

Nevada Institute of Personalized Medicine

University of Nevada, Las Vegas 4505 S. Maryland Parkway, MS 4009 Las Vegas, NV 89154

> Email: nipm@unlv.edu UNLV NIPM Website

MISSION



The Nevada Institute of Personalized Medicine (NIPM) at the University of Nevada, Las Vegas is working to improve individual and systemic healthcare through translational clinical scientific research, education and workforce training, commercialization of technologies, and job creation.

NIPM GOALS

The Nevada Institute of Personalized Medicine (NIPM) at UNLV is working to improve individual and community health in Nevada through research, education, workforce training, technology commercialization, and job creation.

Modern healthcare relies largely on an expensive "one-size-fits-most" model for diagnosis and treatment that often fails to account for biological differences between people. Personalized medicine is different. Your unique genetic makeup – your DNA – already encodes the blueprint for effective treatment and disease prevention.

NIPM will help move Nevada from the trial-and-error medicine of today to the datadriven decision-making of tomorrow by decoding the human genome to predict disease susceptibility, sift through treatment options, and fine-tune drug dosages to minimize adverse effects, and help Nevadans lead longer and healthier lives.

UNLV PARTNERS

- UNLV VPRED, Provost, President
- College of Sciences
- School of Integrated Health Sciences
- Kirk Kerkorian School of Medicine
- School of Life Sciences
- School of Community Health
- School of Nursing
- Department of Mathematical Sciences
- Department of Chemistry and Biochemistry
- Advisory Boards
- National Supercomputing Institute
- Office of Economic Development
- Cleveland Clinic Lou Ruvo Brain Center for Health

SUPPORT: NIH COBRE Grant

- On June 1, 2018, UNLV was awarded an \$11.4 Million Federal Grant to Advance Personalized Medicine in Nevada
- Funding from the National Institutes of Health will support human genetics research
- Will develop pipeline of scientists working to make Nevada a leader in personalized medicine
- Project Number: 5P20GM121325



SUPPORT: GOVERNOR'S KNOWLEDGE FUND



Nevada Governor's Office of Economic Development — Empowering Success —

NIPM is the first GOED-funded project to break even and become sustainable with <u>non-state</u> dollars!

TECHNOLOGY COMMERCIALIZATION

Technology Commercialization in Nevada

Knowledge Fund

Center for Gaming Innovation at the University of Nevada, Las Vegas

Institute for Quantitative Health Sciences at the University of Nevada, Las Vegas

Nevada Advanced Autonomous Systems Innovation Center at the University of Nevada, Reno

Applied Innovation Center for Advanced Analytics at the Desert Research Institute

Nevada Water Center of Excellence Knowledge Fund Proposal

NSHE-Industry Unmanned Autonomous Systems Collaboration Program

Battle Born Venture

Water Center of Excellence

Knowledge Fund

The Knowledge Fund is a \$10 million budget allocation intended to spur research, innovation and commercialization in Nevada. It was created in 2011 as part of Assembly Bill 499, and received funding during the 2013 legislative session. To obtain this funding, the Nevada System of Higher Education (NSHE) submits applications to GOED for projects that could benefit from Knowledge Fund support. GOED, together with the Knowledge Fund Advisory Council, selects the projects that are best suited for funding. In its first year, the Knowledge Fund has supported and established six new projects within NSHE.

Knowledge Fund Advisory Council

- · Dr. Nancy E. Brune, Executive Director, Kenny Guinn Center for Policy Priorities
- · Anthony Ciorciari, former Executive Vice President, IGT
- Steve Henry, Director for Global Security, NSTec
- Jason Mendenahll, Executive Vice President, Switch
- · Billy P. Smith, consulting Principle Health Physicist, M.H. Crew & Associates
- Roger Wittenberg, Founder, Boulder Bay

Knowledge Fund Projects

- · Center for Gaming Innovation at University of Nevada, Las Vegas
- · Institute of Quantitative Health Sciences at the University of Nevada, Las Vegas
- · Nevada Advanced Autonomous Systems Innovation Center at the University of Nevada, Reno
- Applied Innovation Center for Advanced Analytics at the Desert Research Institute

NIPM SYMPOSIUM SPONSORS

delivered by VWI[™]

heligenics

eppendorf

F fisher scientific

part of Thermo Fisher Scientific

Nevada Governor's Office of ECONOMIC DEVELOPMENT



NIPM - EXTERNAL ADVISORY BOARD



Hong-Wen Deng PhD





Jerome Rotter MD, PhD

 \checkmark

LABioMed



Kenton Sanders PhD



University of Nevada, Reno



Bill Shuttleworth PhD

THE UNIVERSITY OF NEW MEXICO.



