

2022–2023 RESEARCH IMPACT REPORT

UC DAVIS HEALTH | SCHOOL OF MEDICINE

Office of Research



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VICE DEAN FOR RESEARCH

Message



KIM BARRETT, PH.D.
Vice Dean for Research

I'm very pleased to be able to present our second annual Research Impact Report from the UC Davis School of Medicine. The report showcases the incredible research being conducted by our faculty that aims to put new knowledge, diagnostic tools, treatments and cures into use to better the lives of not only our own patients, but those worldwide. It has been another banner year for our research enterprise. Once again, UC Davis as a whole brought in more than a billion dollars of extramural support for research, and the School of Medicine, always the lion's share of the total, exceeded $400 million and stands at around 40% of the overall research enterprise. As the Federal fiscal year recently came to a close, we can also report that we have hit an all-time high in critical research support from the National Institutes of Health, our most important source of funding, with an estimated total of $209 million.

Our faculty also continue to be incredibly effective in garnering support for clinical trials from industry partners, the NIH, and state agencies such as the California Institute for Regenerative Medicine, which funds work in the revolutionary areas of cell and gene therapy. Within the pages of this report, you can find more details of selected awards and the impact that the research they will enable will have on health and wellbeing.

Our faculty, staff, trainees and students are the lifeblood of our research enterprise and effectiveness. This report is a vehicle to introduce you to a few members of our community on both the Sacramento and Davis campuses, drawn from among more than 500 principal investigators and their far more numerous team members. Notable examples include Neurological Surgery Assistant Professor Sergey Stavisky, who has received national acclaim for his work on brain-computer interfaces that some day could enable speech production in those suffering from strokes and other conditions. Sergey won a prestigious New Innovators award from the NIH in the past year, along with several other recognitions.

I would also like to highlight a clinical trial sponsored by Janssen Research and Development and led by Dr. Stuart Cohen, Chief of the Division of Infectious Diseases in the Department of Internal Medicine. The trial will assess the efficacy of a novel vaccine to prevent extraintestinal manifestations of infection with pathogenic E. coli bacteria, and particularly life-threatening kidney disease in elderly patients.

Finally, with support from the California Department of Public Health, Dr. Yvonne Wan from the Department of Pathology and Laboratory Medicine is leading a large interdisciplinary team to unravel interplay between the diet, the gut microbiome, the liver and the brain, with a particular focus on understanding why neurological disorders like Alzheimer's Disease disproportionately affect patients from racial and ethnic minority groups.

The report also describes the services offered by the growing School of Medicine Office of Research to our community, and introduces our leadership and staff. Our offerings range from assistance for new faculty to obtain their research funding, to ensuring lab safety, to helping departments with research administration and assessing the effectiveness of their ongoing programs. If you are reading this as a member of the School of Medicine or a collaborator in our sister Schools and Colleges, we invite you to ask us how we might facilitate your research efforts.

Finally, I would be remiss if I were not to mention the ongoing development of Aggie Square. The first buildings are now a highly visible presence on the Sacramento campus, and are scheduled for occupancy in the first quarter of 2025. These wonderful facilities will be a game changer for our research programs, and we are closing in on naming the faculty who will be the first to occupy School of Medicine space in the laboratory and office buildings. With the opportunity to interact closely with tenants from private industry and access to state-of-the-art vivaria and educational facilities, the project will benefit all of us who work in Sacramento and likely beyond. I look forward to reporting on final preparations for the grand opening in next year's report.

Thank you so much for your interest in our work. Please enjoy this showcase of the immense impact that research at UC Davis School of Medicine is having, and don't hesitate to reach out if you would like further information on any of the topics discussed, or indeed our research portfolio in general. We can be reached at somor@ucdavis.edu.

Kim E. Barrett, Ph.D.
Vice Dean for Research
Distinguished Professor of Physiology and Membrane Biology
UC Davis School of Medicine







EXECUTIVE SUMMARY

A Record-Breaking Year

UC Davis School of Medicine continued to demonstrate that it is a leading research, academic, and medical training institution during the 2022-2023 fiscal year.

School of Medicine extramural funding topped $401 million for the first time.

The School of Medicine also achieved new benchmarks in national recognition, including research rankings and prestigious awards for researchers.



US NEWS AND WORLD REPORT RANKINGS

The 2023-2024 U.S. News and World Report on Best Graduate Schools placed two of the School of Medicine's medical education programs in the top 10 for all schools: family medicine as 5th (up from 7th last year) and primary care as 6th (up from 8th). It was also ranked 50th in research, up one spot from last year.

BLUE RIDGE RANKINGS

In its 2022 ranking, the Blue Ridge Institute for Medical Research placed UC Davis School of Medicine among the nation's leading medical schools for National Institutes of Health (NIH) funding. It ranked the school 32nd nationally - one spot higher than last year. Nine School of Medicine departments ranked in the top 20 nationally in their respective fields. They included Cell Biology and Human Anatomy (17), Dermatology (14), Neurology (11), Pharmacology (20), Physical Medicine and Rehabilitation (16), Physiology and Membrane Biology (14), Psychiatry and Behavioral Sciences (20), Public Health Sciences (6) and Urologic Surgery (10).

2022-2023 *Accomplishments*



RESEARCHER RECOGNITION

Craig McDonald was awarded the prestigious designation of a Clinical Research Forum Top Ten research achievement award.

Sergey Stavisky won the 2022 NIH Director's New Innovator Award

Ye Chen-Izu received an Outstanding Investigator Award from the National Heart, Lung and Blood Institute (NHLBI).

Kim Barrett was selected as one of six honorary fellows for the Physiological Society.

Andreas Bäumler was elected to the National Academy of Sciences (NAS).

INSTITUTE FOR PSYCHEDELICS AND NEUROTHERAPEUTICS

UC Davis launched the Institute for Psychedelics and Neurotherapeutics this year. This institute will advance basic knowledge about the mechanisms of psychedelics and translate it into safe and effective treatments for diseases such as depression, post-traumatic stress disorder, addiction, Alzheimer’s disease and Parkinson’s disease, among others.

OUR TEAM

Leadership



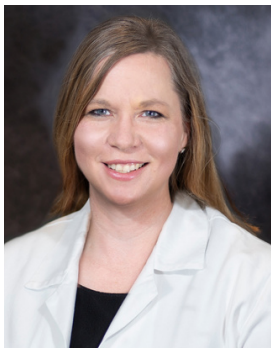
Kim Barrett, Ph.D.
Vice Dean for Research



Ted Wun, M.D., F.A.C.P.
Associate Dean for Translational Research



Angela Haczku, M.D., Ph.D.
Associate Dean for Research Infrastructure



Rachael Callcut, M.D., M.S.P.H., F.A.C.S.
Associate Dean for Data Science and Innovation



Anuurad Erdembileg, M.D., Ph.D., M.A.S.
Assistant Dean for Research



Shawn Rasmussen
Director of Facilities

OUR TEAM

Staff

Research Operations

- Nguyet Kong, Director of Research Operations
- Ida Shunk, Communications Specialist
- Lucy Cai, Research Analyst
- Tasska Johnson, Administrative Officer



Grants Facilitation Unit

- Erica Chedin, Ph.D., Director of Grants Facilitation
- Hardeep Obhi, Ph.D., Research Development Specialist
- Jeffrey Engler, Ph.D., Research Development Specialist
- Heather Hughes, Ph.D., Research Development Specialist



Evaluation Unit

- Stuart Henderson, Ph.D., Director of Evaluation
- Amy Carillo, Ph.D., Evaluation Specialist
- Stacey Neves, M.A., Evaluation Specialist
- Rebecca Giacinto, Ph.D., M.P.H., M.A., Evaluation Specialist
- Melissa Sullivan, Evaluation Analyst

Facilities and Safety

- Tammi Olineka, Associate Director of Facilities and Safety
- Brett Smith, Safety Officer
- Steve Libertini, Safety Officer



- Lilly Greatorex, Space Analyst
- Mark Vasquez, Senior Auto Equipment Operator
- Erik Hanke, Auto Equipment Operator
- Phillip Schroeder, Building Maintenance

SCHOOL OF MEDICINE OFFICE OF RESEARCH UNITS



PHOTO MONTAGE COURTESY OF ANGELA HACZKU



RESEARCH OPERATIONS

Research Metrics Dashboard

Research Operations coordinated major updates to the Tableau-based research grant dashboard, including its rebranding as the School of Medicine Research Metrics Dashboard. Updates included streamlined features and new tabs for Awards, Proposals and Publications.

