

UC DAVIS
HEALTH

SCHOOL OF
MEDICINE

Office of Research

ANNUAL RESEARCH IMPACT REPORT

2021-2022



MESSAGE FROM THE VICE DEAN FOR RESEARCH



It is a distinct honor to offer this first-ever public annual report of our research impact at UC Davis School of Medicine. Within these pages, you can read about our record-breaking year for research funding and some of the exciting investigations that this funding has and will support. Our investigators are working across the entire spectrum of biomedical research, from experiments on cells and molecules to studies that assess the effectiveness of public health interventions and engage our surrounding communities. They are united in a clear-minded goal to improve the health of society. I am certain you will agree that our outstanding faculty fully exemplify the vision of UC Davis Health – “Delivering tomorrow’s healthcare today.”

In this snapshot, we are able to highlight just a few of the more than 500 principal investigators (PIs) directing basic, translational and clinical research projects at UC Davis School of Medicine. In fact, our research community is one of considerable breadth and depth, which is further strengthened by collaborations “across the causeway” to our sister Schools and Colleges. It is also important to note that along with each PI there is typically a team of colleagues, including professional researchers, students, clinical trainees and post-doctoral fellows, powering an engine of discovery. We’re also delighted to be supporting a robust pipeline of early career faculty, many of whom have gained national career development awards and other funding. Together, our researchers are an impressive force for innovation, continuous improvement of healthcare practices, and economic development for the city and region.

This year also saw the official ground-breaking for perhaps our most exciting project – the University/public/private partnership known as Aggie Square. The School of Medicine will be the largest tenant in this technology neighborhood. As the first buildings of the development rise quickly, we are planning for the researchers and scientific emphases that will comprise the first wave of occupants in early 2025, with a focus on team science and the potential for partnerships with neighboring industry tenants. And Aggie Square will be a notable force multiplier for the entire Sacramento campus of UC Davis, not just those who will be housed there, offering new core facilities and shared resources to all. We’re excited to see this distinctive vision of UC Davis Chancellor Gary May move closer to reality.

Thank you for your interest in our many research advances in the past year, and do not hesitate to reach out if we can provide further information about any of the people or projects featured within, or indeed any of our research efforts (somor@ucdavis.edu).

Kim E. Barrett, Ph.D.

Vice Dean for Research and Distinguished Professor of Physiology and Membrane Biology

CONTENTS

Executive Summary	4
School of Medicine Office of Research Units	8
Research Highlights	14
Year at a Glance	16
Research Programs and Center Grants	18
Health Science Contracts	20
Aggie Square	22
Featured Research	24

EXECUTIVE SUMMARY

The School of Medicine Office of Research supports investigators who perform biomedical research across the UC Davis School of Medicine and the UC Davis main campus. It manages research awards and proposals, oversees laboratory safety and research space, provides researchers with guidance and support for grant submissions, and facilitates industry alliances and program evaluation.



In 2021-2022, UC Davis School of Medicine continued to demonstrate that it is a leading research, academic, and medical training institution.

School of Medicine extramural funding rose this year to \$396 million, contributing to the \$1 billion in funding achieved by UC Davis for the first time in its history.

The School of Medicine hit new benchmarks in national recognition, including US News and World Report and Blue Ridge Rankings, and prestigious awards for researchers.

The total National Institutes of Health (NIH) funding for 2021 (NIH fiscal year: October 1 to September 30) was \$194 million and the anticipated funding for 2022 is approximately \$197 million. The NIH Blue Ridge ranking will be released at the beginning of 2023 and the funding amount updated by December 31, 2022.

In fiscal year 2021-2022, the School of Medicine's extramural research funding increased by approximately 8% over 2020-2021.

“

This is an exciting time to join an outstanding team of educators, researchers and clinicians working together to transform lives by improving health.

Kim E. Barrett, Ph.D.
UC Davis School of Medicine
Vice Dean for Research

2021-2022 OUR YEAR IN ACCOMPLISHMENTS



US News and World Report Rankings

UC Davis School of Medicine ranked among America's best for primary care and research, including #7 for family medicine training, #8 for primary care and #51 for research.

UC Davis School of Medicine ranked third in the nation (first in the West) in diversity amongst all medical schools.

UC Davis Medical Center ranked among America's best in 9 adult and 5 pediatric specialties. It remains the top-ranked hospital in the Sacramento area, and sixth overall in California.

UC Davis Children's Hospital ranked among America's best in four specialties: orthopedics, nephrology, neonatology, and urology.



Researcher Recognition

Alicia Agnoli was awarded the prestigious designation of a Top Ten research achievement award as well as a Distinguished Clinical Research Achievement Award (Top 3) by the Clinical Research Forum.

Sergio Aguilar-Gaxiola received the 2nd place 2022 AAMC "Innovations that Bolster Community Trust and Engagement" award.

Andreas Bäumlner was awarded the prestigious Robert Koch Prize for his groundbreaking research in infectious and inflammatory diseases.



Record Funding Year

UC Davis School of Medicine extramural funding for 2021-2022 topped \$396 million, contributing to UC Davis research achieving over \$1 billion for the first time.

The School of Medicine's Blue Ridge ranking improved to 33rd overall, up from 36th in 2021.

LEADERSHIP AND STAFF

The School of Medicine Office of Research is composed of the following units: Senior Leadership, Research Operations, Grants Facilitation, Evaluation, Safety Management and Research Space Planning.



