

# HSRI



UC MERCED  
**Health Sciences**  
RESEARCH INSTITUTE



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UC MERCED  
Health Sciences  
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With more than 70 affiliated faculty members, the Health Sciences Research Institute (HSRI) is the largest organized research unit at UC Merced.

Our faculty includes researchers from across the spectrum, from biomedical researchers examining the fundamental determinants of disease and illness to population and behavioral health researchers working with communities and providers to promote prevention and better treatment.

All share a desire to expand our understanding of health and healthcare, to train our next generation of researchers and to improve the health of the people in California.

HSRI has a special emphasis on finding ways to improve the health of the people in the San Joaquin Valley (SJV). The SJV is a place of natural beauty, with warm and friendly communities and a rich and colorful history. This ethnically diverse region is comprised of significant populations of Latino/Hispanics (49 percent of the population), Asians (6 percent), and African Americans (5 percent). Yet it is also an area with large immigrant populations that have little access to healthcare, significant health disparities for vulnerable populations and more than 22 percent estimated to be living below the poverty line. With five of the eight SJV counties among the top 10 most polluted in the country and health disparities that rival Appalachia, it is a region with tremendous need that has long been ignored.



## From Director Paul Brown

As such, HSRI has a dual mission. The first is to become a world-renowned health research institution by 2020. We will achieve this aim by promoting health related research on campus through our research clusters (such as our Health Disparities or Cancer clusters); organizing research initiatives (such as valley fever); assisting with the development of applications for external funding; mentoring junior faculty and supporting emerging researchers; and forming research partnerships with regional health providers (such as Children's Hospital, UCSF Fresno, Mercy Medical Center Merced). Through wise choice of research foci and strategic investment of resources, HSRI has the potential to become a top health institution.

Our second mission is to identify and promote research that would improve the health status and access to health care for people in the region. These efforts can take many forms, but the central focus will be to work with community organizations, providers and government organizations to identify and address problems that are important to the region. Our faculty is committed to translating health and medical advances in health detection, prevention and treatment into concrete improvements in the health of the community.



As the main health research center at UC Merced, HSRI is helping our campus community become a recognized leader in health related research and improving the health of the community.





## Improving Health from Cells to Communities

The Health Sciences Research Institute (HSRI) at the University of California, Merced, is the campus's hub for health and medical research that expands knowledge and creates solutions to some of the most pressing challenges in the San Joaquin Valley and world. Whether it's looking at cells or communities, faculty members affiliated with HSRI offer valuable insight into how we address and treat society's 21st century health needs.

In laboratories, researchers are studying cancer, HIV, hepatitis C, addiction, neurodegeneration and more. Social sciences researchers are looking at health disparities, environmental health and how people make decisions about their health. Health communications researchers are looking at the best ways to communicate vital information related to health, whether it's through warning labels or viral social media campaigns.

The research is conducted by more than 70 faculty members from all three of the campus' schools: Natural Sciences, Engineering and Social Sciences, Humanities and Arts. In many instances, community organizations and residents are research collaborators, a model that allows researchers to study pressing problems at the local level and create solutions that can directly benefit residents and people across the world.

The institute has eight research branches. Each one explores a different facet of human health. The areas are:

- Health Disparities;
- Environmental Health;
- Biomolecular Research;
- Biosimulation and Modeling;
- Cancer Control and Prevention;
- Immunity and Infectious Diseases;
- Basic and Behavioral Neuroscience, Learning and Development; and
- Health Decision Making

For the latest news on the Health Sciences Research Institute, go to [hsri.ucmerced.edu/news](http://hsri.ucmerced.edu/news).



## Collaborations to Combat Valley Fever

Immunology Professor David Ojcius focuses his innovative research on understanding valley fever, a debilitating disease commonly found in the San Joaquin Valley.

Through the Health Sciences Research Institute, Ojcius is working with Dr. James McCarty with Children's Hospital Central California and UCSF Fresno.

The two are studying the disease, which begins when someone inhales the spores of the fungus *Coccidioides immitis*.



More than 20,000 cases of valley fever were reported in 2011 in the United States, but many more cases likely went undiagnosed, according to the Centers for Disease Control and Prevention.