Award Nominations

Research Operations facilitated the nomination packets of over a dozen School of Medicine Faculty for prestigious institutional and national awards.

Communications

Research Operations disseminates School of Medicine Office of Research internal and external communications. In 2022-2023, we added a LinkedIn account and a web-based events calendar to our communications portfolio.

Events

Post-COVID in-person events returned full force in 2022-2023 and Research Operations coordinated several events this year, including team-building gatherings. The unit also coordinated the return of the School of Medicine Research Celebration.

The Research Operations unit serves as the foundation of the School of Medicine Office of Research. All the team members are essential in supporting the other units and Vice/Associate/Assistant Deans. The unit facilitates research administrative activities through a variety of services for proposal administration and analysis of research and funding metrics. In addition, the unit assists other units within the School of Medicine Office of Research and collaborative units across campus regarding scheduling, ordering, website updates, marketing material, outreach to faculty/staff, event planning and other miscellaneous support activities.





GRANTS FACILITATION

Early Career Investigators

KOHORT is a five-month program solely for postdocs and early-stage investigators, developed and led by the GFU. KOHORT is designed to provide investigators with a solid foundation in creating, submitting, and receiving a career development award from the National Institutes of Health.

R-Level Investigators

The GFU actively facilitates the formation of new collaborations between investigators from the School of Medicine and other academic departments, frequently leading to joint submissions by multiple PIs.

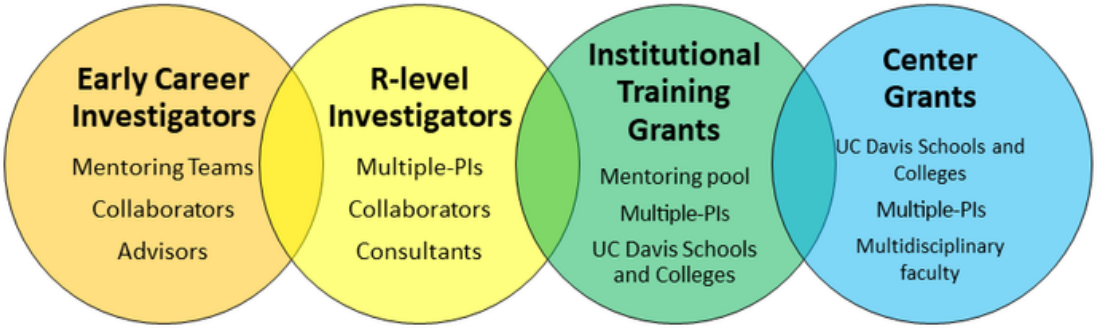
Institutional Training Grants

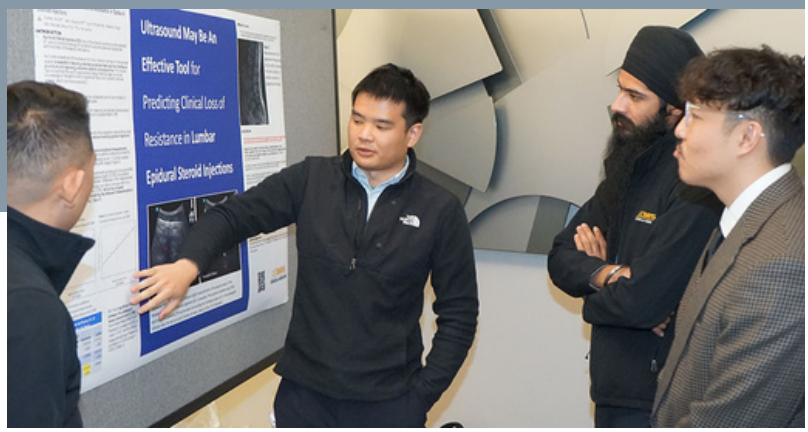
The team consults in assembling diverse mentoring pools and supports collaborations between the School of Medicine and other colleges or schools (e.g., School of Veterinary Medicine, College of Engineering, and College of Biological Sciences).

Large Center Grant Mechanisms

GFU provides advice on establishing the strongest interdisciplinary research teams responsive to the funding mechanism at hand.

The Grants Facilitation Unit (GFU) provides exceptional support to UC Davis School of Medicine investigators in developing, writing/editing, and finalizing grant proposals to fund their research programs. The GFU specializes in assisting investigators with numerous types of National Institutes of Health (NIH) mechanisms, including fellowship (F) awards for predoctoral and postdoctoral scholars, career development (K) awards for early-stage investigators, R-series awards (R03, R21, R01, etc.) for early-stage or established investigators, and institutional training grants (T32, K12) or research program and center grants (P or U series) for multi-investigator teams. The GFU also supports applications to a diverse range of foundations and national research funding institutions.





EVALUATION

Grant Writing

Since 2007, the evaluation team has contributed to over 100 grant applications with approximately 67% receiving new or renewed funding. In FY22-23 the evaluation team provided support for fifteen new grants and grant renewals.

Consultations

The evaluation team's mixed-methods research and evaluation expertise is a sought-after resource not widely available elsewhere at UC Davis Health. In FY22-23, the evaluation team provided over 35 consultations with faculty, staff and scholars.

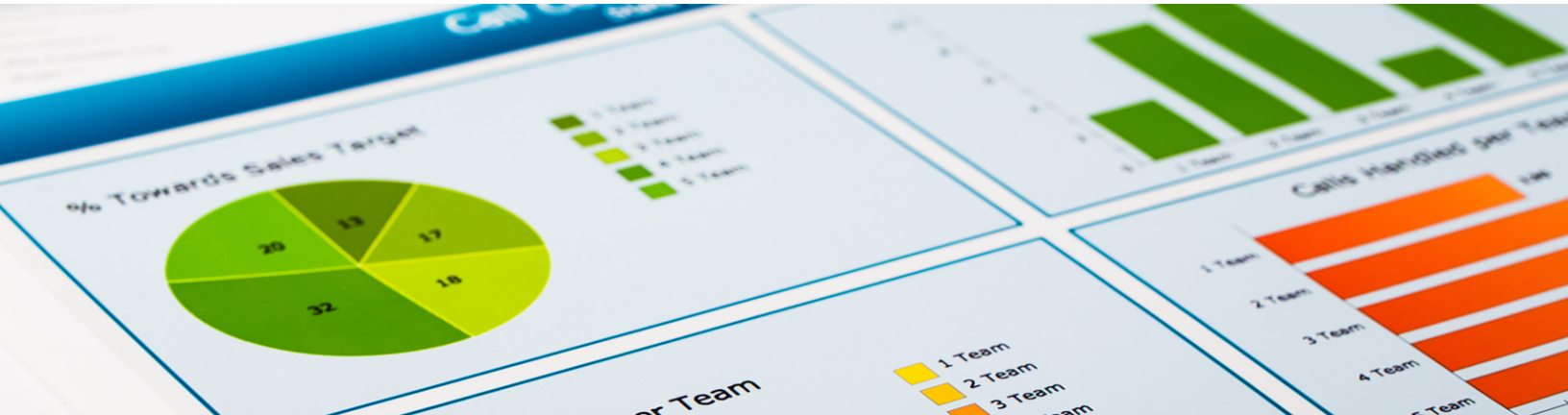
Publications

The Evaluation team works with programs to disseminate evaluation findings and research through academic publications. Members of the evaluation team co-authored one peer-reviewed publication in FY22-23, and produced or contributed to five executive summaries and two final reports.

Professional Service and Leadership

In FY22-23 the team provided survey assistance to the UC Davis Research Core Facilities leadership, Aggie Square and Translational Entrepreneurship leadership.

The Evaluation Unit has served the program evaluation needs of the School of Medicine and the UC Davis research community since 2006. Part of the Office of Research infrastructure, the unit supports UC Davis Health's faculty, staff and students' efforts in educational training and research. The mission of the School of Medicine is "to improve health through the combined power of education, research, clinical care, and community." The Evaluation Unit, with its diverse portfolio, provides support to programs and projects that impact each of these mission areas.





