UC DAVIS
MUSCULOSKELETAL HEALTH RESEARCH DAY

Friday, April 26, 2024
UC Davis Health, Sacramento Campus
Center for Health and Technology (CHT) 1341

Keynote speaker

Grace O'Connell, Ph.D.
Associate Professor of Mechanical Engineering
Berkeley Biomechanics Co-Director
University of California, Berkeley

Agenda

Registration, continental breakfast, poster setup	7:00am-8:00am
Introduction to MSK Research Day and Dr. O'Connell	8:00am-8:05am
Keynote speaker: **Grace O'Connell, Ph.D.** "*Environmental Factors to Support Growth*"	8:05am-9:00am
Break/picture	9:00am-9:15am
Talks selected from abstracts	9:15am-11:45am
Poster session (Education Bldg 3rd floor breezeway)	11:45am-
Lunch for RSVPs (CHT 1341)	12:30pm
Conclude	1:30pm

In support of NIAMS T32 AR079099: *MusculoSkeletal Clinical Learning Experience (MUSCLE) Transdisciplinary Musculoskeletal Research Training Program and*

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UCDAVIS HEALTH | Department of Orthopaedic Surgery

UCDAVIS BIOMEDICAL ENGINEERING

Keynote Lecture:

Environmental Factors to Support Growth

Abstract

Articular cartilage has a limited ability to self-heal following trauma or degenerative diseases, such as osteoarthritis (OA). The aging population and a rise in younger patients (< 60 years old) developing cartilage defects has led to a growing interest in developing biological approaches that aim to repair early-stage cartilage lesions, reduce patient pain, and prolong the need for total joint replacements. However, chondrocytes dedifferentiate during expansion culture, limiting their ability to produce chondrogenic tissue and their utility for cell-based cartilage repair strategies. This seminar discusses how supplementation of expansion culture media with a growth factor cocktail can help to preserve chondrogenic cell properties during two-dimensional (2D) culture and alter tissue production once the cells are returned to a three-dimensional (3D) environment. The lecture will also discuss how the learning environment in the classroom or laboratory can support student growth and learning.

Brief Bio

Grace O'Connell, PhD, is the Don M. Cunningham Chair of Mechanical Engineering, Associate Professor of Mechanical Engineering, and Associate Dean for Inclusive Excellence in the College of Engineering at the University of California, Berkeley. She completed her graduate graining in bioengineering at the University of Pennsylvania under the mentorship of Dr. Dawn Elliott. She then undertook postdoctoral training with Dr. Clark Hung at Columbia University and joined the faculty at UC Berkeley as Assistant Professor of Mechanical Engineering in 2013. Presently, Dr. O'Connell is the co-director of the Berkeley Biomechanics Laboratory, which is a core laboratory focused on biomechanics of hard and soft tissues including bone, intervertebral disc and articular cartilage.

She has authored nearly 70 peer-reviewed publications, book chapters and conference proceedings, along with more than 50 invited speaker engagements nationally and internationally. Dr. O'Connell is a fellow of the American Society of Mechanical Engineering (ASME) and the American Institute of Medical and Biological Engineers (AIMBE). She has received numerous other honors and awards including the University of Maryland's College of Engineering Early Career Distinguished Alumni Award, the inaugural JOR Spine Early Career Award, the YC Fung Young Investigator Award, and the NSF Career Award.

SHORT TALKS

Short talks presented by NIH T32 Scholars

AGE-BASED DIFFERENCES IN MUSCULOSKELETAL ADAPTATION DURING UNLOADING IN MICE UNDERGOING ALENDRONATE TREATMENT

Sophie Orr[1], Suraj Pathak[2], Hodo Ali Edan[2], Henning Langer[2], Keith Baar[2], Blaine A. Christiansen[1]
[1]Department of Orthopedic Surgery, University of California Davis Health, Sacramento, CA 95817 USA; [2]Department of Physiology and Membrane Biology, University of California Davis, Davis, CA 95616 USA

ENGINEERING APPROACHES FOR MUSCLE REGENERATION

Andrea C. Filler[1], J. Kent Leach[1,2]
[1]Department of Orthopaedic Surgery, UC Davis Health, Sacramento, CA 95817 USA; [2]Department of Biomedical Engineering, UC Davis, Davis, CA 95616 USA

FIBROBLAST GROWTH FACTOR 21 SIGNALING CONTRIBUTES TO THE DEVELOPMENT OF SARCOPENIA AND DIABETES IN OBESITY

Devi Jayakrishnan[1], Karen Ryan[1]
[1]Department of Neurobiology Physiology and Behavior, University of California Davis, Davis, CA 95616 USA