“By combining UC Merced’s research strength with Children’s Hospital’s real-world experience treating patients,” Ojcius said, “we hope to discover how valley fever spreads and hope someday to be able to list it in the history books alongside diseases such as polio and measles.”

The two are looking to better understand the immune system’s response to the disease with a long-term goal of developing a vaccine. This project has initial funding from HSRI and Children’s Hospital, though they hope to secure major research funding through public agencies or private donors.







## Faculty Profile

JINAH CHOI  
SCHOOL OF NATURAL SCIENCES

UC Merced biochemistry Professor Jinah Choi is working to understand and treat hepatitis C to improve the lives of millions of people worldwide.

“It’s really exciting that all the pieces are coming together,” Choi said. “Whatever we find in the lab has consequences. It has the potential to really impact people.”

The disease, which was first discovered in 1989 and which affects more than 170 million, doesn’t directly cause liver cancer. Instead, it causes a chronic infection, which over time causes cirrhosis of the liver and damages a person’s DNA. Over time, that damaged DNA may lead to mutations and cancerous cells in the liver.

Hepatitis C is caused by a virus that is transmitted through blood. Choi is using her research to find out how the virus can be cleared from infected cells and also reduce the disease’s harm for those already infected.

When a person becomes infected with the virus — typically through intravenous drug use — the disease suppresses the immune system so it can replicate and spread. By learning how the virus suppresses host immune response, Choi is looking to develop strategies that can help the immune system to eliminate the virus from the body.

Another line of her research looks at reducing the damage done when a person is infected. The virus induces a protein in the liver called Nox, which can increase oxidative stress. That stress, in turn, results in DNA damage.

Choi is studying this protein’s role in liver cancer formation to find ways to reduce the harm that the virus causes in the liver.



Establishing a 21st century research university in the San Joaquin Valley was the first step toward improving the area's health and education rates. The next step is making sure UC Merced's research helps communities across this region and that they can share their ideas and problems with professors.



The Health Sciences Research Institute's Community Research, Innovations and Solutions (CRIS) Network is developing and supporting relationships between the campus's researchers and community organizations throughout the San Joaquin Valley with a common goal of improving the health and well-being of residents.

The network this year will coordinate two joint research projects between the campus and Mercy Medical Center, which is funded by the Yablokoff-Wallace Health Science Research Endowment. Each project will include UC Merced researchers and hospital staff members. The research projects could include clinical interventions to improve care, preventive services and administrative and quality assurance innovations.

This model — researchers working alongside community-orientated institutions — is one the institute hopes to replicate with other organizations in other San Joaquin Valley communities.

With the institute focused on everything from air quality to heart disease, the innovative research can serve the San Joaquin Valley in countless ways.





WEI-CHUN CHIN  
SCHOOL OF ENGINEERING

Engineering Professor Wei-Chun Chin, one of UC Merced's founding faculty members, studies mucus secretion in the airways in hopes of helping people recover better and faster from lung problems, and better control chronic ailments such as asthma and cystic fibrosis.

"Mucus is your body's protection mechanism," he said. It's also a basic biopolymer, so it follows the same basic rules as other biopolymers.

Chin looks at the behaviors of mucus-producing cells, and studies how, by changing certain factors or introducing nanoparticles, he can change the viscosity of mucus, which has to be at the correct density to serve its purpose.

In the airways, that is to expel harmful materials. But if mucus is too thin, it's difficult for pollutants to adhere and be propelled out of the body through coughs and sneezes. If it's too thick, lungs have a difficult time expelling it, and if mucus collects in the lungs, it causes infections.

His work on mucus is connected to his chemical and bioengineering studies. He's also a member of the UC Merced Stem Cell Foundry, and is working on a way to make bone tissue from fingernail or toenail fibers.

The bone tissue could be used to infill breaks or missing sections of human bones.







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Improving society's health goes beyond discoveries in a lab. Part of the solution lies in educating people on how to be healthy and their options for treatment when they are sick.

Health communications is one of the Health Sciences Research Institute's areas that transcends disciplines. Effectively sharing health information — whether it's with a nutritional label or from a doctor to a patient — is vitally important. People must be informed but not overwhelmed with information that can help them make decisions about their personal health.

