues, or organs in order to maximize tissue function. Likewise, rehabilitation seeks to harness the body's innate regenerative potential in order to maximize physical function. We propose that the future of these two fields is inextricably intertwined. Scientists in the field of regenerative medicine stand to benefit from both the increased application of targeted and specific mechanical stimuli as a means to drive physiological tissue responses as well as the increased incorporation of functional assessment when determining the therapeutic benefit of biological technologies being investigated. Accordingly, as understanding of basic biological mechanisms underlying tissue regeneration progresses, rehabilitation specialists will benefit from the incorporation of these emerging principles into the design of clinical protocols. Taken together, it is clear that there is synergy in bringing together the fields of rehabilitation and regenerative medicine, and that the integration of these two fields—Regenerative Rehabilitation—will increase the efficiency of efforts designed to optimize patient outcomes.

This international symposium, the only one of its kind, brings together renowned experts in the fields of regenerative medicine and rehabilitation.

We encourage you to participate in discussion, share your perspectives and ideas, ask questions, and network. We look forward to hearing your thoughts as to how to advance this emerging field of Regenerative Rehabilitation.

Best wishes,

Fabrisia Ambrosio, PhD, MPT
Fabrisia Ambrosio, PhD, MPT
Michael Boninger, MD
Thomas Rando, MD, PhD
Anthony Delitto, PT, PhD, FAPTA
William R. Wagner, PhD

Organized by:

University of Pittsburgh School of Medicine Center for Continuing Education in the Health Sciences

The purpose of the Center for Continuing Education in the Health Sciences is to advance the academic, clinical, and service missions of the University of Pittsburgh Schools of the Health Sciences and the University of Pittsburgh Medical Center through the continuing professional development of physicians, pharmacists, and other health professionals and the translation of biomedical knowledge into clinical practice.

<https://ccehs.upmc.com/>

UPMC Rehabilitation Institute

The largest rehabilitation provider in Western Pennsylvania, the UPMC Rehabilitation Institute (RI) serves as the hub of a UPMC network of more than 70 rehabilitation facilities that combine clinical care and research to help patients regain independence and enhance their quality of life. The RI's academic partners include the Department of Physical Medicine and Rehabilitation at the University of Pittsburgh School of Medicine and the School of Health and Rehabilitation Science. These academic partners are national and international leaders in rehabilitation research and education.

<http://www.upmc.com/Services/rehab/rehab-institute/Pages/default.aspx>

The McGowan Institute for Regenerative Medicine

The McGowan Institute for Regenerative Medicine is a partnership between the University of Pittsburgh and UPMC, and serves as a base for scientists and clinical faculty working in tissue engineering and biomaterials, cellular therapies, and medical devices and artificial organs. McGowan's mission is the development of innovative clinical protocols and the commercial transfer of new technologies.

<http://www.mcgowan.pitt.edu>

University of Pittsburgh School of Health and Rehabilitation Sciences

Through academic research, technology design and rigorous training, the School of Health and Rehabilitation Sciences (SHRS) at the University of Pittsburgh educates the next generation of health professionals who will help others reach their fullest potential.

At SHRS, we are committed to providing the best learning experience and academic environment possible for our students. Instructional excellence is rigorously pursued. Class sizes are intimate, fostering intellectual exchange and discourse. Students are challenged to not just achieve but to excel. And they do. Graduates of SHRS programs are some of the most sought-after professionals.

Our faculty is world class. They are authors, clinicians, noted researchers, speakers and consultants. But foremost, they are teachers... Teachers who care passionately about their field and about their students. They want their students to succeed in the classroom and in their chosen professions.

An SHRS education is more than classroom lectures. It's hands-on learning either in a clinical setting or in the community. Through our strong relationships with the University of Pittsburgh Medical Center and other clinical partners, our students benefit from a wealth of experiences related to their particular field and area of interest. Students train in schools, hospitals, skilled nursing facilities, ambulatory care sites, and in home and community based settings.

Our departments and programs listed here offer undergraduate, graduate and certificate degrees:

- | | |
|---------------------------------------|--|
| • Clinical Dietetics and Nutrition | • Physical Therapy |
| • Communication Science and Disorders | • Physician Assistant Studies |
| • Speech Language Pathology | • Prosthetics and Orthotics |
| • Audiology | • Rehabilitation Counseling |
| • Emergency Medicine | • Rehabilitation Science (undergraduate) |
| • Health Information Management | • Rehabilitation Science and Technology |
| • Occupational Therapy | • Sports Medicine / Athletic Training |

<http://www.shrs.pitt.edu>

University of Pittsburgh Department of Physical Medicine and Rehabilitation

Advancing the Science and Practice of Rehabilitation Medicine

Our mission is to maximize the health, function and well-being of the people and populations we serve by providing the highest quality rehabilitative medical care, conducting highly relevant, cutting-edge research, and training the next generation of clinicians and researchers.

Our research portfolio includes:

- Neural Engineering and Neural Prosthetics
- Biologics as indicators of pain, injury and recovery
- Axon Regeneration
- Biomarkers for brain injury
- Medical homes for Spinal Cord Injury Care
- Motor learning using Transcranial Magnetic Stimulation

Our physicians are experts in the fields of traumatic brain injury, spinal cord injury, sports and musculoskeletal medicine, pain medicine, stroke and many conditions that would benefit from rehabilitation care. We partner with patients to design and implement personalized approaches that maximize participation, recovery and well-being.

<http://www.rehabmedicine.pitt.edu/>

Rehabilitation Research and Development Program at the Veterans Affairs Palo Alto Health Care System, Center for Tissue Repair, Regeneration, and Restoration

Dr. Thomas Rando directs the Rehabilitation R&D program at the Palo Alto VA. Within that program, the “Center for Tissue Repair, Regeneration, and Restoration” (CTR3) focuses primarily on the neuromuscular and musculoskeletal systems and pursues research at the levels of stem cell biology, biomedical engineering, and clinical / translational research.

The VA Palo Alto Rehabilitation R & D Program reflects a long-standing commitment by the Department of Veterans Affairs to advance the well-being of American veterans through support of a full spectrum of rehabilitation research, from concept to clinic.

A firm scientific understanding of the underlying impairment and a multi-disciplinary team creates a strong basis for developing new clinical treatments that reduce the disability of veterans and improve the effectiveness of healthcare delivery by VA clinicians.

Hosted by:

Emory University, Division Of Physical Therapy

The Division of Physical Therapy has historically been a “top 10” physical therapy educational program and seen as a destination of choice for many prospective physical therapy students. This perspective has been nurtured through the unique design of the program that fosters exceptional skills, creativity, reflectivity, and humanity while instilling self-confidence as students transform into outstanding professionals by:

Fostering the skills of problem solving, interpersonal communication, and teaching-learning throughout the entire curriculum:

- Embedding clinical and ethical decision-making in clinical experiences within all aspects of the program
- Understanding the nature and scope of physical therapy practice within the larger healthcare system in which it occurs
- Providing research opportunities between faculty members and their students to nurture inquiry-based and evidence based practice
- Encouraging independent judgment, innovative, competent and confident practitioners

<http://www.rehabmed.emory.edu/pt/>

Endorsed by:



Thank you to our partners and supporters:



International Consortium for Regenerative Rehabilitation Partners
<http://www.ar3t.pitt.edu/home/icrr.html>



McGowan Institute for Regenerative Medicine
<http://www.mirm.pitt.edu/>

UPMC Rehabilitation Institute

Rehabilitation Institute
<http://www.upmc.com/Services/rehab/rehab-institute/Pages/default.aspx>



School of Health and Rehabilitation Sciences
<https://www.shrs.pitt.edu/>



School of Medicine Continuing Education in the Health Sciences
<https://ccehs.upmc.com/home.jsf>



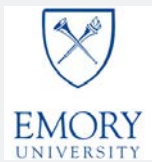
Stanford Institute for Stem Cell and Regenerative Medicine
<http://med.stanford.edu/stemcell.html>



University of California, San Francisco, Department of Physical Therapy and Rehabilitation Sciences
<http://ptrehab.ucsf.edu/>



Mayo Clinic, Department of Physical Medicine and Rehabilitation
<http://www.mayoclinic.org/departments-centers/physical-medicine-rehabilitation/minnesota/overview>



This year's host:

Emory University, Division of Physical Therapy
<http://www.rehabmed.emory.edu/pt/>



University of Virginia, Department for Biomedical Engineering
<http://bme.virginia.edu/index.html> and Orthopaedic Surgery
<https://med.virginia.edu/orthopaedic-surgery/>



Kyoto University, Human Health Sciences, Graduate School of Medicine
<http://www.med.kyoto-u.ac.jp/en/hs/>



(University of Pisa) Azienda Ospedaliero-Universitaria Pisana
<http://www.ao-pisa.toscana.it/>



Indiana University School of Health & Rehabilitation Sciences (IUPUI)
<https://shrs.iupui.edu/>



University of Washington, Institute for Stem Cell and Regenerative Medicine
<http://depts.washington.edu/iscrm/>



Oregon Health and Science University, Center for Regenerative Medicine
<http://www.ohsu.edu/xd/research/centers-institutes/regenerative-medicine/>



Center for Rehabilitation Services
<http://www.upmc.com/Services/rehab/crs/Pages/default.aspx>



Eunice Kennedy Shriver National Institute of Child Health & Human Development (NICHD),
<https://www.nichd.nih.gov/Pages/index.aspx>



National Institute Of Arthritis And Musculoskeletal And Skin Diseases (NIAMS)
<http://www.niams.nih.gov/>



National Institute of Neurological Disorders and Stroke (NINDS),
[<http://www.ninds.nih.gov/>] of the National Institutes of Health [<https://www.nih.gov/>]

International Consortium on Regenerative Rehabilitation (ICRR)

The ICRR Leadership Council is a core of vested individuals and institutions who are interested in expanding the strategic footprint of the field of regenerative rehabilitation. Currently 18 researchers and clinicians represent 12 academic institutions from around the world are partnering to deliver upon a mission which includes educating and training scientists and clinicians across the domains of regenerative medicine and rehabilitation science with the objective of catalyzing interdisciplinary collaborations to create new strategies and technologies to enhance functional recovery and, thus, the quality of life of patients. This Leadership Council plays a key role shaping the future of the field by:

- framing the scientific content for the annual industry symposium;
- becoming leaders in the field and introducing emerging trends, therapies and other information through the symposium; serving as spokespersons for the field as it emerges;
- providing valuable insight and guidance to young investigators, clinicians, therapists and others interested in pursuing regenerative rehabilitation as a career by having first-hand knowledge of potential funding, collaborations and other opportunities to advance research and clinical activities;
- building a new area of science that will have a positive impact on patient outcomes in the future.