Short talks selected from abstracts

EVALUATION OF HIGH BONE MASS PHENOTYPE INDUCED BY DEGRADATION RESISTANT HYPOXIA INDUCIBLE FACTORS

Adriana P. Pantoja[1], Sarah V. Mendoza[1], Deepa K. Murugesh[2], Gabriela G. Loots[1], Damian C.Genetos[1],* Clare E. Yellowley[1],*
[1]University of California, Davis, CA 95616 USA; [2]Lawrence Livermore National Laboratories, Livermore, CA 94550 USA

EVALUATING THE IMPACT OF REPEATED DOSES OF VITAMIN C-ENRICHED HYDROLYZED- AND VEGAN COLLAGEN SUPPLEMENT ON COLLAGEN SYNTHESIS

Emelie Strandberg[1], Keith Baar[1,2]
[1]Department of Neurobiology, Physiology and Behavior; [2]Department of Physiology and Membrane Biology, University of California, Davis, Davis, CA, 95616 USA

FIBRO-ADIPOGENIC PROGENITORS PRODUCE ALTERED EXTRACELLULAR MATRIX AND IMPAIR MUSCLE DIFFERENTIATION

Taryn Loomis[1], Perri E. Gish[2], Ross P. Wohlgemuth[2], Avalon M. Babros[2], Lucas R. Smith[2,3]
[1]Department of Biomedical Engineering; [2]Department of Neurobiology, Physiology, and Behavior, [3]Deparment of Physical Medicine and Rehabilitation, University of California, Davis, Davis, CA 95616 USA

GUT MICROBIOME REGULATION OF THE AGING SKELETAL STEM CELL NICHE

Kelly C. Weldon[1,2], Kun Chen[2], David Morales[2,3], Ethan Hunt[2], Thomas H. Ambrosi[2]
[1]Graduate Group in Immunology; [2]Department of Orthopaedic Surgery, UC Davis Health, Sacramento, CA 95817; [3]Graduate Group in Integrative Pathobiology, University of California, Davis, Davis, CA 95616 USA

SKELETAL STEM/PROGENITOR CELLS AS A VIABLE REGENERATIVE THERAPEUTIC FOR BONE DEFECTS

Amin Cressman[1], Bryan Le[1], Mark Lee[2], Fernando A. Fierro[1]
[1]University of California, Davis; [2]Department of Orthopaedic Surgery, UC Davis Health, Sacramento, CA 95817 USA

THE ROLE OF WISP2 DURING SKELETAL STEM CELL AGING

Kun Chen[1], Kelly C. Weldon[1], David Morales[1], Ethan J. Hunt[1], Thomas H. Ambrosi[1]
[1]Department of Orthopaedic Surgery, UC Davis Health, Sacramento, CA 95817 USA

DYSREGULATED INFLAMMATORY RESPONSE AND POOR FRACTURE HEALING IN POLYTRAUMA

Tony D. Baldini[1], Maryam Rahmati[1*], Robert Charles Henry Gresham[1*], Augustine M. Saiz[1], Jane Burgan[1], Mark Lee[1], Benjamin Osipov[1], Blaine A. Christiansen[1], Thaqif El Khassawna[2,3], D.C. Florian Wieland[4], Zahra Sabouri[2], Andre Lopes[4], Clement Blanchet[4], J. Kent Leach[1]
[1]Department of Orthopaedic Surgery, UC Davis Health, Sacramento, CA, 95817 USA; [2]Experimental Trauma Surgery, Justus-Liebig University Giessen, Giessen, Germany; [3]Faculty of Health Sciences, University of Applied Sciences, Giessen, Germany; [4]Institute of Metallic Biomaterials, Helmholtz Zentrum Hereon, Max-Planck-Straße 1, 21502 Geesthacht, Germany

EARLY UNLOADING AFTER ACL RUPTURE AND PRIOR TO SURGICAL RESTABILIZATION IN MICE SLOWS POST-TRAUMATIC OSTEOARTHRITIS PROGRESSION

Yu-Yang Lin[1], Elias H. Jbeily[1], Cassandra A. Lee[1], Gabriela G. Loots[1], Blaine A. Christiansen[1]
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IMMUNOMODULATORY HYDROGELS FOR BONE REGENERATION IN RESPONSE TO BISPHOSPHONATE-RELATED OSTEONECROSIS OF THE JAW