NIPM NGS AND GENOTYPING SERVICE



Services include QC checks, sample prep, and library prep. Grants are available. Contact us for more details and a custom quote: <u>shirley.shen@unlv.edu</u>

http://www.unlv.edu/nipm/ngs

NIPM BIOINFORMATIC SERVICES



NIPM NGS and Genotyping Services are available at: http://www.unlv.edu/nipm/ngs Seed Grants are available for application at: http://www.unlv.edu/nipm/grants



Ernesto Abel-Santos-Affiliate Faculty



Professor Chemistry and Biochemistry ernesto.abelsantos@unlv.edu 702-895-2608 CHE 218B The Abel-Santos Laboratory is working on a compound that could aid your intestinal tract when antibiotics have wiped out much of the "good" bacteria. This anti-germinant compound, known as CamSA, works by stopping the germination of *Clostridium difficile* (C. diff). While C. diff can be a normal component of bacteria in the human gut, it also can become a problem when competing bacteria are wiped out by antibiotics. That is particularly dangerous for patients with suppressed immune systems, many of whom have been in hospitals, nursing homes, surgery centers and other environments where C. diff thrives. This work has been patented.

CamSA protects mice from CDI



CamSA inhibits Cdiff spore germination





Amei Amei - Affiliate Faculty



Associate Professor of Statistics Mathematical Sciences amei.amei@unlv.edu 702-895-5159 SEB 3127 Development of novel methods in statistics and probability to address issues in genetics of complex diseases and evolution of biological species. Specifically,

- retrospective association testing methods for longitudinal outcomes which can be applied to longitudinal association analysis of cocaine use or cardiovascular diseases
- interaction effects of sets of genetic variants by environment using variance component association tests in generalized linear models
- quantitative methods for genetically informed biomedical research on complex diseases, especially on mental disorders such as schizophrenia, bipolar disorder and addiction

UNIV



Nora Caberoy-Affiliate Faculty



Lincy Assistant Professor of Life Sciences School of Life Sciences nora.caberoy@unlv.edu 702-774-1501 SEB 3170 Areas of Research:

- Retinal Degeneration
- Study the role of retinal pigment epithelium (RPE) cell phagocytosis in photoreceptor death that leads to retinal dysfunction
- Obesity
- Exploration of the physiological and pathological roles of tubby in the development of obesity. Multidisciplinary approaches including animal models, molecular, cellular, genetic, biochemical and functional proteomics by phage display in combination with next generation DNA sequencing (NGS) technology to investigate the above diseases.







Jingchun Chen – NIPM Faculty



Associate Professor, Nevada Institute for Personalized Medicine, Interdisciplinary Program in Neuroscience

jingchun.chen@unlv.edu

702-895-1196 HRC 182 Area of Research Interests:

- Artificial intelligence and deep machine learning modeling to classify complex diseases, such as Alzheimer's disease and psychiatric diseases (schizophrenia, bipolar disorder, major depressive disorder)
- Drug discovery for Alzheimer's disease using multi-omics data and networking
- Genetic correlation/association and causal effects between Alzheimer's disease and other diseases, such as COVID-19, gut microbiome, type II diabetes, and schizophrenia
- Molecular and cellular models to study the role of microglia in aging, neurodegenerative diseases, and Alzheimer's disease.