Kim E. Barrett, Ph.D.
Vice Dean for Research

Barrett is the Vice Dean for Research and Distinguished Professor of Physiology and Membrane Biology at the UC Davis School of Medicine. She is responsible for implementing key initiatives and fostering partnerships across UC Davis Health and with other schools, centers, and colleagues throughout UC Davis. Barrett also leads the medical school's collaborative efforts to develop UC Davis' Aggie Square research program.



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

Wun is the Associate Dean for Research at the School of Medicine. In this role, he has broad oversight and responsibility for the research enterprise. He is the director of the UC Davis Clinical and Translational Science Center, and chief of the Division of Hematology and Oncology. He also serves as co-principal investigator of the California Cancer Reporting and Epidemiologic Surveillance (CalCARES) program, which manages the California Cancer Registry.



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

Haczku serves as the Associate Dean for Research Infrastructure at the UC Davis School of Medicine. In this role, she will develop an action plan for School of Medicine core research facilities and advise on investments. She also directs the translational lung biology program in the Division of Pulmonary, Critical Care and Sleep Medicine.



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

Callcut is the Associate Dean for Data Science and Innovation at the School of Medicine. She is a general surgeon specializing in Trauma, Acute Care Surgery, and Surgical Clinical Care. Callcut leads a NIH and DOD funded team of researchers focused on integration of biomedical big data and surgical data science.



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

Erdembileg administers several Office of Research units and support programs involving subjects such as grant facilitation, research operations, and bridge and matching funds. He oversees an annual operating budget of \$10 million.



Shawn Rasmussen
Director of Facilities

Rasmussen reports to the medical school's Vice Dean for Research, Kim Barrett, to ensure alignment with Sacramento campus planning. He oversees the medical school's facilities in Davis and Sacramento, including 340,000 square feet of space in more than 20 buildings on both campuses.



SCHOOL OF MEDICINE OFFICE OF RESEARCH STAFF

Research Operations

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

Grants Facilitation Unit

- Erica Chedin, Ph.D., Director
- 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
- 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

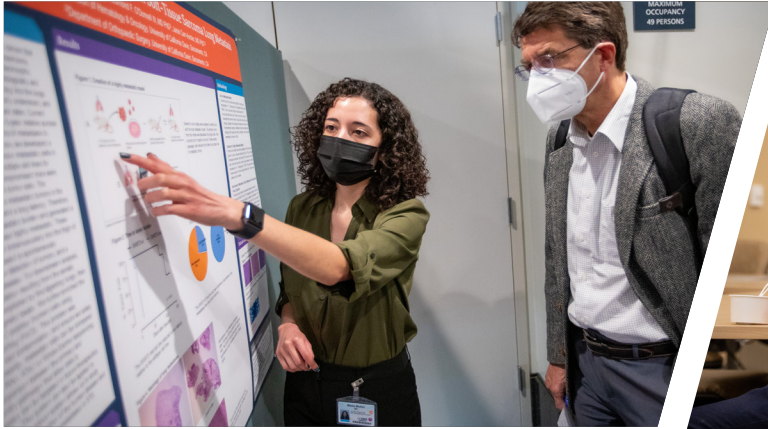
Laboratory Health and Safety

- Brett Smith, Safety Officer
- Steve Libertini, Safety Officer
- Mark Vasquez, Senior Auto Equipment Operator
- Erik Hanke, Auto Equipment Operator
- Phillip Schroeder, Building Maintenance

Research Space

- Tammi Olineka, Associate Director of Facilities and Safety
- Lilly Greatorex, Space Analyst

SCHOOL OF MEDICINE OFFICE OF RESEARCH UNITS



RESEARCH OPERATIONS

The Research Operations unit serves as the foundation of the School of Medicine Office of Research. The team members perform essential work 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 the various units within the School of Medicine Office of Research and across campus with scheduling, ordering, website updates, marketing material, outreach to faculty/staff, event planning and other miscellaneous support activities.



DATA ANALYSIS AND REPORTING

Research Operations analyzes data for School of Medicine research and generates reports on funding and scholarly output. The unit also continually vets data to ensure that research is properly attributed.



INSTITUTIONAL SUPPORT

Research Operations administered several institutional support programs, including institutional matching and Bridge Funding.



AWARD NOMINATIONS

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



COMMUNICATIONS

Research Operations disseminates School of Medicine Office of Research internal and external communications through managing the department website, creating and updating Standard Operating Procedures documents, messaging about funding and other opportunities for researchers, coordinating social media posts and publishing a department newsletter eight times a year.

Teamwork

Research Operations coordinated the return of in-person events, such as our spring staff team-building meeting.



GRANTS FACILITATION

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.



UNIT TRANSFORMATION

GFU expanded the team in 2021-2022. Each of the accomplished team members has a separate focus area: K-awards and early career development, R-series awards, and center grants and program projects.



CONSULTATIONS

The GFU supports proposals to a variety of funders and specializes in NIH mechanisms. The four funding mechanism categories investigators primarily aimed for in 2021-2022 were: the R-series, early-career grants, program project/center grants and supplements to existing grants. The unit provided assistance on 144 grants this year, including 32 R01s.



INSTRUCTION

GFU provides mentoring and instruction in grant writing to faculty and scholars throughout the UC Davis School of Medicine. Scientific writing can be quite challenging, and it is not always easy to present complex ideas in an understandable manner. GFU provides this training for a variety of application mechanisms.



KOHORT

In 2021-2022, GFU developed KOHORT, which will support School of Medicine-associated investigators in creating and submitting a career development proposal (K01, K08, K23, K99/ R00, etc. from the NIH).