Katherine H. Griffin[1,2], Thomas P. Coonan[1], Isabel S. Sagheb[1], Langston A. Wu[1], Boaz Arzi[2], Jamal S. Lewis[3], and J. Kent Leach[1,4]
[1]Department of Orthopaedic Surgery, UC Davis Health, Sacramento, CA; [2]School of Veterinary Medicine, University of California, Davis, CA; [3]Department of Biomedical Engineering, University of Florida, Gainesville, FL; [4]Department of Biomedical Engineering, University of California, Davis, Davis, CA 95616 USA

Full abstracts for short talks and posters available at
https://ucdavis.box.com/s/nkaq21s74uabx2pmqq92zr8fmj9wgi71

POSTER PRESENTATIONS

ELUCIDATING THE ROLE OF YAP IN SARCOMA DEVELOPMENT

Julissa Suarez-Navarro[1,2], Jack Freeland[3], Maria Muñoz[4], Jessica Bergonio[2], Janai R. Carr-Ascher[2,5]
[1]Biochemistry, Molecular, Cellular, and Developmental Biology Graduate Group, University of California, Davis; [2]Department of Internal Medicine, Division of Hematology/Oncology, University of California, Davis; [3]Department of Molecular and Medical Pharmacology, Molecular Biology Interdepartmental Program, University of California, Los Angeles; [4]Molecular Biosciences, University of California, Davis, School of Veterinary Medicine, Davis, CA; [5]Department of Orthopedic Surgery, University of California, Davis

AFFECTED MUSCLES RETAIN DEXTROUS MOTOR CAPABILITIES IN CHILDREN BORN WITH UPPER-LIMB DEFICIENCIES

Eden J. Winslow[1], Marcus A. Battraw[2], Justin J. Fitzgerald1,3,4, Michelle A. James5,6, Anita M. Bagley[5,6], Wilsaan M. Joiner[1,4,7], Jonathon S. Schofield[2]
[1]Department of Biomedical Engineering, University of California, Davis; [2]Department of Mechanical and Aerospace Engineering, University of California, Davis; [3]Clinical and Translational Science Center, University of California Davis Health, Sacramento CA; [4]Department of Neurobiology, Physiology, and Behavior, University of California, Davis; 5Shriners Children's Hospital, Northern California, Sacramento CA; [6]Department of Orthopedic Surgery, University of California Davis Health, Sacramento CA; [7]Department of Neurology, University of California Davis Health, Sacramento CA

FUNCTIONALIZED ANNEALED MICROGELS FOR SPATIAL CONTROL OF OSTEOGENIC AND CHONDROGENIC DIFFERENTIATION

Erika E. Wheeler[1], Jeremy M. Lowen[1], Nathan K. Shimamoto[2], David H. Ramos-Rodriguez[1], Katherine H. Griffin[1] Gabriella C. Bond[2], J. Kent Leach[1,2]
[1]Department of Orthopaedic Surgery, UC Davis Health, Sacramento, CA 95817; [2]Department of Biomedical Engineering, UC Davis, Davis, CA 95616

GLUCOCORTICOID-INDUCED REDUCTION IN OSTEOGENESIS AND ANGIOGENESIS IS COUPLED THROUGH ALTERED SKELETAL STEM CELL LINEAGE DYNAMICS

David Morales[1], Kun Chen[1], and Thomas H. Ambrosi[1]
[1]University of California, Davis

TESTING THE OSTEOGENEIC AND CHONDROGENIC EFFECT OF THE SMALL MOLECULES DMH1 AND SAG21K IN HUMAN SKELETAL STEM CELLS

Ethan J. Hunt[1], Kun Chen[1], Kelly C. Weldon[1,2], David Morales[1,3], Thomas H. Ambrosi[1]
[1]Department of Orthopaedic Surgery, University of California, Davis; [2]Graduate Group in Immunology, University of California, Davis; [3]Graduate Group in Integrative Pathobiology, University of California, Davis

MACROMOLECULAR CROWDING ENHANCES OSTEOGENIC POTENTIAL IN CELL-SECRETED MATRIX-LOADED SPHEROIDS

Shierly W. Fok Lau[1,2], David H. Ramos-Rodriguez[1], J. Kent Leach[1,2]
[1]UC Davis Health, Sacramento, [2]UC Davis, Davis

DISPARATE IMPACT OF OSTEOCYTE OXYGEN-SENSING MECHANISMS ON BONE QUALITY

Kristina V. Wells[1], Sarah V. Mendoza[1], Alice Wong[1], Deepa Murugesh[2], Gabriela G. Loots[2,3], Clare E. Yellowley[1], Damian C. Genetos[1]