LABORATORY HEALTH AND SAFETY

Inspections - a Collaborative Effort

The Safety Unit is instrumental in guiding inspections by external agencies. The Safety Officers also support laboratories with a myriad of internal inspections by such entities as the Lab Safety Professionals, the Biosafety Office and the university Fire Marshal's Offices.

Aggie Square - Looking Forward

The Safety Unit has been instrumental in ensuring the safety and compliance of Aggie Square. This has involved determining the quantities of hazardous materials expected to be utilized by the School of Medicine.

High Hazard Stabilization of Hazardous Chemicals

A significant operation that the Safety Unit coordinated in FY22-23 was a high hazard stabilization of chemicals that were too dangerous to be shipped on public roads. This operation, which required a permit from the Department of Toxic Substances Control (DTSC) and the expertise of Clean Harbors, was meticulously planned to ensure minimal disruption and maximum safety.

The Health and Safety program at UC Davis School of Medicine is responsible for providing a safe workplace by minimizing the potential hazards to faculty, staff, students and visitors. The Laboratory Health and Safety unit sets the standards for safety management and complements individual laboratory safety programs and activities. The unit collaborates with faculty, staff, and students to improve the safety culture and regulatory compliance. It serves as a liaison between researchers, campus Environmental Health &Safety (EH&S), and outside regulatory agencies. The team provides technical expertise and assists labs identify ways to mitigate hazards. We also work hand-in-hand with the research space oversight team, playing a pivotal role during laboratory setups and closeouts





RESEARCH SPACE OVERSIGHT

Aggie Square

The unit has provided support for Aggie Square throughout its construction. This has included involvement in assessments of floor plans, equipment needs and pricing, developing draft animal/rodent policy, securing funding and space details, and assessing potential occupants.

Research Space Policy

This year, the Research Space Oversight unit collaboratively drafted an updated Research Space Policy that will help provide a more optimal way to actively manage space utilization/allocation.

Space Survey Tool

In tandem with development of the new space policy, collaborative work to improve research space oversight has resulted in the creation of a survey tool that will enhance the efficiency and workflow of future space assessments.

The Research Space Oversight unit plays a vital role in the effective management of research space and facilities within the School of Medicine. The unit's primary responsibilities encompass a wide array of functions, including conducting comprehensive space assessments, assisting various departments and units in retaining and preparing spaces for new recruits, and collaborating closely with key stakeholders to address all research space and facilities needs. The unit actively engages in the validation and tracking of Memorandums of Understanding (MOUs) within the School of Medicine and between the school and other schools and colleges. It also facilitates essential tasks like laboratory cleanouts, move-ins, and equipment relocations.



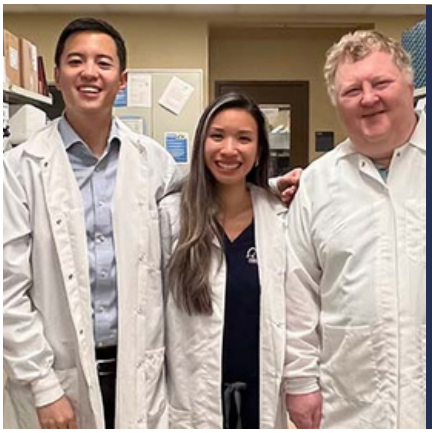
RESEARCH *Highlights*

Examples of some of the breakthrough research conducted by School of Medicine scientists in 2022-2023



Researchers discover how some brain cells transfer material to neurons in mice

Researchers at UC Davis were the first to report how a specific type of brain cells, known as oligodendrocyte-lineage cells, transfer cell material to neurons in the mouse brain. The study was published in the *Journal of Experimental Medicine*, with Olga Chechneva, assistant project scientist at UC Davis Department of Biochemistry and Molecular Medicine, a corresponding author.



Studies show how skin forms differently across the body

Two UC Davis Health studies explored how differences in skin composition may lead to dermatological conditions, such as psoriasis and atopic dermatitis. Emanual Maverakis, professor of dermatology, molecular medical microbiology, Project Scientist Alexander Merleev and Stephanie Le, dermatology resident, were co-lead authors of the studies.



Telemedicine reduces hospital transfers for very ill kids at rural, community emergency departments

New UC Davis Health research confirmed that pediatric critical care telemedicine consults with clinicians in rural and community emergency departments result in significantly fewer interfacility transfers. The study was published in the Journal of the American Medical Association JAMA Network Open, by lead author James Marcin, vice chair for pediatric clinical research.



Tapering may have negative impacts for patients taking opioids long term

A new study found that tapering, or gradually reducing, opioid use may have unintended negative health impacts for some patients on long-term opioid therapy. Elizabeth Magnan, associate professor of family and community medicine, is first author on the study.



Transcatheter edge-to-edge heart valve repair shows benefit for severe tricuspid regurgitation

In an article published in The New England Journal of Medicine, UC Davis Health cardiologists shared promising findings from a recent clinical trial involving a heart valve procedure called transcatheter edge-to-edge repair (TEER). Gagan D. Singh, associate professor of cardiovascular medicine is co-author of the article.



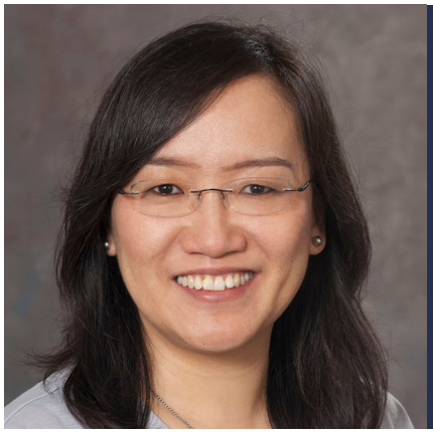
New treatment for recurrence of C. difficile infection approved by FDA

The U.S. Food and Drug Administration (FDA) has approved VOWST™, a microbiota-based therapeutic to prevent recurrence of C. difficile Infection (CDI) in adults following antibacterial treatment for recurrent CDI (rCDI). The approval was based on clinical trials run by UC Davis Health Chief of Infectious Diseases, Stuart Cohen.



Study aims to understand lung cancer in non-smoking Asian American women

The National Institutes of Health (NIH)-funded Female Asian Never Smoker (FANS) study, led by researchers from UCSF Health, UC Davis Health and Stanford Medicine, expanded into Sacramento County. One of the principal investigators in the study is associate director for the Comprehensive Cancer Center's Office of Community Outreach and Engagement, Moon Chen Jr.



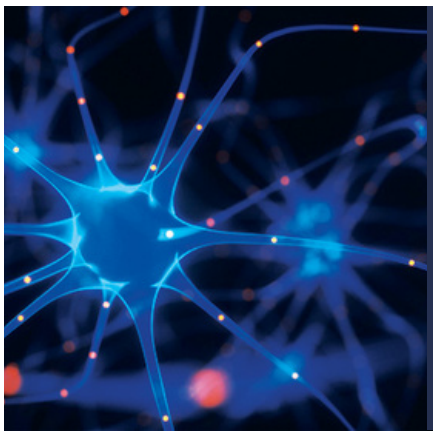
Lipoprotein(a): A less understood but critical risk factor for heart disease

UC Davis Health endocrinology researchers are studying a less understood risk factor for heart disease: lipoprotein(a), or Lp(a). The recently published research on this topic in the journal Atherosclerosis addressed the under-researched aspects of Lp(a) regulation. It was co-authored by Enkhmaa Byambaa, professor of endocrinology, diabetes, and metabolism at UC Davis Health.