ICRR Leadership Council:

Fabrisia Ambrosio, PhD, MPT, Department of Physical Medicine and Rehabilitation, University of Pittsburgh

Tomoki Aoyama, MD, Human Health Sciences, Kyoto University, Japan

Michael L. Boninger, MD, Department of Physical Medicine and Rehabilitation, University of Pittsburgh

Martin K. (Casey) Childers, DO, PhD, Institute for Stem Cell and Regenerative Medicine, University of Washington

Carmelo Chisari, MD, University Hospital of Pisa, Italy

George Christ, PhD, Departments of Biomedical Engineering and Orthopaedic Surgery, University of Virginia

Christopher H. Evans, PhD, Rehabilitation Medicine Research Center (RMRC), The Mayo Clinic

Joseph Hart, PhD, Department of Orthopaedic Surgery, University of Virginia

Kenton Gregory, MD, OHSU Center for Regenerative Med, Oregon Health and Science University

Hiroshi Kuroki, PT, PhD, Human Health Sciences, Kyoto University, Japan

M. Terry Loghmani, PT, PhD, School of Health & Rehabilitation Sciences, Indiana University-Purdue University Indianapolis

David L. Mack, PhD, Institute for Stem Cell and Regenerative Medicine, University of Washington

Linda Noble-Haeusslein, PhD, Department of Physical Therapy and Rehabilitation Sciences, UCSF

Thomas Rando, MD, PhD, Department of Neurology & Neurological Sciences, Stanford University and VAPAHs

Carmen Terzic, MD, PhD, Department of Physical Medicine and Rehabilitation, The Mayo Clinic

Kimberly S. Topp, PhD, PT, FAHA, Department of Physical Therapy and Rehabilitation Sciences, UCSF

Randy D. Trumbower, PhD, Department of Rehabilitation Medicine, Emory University

Stuart Warden, PhD, PT, FACS, School of Health & Rehabilitation Sciences, Indiana University-Purdue University Indianapolis

Steven L. Wolf, PhD, PT, FAPTA, FAHA, Department of Rehabilitation Medicine, Emory University

Hua Xia, PhD, MD, OHSU Center for Regenerative Medicine, Oregon Health and Science University

Special Liaison:

Christopher L. Dearth, PhD, liaison, Walter Reed National Military Medical Center

Interested institutions or for more information, please contact us at rehabmtg@pitt.edu

Course Overview and Objectives:

Overview

Medical advances in the field of Regenerative Medicine are accelerating at an unprecedented rate. Regrowing a lost limb, restoring function to a diseased organ, or harnessing the body's natural ability to heal itself are becoming part of our reality instead of a distant promise. Technologies, such as cellular therapies, bioscaffolds, and artificial devices, are now in use or are being tested in clinical trials throughout the country.

- How do we as clinicians and rehabilitation professional work with the patient regenerative medicine team to maximize patient outcomes and to help fully translate research?
- How do we as investigators in the field of regenerative medicine make the most of these revolutionary results?

Few opportunities are available to bring together scientists and clinicians working in these two currently quite disparate fields: rehabilitation science and regenerative medicine. However rehabilitation science and regenerative therapies have to work closely in order to achieve a successful outcome for the patient. This situation created the need for open cross disciplinary work and collaborative communication. This symposium provides the opportunity for researchers and clinicians from around the world to gather and learn about the latest developments, share ideas and concepts and create sustainable collaborations.

Objectives

During this course, participants will:

- Interact with cutting-edge researchers.
- Learn of the status of translating scientific discoveries into clinical practice.
- Network with colleagues and potential collaborators.
- Raise questions, debate implications, plan follow-up studies, and discuss results.
- Share the status of their own research and clinical observations.
- Meet with presenters to learn about their thinking and future research directions.

Continuing Education Credit

Pennsylvania:

The University of Pittsburgh School of Medicine is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

*The University of Pittsburgh School of Medicine designates this live activity for a maximum of **10.75** AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.*

*Other health care professionals are awarded **1.0** continuing education units (CEU's) which are equal to **10.7** contact hours.*

The University of Pittsburgh is a pre-approved provider of CE for the State Board of Physical Therapy.

Physical Therapy Professionals:

We have received approval through FSBPT's ProCert Program to offer a maximum of 8.0 CCU* (continuing competency units) for the 28 states that accept ProCert accredited hours towards license renewals. For more details on the ProCert Program and a list of the 28 states, please visit their website at: <https://pt.fsbpt.net/aPTitude/content/public/FSBPTCertification>

Emory University Division of Physical Therapy is the issuing institution for PT continuing education credits/units. They will send certificates electronically via e-mail provided on meeting resignation after the meeting.

*Continuing Education Units (CEU), traditional classroom-based format, was once the only activity available to help PT licensees maintain their professional competence. It is now only one of a growing number of activities, such as specialty exams, residencies, and membership in a professional organization that many PT Boards now recognize under the title of continuing competence units.



Participation by all individuals is encouraged. Advance notification of any special needs will help us provide better service. Please notify us of your needs at least two weeks in advance of the program by calling 001-(412) 624 5243

Agenda – Day 1

Friday, October 14th

Opening Session location:
Emory Conference Center Hotel
1615 Clifton Road, Atlanta, GA 30329

4:30 - 6:45 pm	Meeting Registration Open	Emory Conference Center Hotel: Lobby of Starvine Ballroom
6:00 to 9:30pm	Opening Session:	Emory Conference Center Hotel: Starvine Ballroom
6:00 - 6:10pm	“Welcome to Atlanta” and Introduction of Opening Session Speakers Moderated by: Randy D. Trumbower, PT, PhD Assistant Professor, Department of Rehabilitation Medicine Emory University And Steven L. Wolf, PT, PhD, FAAOMPT Professor, Departments of Medicine and Rehabilita- tion Medicine, Emory University School of Medicine	Starvine Ballroom
6:10 - 6:50	Dr. Max Gomez CBS News Medical Correspondent Medical News Journalist Title: <i>“Regenerative Medicine: The State of the Science”</i>	Starvine Ballroom
6:50 - 7:50	Keynote Speaker: Mark T. Tuszynski, MD, PhD Professor, Department of Neurosciences Director, Center for Neural Repair University of California, San Diego Title: <i>“Neural Stem Cells for Spinal Cord Injury”</i>	Starvine Ballroom
7:50-9:30	Welcome Reception	Starvine Ballroom

Agenda – Day 2

Saturday, October 15th

Meeting location:

Emory University campus:
James B. Williams Medical Education Building,
Emory University School of Medicine (SOM),
100 Woodruff Circle, NE Atlanta 30329

7:40am - 4:00pm	Meeting Registration Open	Lobby SOM 110
7:45 - 9:15am	Continental Breakfast Available and Poster set-up	Lobby SOM 110
8:00 - 9:00am	Sunrise Workshop / Pre-Conference course: ‘Regenerative Medicine 101’ Presentations by: Fabrisia Ambrosio, PhD, MPT Associate Professor, Physical Medicine and Rehabilitation University of Pittsburgh And Stuart J. Warden, PhD, PT, FACS Associate Dean of Research, Indiana University School of Health and Rehabilitation Sciences, Associate Professor, Departments of Physical Therapy (School of Health and Rehabilitation Sciences), Anatomy & Cell Biology (IU School of Medicine) and Biomedical Engineering (Purdue University, School of Engineering) Indiana University –Purdue University Indianapolis (IUPUI) Title: <i>“Primer on Mechanobiology and Mechanotherapy”</i>	SOM 110 Auditorium
9:15 - 9:30am	Welcome and Introductions Fabrisia Ambrosio, PhD, MPT Associate Professor, Physical Medicine and Rehabilitation University of Pittsburgh	SOM 110 Auditorium
9:30 - 11:45am	Session 1: Regenerative Rehabilitation Technologies Moderator: Randy D. Trumbower, PT, PhD	SOM 110 Auditorium
9:30 - 10:30	Plenary Speaker: Ravi V. Bellamkonda, PhD Dean, Pratt School of Engineering Duke University Title: <i>“Immune Engineering Repair in CNS & PNS”</i>	SOM 110 Auditorium
10:30 - 10:45am	Morning Break	Lobby SOM 110
10:45 - 11:10	Lena H. Ting, PhD Assistant Professor, Biomedical Engineering Emory University and Georgia Institute of Technology Associate Professor, Woodruff School of Mechanical Engineering Georgia Institute of Technology Title: <i>“Neuromechanical Principles Underlying Sensorimotor Modularity: Implications for Rehabilitation”</i>	SOM 110 Auditorium

11:10 - 11:35	Michael L. Boninger, MD UPMC Endowed Vice Chair for Research and Professor, Department of Physical Medicine and Rehabilitation University of Pittsburgh Title: <i>"Brain Computer Interfaces and Regenerative Rehabilitation"</i>	SOM 110 Auditorium
11:35 - 11:45	Oral Presentation by: Brett S. Klosterhoff, BS Georgia Institute of Technology Title: <i>"Wireless Sensors to Monitor Fracture Healing"</i>	SOM 110 Auditorium
11:45am	Group Photo	Lobby SOM 110
Noon - 12:45	Lunch Break: Lunch will be provided Entertainment and additional seating available outside	Lobby SOM 110
12:45 - 2:30pm	Poster Viewing and Networking Sessions	Lobby SOM 110
2:30 - 3:45pm	Session 2: Applied Mechanobiology to Enhance Cellular Therapeutics and Tissue Engineering: Part 1 Moderated by: Michael L. Boninger, MD	SOM 110 Auditorium
2:30 - 2:55	Robert E. Guldberg, PhD The Petit Director's Chair in Bioengineering and Bioscience Executive Director, Parker H. Petit Institute for Bioengineering and Bioscience, Professor, George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology Title: <i>"Mechanical Regulation of Vascularized Bone Regeneration"</i>	SOM 110 Auditorium
2:55 - 3:20	Thomas A. Rando, MD, PhD Professor, Department of Neurology & Neurological Sciences, Director, Glenn Center for the Biology of Aging Stanford University School of Medicine Director, Rehabilitation Research and Development Chief, Neurology Services Palo Alto VA Medical Center Title: <i>"Effects of Exercise on Stem Cell Therapy for Volumetric Muscle Loss"</i>	SOM 110 Auditorium
3:20 - 3:45	George J. Christ, PhD Professor, Departments of Biomedical Engineering & Orthopaedic Surgery, Mary Mullenburg Stamp Professor of Orthopaedic Research, Director, Basic and Translational Research in Orthopaedic Sur- gery, Head, Laboratory of Regenerative Therapeu- tics, Department of Biomedical Engineering University of Virginia Title: <i>"Bioreactors and Biomaterials for Skeletal Muscle Repair and Regeneration"</i>	SOM 110 Auditorium
3:45 - 4:00pm	Afternoon Break	
4:00 - 5:25pm	Session 3: Applied Mechanobiology to Enhance Cellular Therapeutics and Tissue Engineering: Part 1 Moderated by: Fabrisia Ambrosio, PhD, MPT	SOM 110 Auditorium
4:00 - 5:00	Plenary Speaker: Christine L. Mummery, PhD Professor, Developmental Biology Chair, Department of Anatomy and Embryology Leiden University Medical Centre, The Netherlands Title: <i>"Human Pluripotent Stem Cells in Understanding Genetic Cardiovascular Disease and Effects of Drugs"</i>	