[1]Dept. of Anatomy, Physiology, and Cell Biology, School of Veterinary Medicine, University of California, Davis; [2]Lawrence Livermore National Laboratories Physical and Life Sciences Directorate.; [3]Department of Orthopaedic Surgery University of California Davis Health

REMODELING AND MECHANOSENSING VARY AS A FUNCTION OF STRAIN PATTERN AND MAGNITUDE IN ENGINEERED HUMAN LIGAMENTS

Kenneth T. Tam[1], Alec M. Avey[1], Keith Baar[1, 2]

[1]Department of Neurobiology, Physiology and Behavior, University of California Davis, Davis, CA, [2]VA Northern California Health Care System, Mather, CA

TIBALIS ANTERIOR TENDON IS WEAKENED IN AN ADENINE DIET-INDUCED MODEL OF CHRONIC KIDNEY DISEASE

Christopher MT Hayden[1], Natalie K Gilmore[1], Baback Roshanravan[2], Keith Baar[3]

[1]Molecular, Cellular, and Integrative Physiology Graduate Group, [2]Department of Medicine, Division of Nephrology, [3]Department of Physiology and Membrane Biology, University of California Davis

KETOGENIC DIET INDUCES BONE LOSS IN ADULT MICE AND MAY REDUCE THE ANABOLIC EFFECT OF EXERCISE

Benjamin Osipov[1], Sophie V. Orr[1], Yu-Yang Lin[1], Ritvik S. Punati[1], Maryam Rahmati[1], Suraj J. Pathak[2], Kei Takahata[3], Keith Baar[2], Blaine A. Christiansen[1]

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DEVELOPMENT OF A NOVEL NUTRITIONAL SUPPLEMENT TO INCREASE HUMAN CONNECTIVE TISSUE COLLAGEN SYNTHESIS

Kevin J.M. Paulussen[1], Keith Baar[1,2]

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INVESTIGATING ECM DIFFERENCES AND RESPONSE TO LOADING DIFFERENCES BETWEEN MRL AND B6 CARTILAGE CONSTRUCTS

Rahul D. Patel[1], David HR Rodriguez[1], J. Kent Leach[1], Gabriela G. Loots[1]

[1]UC Davis Department of Orthopaedic Surgery

EFFECTS OF RESORBABLE VS. NON-RESORBABLE SUTURES ON RAT ACHILLES TENDON REPAIR OUTCOMES 30-DAYS POST SURGERY

Natalie K. Gilmore[1], Keith Baar[2]

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PROSTATE CANCER AND BONE CELL CROSSTALK INVESTIGATED BY UTILIZING CONDITIONED MEDIA EXPERIMENTS

Max A. Tracy[1], Kristina V. Wells[1], Damian C. Genetos[1]

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DOES TIMING OF PREOPERATIVE KNEE ASPIRATION OR OTHER INJECTIONS INFLUENCE TOTAL KNEE ARTHROPLASTY INFECTION RISK?

Hania Shahzad[1], John P. Meehan[1], Mauro Giordani[1], Safdar N. Khan[1], Zachary C. Lum[1]*
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EVALUATING DIFFERENCES IN CLINICAL PROFILES OF CARTILAGINOUS TUMOR PATIENTS

Hector L. Sanchez Perez[1], Kyle Walker[2], Andres T. Ramos[1], Samuel K. Simister[2], Shannon Tse[2], Aziz Saade[2], Hania Shazad[2], Steven W. Thorpe[2], R Lor Randall[2]
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PEDIATRIC SPINAL INJURIES AT A LEVEL-ONE TRAUMA CENTER IN CALIFORNIA: A 15-YEAR EXPERIENCE

Hannah E. Neiger[1], Minna MC. Wieck[2], Arzu Ozturk[2], Hai V. Le[2], Rolando Roberto[2]
[1]California Northstate University College of Medicine, [2]University of California, Davis Medical Center

HANDS-ON OR GLOVED APPROACH? UNVEILING PATIENT EXPERIENCES IN ORTHOPAEDIC FOOT AND ANKLE CLINICS

Frank Sierra[1], Yvonne Conway[2], Andrea Rincon[1], Samuel K. Simister[2], Christopher Kruelen[2], Eric Giza[2]
[1]UC Davis Health School of Medicine, Sacramento, CA; [2]UC Davis Health Department of Orthopaedic Surgery, Sacramento, CA

EFFICACY AND SAFETY OF TRAMADOL IN TOTAL KNEE ARTHROPLASTY: A SYSTEMATIC REVIEW

Frank Sierra[1], Katherine Guo[1], Shannon Tse[2], Sam Simister[2], Zachary Lum[2]
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