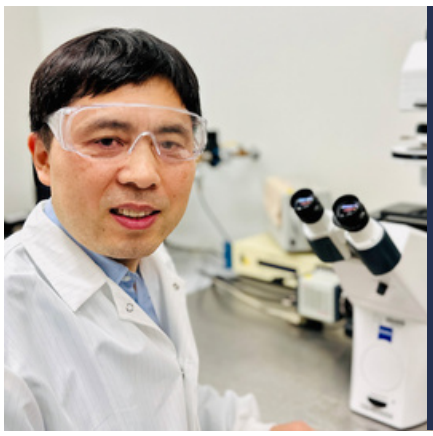
Nephrology researchers shining a light on chronic kidney disease

Led by Baback Roshanravan, associate professor of medicine and the Paul F. Gulyassy endowed professor in nephrology, UC Davis Health nephrology researchers are conducting three separate NIH funded clinical studies analyzing the effects of therapeutics and lifestyle interventions on the metabolic and physical health of patients suffering from chronic kidney disease.



UC Davis team identifies genes that can help improve stroke diagnosis and treatment

UC Davis Health researchers are trying to determine whether a different treatment option can reliably and accurately improve stroke diagnosis and treatment. The study's co-authors are Bodie Knepp, Xinhua Zhan, Marisa Hakoupian, Heather Hull, Noor Alomar, Hajar Amini, Frank R. Sharp, Boryana Stamova and Bradley P. Ander of the UC Davis MIND Institute and the Department of Neurology.



New mouse study reveals a key process in how the brain forms memories

A mouse study led by researchers at the UC Davis School of Medicine identified an intricate molecular process involving gene expression in the neurons that appears to play a critical role in memory consolidation. The research was published in Science Signaling, with Yang K. Xiang, a professor in the Department of Pharmacology as senior author of the paper.



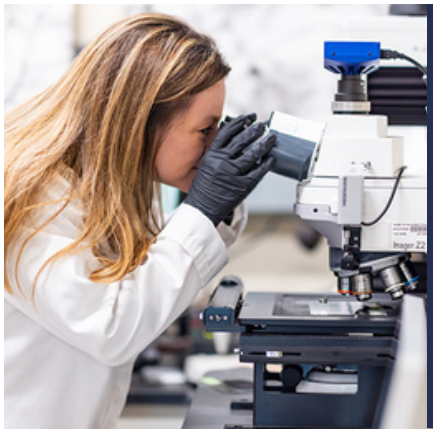
Could monoclonal antibodies replace opioids for chronic pain?

Researchers at UC Davis are trying to create monoclonal antibodies that can help fight chronic pain. The goal is to develop a non-addictive pain medication that can replace opioids. Vladimir Yarov-Yarovoy and James Trimmer, professors in the Department of Physiology and Membrane Biology at the UC Davis School of Medicine, are leading the project.



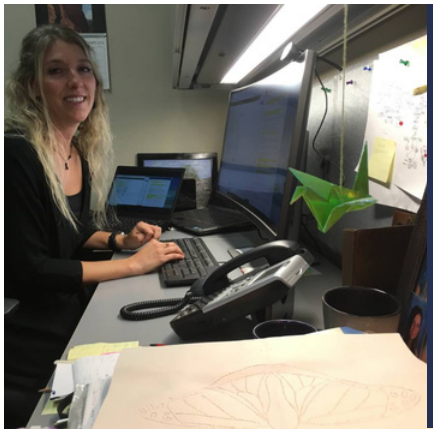
New study links muscle scarring to stem cells' sensitivity to stiffness

A UC Davis Health team is on a mission to solve a key mystery in the formation of muscular fibrosis. Lucas R. Smith, assistant professor in the Departments of Physical Medicine and Rehabilitation and Neurobiology, Physiology and Behavior, and his team may have unlocked a way to prevent these cells from getting stuck in an endless loop of collagen production, causing fibrotic muscles.



UC Davis study uncovers age-related brain differences in autistic individuals

A new study published in *PNAS* led by UC Davis MIND Institute researchers confirms that brain development in people with autism differs from those with typical neurodevelopment. Co-senior author Cynthia Schumann is a professor of neuroscience in the Department of Psychiatry and Behavioral Sciences affiliated with the UC Davis MIND Institute.



How does wildfire smoke impact pregnancy and children?

UC Davis Health researchers were awarded a $1.35 million U.S. Environmental Protection Agency (EPA) grant to study the impact of wildfire smoke on pregnancy, health and development. The study is led by Professors Rebecca J. Schmidt and Miriam Nuño, from the Department of Public Health Sciences.

MAJOR *Funding*

Selected new awards of $1M+ during fiscal year 2022-2023



Ted Wun, $15.7 million
California Department of Public Health
Project: Statewide California Cancer Registry

Mehrdad Abedi, $8 million
California Institute for Regenerative Medicine
Project: Alpha Stem Cell Clinic for Northern and Central California 2.0

Deborah Bennett, $4.9 million
Vanguard Charitable Endowment Program
Project: Pregnancy Health and Autism Study (PRISM)

Joseph Anderson, $4 million
California Institute for Regenerative Medicine
Project: Hematopoietic Stem Cell Gene Therapy for the Treatment of Tay-Sachs

William Murphy, $3.9 million
California Institute for Regenerative Medicine
Project: Overcoming resistance to standard CD19-targeted CAR T using a novel triple antigen targeted vector



Rachel Whitmer
2022-2023 Major Awards

$7.2 million, National Institute on Aging
Project: Kaiser Healthy Aging and Diverse Life Experiences Study

$5.2 million, National Institute on Aging
Project: Epidemiology of Age-related Dementia, Mild Cognitive Impairment and Brain Pathology in a Multiethnic Cohort of Oldest-Old

$1.8 million, Wake Forest University
Project: U.S. POINTER Study



Heather Riden
2022-2023 Major Awards

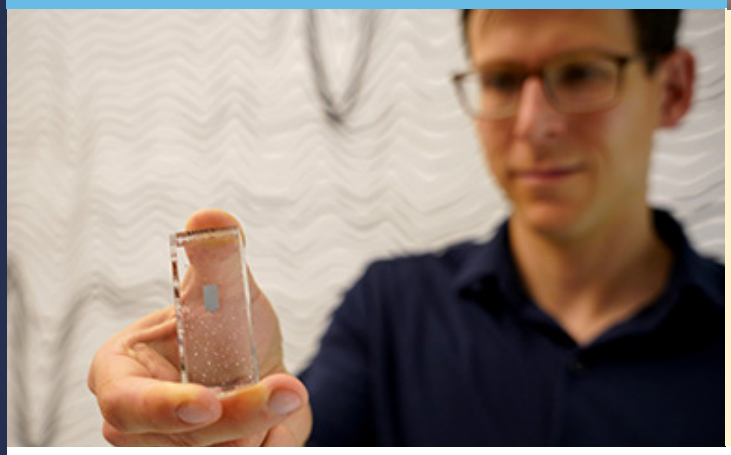
$7.1 million, California Department of Industrial Relations
Project: California COVID-19 Workplace Outreach

$4 million, California Governor's Office of Planning and Research
Project: Statewide Agriculture and Farmworker Education (SAFE) Program

Bradley Pollock
2022-2023 Major Awards
$3.7 million, California Department of Public Health
Project: California Epidemiologic Investigation Service (Cal-EIS) Fellowship Program

$1.1 million, California Department of Public Health
Project: Emergency Preparedness for Covid Response





Sergey Stavisky
2022-2023 Major Awards
$2.3 million, DoD Congressionally Directed Medical Research Program (CDMRP)
Project: Hematopoietic Stem Cell Gene Therapy for the Treatment of Tay-Sachs

$1.4 million, National Institutes of Health
Project: A brain-computer interface for voice synthesis in people with ALS

Stephen McCurdy, $3.1 million
California Department of Public Health
Project: Preventive Medicine Residency Program

Elisa Tong, $2.6 million
California Department of Public Health
Project: CA Quits

David Johnson, $2.3 million
California Department of Public Health
Project: Pragmatic testing for the adoption of The Good Life program for healthy aging

Abhijit Chaudhari, $2.1 million
NIH National Center for Complementary and Integrative Health
Project: Total-body PET for assessing myofascial pain

Glenn Yiu, $2 million
UC Multicampus Research Programs and Initiatives
Project: The Collaborative UC Tele-Ophthalmology Program for Diabetic Retinopathy Screening

Kent Pinkerton, $1.9 Million
National Institute for Occupational Safety and Health
Project: Western Center for Agricultural Health and Safety

Marc Schenker, $1.8 million
California Department of Public Health
Project: Emergency Preparedness Office