EVALUATION

The Evaluation Unit (EU) has served the needs of the School of Medicine and the UC Davis Health 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.



EVALUATION PROJECTS

The Evaluation Unit supports evaluation efforts of programs, schools and centers to ensure program improvement, capture research participant experience and collect data to secure additional funding.



EVALUATION PUBLICATIONS

The Evaluation team works with programs to disseminate evaluation findings and research through academic publications. EU team members co-authored 4 peer-reviewed articles, 2 public access articles and 2 case studies/executive studies.



CONSULTATIONS

The Evaluation team's mixed-methods research (e.g., survey development and qualitative methods) and evaluation expertise is a sought-after resource not widely available elsewhere at UC Davis Health. In 2021-2022, the unit added monthly office hours to broaden this access.

PROFESSIONAL ACTIVITY

The EU team participated in professional and leadership activities, including presence on School of Medicine strategic planning workgroups, regional associations and national organizations.



LABORATORY HEALTH AND SAFETY

The Health and Safety (H&S) 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 Safety Management program sets the standards for safety management and complements individual laboratory safety programs and activities.



COVID UPDATES

The School of Medicine Laboratory Health & Safety (H&S) unit kept current on campus and county guidance to help departments and labs remain in compliance with the changing COVID-19 safety protocols.



WILDFIRE SMOKE

To meet the increasing problem of wildfire smoke, School of Medicine H&S worked to confirm proper function of HVAC systems, ensure building ventilation and communicate air quality notices.



FIRE INSPECTIONS

The Safety Officers worked with each party to address the findings of fire inspections.



SAFETY INSPECTION AND CONSULTATIONS

The unit worked to stabilize hazards, clear out laboratory facilities and equipment and conduct safety-related space inspections.

RESEARCH SPACE

The Research Space Oversight unit, under the School of Medicine Office of Research (SOMOR), carries out all SOM research space assessments, allocations, and recommendations as well as the maintenance of Memoranda of Understanding (MOUs) between the UC Davis School of Medicine, College of Biological Sciences, College of Agricultural and Environmental Sciences and School of Veterinary Medicine.



LABORATORY SPACE ASSIGNMENTS

School of Medicine Research Space includes 376,000 assignable square feet between the Davis and Sacramento campuses. The space includes experimental (wet), computational (dry) and hybrid research space in over 35 buildings.



SPACE OVERSIGHT

The School of Medicine Research Space unit works with departments and Facilities and Maintenance units in Sacramento and Davis for facilitation of various research space projects and/or renovations.



SPECIAL PROJECTS

The unit works with Principal Investigators, their respective departments and collaborative units to update their space as needed. In 2021-2022, the unit facilitated the installation of cutting-edge cell data technology and monkeypox testing equipment for SOM research.



RESEARCH HIGHLIGHTS

Examples of breakthrough research in 2021-2022.

Cellular therapy improves signs and symptoms of Duchenne Muscular Dystrophy

A clinical trial at UC Davis Health and six other sites showed that a cellular therapy offers promise for patients with late-stage Duchenne muscular dystrophy (DMD), a rare genetic disorder causing muscle loss and physical impairments in young people. It is the first treatment to lead to meaningful functional improvements in the most severe cases of DMD. Craig McDonald is the trial's national principal investigator and lead author on the study. McDonald is professor and chair of Physical Medicine and Rehabilitation and professor of Pediatrics at UC Davis Health.

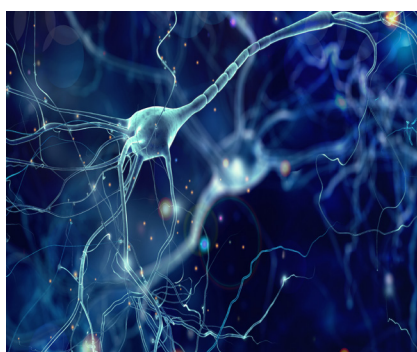
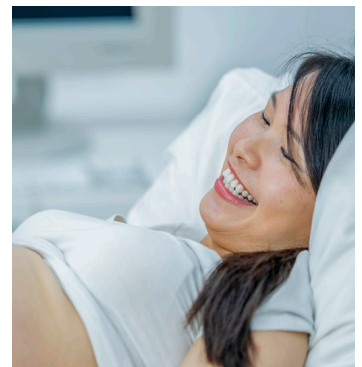


\$2.7 million grant to find new addiction treatments related to psychedelics

Researchers at the University of California, Davis, and the University of Colorado Anschutz Medical Campus have received a \$2.7 million grant from the NIH to screen hundreds of compounds to discover new, nonhallucinogenic treatments for substance use disorders. David Olson, associate professor in the departments of Chemistry, and Biochemistry and Molecular Medicine at UC Davis, is a leader in the growing focus on psychedelics research at UC Davis and UC Davis Health.

UC Davis lab develops fetal oximetry device to prevent unnecessary C-sections

Fetal hypoxia, a condition that occurs when the fetus is deprived of an adequate supply of oxygen, is one reason obstetricians may perform a Caesarean section. UC Davis electrical and computer engineering professor Soheil Ghiasi's lab has built a specialized device to measure a baby's blood oxygen saturation levels non-invasively: a transabdominal fetal pulse oximeter (TFO). The research team is currently testing the accuracy of the TFO in collaboration with Diana L. Farmer, chair of the UC Davis Department of Surgery and an internationally renowned fetal and neonatal surgeon at UC Davis Health.