UNIV



Shawn Gerstenberger- Affiliate Faculty



Dean, School of Community Health Sciences and Professor, Environmental and Occupational Health shawn.gerstenberger@unlv.edu 702-895-1565 BHS 514

<

Research Interests:

- Childhood Lead Poisoning and Healthy Homes
- Asthma Triggers and Home Interventions
- Heavy Metal Contamination of food items: candy, hot sauce, fish, etc.
- Currently have several HUD, US FWS and Dignity Health Funded Projects
- Metals analysis, Lead and Mercury
- Portable XRF
- GC-MS
- AA
- Spectrophotometry
- Microwave Digestion





Mira Han - Affiliate Faculty



Assistant Professor School of Life Sciences mira.han@unlv.edu 702-774-1503 SEB 3178

- Evolution of genome structure using bioinformatics to investigate how genomes change through gene duplication, loss and gene transpositions.
- Phenotypic effects of Copy Number Variations (CNVs), indels and transposable element polymorphisms.



Variation in transposable element activity in humans



Brian Hedlund - Affiliate Faculty



Greg Fullmer Associate Professor of Life Sciences School of Life Sciences brian.hedlund@unlv.edu 702-895-0809 WHI 101

- "Microbial dark matter": Environmental genomics, systems biology, cultivation & systematics
- Ecology of thermophiles: Biogeochemical cycles & temperature-energy relationships
- Human microbiome: Effects of diet on gut microbial community composition, function, and role in *Clostridioides difficile* infection





Thessa Hilgenkamp – Affiliate Faculty



Assistant Professor Department of Physical Therapy, School of Integrated Health Sciences, UNLV Thessa.Hilgenkamp@unlv.edu Areas of Research:

- Individuals with intellectual disabilities, Down syndrome and multiple sclerosis
- Physical activity and exercise
- Cardiovascular physiology
- Experimental to epidemiological research





Jefferson Kinney - Affiliate Faculty



Associate Professor Psychology jefferson.kinney@unlv.edu 702-895-4766 CBC B426 **Research interests:**

- Alzheimer's disease-
 - We are currently investigating several candidate targets involved in the development and progression of Alzheimer's disease pathological features and behavioral impairments. These include genetic, immune, molecular, and cellular targets.
- Alterations in inhibitory signaling with relevance to schizophrenia-
 - We are investigating alterations in GABA signaling as it relates to behavioral, cellular, and protein level changes associated with schizophrenia.

Neurobiology of Learning and Memory-

• We are examining the role of GABA and glutamate signaling in learning and memory. These projects are directed at understand the interplay between excitation and inhibition in normal learning.



Hyunhwa Lee - Affiliate Faculty



Assistant Professor School of Nursing hyunhwa.lee@unlv.edu 702-8953492 BHS 448

Research interests:

- (a) early life adversity and its effect on adulthood mental health (e.g., depression, posttraumatic stress disorder [PTSD]) and disease progress for post-concussive syndrome (e.g., sports concussion
- (b) the role of genetic factors and epigenetic regulation in these health outcomes, using improved methods for evaluating molecular-genetic mechanisms and immune system activation. Especially, the purpose of my project is to better understand the mechanisms involved in the development and perpetuation of persistent post-concussive syndrome, PTSD, and psychological resilience, as compared with traumatized controls without negative mental health outcomes.
- Board Certified Psychiatric and Mental Health Nurse Practitioner





Qian Liu – NIPM Faculty



Assistant Professor of Bioinformatics

Nevada Institute of Personalized Medicine

School of Life Sciences

Email: qian.liu@unlv.edu Tel: 702-895-1187 Office: HRC 183G

< 1

Area of Research interests:

 Development of deep learning tools in computational biology

GenLab @

- Modification detection for both DNA and RNA on Nanopore sequencing
- 3rd generation long-read sequencing
- Identification of methylation biomarkers in neurological/autoimmune disorders
- Protein structural analysis



Joseph Lombardo - Affiliate Faculty



Executive Director, National Supercomputing Center (Cherry Creek) Lombardo@nscee.edu 702-895-4153 SEB 1218

- Full-service supercomputing facility
- Mission for excellence in education and research in supercomputing and its applications
- Provides supercomputing training and services to academic and research institutions, government and private industry
- Supports medical informatics and health care
- Serves researchers at the University of Nevada Las Vegas and other statewide, nationwide and global research







Sarah Love - NIPM Staff



Program Coordinator, NIPM <u>sarah.love@unlv.edu</u>

702-895-1297 WHI 117 • Day-to-day operations: budgets, events, human resources related functions, meetings, purchasing, reporting, scheduling, travel

Sarah Love is a true rebel as she received her degree in psychology in 2011 from UNLV and began working in the Student Affairs Division at UNLV in 2012. She later transitioned to the Nevada Institute of Personalized Medicine in 2017.