This past year, HSRI held a Health Communications Day that featured a keynote from Bradford Hesse, chief of the National Cancer Institute's Health Communication and Informatics Research Branch. The day included a meeting between Hesse and faculty members about health communications as



well as a panel discussion with members of the community to discuss research project ideas connected to the San Joaquin Valley.

Research projects underway or in development include evaluating communications strategies related to genetic testing for cancer, understanding the components of viral Internet campaigns and how they could be used in public health campaigns, and also the perceptions and challenges with telemedicine.



## Partners for a Healthy Future

Community and foundational support is a key element in harnessing research to improve the lives of San Joaquin Valley residents. The Health Sciences Research Institute has two partners who are helping make a difference in this region.



Longtime UC Merced supporters Elizabeth and Bud Wallace established the Yablokoff-Wallace Health Science Research Endowment, which provides a unique model for how philanthropists can support ongoing research collaborations between community and academic partners to improve local and regional health in the San Joaquin Valley.

The endowment will support two collaborative projects every year between UC Merced and Mercy Medical Center staff members. The projects are meant to have an immediate impact on the health of local residents.

Sierra Health Foundation has awarded HSRI a grant to engage community partners in understanding and addressing the valley fever epidemic in the San Joaquin Valley. Researchers will study the clinical, social, economic and political factors that influence the valley fever epidemic and try to improve the surveillance, prevention and treatment to minimize the disease's harm.

This support is an endorsement of how some our society's greatest health problems can be solved with innovative research.





## Faculty Profile

SUSANA RAMIREZ  
SCHOOL OF SOCIAL SCIENCES, HUMANITIES & ARTS

From sunrise to sunset, people consume all kinds of information — news, television, social media and more.

UC Merced public health Professor A. Susana Ramirez wants to know how that influences people's health decisions and behaviors.

For example, one paper she coauthored shows that people who got health information from the media made healthier choices, including exercising more and eating more fruits and vegetables. There may be several explanations, including that people resolved to be healthier or that it reinforced an existing commitment.

Ramirez, who has a sub-focus on Latino health, plans to incorporate San Joaquin Valley communities in her research, as well as using the findings to improve their health.

“The San Joaquin Valley has a diverse Latino population, in terms of generations and language,” she said. “There’s a compelling case and need for the kind of research I’m doing.”

Before coming to UC Merced in 2013, Ramirez was a postdoctoral research fellow at the National Cancer Institute, part of the National Institutes of Health.







## Improving Health

Robust academic and research programs are the foundation for an excellent and cutting-edge medical education program.

The Health Sciences Research Institute has taken the lead on UC Merced's medical education planning, given the institute's interdisciplinary structure that looks holistically at the San Joaquin Valley's health.

While the campus's research fields continue to grow and develop, steps have already been taken to begin addressing the dire need for physicians in the San Joaquin Valley. The shortage is well documented and will only intensify in the future given the rapid population growth in the region.

To help address these disparities, UC Merced announced a partnership with the UC Davis School of Medicine and UCSF Fresno to establish a medical education program to train students interested in practicing in the San Joaquin Valley. Together, the three campuses established the UC Merced San Joaquin Valley Program in Medical Education (PRIME).

PRIME is an expedient and cost-effective way to train physicians to serve the San Joaquin Valley. Students admitted to UC Merced San Joaquin Valley-PRIME spend the first two years on the UC Davis campus in Sacramento, with learning activities in the San Joaquin Valley. The third and fourth years are spent conducting clinical rotations in the San Joaquin Valley.

The inaugural group of five PRIME students began clinical training at UCSF Fresno in spring 2013. Six more students were admitted to PRIME in 2012. The third class of students started the program in August 2013.

Continued funding is needed to sustain and grow PRIME and other medical education efforts at UC Merced in the future.



## Faculty Research and Activities

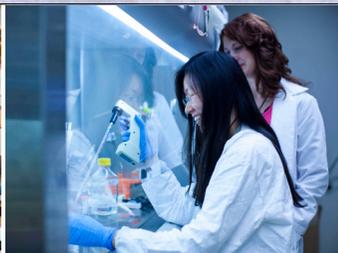
HSRI's diverse faculty has published more 150 peer reviewed research articles over the past year in high-impact journals including Nature, Science, the New England Journal of Medicine, the Proceedings of the National Academy of Sciences and the Public Library of Science ONE .