Researchers may have unlocked function of mysterious neuron structure

James Trimmer, distinguished professor of Physiology and Membrane Biology at the UC Davis School of Medicine may have discovered the function of mysterious clusters of proteins found on the cell body of neurons in the hippocampus, a part of the brain. In a new study published in *Proceedings of the National Academy of Sciences (PNAS)*, Trimmer and his colleagues reveal these protein clusters are calcium signaling "hotspots" in the neuron that play a crucial role in activating gene transcription. Transcription allows portions of the neuron's DNA to be "transcribed" into strands of RNA that are then used to create the proteins needed by the cell.

UC Davis engineered antibody helps block SARS-CoV-2 transmissions

Jogender Tushir-Singh is senior author of a study detailing the engineering of a novel antibody, FuG1, that can directly interfere with the cell-to-cell transmission ability of SARS-CoV-2, the virus that causes COVID-19. Tushir-Singh is an associate professor in the Department of Medical Microbiology and Immunology and a member of the UC Davis Comprehensive Cancer Center therapeutics program.



Discovery of cell protein that keeps Kaposi's Sarcoma herpesvirus dormant

A team of UC Davis researchers has identified a protein in the cancer cell's nucleus as a critical agent keeping Kaposi's sarcoma-associated herpesvirus dormant and undetected by the body's immune system. Yoshihiro Izumiya, the study's senior author, is a professor in the Department of Dermatology and director of the Viral and Pathogens Associated Malignancies Initiative at UC Davis Comprehensive Cancer Center.

NIH grant funds new study to evaluate heart failure in California Central Valley

A multidisciplinary team of physicians from UC Davis Health, including cardiologists Martin Cadeiras, Javier E. López and Nipavan Chiamvimonvat, has been awarded a \$1.5 million grant to research a common but poorly understood type of heart failure. The funding will allow researchers to take a precision medicine approach to evaluating heart failure with preserved ejection fraction (HFpEF). HFpEF is associated with a five-year mortality of 30-60%. The team will utilize UC Davis Health's EXPLORER Total Body Scanner, the first and only Total Body PET scanner approved by the FDA in the United States.



Placenta may hold cues for early autism diagnosis and intervention

In a study published in *Genome Biology*, a team of researchers affiliated with the UC Davis MIND Institute used genomic sequencing to find a DNA methylation signature in the placenta of newborns eventually diagnosed with autism. This signature mark was linked to early fetal neurodevelopment. They also located and characterized a novel gene known as LOC105373085 and renamed it NHIP (neuronal hypoxia inducible, placenta associated). The discovery links the gene to the mother's early prenatal vitamin use and placental oxygen levels. Janine LaSalle is lead author on the study and professor of Microbiology and Immunology at UC Davis Health.

YEAR AT A GLANCE

In 2021-2022 our researchers received funding from a variety of sources.

New awards of \$1M+ during fiscal year 2021-2022

Through this funding, UCD will provide training and technical assistance to local tobacco control programs, transfer information among local tobacco control programs, and identify programs effective in decreasing smoking and tobacco use.

ELISA TONG
\$12.1M

California Tobacco Control Program

This funding will provide intensive tobacco cessation training and consultation by UCD for up to 40 Federally Qualified Health Centers funded by the California Department of Public Health.

JEFFREY HOCH
\$7.5M

The Healthy Living Clinic Initiative

Prostate cancer tumors have traits that are a major mechanism of therapy resistance and progression. This study identifies major new therapeutic targets for therapy resistance-associated tumors in prostate cancer.

HONGWU CHEN
\$1.1M

Targeting a key tumor plasticity driver in lethal prostate cancer

GAREN WINTEMUTE
\$1.1M

Core Operating Support for the Violence Prevention Research Program

This award provides core operating support to sustain the Violence Prevention Research Program and produce and disseminate research to advance gun violence prevention efforts in California.

SERGIO AGUILAR-GAXIOLA
\$5M

Health Equity Outreach and UC Davis Partnership

The Health Equity Outreach and UC Davis Partnership will focus on community-based strategies to increase vaccine access and uptake by underserved populations in Sacramento and Yolo counties.



These awards will help fuel research in diverse areas from Alzheimer's to Violence Prevention.

This is a project to develop and distribute software to manage and curate annotations in longitudinal image volumes. This software will make it easy for users to distribute their data and analysis effectively.

ROBERT CUDMORE
\$1.1M

Map Manager

This project will develop conformationally-specific recombinant monoclonal antibodies including Immunoglobulin G, single chain variable fragments and nanobody formats as a novel class of biologics to target voltage-gated sodium channels involved in pain signaling.

VLADIMIR YAROV-YAROVY
\$1.5M

Development of therapeutic antibodies to target sodium channels involved in pain signaling



DEBORAH LIEU
\$1.2M

Building a hiPSC-based biopacemaker

This project aims to develop a proof-of-concept biopacemaker constructed by bioprinting hiPSC-derived pacemaking cells and support cells based on the blueprint of the native pacemaking tissue of a large mammalian heart.

TARA NIENDAM
\$2.1M

California Early Psychosis Training and Technical Assistance Project

This grant provides foundational training and technical assistance to the Substance Abuse and Mental Health Services Mental Health Block Grant Grantees with guidance on initial implementation, scaling and operation of Early Psychosis Intervention programs using the Coordinated Specialty Care model.

FERNANDO FIERRO
\$1.05M

Dose finding studies and safety confirmation

This project will include performing dose-finding efficacy studies, cell persistence and cell distribution studies and comprehensive safety studies of clinical grade MSC/VEGF stem cell therapy in an immune deficient mouse model of hind limb ischemia.

