Research Report

Highlights in Musculoskeletal Research 2022

UCSF Orthopaedic Surgery

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UCSF Orthopaedic Surgery
School of Medicine

Cover: At top, musculoskeletal researcher Andrés Betancourt-Torres, performs research on metabolism and cell signaling of bone cells in the Alliston Laboratory of Skeletal Mechanobiology on the Parnassus Campus. At lower left, Dr. Anthony Luke, at right, and lab manager Brooke Schultz, at left, conduct research with staff research associate Joshua Johnson, center, on biomechanics and exercise physiology at the UCSF Human Performance Center. At lower right, postdoctoral scholar Noah Bonnheim, PhD, of the Fields Laboratory for Biomechanics and Biosupport, collaborates with researchers at the annual UCSF CCMBM, REACH & Department of Orthopaedic Surgery Scientific Retreat at Genentech Hall at UCSF Mission Bay campus in San Francisco.

May 11, 2023

Scientists in Dr. Brian Feeley and Dr. Xuhui Liu's Muscle Injury and Translational Orthopedic (MITO) Research Lab perform research on muscle tissue quality and its impact on common problems, such as rotator cuff tears, knee pain, limb immobilization, joint contractures, and low back pain. This stem cell research is funded by the NIH, the VA, UCSF, and private donations. (Photo: UCSF Department of Orthopaedic Surgery)

Message from the Chair of the UCSF Department of Orthopaedic Surgery

Dear colleagues and friends,

It is with great enthusiasm that I share our annual research report with you. Research and discovery to improve musculoskeletal health has always been a cornerstone of our department's mission: Pioneering musculoskeletal care to transform lives.

Committed to health equity – the belief that everyone has the opportunity to lead the healthiest life possible – our department has embraced basic, clinical, and translational discovery. Our goal is that all patients will benefit from innovation that stems from the results of benchwork and clinical studies that have been performed at UCSF over the past several decades.

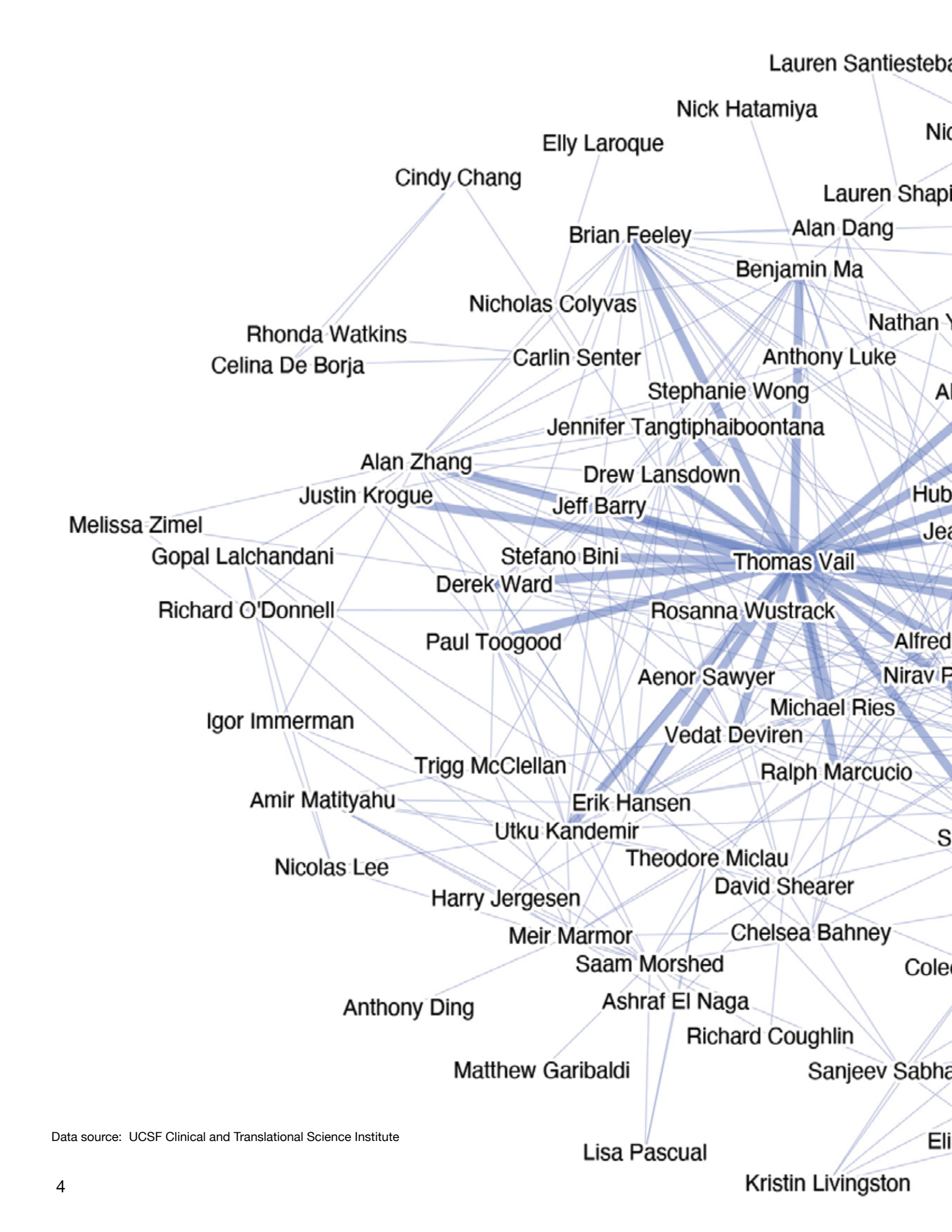
Through an evidence-based approach, our researchers seek to understand and address the many obstacles to good musculoskeletal health that is intimately linked to general good health – ranging from sudden cell death (osteonecrosis) and hereditary disorders to day-to-day societal factors, such as poverty, discrimination, malnutrition and access to health care.

It is our researchers' quest – and curiosity – to finding answers to medicine's unsolved problems that is one of the greatest public services that we can offer our patients.

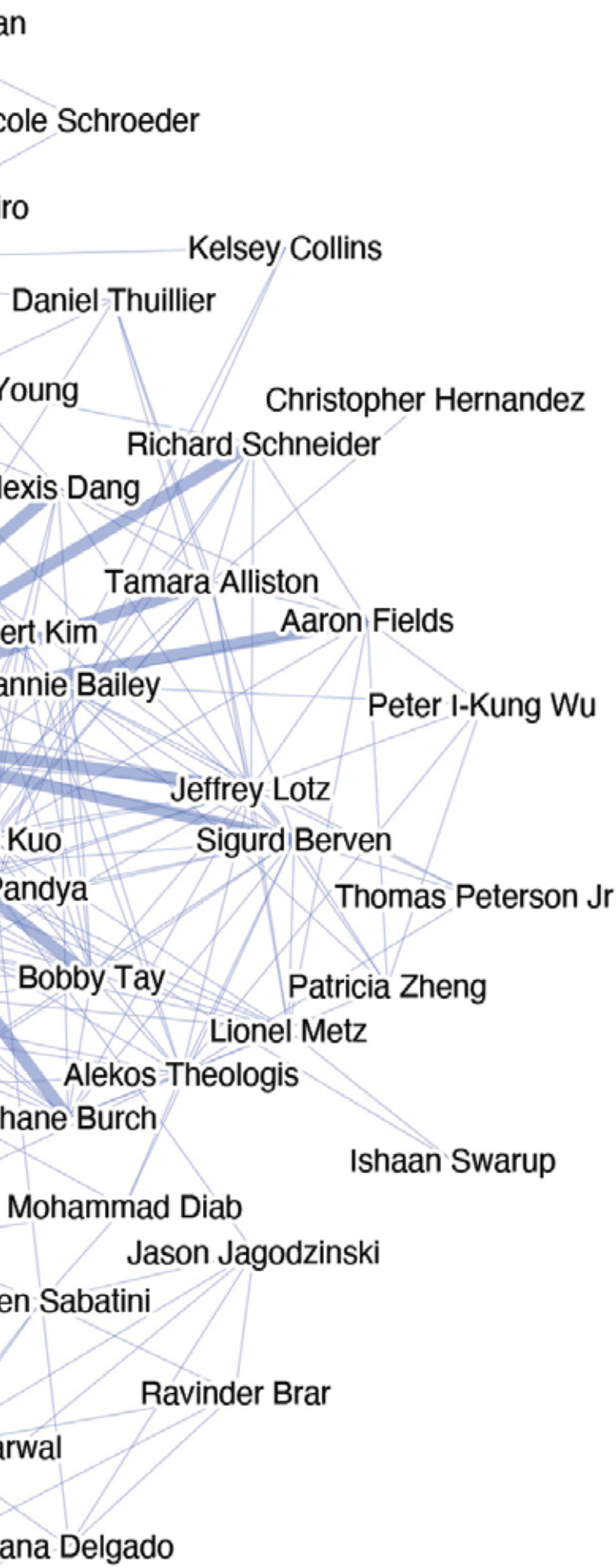
Please enjoy learning about our ongoing studies, new members of our research team, and the collaborations among our researchers worldwide.

Sincerely,

Thomas Parker Vail, MD
The Michael and Antoinette Pappas Endowed Chair
James L. Young Professor
Department of Orthopaedic Surgery
University of California, San Francisco



Data source: UCSF Clinical and Translational Science Institute



Thank you, Dr. Vail!

Thomas Parker Vail MD has been the Department Chair for the past 16 years. He arrived with a vision to drive our musculoskeletal research program forward, and in doing so has made UCSF into one of the most successful research institutions in the country.

He has guided it with a steady hand through many phases of maturation – from recruiting junior faculty and mentoring medical students to supporting our curiosities in basic, translational and clinical science.

We couldn't be more grateful for your dedication and commitment to musculoskeletal research.

This is a snapshot of the network of research collaborations that Dr. Vail has fostered over his time as Chair.

Thank you.

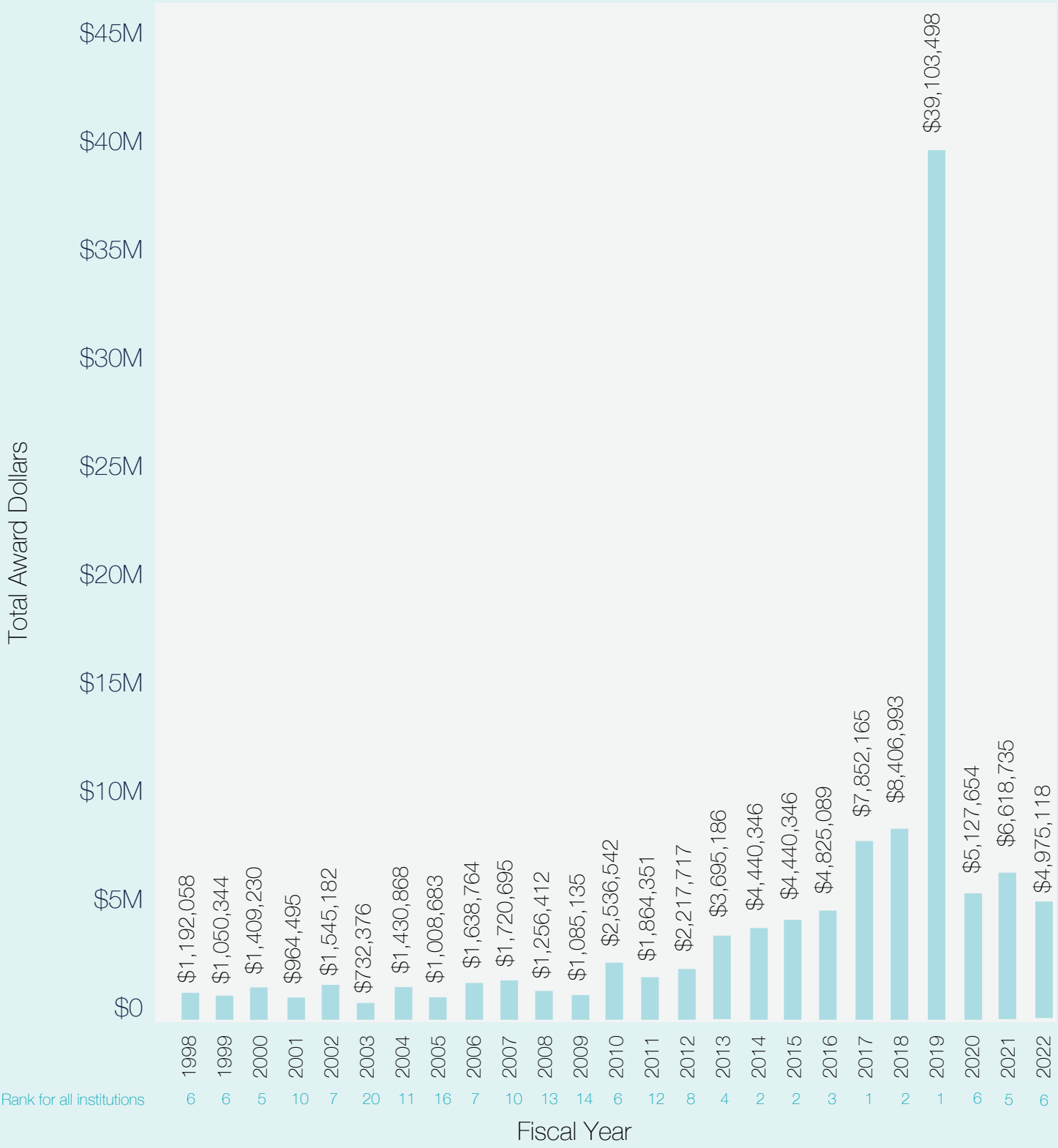
Our Vision

Pioneering musculoskeletal discovery and innovative care to transform lives.

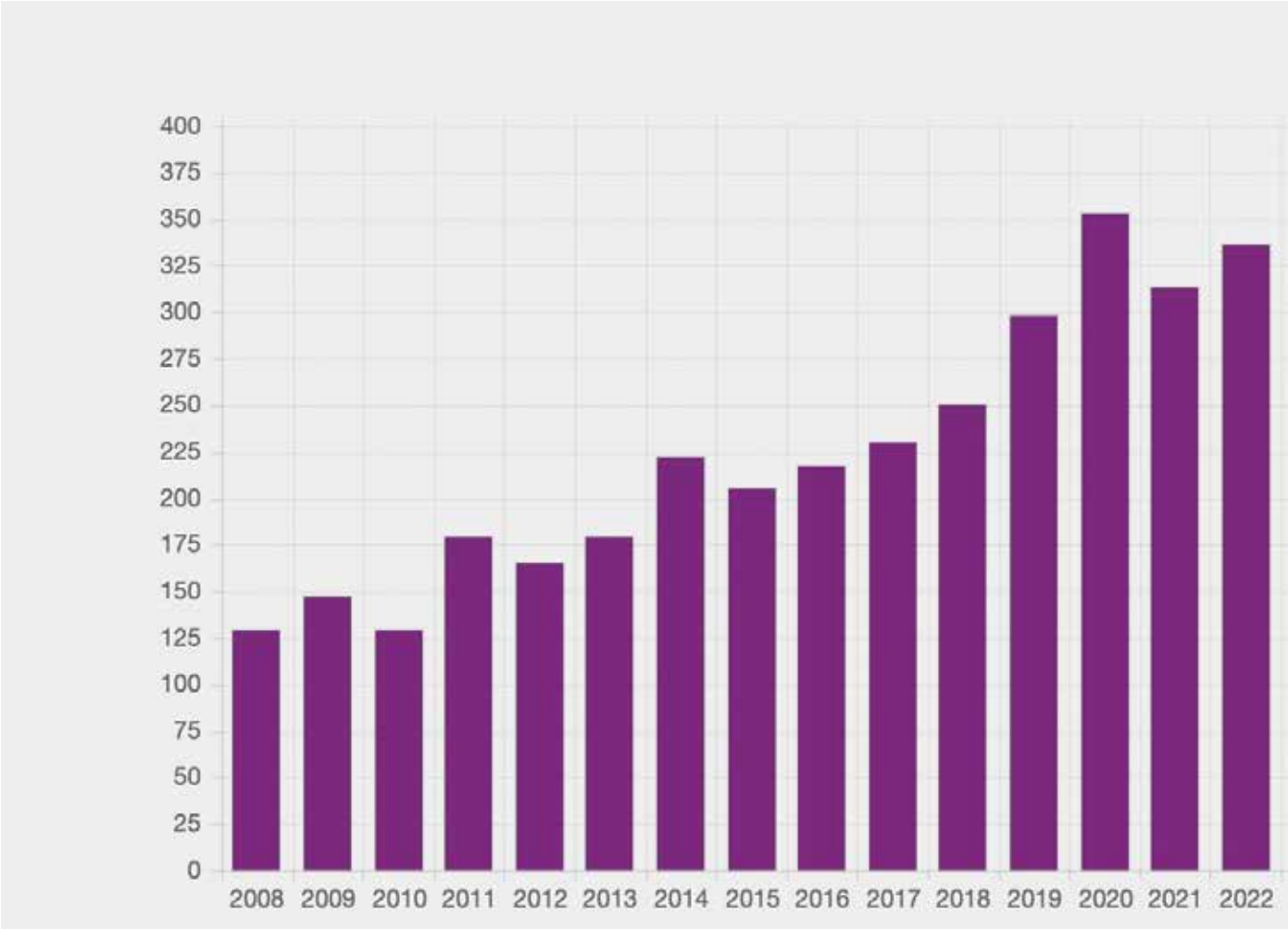
More than 250 musculoskeletal researchers gathered for the 2022 UCSF CCMBM, REACH & Department of Orthopaedic Surgery Scientific Retreat at Genentech Hall at UCSF Mission Bay campus in San Francisco. Researchers from the Department participate in more than 50 scientific meetings and conferences throughout the year.