Eamon Dickson, $1.65 Million
National Institute of Neurological Disorders & Stroke
Project: Alpha-Synuclein aberrantly modifies the nanoscale distribution and function of ion channels to promote neuronal cytotoxicity

Martin Cadeiras, $1.6 million
American Heart Association
Project: Psychosocial stressors and exposomics on CV health in underserved multiethnic populations in Northern California

Johannes Hell, $1.6 million
National Institute on Aging
Project: Dysregulation of Cav1.2 by beta amyloid peptide

Daniel Shapiro, $1.6 million
County of Sacramento
Project: Community Programs for Outreach and Intervention with Youth and Young Adults at Clinical High Risk for Psychosis

Oanh Meyer, $1.4 Million
National Institute on Aging
Project: Vietnamese Insights into Cognitive Aging Program

Kyle Fink, $1.4 million
California Institute for Regenerative Medicine
Project: AAV-dCas9 Epigenetic Editing for CDKL5 Deficiency Disorder

Rebecca Schmidt, $1.35 million
United States Environmental Protection Agency
Project: Early Life Vulnerability to Climate-driven Wildfire Events on Pregnancy and Child Developmental Health Outcomes in Underserved Populations



SERGIO AGUILAR-GAXIOLA
2022-2023 Major Awards
$1.5 million, California Department of Health Care Services
Project: CALHOPE: Together for Wellness (T4W)/ JUNTOS POR NUESTRO BIENESTAR (Youth and QI Expansion Initiative)

$1.7 million, PHS Health Resources and Services Administration
Project: Digital Health Equity Program

David Amaral, $1.3 million
Angelman Syndrome Foundation, Inc.
Project: Production of a nonhuman primate model of Angelman syndrome

Ching-Hsien Chen, $1.2 million
UC Tobacco-Related Disease Research Program
Project: Molecular characterization and targeting of smoke-driven ASS1 deficiency in pulmonary fibrosis

Ye Chen-Izu, $1.1 million
National Heart, Lung & Blood Institute
Project: Mechanical Load Effects on Cardiac Function and Heart Diseases

Julie Sutcliffe, $1.1 million
DoD Congressionally Directed Medical Research Program
Project: Molecularly Targeted Radionuclide Therapy via the Integrin Alphavbeta6

Craig McDonald, $1 million
Sarepta Therapeutics
Project: UC Davis/CINRG Expanded Duchenne Natural History Study

Garen Wintemute, $1 million
Heising-Simons Foundation
Project: Heising-Simons Foundation grant to Center for Violence Prevention Research in honor of Deanna Gomby

Heather Young, $1 million
California Department of Aging
Project: An Equity Plan to Improve Caregiver Services and Supports in California

Xiaodong Zhang, $1 million
American Heart Association
Project: Mechanistic underpinnings of psychosocial stressors on cardiovascular central control and cardiac arrhythmias



Research program and center grants are large, multi-project efforts that generally include a diverse array of research activities.

RESEARCH PROGRAM AND CENTER GRANTS



Diana Miglioretti, $3.8 million

National Cancer Institute

Advancing Equitable Risk-based Breast Cancer Screening and Surveillance in Community Practice. This program follows the premise that screening and surveillance will be most effective and equitable when all women have access to high-quality risk assessment and breast imaging, and when screening and surveillance strategies are targeted to clinically meaningful outcomes



Primo Lara, $3.5 million

National Cancer Institute

Comprehensive Cancer Center Support Grant. The UC Davis Comprehensive Cancer Center discovers new knowledge that leverages and translates the best of UC Davis science to generate innovation and impact on its highly diverse catchment area and beyond.



Charles DeCarli, $3.2 million

National Institute on Aging

UC Davis Alzheimer's Disease Center. The mission of the UC Davis Alzheimer’s Disease Research Center (UCD ADRC) is to promote a highly innovative and enriched research environment focused on understanding the heterogeneity of brain aging among diverse populations that will ultimately lead to effective therapies to prevent or mitigate dementia.



Cameron Carter, $3.1 million

National Institute of Mental Health

UC Davis Conte Center: Neuroimmune Mechanisms of Psychiatric Disorders. The UC Davis Conte Center brings together investigators with a unique combination and wide range of complementary expertise to address a critical gap in knowledge related to the potential links between immune dysregulation and psychiatric illness.

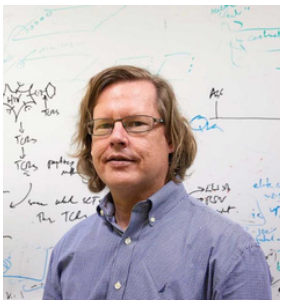


Irva Hertz-Picciotto
$4.5 Million
National Institutes of Health Office of the Director

Pre-adolescent and Late-adolescent Follow-up of the CHARGE Study Children. This project seeks to identify early childhood exposures, behaviors, or experiences that may increase risks for attention deficits, inattention, hyperactivity, anxiety or depressive mood.

$1.5 Million
National Institute of Environmental Health Sciences

UC Davis Environmental Health Sciences Core Center (EHSC). The mission of the EHSC is to advance understanding of environmentally induced disease and disability and to translate this knowledge into interventions, new practices or policy changes.



Dennis Hartigan-O'Connor, $1.4 million
National Institute of Allergy and Infectious Diseases

Multi-omic understanding of the transformed host T-cell response to HIV following therapeutic vaccination. This project aims to discover what features of the vaccine and host allow therapeutic vaccination to elicit a superior immune response that may control the HIV virus after daily antiretroviral therapy is stopped.



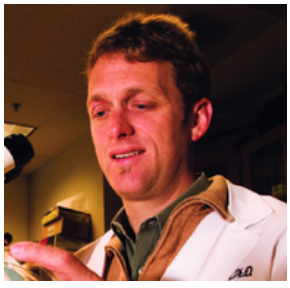
James Trimmer, $1.4 million
National Institute of Neurological Disorders & Stroke

Recombinant Immunolabels for Nanoprecise Brain Mapping Across Scales. This project is aimed at enhancing dissemination of a valuable resource of renewable affinity labels, in the form of monoclonal antibodies, for brain mapping across scales.



Leonard Abbeduto, $1.25 million
National Institute of Child Health & Human Development

MIND Institute Intellectual and Developmental Disabilities Research Center (IDDRC). The IDDRC supports a translational science agenda focused on intellectual and developmental disabilities.



Alexander Borowsky, $1 million
National Institute of Child Health & Human Development

California Partnership for Personalized Nutrition. This project established a statewide team to study variance in dietary patterns and physiological responses to patterns and specific foods as shaped by disparate factors including complex genetic, microbiome, psychosocial, human ecology, and metabolic variables.

HEALTH SCIENCE
Contracts

Selected health science contracts of over $1 million awarded to UC Davis Health researchers in 2022-2023.



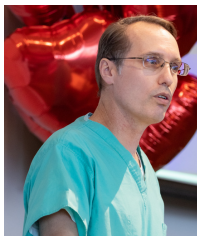
Stuart Cohen, $4.5 million
Janssen Research & Development, LLC
Phase 3 Study to Assess Efficacy, Safety & Immunogenicity of Vaccination w/ ExPEC9V in Prevention of Invasive Extraintestinal Pathogenic Escherichia coli Disease in Adults Aged 60 Yrs & Older w/ History of UTI in Past 2 Years



Timothy Albertson, $4.1 million
Pfizer, Inc.
A Phase 1/2/3 placebo-controlled, randomized, observer-blind, dose-finding study to evaluate the safety, tolerability, immunogenicity and efficacy of SARS-COV-2 RNS vaccine candidates against COVID-19 in healthy individuals



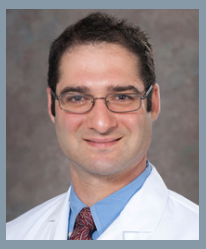
Doris Chen, $1.5 million
University of Southern California
A Placebo-Controlled, Double-Blind, Parallel Treatment Arm, 216 Week Study to Evaluate Efficacy and Safety of Treatment With BAN2401 in Subjects With Preclinical Alzheimer's Disease and Elevated Amyloid (A45 Trial) and in Subjects With Early Preclinical Alzheimer's Disease