RESEARCH PROGRAMS AND CENTER GRANTS

In 2021-2022, major grants were awarded to programs and centers conducting multidisciplinary work in areas such as cancer, Alzheimer's disease and autism. These are the programs and center grants for which funding was obligated during the 2021-2022 fiscal year.



UC Davis Clinical and Translational Science Center U1 grant for \$4.91 million from the National Center for Advancing Translational Science (NCATS)

Principal Investigator: Ted Wun. The UC Davis Clinical and Translational Science Center (CTSC) facilitates research across disciplines. It helps form, support and retain research teams working to improve human health. It fosters trainee and scholar success at all career stages, facilitates better health among underserved rural communities and has established strong community partnerships to advance health care access and community-based participatory research.



UC Davis Environmental Health Sciences Core Center P30 grant for \$3.09 million from the NIH National Institute of Environmental Health Sciences (NIEHS)

Principal Investigator: Irva Hertz-Picciotti. The UC Davis Environmental Health Sciences Center has three key areas or research “cores:” the Community Engagement Core brokers partnerships between scientists and the communities where they do their work; the Environmental Exposure Core provides researchers with expertise in study design; and the Integrative Health Sciences Facility Core is a liaison to animal laboratories, human clinical studies, tissue biorepositories and statistical support.



Cancer Center Support P30 grant for \$3.56 million from the NIH National Cancer Institute (NCI)

Principal Investigator: Primo Lara. The UC Davis Comprehensive Cancer Center has been continuously designated by the National Cancer Institute since 2002, successfully achieving comprehensive status in 2012. It is the only NCI designated Cancer Center located in the Central Valley of Northern California. Its mission is to use transdisciplinary, translational, and transformative research to address and reduce the cancer burden in its surrounding 19-county area and beyond.



Center for the Development of Phenotype-Based Treatments of Autism Spectrum Disorder P50 grant for \$2.27 million from the NIH National Institute of Child Health & Human Development (NICHD)

Principal Investigator: Leonard Abbeduto. The UC Davis MIND Institute Autism Center of Excellence (ACE) is one of five Centers awarded by the National Institutes of Health in 2017. This ACE, called the Center for the Development of Phenotype-Based Treatments of Autism Spectrum Disorder, aims to discover effective treatments for children with autism.

UC Davis Alzheimer's Disease Core Center P30 grant for \$3.12 million from the NIH National Institute on Aging (NIA)

Principal Investigator: Charles DeCarli. The mission of the UC Davis Alzheimer's Disease Research Center (ADRC) is to advance the understanding of Alzheimer's disease and related dementias through comprehensive patient evaluations and cutting-edge research. The ADRC conducts basic and clinical research including clinical trials, clinical evaluations, community outreach and education, professional education and research training.



The Clinical Significance of Incidental White Matter Lesions on MRI Amongst a Diverse Population with Cognitive Complaints (INDEED) U19 grant for \$13.21 million from the NIH National Institute of Neurological Disorders & Stroke (NINDS)

Principal Investigator: Charles DeCarli. This project aims to identify the extent and characteristics of white matter (WM) injury that influence cognitive and health outcomes, evaluate progression of WM injury on cognition and health outcomes and build and validate a predictive risk model for precision medical management and planning needed by patients with WM lesions.



Nonhuman Primate Testing Center for Evaluation of Somatic Cell Genome Editing Tools U42 grant for \$3.93 million from NIH Office of the Director (OD)

Principal Investigators: Alice Tarantal and David Segal. The Nonhuman Primate Testing Center will offer state-of-the-art capabilities for Somatic Cell Genome Editing (SCGE) awardees to conduct high quality research in nonhuman primates. The Nonhuman Primate Testing Center leverages a supportive framework that has demonstrated a long-standing commitment to providing research opportunities and collaborations to investigators nationwide.



Pre-adolescent and Late-adolescent Follow-up of the CHARGE Study Children UH3 grant for \$3.98 million from NIH Office of the Director (OD)

Principal Investigators: Irva Hertz-Picciotti, Deborah Bennett and Julie Schweitzer. This project leverages the resources of the Childhood Autism Risks from Genes and Environment (CHARGE) Study, which, since 2003, has been enrolling three groups: children with autism spectrum disorder, children with other developmental delays and children with typical development. The follow-up study will examine the enrollees for attention deficit or hyperactivity symptoms, changes in cognitive or adaptive function, changes in severity or diagnosis and symptoms of anxiety or depression.



HEALTH SCIENCE CONTRACTS

Health science contracts of over 1 million dollars awarded to UC Davis Health researchers in 2021-2022.



ALEXANDER BOROWSKY

Eunice Kennedy Shriver National Institute of Child Health and Human Development

\$1,088,463

California Partnership for Personalized Nutrition (CAPPN) Clinical Center was funded by NIH as part of the national Nutrition for Precision Health (NPH) consortium.

Critical to the success of efforts such as CAPPN and the national NPH consortium is the recruitment and retention of a diverse study cohort that is representative of the region and the nation.

SARA WALDMAN

Gilead Sciences, Inc.

\$1,451,703

A Phase III Double-Blind Study to Evaluate Efficacy and Safety of Lenacapavir for HIV Pre-Exposure Prophylaxis Cisgender Men, Transgender Women, Transgender Men, & Gender Non-binary People Who Have Sex with Male Partners

The primary objective of this study is to evaluate the efficacy of lenacapavir (LEN) in preventing the risk of human immunodeficiency virus (HIV) infection relative to the background HIV incidence rate.