NIH Ranking

NIH Research Grants for UCSF Department of Orthopaedic Surgery

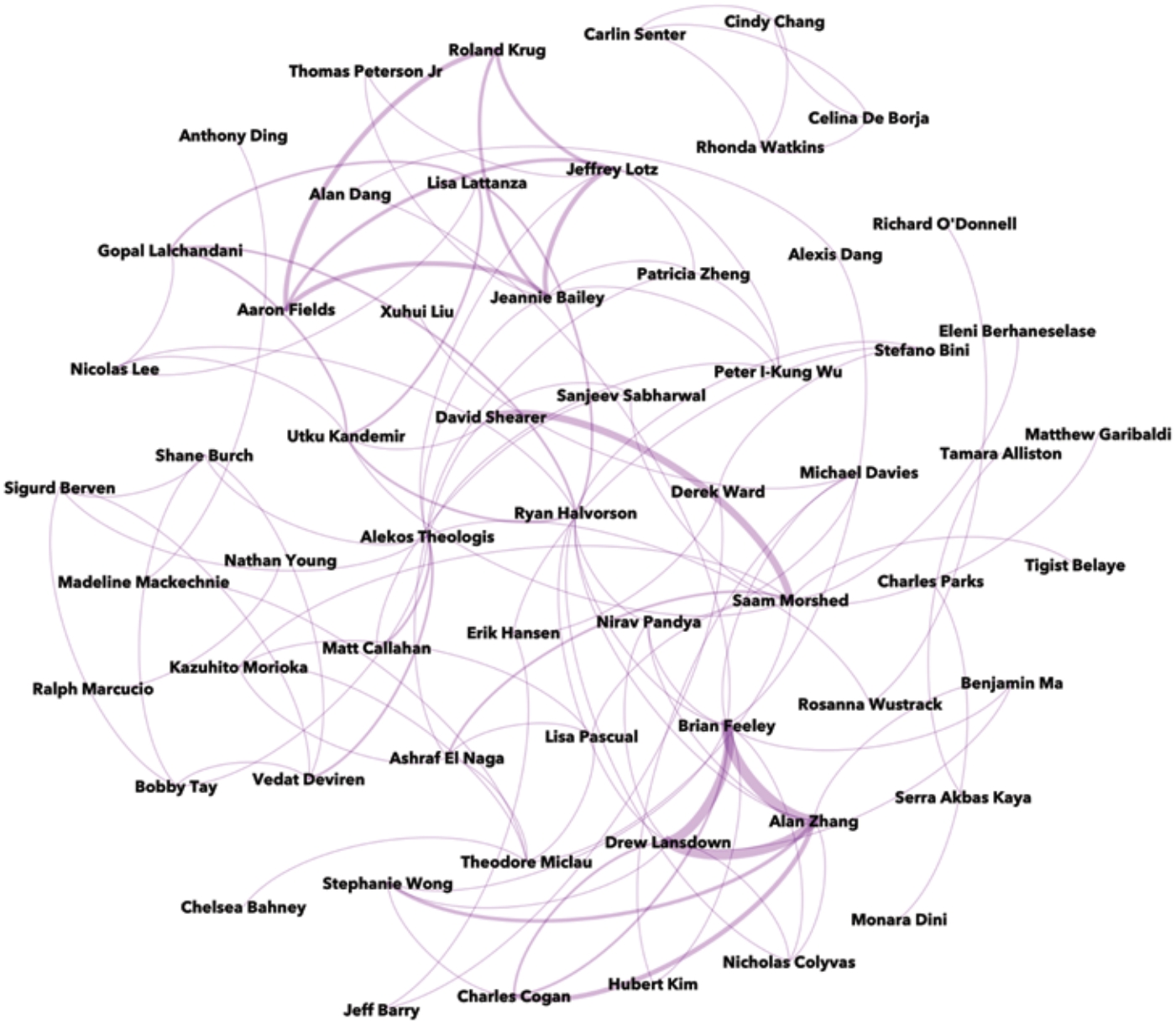


Research: UCSF Publications



Journals of our Published Research

Co-authorships within Department



2022 Grants and Fellowships

Jeannie Bailey, PhD

NIH Natl Inst Arthr, Musculoskel & Skin - University of North Carolina System A140758

Collaborative utilization and assessment of biomechanics technologies within the BACPAC consortium

8/1/2022-5/31/2024

$140,833

Jeffrey Barry, MD

American Assoc of Hip and Knee Surgeons - Fellowship A140097

Fellowship

9/20/2022-9/19/2023

$20,000

OMeGA Medical Grants Association A139222

UCSF Adult Reconstruction OMEGA Grant

8/1/2022-7/31/2023

$28,000

Cindy Chang, MD

Ossur Americas - Fellowship A139558

Ossur Fellowship

7/1/2022-6/30/2023

$20,000

Ashraf El Naga, MD

Ankasa Regenerative Thera, Inc. A139563

a liposomally formulated Wnt protein named ART352-L

7/1/2022-6/30/2023

$41,941

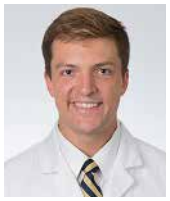
Brian Feeley, MD

CALIF Inst for Regenerative Medicine A138969

Matrix Assisted Transplantation of Promyogenic Fibroadipoprogenitor Stem Cells

4/1/2022-3/31/2024

$1,179,478



Ryan Halvorson, MD

Orthopaedic Research and Education Fdn. (OREF) A140720

Phenotyping Post-Operative ACL Recovery Trajectories

10/1/2022-9/30/2023

$5,000

Jae-Young Jung, PhD

NIH Natl Inst Arthr, Musculoskel & Skin – Fellowship A139971

Understanding the multiscale basis of solute transport in the cartilage endplatee

8/1/2022-7/31/2024

$141,536

Muscular Dystrophy Association, Inc. A140077

Mirabegron in Treating Muscle Dystrophy

9/1/2022-8/31/2025

$300,000

Sanjeev Sabharwal, MD, MPH

OrthoPediatrics Corp - Fellowship A139732

Fellowship 2022-23

8/1/2022-7/31/2023

$122,650.89

Richard Schneider, PhD

NIH Natl Inst Dental & Craniofacial Res. R01 A138527

Mesenchymal Regulation of Osteogenesis

2/1/2022-3/31/2027

$3,170,360

Christopher Stewart, MD

Orthopaedic Research and Education Fdn. (OREF) A140469

Limb Optimization: Factors that Influence Limb Reconstruction or Amputation

10/1/2022-9/30/2023

$5,000

Bobby Tay, MD

NuVasive, Inc. - Fellowship A139124

Orthopaedic Spine Fellowship 2022-2023

8/1/2022-7/31/2023

$23,111.83

OMeGA Medical Grants Association - Fellowship A140718

2022-2023 Omega Spine Fellowship

8/1/2022-7/31/2023

$24,000

Sarah Wong,DDS, PhD

Osteo Science Foundation – Fellowship A139795

Osteo Science Foundation OMS Research Fellowship

7/1/2022-6/30/2023

$65,448

2022 Grants and Fellowships

Katherine Woolley, MD

Mt. Zion Health Fund A140705

The Environmental Impact of Same Day versus Short Stay Total Shoulder Arthroplasty

12/1/2022-11/30/2023

$40,000

Alan Zhang, MD

Arthroscopy Association of North America – Fellowship A139833

ARTHROSCOPY/SPORTS FELLOWSHIP 2022-2023

8/1/2022-7/31/2023

$10,835.52

Patricia Zheng, MD

The Spine Intervention Society A132385

ATLAS - Application to Track Longitudinal outcomes After Spine interventions

8/1/2018-6/30/2023

$25,000

Center Related Grants

REACH projects

• BEST (Biomarkers for Evaluating Spine Treatments)

• REACH Participant Diversity Program (INVEST)

• Apple Watch project: "Identifying Biophysiological phenotypes related to chronic low back pain: a longitudinal study tracking activity and heart-rate using wrist-worn sensors"

• BACPAC ancillary project "Formalize Theoretical cLBP Models using existing clinical data." In 2022, six projects were funded as part of the Theoretical Modeling Challenge:

1. Developing Robust Prediction Models for Outcomes Following Surgical Interventions for Chronic Low Back Pain - $50,000

a. Thomas Peterson, PhD, UCSF; Julie Fritz, PT, PhD, ATC, FAPTA, U. Utah; Aaron Scheffler, PhD, UCSF; Zorica Buser, PhD, USC; Brook Martin, MPH, PhD, U. Utah; Andrew Bishara, MD, UCSF

2. Pooled analysis and phenotype development for chronic low back pain patients across theoretical model working group datasets - $50,000

a. Abel Torres-Espin, PhD, UCSF; Anastasia Keller, PhD, UCSF; Thomas A. Peterson, PhD, UCSF; Andrew Bishara, MD, UCSF; Gina McKernan, PhD, University of Pittsburgh; Adam Ferguson, PhD, UCSF; Aaron Scheffler, UCSF

3. Phenotyping patients with endplate bone marrow lesions: psychosocial factors and image-based biomarkers - $50,000

a. Noah B. Bonnheim, PhD, UCSF; Aaron J. Fields, PhD, UCSF; Nico Sollmann, PhD, UCSF; Thomas A. Peterson, PhD, UCSF; Gabby Joseph, PhD, UCSF; Ann A. Lazar, PhD, MS, UCSF

4. Challenging and improving mechanistic cLBP models - $50,000

a. C. Anthony Hunt, PhD, UCSF; Glen E.P. Ropella; Irina Strigo, PhD, UCSF; Wolf Mehling, PhD, UCSF; and Paul Anderson, PhD, Cal Poly

5. Validating Machine Learning Algorithms for Better Treatment of Chronic Low Back Pain - $50,000

a. Ajay Wasan, MD, MSc, U. Pittsburgh; Jong Jeong, PhD, U. Pittsburgh

6. Semi-automated Knowledge Graph Construction for Mechanistic cLBP models - $50,000

a. Paul Anderson, PhD, Cal Poly; Glen E.P. Ropella; C. Anthony Hunt, PhD, UCSF

CDMI projects

1. Understanding Bacterial Infiltration into Bone and Bone Allograft - Christopher Hernandez, PhD, UCSF - $40,000

2. Regeneration of craniofacial muscle after volumetric muscle loss using hydrogel, muscle stem cells and chemokines - Jason Pomerantz, MD, UCSF - $40,000

2022 CCMBM awards

• Kazuhito Morioka, CCMBM Pilot Award, "Nociplastic spinal cord-muscle loop in degenerative disc disease (DDD)" $40,000

• Noah Bonnheim, CCMBM Junior Investigator Travel Award to the Summer Biomechanics, Bioengineering, and Biotransport Conference (SB3C)

Zuzana Vavrusova, CCMBM
• Junior Investigator Travel Award to the Society for Developmental Biology Annual Meeting

• Ryan Halvorson, 2022 Best Slam Talk, "Rethinking Clinical Motion Capture using Greek Mythology: Implementing Procrustes Motion Analysis"

• Serra Kaya, 2022 Best Postdoctoral Poster, "*Transcriptomic Analysis of Aged Mouse Bone Identifies Novel Genes Enriched for Genetic Associations with Osteoarthritis in Human*"

• Jessica Ornowski, 2022 Second Place Trainee Poster, "*Validity of Automated T1-weighted Thresholding Approaches for Predicting Fat Infiltration of the Paraspinal Muscles with Comparison to Advanced Water-far Sequences?*"

• Karsyn Bailey, 2022 Best Graduate Student Poster, "*Mechanosensitive Control of Articular Cartilage and Subchondral Bone Homeostasis Requires Osteocytic TGFβ Signaling*"

• Jihee Yoon, 2022 Second Place Graduate Student Poster, "*miR-181a/b Controls Osteocyte Bioenergetics*"

2022 NOVA Seed OREF Research Awardees

NOVA Grant- Jeannie Bailey, PhD "Identification and prediction of postoperative recovery trajectories among patients undergoing surgery for chronic musculoskeletal pain conditions: a potential tool for anticipating long-term outcomes"

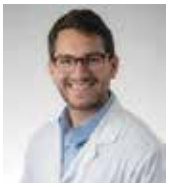
DEI NOVA Grant- Nirav Pandya, MD "The Impact of Primary Language on Outcomes after Anterior Cruciate Ligament Reconstructions"

SUPERNOVA- Lauren Shapiro, MD "The Impact of Spanish Language on PROM Use – A Mixed-Methods Approach"

Seed Grant- Saam Morshed, MD, PhD, MPH "Does a Digital Mental Health Intervention Impact Symptoms of Depression, Anxiety and Post-Traumatic Stress Disorder After Musculoskeletal Trauma? A Pilot Feasibility Study"

Seed Grant- Stephanie Wong MD and Grace O'Connell PhD "Multi-Scale Differences Males and Females with ACL Rupture"

2022 OREF Resident Research Symposium Winners



First Place (Tie)

Heterogeneous Human Fibroadipogenic Cells Subpopulations are Altered in Injury
Steven Garcia, MD,
University of California,
San Francisco

Defining Endogenous Mitochondrial Transfer in Muscle Following Rotator Cuff Injury
Michael Davies, MD,
University of California,
San Francisco

Second Place

Breaking the Glass: Gender Differences in Endowed Chair Positions and NIH Funding in Musculoskeletal Research
Alicia Asturias, MD,
University of California,
San Francisco

Third Place

Impact of Social Determinants of Health on Preoperative Opioid Utilization in Patients with Lumbar Degeneration
Jennifer M. O'Donnell, MD,
University of California, San Francisco

An Analysis of the Prognostic Factors for Adult Patients with High-Grade Extremity Sarcomas in the California Cancer Registry, 1988-2017
Sarah Stroud, MD,
University of California,
San Francisco

Research Programs and Activities

Associate Specialist Mohamed Habib, a member of the Fields Laboratory for Orthopaedic Biomechanics and Biotransport, studies structure-function relationships in musculoskeletal tissues research, with a particular focus on the effect of matrix modification of the cartilage endplate for improving solute transport and disc nutrition.

Basic, Translational, and Clinical Research

The UCSF Department of Orthopaedic Surgery has a diverse and broad basic and translational research program in musculoskeletal biology. Areas of focus include molecular and cell biology, developmental and stem cell biology, tissue regeneration, and biomechanics and biomaterials. This is in addition to our clinical research program, which spans all orthopaedic subspecialties. Each of our various research programs are aimed at bringing new insights to our understanding of the musculoskeletal system. A major goal is to develop novel treatments for defects, diseases, conditions, and injuries that affect musculoskeletal function. We are driven by the desire to improve the delivery and outcomes of orthopaedic care.

Additionally, the Department has a strong tradition in clinical research across all subspecialties. Over the past decade, clinical researchers have established a large collaborative network both within UCSF as well as with national and international clinical researchers. This has improved the impact and depth of our clinical research.

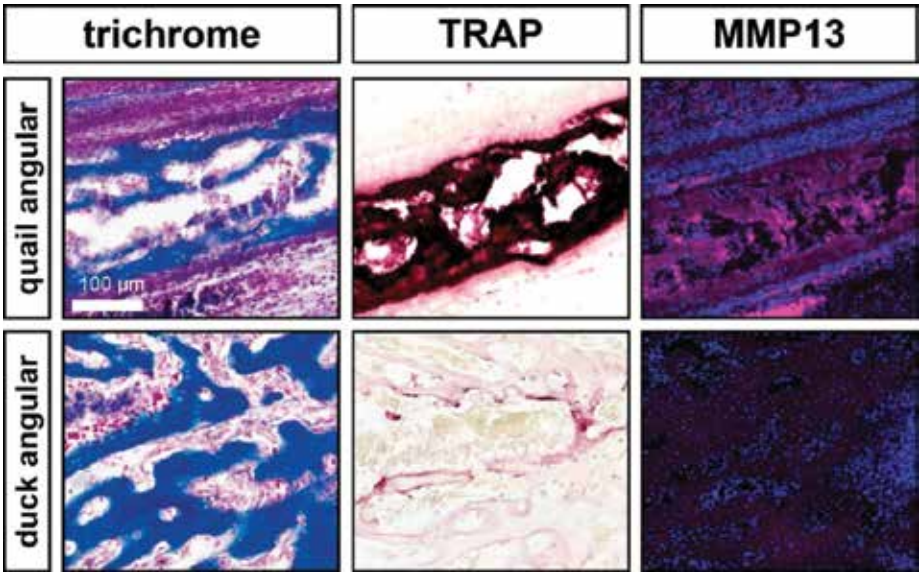
Last year, our basic, translational, and clinical research was published in many high impact journals such as Bone, eLife, FASEB Journal, the Journal of Bone and Mineral Research, PNAS, as well as all major orthopaedic surgery journals including the Journal of Bone & Joint Surgery (JBJS), Journal of Orthopaedic Trauma (JOT), Spine journal, Journal of Pediatric Orthopaedics (JPO), Clinical Orthopaedics and Related Research (CORR), and the American Journal of Sports Medicine (AJSM).

Our faculty, fellows, and residents have been invited to present at numerous national and international conferences such as those held by the American Academy of Orthpaedic Surgeons (AAOS); American Association for Anatomy (AAA), Orthopaedic Research Society (ORS); the American Orthopaedic Society in Sports Medicine (AOSSM); the International Society of the Study of the Lumbar Spine (ISSLS); the American Society for Bone and Mineral Research (ASBMR); the Gordon Research Conferences (GRC), International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine (ISAKOS); the Hip and Knee Society; and the Orthopaedic Trauma Association (OTA).

While the individual projects are too numerous to list in detail, there have been several highlights of collaborative research across spine surgery, chronic low back pain, osseointegration, 3D printing for improving surgical outcomes, shoulder arthroplasty and instability, imaging analysis using high resolution MRI and CT, global health through UCSF's Institute for Global Orthopaedics and Traumatology (IGOT), pediatrics and pediatric sports medicine.

UCSF Orthopaedic Research Laboratory at Parnassus Heights

At Parnassus Heights, our basic science laboratories collaborate to investigate mechanisms underlying different orthopaedic conditions ranging between skeletal deformity, osteoporosis, and joint degeneration. Staff research associate Jiamin Zhou performs orthopaedic research at the Parnassus campus.



The Schneider Laboratory for Developmental and Evolutionary Skeletal Biology assayed bone (stained blue with trichrome) for enzymes (TRAP and MMP13) that resorb bone in quail and duck embryos. The lab observes qualitatively higher levels of TRAP (red) and MMP13 (pink) staining in the quail angular bone compared to that observed in duck, which has very low levels of these enzymes in this same bone. Understanding the genetic and molecular mechanisms that control where and when bone-resorbing enzymes are expressed is a goal of our research, which can help us devise molecular-based therapies to treat human skeletal diseases where there is too much or too little bone resorption.

Development and Evolutionary Skeletal Biology

UCSF Parnassus Heights

The Schneider Laboratory for Developmental and Evolutionary Skeletal Biology is directed by **Richard A. Schneider, PhD.**

Dr. Richard A. Schneider, PhD, directs the Laboratory for Developmental and Evolutionary Skeletal Biology. Dr. Schneider and his lab investigates how the developing musculoskeletal system achieves its structural and functional integration. His lab has created a unique surgical transplantation system that involves embryos from two distinct types of birds (quail and duck), which differ considerably in their functional anatomy and growth rates. Transplanting skeletal and other progenitor cells between them challenges the resulting chimeric “quck” and “duail” embryos to integrate two different species-specific developmental programs. By focusing on donor- versus host-controlled changes to embryonic patterning and growth, this strategy has illuminated molecular and cellular mechanisms that regulate the musculoskeletal system and enable bones, cartilages, tendons, muscles, and other tissues to achieve their proper size, shape, orientation, and functional integration. A goal is to devise novel molecular- and cell-based therapies for repairing and regenerating musculoskeletal tissues affected by birth defects, disease, and injury. Work from the Schneider Lab has also helped elucidate the role of development in evolution.

Skeletal Mechanobiology

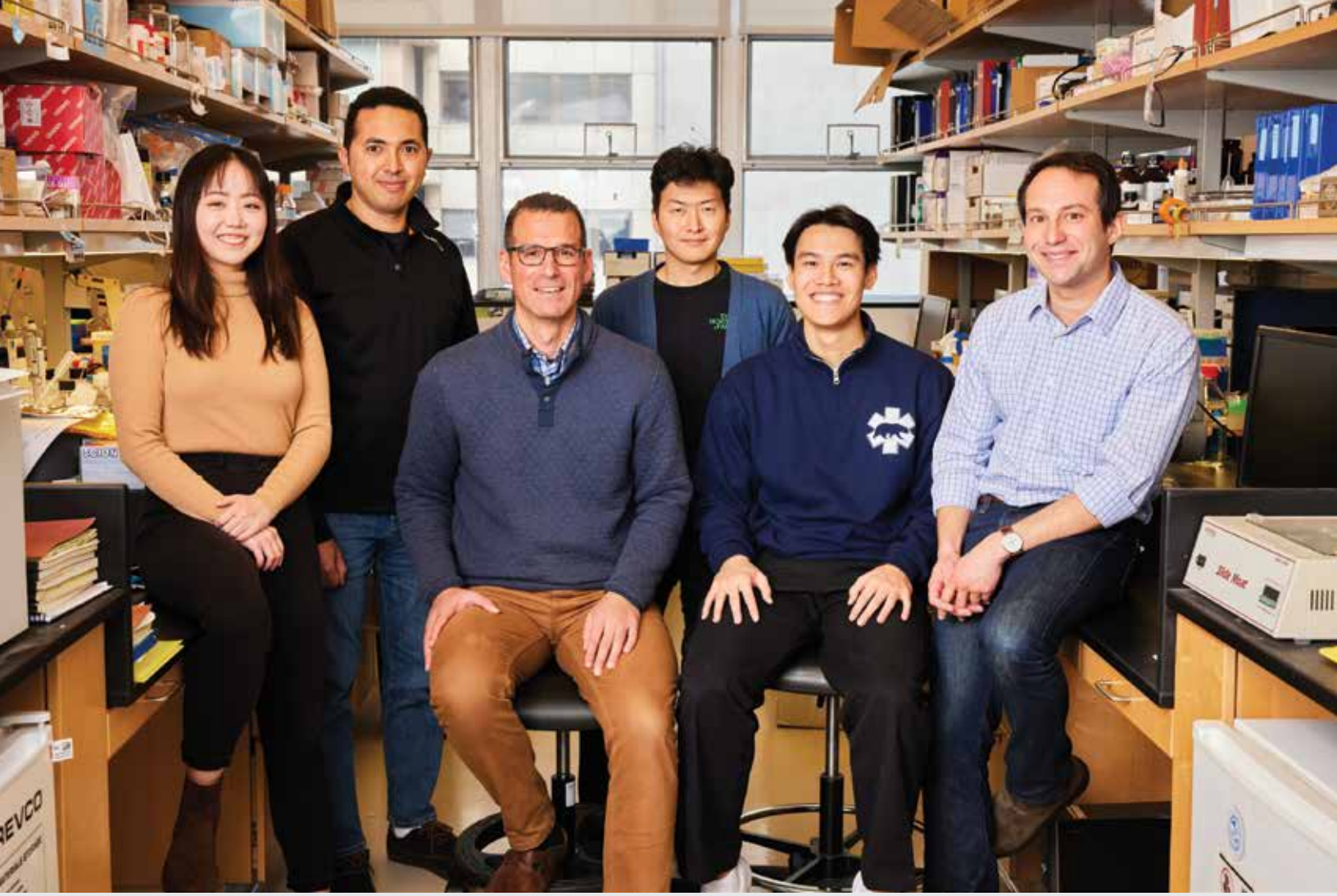
Eli and Edythe Broad Center of Regeneration Medicine and Stem Cell Research on Parnassus Heights

The Laboratory for Skeletal Mechanobiology is directed by **Tamara Alliston, PhD.**

Dr. Tarmara Alliston, PhD, directs the Laboratory for Skeletal Mechanobiology. Dr. Alliston and her lab investigate the molecular pathways controlling skeletal cell behavior, how these pathways coordinate with physical cues to influence mechanical integrity of healthy bone and cartilage, and how they can be harnessed to repair tissue damaged in degenerative skeletal diseases like osteoporosis and osteoarthritis. To answer these questions they combine molecular, cellular, physiologic, and materials science approaches. In particular, they seek to define the function of TGFb in synergistically coordinating physical and biochemical cues in bone and cartilage cells. Since TGFβ is a powerful regulator of homeostasis throughout the skeleton, understanding this signaling pathway has helped their team uncover fundamental new cellular mechanisms that participate in skeletal health and disease.