Sarah Love is the Program Coordinator for NIPM and assists the Executive Director with daily operations. She is experienced at managing complex accounts and confidential records, and comes to NIPM from the UNLV financial aids office.



Fatma Nasoz - Affiliate Faculty



Associate Professor of Computer Science Director of Data Science, The Lincy Institute fatma.nasoz@unlv.edu 702-895-0097 GUA 2119

- Machine learning: deep learning analysis of primary and secondary data across domains including health, education, finance, and genomics
- Data visualization: health, education, and social services data collection, visualization, and sharing
- Human-computer interaction: intelligent and adaptive user interfaces for e-learning, driving, and telemedicine



Edwin Oh – NIPM Faculty



Associate Professor, NIPM/School of Medicine edwin.oh@unlv.edu <u>SEB</u> 1176 Phone: (702) 895-0509 Areas of interest:

- Genomic interpretation
- Neurological genetic disease
- Ph.D. in Neuroscience, University of Michigan

Following his postdoc at Johns Hopkins University, Ed served as an Assistant Professor in the Department of Neurology at Duke University. The primary questions for his research program are 1) what are the genetic and structural variants that contribute to human health and disease, 2) how do we interpret such variation to improve the cellular and molecular diagnosis of genetic diseases, and 3) how do we enable the development of therapeutic paradigms. Ed is expert at a variety of molecular and genomic technologies, and animal modeling systems.



Jessica Paje – NIPM Staff



Sr. Administrator jessica.paje@unlv.edu 702-895-1297

WHI-117

• Establishes and manages best practices for regular operation of the Institute

• Manages the pre- and post-activities for the COBRE grant

Jessica Paje joined NIPM in July 2020 as the Sr. Administrator. Her previous work experience was Program Manager at the John A. Burns School of Medicine, University of Hawaii at Manoa. For five years, she helped manage the IDeA Networks of Biomedical Research Excellence (INBRE), a federally funded grant sponsored by the National Institutes of Health (NIH) and National Institute of General Medical Sciences (NIGMS). Jessica earned her Master's in Public Administration from the University of Hawaii at Manoa in 2018.



Martin R. Schiller – NIPM Director



Executive Director, NIPM and Professor, School of Life Sciences martin.schiller@unlv.edu WHI 118 Website: www.unlv.edu/ news/expert/martinschiller

- Expertise
 - Functional Genomics
 - Structural Biology Bioinformatics
 - Pharamacology

The Schiller Lab invented a high accuracy & throughput molecular function assays system. This GigaAssay has been used to invent new diagnostics and companion diagnostics below), and develop the first High Content Screening for Biologics Drugs in a UNLV spinoff Co. - Heligenics



Next Generation Drug Discovery for Biologics Comprehensive Clinical Decision Tree for selecting Drugs to Treat Breast Cancer







Jay Shen - Affiliate Faculty



Associate Dean, School of Life Sciences and Professor, Healthcare Administration & Policy jay.shen@unlv.edu 702-895-5830 GTW 338 Research areas of focus and interest:

- Access to care and disparities in clinical outcomes/quality of care regarding race/ethnicity, uninsured and socioeconomically disadvantaged populations
- Health services research including comparative effectiveness research, effects of EHR adoption on health organizational performance, clinical outcomes and patient safety, care transition, palliative care and geriatric care, substance use and mental health, dental care access and costs
- Projects in Nevada
 - Factors associated with use of opioid, heroin, and cannabis among ED patients
 - Engaging patients with life-limiting illnesses on receiving palliative care
 - Engaging Asian communities in palliative care
 - Reduction in medication errors among hospitals
 - Economic effects of the smoking restriction law on healthcare
 - Diabetic complications and maternal outcomes



Shirley Shen – NIPM Staff



Laboratory Manager shirley.shen@unlv.edu 702-895-4550 HRC 422

- Manages the NIPM Sequencing Lab day-to-day operations
- Ensures compliance with UNLV, state, and federal regulations
- Prepares and conducts training sessions for students and faculty.