CRAIG MCDONALD

Sarepta Therapeutics

\$1,184,031

A Phase III Multinational, Randomized, Double-Blind, Placebo-Controlled Systemic Gene Delivery Study to Evaluate the Safety and Efficacy of SRP-9001 in Subjects With Duchenne Muscular Dystrophy (EMBARC)

The EMBARK study tests a new investigational drug to treat the muscle disorder, Duchenne Muscular Dystrophy (DMD). The study drug is called SRP9001. It is not currently approved by regulatory authorities for treating DMD, but it is approved for research.



BRIAN JONAS

La Roche Ltd
\$1,445,249

An Open-Label, Multi-Center, Phase I Study to Evaluate the Safety, Tolerability, Pharmacokinetics, and Pharmacodynamics of RO7283420 as a Single Agent in Hematologic and Molecular Relapsed/Refractory Acute Myeloid Leukemia

RO7283420 is a new antibody that can bind to the cells in the immune system and the leukemia cells at the same time, so that immune cells can recognize and kill the leukemia cells. The purpose of this study is to test the safety of the study drug at different dose levels in patients with Acute Myeloid Leukemia.



NEAL FLEMING

Edwards Lifesciences LLC
\$1,497,870

Hypotension Prediction Index Software Guided Hemodynamic Management for Noncardiac Surgery Patients - Blood Pressure Trial (HPI SMART- BP Trial)

The purpose of this research is to find out whether using the Acumen Hypotension Prediction Index (HPI) Feature Software as a decision support along with standard monitoring device can help reduce post-operation complications. The Acumen HPI Feature Software is an algorithm that provides information that indicates the possibility of a hypotensive (low blood pressure) event occurring.



AGGIE SQUARE

Aggie Square is where university, industry, and community will meet to create opportunities for everyone.

Located on the UC Davis Sacramento Campus, Aggie Square will house business partners and community-based programs with UC Davis innovation and research to create a stronger and healthier shared community. Aggie Square will feature state-of-the-art research facilities, modern office and mixed-use space and world-class amenities. It will create new public space with welcoming, accessible entry points that connect the university with its neighboring communities. The result will be a unique live/learn/work/play environment that values inclusion and creates chance encounters among creative people.

The entrepreneurial partnerships forged at Aggie Square will advance human health, enrich lifelong learning, enhance emerging technologies, and set the stage for future collaborations.

Life Sciences, Technology and Engineering

Aggie Square will bring world-class researchers and the communities they serve together with entrepreneurs, technical experts and engineers who guide ideas from concept to market.

Features and Benefits

- 500,000 ± S.F. to include:
 - Behavioral Testing core for small animals
 - Surgical Skills lab
- Emerging cell and gene therapies
- Medical device development
- Digital health innovations
- Biomedical engineering
- STEM career development
- Technology incubators and accelerators

2017. Sacramento Mayor Steinberg and UC Davis Chancellor May form Aggie Square Workgroup.

2018. Initial outreach meetings and funding commitments.

2020. Aggie Square approved by UC Board of Regents.





Artist's rendering of the Aggie Square plaza. Aggie Square is an innovative collaboration among the university, community and business leaders that will foster state-of-the-art, translational research.

February 18, 2022. Ceremonial Groundbreaking of Aggie Square.

June 2022. Construction begins on Aggie Square Phase I.

First Quarter 2025. Anticipated move-in of first Aggie Square occupants.



FEATURED RESEARCH

In 2021-2022, 501 School of Medicine principal investigators (PIs) submitted project grants. The following pages include in-depth looks at just a handful of these PIs and their work during this year.



JAN NOLTA



2021-2022 AWARDS

University of California
Office of the President
(UCOP) \$21M - Jordan's
Syndrome Research Phase II

California Institute for
Regenerative Medicine
\$4.9M - CIRM Cell and Gene
Therapy Training Program
2.0

Jan Nolta, director of the Institute for Regenerative Cures at the UC Davis School of Medicine, is PI on a Phase II trial awarded \$21M from the University of California Office of the President in 2021. In this study, the team is working on creating stem cells from skin samples of individuals with Jordan's syndrome and enabling them to be grown into brain cells or even 'mini-brains' in a dish.

Jordan's syndrome is named after Jordan Lang, the first child diagnosed in the U.S. Through the Jordan's Guardian Angels foundation, an international team of clinicians and scientists has been collaborating on research since 2017 to learn all that they can about the mutation, called PPP2R5D, that causes the illness' symptoms, including autism, intellectual disabilities, behavioral challenges and seizures. It also has been linked with Alzheimer's disease and ovarian cancer.

Nolta and UC Davis Health became involved in Jordan's syndrome research in March 2017, after Jordan Lang's pediatric neurologist heard a neurology grand rounds talk describing the work at the Institute for Regenerative Cures. With the wealth of expertise in stem cell science and neurological disorders, it made sense to make the Institute the administrative home for the state funds, which will support research conducted in California as well as by the other Jordan's syndrome teams.

Nolta is also the recipient of a \$4.9M grant from the California Institute of Regenerative Medicine (CIRM) for continued funding of the CIRM Scholar Research Training Program. This grant provides comprehensive research training to predoctoral, postdoctoral and clinical fellows for careers in regenerative medicine and gene therapy. "Well-trained personnel are needed to eliminate critical bottlenecks in bringing cell and gene therapies to the clinic and to ensure these new therapies will be made available to all patients in need," says Nolta. "With our recruitment efforts centered on trainees from historically underrepresented groups, and the addition of equity-centered inclusive training practices, the program aims to further increase the diversity of California's future leaders in cell and gene therapy expertise. The new cohorts of scholars proposed will also be focused on reducing healthcare disparities in California, thus providing benefit to a wide range of patients and communities."