This research has provided important new insight on factors that cause common musculoskeletal problems, like joint injuries, osteoarthritis, and bone fragility in aging men and women. Now the research team is building on what they have learned in the laboratory to discover new therapeutic strategies to prevent skeletal disease and to improve skeletal repair.

Visiting scholar Christoforos Meliadis performs experiments in the Alliston Laboratory of Skeletal Mechanobiology located in the Stem Cell Building on the Parnassus campus.



Fields Laboratory for Orthopaedic Biomechanics and Biotransport. Pictured are, from left, Jiamin Zhou Mohamed Habib, PhD, PEng, Aaron Fields, PhD, Jae-Young Jung, PhD, Shayan Hussain and Noah Bonnheim PhD.

Orthopaedic Biomechanics and Biotransport

UCSF Parnassus Heights

The Orthopaedic Biomechanics and Biotransport Laboratory is directed by **Aaron Fields, PhD.**

Dr. Aaron J. Fields, Ph.D, directs the Orthopaedic Biomechanics and Biotransport Laboratory. Dr. Fields and his lab investigate structure-function relationships in musculoskeletal tissues, with a particular focus on discovering the mechanisms of nutrient transport in cartilage and bone, and developing strategies that harness nutrient transport to improve tissue repair and regeneration. The lab combines engineering and biology approaches for: (1) understanding the effects of aging and disease on structure-transport relationships, and (2) developing translatable diagnostic and therapeutic strategies. An overall theme of this research is the use of advanced experimental and computational tools to measure how tissue constituents at the nano- and microscales impact whole-organ behavior. The research involves close collaborations with clinicians, including spine surgeons, physiatrists, and radiologists.

A primary focus of the lab's current research is the role of the cartilage endplate (CEP) in spinal disc degeneration and low back pain. The CEP forms a semi-permeable barrier that separates nutrient-rich vertebrae from the cells living inside the avascular discs. Research from the Fields lab has demonstrated how poor nutrient transport through the CEP impacts disc cell survival and function. Now the research team is using this knowledge to enhance the translation of disc regenerative therapies to the clinic.

Researcher Spencer Silvey, at left, and Alex Brown, PhD, perform experiments at the Brack Laboratory for Skeletal Muscle Regeneration and Aging on muscle aging and muscle recovery following cancer treatment.

Stem Cell Laboratory

Eli and Edythe Broad Center of Regeneration Medicine and Stem Cell Research on Parnassus Heights

The Brack Laboratory for Skeletal Muscle Regeneration and Aging is directed by Dr. **Andrew Brack, PhD**, and focuses on the development of strategies to accelerate skeletal muscle repair.

Andrew Brack, PhD, directs the Stem Cell Laboratory and has developed collaborations with clinical faculty, including sports medicine and oncology. Active studies include studies on muscle aging and muscle recovery after radiotherapy. This effort uses state of the art machine learning and molecular biology to determine the causes of muscle dysfunction and identify strategies to rejuvenate the regenerative potential of skeletal muscle. During aging or in response to radiotherapy, the capacity for muscle repair is diminished, leading to reduced mobility and strength. In the future, the Brack Lab hopes that current projects will lead to strategies that reverse aging and improve recovery after radiotherapy.

Skeletal Regeneration/Molecular and Cellular Biology

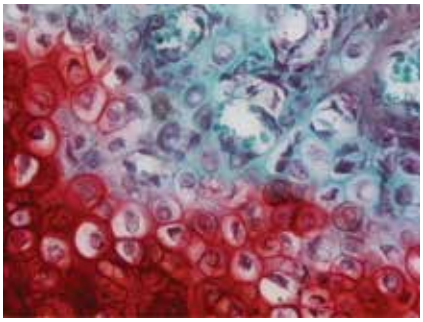
Zuckerberg San Francisco General Hospital (ZSFGH)

The Molecular and Cellular Biology Laboratory is directed by **Ralph Marcucio, PhD,** and **Ted Miclau, MD.**

The major focus of the work performed is to examine the processes that occur during bone regeneration after traumatic injury. Understanding the events that occur during fracture repair is essential for developing therapies to help people that exhibit difficulties in bone healing. For example, delayed or non-union afflict approximately 10% of all people undergoing fracture repair. By understanding how the body normally responds to orthopaedic trauma, they are laying the foundation for the development of new therapeutic regimens to treat a wide variety of skeletal pathologies.

The research utilizes a murine tibia fracture model that was developed by members of the laboratory and is used in other laboratories throughout the national and international orthopaedic Skeletal Regeneration/Molecular and Cellular Biology.

Researchers at the Skeletal Regeneration/ Molecular and Cellular Biology Laboratory study bone regeneration following traumatic injury.



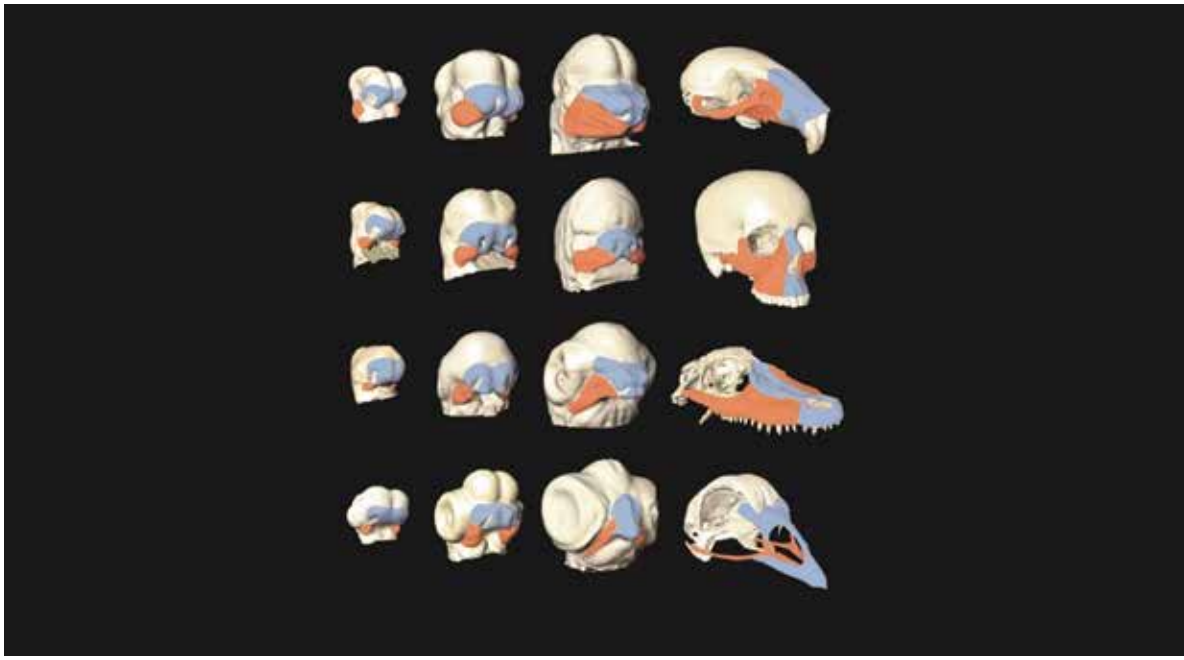
Laboratory for Evolutionary Anatomy

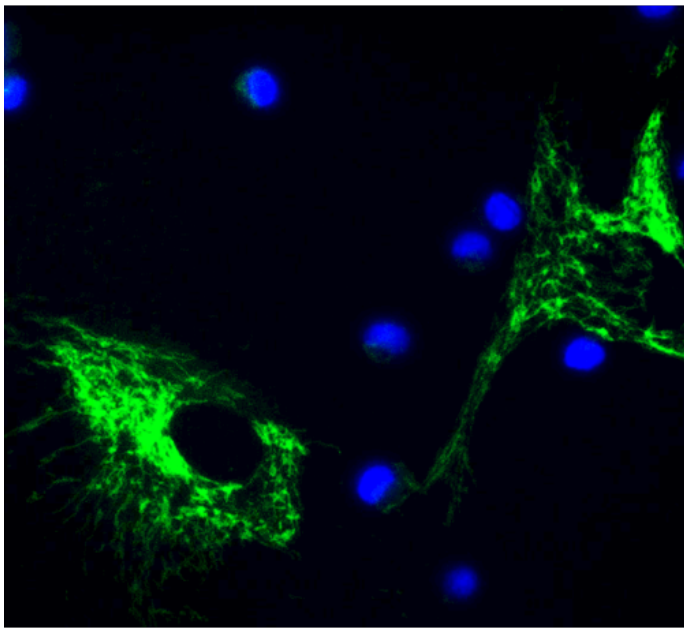
Zuckerberg San Francisco General Hospital (ZSFGH)

The Laboratory for Evolutionary Anatomy is directed by **Nathan Young, PhD.**

The Young Laboratory addresses biomedical basic research through the lens of evolution, utilizing functional compromise and historical constraint as fundamental explanatory principles. When combined with mechanistic insights from experimental systems, this approach yields significant insights into the generation of individual phenotypes, both normal and abnormal. The lab research program combines classical embryology, modern experimental and genetic tools, and advanced methods for quantifying and comparing phenotypes at a range of scales.

Comparison of facial development from embryos to adults in mouse, human, alligator, and chicken (Young Laboratory for Evolutionary Anatomy).





The Muscle Injury and Translational Orthopaedic (MITO) Laboratory is co-directed by Brian Feeley, MD and Xuhui Liu, MD at the UCSF Research Facility at Mission Bay.

The Muscle Injury and Translational Orthopaedic (MITO) Lab at the UCSF Mission Bay campus is directed by Xuhui Liu, MD and Brian Feeley, MD

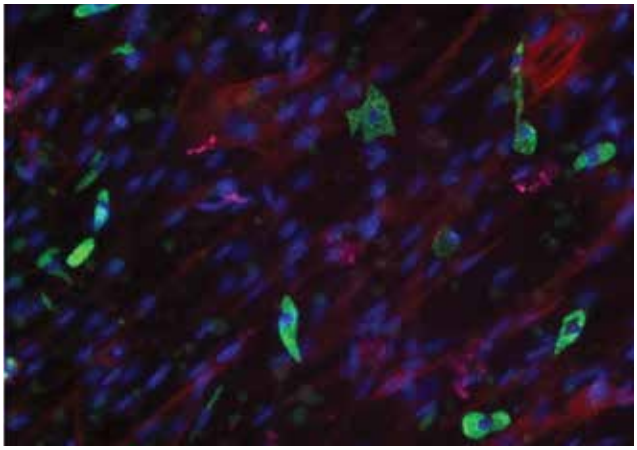
Orthopaedic Translation Research

UCSF VA Research Facility at Mission Bay

The Muscle Injury and Translational Orthopaedic (MITO) Laboratory is co-directed by **Brian Feeley, MD** and **Xuhui Liu, MD** at the UCSF Research Facility at Mission Bay.

The MITO lab performs research on muscle tissue quality and its impact on common problems, including rotator cuff tears, volumetric muscle loss, and neurodegenerative conditions. They collaborate with researchers at the UCSF and the VA Mission Bay campus to develop models for studying the molecular and cellular mechanisms responsible for muscle degeneration—and regeneration. This stem cell research is funded by the NIH, the VA, UCSF, and private donations. In 2022, the group, collaborating with Dr. Kevin Healy at UC Berkeley, was awarded a CIRM grant to study regenerative potential of stem cells in muscle, as well as a VA Merit Grant to evaluate mitochondrial properties in muscle stem cells. Residents Michael Davies and Steven Garcia continue to publish and win awards (ASES and OREF awards) Steven Garcia was awarded an NIH Diversity Supplement Grant as well (2021-22), and Brian Feeley/Steven Garcia were awarded a Diversity Mentorship Grant from the NIH to highlight his research and bring in underrepresented undergraduate STEM students into the lab. Xuhui Liu is expanding our work to muscular dystrophies, and was awarded a large grant from the Muscular Dystrophy Association. Finally, undergraduates Austin Lee and Agustin Diaz were accepted to medical school and will begin in 2023.

The group focuses on specific changes within muscle that occur across disease pathologies. Our central hypothesis is that some stem cells within muscle may have the ability to help promote a regenerative phenotype and help muscle recover from injuries. Certain cells (called fibroadipoprogenitors or FAPs), can turn into white fat, which may be energy stores for the muscle. They can also become brown fat or beige fat. As it turns out, beige fat plays an important role in energy balance, and it may produce local growth factors that promote a regenerative environment for muscle, as well as secrete factors within exosomes to promote muscle growth and differentiation. We also have found that these cells have the capability to transfer their mitochondria to other cells to promote muscle regeneration. In other words, with the right stimulus, these cells might be available to help muscle get healthy again. In 2022, we focused on expanding our work by evaluating the transcriptomic profiles of these cells in human and mouse cell lines, particularly in rotator cuff tear patients. We have expanded to evaluate other tissues as well, including ACL injuries in youth and adult athletes, working in collaboration with Nirav Pandya, MD and Stephanie Wong, MD.



Stem cells found within the rotator cuff muscle can be stimulated into fibrotic tissue (red) or fat tissue (green) depending on the stimulus. (Courtesy of the UCSF Muscle Injury and Translational Orthopaedic (MITO) Laboratory)

Orthopaedic Translational Research

Multi-campus Laboratory

The Laboratory for Orthopaedic Translational Research is directed by **Hubert Kim, MD, PhD** and **Alfred Kuo, MD, PhD** at the UCSF VA Research Facility at Mission Bay.

Drs. Hubert Kim, MD, PhD, and Alfred Kuo, MD, PhD, co-direct the Laboratory for Orthopaedic Translational Research. The focus of their team's research effort is to examine the molecular and cellular mechanisms responsible for secondary injury cascades that are set in motion after trauma. There is particular interest in tissues that have an extremely limited capacity for healing and regeneration, where preservation of existing cells and tissue may be of great clinical significance. The intention is to apply lessons learned in the laboratory to design better treatments for patients. In addition, the laboratory evaluates new diagnostics and therapeutics for musculoskeletal conditions, including the use of ultrasound and powered knee braces for patients with knee osteoarthritis, and a novel implant for hip arthroplasty.

Orthopaedic Tissue Engineering and Regeneration

UCSF Parnassus Heights

The Orthopaedic Tissue Engineering and Regeneration Laboratory is directed by **Jeffrey C. Lotz, PhD.**

The Laboratory of Orthopaedic Tissue Engineering and Regeneration is directed by Jeffrey C. Lotz, PhD.

Dr. Jeffrey C. Lotz, PhD, is the David S. Bradford M.D. Endowed Chair in Orthopaedic Surgery and Vice Chair of Orthopaedic Research at UCSF. Dr. Lotz has led the Orthopaedic Tissue Engineering Laboratory at UCSF since 1992, and his research focuses on identifying mechanisms of disc degeneration, developing novel diagnostics and therapies for low back pain, and the biomechanics of spinal instrumentation. He is bringing his multifaceted expertise to bear on the development of precision medicine approaches for chronic low back pain as principal investigator of one of the three Mechanistic Research Centers funded through the NIH Back Pain Consortium (BACPAC) Research Program (under NIH HEAL). BACPAC is a translational, patient-centered effort to combine state-of-the-art diagnostic tools and artificial intelligence approaches to personalize therapies for chronic low back pain. Dr. Lotz is also director of two other research centers, including the NIDCR-funded Center for Dental, Oral and Craniofacial Tissue and Organ Regeneration (C-DOCTOR), and the NSF-funded Industry/University Cooperative Research Center (CDMI). Dr. Lotz earned a doctorate degree in Medical Engineering from the Harvard/MIT Division of Health Sciences and Technology, a Master of Science Degree in Mechanical Engineering Design from Stanford University, and Bachelor of Science Degree in Mechanical Engineering from UC Berkeley.

Resident Ryan Halvorson MD, at right, and clinical researcher Luana Leal, at center, work with novel markerless motion-capture technology to track patient biomechanical function developed from the Musculoskeletal Research Consortium (METRICS) lab led by Jeannie Bailey, PhD.

Data science and Technology Development for Enhancing Clinical Research

UCSF VA Health Center, Research Facility at Mission Bay

The Laboratory of Digital Orthopaedic Biomechanics is directed by Jeannie F. Bailey, PhD.

Dr. Jeannie F. Bailey, PhD, directs the Laboratory for Digital Orthopaedic Biomechanics. Her lab is part of the Musculoskeletal Research Consortium (METRiCS) bridging musculoskeletal research across Orthopaedic Surgery, Neurosurgery, and Physical Therapy. Dr. Bailey is also the director of the Physical Function and Biomechanics Research Core for an NIH Mechanistic Research Center for Phenotyping Chronic Low Back Pain in close collaboration with other UCSF Orthopaedic Surgery investigators. Her research develops advanced technology and data science approaches for creating and analyzing novel patient outcomes for predicting response to treatment. She has numerous studies tracking patient-specific biomechanical and muscle health in astronauts, low back pain patients, and orthopaedic surgery patients. Using these approaches, her research seeks to clarify the role of muscle health on predicting post-treatment biomechanical and pain-related outcomes for orthopaedic surgery patients. She is also actively developing and testing digital tools for enhancing patient-engagement with care and recovery, as well as safe and non-invasive digital therapeutics. While much of her basic science research is funded by the NIH and DOD, she also has numerous grants through the UCSF Innovations office to develop novel devices and digital health applications for orthopaedic patient care.

Laboratory for Digital and Computational Health Science

Multi-Campus Laboratory

Dr. Thomas Peterson PhD is Director of the Informatics Core for the UCSF REACH Center for Chronic Low Back Pain

Dr. Tom Peterson, PhD's Laboratory for Digital and Computational Health Science works in close coordination with experts and trainees in the clinical domain to advance computational health sciences by leveraging advanced statistical techniques and artificial intelligence / machine learning (AI/ML) models. As director of the analytics core for the UCSF Core Center for Patient-centric Mechanistic Phenotyping for Chronic Low Back Pain (REACH for cLBP), Peterson's team provides cutting-edge tools for studying multimodal data including electronic health records (EHRs), clinical images, biomechanical sensors, and free-text clinical notes. This year, Dr. Peterson published a book chapter describing AI/ML techniques applied to the management of spinal disorders [1]. Additionally, using his expertise in EHRs in his work with UC Health in 2021, Dr. Peterson published the first research paper to study the combined EHRs of five major UC academic medical institutions (UCSF, UCLA, UCD, UCI, and UCSD) [2].

Such expertise from the Peterson Lab in a variety of computational health science domains promises innovations for the advancement of precision medicine in orthopaedic surgery for the future.

Clinical Research

In 2022, the UCSF Department of Orthopaedic Surgery continued to advance clinical research initiatives across our subspecialties. Our research endeavors resulted in numerous publications, meeting presentations and grants awarded. The following section will highlight programs from each of our subspecialty sections.

Arthroplasty

UCSF's Arthroplasty Group participates in and designs research studies looking to advance the field of total joint replacement. Projects include utilizing sensors in analyses of post-operative gait, novel imaging modalities of periprosthetic joint infections, treatment of postoperative pain, and best treatment of distal femur fractures in elderly patients. The arthroplasty group consists of Drs Thomas Vail, Erik Hansen, Stefano Bini, Derek Ward and Jeff Barry.

Project Highlights

A validation study using gait analysis to test the accuracy of wearable sensor data in post-surgical patients

In collaboration with the UCSF Human Performance Center (HPC)

Wearable sensors are becoming increasingly accurate in their evaluation of motion in three-dimensional space. If a strong association can be demonstrated between wearable sensor data and clinical outcomes, wearables could quickly become the reference point for objectively evaluating clinical results with greater accuracy than ever before.