5:00 - 5:25	Kenton Gregory, MD Director, OHSU Center for Regenerative Medicine Professor, Division of Cardiovascular Medicine and Department of Biomedical Engineering, School of Medicine Oregon Health and Science University (OHSU) Title: “ <i>Treatment of Severe Extremity Injury Using Autologous Bone Marrow Mononuclear Cells and Focused Rehabilitation</i> ”	SOM 110 Auditorium
5:30 - 6:30pm	Happy Hour and Networking	Lobby Between SOM 110 & 120
6:15 - 6:20pm	Poster Awards Announced Fabrisia Ambrosio, PhD, MPT Associate Professor, Physical Medicine and Rehabilitation University of Pittsburgh And Randy D. Trumbower, PT, PhD Assistant Professor, Department of Rehabilitation Medicine Emory University	Lobby Between SOM 110 & 120
6:20 - 6:30pm	Presentation by: Marcas M. Bamman, PhD Director, Center for Exercise Medicine Director, National Rehabilitation Research Resource to Enhance Clinical Trials (REACT) University of Alabama, Birmingham Title: “ <i>National Research Resources for Regenerative Rehabilitation</i> ”	Lobby Between SOM 110 & 120
6:30 - 7:15pm	<u>Panel Discussion: Advancing Regenerative Rehabilitation: Lessons Learned and Moving Forward</u> Moderator: Marcas M. Bamman, PhD Panel members: George J. Christ, PhD Professor, Departments of Biomedical Eng. and Orthopaedic Surgery, University of Virginia Steven C. Cramer, MD Professor, Departments of Neurology, Anatomy & Neurobiology, and Physical Medicine & Rehabilitation University of California, Irvine, School of Medicine Linda Noble-Haeusslein, PhD Professor, Departments of Neurological Surgery and Physical Therapy and Rehabilitation, University of California, San Francisco Christine L. Mummery, PhD Professor, Developmental Biology and Chair, Dept. of Anatomy and Embryology, Leiden University Medical Center, The Netherlands Steven L. Wolf, PhD, PT, FAPTA, FAHA Professor, Departments of Medicine and Rehabilitation Medicine, Emory University School of Medicine	Lobby Between SOM 110 & 120
7:15pm	Emory tours will include labs by: Randy Trumbower, PT, PhD: InSPIRe lab (Integrate Sensorimotor Plasticity and Interventions to promote Recovery) Trisha Kesar, PT, PhD: MOTIONS lab (Movement Observation To Impact Optimal Neuromuscular Status) Michael Borich, PT, PhD: NPRL lab (Neural Plasticity Research Lab) Lena Ting, PhD: Neuromechanics Lab, is part of the joint Georgia Tech and Emory Department of Biomedical Engineering. Cathrin BueteFisch, MD, PhD Steven L. Wolf, PT, PhD, FAAOMPT	Emory Labs as noted

Agenda – Day 3

Sunday, October 16th

Meeting location:

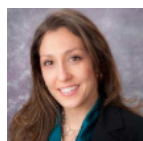
Emory University campus:
James B. Williams Medical Education Building,
Emory University School of Medicine (SOM),
100 Woodruff Circle, NE Atlanta 30329

8:30 - 9:15am	Continental Breakfast Available and Poster removal	Lobby SOM 110
9:00 - 9:05am	Reconvene and Introductions Fabrisia Ambrosio PhD, MPT Associate Professor, Physical Medicine and Rehabilitation University of Pittsburgh	SOM 110
9:05 - 10:30am	Session 4: Modulators of Neural Plasticity and Regeneration Moderated by: Steven L. Wolf, PT, PhD, FAAOMPT	SOM 110
9:05 - 9:30	Sean I. Savitz, MD Professor, Department of Neurology Frank M. Yatsu Chair, Department of Neurology Director, Stroke Program McGovern Medical School University of Texas Medical School, Houston Title: <i>"Cell-based Therapies to Enhance Stroke Recovery"</i>	SOM 110
9:30 - 9:55	Arthur W. English, PhD Professor, Department of Cell Biology Emory University School of Medicine Title: <i>"Enhancing Peripheral Axon Regeneration with Exercise: The Role of Neuronal Activity"</i>	SOM 110
9:55 - 10:20	Steven C. Cramer, MD Professor, Departments of Neurology, Anatomy & Neurobiology, and Physical Medicine & Rehabil- itation, Associate Director, UC Irvine Institute for Clinical & Translational Science, Clinical Director, Sue & Bill Gross Stem Cell Research Center, University of California, Irvine, School of Medicine Title: <i>"Brain Repair After Stroke"</i>	SOM 110
10:20 - 10:30	Oral Presentation by: Susanne Clinch, BSc. Cardiff University, UK Title: <i>"Regenerative Medicine in Huntington's Disease: Optimizing Rehabilitation Strategies Post Transplantation in a Rat Lesion Model"</i>	SOM 110
10:30 - 10:40	Morning Break	Lobby SOM 110
10:40 - 12:55pm	Session 5: Harnessing Intrinsic Tissue Regeneration Through Mechanical Stimulation Moderated: Linda Noble-Haeusslein, PhD	SOM 110
10:40 -11:05	Christopher H. Evans, PhD Professor, Departments of Physical Medicine and Rehabilitation and Orthopedics, Director, Rehabilitation Medical Research Center, Mayo Clinic Maurice Muller Professor of Orthopaedic Surgery Emeritus, Harvard Medical School Title: <i>"Regenerative Rehabilitation Applied to Bone Healing"</i>	SOM 110

11:05 - 11:30	Todd C. McDevitt, PhD Senior Investigator, Gladstone Institute of Cardiovascular Disease Investigator, Roddenberry Center for Stem Cell Biology and Medicine, Gladstone Institutes Professor, Departments of Bioengineering and Therapeutic Sciences, University of California, San Francisco Title: <i>"Mechanics of Multicellular Stem Cell Microenvironments"</i>	SOM 110
11:30 - 11:40	Break	Lobby SOM 110
11:40 - 12:05	Wenchun Qu, MD, MS, PhD Assistant Professor, Departments of Anesthesiology, Pain Medicine and Physical Medicine & Rehabilitation Mayo Clinic Medical School Title: <i>"Stem Cell Technologies for the Treatment of Degenerative Disc Disease"</i>	SOM 110
12:05 - 12:30	Nick J. Willett, PhD Assistant Professor, Department of Orthopaedics Emory University School of Medicine Title: <i>"Mechanical Loading to Enhance Musculoskeletal Regenerative Therapies"</i>	SOM 110
12:30 - 12:55	Gordon L. Warren, III, PhD, FACSM Distinguished University Professor, Department of Physical Therapy Georgia State University Title: <i>"Estrogen Impacts Inflammation and Recovery of Strength Following Traumatic Muscle Injury"</i>	SOM 110
12:55 - 1:00pm	Wrap-up and announcement of the 6th Annual Symposium	SOM 110

BIOGRAPHIES

Course Directors' Biographies:

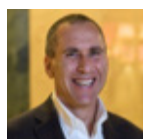


Fabrisia Ambrosio, PhD, MPT

Associate Professor, Department of Physical Medicine and Rehabilitation
McGowan Institute for Regenerative Medicine
University of Pittsburgh
Pittsburgh, PA

Fabrisia Ambrosio, PhD, MPT graduated with a Master of Science in Physiology-Endocrinology from Laval University in Québec City, Québec and a Master of Physical Therapy from the Medical College of Pennsylvania and Hahnemann University. In 2005, Dr. Ambrosio graduated with a PhD in Rehabilitation Science & Technology from the University of Pittsburgh. Also in 2005, she accepted a position as a faculty member in the Department of Physical Medicine & Rehabilitation at the University of Pittsburgh. She holds secondary appointments in the Departments of Physical Therapy, Orthopaedic Surgery, and Microbiology & Molecular Genetics at the University of Pittsburgh, and is a faculty member of the McGowan Institute for Regenerative Medicine.

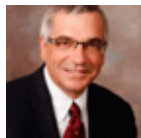
Dr. Ambrosio's research has the long-term goal of developing regenerative rehabilitation approaches to improve the skeletal muscle healing and functional recovery. Her laboratory investigates the underlying mechanisms by which targeted and specific mechanotransductive signals can be used to enhance donor and/or endogenous stem cell function using mouse and human models.



Michael Boninger, MD

UPMC Endowed Vice Chair of Research of Physical Medicine and Rehabilitation
University of Pittsburgh School of Medicine
Pittsburgh, PA

Michael Boninger, MD is a Professor and UPMC Endowed Vice Chair for Research in the Department of Physical Medicine & Rehabilitation at the University of Pittsburgh, School of Medicine. He has joint appointments in the Departments of Bioengineering, Rehabilitation Science and Technology and the McGowan Institute of Regenerative Medicine. He is Senior Medical Director for Post-Acute Care for the Health Services Division of UPMC. He is also a physician researcher for the United States Department of Veterans Affairs. Dr. Boninger has an extensive publication record of over 220 papers. His central research focus is on enabling increased function and participation for individuals with disabilities through development and application of assistive, rehabilitative and regenerative technologies. Dr. Boninger also has extensive experience and publications related to training researchers. His students have won over 50 national awards. Dr. Boninger holds 4 United States patents and has received numerous honors, including being inducted into the Institute of Medicine of the National Academy of Science.

**Anthony Delitto, PhD, PT, FAPTA**

Dean, School of Health and Rehabilitation Sciences
Professor, Department of Physical Therapy
University of Pittsburgh
Pittsburgh, PA

Anthony Delitto, PhD, PT, FAPTA is a Professor in the Department of Physical Therapy and the SHRS Dean of the School of Health and Rehabilitation Sciences at the University of Pittsburgh. He is also Vice President for Education and Research Centers for Rehabilitation Services, the largest physical and occupational therapy provider for the UPMC. Dr. Delitto earned his BS in Physical Therapy from SUNY-Buffalo and his MHS/PT and PhD in Psychology from Washington University in St. Louis, Missouri.

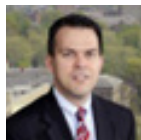
Dr. Delitto is primarily interested in conducting evidence-based studies in rehabilitation settings, particularly in populations who have musculoskeletal dysfunction (e.g., low back pain). Most recent completed studies include, "A Randomized Clinical Trial of Treatment for Lumbar Spinal Stenosis" (NIH/NIAMS 1R01AR/NS45622), in which patients diagnosed with lumbar spinal stenosis and consented to surgery were randomly assigned to surgical versus non-surgical intervention and followed initially (6 weeks) and at 2 years after intervention. He is also the site PI for the study, "Exploratory Study of Different Doses of Endurance Exercise in People with Parkinson Disease: The SPARX Study" (NINDS 1 R01 NS074343), a Phase II study which is to determine the futility or non-futility of conducting a Phase III randomized controlled trial to determine the effects on function of exercise regimens in patients with Parkinson's disease (the SPARX study).

Dr. Delitto was a member of the recently convened Chronic Low Back Pain Task Force at NIH. He is a Catherine Worthingham Fellow of the American Physical Therapy Association (APTA) and has received numerous awards and recognitions from APTA, including the Mary McMillan (2008) and the John HP Maley Lecture Awards, the Lucy Blair Service Award, the Marion Williams Award for Research, and the Helen J. Hislop Award for Outstanding Contributions to Professional Literature. He is a six-time winner of the Orthopaedic Section, APTA's Steven J. Rose Award for Excellence in Clinical Research.