Shirley joined UNLV in 2001 as a research associate in the department of mechanical engineering and has worked at the School of Medicine, Genomics Core Facility and School of Nursing in UNLV. She earned her Master of Science in medical studies from Nanjing Medical University in China and has earned awards for her work in research including the UNLV Merit Award for Outstanding Research Performance.

UNIV



Richard Tillett – NIPM Staff



Bioinformaticist richard.tillett@unlv.edu 702-895-1297

- Bioinformaticist, NIPM Genome Acquisition & Analysis Core
- With 16 years of experience in DNA sequencing, molecular biology, and bioinformatics, Dr. Tillett aims to support and advance genomic studies and projects through bioinformatic support and training. Dr. Tillett obtained his Ph.D. in Biochemistry from the University of Nevada Reno in 2011 and is the author of two recent studies on the genomic identities and spread of SARS-CoV-2 in the state of Nevada. Dr. Tillett is a Data Carpentry-certified Genomics Instructor and advocate for increasing bioinformatic skillsets in research and student communities.
- Dr. Tillett joins the GAA core to support life scientists in genomic study design, sequencing strategy, RNA-seq, genotyping and variant analyses, single-cell sequencing, genome assembly, and bioinformatics training and outreach.



Van Vo – NIPM Faculty



Assistant Research Professor Nevada Institute of Personalized Medicine, College of Sciences, UNLV <u>van.vo@unlv.edu</u> Areas of Research:

- Effects of gene mutations on development
- Induced pluripotent stem cells (iPSCs) as a model system to explore human diseases
- Cancer drug development
- Wastewater surveillance of SARS-CoV-2 and other viruses





Qing Wu – Affiliate Faculty



Professor of Biomedical Informatics Ohio State University Qing.wu@osumc.edu 614-688-9752 Area of Research interests:

- Development and validation of personalized clinical risk assessment
- Meta-analysis research
- Machine Learning and statistical modeling for precision prediction
- Bone density and osteoporosis research
- Statistical consulting in biomedical research





Hui Zhang - Affiliate Faculty



Associate Professor Chemistry and Biochemistry hui.zhang@unlv.edu 702-774-1489 SEB 4138

Research Interests:

-Biochemical and genetic control of embryonic, fetal, and adult stem cells in development and adult tissue renewal and regeneration through the coordinated regulation between stem cell specific transcriptional factors, epigenetic histone modification, chromatin remodeling, and DNA methylation.

-The cell cycle of embryonic stem cells and other related stem cells are unusual because many somatic cell cycle proteins, such as G1 or S cyclins, and tumor suppressor proteins, such as the retinoblastoma susceptibility gene encoded protein (Rb and Rb family proteins), are either not required or they do not exhibit cell-cycle dependent oscillation in these stem cells. Our ongoing research is trying to elucidate this unique stem cell replication/division mechanism.

-Development of synthetic lethal chemical inhibitors targeting the epigenetic vulnerability of human cancers.

This research not only try to answer the question why stem cells are so unique to maintain their pluripotency/multipotency and self-renewal potential to control the lineage-specific differentiation in development and tissue repair/regeneration, also helps to understand the underlying mechanisms of many human diseases such as cancers and developmental disorders in order to develop novel therapeutics.