The Use of Venlafaxine in Reducing Post-Surgical Pain and Opioid Consumption after Primary Total Knee Arthroplasty

In collaboration with the UCSF Department of Anesthesia

Neuropathic pain medications, specifically venlafaxine, maybe effective in managing nerve pain after surgery. We propose a prospective randomized clinical trial to evaluate the efficacy of venlafaxine in reducing pain intensity and opioid consumption at post-operative day 1 and one week after surgery, and as well as examine whether the use of venlafaxine will reduce the incidents of chronic postsurgical pain in TKR patients at 3 months.

Biodistribution of 11C D-methionine Positron Emission Tomography In Normal Subjects and Those with Suspected Infection

In collaboration with the UCSF Department of Radiology and Biomedical Imaging

Diagnosis of periprosthetic joint infections (PJIs) utilizing radiographic imaging techniques comes with unique challenges. The goal of this project is to assess the ability of a positron-emitting topography (PET) agent in directly detecting bacterial infection in human subjects, which localize to bacteria but not mammalian cells. Such technique can further the identification process of PJI that can assist in proper control of invading organisms.

Perioperative Antibiotic Prophylaxis in Patients Undergoing Elective Total Knee Arthroplasty: A prospective, randomized, open-label controlled multi-center trial

Administration of prophylactic antibiotics before surgery is a well-established strategy to prevent PJIs and SSIs; yet, discussions linger regarding the choice of antibiotic, duration of prophylaxis, optimal dosage and timing, and route of administration. This open-label trial is designed to identify the comparative effectiveness of various perioperative strategies for antibiotic delivery as prophylaxis against PJI and SSIs in elective TKAs.

Dexamethasone in Total Knee Arthroplasty: What Dose Should We Be Giving Patients Intraoperatively?

Corticosteroids are a medication commonly introduced intraoperatively as part of contemporary multimodal approach to total joint arthroplasty due to their potent anti-inflammatory and anti-emetic properties. Several studies demonstrate that corticosteroids, primarily dexamethasone, reduces postoperative nausea and vomiting as well as postoperative pain and opioid consumption. However, the optimal medication, dose, and number of doses that should be administered in the perioperative period remain unknown. The general purpose of this randomized, double-blind study is to determine the most efficacious and safest dexamethasone dose given intraoperatively during total knee arthroplasty that reduces postoperative opioid consumption and pain, improves postoperative nausea and vomiting, and

A Multicenter Randomized Controlled Trial of Acute Open Reduction Internal Fixation versus Distal Femur Replacement for Distal Femur Fractures (DIFFIR)

This multicenter randomized controlled trial aims to determine the best surgical treatment of distal femur fractures (native and periprosthetic) in elderly patients (65 years of age and older). It compares ORIF to distal femoral replacement and is a study involving the arthroplasty and trauma group at UCSF.

Biodistribution of 11C D-methionine Positron Emission Tomography In Normal Subjects and Those with Suspected Infection

Site Co-Investigators: Jeff Barry, MD; Stefano Bini, MD; Erik Hansen, MD; Thomas Vail, MD; Derek Ward, MD.

In collaboration with the UCSF Department of Radiology and Biomedical Imaging

The goal of this project is to assess the ability of a positron-emitting topography (PET) agent in directly detecting bacterial infection in human subjects, which localize to bacteria but not mammalian cells.

Perioperative Antibiotic Prophylaxis in Patients Undergoing Elective Total Knee Arthroplasty: A prospective, randomized, open-label controlled multi-center trial

Site Co-Investigators: Jeff Barry, MD; Stefano Bini, MD; Erik Hansen, MD; Thomas Vail, MD; Derek Ward, MD.

Sponsored by Duke University

This open-label trial is designed to identify the comparative effectiveness of various perioperative strategies for antibiotic delivery as prophylaxis against PJI and SSIs in elective TKAs.

A 3-D print of a human foot and ankle joint is on display in a light box at the Makers Lab, in the Kalmanovitz Library, at the Parnassus campus. (Photo Courtesy of UCSF)

Foot and Ankle

Dr. Kirstina Olson, Dr. Daniel Thuillier and Dr. Lan Chen have continued to build the research infrastructure for the Foot and Ankle Section. Dr. Chen is currently working on large administrative database research evaluating complication rates in outpatient total ankle arthroplasty. Dr Olson is coordinating a study evaluating post-operative pain control in foot and ankle patients utilizing pain catheters and long acting nerve blocks. Dr Thuillier is assessing timing of Achilles tendon rupture repairs and early return of strength and higher levels of activity. Dr Thuillier is evaluating lower extremity atrophy and clinical function after surgical repair for chronically torn tendons.

Hand and Upper Extremity

The hand and upper extremity division has multiple on-going projects evaluating a variety of upper extremity pathologies. We have received two grants from the American Foundation for Surgery of the Hand to study 1) the biomechanical properties of metacarpal fracture fixation and 2) disparities in access to care for distal radius fractures. Other studies include predictors of success during residency, medical mistrust during outpatient care, and the impact of language and culture on outcomes.

Dr. Lauren Santiesteban, MD exams a patient's hand at the UCSF Orthopaedic Institute on the Mission Bay Campus in San Francisco.

Highlighted publications:

Halvorson RT, Lalchandani GR, Cherches MF, Petit LM, Lattanza L, Lee NH, Kandemir U. Interobserver and Intraobserver Reliability of Classification Systems for Radiographic Complications After Radial Head Arthroplasty. J Hand Surg Am. 2022:S0363-5023(21)00796-6. doi: 10.1016/j.jhsa.2021.11.028.

Cherches MF, Halvorson R, Lalchandani G, Kandemir U, Lattanza LL, Lee N. Anatomic Radial Head Arthroplasty: The Importance of Implant Angle. J Hand Surg Am. 2022;47(6):534-539. doi: 10.1016/j.jhsa.2022.02.001.

Truong NM, Zhuang T, Leversedge C, Ma CB, Kamal RN, Shapiro LM. Medicaid Insurance is Associated with Treatment Disparities for Proximal Humerus Fractures in a National Database Analysis. J Shoulder Elbow Surg. 2022:S1058-2746(22)00909-0. doi: 10.1016/j.jse.2022.11.016.

Shapiro LM, Welch JM, Chatterjee M, Katarincic JA, Leversedge FJ, Dyer GSM, Fufa DT, Kozin SH, Chung KC, Fox PM, Chang J, Kamal RN. A Framework and Blueprint for Building Capacity in Global Orthopaedic Surgical Outreach. J Bone Joint Surg Am. 2023;105(3):e10. doi: 10.2106/JBJS.22.00353.

Shapiro LM, Graham LA, Hawn MT, Kamal RN. Quality Reporting Windows May Not Capture the Effects of Surgical Site Infections After Orthopaedic Surgery. J Bone Joint Surg Am. 2022;104(14):1281-1291. doi: 10.2106/JBJS.21.01278.

Nwosu C, Wittstein J, Erickson M, Schroeder N, Santiesteban L, Klifto C, Jiang Y, Shapiro LM. Representation of Female Speakers at the American Academy of Orthopaedic Surgeons (AAOS) Annual Meetings Over Time. J Am Acad Orthop Surg. 2022. DOI: 10.5435/JAAOS-D-22-00615.

Oncology

The Oncology Section has a number of on-going research projects involving osseointegration and bone anchored, transcutaneous prostheses for amputees, functional and health related outcomes following limb salvage surgery for primary bone sarcomas, health disparities among patients with primary and secondary bone tumors, and sarcoma immunotherapy. UCSF is a world leader in the use of osseointegration to improve function for transfemoral amputees and continues to advance innovation in this field through clinical care and research. The complex amputations clinic and osseointegration program is headed by Dr. Richard O'Donnell. Our sarcoma center is also engaged in clinical research to assess outcomes of oncologic and limb salvage treatment with a focus on health disparities and basic science projects assessing the host immune response to bone and soft tissue sarcomas as well as the impact of local infection on systemic relapse of osteosarcoma in collaboration with the Colorado State University Veterinary School. Dr. Rosie Wustrack and Dr. Melissa Zimel are working with the California Cancer registry to assess Health disparities in adult primary bone sarcoma treatment. UCSF is also a leader in the Northern California and Oregon Compress Collaboration, which is a group of five tertiary sarcoma centers working together to conduct research on the long-term outcomes of patients undergoing limb salvage surgery with endoprosthetic reconstructions.

Current On-going Studies:

1. Minimum 10-year follow-up for patients with distal femur Compress endoprosthetic reconstruction: A Multi-Center Retrospective Study

2. The Effect of local and remote Staph aureus infection in osteosarcoma relapse in a mouse model

3. Proximal Tibia Hemiarthroplasty Reconstruction Following Resection of Malignant Bone Tumors in Skeletally Immature Patients

4. An Analysis of Prognostic Factors for Adults with High-Grade Extremity Sarcomas in the California Cancer Registry, 1988-2017

5. Elucidating immunologic drivers of chondrosarcoma progression and metastases

6. OPRA Implant System Premarket Approval and Related Studies

7. A 2-year follow-up, multidisciplinary study focused on outcomes and experience with the OPRA Axor II coupling unit

8. Phantom limb pain multimodal imaging

9. COVID-19: Surgical implications study

10. Osseointegration Quality Registry

11. ASSIST: Amputee Smart Safe Implant Sensor Technology

12. Patient Preferences for Attributes of Risk and Benefit of Prosthetic Devices for Upper Limb Loss

13. An osseointegrated transfemoral prosthesis offering long-term bi-directional efferent-afferent neural transmission (IDE)

14. Transhumeral Amputation Osseointegration Study, TAOS

Dr. Rosanna Wustrack reviews a radiology report with a medical student at the UCSF Mission Bay Hospital in San Francisco. (Photo Courtesy of the UCSF Department of Orthopaedic Surgery)

Highlighted Publications:

Tanaka, K. S., Andaya, V. R., Thorpe, S. W., Gundle, K. R., Hayden, J. B., Duong, Y. C., ... & Study Group FORCE. (2023). Survival and failure modes of the Compress® spindle and expandable distal femur endoprosthesis among pediatric patients: A multi-institutional study. Journal of Surgical Oncology, 127(1), 148-158.

Veerman, K., & Wertheim, H. (2022). Prophylactic Antibiotic Regimens in Tumor Resection Surgery Involving a Prosthesis. JAMA oncology, 8(8), 1222-1222.

Stroud, S. G., Geiger, E. J., Lichtensztajn, D. Y., Goldsby, R. E., Cheng, I., Wustrack, R., & Theologis, A. A. (2022). Survival of patients with primary osseous malignancies of the mobile spine is associated with access to "standard treatment" protocols. Journal of the American Academy of Orthopaedic Surgeons, 30(17), 841-850.

Wustrack, R. L., Shao, E., Sheridan, J., Zimel, M., Cho, S. J., Horvai, A. E., ... & Okimoto, R. A. (2021). Tumor morphology and location associate with immune cell composition in pleomorphic sarcoma. Cancer Immunology, Immunotherapy, 70, 3031-3040.

Geiger, E., Liu, W., Srivastava, D.K., Bernthal, N.M., Weil, B.R., Yasui, Y., Ness, K.K., Krull, K.R., Goldsby, R.E., Oeffinger, K.C., Robison, L.L., Dieffenbach, B.V., Weldon, C.B., Gebhardt, M.C., Howell, R., Murphy, A.J., Leisenring, W.M., Armstrong, G.T., Chow, E.J., Wustrack, R.L. (2021). What are Risk Factors for and Outcomes of Late Amputation After Treatment for Lower Extremity Sarcoma: A Childhood Cancer Survivor Study Report. Clinical Orthopaedics and Related Research.

Penumarthy, N. L., Goldsby, R. E., Shiboski, S. C., Wustrack, R., Murphy, P., & Winestone, L. E. (2020). Insurance impacts survival for children, adolescents, and young adults with bone and soft tissue sarcomas. Cancer medicine, 9(3), 951-958.

Zaid MB, O'Donnell RJ, Potter BK, Forsberg JA. Orthopaedic Osseointegration: State of the Art. J Am Acad Orthop Surg. 2019 Nov 15;27(22):e977-e985. doi: 10.5435/JAAOS-D-19-00016. PMID: 31181031.

Zaid MB, Wustrack RL, Garibaldi M, Geiger E, Andaya V, O'Donnell RJ; Prospective study of percutaneous bone-anchored implants in transfemoral amputees: Brain-machine platform technology for external prosthetic control and feedback; Conf Proc IEEE Eng Med Biol Soc; 2019

Strony, John BS1; Brown, Scot MD1; Choong, Peter MMBS, MD2; Ghert, Michelle MD, FRCSC3; Jeys, Lee MB, ChB, MSc, FRCS4; O'Donnell, Richard J. MD5. Musculoskeletal Infection in Orthopaedic Oncology: Assessment of the 2018 International Consensus Meeting on Musculoskeletal Infection. The Journal of Bone and Joint Surgery 101(20):p e107, October 16, 2019. | DOI: 10.2106/JBJS.19.00182

Matthew Garibaldi, MS, CPO, above, serves as the Associate Clinical Professor and as the Director of the Orthotic and Prosthetic Centers for the Department of Orthopaedic Surgery at UCSF. He oversees his division's activities in patient care, research, and education.

Orthotics and Prosthetics

The UCSF Orthotic and Prosthetic research division focuses on investigating the impact of devices in daily life beyond the clinical setting. Our prosthetic projects, investigate amputee care locally and globally. As part of an IGOT research collaboration we published on the cost-effectiveness of transfemoral prosthetic care in Tanzania. On the local front we are developing multiple projects which seek to improve outcomes for amputees. ASSIST (Amputee Safe Smart Implant Sensor Technology) is designed to use sensors to better understand the kinematics movements patterns of patients living with amputation. By being able to monitor patients more closely outside of the clinic, clinicians can proactively adjust their prosthetic devices to optimize use and improve safety. PROPEL (Physical Rehabilitation Optimization and Patient Education for Life) is a project using a multidisciplinary approach to create a customizable algorithm of exercises to help patients with unilateral transtibial and transfemoral amputation reach their physical goals. In a joint project with San Jose State University, we are quantifying how biofeedback training impacts functional outcomes in above knee prosthesis users. To better understand metrics for evaluating transtibial prosthetic alignment and socket fit our team published a scoping review, and a prospective study focused on transtibial fit and alignment is currently in publication. Prosthetic research also focused on the development of a discrete-choice preference measure for upper limb prosthetic devices that was developed to investigate patient's risk/benefit preference choices for regulatory decision making. Our orthotic projects center around assessing the efficacy and impact of devices on the everyday lives of users. For example, we are currently using pressure and temperature sensors to collect data on patients using the UCSF pectus carinatum orthosis to determine the ideal treatment criteria. We also are in progress with a study looking at how osteoarthritis knee orthoses impact patients' activity and pain outside of the clinical environment. At the UCSF 2022 Inman Abbott Conference, results were shared from a retrospective study on proximal junctional kyphosis rates after the introduction of a Soft TLSO. This preliminary work will lay the foundation for further investigation into the impact of post-operative TLSOs on surgical outcomes.

Recent publications:

Won NY, Paul A, Garibaldi M, Baumgartner RE, Kaufman KR, Reider L, Wrigley J, Morshed S. Scoping review to evaluate existing measurement parameters and clinical outcomes of transtibial prosthetic alignment and socket fit. Prosthet Orthot Int. 2022 Apr 1;46(2):95-107. doi: 10.1097/PXR.0000000000000061. PMID: 35412519.

Wilson L, Dohan D, Garibaldi M, Szeto D, Timmerman M, Matheny J. Prosthesis preferences for those with upper limb loss: Discrete choice study of PULLTY® for use in regulatory decisions. J Rehabil Assist Technol Eng. 2023 Jan 20;10:20556683231152418. doi: 10.1177/20556683231152418. PMID: 36698551; PMCID: PMC9869218.

Pediatrics

Pediatric Orthopaedic Clinical Research

Led by surgeons Drs Sanjeev Sabharwal, Nirav Pandya, Ravinder Brar, Celina de Borja, Eliana Delgado, Mohammad Diab, Jason Jagodzinski, Kristin Livingston, Coleen Sabatini, Ishaan Swarup and Rhonda Watkins, UCSF's Pediatric Orthopaedic research team designs and facilitates clinical research on pediatric orthopaedic care, global health, public policy, and technology.

Project Highlights (Prospective, Multi-Center/Multi-Faculty Studies)

Efficacy of Patient Education in Pediatric Orthopaedic Trauma
Investigators: Drs. Ishaan Swarup (lead investigator), Celina De Borja, Rhonda Watkins

The quality and usefulness of the Pediatric Orthopaedic Society of North America (POSNA) OrthoKids website (orthokids.org) content has not been assessed. The purpose of this study is to determine the readability, understandability, and actionability of the OrthoKids' educational material regarding ankle fractures, elbow fractures, femur fractures, and forearm fractures.

Assessing the Prevalence of Bullying in Pediatric Orthopaedic Patients

Investigators: Dr. Kristin Livingston, Dr. Celina De Borja, Dr. Coleen Sabatini, Dr. Sanjeev Sabharwal, Dr. Ishaan Swarup

The study aims to determine what the prevalence is of bullying in a population of adolescents under the care of a pediatric orthopaedist, with the focus on children using various assistive devices or other orthopaedic devices and on children with chronic disabilities. We plan to determine if there is a link between bullying and musculoskeletal conditions as well as to determine if assistive devices (walkers/wheelchairs/crutches), braces, casts, or external fixators were associated with an increased risk of bullying.

Development of a new patient reported outcome measure for children with lower limb deformities – Field Testing of LIMB-Q Kids

Investigators: Dr. Sanjeev Sabharwal

The specific aim of this study is to field-test LIMB-Q Kids in an international heterogeneous population of children and young adults with lower limb deformities. This is a prospective study that will involve the completion of LIMB-Q Kids by children with lower limb deformities from various sites.

SCFE Longitudinal International Prospective Registry (SLIP)

Investigators: Dr. Ishaan Swarup (lead investigator), Dr. Jason Jagodzinski

As the most common disorder of the adolescent hip, and one that requires surgical treatment to ensure full mobility, SCFE demands attention and research into more effective treatment methods. This study involves the development of a comprehensive patient log and the initiation of a study examining patients' conditions prior to surgery and their long-term outcomes across multiple participating centers will provide valuable insight into the treatment and management of this condition.

Members of the Division of Pediatric Orthopaedic Surgery include (from left): Eliana Delgado, MD, MPH; Jason Jagodzinski, MD; Celina de Borja, MD; Sanjeev Sabharwal, MD, MPH; Nirav Pandya, MD; Mohammad Diab, MD; Ishaan Swarup, MD; Kristin Livingston, MD; and Ravinder Brar, MD, MPH (Not pictured: Coleen Sabatini, MD, MPH and Rhonda Watkins, MD, MPH)

The Pediatric Spine Registry Study (PSSG)

Investigators: Dr. Ishaan Swarup (lead investigator), Dr. Mohammad Diab

The Pediatric Spine Registry (PS Registry) collects patient data on children with spine and chest wall disorders. This registry will serve as a hypothesis-generating database of prospectively collected outcomes. In turn, this will facilitate the development of targeted, hypothesis-testing randomized controlled trials and observational studies that can be housed within the larger registry.

Multi-Center Pin Site Infection Study (MPSIS) Group:

Site Investigator: Dr. Sanjeev Sabharwal

This multi-center study is working to measure and document pin site infection rate and pin site care among pediatric patients across Canada, US, and UK through a multicenter pin site infection database. The study aims to determine the rate of pin site infections and compare the rates across participating surgical practices, to document the factors affecting the rate of pin site infections across participating surgical practices, and to compare methods of pin site care across participating surgical practices.

Conditioning + Open-label Placebo for the Management of Pain in Children who Undergo Surgical Treatment of Idiopathic Scoliosis

Site Investigators: Dr. Mohammad Diab, Dr. Ishaan Swarup, Dr. Lionel Metz

This study aims to investigate the effects of conditioning + open-label placebo (COLP) on standard postoperative treatment for patients ages 10 to 17, inclusive, undergoing surgery for adolescent idiopathic scoliosis in a randomized controlled, 6-week trial with 64 AIS patients randomly assigned to one of two arms: COLP + treatment as usual (TAU) and TAU control. The primary outcome measure is postoperative opioid consumption, both amount and duration. Secondary outcomes include pain, functional ability, and mental health scores.

Children's Orthopedic Trauma and Infection Consortium for Evidence based Studies (CORTICES)

Site Investigator: Dr. Ishaan Swarup

CORTICES is a collaboration of pediatric orthopedic surgeons dedicated to improving the Quality, Safety, and Value in the management of emergent orthopaedic conditions (trauma and infection). This registry seeks to investigate the effects of pediatric orthopedic trauma-related injuries and musculoskeletal infections, using the collaborative efforts of multicenter principal investigators, and to advance evidence-based pediatric orthopedic care by filling in the research gaps that currently exist within the scientific literature of these issues.