**Thomas A. Rando, MD, PhD**

Professor, Department of Neurology and Neurological Sciences
Stanford University School of Medicine
Director of the Rehabilitation Research & Development and
Chief of Neurology, Palo Alto VA Medical Center
Stanford, CA

Thomas A. Rando, MD, PhD is Professor of Neurology and Neurological Sciences and Director of the Glenn Center for the Biology of Aging at Stanford University School of Medicine. He is also Chief of Neurology at the Palo Alto VA Medical Center where he is Director of the Rehabilitation Research & Development program whose focus is the emerging field of regenerative rehabilitation. Research in the Rando laboratory concerns the basic biology of stem cells, how stem cells function in adult tissue homeostasis, and how their function is altered in during aging and in response to physical activity. Groundbreaking work from his laboratory showed that much of the age-related decline in stem cell function is due to influences of the aged environmental and can be reversed by exposing the aged cells to a youthful systemic environment. Dr. Rando has received numerous awards, including a Paul Beeson Physician Faculty Scholar in Aging, a Senior Scholar Award from the Ellison Medical Foundation, and a "Breakthroughs in Gerontology" Award from the American Federation for Aging Research. In 2005 he received the prestigious NIH Director's Pioneer Award for his work at the interface between stem cell biology and the biology of aging, and in 2013 he received a Transformative Research Award from the NIH to study the mechanisms of the benefits of physical activity on tissues and stem cells throughout the body, with a particular focus on the "muscle-brain axis" and how muscle activity leads to enhanced neurogenesis and cognitive function.

**William R. Wagner, PhD**

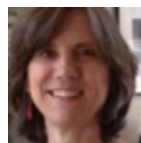
Director, McGowan Institute for Regenerative Medicine
Professor of Surgery, Bioengineering & Chemical Engineering
University of Pittsburgh
Pittsburgh, PA

William R. Wagner, PhD is the Director of the McGowan Institute for Regenerative Medicine as well as a Professor of Surgery, Bioengineering and Chemical Engineering at the University of Pittsburgh. He also serves as the Director of Thrombosis Research for the Artificial Heart and Lung Program, and Deputy Director of the NSF Engineering Research Center on "Revolutionizing Metallic Biomaterials". He holds a B.S. (Johns Hopkins Univ.) and Ph.D. (Univ. of Texas) in Chemical Engineering. Dr. Wagner is the Coordinator for the Cellular and Organ Engineering track for Bioengineering graduate students, and currently teaches in the areas of biomaterials and tissue engineering.

Professor Wagner is the Founding Editor and Editor-in-Chief of one of the leading biomaterials journals, "Acta Biomaterialia", and currently serves on the editorial boards of the "Journal of Biomedical Materials Research part A", "Biotechnology and Bioengineering", and the "Journal of Tissue Engineering and Regenerative Medicine". Dr. Wagner is also a past president of the American Society for Artificial Internal Organs (ASAIO; 2010-2011) and serves on the Executive Board of the International Federation of Artificial Organs (IFAO). He is a fellow and former vice president of the American Institute for Medical and Biological Engineering (AIMBE; 2000) and has also been elected a fellow of the Biomedical Engineering Society (2007), the International Union of Societies for Biomaterials Science and Engineering (2008) and the American Heart Association (2001). He has served as Chairman for the Gordon Research Conference on Biomaterials: Biocompatibility & Tissue Engineering as well as for the First World Congress of the Tissue Engineering and Regenerative Medicine International Society (TERMIS). In 2006 he was selected to the "Scientific American 50", the magazine's annual list recognizing leaders in science and technology from the research, business and policy fields. In 2011 he was awarded the Society for Biomaterials Clemson Award for Applied Research. He has served on numerous NIH and NSF study sections, is a member of the NIH College of Reviewers, and has been a member of external review committees for national and international organizations focused on bioengineering and regenerative medicine. His research has generated numerous patents and patent filings that have resulted in licensing activity, the formation of a company, and University of Pittsburgh Innovator Awards in 2007, 2008, 2009 and 2010.

Dr. Wagner's research interests are generally in the area of cardiovascular engineering with projects that address medical device biocompatibility and design, tissue engineering, and targeted imaging. His research group is comprised of graduate students in Bioengineering and Chemical Engineering as well as post-doctoral fellows with backgrounds in surgery, polymer chemistry, or engineering. Dr. Wagner and his group enjoy working across the spectrum from in vitro to clinical studies. The McGowan Institute and the University of Pittsburgh Medical Center are uniquely positioned to allow such broad-based projects to flourish and complement one another. Researchers within Dr. Wagner's group are afforded the opportunity to observe first-hand the clinical successes and failures of currently employed cardiovascular devices while concurrently working on projects that attempt to describe the current modes of failure, test solutions for the current device shortcomings, or develop technologies that may find application as future cardiovascular therapies. The front-line experience afforded by the clinical environment has proven invaluable in the learning experience of group members, not to mention the input such experience has on the creative environment.

Associate Course Director Biography:

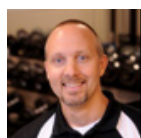


Linda J. Noble-Haeusslein, PhD

Alvera Kan Endowed Chair and Professor, Departments of Neurological Surgery and Physical Therapy and Rehabilitation Services
University of California, San Francisco
San Francisco, CA

Linda J. Noble-Haeusslein, PhD, is Professor and Alvera Kan Endowed Chair, Departments of Neurological Surgery and Physical Therapy and Rehabilitation Services at the University of California at San Francisco. The Noble-Haeusslein laboratory studies key determinants of injury and repair in models of traumatic injury to the developing brain and the adult spinal cord. The focus is on the intersection between the innate immune response, matrix metalloproteinases, and specific receptors on leukocytes that modulate demyelination. A second area of research addresses stem cells as modifiers of circuitry that control bladder function and nociception in the injured spinal cord. Using embryonic medial ganglionic eminence cells, the primary source of GABAergic inhibitory interneurons, ongoing studies are evaluating their ability to modify synaptic function and reduce hyperexcitability in circuitry that are responsible for bladder dyssynergia and pain syndromes. Dr. Noble-Haeusslein has recently completed service as a regular member and chair of the NINDS NSDA study section and has contributed to three Institute of Medicine Committees that have addressed traumatic brain injury from the perspectives of its long term consequences and early nutritional support. Her studies on traumatic CNS injuries are funded by the Department of Defense, NIH/NINDS, Craig H. Neilsen Foundation, and the California Institute For Regenerative Medicine.

Speaker Biographies



Marcas M. Bamman, PhD

Director, Center for Exercise Medicine
Director, National Rehabilitation Research Resource to Enhance Clinical Trials (REACT)
University of Alabama, Birmingham
Birmingham, AL 35294-0005

Dr. Bamman is a Professor in the UAB Departments of Cell, Developmental, and Integrative Biology, Medicine, and Neurology; Director of the UAB Center for Exercise Medicine (UCEM, >175 members); and Director of the Core Muscle Research Laboratory in the Birmingham/Atlanta VA Geriatric Research, Education, and Clinical Center (GRECC). Dr. Bamman is the Principal Investigator/Program Director of the new NIH National Rehabilitation Research Resource to Enhance Clinical Trials (REACT, P2CHD086851); Director of the Coordinating Center for the NIH National Medical Rehabilitation Research Resource (MR3) Network; and Founding Director of the 68-site, CTSA Consortium-affiliated National Exercise Clinical Trials Network (NExTNet) – all of which are designed to foster and increase the scientific rigor and impact of clinical trials. Over the years he has directed several exercise clinical trials including randomized dose-response trials (e.g., NIH, NCT02442479), and he is currently the Principal Investigator of four, multi-site randomized exercise trials focused on: (i) total joint arthroplasty rehabilitation (NIH, NCT02628795); (ii) aging with mobility impairment (NIH, NCT02308228); (iii) Parkinson's disease (Curry Foundation); and (iv) epigenetic determinants of exercise responsiveness (Department of Defense). All of his human studies are biologically driven – centered on cellular/ molecular analyses of biospecimens and primary stem cells coupled with thorough in vivo phenotyping in healthy (19 to 83 y/o) and diseased – to better understand mechanisms of exercise-induced improvements in neuromuscular function and muscle mass/quality in the face of atrophy and dysfunction in acute (e.g., surgery, trauma, disuse, burn) or chronic (e.g., Parkinson's, arthritis, cancer, spinal cord injury) conditions. Finally, Dr. Bamman has served on >30 federal review panels and NIH study sections, including a 4-year term serving the NIH/CSR Skeletal Muscle and Exercise Physiology (SMEP) study section.

**Ravi V. Bellamkonda, PhD**

Dean, Pratt School of Engineering
Duke University
Durham, NC 27708-0144

Ravi Bellamkonda, a renowned biomedical engineer who has led one of the top-ranked departments in the country, is the new Vinik Dean of the Pratt School of Engineering at Duke University. Dr. Bellamkonda was the Wallace H. Coulter Professor and chair of the Wallace H. Coulter Department of Biomedical Engineering at Georgia Institute of Technology and Emory University, a unique collaboration between the two Atlanta institutions at which he held a joint faculty appointment. Dr. Bellamkonda succeeds Tom Katsouleas, who was named provost of the University of Virginia in 2015.

As chair, Dr. Bellamkonda helped develop programs to sustain deep student learning and entrepreneurship at the undergraduate level. He also directed an NIH-funded training grant on the Rational Design of Biomaterials, initiated a novel graduate leadership program for bioengineering graduate students, and is co-principal investigator for the Emory-Georgia Tech- Morehouse College Clinical and Translational Science Award (CTSA) grant.

Dr. Bellamkonda's own research involves an exploration of the interplay of biomaterials and the nervous system for designing novel brain-machine interfaces, using immunomodulation to foster nerve repair and design devices for brain tumor therapy. It is supported by grants from the National Institutes of Health, the National Science Foundation, Ian's Friends Foundation, Georgia Research Alliance and the Marcus Foundation.

A graduate of Osmania University (India) who received his Ph.D. from Brown University and did post-doctoral training at MIT, Dr. Bellamkonda started his career at Case Western Reserve before moving to the Coulter Department of Biomedical Engineering in 2003. From 2010-2013, he served as associate vice president for research at Georgia Tech, where he led programs to enhance translational research, technology transfer and programs that encourage innovation in research and education and faculty development.

Dr. Bellamkonda is the president of the American Institute for Biological and Medical Engineering (AIMBE), a policy advocacy group, and is a frequent consultant on biomedical engineering research and education. He's the recipient of numerous honors, including the Clemson Award for Applied Research from the Society for Biomaterials, the EUREKA award from the National Cancer Institute, a CAREER award from the National Science Foundation, and the best professor award from the Georgia Tech BME students.

**George J. Christ, PhD**

Professor, Departments of Biomedical Engineering & Orthopaedic Surgery, Mary Muilenburg Stamp Professor of Orthopaedic Research, Director, Basic and Translational Research in Orthopaedic Surgery, Head, Laboratory of Regenerative Therapeutics, Department of Biomedical Engineering, University of Virginia
Charlottesville, VA 22904

Dr. George Christ is Professor of BME and Orthopaedic Surgery, Mary Muilenburg Stamp Professor of Orthopaedic Surgery, and Director of Basic Science & Translational Research for Orthopaedic Surgery, University of Virginia.