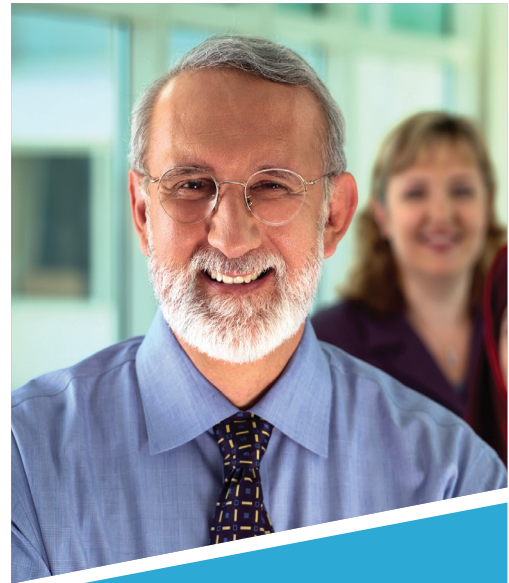
SERGIO AGUILAR-GAXIOLA

Sergio Aguilar-Gaxiola, director of UC Davis Center for Reducing Health Disparities and lead for the Digital Health Equity Program, received over \$500,000 in funding from the UCLA Community Engagement Research Alliance against COVID-19 in Disproportionate Communities, funded by the NIH Community Engagement Alliance (CEAL). CEAL is built on the strength of local organizations that have a direct line to the communities and individuals hardest hit by COVID-19. Announced just six months into the pandemic, the mission of CEAL is to provide trustworthy, science-based information through active community engagement and outreach, with the goal of building long-lasting partnerships as well as improving diversity and inclusion in the research response to COVID-19.

Aguilar-Gaxiola has been a leader in outreach to disadvantaged communities that were disproportionately impacted by COVID since the beginning of the pandemic. He is also one of the PIs of ÓRALE COVID-19!, which partners with Latinx community groups in the Central Valley to help decrease disparities in COVID-19 morbidity and mortality rates. He led projects to encourage the use of telehealth/telemental health improvement in order to reach and provide maximum benefit to at-risk and vulnerable populations, such as farmworkers.

In June 2022, the Digital Health Equity Program received \$1.7 million in funding to support the creation of a regional digital public health platform to improve access and continuity of care for vulnerable populations in Sacramento and Northern California. Aguilar-Gaxiola notes that “for underserved communities, there is little access to needed health services regardless of location or point of entry. This funding helps address these health inequities and enables us to expand on our ability to further health care access for all patients.”

This year, Aguilar-Gaxiola also received \$5 million in funding from the California Department of Public Health for a partnership between UC Davis and the state on health equity outreach.



2021-2022 AWARDS

UC Los Angeles, \$517,500
- Community-Engagement
Research Alliance
Against COVID-19 in
Disproportionately Affected
Communities (CEAL)

State of California Mental
Health Services Oversight
and Accountability
Commission, \$595,000
- Interdisciplinary
Collaboration and Cultural
Transformation Model
(ICCTM)

CDPH, \$5M – Health Equity
Outreach and UC Davis
Partnership

CHARLES DECARLI



2021-2022 AWARDS

NIH (NIA), \$3.1M - UC Davis Alzheimer Disease Research Center

NIH, \$13.2M - Diverse Vascular Cognitive Impairment and Dementia

Charles DeCarli, director of the UC Davis Alzheimer's Disease Research Center (ADRC) was the recipient of a \$3.1M award from the National Institutes of Health (NIH). ADRC, a congressionally designated NIH Center of Excellence, has enjoyed over thirty years of continuous funding for its important work. Its mission is to advance the science of healthy brain aging among diverse populations while caring for those affected by the disease. It is one of 33 Alzheimer's Disease Research Centers funded by the National Institute on Aging (NIA).

DeCarli is the principal investigator for the award and has been the director of the UC Davis ADRC since 2000. He is the nation's foremost expert on the role of subcortical cerebrovascular disease in cognitive decline. This year he was also the recipient of a major award of \$13.2M from the NIH for the Diverse Vascular Cognitive Impairment and Dementia (VCID) project. Diverse VCID is a 6-year study of 2,250 Americans from diverse backgrounds to understand the role that white matter lesions play in developing Alzheimer's disease and related dementias (ADRD).

Despite decades of research, scientists still do not fully understand what causes Alzheimer's disease. DeCarli points out that researchers' understanding of the disease has changed dramatically from 30 years ago. "For example, we now know that all dementia is not Alzheimer's disease. Dementia is essentially a brain failure. And similar to heart failure, there can be many different problems that lead to the failure." He notes that one frustrating aspect of the disease that hasn't changed in 30 years is that there still are not great treatments. But he is optimistic that the research will eventually lead to effective therapeutics for Alzheimer's disease and other dementias.

DeCarli is also co-PI on other new awards in 2022. These include a \$24.4M grant for a study that will identify critical periods in adulthood when vascular disease and Alzheimer's disease biomarkers affect cognitive decline and will help guide therapeutic interventions for Latinos. An additional \$1.4M is for a study looking at socioeconomic adversity and dementia risk in Hispanics and Latinos. He is also co-PI on a study looking at environmental/pollutant causes for Alzheimer's disease (\$2M).