Jeffrey Southard, $1.5 million
Edwards Lifesciences LLC
Safety and Effectiveness of Balloon-Expandable Bioprosthetic SAPIEN X4 Transcatheter Heart Valve (ALLIANCE)

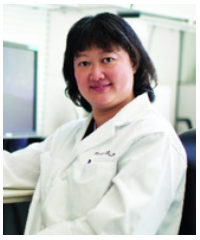


Craig McDonald, $1.2 million
Sarepta Therapeutics
A Phase 3, Multinational, Randomized, Double-Blind, Placebo-Controlled Systemic Gene Transfer Therapy Study to Evaluate the Safety and Efficacy of SRP-9001 in Non-Ambulatory and Ambulatory Subjects W/ Duchenne Muscular Dystrophy (ENVISION)



Jonathan Riess
$1.3 million
Kinnate Biopharma Inc.
A Phase 1/1b Open-Label, Multicenter Study to Investigate the Safety, Tolerability, Pharmacokinetics, and Antitumor Activity of KIN-2787 in Participants with BRAF and/or NRAS Mutation-positive Solid Tumors

$1 million
Revolution Medicines, Inc.
A Phase 1/1b, Open-Label, Multicenter, Dose-Escalation Study of RMC-5552 Monotherapy in Adult Subjects with Relapsed/Refractory Solid Tumors



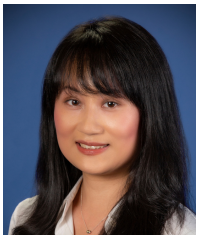
Tianhong Li, $1.2 million
ONCOC4, Inc.
Safety, Pharmacokinetics (PK), and Efficacy of ONC-392 as a Single Agent and in Combination with Pembrolizumab in Advanced Solid Tumors and NSCLC: An Open Label Phase IA/IB Study



Rasmus Hoeg, $1.1 million
Orca Biosystems, Inc.
A Multicenter Phase Ib Trial for Patients with Advanced Hematologic Malignancies undergoing Allogeneic Hematopoietic Cell Transplantation with TregGraft, a T-cell-Depleted Graft with Additional Infusion of Conventional T cells and Regulatory T cells



Scott Fishman, $1.1 million
UC San Francisco
UCSF Core Center for Patient-centric Mechanistic Phenotyping in Chronic Low Back Pain



Aileen Wang, $1 million
CSL Behring
A Pivotal Phase 3 Trial to Evaluate the Safety and Efficacy of Clazakizumab for the Treatment of Chronic Active Antibody-Mediated Rejection in Kidney Transplant Recipients



Primo Lara, $1 million
AstraZeneca AB
A Phase 3 Double-Blind, Randomised, Placebo-Controlled Study Assessing the Efficacy and Safety of Capivasertib + Docetaxel Versus Placebo + Docetaxel as Treatment for Patients with Metastatic Castration Resistant Prostate Cancer (mCRPC)

AGGIE *Square*

AGGIE SQUARE

With less than 18 months to go until its anticipated opening, Aggie Square is already a game-changer for UC Davis research. It has caught the attention of potential new leaders and faculty recruits to our campus. It is a crucial partnership in our goal to expand commercialization of UC Davis research. It will elevate research for the entire campus - not just occupants of Aggie Square but also all stakeholders will benefit from this endeavor. It will raise our national profile, leading to increases in extramural funding, philanthropy and research rankings.



The topping off ceremony for the first phase was May 4, 2023, and occupancy is expected to begin in January 2025.

What . . . where . . .why . . .?

Aggie Square is a complex of new buildings developed and built by a private partner (Wexford) on UC Davis Land.

Will house both university and private tenants.

University/Private/Community partnership

Chancellor May's legacy project based on his success with a public/private innovation zone at Georgia Tech

Four buildings in initial phase - together with a parking garage

A doubling of School of Medicine research space in Sacramento

Located on the southern boundary of the Sacramento campus

New "doorway" to campus on 3rd Avenue intended to welcome the community

Accelerate innovation and translation of biomedical advances

Serve as an engine for regional economic development



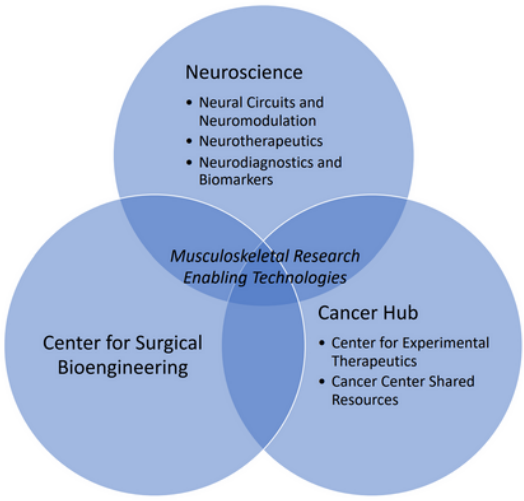
Life Sciences/Technology/Engineering East Building

Guiding Principles for School of Medicine Research Space

The process of assigning Aggie Square space to its initial occupants is ongoing. The process is guided by the following principles:

- Aggie Square space is thematic and occupants will shift over time.
- Space will remain assigned to the SOM Dean's Office
- Criteria to select specific investigators is transparent. Consultation with FEC and Council of Chairs.
- A mix of junior and senior faculty will foster mentorship and collaboration
- Aggie Square elevates the entire Sacramento campus; its resources support more than just the occupants.

Aggie Square Research Themes



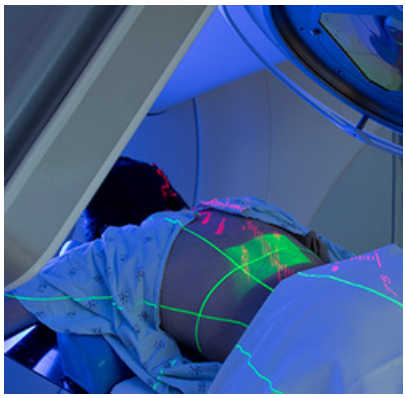
AGGIE SQUARE

Follow Aggie Square developments: aggiesquare.ucdavis.edu/







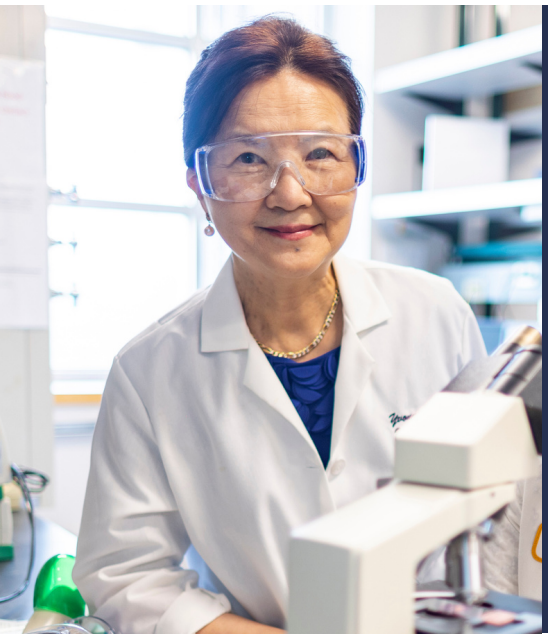






Features

An in-depth look at some of the research projects that defined our year.



Yu-jui Yvonne Wan

Distinguished Professor and Vice Chair for Research
Department of Pathology and Laboratory Medicine

2022-23 Major Award: (CDPH) $1M - Racial/Ethnic Disparities in Metabolic Dysfunction and Alzheimer's Disease: The Diet-Gut-Liver-Brain Axis

In 2023, Pathology and Laboratory Medicine Vice Chair for Research Yu-jui Yvonne Wan received $1 million from the California Department of Public Health to support highly collaborative research projects, in particular her project on the relationship between Alzheimer's disease and metabolic dysfunction. She has teamed up with more than 12 faculty members with expertise in various disciplines ranging from computer science, bioinformatics, data management, statistics, cancer, aging, pathology, synthetic chemistry, and drug discovery to identify biomarkers or drug targets for metabolic disease treatment and prevention.