The Pediatric ALL Evaluation and Trial (PALLET): A Randomized, Controlled Trial

Site Investigator: Dr. Nirav Pandya

This study is a multicenter, unblinded, randomized controlled trial with longitudinal data collection. The purpose of the study is to investigate whether adding anterolateral ligament (ALL) reconstruction to anterior cruciate ligament (ACL) reconstruction in children will result in a lower rate of ACL re-tear than just ACL reconstruction alone.

Psychometric properties of the Gait Outcomes Assessment List for children with Limb Deformities (GOAL-LD)

Site Investigator: Dr. Sanjeev Sabharwal

The primary goal of limb length equalization and deformity correction is the the improvement of patients' gait, function as well as pain and hence their quality of life. To the best of our knowledge, there is no (validated) specialized tool for assessing the physical and psychosocial function of children with lower limb abnormalities pre- and/or postoperatively, despite improved function being a major aim of surgery.

International Legg-Calvé-Perthes Study Group (IPSG)

Site Investigator: Dr. Ishaan Swarup

Legg-Calvé-Perthes disease is a childhood hip disorder which is common enough to be a significant public health problem (affects 1 in 740 boys between ages 0—14), but uncommon enough to have enough patients from a single institution to perform a definitive prospective study comparing the results of current treatments. The present study will establish a database of prospectively identified patients with Legg-Calvé-Perthes (LCP) Disease and collect information regarding their presentation, treatment, and outcomes while receiving currently available treatments.

Patient Expectations in Patients with Adolescent Idiopathic Scoliosis

Investigators: Dr. Ishaan Swarup, Dr. Mohammad Diab, Dr. Lionel Metz

Dr. Swarup is leading a prospective study exploring preoperative patient expectations in patients with adolescent idiopathic scoliosis (AIS). The study is funded by grants through the Scoliosis Research Society (SRS) and the Orthopaedic Research and Education Foundation (OREF). It is currently in its first phase of survey development and future directions include correlating preoperative expectations with postoperative outcomes.

Host perspectives of high-income orthopedic resident rotations in low- and middle- income countries

Principal Investigator: Dr. Sanjeev Sabharwal

With collaboration from host faculty in low- and middle- income countries (LMICs), a semi-structured interview guide was designed. UCSF resident Heather Roberts interviewed 20 LMIC surgeons and trainees who had hosted orthopedic residents from high-income countries (HICs) within the past 10 years. This qualitative study explores the perspectives of LMIC surgeons and trainees who host visiting residents from HICs.

Spine

UCSF's Spine Service continues to demonstrate excellence in research throughout 2022. Our spine surgeons at UCSF have authored over 500 peer-reviewed articles, and numerous textbooks and chapters demonstrating their expertise and commitment to advancing the field. In the past 5 years, UCSF Spine surgeons and scientists have received recognition for multiple major spine society awards in clinical and basic science research, including the Hibbs Awards, Harrington Award, the Henry Farfan award, the ISSLS prize, and the Whitecloud Award. These achievements underscore UCSF's Spine Service as a leading research center in the field of spine surgery.

Below are highlighted research initiatives from 2022

1) Prospective Evaluation of Elderly Deformity Surgeries (PEEDS) Study

Sponsor: AO Foundation

As the population ages, spinal deformity surgery for older patients is becoming more prevalent. However, the suitability of these patients for major spinal reconstruction procedures and the associated risks and benefits are still under investigation. An international multicenter study aimed to determine the value of surgery in spinal deformity patients aged 60 or older, using the Scoliosis Research Society-22r Questionnaire (SRS-22r) as the primary outcome measurement tool, as well as other secondary outcome measures including the Oswestry Disability Index (ODI), a numeric rating scale for pain (NRS), EQ-5D, and animal fluency test

2) Spinal Deformity Intraoperative Monitoring (SDIM) Study

Sponsor: AO Foundation

Multimodality monitoring is crucial in osteotomy procedures to prevent neurological injury and ensure successful outcomes. This international multicenter study aims to collect real-time data and identify contributing factors associated with intraoperative neuromonitoring changes during spinal surgeries. The data will help fill current knowledge gaps and educate spinal surgeons on how to recognize relevant changes and take appropriate actions to mitigate risks during complex spinal surgeries.

Pictured above is a 3D printed spine created from a clinical CT scan of a patient with a spinal deformity. The UCSF Spine Center is using additive manufacturing (3D printing) for rapid prototyping of novel spinal implants as well as for creating anatomic models for surgical planning in complex cases. (Photo courtesy of UCSF)

3) A Concurrently Controlled Study of the LimiFlex™ Paraspinous Tension Band in the Treatment of Lumbar Degenerative Spondylolisthesis with Spinal Stenosis

Sponsor: Empirical Spine, Inc

The standard surgical option for degenerative spondylolisthesis is decompression with instrumented fusion, but implantation of a paraspinous tension band could provide additional benefits. This multi-center clinical study aims to compare the clinical outcomes of patients with lumbar degenerative spondylolisthesis and stenosis treated with decompression and the LimiFlex™ Paraspinous Tension Band to those treated with decompression and transforaminal lumbar interbody fusion (TLIF) with concomitant posterolateral fusion (PLF) and pedicle screw instrumentation, which is the current surgical standard. The tension band may offer a biomechanical advantage by preventing excessive postoperative flexion and increasing facet engagement.

4) Feasibility and utility of Point of Care Ultrasound-based bone density and lumbar muscle assessment in preoperative planning for reconstructive spine surgery

Sponsor: NSF, CDMI

The use of point-of-care technology to assess bone density and paraspinous muscle characteristics in reconstructive spine surgery could improve outcomes by facilitating precise, data-driven, and individualized surgical decisions. The Radiofrequency Echographic Multi Spectrometry (REMS) technology allows for direct, non-ionizing measurement of bone mineral density and is portable, allowing for screening at the point of care. The study aims to compare the efficiency of REMS in assessing bone quality between radiology technicians and trained health professionals, identify the relationship between pre-operative REMS-based bone density and muscle quality with health status metrics, assess lumbar paraspinous musculature, and evaluate the time and cost of obtaining BMD using REMS compared to conventional DEXA techniques.

5) Validating a Novel UCSF Classification to Guide Degenerative Spondylolisthesis Treatment

Sponsor: Heiman Grant, UCSF School of Medicine Summer Explore Grant

The study aims to evaluate the UCSF Degenerative Spondylolisthesis Classification to establish a standard approach to treating DS. The classification criteria are location of spinal stenosis, global spinal alignment, leg and back pain, and segmental translation. The study has two purposes: to validate the classification and to demonstrate that consistent surgical techniques based on the classification's recommendations improve clinical outcomes. The study will use 10 cases evaluated by eight surgeons to evaluate interobserver and intraobserver variability, and a retrospective study of consecutive DS cases treated at the UCSF Medical Center between 2016 and 2020 to assess appropriate surgical strategies based on the classification and their impact on clinical outcomes.

6) Opiate in Spine Surgery:

Sponsor: Hellman Student Research Grant

Opiate utilization is an important predictor of perioperative outcomes in spine surgery. Social determinants of health are a predictor of preoperative opiate utilization. Preoperative opiate utilization is an important predictor of opiate consumption at 1 year after surgery. The development of policies for the appropriate prescription of opiates is an important priority for our spine service.

7) Predictive Models for Length of Stay and Discharge Disposition in Elective Spine Surgery: Development, Validation, and Comparison to the ACS NSQIP Risk Calculator

Sponsor: UCSF-CTSI Grant

This retrospective study aimed to predict hospital length of stay (LOS) and discharge disposition following adult elective spine surgery using machine learning and compare it with the ACS NSQIP prediction calculator. The study included 3678 adult patients undergoing elective spine surgery between 2014 and 2019, and predictive variables included demographics, surgical invasiveness, comorbidities, and more. Regression, classification trees, and LASSO were used to build predictive models, and the performance was evaluated using validation on 16% of patients and comparing it to the ACS NSQIP online risk calculator. The developed predictive models exhibited superior performance in predicting length of stay compared to the NSQIP and similarly for discharge location

8) Preoperative optimization in spine surgery

A systematic review to determine the level of evidence to support specific preoperative optimization protocols for spine surgery. Identification of risk factors for perioperative complications is useful to identify opportunities for preoperative optimization and for reducing complication rates. Preoperative optimization is an important priority in payment reform program and risk sharing healthcare economic models, including bundled payments and accountable care organizations. The purpose of this study is to provide a state of the art review of the literature on risk factors for complications in adult deformity surgery, and to guide an evidence-based approach to preoperative protocols.

Sports Medicine and Shoulder

The UCSF Sports Medicine and Shoulder Service continues to lead the country in basic science, translation and clinical research. This group's research efforts are led by Dr. Brian Feeley, Dr. Alan Zhang, Dr. C. Benjamin Ma, Dr. Drew Lansdown, and Dr. Stephanie Wong. The team participates in numerous clinical research initiatives and collaborates with institutions from across the country.

In 2022, the group published 95 peer-reviewed studies and received over $1,300,000 in grant funding and sponsored study funding.

Project Highlights

Prospective Data Collections

To better provide patient-centered treatments, active collection of patient-reported outcomes measurements is paramount. To fulfill this mission, the group currently participates in multiple prospective clinical outcome registries.

UCSF is an active member of the Multicenter Orthopaedic Outcomes Network (MOON) shoulder group. Along with 12 other institutions across the United States, they actively follow patients undergoing surgery for shoulder instability and rotator cuff repairs. They have collected information on over 1,900 patients with shoulder instability, which is the largest cohort reported.

The UCSF Shoulder arthroplasty database has enrolled over 1,800 patients in a prospective collection and successfully published over 100 abstracts and scientific papers.

The UCSF Hip Arthroscopy database is actively collecting outcomes measurements on patients undergoing hip arthroscopy surgery. Over 1,150 patients have been enrolled in this on-going study, yielding over 50 abstracts and research publications.

Sports Medicine Clinical Trials

UCSF Sports Medicine is currently performing several prospective clinical trials focusing on arthritis, rotator cuff tears, and cartilage injuries. Current studies include:

Operative vs. Non-Operative Treatment for Atraumatic Rotator Cuff Tears: A Multicenter Randomized Controlled Pragmatic Trial (ARC Trial)

Site Co-Investigators: C. Benjamin Ma, MD (PI), Brian Feeley, MD, Alan Zhang, MD, Drew Lansdown, MD, Anthony Luke, MD, and Carlin Senter, MD

Funding: Patient-Centered Outcomes Research Institute (PCORI)

The Arthroscopic Rotator Cuff (ARC) Trial is a large, multicenter, randomized clinical trial comparing operative and non-operative treatment for rotator cuff tears that develop over time. This study aims to find out which treatment works better and for whom, in order to help patients in the future select the best treatment for them.

Prospective, Randomized, Double-Blind, Placebo Controlled Study to Evaluate the Safety and Efficacy of Pulsed Electromagnetic Field (PEMF) Therapy as an Adjunctive Treatment to Surgical Repair of Full Thickness Rotator Cuff Tears

Site Co-Investigators: Brian Feeley, MD (PI), C. Benjamin Ma, MD, Alan Zhang, MD and Drew Lansdown, MD

Sponsor: Orthofix Medical Inc.

Using a non-invasive therapeutic device, this study aims to evaluate the safety and efficacy of applying pulsed electromagnetic fields (PEMF) to rotator cuff repairs. It hopes to demonstrate that exposure to PEMF therapy following surgical repair will reduce tendon re-tear rates, improve clinical outcomes and range of motion, and decrease fatty infiltration.

Evaluation of Muscle Stem Cells in Rotator Cuff and Other Muscle Injury Models

Principal Investigators: Brian Feeley, MD and Xuhui Liu, MD

Funding: NIH, VA Merit

Previous data has highlighted the presence of fibro-adipocyte precursor (FAP) cells within muscle in mice, their ability to proliferate after injury, and their capability to regulate muscle quality with pharmacologic modulation. However, their presence and capabilities in human musculoskeletal conditions are not known. This study aims to evaluate the cellular plasticity, differentiation capability, and functional role of human fibro-adipocyte precursor cells (hFAPs) harvested from patients with musculoskeletal injuries.

Comparison of Outcomes Utilizing Blood Flow Restriction Training as a Rehabilitative Protocol in Post-operative Meniscus Repair Patients

Principal Investigators: Drew Lansdown, MD, and Brian Feeley, MD

Blood flow restriction (BFR) is a training tool that has been shown to be useful in the rehabilitative setting, but its utility in patients undergoing meniscus surgery is unknown. This study therefore seeks to understand whether BFR is a useful rehabilitation tool in this population. BFR is a unique and promising strategy for surgical patients, as it is low-load and can be used in early phases of rehabilitation, including non-weight bearing periods.

Montelukast as a potential chondroprotective treatment following Anterior cruciate ligament reconstruction (MOCHA Trial)

Site Co-Investigators: Drew Lansdown, MD (Co-PI), Sharmila Majumdar, PhD (Co-PI), C. Benjamin Ma, MD, Brian Feeley, MD, Alan Zhang, MD, Nicholas Colyvas, MD, Elly LaRoque, MD, Sara Edwards, MD and Stephanie Wong, MD

Sponsor: Arthritis Foundation

This is a multicenter randomized, placebo-controlled trial to assess whether a 6-month course of oral montelukast after anterior cruciate ligament (ACL) reconstruction reduces systemic markers of inflammation and biochemical and imaging biomarkers of cartilage degradation. This study will specifically target older ACL reconstruction patients with concomitant meniscal injuries as this group is at greatest risk of rapid posttraumatic osteoarthritis (PTOA) progression.

Anterior Cruciate Ligament Reconstruction Using Bone Patellar Bone or Quad Tendon Autograft With or Without Lateral Extra-Articular Tenodesis in Individuals Who Are at High Risk of Graft Failure (STABILITY 2)

Site Co-Investigators: C. Benjamin Ma, MD (PI), Alan Zhang, MD, Drew Lansdown, MD, Nirav Pandya, MD, Stephanie Wong, MD,

Sponsor: NIAMS – National Institute of Arthritis Musculoskeletal and Skin Disorders

This is a multicenter, international randomized clinical trial to compare outcomes between patients who will undergo different types of ACL reconstruction. The objective of this trial is to determine if graft type (QT, BPTB, HT) with or without a LET affects: rate of ACL clinical failure 2 years after ACLR, patient reported outcomes, return to sports and cost-effectiveness of ACLR and LET.

Treatments in Shoulder Arthritis (TRISHA)

Co-Investigators: Brian Feeley, MD, (Co-PI), Drew Lansdown, MD, (Co-PI), C. Benjamin Ma, MD

Sponsor: NIH, Stryker

This is a prospective, observational, longitudinal single-site cohort study of adults with shoulder osteoarthritis to better understand the natural history of shoulder arthritis and to identify predictors of outcomes of non-operative treatment.

A Phase 3 Prospective, Randomized, Partially Blinded Multi-Center Study to Measure the Safety and Efficacy of NOVOCART® 3D, Compared to Microfracture in the Treatment of Articular Cartilage Defects

Site Co- Investigators: C. Benjamin Ma, MD (PI) and Drew Lansdown, MD

Sponsor: Aesculap Biologics

This prospective, randomized, partially-blinded multi-center study is being conducted to compare NOVOCART® 3D relative to Microfracture for the treatment of knee cartilage defects. Subjects with articular knee defects will be randomized to receive either Microfracture or NOVOCART® 3D, an autologous chondrocyte transplantation system.

Sports Subspecialty Research Centers

Youth Sports Injury Assessment and Prevention Center

The UCSF Sports Medicine Center for Young Athletes is a comprehensive, integrated clinical and research program which brings together orthopedic surgeons, physical therapists, athletic trainers, primary care physicians, and kinesiologists to provide cutting edge care for athletes under the age of 18.

Led by Nirav Pandya, MD and Anthony Luke, MD, MPH the center has successfully published and presented nearly 30 abstracts and scientific papers. They are also one of the few centers in the country participating in a prospective multi-center adolescent clavicle fracture registry as well as an adolescent shoulder instability registry.

Members of the Sports Medicine and Shoulder Service include: Justin Krogue, MD; Stephanie Wong, MD; Drew Lansdown, MD; Anthony Luke, MD, MPH; C. Benjamin Ma, MD; Alan Zhang, MD; Elly LaRoque, MD; Brian Feeley, MD; Bill Berrigan, MD, RMSK; Carlin Senter, MD; Nicholas Colyvas, MD; and Nicolas Hatamiya DO (Not pictured are: Alexis Dang, MD; Sara L. Edwards, MD; Nirav Pandya, MD; Jennifer Tangtiphaiboontana, MD; James A. Tom, MD; and Kristin Wingfield, MD)

Dr. Alan Zhang, above, is Director of the UCSF Hip Preservation Center (hipcenter.ucsf.edu).

UCSF Hip Preservation Center

Alan Zhang, MD and Stephanie Wong, MD lead clinical and translation research on hip injuries in active individuals. The Hip Preservation Center has prospectively collected clinical outcomes measurements on over 1100 patients who have undergone hip arthroscopy at UCSF and published numerous abstracts and articles to improve patient centered care in this arena.

Translational Quantitative Imaging Center

Advanced Translational Imaging Research Core

The Sports Medicine group at UCSF utilizes advanced biomedical imaging techniques to study different conditions of the knee, shoulder, and hip. The Sports Medicine group closely collaborates with the UCSF Department of Radiology and the MQIR (Musculoskeletal Quantitative Imaging Research) group including Sharmila Majumdar, PhD, Richard Souza, PhD, PT, and Thomas Link, MD, PhD, to leverage these technologies to better evaluate patients and the effects of non-surgical and surgical treatment.

Trauma

Advanced Translational Imaging Research Core

The Institute for Global Orthopaedics and Traumatology (IGOT), founded in 2006 by the UCSF Department of Orthopaedic Surgery faculty and residents, is an academic international initiative that addresses global disparities in orthopaedic trauma care. IGOT's international research efforts have been supported through extramural funding from the following organizations:

• OREF Career Development Grant – "Pilot Randomized Controlled Trial to Evaluate Local Gentamicin for Tibia Fractures in Tanzania"

• NIH K23 GO-Tibia – "Pilot, Masked, Randomized Controlled Trial Evaluating Locally-Applied Gentamicin versus Saline in Open Tibia Fractures (pGO-Tibia)"

• NIH R01 – "International Orthopaedic Multi-Center Study in Fracture Care (INORMUS)"

The goal of IGOT's Global Research Initiative (GRI) is to enable orthopaedic surgeons from low-and-middle-income countries (LMICs) to conduct high-quality studies on locally relevant topics that can help to reduce the burden of musculoskeletal disease in their environments. To achieve this goal, IGOT hosts an annual International Research Symposium in San Francisco, provides guidance on study design and data management for partner institutions, and supports the year-long McClellan International Research Fellowship for two 3rd year medical students. Since 2006, IGOT has worked with 65 global leaders across 10 countries on 45 research projects in Sub-Saharan Africa and 100 global leaders across 19 countries on 15 research projects in Latin America. IGOT has facilitated the travel of more than 50 IGOT surgeon-leaders and scholars to and from our partner institutions.