Extensive health-related research activities on campus have been recognized locally and nationwide. Jeffrey Gilger, a psychology professor in the School of Social Sciences, Humanities and Arts, studies the neurology of dyslexia. Gilger recently published articles in Developmental Neuropsychology, Roeper Review and Frontiers in Human Neuroscience that take a different look at dyslexia, which manifests itself as a phonological disorder — the brain doesn't match sounds to the correct letter symbol — and affects people of all languages.

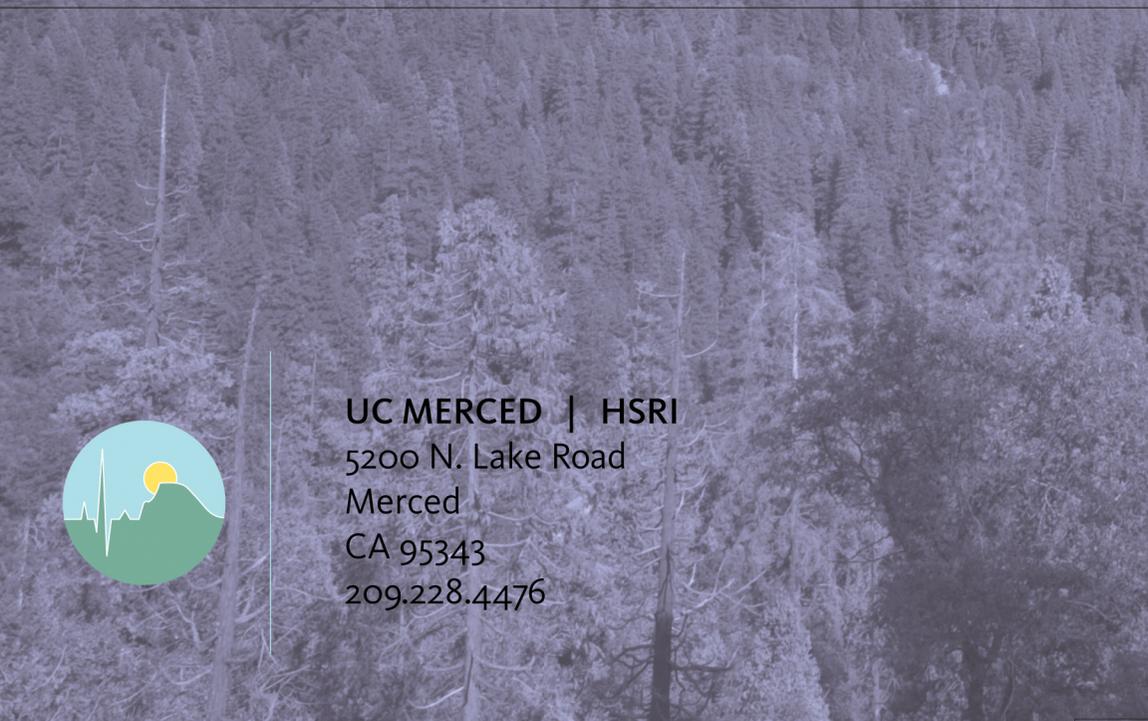
On average, estimates are that 7 percent of the school-age population has dyslexia, with some studies suggesting even higher rates. Dyslexia runs in families and research has identified several genes that, along with environmental factors, may contribute to the risk for the condition. Gilger, who has been on the UC Merced faculty for two years, has been using brain imaging to examine the neurobiological processes found in adults with dyslexia and a special group of dyslexics who are gifted in nonverbal (spatial) abilities.

Miriam Barlow, a biology professor in the School of Natural Sciences, has spent the past 14 years researching antibiotic resistance and is making her expertise available through a public-service program. Project Protect, an online program for distributing information, is on Facebook and Twitter and is dedicated to sharing information about antibiotic resistance and how to stay healthy. People can submit questions, and Barlow will answer them or she and her students will refer people to other sources of information.

“Project Protect is all about patient education,” says Barlow. “It’s about making sure people know what should be happening to them.”







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