Because Alzheimer's disease (AD) cannot be cured, early detection and prevention methods are urgently needed. There is a clear racial disparity in cognitive impairment and metabolic diseases that disproportionately affect minorities, who also have a significantly lower diet quality. Thus, diet-related racial disparities affecting metabolism and neuronal function warrant attention. Wan's team's novel data revealed that liver and brain pathologies frequently co-present. In early stages of liver disease, such as diet-induced fatty liver, the brain is also inflamed accompanied by reduced neuroplasticity. Using probiotics and antibiotics, they further established the significance of diet and gut microbiota in influencing neuroplasticity and metabolic liver health.

Based on these findings, the team proposes testing a novel hypothesis: metabolic dysfunction and diet-associated molecular signatures are predictors for cognitive impairment in a racial/ethnicity-specific manner. They propose using machine learning to generate risk prediction models in patients and animal models. Molecular signatures such as metabolites, bacteria, cytokines, or transcriptomes associated with diet and disease phenotype potentially might be predictors. The outcome of this study will uncover mechanisms as well as generate predictors for metabolism-associated neuronal dysfunction, leading to early AD detection and prevention.

Wan's team on this project consists of multidisciplinary members with different cultural backgrounds and areas of expertise. They include Blythe Durbin-Johnson, Ph.D., Principal Statistician in the Division of Biostatistics, Department of Public Health Sciences; Brian Paciotti, Ph.D. M.S., PMP, Clinical Analyst, Research Infrastructure, Data Center of Excellence; Nick Anderson, Ph.D., Cardiff Professor of Informatics and Associate Director of Informatics Research; Xin Liu, Ph.D., Professor of Computer Science, Department of Computer Science; Rex Liu (Xin Liu and Yu-Jui Yvonne Wan's co-mentee), computer science doctoral candidate, Department of Computer Science; and Alyssa Weekley, Ph.D., Assistant Professor, Department of Neurology.



Peter Belafksy

Professor, Department of Otolaryngology

Director, Center for Voice & Swallowing

2022-23 Major Award: (CIRM) $11M - A Double-Blind Randomized Placebo-Controlled Investigation of Autologous Muscle Derived Progenitor Cells for the Treatment of Dysphagia

Dysphagia is a condition which causes difficulty swallowing foods or liquids, arising from the throat or esophagus, ranging from mild difficulty to complete and painful blockage. Consequences of dysphagia include malnutrition, dehydration, social isolation, feeding tube dependency, depression, aspiration pneumonia, pulmonary abscess, and death.

Any condition that weakens or damages the muscles and nerves used for swallowing, or leads to a narrowing of the back of the throat or esophagus, can cause dysphagia. This includes cancers of the head and neck (HNC), the treatment for which can make it difficult to swallow. Despite the devastating consequences caused by treatment for HNC, few effective treatments for HNC-related dysphagia exist.

Peter Belafsky, one of the key innovative leaders in the field of dysphagia and swallowing disorders, is principal investigator on a new clinical trial that uses stem cells to treat patients with swallowing problems related to tongue injury from cancer treatment. This stem cell therapy approach got its start a number of years ago, when UC Davis recruited Jan Nolta to run a stem cell therapeutics program. Belafsky and Nolta developed a theory about using a patient's own stem cells to help them regenerate their lost muscle tissue. This year, Belafsky received a major grant from CIRM to fund the resulting project, REVIVE. REVIVE involves a novel technique in which researchers take Autologous Muscle Derived Progenitor Cells (AMDCs) from a biopsy of a patient's thigh muscle and inject these stem cells into the patient's tongue. The theory is that the stem cells will fuse with existing muscle fibers to increase tongue strength and patients' ability to swallow.

This clinical trial has the potential to directly benefit millions of underserved Californians with swallowing disorders who currently have no effective treatment. It could also have far-reaching implications for the use of AMDCs in the treatment of other vulnerable populations with dysphagia and individuals with muscle injury from other causes.



Aijun Wang

Professor and Vice Chair for Translational Research, Innovation and Entrepreneurship, Department of Surgery

Professor, Department of Biomedical Engineering

Co-Director, Center for Surgical Bioengineering

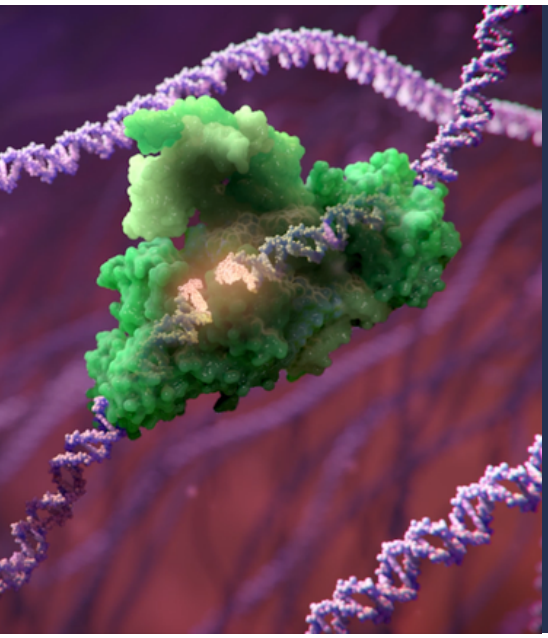
2022-23 Major Awards: (CIRM) $3.08M & $2.035M. Living Synthetic Vascular Grafts with Renewable Endothelium & *In utero* Treatment of Duchenne Muscular Dystrophy with Non-Viral Gene Editing

Professor Aijun Wang's team received over $5 million in funding from the California Institute for Regenerative Medicine (CIRM) in 2022-2023 for two distinct projects that both involve engineering stem cells for disease treatment.

One project aims to develop a "smart" and durable vascular device for improved hemodialysis access for end stage renal disease patients. This device uses a unique molecule that guides the patient's own stem cells to help prevent the failure of synthetic vascular grafts. Such graft failures are a common problem for patients suffering from kidney disease who are undergoing hemodialysis. This molecule interacts very specifically and engages strongly with endothelial progenitor cells and endothelial cells circulating in the blood, supporting the formation of a native inner lining that prevents blood clots. The grant falls under CIRM's Medical Device Translational Research Projects, which will fund the prototyping, optimization and testing of this new type of graft in translational animal models.

The second funded project aims to develop a much-needed cure for Duchenne muscular dystrophy (DMD), by editing the gene in stem cells that encodes dystrophin, a key protein in stabilizing muscle fibers. This technology will target the stem cells and edit the dystrophin gene in the heart, diaphragm and limb muscles *in utero* and correct the DMD mutations before the onset of the disease. This project is a collaboration with the Murthy laboratory at UC Berkeley. This groundbreaking work is funded by a $2 million Quest Award from CIRM. The DISC-2 Quest Awards Program promotes the discovery of promising new stem cell-based and gene therapy technologies that could lead to broad use and improved patient care.

Wang is the vice chair for translational research, innovation and entrepreneurship in the Department of Surgery, and also co-directs the Center for Surgical Bioengineering at UC Davis. He also leads the Wang Lab, a prime research hub in stem cell therapy and gene editing for early treatments of birth defects, such as spina bifida.