RACHEL WHITMER

Rachel Whitmer is the chief of the division of epidemiology at UC Davis, and the associate director of the UC Davis ADRC. Whitmer leads several population-based studies looking at risk and protective factors for Alzheimer's and other types of dementia, including the *Life After 90* study, which looks at the role of early life influences on the risk of very late-onset dementia, including in ethnic minorities. Those who are 90+ years of age, known as "the oldest old," are the fastest growing segment of the elderly population. This group is at the highest risk of Alzheimer's disease and related dementias (ADRD) but there is little research on ADRD and brain health in the oldest old, especially among the non-white population.

This scarcity of information is the driver of Whitmer's study, which recently received over \$25 million total (\$5.1M in 2021-22) support from the NIH for five additional years of funding. The Life After 90 study has enrolled over 1000 individuals aged 90+. The cohort is diverse: 72% identify as other than non-Hispanic White. During cycle 1, Whitmer's team discovered that: incidence rates for ADRD double after age 95, are different by sex and race/ethnic group and that there are complex patterns of cognitive aging and vascular cerebral pathology. Importantly, over 20% of the cohort are cognitive 'super-agers;' individuals who not only do not have ADRD or cognitive impairment but have cognitive function typical of someone aged 50-60 years.

For cycle 2 of this study, the team will enroll an additional 400 diverse oldest-old individuals, will identify predictors of cognitive super-agers, and will examine how blood-based biomarkers of neurodegeneration and vascular cognitive impairment and are associated with brain health. They will also leverage health data from electronic medical records to identify early adulthood predictors of late life ADRD and brain health outcomes. For example, one third of the cohort had either hypertension or hyperlipidemia at age 40; but the impact of this on brain health after age 90 is not yet well understood. The continuation of *Life After 90* will provide new information on not only risk of ADRD after age 90 but also how to have exceptional brain health in a diverse cohort.



2021-2022 AWARDS

Wake Forest University,
\$1.4M - US POINTER Study

NIH (NIA), \$3.6M - KHANDLE

NIH (NIA), \$5.1M -
Epidemiology of Age-related
Dementia, Mild Cognitive
Impairment and Brain
Pathology in a Multiethnic
Cohort of Oldest-Old

BRAD POLLOCK



2021-2022 AWARDS

California Department
of Public Health (CDPH),
\$14.7M - HAI Preventionist

In 2021, UC Davis was awarded \$14.7M in funding through the California Department of Public Health (CDPH) as part of a contract with the state's Healthcare Associated Infections (HAI) Preventionist program. The PI is Brad Pollock, chair of the UC Davis Department of Public Health Sciences.

HAIs are the most common complication of hospital care, occurring in about 1 in every 25 patients. HAIs can be caused by a wide variety of common and unusual bacteria, fungi, and viruses, including MRSA (methicillin-resistant *Staphylococcus aureus*), staph bacteria resistant to other antibiotics, surgical site infections and *Clostridium difficile* infection (CDI).

The HAI Program in the California Department of Public Health Center for Health Care Quality oversees the prevention, surveillance, and reporting of HAI and antimicrobial resistance (AR) in California's hospitals and other healthcare facilities. The HAI Infection Preventionist Program provides non-regulatory consultation and assistance to support HAI prevention.

Through UC Davis' HAI contract, Pollock's team is providing staff to support the CDPH's patient safety services and HAI program. It will also facilitate responses to unusual infectious disease occurrences and outbreaks in healthcare facilities and other congregate settings. "The activities are focused on improving the quality of care for Californians by preventing unnecessary HAI and rapidly responding to contain outbreaks," says Pollock. "Activities are conducted over multi-year time periods to provide aggregate data and analyze data and advance the development of public health action plans and recommendations."

KYLE FINK

Researchers at the UC Davis MIND Institute launched a \$4 million program to find transformative therapies for ADNP syndrome, which is named for the mutation in the activity-dependent neuroprotective protein (ADNP) gene. The rare genetic condition causes developmental delays and can affect the brain, heart, gastrointestinal system and more. The PI is Kyle Fink, assistant professor in the Department of Neurology, the UC Davis Stem Cell Program and the Gene Therapy Center.

The ambitious three-year project is funded through a unique partnership between the ADNP Kids Research Foundation and international textile company Simba Global. The research will involve the MIND Institute's interventional genetics team, which includes internationally recognized experts in mouse models for therapeutic development and in gene therapy, including the use of the gene editing tool CRISPR.

The interventional genetics team includes MIND Institute faculty members who are leading experts in their disciplines. The group excels in what is called "bench to bedside" research — translating results from the lab directly into therapies for patients.

The program will include two major phases. First, the team will use stem cell technology to create a human ADNP model in Petri dishes. They will also characterize mice with ADNP mutations. "That information will be useful to anyone who wants to study ADNP," Fink explains. "We will be able to say, 'in the mice at this age, there's this big effect, so if you have a drug, you can test it in this mouse at this age using these tasks.'"

The second phase, the one that "everyone gets the most excited about," notes Fink, is evaluating therapies for ADNP. To fast-track progress, the team will work simultaneously on three different therapies. "We think of it as shots on goal," Fink says. "Time is of the essence with these conditions."



2021-2022 AWARDS

ADNP Kids Research
Foundation/Simba Global,
\$4M – Transformative
Therapies for ADNP
Syndrome



RESEARCH IMPACT REPORT

2021-2022

UCDAVIS | **SCHOOL OF**
HEALTH | **MEDICINE**

Office of Research

2921 Stockton Blvd., Suite 1400

Sacramento, CA 95817

Phone: 916-703-9141

health.ucdavis.edu/medresearch/