Selected Current Projects

pGO-Tibia Validation of Telephone Survey for Prediction of Fracture-Related Infection

Tanzania

Principal Investigator: Dr. Saam Morshed

Cost Effectiveness of External Fixation vs. Intramedullary Nailing for the Treatment of Diaphyseal Open Tibia Fractures

Principal Investigator: Dr. David Shearer

Pediatric Femur Fractures Randomized Controlled Trials - Flexible Nail vs. K-Wire

Tanzania

Principal Co-Investigators: Drs. David Shearer and Saam Morshed

Below-Knee Amputation Cost-Effective Analysis

Total Joint Replacement Registry

Tanzania

Principal Co-Investigators: Drs. David Shearer and Saam Morshed

Flaps Follow Up Registry

Tanzania

Principal Co-Investigators: Drs. Michael Terry, David Shearer, and Saam Morshed

SIGN Database – Epidemiology and Outcomes of Firearm-Related Fractures

SIGN Database – Antibiotic Use in Open Fractures

Principal Investigator: Dr. David Shearer

SIGN Spine – Evaluation of an Implant Donation Program for the Treatment of Operative Thoracolumbar Fractures

Tanzania and Kenya

Principal Co-Investigators: Drs. David Shearer, Ashraf El Naga, and David Gendelberg

Surgical Outcomes of Children Treated for Gluteal Fibrosis in Uganda

Epidemiology and Clinical Outcomes for Pediatric Patients with Post-Injection Paralysis

Injection Risk Analysis for Gluteal Fibrosis and Flaccid

Pictured, from left, are: Richard Coughlin, MD;Coleen Sabatini, MD, MPH; David Shearer, MD; Saam Morshed, MD, MPH, PhD; Sanjeev Sabharwal, MD, MPH; Madeline Mackechnie, IGOT's Director of Global Programs; and Theodore Miclau III, MD

Paralysis

Outcomes of Vascularized Free Fibula Flaps

Validation of Outcome Instrument for Gluteal Fibrosis

TB Osteomyelitis in Children and Adolescents

Uganda

Principal Investigator: Dr. Coleen Sabatini

Perception of Orthopaedic Training Program Views on Global Health in Orthopaedic Residency Applications: A Survey of Program Directors and Medical Students

North America

Principal Investigator: Dr. David Shearer

International Orthopaedic Multi-Center Study in Fracture Care (INORMUS)

Global

Principal Investigator: Dr. Theodore Miclau

Opportunities for International Orthopaedic Volunteerism: An Exploration of United States and Canada-Based Nonprofit Organizations

North America

Principal Investigator: Dr. Theodore Miclau

Predictors of Clinical Outcomes for Open Tibia Fracture Management Across Latin America: A Prospective Multi-National Study

Femoral Neck Fracture Care in Latin America

Barriers to and Outcomes of Initiating Clinical Research at Two Trauma Centers in Mexico

Latin America

Principal Investigator: Dr. Theodore Miclau

Essential Resources for Musculoskeletal Trauma Care Worldwide: A Delphi Study

Global

Principal Investigator: Dr. Theodore Miclau

Highlighted Publications

• Haonga BT, Ngunyale P, von Kaeppler EP, Donnelley CA, Won NY, Eliezer EN, Brown K, Flores MJ, O'Marr JM, Rodarte P, Urva M, Cortez A, Porco T, Morshed S, Shearer DW. A Pilot, Masked, Randomized Controlled Trial to Evaluate Local Gentamicin Versus Saline in Open Tibial Fractures (pGO-Tibia). OTA Int 2023. e268-76.

• Urva M, Cortez A, Katyal T, Shearer DW, Morshed S, Miclau T, MacKechnie MC, Sabharwal S. Orthopaedic Trauma Observerships in North America for International Surgeons: The Visitors' Perspective. OTA Int. 2023;6(1):e229-37.

• Brown KE, Solaiman RH, Flores MJ, Nadone H, MacKechnie MC, Shearer DW, Miclau T. Opportunities for International Orthopaedic Volunteerism: An Exploration of United States and Canada-Based Nonprofit Organizations. JBJS. 2023. Epub ahead of print.

• Donnelley CA, von Kaeppler EP, Hetherington A, Shirley C, Haonga BT, Challa ST, Andrysek J, Mochizuki Lutyens E, Mamseri L, Mwakasungula G, Morshed S, Shearer DW. Cost-Effectiveness Analysis of Prosthesis Provision for Patients with Transfemoral Amputation in Tanzania. Prosthet Orthot Int. 2022;46(5)e523-30.

• Song S, Muhumuza MF, Penny N, Sabatini CS. Epidemiology and Treatment Outcomes in Pediatric Patients with Post-Injection Paralysis. BMC Musculoskelet Disord. 2022; 23(1):754.

• Cortez A, Urva M, Haonga BT, Donnelley CA, von Kaeppler EP, Roberts HJ, Shearer DW. Outcomes of Intramedullary Nailing and External Fixation of Open Tibial Fractures: Three to Five-Year Follow-Up of a Randomized Clinical Trial. JBJS. 2022;104:e1877-85.

• von Kaeppler EP, Coss N, Donnelley CA, Atkin DM, Tompkins M, Haonga B, Molano AMV, Morshed S, Shearer DW. Establishing Sustainable Arthroscopy Capacity in Low- and Middle-Income Countries (LMICs) through High-Income Country/LMIC Partnerships: A Qualitative Analysis. JBJS. 2022 Jul 5;7(3):e21.00160.

• Holler JT, Cortez A, Challa S, Eliezer E, Haonga B, Morshed S, Shearer DW. Risk Factors for Delayed Hospital Admission and Surgical Treatment of Open Tibial Fractures in Tanzania. JBJS. 2022; 104(8):716-722.

• Miclau T, MacKechnie MC, Born CT, MacKechnie MA, Dyer GSM, Yuan BJ, Dawson J, Lee C, Ishmael CR, Schreiber VM, Tejwani NC, Ulmer T, Shearer DW, Agarwal-Harding KJ, Johal H, Khormaee S, Sprague S, Whiting PS, Roberts HJ, Coughlin R, Gosselin R, Rosenwasser MP, Johnson A, Babu JM, Dworkin M, Makhni MC, McClellan T, Nwachuku CO, Miclau E, Morshed S. International Orthopaedic Volunteer Opportunities in Low-and Middle-Income Countries. JBJS. 2022;104(10):e44.

• Roberts HJ, Coss N, Urva M, Haonga B, Woolley PM, Banksota B, Morshed S, Shearer DW, Sabharwal S. Host Perspectives of High-Income Country Orthopaedic Resident Rotations in Low-and Middle-Income Countries. JBJS. 2022;104(19):1667-74.

• MacKechnie MC, Flores MJ, Giordano V, Terry MJ, Garuz M, Lee N, Padilla Rojas LG, MacKechnie MA, Bidolegui F, Brown K, Quintero JE, Ding A, Sanchez Valenciano CG, Tabares Neyra H, Segovia J, Aguilar D, van Lieshout EMM, Verhofstad MHJ, Miclau T. Management of Soft-Tissue Coverage of Open Tibia Fractures in Latin America: Techniques, Timing, and Resources. Injury. 2022;53(4):1422-9.

• Flores MJ, Brown KE, Morshed S, Shearer DW. Evidence for Local Antibiotics in the Prevention of Infection in Orthopaedic Trauma. J Clin Med. 2022;11(24):7461-70.

Highlighted Publications

Fukase N, Duke VR, Lin MC, Stake IK, Huard M, Huard J, Marmor MT, Maharbiz MM, Ehrhart NP, Bahney CS, Herfat ST. Wireless Measurements Using Electrical Impedance Spectroscopy to Monitor Fracture Healing. Sensors (Basel). 2022 Aug 19;22(16):6233.

Braun BJ, Grimm B, Hanflik AM, Richter PH, Sivananthan S, Yarboro SR, Marmor MT. Wearable technology in orthopedic trauma surgery - An AO trauma survey and review of current and future applications. Injury. 2022 Jun;53(6):1961-1965.

Marmor MT, Grimm B, Hanflik AM, Richter PH, Sivananthan S, Yarboro SR, Braun BJ. Use of Wearable Technology to Measure Activity in Orthopaedic Trauma Patients: A Systematic Review. Indian J Orthop. 2022 Apr 9;56(7):1112-1122.

Trauma/Biomechanics Research Center

The OTI Digital Science Lab (OTI-DSL) aims to develop novel strategies and technology to treat orthopaedic trauma with a focus in the following clinical areas:

• Acute compartment syndrome

• Post-operative pain

• Geriatric fractures

• Adult tibia fractures

Using a collaborative cross-disciplinary approach, the lab offers expertise in engineering, clinical research and data science, in the following domains:

• Data – predictive modeling and retrospective analysis of large clinical datasets and prospective collected longitudinal biometrics

• Imaging - MSK ultrasound, AI, computer vision

• Sensors – implantable sensors and wearable technologies to monitor injury recovery

• Simulation and modeling – experimental biomechanics, finite element analysis (FEA), machine learning

The lab has received funding from the Department of Defense (DOD), National Science Foundation (NSF), AO Foundation, NSF Center for Disruptive Musculoskeletal Innovation (CDMI), and the Orthopaedic Trauma Association (OTA).

Selected Projects (Current)

Department of Defense Grant - Development of a Handheld Ultrasound-based System to Assist in Clinical Diagnosis of Acute Compartment Syndrome

UCSF Human Performance Center Grant - Validation of Use of Previously Collected Apple Health Data to Determine Current Performance Level

Perfusion Detection for Acute Compartment Syndrome Using Kinect Camera

Retrospective Analysis of UCSF Epic Data on the Management of Acute Postoperative Pain (APP)

Biomechanical Evaluation of Curvafix Implant for Geriatric Pelvic Fractures

Biomechanical Evaluation of Primary Total Hip Reconstruction Using Locking Acetabular Cup for Type A&B (Partial Articular) Acetabulum Fractures In The Elderly

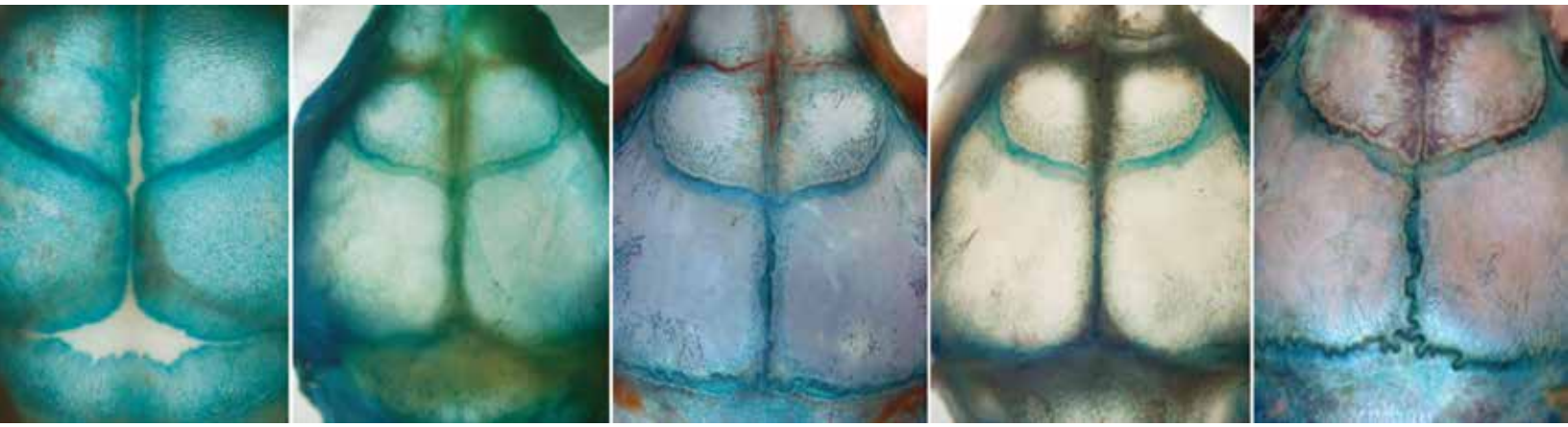
Retrospective National Registry Analysis of Fracture Outcomes

Special Research Initiatives

The Center for Dental, Oral, and Craniofacial Tissue and Organ Regeneration (C-DOCTOR)

C-DOCTOR (c-doctor.org) is a national resource for the clinical translation of innovative regenerative technologies to replace dental and craniofacial tissues and organs lost to congenital disorders, trauma, and disease. C-DOCTOR represents a public-private partnership with the primary mission of providing comprehensive clinical, scientific, technical, regulatory, financial, and management resources to promote cost-effective transition and timely development of tissue engineering/regenerative medicine products. C-DOCTOR is led by project co-PIs, Yang Chai DDS at USC and Jeffrey Lotz, PhD from UCSF. Other center co-directors include Michael Longaker, M.D, MBA from Stanford, Nancy Lane MD, from UC Davis, Ben Wu, DDS PhD, from UCLA, and Kevin Healy PhD from UC Berkeley.

The overall goals for C-DOCTOR are to: 1) attract existing and new technologies that align with unmet clinical needs and have a strong commercial case; 2) customize and align C-DOCTOR resource infrastructure to project team needs; and 3) enhance project value and success probability through consultation and training with close collaboration between teams and C-DOCTOR faculty and advisors. As such, C-DOCTOR is a robust innovation ecosystem that facilitates de-risking of promising technologies through completion of pre-clinical testing, and FDA submissions for regulatory approval for human clinical trials. This novel NIH-supported incubator provides a unique mechanism to identify cutting edge regenerative technologies, align them with unmet clinical needs, and scale-up for regulatory approval and future commercial deployment.



CODE Technology and the BRIDGE Lab

The Department of Orthopaedic Surgery has made the collection of patient reported outcome measures (PROMs) a top priority over the last few years, partnering with CODE Technology in order to collect data from all surgical cases. CODE Technology is a technology company specializing in PROM collection and has streamlined our ability collect data without disruption to clinical flow while also increasing our long-term PROM capture rate on patients who undergo surgery. This has allowed the department to develop a rich data asset that has applications in both research and quality of care improvement initiatives. Since 2019 CODE has collected PROM on 38,682 surveys from the Department of Orthopaedic Surgery with a 65% overall capture rate (all modules and all intervals).

In an effort to bring PROM data to the point of care, the Department has also partnered with the BRIDGE Lab, led by Dr. Riley Bove, MD, integrating this data into our electronic medical record. This effort is supported by both the Department, as well as by a private contribution from the Guzik Foundation to Dr. Bobby Tay, MD. The primary aim of this collaboration is to bring research data to the point of care in real time, allowing for dynamic decision-making and improved care planning for each surgical candidate.

DEI Research Initiatives

The Department has continued to prioritize initiatives for fundamental and applied research on topics related to diversity, equity, and inclusion. Many opportunities exist to conduct clinical research that may pertain to topics such as development of advanced methods to quantify and mitigate healthcare disparities for persons with MSK disorders.

In 2022, the Orthopaedic Surgery Research Committee championed the first DEI NOVA (New Orthopaedic Vision Award) in 2022 which is aimed to promote this field of research within our department and to cultivate future large-scale grants for investigators studying DEI topics.

The inaugural DEI NOVA (New Orthopaedic Vision Award) was granted to Dr. Nirav Pandya for his study “The Impact of Primary Language on Outcomes after Anterior Cruciate Ligament Reconstructions.”

Dr. Anthony Luke, at center, performs clinical research with staff research associate Joshua Johnson, at left, and lab manager Brooke Schultz, at right, on biomechanics, exercise physiology and motion-capture analysis at the UCSF Human Performance Center.

UCSF Human Performance Center

The Human Performance Center (HPC) is the key center for exercise related science serving the UCSF community. The HPC is upgrading its 3D Motion Analysis system to the new Qualisys Motion Capture System. This includes both a 10-camera Arqus A5 traditional marker-based system as well as a 10-camera Miqus Color Video system for Theia Markerless 3D motion analysis which can be run independently as well as simultaneously. Furthermore, the markerless system has the ability to be portable and can be used both inside and outside of the laboratory. The department's investment in the state-of-the-art equipment and expert staff enable the center to remain at the forefront of research involving human motion and exercise, investigating knee osteoarthritis, prostate cancer, Parkinson's Disease and other conditions that plague human function as people age.

Anthony Luke MD, MPH is the Director of the HPC and Brooke Schultz, MS, is the manager and full time Biomechanist for the Motion Capture system and AMTI force plates. In 2022, the HPC welcomed Mathias Sorensen, BS who is the exercise physiologist of the lab. Richard Souza, PT, PhD, is the HPC Director of Research.

Osteoarthritis

The HPC continues to support Dr. Souza with his research on osteoarthritis progression in the lower extremities. His continued collaboration with the Department of Radiology on joint osteoarthritis currently has two active R01 research projects: (1) evaluating the interconnectivity of the knee and hip joints and (2) investigating the interaction of bone and cartilage in the patellofemoral joint. Both studies are longitudinal tracking of participants, evaluate tissue health through X-ray and MRI, as well as use 3D Motion Capture and functional testing motion analysis. In addition, study participants wear the AX6 activity tracker for 7 days of continuous physical activity tracking in their home environment.

2022 Highlights

- The HPC awarded two $5,000 Seed Grant opportunities:

  – Drs. Meir Marmor, MD and Safa Herfat, PhD received funding to explore whether activity measurements routinely collected in "real life" on smartphones can be compared to activity measurements performed in the HPC.

  – PhD student, Hector Carbajal Mendez, will partner with the HPC Biomechanics team to assess the variability and reliability of 3D kinematics and segment positions calculations for the new marker-less motion capture system with that of the traditional marker-based motion capture system.

- CCMBM Pilot/Feasibility grant awarded for $50,000 to evaluate changes in gait biomechanics from decline treadmill walking on patients with patellofemoral joint osteoarthritis (PI: Souza; Award Number: P30AR075055).

- Dr. Stefano Bini completed Phase 1 of the Google, Inc ATAP funded research; a proof of concept validation using sensors as a tool for remote monitoring of movement and patient function.

- Dr. Anthony Luke and Dr. Saul Villeda completed Phase 1 of their Platelet Rich Plasma/Orthobiologics research evaluating protein differences in the blood of older patients compared to young patients. Phase 2 was also completed, investigating protein changes in knee osteoarthritis in mice.

The Department of Orthopaedic's Chief Technology Officer and Professor of Clinical Orthopaedics, Dr. Stefano Bini, received funding from Google, Inc.'s Advanced Technology and Projects (ATAP) division, to investigate the use of the Jacquard wearable sensor as a tool for remote monitoring of movement and function in patients undergoing Total Knee Arthroplasty. Phase 1, a proof of concept validation, was completed in 2022. Funding for Phase 2 was received to continue his work on TKA patients via a series of tasks such as level ground walking, stair ascent, and sit-to-stand while simultaneously using the Vicon 3-D Motion Capture system and Jacquard sensors.

Dr. Anthony Luke (Benioff Distinguished Professor in Sports Medicine) and Dr. Saul Villeda (Endowed Chair in Biomedical Research/Dept. of Anatomy) are continuing their Phase 3 study which is a randomized controlled trial evaluating the protein changes in blood and synovial fluid following platelet rich plasma injection versus saline control in knee osteoarthritis patients. They aim to explore the biological pathways by which PRP acts, including mirroring the human study in mice. This research is supported by the Lynne and Marc Benioff Foundation and other philanthropic donors.

Parkinson's Disease

The Michael J. Fox Foundation funded Neurosurgery's Dr. Doris Wang, MD PhD's investigation into decoding the neural control of normal and abnormal gait patterns in Parkinson's disease using adaptive neurostimulation to understand and improve circuit mechanisms of human gait control. Patients have either the Medtronic Activa PC+S or Medtronic Summit RC+S device implanted in their brain. Subjects perform a treadmill-based gait retraining task in the HPC, during which signals from the implanted device are synced with the Vicon motion capture system, Xsens motion capture system, and wireless Delsys EMG to evaluate gait kinematics.

In the SPARX3 study (PI: Dr. Nijee Luthra, MD PhD, Neurology), the HPC team implements a treadmill-based exercise training program utilizing Heart Rate Zones for early-stage Parkinson's patients. A VO2peak fitness assessment is is administered at multiple timepoints in addition to disease biomarkers and other functional movement tests. Dr. Luthra received a K23 award in 2022 to continue her investigation of exercise for Parkinson's patients. The new project will kick off in 2023 and include a resistance training program in addition to treadmill-based aerobic exercise.

The EDGE Lab

UCSF Orthopaedic Surgery faculty continue to expand innovative deployment of "Advanced Visualization and Manufacturing" capabilities on the frontlines of healthcare.

The EDGE Innovations Lab was founded in 2018 by Aenor Sawyer, MD,MS, Alexis Dang, MD and Alan Dang, MD with a focus on Engineering, Designing, and Growth Enabling digital (EDGE) and manufacturing technologies.

This initiative provided clinical 3D printing across the many campuses of the Department including UCSF Parnassus Heights, The Orthopaedic Institute at Mission Bay, ZSFGH, SF VAHC, UCSF Benioff Children's Hospital Mission Bay, and UCSF Benioff Children's Hospital Oakland. The EDGE team successfully enabled frontline 3D printing of Precision Anatomic Models for surgical pre-operative planning and continues to conduct research to assess the efficacy and economics of the technology.

This foundational initiative of EDGE served as the springboard for 2 larger exciting programs in advanced visualization and manufacturing technologies at UCSF.

1. In 2022 the UCSF Center for Advanced 3D+ Technologies (CA3D+) was awarded expanded funding from UCSF Medical Center to expand frontline 3D+ services to providers and patients. Dr. Aenor Sawyer, Dr. Alexis Dang and Dr. Alan Dang spearheaded a multidisciplinary initiative, in collaboration with the Pediatric Cardiac and Radiology Departments. The "+" includes augmented reality, virtual reality, and 4D imaging (3D-imaging with a time component).