Dr. Christ is the Past Chairman of the Division of Systems and Integrative Pharmacology of the American Society of Pharmacology and Experimental Therapeutics (ASPET), and Past President of the North Carolina Tissue Engineering and Regenerative Medicine (NCTERM) group. He is on the Editorial Board of five journals and is an ad-hoc reviewer for 2 dozen others.

Dr. Christ has authored 214 scientific publications and is co-editor of a book on integrative smooth muscle physiology and another on regenerative pharmacology. Dr. Christ has served on both national and international committees related to his expertise in muscle physiology, and on NIH study sections in the NIDDK, NICHD, NCRR and NHLBI. He has chaired working groups for both the NIH and the World Health Organization.

Dr. Christ is a co-inventor on more than 26 patents (national and international) that are either issued or pending, related to gene therapy for the treatment of human smooth muscle disorders and tissue engineering technologies. Dr. Christ has also been the driving scientific force behind the preclinical studies and IND approvals supporting three Phase I clinical trials for gene therapy for benign human smooth muscle disorders. He is also spearheading the development of a tissue engineered muscle repair (TEMR) technology platform for the treatment of Wounded Warriors, as part of the AFIRM consortium. An IND for a first-in-man pilot study will soon be submitted to further develop this technology for treatment of cleft lip. Dr. Christ has been extensively involved in basic and translational studies of regenerative medicine directed toward vessel tissue engineering and bladder regeneration, and most recently, regenerative pharmacology.

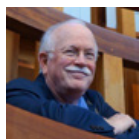


Steven C. Cramer, MD

Professor, Departments of Neurology, Anatomy & Neurobiology, and Physical Medicine & Rehabilitation, Associate Director, UC Irvine Institute for Clinical & Translational Science, Clinical Director, Sue & Bill Gross Stem Cell Research Center, University of California, Irvine, School of Medicine
Irvine, CA 92697

Dr. Steven C. 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 plus and a fellowship in cerebrovascular disease at Massachusetts General Hospital. He also earned a Masters Degree in Clinical Investigation from Harvard Medical School.

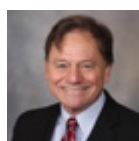
His research focuses on neural repair after central nervous system injury in humans, with an emphasis on stroke and recovery of movement. Treatments examined include robotic, stem cell, brain stimulation, pharmacologic, and telehealth methods. A major emphasis is on translating new drugs and devices 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 200 manuscripts.



Arthur W. English, PhD

Professor, Department of Cell Biology
Emory University, School of Medicine
Atlanta, GA 30322

My background is in neuroanatomy and neurophysiology. My research record includes studies in both the peripheral nervous system and the spinal cord and has been a melding of cellular and systems/integrative Neuroscience. For the past 12 years, I have studied ways in which axon regeneration and target reinnervation can be enhanced after injury to peripheral nerves. This work has identified moderate exercise as an experimental therapy to promote axon regeneration after peripheral nerve injury and probed the mechanism of action of brief electrical stimulation in doing the same. Using mouse genetics as a research tool, we have demonstrated that the effects of exercise require neuronal BDNF/trkB signaling. Using optogenetics and chemogenetics, we have shown that increased activity of the injured neurons is both sufficient to promote regeneration of their axons and also necessary for the enhancing effect of exercise.



Christopher H. Evans, PhD

Professor, Departments of Physical Medicine and Rehabilitation and Orthopedics, Director, Rehabilitation Medical Research Center
Mayo Clinic
Maurice Muller Professor of Orthopaedic Surgery Emeritus,
Harvard Medical School

Christopher Evans is Professor of Physical Medicine & Rehabilitation and Orthopedics at the Mayo Clinic. He is also the Maurice Müller Professor of Orthopaedic Surgery Emeritus at Harvard Medical School.

Trained in molecular biology in Europe, he came to the University of Pittsburgh Medical School, rising through the ranks to become the inaugural Henry Mankin Professor of Orthopaedic Surgery and Professor, Department of Molecular Genetics and Biochemistry. While at the University of Pittsburgh he obtained a MA in the History and Philosophy of Science. In 1994, he was awarded a D.Sc. by the University of Wales. He was recruited to Harvard Medical School in 1999 and to the Mayo Clinic in 2013.

Dr. Evans's research interests focus on the application of biological therapies, particularly gene therapy, to the treatment of disorders of bones and joints, a field he pioneered. He was PI on the world's first arthritis gene therapy clinical trial and is developing gene therapies for bone healing and cartilage repair.

Dr. Evans is Past-President of the Orthopaedic Research Society and is a Fellow of the Royal Society of Chemistry and the Royal College of Pathologists. He is the recipient of the Kappa Delta Award for Orthopaedic Research, The Marshall Urist Award for Excellence in Tissue Regeneration Research, and the Arthur Steindler Award for significant contributions to the understanding of the musculoskeletal system.

**Dr. Max Gomez**

CBS News Medical Correspondent
Medical News Journalist

Award-winning broadcast journalist Dr. Max Gomez rejoined WCBS-TV as a medical reporter in June 2007.

The recipient of numerous journalism awards, Dr. Gomez has received seven New York Emmy Awards, two Philadelphia Emmys, a UPI honor for Best Documentary for a report on AIDS, and an Excellence in Time of Crisis Award from New York City after September 11. In addition, Dr. Gomez received national television journalism awards from the National Marfan Foundation and from the Leukemia Society of America for his report on two twin girls from Long Island, both suffering from Leukemia, who got bone marrow transplants from their seven-year-old sister. He was also named the American Health Foundation's Man of the Year and was a NASA Journalist-In-Space semi-finalist in 1986.

Dr. Gomez has served on the national board of directors for the American Heart Association, the Princeton Alumni Weekly and the Partnership for After School Education. He also mentors undergraduate journalism and medical students and physicians who are interested in medical journalism.

Dr. Gomez has been on the board of advisers for the Science Writers Fellowship at the Marine Biological Laboratory in Woods Hole, Mass.; the Hope and Heroes Children's Cancer Fund at the Children's Hospital of New York; is a member of the honorary board of the Long Island Chapter of the Crohn's and Colitis Foundation of America; and served as the grand marshal of the Multiple Sclerosis Walk for over a decade. Dr. Gomez is also the co-author of "The Healing Cell: How the Greatest Revolution in Medical History is Changing Your Life", a primer on the numerous uses of adult stem cells in treating and curing diseases. It includes an introductory message from Pope Benedict XVI. He also co-authored "The Prostate Health Program: A Guide to Preventing and Controlling Prostate Cancer," which explains how an innovative program consisting of diet, exercise and lifestyle changes may prevent prostate cancer. Previously, Dr. Gomez served as Health and Science Editor for WNBC-TV.

Gomez joined WNBC-TV in 1997 after serving as the medical reporter/health editor for WCBS-TV from 1994 to 1997. Prior to that, he was the health and science editor for KYW-TV in Philadelphia and the health and science reporter/editor for WNEW-TV.

A native of Havana, Cuba, Dr. Gomez speaks Spanish. He graduated cum laude from Princeton University, with a Ph.D. from the Wake Forest University School of Medicine. He was also a N.I.H. Postdoctoral Fellow at New York's Rockefeller University. Dr. Gomez currently resides in New York City.

**Kenton Gregory, MD**

Director, OHSU Center for Regenerative Medicine
Professor, Division of Cardiovascular Medicine and
Department of Biomedical Engineering, School of Medicine
Oregon Health and Science University (OHSU)

Kenton Gregory, MD is the founding director of the OHSU Center for Regenerative Medicine and a professor in the OHSU Department of Biomedical Engineering. He is a pioneering physician-bioengineer internationally recognized for his breakthroughs in the development of lifesaving medical products. He holds more than 40 domestic and international patents and has served as principal investigator on five FDA-sponsored clinical trials. Dr Gregory has been a program leader for the Armed Forces Institute for Regenerative Medicine (AFIRM) for the past 8 years Gregory received his undergraduate degree in chemical engineering and doctorate in medicine from the University of Southern California. He has held teaching positions at the UC Irvine Medical School, Harvard University School of Medicine and OHSU. Dr. Gregory is a Fellow of the American College of Cardiology, Fellow of the American Institute of Biomedical Engineering and an Intellectual Ventures Fellow.

At the OHSU Center for Regenerative Medicine, Dr Gregory is the PI initiating a First In Man FDA Clinical Trial for the Use of Autologous Bone Marrow Mononuclear Cells to Treat Severe Extremity Injury. He also leads regenerative medicine research efforts for the use of adult stem and progenitor cells for heart, skin, nerve, spinal cord, and vascular regeneration as well as the use of cells to treat acute respiratory distress syndrome in DoD and DARPA supported research. Dr Gregory is co-inventor of technologies to assess stem cell functionality.

Gregory has launched seven spin-off companies since 1991 — three of which are headquartered in Oregon. He was co-founder of Tissue Genesis Inc that is conducting several clinical trials in regenerative medicine. He was the founder of the Oregon Medical Laser Center at Providence St. Vincent Medical Center, where he held an endowed chair in laser medicine and surgery, and he is a practicing cardiologist.

**Robert E. Guldberg, PhD**

The Petit Director's Chair in Bioengineering and Bioscience
Executive Director, Parker H. Petit Institute for Bioengineering and Bioscience, Professor, George W. Woodruff School of Mechanical Engineering
Georgia Institute of Technology

Robert E. Guldberg is the Parker H. Petit Chair in Bioengineering and Bioscience. He is a Professor in the Georgia Institute of Technology's Woodruff School of Mechanical Engineering and Georgia Tech/Emory Department of Biomedical Engineering. Dr. Guldberg received all of his degrees from the University of Michigan in mechanical engineering and bioengineering and completed a post-doctoral fellowship in molecular biology. His research program funded by grants from the NIH, NSF, and DOD is focused on musculoskeletal growth and development, regeneration of limb function following traumatic injury, degenerative diseases such as skeletal fragility and osteoarthritis, and novel orthopaedic devices. Dr. Guldberg has advised 47 post-doctoral fellows and graduate students over the past 20 years and published over 200 peer-reviewed papers and book chapters. In 2009, Dr. Guldberg was appointed Executive Director of the Petit Institute for Bioengineering and Bioscience (IBB) (<http://www.ibb.gatech.edu/>). Under his leadership, the Petit Institute has grown to include over 180 faculty members from a broad range of science, engineering, and clinical disciplines, 17 interdisciplinary research centers, and three graduate programs in bioengineering, bioinformatics, and quantitative biosciences. Dr. Guldberg also co-directs the GT/Children's Healthcare of Atlanta (CHOA) Center for Pediatric Innovation (CPI), co-chairs the Extremity Trauma Focus Area of the Armed Forces Institute for Regenerative Medicine (AFIRM) and is past co-director of the GT/Emory/UGA Center for Regenerative Engineering and Medicine (REM). Dr. Guldberg serves on numerous advisory and editorial boards and has held several national leadership positions, including most recently President of the Americas Chapter of the Tissue Engineering and Regenerative Medicine International Society (TERMIS-AM). Dr. Guldberg is a Children's Healthcare of Atlanta research scholar and has been elected a Fellow of TERMIS, the American Society of Mechanical Engineers (ASME), and the American Institute for Medical and Biological Engineering (AIMBE).