Alice Tarantal

Professor, Departments of Pediatrics and Cell Biology and Human Anatomy

Vice Chair for Translational Research, Department of Pediatrics

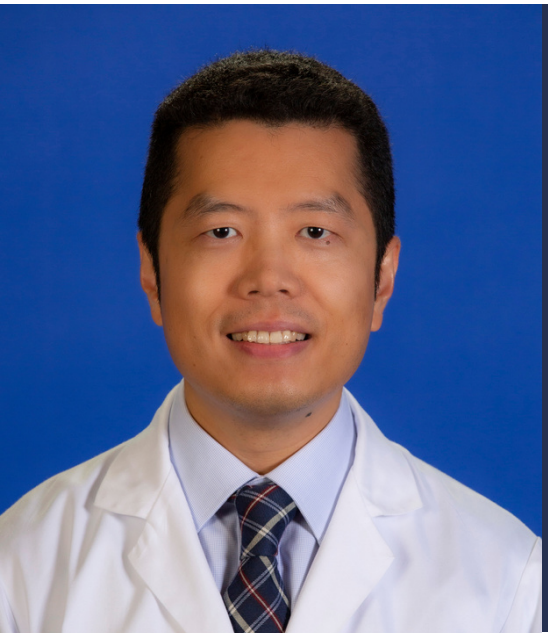
2022-23 Major Awards: (NIH) Nonhuman Primate Testing Center for Evaluation of Somatic Cell Genome Editing Tools (FY22-23: $2.4M; total funds $14.3M)

(CIRM) $2.9M. COMPASS Undergraduate Program

Alice Tarantal, professor of Pediatrics and Cell Biology and Human Anatomy, and Reproductive Sciences and Regenerative Medicine Unit and Multimodal Imaging Core Leader at the California National Primate Research Center, received funding in FY22-23 from the NIH for two centers focused on somatic cell genome editing. The Nonhuman Primate Testing Center for Evaluation of Somatic Cell Genome Editing Tools has been supporting collaborative projects for investigators that are members of the NIH Common Fund Somatic Cell Genome Editing (SCGE) Consortium. The Testing Center was established to support a range of projects that aim to identify safe and effective somatic cell genome editing methods to treat patients with common or rare diseases affecting a variety of cells and organ systems.

The Testing Center includes colleagues David Segal (Biochemistry and Molecular Medicine, Genome Center), Dennis Hartigan-O'Connor (Medical Microbiology and Immunology, Primate Center), and Nick Anderson (Public Health Sciences, Clinical and Translational Science Center). The SCGE Consortium was established to develop targeted systems for the delivery of new genome-editing proteins and to improve human genome editing tools as well as to explore new methods for assessing unintended biological effects. To expand these capabilities beyond the SCGE Consortium, a new program was recently funded that has opportunities for NIH investigators nationwide. The new NIH Center for Somatic Cell Genome Editing ($6.9M) funded in September 2023 provides state-of-the-art capabilities for investigators to conduct high-quality, robust, and innovative translational research studies with rigor and reproducibility across all age groups (prenatal to adult) and using cutting-edge techniques and approaches.

Other NIH funding received during FY22-23 includes the Translational Regenerative Medicine and Gene Therapy/Genome Editing Resource Program ($3.1M), which validates models, tests new therapies, and serves as a pipeline for preclinical and investigational new drug (IND)-enabling investigations. Tarantal also received funding from the California Institute for Regenerative Medicine for the Creating Opportunities through Mentorship and Partnership Across Stem Cell Science (COMPASS) Undergraduate Program, which is focused on preparing diverse undergraduate students for careers in regenerative medicine and gene therapy, while fostering untapped talent within groups that are historically underrepresented in the biomedical sciences. Anna La Torre (Cell Biology and Human Anatomy) serves as Associate Director of the training program.



Chengfei Liu

Assistant Professor, Department of Urological Surgery

2022-23 Major Award: (DOD) $1.4M - Targeting the CD200/CD200R signaling as a novel strategy for the treatment of therapy resistant prostate cancer

Chengfei Liu's research focuses on understanding the mechanisms of drug resistance and progression in lethal prostate cancer with specialized focus on drug development for the treatment of prostate cancer. Cumulatively, his background in clinical medicine, oncology and urology has tailored his research to be unique, with applications such as better drug targeting and overcoming drug resistance in prostate cancer treatment.

His grant from the Department of Defense looks at a specific problem in the treatment of prostate cancer with immune regulating drugs called immune checkpoint inhibitors. Immune checkpoints are a normal part of the immune system. Their role is to prevent an immune response from being so strong that it destroys healthy cells in the body, but they can also prevent the immune system from destroying cancer. The ability to solve this problem by using immune checkpoint inhibitor drugs has revolutionized the cancer treatment landscape for patients in recent years. However, their benefit has not fully materialized in the treatment of prostate cancer. Pre-clinical research suggested that the standard prostate cancer treatment, enzalutamide, may show better outcomes when combined with immune checkpoint inhibitors. Unfortunately, a global phase III clinical trial using this drug combination failed to extend overall survival in late-stage prostate cancer patients and the underlying mechanisms remain unknown.

Liu is investigating the causes of this treatment failure. His previous studies discovered that one of the immune checkpoints (CD200), is highly overexpressed in enzalutamide-resistant prostate cancer and negatively regulated by androgen receptor (AR) signaling. This may indicate that signaling activation of CD200 and its receptor CD200R has a role in the resistance to enzalutamide treatment and immunotherapy in advanced prostate cancer. His study will test this hypothesis and study the underlying mechanisms of CD200/CD200R to determine how enzalutamide-mediated immune evasion can be regulated and further develop potential prostate cancer treatment strategies.



Nam Tran

Professor and Senior Director of Clinical Pathology, Department of Pathology and Laboratory Medicine
Co-Director, UC Davis Center for Diagnostic Innovation
Director of the Pathology Biorepository

2022-23 Major Awards: Business grants supporting multiple projects for FDA regulatory approval of new tests

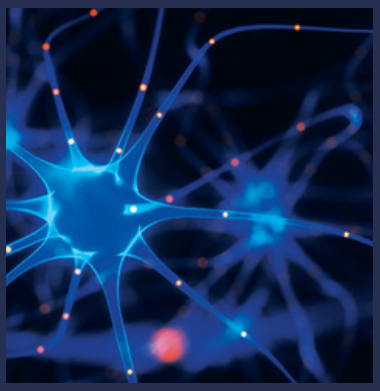
Throughout the COVID-19 pandemic, pathology and laboratory medicine professor Nam Tran emerged as one of UC Davis' sought-out expert voices on COVID issues. Tran is the senior director of clinical pathology at UC Davis Health and served as a key figure in COVID-19 test development and deployment. During this time, he emerged as a national spokesperson for diagnostic lab science, a member of the California Governor's COVID-19 Task Force, and a trustworthy authority in dozens of news stories to help the public understand COVID-19 testing. This expertise was later extended to the 2022 monkey pox outbreak; his team led the development of an in-house molecular test.

At the start of the pandemic in 2020, Tran and his colleagues gained national attention for rapid (19 day) development of a COVID-19 diagnostic test from scratch. When very little was known about the virus, Tran implemented a process to save infected patients' COVID-19 clinical samples via the UC Davis Health pathology biorepository, so they could be used in future research in collaboration with the Davis campus, including through our unique California National Primate Research Center. This work later translated to the development of one of the first machine learning enhanced mass spectrometry-based COVID-19 tests with industry partners.

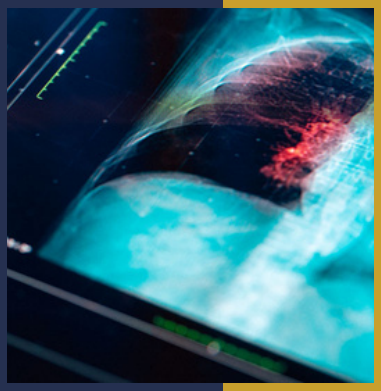
Tran's research focuses on the implementation of innovative clinical chemistry and molecular solutions for acute care settings with particular focus on biomarkers of injury, infectious diseases, and point-of-care testing. This includes the discovery and application of novel biomarkers as well as development of biosensor technologies for these applications. In recent years, he has extended his interest to the use of artificial intelligence and machine learning for laboratory medicine applications – culminating with development of a unique automated machine learning software and spawning a University of California equity owned start-up company. This machine learning software helped pioneer the development of novel algorithms for predicting acute kidney injury and sepsis in high-risk burn patients.

This year, Tran received funding for multiple projects supporting FDA regulatory approval of new tests in the areas of cardiovascular and infectious diseases. These are business-related grants that illustrate UC Davis' relationships with various industry partners and are central to the operation of the UC Davis Center for Diagnostic Innovation, which he co-founded and now co-directs. These awards include assays for SARS-COV-2 and for an analytical performance evaluation of novel biomarkers for predicting cardiovascular disease.









2022-2023 RESEARCH IMPACT REPORT

UC DAVIS SCHOOL OF MEDICINE
OFFICE OF RESEARCH

916-703-9141

health.ucdavis.edu/medresearch/

2921 Stockton Blvd., IRC Building, Suite 1400