2. At the San Franciso VA, Dr Alexis Dang and Dr Alan Dang successfully developed the TRST-3D (Translational Radiology and Surgical Technologies) program. This was initially funded through a 1.4 million dollar grant over 3 years starting in 2018. This was followed up with an additional 1.4million dollars starting fiscal year 2023. this is now considered the flagship medical 3D printing program within the Veterans Administration nationally.

As a result of their work in the 3D imaging arena, Alexis Dang, MD and Alan Dang, MD won the San Francisco Federal Executive Board "Federal Employee of the Year" award in Science & Technology related to 3D printing in orthopaedics.

Core Center for Patient-centric, Mechanistic Phenotyping in Chronic Low Back Pain (REACH) Center 2022 Annual Report

Expanding his innovative research into developing diagnostic tools, clarifying mechanisms, and testing biologic therapies for chronic low back pain (cLBP), Jeffrey Lotz, PhD, serves as the director and Principal Investigator of the Core Center for Patient-centric, Mechanistic Phenotyping in Chronic Low Back Pain (REACH). REACH is an NIH U19 Back Pain Consortium (BACPAC) Mechanistic Research Center (MRC) focused on positively impacting the opioid epidemic through the discovery of cLBP mechanisms and phenotypes that will ultimately lead to precision medicine for low back pain and reduced dependence on additive therapies.

REACH continues to conduct two ongoing, longitudinal clinical cohort studies, comeBack and BackHome. In both studies, data elements from psychological, biological, and social domains are measured in cLBP subjects. In addition to comeBACK and BackHome, REACH is participating in the BEST (Biomarkers for Evaluating Spine Treatments) trial, a multicenter BACPAC study being led by the University of North Carolina at Chapel Hill.

In 2022, six projects were funded as part of the Theoretical Modeling Challenge:

- Developing Robust Prediction Models for Outcomes Following Surgical Interventions for Chronic Low Back Pain
- Pooled analysis and phenotype development for chronic low back pain patients across theoretical model working group datasets
- Phenotyping patients with endplate bone marrow lesions: psychosocial factors and image-based biomarkers
- Challenging and improving mechanistic cLBP models
- Validating Machine Learning Algorithms for Better Treatment of Chronic Low Back Pain
- Semi-automated Knowledge Graph Construction for Mechanistic cLBP models

Led by REACH Co-Directors Jeffrey Lotz and Conor O'Neill, PhD, REACH investigators also received supplement funding from the Helping to End Addiction Long-term (HEAL) Initiative for the REACH Participant Diversity Program (INVEST). The program aims to ensure participant diversity in the longitudinal cohort studies comeBack, BackHome, and the BACPAC-wide BEST study.

In 2022, the REACH Physical Function and Biomechanics Core was awarded five hundred Apple Watches to use in the BackHome cohort. Under REACH investigators Jeannie Bailey, PhD, Patricia Zheng, M.D., and Trisha Hue, PhD., the watches will be used to collect data on vital signs, such as heart rate/variability, sleep, mobility, and activity data.

REACH continues to provide funding for internal ancillary studies. The following REACH ancillary projects are in progress:

Role of the gut microbiome in the progression of vertebral endplate bone marrow lesions (Modic changes) in chronic low back pain

- Adding Neuro-Imaging for new Mindfulness intervention Assessment (ANIMA Study),

To date, REACH authors have published over twenty-five articles and presented more than fifteen abstracts/posters.

Special Research Initiatives

UCSF Musculoskeletal (MSK) Center 2022 Annual Report

Advancing her pioneering research into bone fragility and osteoarthritis, Tamara Alliston, PhD, serves as the director of the UCSF Musculoskeletal (MSK) Center. The center was founded on a cooperative approach, serving as a nexus for investigators to provide innovative interventions to transforming musculoskeletal related aging, injury, and disease. Four main goals to 1) Foster Discovery, 2) Support MSK Discovery and Translation, 3) Recruit and Equip Diverse New Investigators for Success, and 4) Engage the public, fuels advancement on ongoing basic and translational collaborations that span across the research spectrum to improve MSK health to prevent the effects of aging, cure arthritis and osteoporosis, and to enhance human performance.

Under Dr. Alliston's leadership, the successful launched of the UCSF MSK Center in 2021 has supplied a steadfast effort to push new, bold ideas for musculoskeletal discovery, education, and advocacy. In June 2022, the center announced two inaugural grants and awardees:

• Rotator cuff regeneration: Dr. Feeley and Xuhui Liu, MD (UCSF); Akos Gerencser, PhD (Buck Institute); Grant Dornan, MSc, and Aiping Lu, MD (SPRI).

• Fracture repair: Ralph Marcucio, PhD (UCSF); Herb Kasler, PhD (Buck Institute); Chelsea Bahney, PhD (SPRI).

Expanding on the MSK Center's faculty community, the center in collaboration with the Diabetes, Institute for Regenerative Medicine (IRM), the Benioff Center for Microbiome Medicine (BCMM), Health Innovation via Engineering (HIVE), and Bakar Aging Research Institute (BARI) center, recently recruited two exceptional new faculty members whose work will further our understanding of systemic factors involved in musculoskeletal health. Recent faculty appointments of assistant professor Kelsey Collins, PhD, and professor Christopher Hernandez, PhD, to the Department of Orthopaedic Surgery significantly strengthened the center's ability to reach beyond knowledge barriers and bridge outstanding musculoskeletal research with leading scientists throughout UCSF, including those who study metabolism, the microbiome, and stem cells. To support our increasing MSK investigators and growing community, development plans and designs were completed to remodel new laboratory space in the future.

In 2022, the center was awarded funding for the UC Skeletal Research Enhancing Training Collaboration & Health (STRETCH) program, with partnership from UC Leadership Excellence through Advance Degrees (LEADS) program, which serves to provide under-represented undergraduate students a two-year research experience that incorporates one summer research at the home campus and a second summer research at another UC.

Additional efforts in providing resources for MSK investigator success include a faculty mentoring program and the recently launched Open MIKE (Musculoskeletal Integrated Knowledge Exchange) program. The MSK Center's Open MIKE program aims to foster collaboration of MSK scientists with experts outside the MSK field by funding small networking opportunities to strategize on musculoskeletal research topic and to encourage grant applications.

As the MSK community expands its research fields across broad scientific fields, the MSK Center seeks to forge bridges by recruiting new faculty in collaboration with Endocrinology and Epidemiology and Biostatistics. The MSK community will be sharing groundbreaking and innovative ideas to improve MSK health targeting to the public at an upcoming Development Event, which will highlight MSK research advancements on precision diagnostics and personalized treatments, sexually dimorphic effects on MSK health, and how to overcome MSK health disparities and workforce diversity by examining social determinants. The MSK Center invites you to join the effort to improve MSK health by discovering interventions, therapies, prevention, and cures that are clinically relevant in MSK related aging, injury, and disease to improve human performance.

Special Research Initiatives

UC Space Health

"Out of This World" MSK Research and Health Tech Innovation

Dr. Aenor Sawyer is the Director of UC Space Health and Director of the UCSF Skeletal Health Service in the UCSF Department of Orthopaedic Surgery.

Background: The Spaceflight environment provides unique opportunities to accelerate basic science in areas of aging, immunology, tissue engineering, organs on a chip, and effects of radiation – all of which are highly relevant to advancing Musculoskeletal research.

UC Space Health (https://spacehealth.ucsf.edu), a cross-campus and cross-discipline initiative was "launched" by Dr. Aenor Sawyer, and by December 2021 we had engaged over 100 UC Space faculty and trainee researchers as well as over 20 external academic, government and industry partners. Dr. Stephen Robinson, Professor of Engineering (UC Davis) and Retired NASA Astronaut is the Co-Director of UC Space Health with Dr. Sawyer. In Oct 2021, the UC Space Health team successfully completed the deliverables of a 3 year, $2M grant from NASA's Translational Research Space Health Institute.

In 2022 the UC Space Health lab team expanded education and research initiatives at the intersection of Space Health, Health Technology, and MSK research. These include:

- An MOU has been established between UCSF's UC Space Health and the International Space Station National Laboratory (ISSNL) focused on collaborative educational and research initiatives.
- ASTRO 3DO goes to Antarctica - a test of longitudinal remote body composition monitoring in Antarctica, a Space Analog.
- Health Sensing Technologies to keep Antarctic Expeditioners safe- feasibility, tolerability and utility of remote surveillance with minimally intrusive, multiparametric health sensors in the extreme and remote environment of Antarctica, a Space Analog.
- "Omni-BUS" - a novel FDA approved, Ultrasound-based mobile assessment of bone mineral density, bone quality and fracture risk utilizing Radiofrequency Echographic Multi-Spectrometry (REMS) is being piloted in the Spine Surgery Clinics.
- UC Space Health collaborates with Space Aging Gravity Experiment (A.G.E.) Investigators Tobias Deuse, MD and Sonja Schrepfer, MD, PhD, and the TSI Laboratory.

2022 Resident Research Highlights

OREF Resident Research Grant

Ryan Halvorson, MD

Orthopaedic Research and Education Fdn. (OREF) A140720

Phenotyping Post-Operative ACL Recovery Trajectories

10/1/2022-9/30/2023

$5,000

Christopher Stewart, MD

Orthopaedic Research and Education Fdn. (OREF) A140469

Limb Optimization: Factors that Influence Limb Reconstruction or Amputation

10/1/2022-9/30/2023

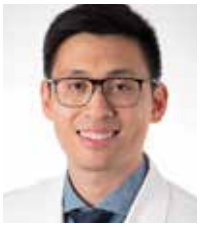
$5,000

JOJ Resident Research Grants

Edgar Garcia-Lopez MD

"A Biomechanical Analysis of Oblique Metacarpal Meta-Diaphyseal Fracture Fixation in a Cadaver Model"

$5000



Favian Su MD

"Outcomes of Non-operative Treatment in Shoulder Osteoarthritis (TRISHA)"

$5000

Kelechi Nwachuku MD

"Assessing Culture Positivity of Open-tibia Fractures at time of debridement in a Low Resource Setting"

$5000

Jeffrey Kwong MD

"Impact of Insurance Type on Access to Care Following Distal Radius Fracture: A Mixed Methods Study"

$5000

New Faculty

Christopher J. Hernandez, PhD

Christopher Hernandez, PhD comes to UCSF by way of the East Coast, where he has served as a Professor in the Sibley School of Mechanical and Aerospace Engineering at Cornell University and as an Adjunct Scientist at the Hospital for Special Surgery.

Dr. Hernandez's laboratory investigates the effects of the microbiome on bone and joint disorders, periprosthetic joint infection, and the biomechanics and mechanobiology of infectious bacteria. A recent NSF award supports his efforts to build living materials, inspired by his research on bacteria and bone.

Dr. Hernandez is a Fellow of the American Institute for Medical and Biological Engineering (AIMBE), the American Society of Mechanical Engineers (ASME), and the American Society for Bone and Mineral Research (ASBMR). He is the 2018 recipient of the ASBMR Fuller Albright Award for Scientific Excellence and was recently awarded Educator of the Year by the Society of Hispanic Professional Engineers in 2021.

Based in the UCSF Department of Orthopaedic Surgery and the UCSF Musculoskeletal Center, Dr. Hernandez also holds appointments in the UCSF Department of Bioengineering and Therapeutic Sciences and the Benioff Center for Microbiome Medicine. He has been named as a Chan Zuckerberg Biohub Investigator and will serve as the next Director of UCSF HIVE, Health Innovations via Engineering.

Kelsey H. Collins, PhD

Kelsey Collins received her doctoral degree in Biomedical Engineering in 2017 at the University of Calgary, where she studied the role of obesity in osteoarthritis in the laboratory of Dr. Walter Herzog.

As a Postdoctoral Research Scholar and Research Instructor in the laboratory of Dr. Farshid Guilak at Washington University in St. Louis, Dr. Collins investigated the effects of fat and other systemic factors on cartilage using novel stem cell and synthetic biology tools.

Her research was acknowledged with a New Investigator Recognition Award from the Orthopaedic Research Society in 2020 and she was named among the inaugural class of Rising Stars in Engineering in Health by Columbia University in 2020. Dr. Collins was recently awarded a prestigious NIH Pathways to Independence K99/R00 to investigate the role of fat in osteoarthritis

Dr. Collins' laboratory in the UCSF Department of Orthopaedic Surgery will investigate metabolic and systemic factors driving age-related musculoskeletal diseases using tissue engineering and regenerative medicine approaches. With affiliations in the UCSF Musculoskeletal Center, Diabetes Center, Eli and Edythe Broad Center of Regeneration Medicine and Stem Cell Research, and the Benioff Center for Microbiome Medicine, Dr. Collins is in an ideal position to discover new mechanisms of osteoarthritis and advance therapeutic development for musculoskeletal damage, pain and metabolic diseases.

New Faculty

Ninad Karandikar, MD

Dr. Ninad Karandikar is a board-certified specialist in Physical Medicine and Rehabilitation (PM&R), with a focus on providing non-operative care for patients with acute and chronic spine pain and musculoskeletal disorders. Dr. Karandikar is triple board-certified in Physical Medicine and Rehabilitation (ABPMR), Electrodiagnostic Medicine (AANEM), and Brain Injury Medicine (ABPMR).

Dr. Karandikar specializes in diagnostic and therapeutic interventional procedures, including spinal injections, and nerve conduction studies/ electromyography.

Dr. Karandikar has published widely on the topics of regenerative medicine, prosthetics, and gait analysis.

Dr. Karandikar's research interests include applications of digital health and AI, with a focus on improving clinical outcomes, and health equity.

A dedicated and passionate medical educator, Dr. Karandikar has extensive experience in teaching and mentoring medical students, residents, fellows, and other allied healthcare professionals. He has received numerous regional and national teaching awards.

Dr. Karandikar completed his residency in Physical Medicine and Rehabilitation at the University of Kentucky, Lexington, KY. He subsequently completed his fellowship in PM&R Interventional Spine at the Stanford University School of Medicine.

Prior to joining UCSF, Dr. Karandikar served as Clinical Associate Professor in the Department of Orthopaedic Surgery at Stanford University School of Medicine. In addition, Dr. Karandikar served as Assistant Chief, Department of Physical Medicine and Rehabilitation and Medical Director at the VA Palo Alto Medical Center.

Outside of his practice, Dr. Karandikar enjoys spending time with family, traveling, and exploring diverse cuisines.

Dr. Bill Berrigan, MD, RMSK

Dr. Bill Berrigan is a primary care sports medicine doctor who focuses on helping patients of all ages stay active, reduce injury risk and achieve peak performance.

Dr. Berrigan is board-certified in Sports Medicine, Physical Medicine and Rehabilitation and Musculoskeletal Sonography, and fellowship-trained in Primary Care Sports Medicine. Dr. Berrigan has a particular focus on providing ultrasound-guided injections and non-operative care for patients with acute sports injuries, chronic disorders and pain conditions.

An avid researcher, Dr. Berrigan's clinical research interests include: non-invasive measures for diagnosis and treatment of chronic exertional compartment syndrome; ultrasound shear wave elastography as a diagnostic and prognostic tool for musculoskeletal pathology and interventions; and evidenced-based use of orthobiologics, which involve using a patient's own cells and growth factors to treat an injury.

Dr. Berrigan earned his medical degree at St. George's University School of Medicine, Grenada, West Indies. He completed an internship in internal medicine at the Hackensack Meridian Jersey Shore University Medical Center, and followed with a residency in Physical Medicine and Rehabilitation at Medstar Georgetown National Rehabilitation Hospital. Dr. Berrigan then completed fellowship training in Primary Care Sports Medicine at Emory University School of Medicine where he served an additional year as chief fellow focused on teaching and academic leadership.

While at Emory, Dr. Berrigan provided sports coverage for the Atlanta Falcons (NFL), the Atlanta Hawks (NBA) and the Atlanta Dream (WNBA). He served as head team physician for the professional Fan Controlled Football (FCF) league and assistant team physician for the College Park Skyhawks, the G league affiliate of the Atlanta Hawks. During his undergraduate years at Villanova University, he was a hammer thrower on the school's Division 1 Track and Field team. Additionally, he has also been involved in competitive bodybuilding.

Dr. Berrigan grew up in San Marcos, California. He enjoys spending time with his family, traveling, hiking national parks and following Villanova basketball.

Dr. Berrigan sees patients at both the UCSF Orthopaedic Institute on the Mission Bay campus in San Francisco and at the UCSF Redwood Shores Specialty Clinic on the Peninsula.

Dr. Nicolas Hatamiya DO

Dr. Nicolas Hatamiya is a Board Certified Primary Care Sports Medicine doctor who focuses on caring for patients of all ages and strives to provide comprehensive care to help them achieve their goals and embrace healthy lifestyles. He has particular interests in musculoskeletal ultrasound, preventative medicine and exercise-as-medicine care.

In research, Dr. Hatamiya's interests include applications of digital health technologies, point-of-care ultrasound, and improving musculoskeletal medical education. He has also performed research in biomechanics and exercise physiology.

Dr. Hatamiya earned his bachelor's degree in Integrative Biology from the University of California, Berkeley, and followed by earning his Doctor of Osteopathic Medicine from Western University of Health Sciences in Pomona, Calif. He completed a residency in family medicine at Stanford Health Care, at which he served as chief resident and completed a faculty development track. Dr. Hatamiya then completed a fellowship in primary care sports medicine at the University of California, Los Angeles.

On the playing field, Dr. Hatamiya has served as a team physician for the UCLA Bruins, local high schools, and served as assistant team physician for the Los Angeles Lakers and Los Angeles Dodgers. Currently, he is a team physician for the Academy of Art University in San Francisco (NCAA Division II) and the Oakland Roots USL professional soccer team.

Dr. Hatamiya is also the Associate Program Director of the Primary Care Sports Medicine fellowship program. He is a member of the American Medical Society for Sports Medicine, American College of Sports Medicine, American Academy of Family Physicians and Society of Teachers of Family Medicine. In 2020, he received a grant from the American Medical Society for Sports Medicine for a local humanitarian service project.

Dr. Hatamiya will see patients at the UCSF Orthopaedic Institute in San Francisco, UCSF's Berkeley Outpatient Center and at the UCSF Sports Medicine Center for Young Athletes in Walnut Creek.

Dr. Gopal Lalchandani, MD

Dr. Gopal Lalchandani treats both pediatric and adult patients. His clinical expertise includes acute upper limb trauma and post-traumatic reconstruction of complex injuries of the hand, wrist, forearm, and elbow. He also cares for a variety of upper extremity conditions including sports-related injuries, arthritis, carpal tunnel, tendon lacerations, and ligament injuries. His unique clinical interests also include pediatric congenital hand and complex injuries of the elbow.

Dr. Lalchandani completed his bachelor's degree at the University of California, Berkeley, and earned his medical degree from Washington University School of Medicine in St. Louis. He then completed his internship and residency at the UCSF Department of Orthopaedic Surgery, at which he served as a chief resident during his final year. Most recently, Dr. Lalchandani completed the Harvard Hand and Upper Extremity Fellowship at the Brigham & Women's, Boston Children's, and Massachusetts General Hospitals.

An avid researcher, Dr. Lalchandani's clinical research interests include wide-awake hand surgery, management of distal radius fractures, and the post-operative outcomes after upper extremity surgery – from flexor tendon repair to radial head arthroplasty. His work has been presented both nationally and internationally, and he has published multiple peer-reviewed manuscripts.

Fluent in conversational Spanish, Dr. Lalchandani grew up in Sacramento, CA. He enjoys spending time with his family, traveling, and skiing.

Dr. Lalchandani sees patients at the UCSF Orthopaedic Institute on the Mission Bay campus in San Francisco, UCSF Benioff Children's Hospital Walnut Creek and UCSF Benioff Children's Hospital in Oakland.

News and Media

C. Benjamin Ma, MD appointed as the V-Nee Yeh Endowed Professor in the UCSF Department of Orthopaedic Surgery

SAN FRANCISCO (Feb. 2, 2022) -- The UCSF Dept. of Orthopaedic Surgery is pleased to announce that C. Benjamin Ma MD, a Professor in Residence in Sports Medicine and Shoulder Surgery and Vice Chair of Adult Clinical Operations, has been appointed to the V-Nee Yeh Endowed Professorship.

As holder of the V-Nee Yeh Endowed Professorship, Dr. Ma will support orthopaedic research,service activities, and teaching related to the department's vision to pioneering musculoskeletal discovery and innovative care to transform lives.

"I am grateful and honored for this opportunity afforded me by Mr. Yeh -- a true innovator and leader in the international business world," Dr. Ma said. "Through Mr. Yeh's generosity, we will continue to develop our research focus on the management of sports medicine injuries and training of the future generations of orthopaedic surgeons."

"Dr. Ma's impressive accomplishments in leadership, education, and research will position him well for continuing success," said Thomas P. Vail MD, Chair of the UCSF Department of Orthopaedic Surgery. "I look forward to Dr. Ma's bright future, and the many contributions that he will make in the pursuit of advancing orthopaedics at UCSF."