**Todd C. McDevitt, PhD**

Senior Investigator, Gladstone Institute of Cardiovascular Disease
Investigator, Roddenberry Center for Stem Cell Biology & Medicine,
Gladstone Institutes
Professor, Departments of Bioengineering and Therapeutic Sciences
University of California, San Francisco

Todd McDevitt, Ph.D. is a Senior Investigator at the Gladstone Institutes and a Professor in the Department of Bioengineering and Therapeutic Sciences at the University of California, San Francisco. Previously, Dr. McDevitt was the Carol Ann and David D. Flanagan Professor in the Wallace H. Coulter Department of Biomedical Engineering at the Georgia Institute of Technology and Emory University, founding Director of the Stem Cell Engineering Center at Georgia Tech, and a Faculty Member and former Petit Faculty Fellow in the Parker H. Petit Institute for Bioengineering and Bioscience at Georgia Tech. The objective of Dr. McDevitt's research program is to develop enabling technologies for the directed differentiation and morphogenesis of stem cells for regenerative medicine, models of development and disease, and diagnostic applications. Much of the research in the McDevitt laboratory focuses on the application of microscale technologies to engineer stem cell fate and probe mechanisms of tissue engineering, as well as provide scalable and robust approaches for stem cell bioprocessing and engineering regenerative molecular therapies from stem cells. He has received several honors and awards, including a New Investigator Award from the American Heart Association (2004), the Society for Biomaterials Young Investigator Award (2010), recognized as one of the "40 Under 40" by Georgia Trend magazine (2013), and was inducted in the American Institute of Medical and Biological Engineering (AIMBE) College of Fellows (2014). In addition, Dr. McDevitt received the Petit Institute Interdisciplinary Research and Education Award (2009), the Georgia Tech Junior Faculty Outstanding Undergraduate Research Mentor Award (2010), the "Above and Beyond" (Eagle) Award from the Georgia Tech Biomedical Engineering Department (2011) and Best Advisor Award for the Georgia Tech Bioengineering Graduate Program (2013).

Dr. McDevitt graduated cum laude with a Bachelor of Science in Engineering (B.S.E.) from Duke University in 1997 double majoring in Biomedical and Electrical Engineering, received his Ph.D. in Bioengineering from the University of Washington in 2001, and conducted postdoctoral research in the Department of Pathology at the University of Washington from 2002-04. He spent 10 years at Georgia Tech (2004-14) before moving to the Gladstone Institutes after receiving a California Institute for Regenerative Medicine (CIRM) Research Leadership Award.

**Christine L. Mummery, PhD**

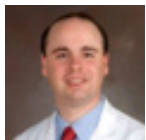
Professor, Developmental Biology
Chair, Department of Anatomy and Embryology
Leiden University Medical Centre, The Netherlands

Christine Mummery studied physics at the University of Nottingham, UK and has a PhD in Biophysics from the University of London. After positions and postdoc and tenured group leader at the Hubrecht Institute, she became professor at the UMC Utrecht in 2002. In 2008, she became Professor of Developmental Biology at Leiden University Medical Centre in the Netherlands and head of the Department of Anatomy and Embryology. Her research concerns heart development and the differentiation of pluripotent human stem cells into the cardiac and vascular lineages and using these cells as disease models, for safety pharmacology, drug discovery and future cardiac repair. She is a member of the Royal Netherlands Academy of Science (KNAW), and board member of the International Society of Stem Cell research (ISSCR), the KNAW and the Netherlands Medical Research Council (ZonMW). She was recently awarded the Hugo van de Poelgeest Prize for Animal Alternatives in research. She co-authored a popular book on stem cells "Stem Cells: scientific facts and Fiction" in 2011 (2nd edition 2014) and is editor in chief of the ISSCR journal Stem Cell Reports.

**Wenchun Qu, MD, MS, PhD**

Assistant Professor, Departments of Anesthesiology,
Pain Medicine and Physical Medicine & Rehabilitation
Mayo Clinic Medical School

Dr. Wenchun Qu received his MD from Second Military Medical University in Shanghai, China, in 1990; his MS in Biostatistics from University of Southern California in Los Angeles, CA, in 2002; and his PhD in Occupational Sciences from University of Southern California in Los Angeles, CA, in 2003. Dr. Qu completed a post-doctoral fellowship in Physical Medicine and Rehabilitation at the University of Pennsylvania in 2008; internship in the Department of Medicine at Nassau University Medical Center, East Meadow, NY; residency in Physical Medicine and Rehabilitation at Mayo Clinic, Rochester, MN, in 2012; and Pain Medicine fellowship at Mayo Clinic, Rochester, MN, in 2013 before joining the Mayo Clinic staff. He is active in teaching and research with more than 30 publications in peer-reviewed journals. Dr. Qu's research team has engaged in a variety of research efforts to direct mesenchymal stem cells (MSCs) toward nucleus pulposus and cartilage tissues, to assess the efficacy of MSCs for treatment of painful degenerative disc conditions, osteoarthritis of synovial joints and sacroiliac joints, and to develop delivery technology for MSC transplantation. These efforts include genome studies of the nucleus pulposus cells and chondrocytes, investigation on cytotoxicity of radiology contrast and local anesthetics, and clinical trials of MSC application for discogenic pain and facetogenic pain. The ultimate goal is to establish pain and musculoskeletal regenerative medicine as the new therapeutic modality for joint and spine conditions.

**Sean I. Savitz, M.D.**

Professor and Frank M. Yatsu Chair in Neurology
McGovern Medical School
University of Texas Medical School at Houston

Sean I. Savitz, MD is a tenured Professor of Neurology, holds the Frank M. Yatsu Chair in Neurology, and directs the Stroke Program at the University of Texas Medical School in Houston. He graduated from Harvard College, received his MD from Albert Einstein College of Medicine, and completed neurology residency training and a cerebrovascular fellowship at the Harvard Medical School Neurology Training Program. He and his team run one of the largest academic stroke programs in the world, testing novel treatments for patients with ischemic stroke and brain hemorrhage. Dr. Savitz oversees a bidirectional, translational laboratory and clinical research program on cell therapies in stroke and is conducting some of the first clinical trials testing cell therapies in stroke patients. He has been funded by grants from the National Institute of Health, the Howard Hughes Medical Institute, and the American Heart Association, and is an author of over 100 publications in the biomedical literature.

**Lena H. Ting Ph.D.**

Assistant Professor, Biomedical Engineering
Emory University and Georgia Institute of Technology
Associate Professor, Woodruff School of Mechanical Engineering
Georgia Institute of Technology

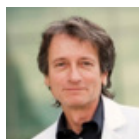
Dr. Ting is a Professor in the W.H. Coulter Department of Biomedical Engineering at Emory University and Georgia Institute of Technology. She received a B.S. in Mechanical Engineering at the University of California at Berkeley, an M.S.E. in Biomechanical Engineering and Ph.D. in Mechanical Engineering from Stanford University. She received postdoctoral training in neurophysiology at the University of Paris V, and Oregon Health and Sciences University. Her research in neuromechanics focuses on the sensorimotor interactions between brain, body, and environment at the level of muscular coordination during balance and gait in humans and animals using methods from neurophysiology, rehabilitation, robotics, and biomechanics. She uses experimental and computational methods to understand the neural basis of the structure and variability of sensorimotor patterns and has several collaborations to use such methods to understand of gait and balance deficits and mechanisms of rehabilitation in stroke, spinal cord injury, Parkinson's disease, and lower limb loss

**Randy D Trumbower, PT, PhD**

Assistant Professor, Department of Rehabilitation Medicine
Emory University

Dr. Trumbower is an Assistant Professor and Director of Research within the Department of Rehabilitation Medicine, Division of Physical Therapy, Emory University. He also holds a joint appointment with the Department of Biomedical Engineering, Emory University and Georgia Tech.

My career goals are to formulate new knowledge and evidence for physical therapy practice and to foster leadership through research, teaching and service. I am committed to an academic career with emphasis on translating mechanistic research to evidence-based clinical application in the field of neurologic rehabilitation. My research goal is to develop robust interventions aimed to improve physical abilities for people with stroke and spinal cord injury. I also am deeply committed on preparing outstanding researchers, biomedical engineers, and evidence-based practitioners to help advance our profession.



Mark H. Tuszynski, MD, PhD
Professor, Department of Neurosciences
Director, Center for Neural Repair
University of California, San Diego

In his research program, Dr. Tuszynski seeks to gain a greater understanding of the role of neurotrophic factors in axonal growth and cell survival in the intact and injured adult central nervous system.

Dr. Tuszynski's research bridges basic mechanisms of neurobiological function and clinical translation. He initiated the first human trial of gene therapy for an adult neurodegenerative disorder — Alzheimer's disease (AD) — in April 2001. In that study, he delivered human nerve growth factor to the cholinergic basal forebrain to determine whether cholinergic cell loss can be reduced and cholinergic function amplified in people with AD.

Current Tuszynski Laboratory Research Topics: Biological Basis of Normal Learning and Memory Hypothesis: Growth factors modulate alterations in neuronal structure and function to physically represent experience in cortical neuronal systems.

This research program aims to identify neural mechanisms that lead to the representation of long-term experience (memory) in the brain. Learning in motor systems in the cortex is a key model in these studies. Neurodegeneration, Aging, and AD Hypothesis: Neurons undergo functional decline in aging as a result of a combination of cell dysfunction and, in limited regions, cell death. Growth factors can ameliorate both cellular dysfunction and death in animal models of aging and degeneration, including AD. This research is identifying mechanisms that underlie age-related loss of function in the nervous system. The therapeutic potential of gene delivery of growth factors is being explored as a possible treatment for age-related diseases such as AD and Parkinson's disease.

Spinal Cord Injury (SCI) Hypothesis: Combinatorial therapeutic strategies can enhance axonal plasticity and regeneration after acute and chronic SCI.

The failure of the spinal cord to regenerate after injury is caused by (1) lack of production of growth-promoting substances such as growth factors in the injury site, (2) lack of permissive bridges for axon growth within injury sites, (3) deficiency of strong signals for the injured cell to re-enter an active growth state, and (4) blockade of growth by inhibitors in the injured region.

This research program tests the ability of cells and growth factors to promote regeneration after SCI. Tested cells include stem cells, autologous bone marrow cells, Schwann cells, and fibroblasts. The Tuszynski group is examining both acute and chronic models of SCI.

**Stuart J. Warden, BPhysio (Hons), PhD, FACSM**

Associate Dean of Research, Indiana University School of Health and Rehabilitation Sciences, Associate Professor, Departments of Physical Therapy (School of Health and Rehabilitation Sciences), Anatomy & Cell Biology (IU School of Medicine) and Biomedical Engineering (Purdue University, School of Engineering)
Indiana University –Purdue University Indianapolis (IUPUI)

Stuart J. Warden is Associate Dean for Research within the Indiana University (IU) School of Health and Rehabilitation Sciences, and an Associate Professor within the Departments of Physical Therapy (IU School of Health and Rehabilitation Sciences), Anatomy & Cell Biology (IU School of Medicine), and Biomedical Engineering (Purdue University School of Engineering). Dr. Warden is also the founding director of the IU Center for Translational Musculoskeletal Research.