NIPM Team paper in Today's Practice

Today's Practice TECHNOLOGY

PERSONALIZED MEDICINE IN THE ERA OF GENOMICS:

AN EXCITING TIME FOR TODAY'S PRACTICE

SPECIAL FEATURE: PERSONALIZED MEDICINE IN APPLICATION

BY MICHAEL A. NASIAK, XIANGNING CHEN, QING WU, MIRA HAN, JUSTIN ZHAN, JINGCHUN CHEN, JENICA L. ABRUDAN & MARTIN R. SCHILLER

Already, elements of genomics are being incorporated into standards of care, while continued consumer-driven marketing tactics have been successful in capturing the imagination of the public seeking its potential. Our patients have therefore become acutely aware that their health can be impacted in some positive way. With the nearly daily discoveries heralded in the news – and, at times, with concurrent and possibly misleading hype – of how the knowledge of applying genomics can counteract the afflictions endured by humanity, those seeking guidance will turn to us for clarifying how we can make a real difference in their well-being. Our duty must be ensuring we have a familiarity of the fundamentals concerning what Personalized Medicine can (and can't) promise, as the applications currently available are but a fraction of what is forthcoming. "The genetic blueprint which makes us who we are is almost the exactly the same in all of us. However, our individual genomes contain over a million scattered variations, giving each of us our uniqueness not only in the specialness of our individuality, but also in our vulnerabilities."

NIPM wins \$11.4M NIH COBRE award

This peer-reviewed center award has 45 UNLV and national contributing partners, and received support letter from 60 individuals and organizations

COBRE Component	Impact on Health
Overall (Scientific Premise summary)	Advance the use of genomics and genetics in personalized medicine through cutting- edge research discovery and use of genetic markers, building a center of excellence that fosters new investigator independence, and collaborating with the UNLV School of Medicine and other partners in basic and translational research
GAA core	Build computational and genomics research capacity, providing expert analysts to enable population-level genomics research for COBRE researchers, for scientists at UNLV, and for the IDeA network
Research project 1	Develop a new method using multi-omics profiling to identify the tissue of origin for cancers of unknown primaries to increase the accuracy of diagnosis and treatment
Research project 2	Increase the accuracy of osteoporosis diagnosis by using individualized clinical reference ranges based on individual genetic makeup and environment
Research project 3	Understand the functional role of microglia and immune system dysfunction in schizophrenia etiology to help identify new genetic markers for subtyping schizophrenia and to develop new therapeutic strategies
Research project 4	The role of engineered hybrid proteins in the clearance of the most toxic form of amyloid beta, and to test their potential as therapeutics to prevent the progression of Alzheimer's disease in an animal model.
Research project 5	Use advanced deep learning to identify various base modifications in DNA and RNA via Nanopore sequencing, and dissect methylation biomarkers in neurological diseases
Research project 6	The causative role of IMPK in intestinal carcinoids



NIH grant number: P20 GM121325



SUGGESTIONS? WANT TO PARTICIPATE?

Would you like to:

Receive clinical genetics healthcare
Have your genome sequenced and analyzed
Partner with NIPM on a project
Commercialize a NIPM technology
Discuss Personalized Medicine
Have a NIPM faculty teach a class or give a seminar
Donate to NIPM

Contact email: nipm@unlv.edu

VCS-OncoCycle startup from NIPM



Enabling personalized medicine™

SBA

STARTUPNV

Our company has invented a new single-cell screening technology called the GigaAssay (patent pending) that can rapidly identify the pathogenic potential of **all** mutants in any gene. This company will produce and monetize gene maps for cancer genes that control cell division with several healthcare applications:

- e-commerce sales of personalized genetic reports to patients
- licensing to diagnostic testing companies,
- licensing to drug development companies
- licensing to carrier screening companies



Food Genes and Me startup from NIPM

Food Genes and Me, LLC

Food Genes and Me is the first technology spinoff company from UNLV with angel investment funding. The companies mission is to recommend foods and supplements based on the highest quality-nutrigenetic studies available

Y FOOD GENES AND ME

How It Works Who We Are Contact Us

Stay Up to Date Sign in

Discover the foods that suit your DNA

Join our pre-release beta and receive free nutritional guidelines based on your genes

Everyone knows that your daily diet directly affects your health. What many don't know is that the relationship between your DNA and your diet can significantly impact your risk for specific health conditions.

We now know that "one-size fits all" diets are irrelevant, because on a genetic level, our body's needs are quite different. Our technology precisely hones in on those differences and is able to customize the perfect nutritional guidelines based on one thing—you.



Not ready? Join our mailing list for now.

www.foodgenesandme.com