Welcome, Class of 2027!

SAN FRANCISCO (March 18, 2022) -- The UCSF Deptartment of Orthopaedic Surgery is pleased to announce the incoming Residents of the Class of 2027!

Top row from left:

Camille Sullivan, MD, PhD
University of Cincinnati College of Medicine

Lisa Bonsignore-Opp, MD
Columbia University Vagelos College of Physicians and Surgeons

Natalie Kucirek, MD
University of California, San Francisco, School of Medicine

Middle row:

Angela Xiao, MD
Emory University School of Medicine

Bottom row, from left:

Anoop Galivanche, MD
Yale School of Medicine

Katherine Bach, MD
Perelman School of Medicine at the University of Pennsylvania

Ramesh Ghanta, MD
Baylor College of Medicine

Agency provides Department with $1.2M grant to support translational orthopaedic research in muscle stem cells

SAN FRANCISCO (Feb. 17, 2022) -- The UCSF Department of Orthopaedic Surgery is pleased to announce that Brian Feeley, MD and Xuhui Liu, MD, Co-Directors of the UCSF Muscle Stem Cell Lab, received a $1.2M grant from the California Institute of Regenerative Medicine (CIRM) this week to continue pursuing their translational research in regenerative medicine.

The grant, entitled "Matrix Assisted Cell Transplantation of Promyogenic Fibroadipogenic Progenitor (FAP) Stem Cells," seeks to determine how muscle stem cells can be activated to be transplanted into patients with chronic muscle conditions, such as rotator cuff or spine degeneration. To support this research, the CIRM grant will provide $1,179,478 of funding over the next two years.

"This grant will allow us to continue to look at how muscle stem cells within our own body can be used to improve outcomes from musculoskeletal conditions such as rotator cuff tears, low back pain, and muscle injury," said Dr. Feeley, an orthopaedic surgeon who also serves as chief of the UCSF Sports Medicine and Shoulder Service. "The goal of this project is to advance our basic science data into the clinics quickly."

"Muscle stem cells -- adult stem cells present in skeletal muscle tissue – are capable of self-renewal, giving way to healthy skeletal muscle cells," said Dr. Liu. "For this project we are going to evaluate the ability of our own muscle stem cell to be grown and implanted into a scaffold and help degenerated muscle recover, similar to what we can do with cartilage implantation in the knee. "

"Our work is in partnership with Dr. Kevin Healy," Dr. Feeley added. Dr. Healy is the Jan Fandrianto Distinguished Professor in Engineering at the University of California at Berkeley in the Departments of Bioengineering, and Materials Science and Engineering, who adds his expertise in the use of highly specialized scaffolds to hold the cells for durable implantation of the stem cells.

"This grant allows us to take a lot of the more basic work we have done on muscle stem cells, deter-mining what activates them, and what allows them to become regenerative, and translate it into treatments for patients in the near future ," Dr. Feeley said.

To learn more about the UCSF Muscle Stem Cell Lab, please visit https://feeleylab.ucsf.edu/.

To learn more about CIRM, visi https://www.cirm.ca.gov/.

Musculoskeletal research expands at UCSF, scientists Kelsey H. Collins, PhD, Christopher J. Hernandez, PhD join Department

SAN FRANCISCO (June 14, 2022) – The UCSF Department of Orthopaedic Surgery and the UCSF Musculoskeletal Center are pleased to announce the faculty appointments of two scientists: Kelsey H. Collins, PhD and Christopher J. Hernandez, PhD.

“From basic science to clinical research, we constantly seek to push scientific boundaries by collaborating broadly across the scientific community,” said Dr. Thomas P. Vail, MD, chair of the Department. “With the addition of Dr. Collins and Dr. Hernandez to our Department, we significantly strengthen the ability to reach beyond knowledge barriers and further our understanding of systemic factors involved in musculoskeletal health and disease.”

“Both Dr. Collins and Dr. Hernandez bridge the outstanding musculoskeletal research in our Department with leading scientists throughout UCSF, including those who study metabolism, the microbiome, and stem cells” said Dr. Tamara Alliston, PhD, Professor and Director of the UCSF Musculoskeletal Center. “We welcome them to our faculty and look forward to exciting discoveries and new collaborations that will emerge from each of their laboratories.”

About Kelsey H. Collins, PhD

Kelsey Collins received her doctoral degree in Biomedical Engineering in 2017 at the University of Calgary, where she studied the role of obesity in osteoarthritis in the laboratory of Dr. Walter Herzog.

As a Postdoctoral Research Scholar and Research Instructor in the laboratory of Dr. Farshid Guilak at Washington University in St. Louis, Dr. Collins investigated the effects of fat and other systemic factors on cartilage using novel stem cell and synthetic biology tools.

Her research was acknowledged with a New Investigator Recognition Award from the Orthopaedic Research Society in 2020 and she was named among the inaugural class of Rising Stars in Engineering in Health by Columbia University in 2020. Dr. Collins was recently awarded a prestigious NIH Pathways to Independence K99/R00 to investigate the role of fat in osteoarthritis

Dr. Collins’ laboratory in the UCSF Department of Orthopaedic Surgery will investigate metabolic and systemic factors driving age-related musculoskeletal diseases using tissue engineering and regenerative medicine approaches. With affiliations in the UCSF Musculoskeletal Center, Diabetes Center, Eli and Edythe Broad Center of Regeneration Medicine and Stem Cell Research, and the Benioff Center for Microbiome Medicine, Dr. Collins is in an ideal position to discover new mechanisms of osteoarthritis and advance therapeutic development for musculoskeletal damage, pain and metabolic diseases.

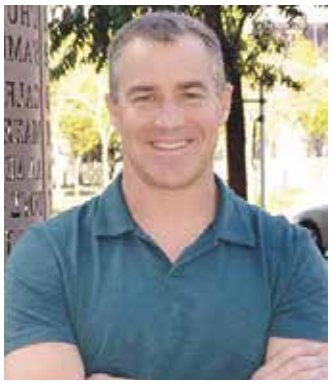
About Christopher J. Hernandez, PhD

Christopher Hernandez, PhD comes to UCSF by way of the East Coast, where he has served as a Professor in the Sibley School of Mechanical and Aerospace Engineering at Cornell University and as an Adjunct Scientist at the Hospital for Special Surgery.

Dr. Hernandez’s laboratory investigates the effects of the microbiome on bone and joint disorders, periprosthetic joint infection, and the biomechanics and mechanobiology of infectious bacteria. A recent NSF award supports his efforts to build living materials, inspired by his research on bacteria and bone.

Dr. Hernandez is a Fellow of the American Institute for Medical and Biological Engineering (AIMBE), the American Society of Mechanical Engineers (ASME), and the American Society for Bone and Mineral Research (ASBMR). He is the 2018 recipient of the ASBMR Fuller Albright Award for Scientific Excellence and was recently awarded Educator of the Year by the Society of Hispanic Professional Engineers in 2021.

Based in the UCSF Department of Orthopaedic Surgery and the UCSF Musculoskeletal Center, Dr. Hernandez also holds appointments in the UCSF Department of Bioengineering and Therapeutic Sciences and the Benioff Center for Microbiome Medicine. He has been named as a Chan Zuckerberg Biohub Investigator and will serve as the next Director of UCSF HIVE, Health Innovations via Engineering.



Brian Feeley, MD receives Ron Conway Family Endowed Professorship in Sports Medicine Research

SAN FRANCISCO (June 16, 2022) -- The UCSF Department of Orthopaedic Surgery is delighted to announce that Brian Feeley, MD, the Chief of the Sports Medicine and Shoulder Service and a Professor in Residence, has been appointed the Ron Conway Family Endowed Professorship in Sports Medicine Research.

This Professorship will facilitate Dr. Feeley's pioneering research on muscle tissue and its impact on common musculoskeletal problems, such as rotator cuff tears, knee pain, limb immobilization, joint contractures, and low back pain, as well as Dr. Feeley's extensive mentorship and teaching activities.

"Time and again, Mr. Conway has demonstrated incisive acumen, identifying potential for transformative innovation in technology," Dr. Feeley said. "To have my medical research be dubbed worthy of his investment is a true honor. Through his generosity, UCSF will continue raising the bar for management of sports medicine injuries as well as training future generations of orthopaedic surgeons, with particular attention paid to supporting those from traditionally underrepresented backgrounds."

"Dr. Feeley is a uniquely talented orthopaedic surgeon, educator, and investigator," said Dr. Thomas P. Vail, Chair of the Department. "His creative approach to characterizing stem cells in muscle and studying the role of stem cells in muscle degeneration – and regeneration – is truly remarkable. We congratulate him on receiving this very generous support to continue his pursuit of understanding cellular and molecular changes that occur within muscle after injury."

In addition to Dr. Feeley's clinical practice at the UCSF Orthopaedic Institute, he runs the Feeley-Liu Laboratory for Muscle Regeneration with colleague, Xuhui Liu, MD, a research scientist in the field of orthopaedic surgery.

"Dr. Feeley is truly passionate about understanding the how and why of cell healing. He continuously partners with peers, using evidence-backed science to find answers to these questions," said Dr. Liu.

To date, the Feeley-Liu Lab has published approximately 35 research studies on muscle tissue quality and its impact on common problems such as rotator cuff tears, low back pain, and neurologic conditions. They use cutting edge research tools such as CRISPR gene editing, single cell trancriptomics, and 2-photon microscopy to study the effects of muscle stem cells on tissue regeneration.

"We hope to eventually be able to improve surgical outcomes and decrease recovery times by influencing the way stem cells in an injured rotator cuff behave after repair, that is, to use the tricks we figured out for stimulating beige fat in mice to prompt humans' own stem cell regeneration," Dr. Feeley said.

Photo: Matt Callahan, MBA, has been selected to lead the UCSF Department of Orthopaedic Surgery as its Chief Administrative Officer. (Courtesy of the UCSF Department of Orthopaedic Surgery)

Matt Callahan named Chief Administrative Officer of UCSF Department of Orthopaedic Surgery

SAN FRANCISCO (July 26, 2022) -- The UCSF Department of Orthopaedic Surgery is pleased to announce the appointment of Matt Callahan, MBA, as Chief Administrative Officer of the Department.

Since 2014, Callahan has served as the department's Analytics Program Manager. In the role he has focused on improving the department's and service lines' ability to make decisions with accurate and nuanced data. He has held an active role in the strategic planning for and execution of the department's continued clinical expansion. He is also heavily involved in recruiting and mentoring staff, deploying new technologies, operational improvement, and clinical research. He succeeds Richard Capra, who recently retired after 14 years of service to the department.

"I am greatly honored for the opportunity to continue to collaborate with our brilliant faculty and staff to improve musculosketal care locally and worldwide," Callahan said.

"Our department has the best and brightest physicians and staff caring for patients, researching new treatments and cures, and teaching the next generation of clinicians. I look forward to continuing to carry on our department's mission."

"The vision of our department is to pioneer musculoskeletal discovery and innovative care to transform lives," Dr. Thomas P. Vail, Department Chair, said. "Matt is the perfect person to lead our department in achieving this goal."

Callahan will provide administrative and executive counsel to the Department Chair as well as managing the administrative and academic services within the department. He is responsible for working with department leadership to develop and execute strategic plans to deliver on the department's tripartite mission.

"Matt's operational experience across a variety of areas in healthcare and his proven leadership in process improvement will serve him well in this his new role," said Dr. C. Benjamin Ma, Vice Chair of Adult Clinical Operation in the Department. "His ability to bring together great teams is one of the strengths of his already successful career."

Matt Callahan, MBA, grew up in the East Bay and received both his Bachelors of Finance degree and his Masters of Science in Business Administration degree from San Diego State University, where he was a two-time letterman on the university's D1 football team. Callahan has also received certifications from the UCSF School of Medicine Leadership Development Program and the Epic Clarity Report Writing Program. As a published academic researcher, Callahan has also contributed on several peer-reviewed articles with members of the department's faculty.

Callahan, a life-long Oakland A's fan, spends his free time with his wife Cori and their three young children enjoying the Bay Area.

Orthopaedic researcher Ralph Marcucio, PhD, receives prestigious investigator award for achievements in craniofacial biology

SAN FRANCISCO (August 29, 2022) – The UCSF Department of Orthopaedic Surgery is pleased to announce that Ralph Marcucio, PhD, a Professor of Orthopaedic Surgery, has been named the recipient of the David Bixler Distinguished Scientist in Craniofacial Research Award by the Society for Craniofacial Genetics and Developmental Biology.

The research award is named after the society's first president, David Bixler, who founded the organization in 1975 to promote research, education, communication and policy about normal and abnormal development of the head, face and neck.

"I am honored and humbled to be recognized by my peers with this award The award is really an acknowledgement of the dedication and outstanding work of all the members of my laboratory and my collaborators" Dr. Marcucio said. "In academic medical research, it is a genuine privilege to be engaged with my colleagues in this work to provide a better understanding of craniofacial anomalies."

"I am very pleased that Dr. Marcucio is being recognized by his peers with this award to celebrate his commitment to orthopaedic research," said Dr. Thomas P. Vail, Chair of the Department. "We are always amazed by his unwavering curiosity and commitment to craniofacial and musculoskeletal research."

Dr. Marcucio will accept the award at the society's annual meeting in La Jolla, Calif. next month.

Orthopaedic scientists recognized for their research at the 2022 (OREF) Southwest Region Resident Research Symposium include: from left, Grant Schroeder, MD, Stanford Health Care; Joseph Wick, MD, University of California, Davis; Jennifer M. O'Donnell, MD, UCSF; Sarah Stroud, MD, UCSF; Alicia Asturias, MD, UCSF; Brendon Mitchell, MD, University of California, San Diego; Michael Davies, MD, UCSF; and Steven Garcia, MDUCSF. (Courtesy Photo)

Department hosts 2022 OREF Residents Research Symposium, awards rising scientists for contributions to orthopaedic research

SAN FRANCISCO (Sept. 23, 2023) – This week, the UCSF Department of Orthopaedic Surgery hosted the Orthopaedic Research and Education Foundation (OREF) Southwest Region Resident Research Symposium at the Mission Bay Conference Center in San Francisco on Wednesday, Sept. 21, 2022.
The symposium, attended by approximately 60 orthopaedic researchers and live streamed to more than 1,000 participants, provided residents with the opportunity to share their research projects among their collaborators, mentors and piers. View the Complete Program. Dr. Alan Zhang MD served as moderator and program organizer.

The symposium's keynote speaker featured Nicholas M. Bernthal, MD, Chair of the Orthopaedic Surgery Department at the David Geffen School of Medicine at UCLA. Dr. Bernthal presented "'Don't Stop Believin': Translating Ideas to Practice and Staying 'Young' in Orthopaedic Surgery." (Watch Dr. Bernthal's Keynote).

"We are honored to host the Orthopaedic Research and Education Foundation (OREF) resident research symposium for the third time," said Dr. Thomas P. Vail MD, Chair of the UCSF Dept. of Orthopaedic Surgery. "This annual event brings together orthopaedic residents from our region to meet in person and share their research. The OREF provides a catalyst for research, mentoring, and professional opportunity."

To learn more, visit the OREF 2022 Resident Research Symposium Website

2022 OREF Resident Research Awardees

First Place (Tie)

Heterogeneous Human Fibroadipogenic Cells Subpopulations are Altered in Injury

Steven Garcia, MD, University of California, San Francisco

Defining Endogenous Mitochondrial Transfer in Muscle Following Rotator Cuff Injury

Michael Davies, MD, University of California, San Francisco

Second Place

Breaking the Glass: Gender Differences in Endowed Chair Positions and NIH Funding in Musculoskeletal Research

Alicia Asturias, MD, University of California, San Francisco

Can Laser-Assisted Indocyanine Green Angiography Be Used to Quantify Perfusion Changes by Anatomical Location During Staged Fixation of Pilon Fractures? A Pilot Study

Brendon Mitchell, MD, University of California, San Diego

Third Place

Patient Characteristics, Injury Types, and Costs Associated with Secondary Over-Triage of Isolated Cervical Spine Fractures

Joseph Wick, MD, University of California, Davis

Impact of Social Determinants of Health on Preoperative Opioid Utilization in Patients with Lumbar Degeneration

Jennifer M. O'Donnell, MD, University of California, San Francisco

An Analysis of the Prognostic Factors for Adult Patients with High-Grade Extremity Sarcomas in the California Cancer Registry, 1988-2017

Sarah Stroud, MD, University of California, San Francisco

Presenters Choice Award

ACL Injuries Among Pac-12 Athletes: A 5-Year Epidemiologic Study

Grant Schroeder, MD, Stanford Health Care

News

Inside Philanthropy: Who's supporting a Project to Save Limbs and Futures After Traumatic Injury?"

Article features the Institute for Global Orthopaedics and Traumatology

URL: https://www.insidephilanthropy.com/home/2022/1/4/whos-supporting-a-project-to-save-limbs-and-futures-after-traumatic-injury

New York Times: Considering Bone or Joint Surgery? You May Not Need It.

Article features Saam Morshed, MD

URL: https://www.nytimes.com/2022/01/04/well/bone-joint-surgery.html

Chelsea Bahney PhD receives 2022 OTA Research Grant

Title: Injectable bioinspired nanowires to accelerate fracture healing through therapeutic delivery of painless nerve growth factor.

Principal Investigator: Chelsea S Bahney, PHD

Co-Investigator: Chengbaio Wu, Tejal Desai

Awarded Funds: $50,000

Funded by: OTA

Grant Type: Basic Science

Aarti Deshpande, CPO and current prosthetic resident Megan D'Apice, MSPO, recently returned from Queeétaro, Mexico at which they were working with Huges International Clinics. They were worked at the Crimal Rehabilitación Intergral clinic to provide clinical care to local patients.

On Thursday September 8, 2022, the International Combined Orthopaedic Research Societies (ICORS) triennial Congress in Edinburgh, Scotland announced the inaugural transformative contribution awards. Congratulations Dr. Theodore Miclau on winning the @icors_I transformative award for his contributions to ICORS along with fellow winner and AO Research Director, R. Geoff Rich

Hovhannes Karapetyan MD, at left, completed a 6-week visiting fellowship at the Orthopaedic Trauma Institute.

In December 2022, Advisory Board member and IOTA Steering Committee Chair, Theodore Miclau, III, MD and other leaders in trauma convened for the 1st Triennial Conference of the International Orthopaedic Trauma Association (IOTA). The meeting, hosted in Amsterdam, was organized by the IOTA in collaboration with the Dutch Trauma Foundation (STN).

Sensors
Imaging
OTI
DSL
Simulation
Data
Orthopaedic Trauma Institute
UCSF + SAN FRANCISCO GENERAL HOSPITAL
DIGITAL SCIENCE LABORATORY

The OTI Digital Science Lab (DSL) is directed by Meir Marmor, MD and Safa Herfat, PhD. Their research aims to develop novel strategies and technology to treat orthopaedic trauma. Using a collaborative cross-disciplinary approach, our lab offers expertise in engineering, clinical research and data science.

Projects in our laboratory are are/were funded by the Department of Defense (DOD), National Science Foundation (NSF), AO Foundation, NSF Center for Disruptive Musculoskeletal Innovation (CDMI), and the Orthopaedic Trauma Association (OTA).

Showcased are DSL publications in Sensors, Simulation & Modeling, Data and Imaging.

IGOT San Francisco SMART Course, October 2022

Orthopaedic researcher Ralph Marcucio, PhD, receives prestigious investigator award for achievements in craniofacial biology. Dr. Marcucio was named the recipient of the David Bixler Distinguished Scientist in Craniofacial Research Award by the Society for Craniofacial Genetics and Developmental Biology.

IGOT CUBA SMART Course

Orthotics & Prosthetics Residency Mentors presented with the 'Team Boyden Award': Aarti Deshpande, CPO, MS; Nicole Henry, MS; Chrysta Irolla, MS; and Adrian Ravitz, CO were awarded the 'Team Boyden Award' at the School of Medicine's recent Celebration of New Members and teacher's award ceremony! The Jaclyne Witte Boyden Award honors and recognizes exemplary service by staff in support of health professions education.

Philanthropy

Support the UCSF Department of Orthopaedic Surgery

To learn more about how to make a gift for the Department of Orthopaedic Surgery, please contact Ian Shore, MNA, CFRE, Associate Director of Development, UCSF University Development & Alumni Relations, at (415) 502-3482 or send an email to ian. shore@ucsf.edu.

makeagift.ucsf.edu

To learn more about research opportunities in the UCSF Department of Orthopaedic Surgery or to add your support, please visit:

orthosurgery.ucsf.edu

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UCSF Orthopaedic Surgery