Dr. Warden completed his physiotherapy and PhD degrees at the University of Melbourne before embarking on clinical and research post-doctorates at the Australian Institute of Sport and IU Department of Orthopedic Surgery, respectively. Stuart's research interests are diverse, and include the study of the normal physiology and healing of connective tissues, including bone, muscle, tendon and ligament. He has particular interest in the study of mechanical loading effects on the musculoskeletal system, and has published in leading journals including the Proceedings of the National Academy of Sciences and Lancet Diabetes and Endocrinology, as well as a diverse array of other leading journals.

For his research endeavors, Dr. Warden has been awarded funds from the National Institutes of Health and Department of Defense, and he has been the recipient of awards from the American College of Sports Medicine, American Society of Bone and Mineral Research, Orthopaedic Research Society, and Sports Medicine Australia.

Dr. Warden has contributed to over 100 peer-reviewed publications, and he currently serves as an Section Editor for Current Osteoporosis Reports, Associate Editor for the British Journal of Sports Medicine, Journal of Musculoskeletal and Neuronal Interactions, and Journal of Orthopedic and Sports Physical Therapy, and Editorial Board member for Bone, Bone Reports, Journal of Bone and Mineral Research, and Journal of Science and Medicine in Sport.

**Gordon L. Warren, III, PhD, FACSM**

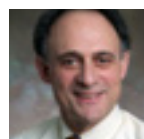
Distinguished University Professor,
Department of Physical Therapy
Georgia State University

Dr. Gordon Warren is a Distinguished University Professor in the Department of Physical Therapy at Georgia State University in Atlanta. He has joint appointments at Georgia Tech in the School of Applied Physiology and at the U.S. Army Institute of Surgical Research in San Antonio. Dr. Warren has published 84 research articles that have been cited over 6100 times in the peer-reviewed literature. His central research focus has been on understanding the cellular and molecular mechanisms that are responsible for the strength losses and recovery therefrom following several different types of skeletal muscle injuries, to include traumatic injuries mimicking battlefield wounds of the extremities. He is one of few PhD researchers of such injuries to have battlefield experience and to have possessed airborne and ranger qualifications in the U.S. Army.

**Nick J. Willett, PhD**

Assistant Professor, Department of Orthopaedics
Emory University School of Medicine

I am an assistant professor in the Department of Orthopaedics at the Emory University School of Medicine. In the musculoskeletal field a limiting factor in addressing unmet clinical needs has been that the musculoskeletal system is often studied and treated as independent tissues rather than functionally integrated units. My overall research has focused on a systems integration approach to musculoskeletal disease and regenerative engineering by applying novel imaging and engineering approaches to mechanistic biology problems. My current work has three main thrusts: (i) cell and biologic therapies for the healing of large bone and muscle defects, (ii) multi-scale mechanical regulation of bone regeneration, and (iii) intra-articular therapeutic delivery for post-traumatic osteoarthritis. Building upon my experiences and combining my background in mechanical engineering, vascular biology and musculoskeletal tissue regeneration, my research has integrated mechanics principles and analytical tools with molecular biology techniques to uniquely address challenges of musculoskeletal disease and regeneration.

**Steven L. Wolf, PhD, PT, FAPTA, FAHA**

Professor, Departments of Medicine and Rehabilitation Medicine
Emory University School of Medicine

I explore novel interventions to improve extremity use in patients with stroke as well as mechanisms of cortical reorganization and inter-joint coordination associated with such changes. Within the past 23 years I have led several NIH funded clinical trials governing this concept. More recently, our lab has been emphasizing clinical measures of neural plasticity for interventions designed to improve posture in older adults or stroke survivors as well as to improve limb function in the latter group through the addition of electrophysiological (including TMS) and imaging studies. Our newest studies involve use of robotics and mixed reality, both of which have telerehabilitation capabilities and are directed toward home-based treatment post-stroke. Our present NINDS ICARE RCT explores a novel intervention for upper extremity recovery in acute stroke survivors. Recently our stroke studies have also included obtaining buccal swaps to identify a polymorphism for brain derived nerve growth factor so that we can determine if a relationship exists between the presence of the polymorphism and limitations in reacquisition of motor function. We also study changes in upper extremity movement following stroke using home base robotic and telerehabilitation interfaces that complement our mixed reality studies. While our studies with stroke survivors have addressed primarily efforts to improve motoric function within the upper extremity, we have also done extensive work in monitoring lower extremity muscle activity to determine the extent to which selective feedback can enhance ambulation amongst stroke survivors. The collective experience in undertaking continuous work in stroke rehabilitation for over 35 years and working with stroke specialists who address motor difficulties faced by these patients, positions me to be of assistance to motor control scientists as well as to partake in oversight of stroke based clinical trials. In January 2014 I was asked to serve as co-chairman of the Recovery and Rehabilitation Working Group of the newly NINDS funded Stroke Network in which we are one of 25 sites. This honor provides further opportunity to facilitate recruitment and retention strategies for clinical trials. Most recently we have been funded to participate in a multisite trial (NIH U01 NS091951) on use of telerehabilitation to facilitate upper extremity functional return within 90 days after stroke. This study, led by Steven Cramer, MD, is the first rehabilitation and recovery project funded through the Stroke Network. This work is compatible with our experiences in a successful, home-based robotics study (RC3 NS070646-01) recently completed in collaboration with colleagues at the Cleveland Clinic that targeted chronic stroke survivors. In addition, last year we were funded to participate in a multisite trial (NIH U01 NS091951) on use of telerehabilitation to facilitate upper extremity functional return within 90 days after stroke. This study, led by Steven Cramer, MD, is the first rehabilitation and recovery project funded through the Stroke Network. This work is compatible with our experiences in a successful, home-based robotics study (RC3 NS070646-01) recently completed in collaboration with colleagues at the Cleveland Clinic that targeted chronic stroke survivors. Last, as co-PI for the Emory site during the North Star Neuroscience post-stroke brain stimulation study, I gained considerable experience with neurosurgeon Robert Gross in applying rehabilitation procedures to individuals receiving direct implanted subdural, sub-threshold motor stimulation.

Faculty Disclosure

Faculty for this activity has been required to disclose all relationships with any proprietary entity producing health care goods or services.

No relevant financial relationships with commercial entities were disclosed by:

- **Fabrisia Ambrosio, PhD, MPT**
- **Ravi Bellamkonda, PhD**
- **Michael L. Boninger, MD**
- **George J. Christ, PhD**
- **Anthony Delitto, PhD, PT, FAPTA**
- **Arthur W. English, PhD**
- **Christopher H. Evans, PhD**
- **Maximo M. Gomez, PhD**
- **Kenton Gregory, MD**
- **Brett Klosterhoff**
- **Linda J. Noble-Haeusslien, PhD**
- **Wenchan Qu, MD, MS, PhD**
- **Thomas A. Rando, MD, PhD**
- **Carmen M. Terzic, MD, PhD**
- **Lena H. Ting, PhD**
- **Mark T. Tuszynski, MD, PhD**
- **Stuart J. Warden, PhD, PT, FACSM**
- **Gordon Warren, III, PhD, FACSM**
- **William R. Wagner, PhD**
- **Steven L. Wolf, PT, PhD, FAAOMPT**

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- o Consultant for RAND Corp, Roche, Dart Neuroscience, and Micro Transponder
- o Stockholder: Co-founder of personalRN

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- o Stockholder: Vertera, Inc, and MiMedx, Inc

Todd C. McDevitt, PhD

- o Stockholder and Founder: CollectCell

Christine Mummery, PhD

- o Consultant and Stockholder: Galapagos BV
- o Founder: Pluriomics bv

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- o Grant/Research Support: Aldagen, Arthersys, Genentech, Pfizer, NIH, Let's Cure CP, TIRR Foundation, and Cord Blood Registry Systems.
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Nick J. Willet, PhD

- o Grant/Research Support: Pacira Pharmaceuticals, Inc

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1. Short-term Physiologic Compressive Loading Mitigates Articular Cartilage Damage Following Traumatic Impact Injury In Vitro:

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²Center for Cellular and Molecular Engineering, University of Pittsburgh, Pittsburgh, PA

2. Regenerative Medicine in Huntington's Disease: Optimizing Rehabilitation Strategies Post Transplantation in a Rat Lesion Model

Susanne Clinch¹, Mariah Lelos¹, Monica Busse², Anne Rosser¹

¹School of Biosciences, Cardiff University, United Kingdom

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3. Regenerative and Rehabilitative Measures for Severe Musculoskeletal Trauma

Beth Pollot, Stephen Goldman, Sarah Greising, Joseph Wenke, & Benjamin Corona

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4. Investigation of early stages - Parkinson's disease rat model with rotenone

Megumi Goto, Saramu Momma, Akira Mitani

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5. Interaction of Injury Severity and PT Staffing in the ICU on the Mobilization of Traumatically Injured Patients: A Retrospective Study

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6. Five Generations: A Framework for Regenerative Stem Cell Therapies

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7. Wireless Sensors to Monitor Fracture Healing

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²Michigan Technological University, Houghton, MI,

³Emory University, Atlanta, GA,

⁴University of Pennsylvania, Philadelphia, PA

8. The Effect of Electrical Stimulation on Muscle Reinnervation and Axon Elongation in a Mouse Model of Val66Met

Claire McGregor, Art English
Emory University, Department of Cell Biology

9. Engineering Pre-Vascularized Skeletal Muscle with Physiologically-Relevant Cellular Organization for Treatment of Volumetric Muscle Loss

Karina H. Nakayama^{1,2}, Marco Quarta¹, Victor Garcia¹, Cynthia Alcazar¹, Igor Akimenko¹, Zachary Strassberg¹, Oscar Abilez², Thomas A. Rando, MD^{1,3}, Ngan F. Huang^{1,2,4}

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10. Whole-body Vibration Training in Healthy Males Promotes Stem/progenitor Cell Circulation and Decreased Inflammation Levels

Neff B¹, Rupert K², Jawed YT³⁻⁵, Beli E³, Grant M³, March KL^{3-5*}, Kaleth AS², Loghmani MT¹

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³ School of Medicine, Indiana University, Indianapolis, IN

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⁵ Roudebush Veteran Affairs Medical Center, Indianapolis, IN

11. Age-related Declines in Klotho Drive Dysfunctional Muscle Progenitor Cell Bioenergetics and Impaired Skeletal Muscle Regeneration

Sahu A^{1,2}, Cheikhi A², Shinde Sa, Mazzotta C^{1,3}, Winter La^{1,4}, Vo NV^{5,6,9}, Stolz D⁷, Roginskaya V⁸, Van Houten B⁸, Barchowsky A^{2,8}, *Ambrosio F^{1,4,5,9}

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12. Short-term Effects of Real-time Gait Biofeedback on Post-stroke Gait Biomechanics

Christopher S Schenck¹, Steven P Eicholtz², Steven L Wolf², Trisha M Kesar²

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13. Novel Rehabilitation Techniques to Improve Muscle Function Following Volumetric Muscle Loss Injuries.

Anna S. Nichenko¹, W. Michael Southern¹, Anita Qualls^{1,2}, Zach Agan¹, Gordon L. Warren³, Jarrod A. Call^{1,2}, Sarah M. Greising⁴

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14. Age-related Declines in Klotho Drive Dysfunctional Muscle Progenitor Cell Bioenergetics and Impaired Skeletal Muscle Regeneration

Sahu A^{1,2}, Cheikhi A², Shinde Sa, Mazzotta C^{1,3}, Winter La^{1,4}, Vo NV^{5,6,9}, Stolz D⁷, Roginskaya V⁸, Van Houten B⁸, Barchowsky A^{2,8}, *Ambrosio F^{1,4,5,9}

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⁸ Department of Pharmacology & Chemical Biology, University of Pittsburgh Cancer Institute, University of Pittsburgh, Pittsburgh, PA

⁹ McGowan Institute for Regenerative Medicine, University of Pittsburgh, PA

15. Short-term Effects of Real-time Gait Biofeedback on Post-stroke Gait Biomechanics

Christopher S Schenck¹, Steven P Eicholtz², Steven L Wolf², Trisha M Kesar²

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16. Early Rehabilitative Interventions to Address Skeletal Muscle Metabolic Capacity Following Volumetric Muscle Loss Injury

Southern, W.M.,¹ Nichenko, A.S.,¹ Qualls, A.,^{1,2} Agan, Z.,¹ Warren, G.L.,³ Greising, S.M.,⁴ Call, J.A.^{1,2}

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17. Muscle-contraction training can enhance the efficacy of cell transplantation treatment for Duchenne Muscular Dystrophy(DMD)

Nana Takenaka-Ninagawa, Center for iPS Cell Research and Application (CiRA), Kyoto University

Yuta Itoh, Faculty of Rehabilitation Science, Nagoya Gakuin University

Keisuke Kawakami, Oita University Faculty of Welfare and Health Sciences

Hidetoshi Sakurai, Center for iPS Cell Research and Application (CiRA), Kyoto University

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**Alliance for Regenerative Rehabilitation
Research and Training**

<http://www.ar3t.pitt.edu>

and

**NIH National Medical Rehabilitation
Research Resource (MR3) Network**

<https://ncmrr.org/>

**National Rehabilitation Research Resource
to Enhance Clinical Trials (REACT)**

<https://react.center>

Travel Awards:








Thanks to the generous support by the Alliance for Regenerative Rehabilitation Research and Training (AR3T) Program we were able to provide registration and/or travel funds to a total of 17 attendees.







These awards are to provide opportunities for graduate students, medical fellows and residents, post-doctoral fellows, rehabilitation clinicians, and junior investigators to participate in the Fifth Annual Symposium on Regenerative Rehabilitation, to be held at Emory University in Atlanta, GA on October 14 – 16, 2016.

Congratulations to all of our recipients!


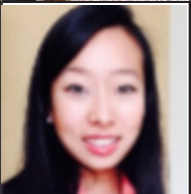

Travel Award Recipients:

Domestic Awardees

Caroline Addington Arizona State University Tempe, AZ	
Allison Bean* Resident Physician at Rutgers New Jersey Medical School Newark, NJ	
Tiffany Chin Saint Charles Hospital New York City, NY	
Carlos Diaz Maristas Guaynoba San Juan, PR	
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Amrita Sahu* University of Pittsburgh Pittsburgh, PA	

International Awardees:

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Carolina Mie Kawagosi Onodera Institution: University of Campinas - Brazil	
Nana Takenaka-Ninagawa* Postdoctoral fellow, Japan Society for the promotion of Science Kyoto University center for iPS cell research and application Kyoto University	

*denotes poster presenter

Driving Directions To Emory's Michael Street Parking Deck

550 Houston Mill Rd. NE Atlanta, GA 30329

Coming North on I-85

- * EXIT at North Druid Hills Road (Exit 89).
- * RIGHT off ramp on North Druid Hills.
- * RIGHT on Briarcliff. (1st major intersection)
- * LEFT on Clifton Road (Quick Trip on right corner)
- * RIGHT on Houston Mill Rd
- * First LEFT onto Rollins Way
- * Follow signs to VISITOR PARKING MICHAEL ST
- * *Park/Walk to 3rd level to access pedestrian bridge*

Coming South on I-85

- * EXIT at North Druid Hills Rd (Exit 89).
- * LEFT off ramp on North Druid Hills Rd.
- * RIGHT on Briarcliff (1st major intersection)
- * LEFT on Clifton Road (Quick Trip on right corner)
- * RIGHT on Houston Mill
- * First LEFT onto Rollins Way
- * Follow signs to VISITOR PARKING MICHAEL ST
- * *Park/Walk to 3rd level to access pedestrian bridge*

Coming North on I-75

- * Follow I-85 North
- * When I-75 and I-85 separate, see **Coming North I-85**

Coming South on I-75

- * EXIT at I-85 North
- * EXIT at North Druid Hills Road exit (Exit 89).
- * RIGHT off ramp on North Druid Hills
- * See Coming North on I-85

Coming East on I-20

- * EXIT at I-75/ I-85 North
- * Follow I-85 North
- * When I-75 and I-85 separate, see Coming North I-85



Walking Directions from Michael Street Parking to James B. Williams Medical Education Building (School of Medicine)

100 Woodruff Circle, Atlanta, GA 30322

- * PARK in the Michael Street Parking Deck
- * *Park or walk to the 3rd floor of the deck*
- * FOLLOW signs to the "1462 Building," "Whitehead Research" and pedestrian walkway.
- * FOLLOW walkway alongside the research building * Dead-end into a plaza
- * Turn RIGHT toward the stone pedestrian bridge
- * CROSS the bridge
- * The "James B. Williams Education" building is 2nd building on the LEFT after the bridge



Walking Directions

Emory Conference Center and Hotel

to

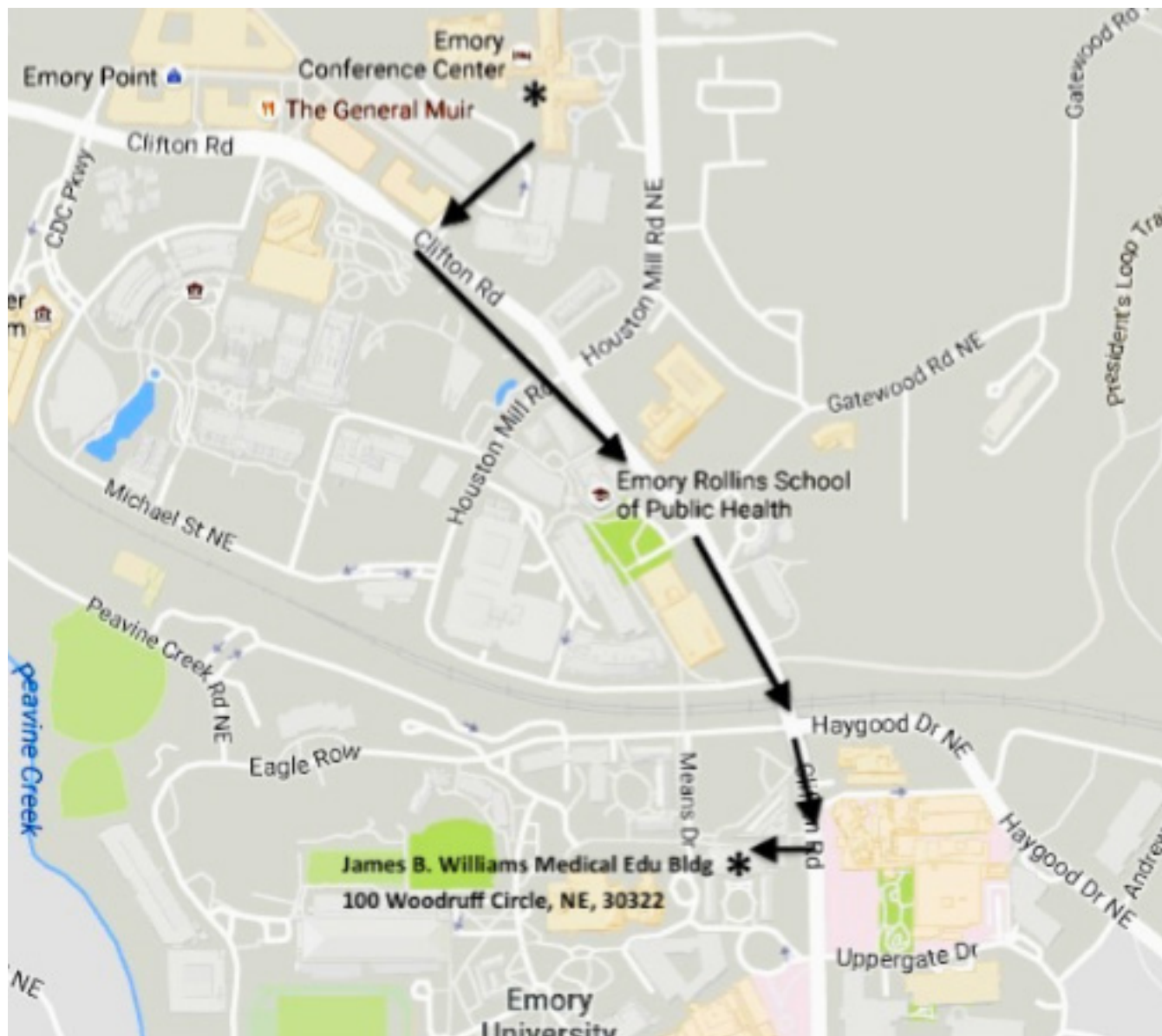
James B. Williams Medical Education Building

(Emory School of Medicine)

100 Woodruff Circle, NE Atlanta, GA 30322

0.7 miles (10-15 minute walk)

- Turn LEFT onto Clifton Road
- Cross over Houston Mill Road and Haygood Drive
- After crossing Haygood Drive, the Medical Education Building is the **2nd building on the RIGHT**. It is constructed from grey marble.
- Turn RIGHT onto the walkway between the Woodruff Health Science Administration building and the Medical Education Building.
- FOLLOW the walkway down the steps to the plaza and fountain.
- ENTER the building on the LEFT, across from the fountain



Notes:



AR³T

Alliance for
Regenerative Rehabilitation
Research and Training

The Alliance for Regenerative Rehabilitation Research and Training (AR³T), an NIH-funded resource center, supports the expansion of scientific knowledge, expertise and methodologies across the fields of regenerative medicine and rehabilitation through education, training, research support, and funding opportunities.



Carmen Terzic, MD, PhD (Mayo Clinic), Thomas A. Rando, MD, PhD (Stanford University), Fabrisia Ambrosio, PhD, MPT (University of Pittsburgh), Michael Boninger, MD (University of Pittsburgh), Linda Noble-Haeusslein, PhD (University of California San Francisco)

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