Minority Health and Health Disparities Research Training (MHRT) Program

7th Annual E Ho'oulu Haumāna Presentation

August 14, 2020

NIMHD
National Institute on Minority Health and Health Disparities

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Director's Message

E komo mai

Thank you for attending *E Hoʻoulu Haumāna* 2020. Tonight, students participating in the Minority Health and Health Disparities Research Training (MHRT) program will share their research experiences with us. We are sure everyone will enjoy their presentations.

After being renewed by the National Institutes of Health, MHRT 2020 is in the seventh year of the program. During the first six years of the program, 60 students completed the program; conducted research in Cameroon, Thailand, Germany, Palau, Laos and India; and are now continuing their academic or professional careers. They are the best recruiting tool we have. This year, we were excited when a large number of students applied for the program. After a very competitive process, in January 2020 nine students were selected. From the first meeting, it was clear that MHRT 2020 students were bright, hardworking and full of energy. This year we also recruited five graduate students in the MHRT program who conducted their research at the University of Hawaii at Manoa. We have truly enjoyed working with all of them.

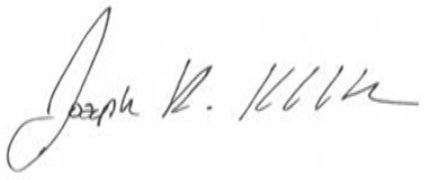
The short-term goals of the MHRT program are to provide each student with an intellectually stimulating research experience, an interesting culture exchange, and a *safe* return home from abroad. Due to COVID-19 pandemic this year MHRT students were unable to conduct international research projects. In March 2020 it was apparent that students were to stay in Hawaii to gain research experience or drop out of the program. Unanimously students decided to stay in the program and change their focus to COVID-19 related research projects. Over the last eight months, several people have contributed their time, talent, and expertise to ensure success of the renewed MHRT program. We send a huge MAHALO to the MHRT students, the University of Hawai'i faculty mentors, the faculty who have participated in workshops, and the staff for their organizational skills. We thank Dr. Angela Sy and Mr. Sambridh Neupane for their hard work in keeping the MHRT program on track.

The long-term goal of the program is to increase the number of under-represented scientists in biomedical research. *E Ho'oulu Haumana* summarizes our goals as the words essentially mean "the growth of students." The program seeks to provide MHRT students with the help and encouragement they need as they transition from undergraduate students, to graduate students in the biomedical sciences, to future leaders in biomedical research. Although the students officially complete the program tonight, it doesn't end here. We will continue to help the students conduct research in Hawai'i, provide advice on career options, and (of course) write letters of recommendation as MHRT 2020 students enter the next phase of their career. We are sure everyone will enjoy watching the continued growth of our MHRT 2020 students.

This year most of the MHRT students conducted research in COVID-19 related research topics. They have wonderful stories to tell. So sit back, relax and enjoy the evening.

The Directors

Vivek R. Nerurkar



Joseph Keaweʻaimoku Kaholokula

About the Program

The Minority Health and Health Disparities Research Training (MHRT) program allows U.S. institutions to offer short-term international and domestic research training opportunities to undergraduate and graduate students from under-represented backgrounds. Funded by the National Institute of Minority Health and Health Disparities (NIMHD) at the National Institutes of Health (NIH), the MHRT program is associated with the Department of Tropical Medicine, Medical Microbiology and Pharmacology at the John A. Burns School of Medicine, University of Hawaii at Manoa.

The specific objectives of the program are to encourage students from under-represented backgrounds to pursue careers in science and biomedical, clinical, and behavioral health research and also to expose students to global health issues that relate to health disparities. The program also aims to enable collaborations between colleges/universities and international research programs.

Currently, the program offers international research sites in Thailand, India, Liberia, and domestic sites in Arkansas, Utah, Washington and Guam. This year due to COVID-19 travel restrictions, students conducted their research in Hawaii. UH has partnered with leading scientists and universities in these locations to serve as research mentors for MHRT students. Selected students spend 8-9 weeks during the summer at their International training sites under the guidance of their assigned in-country mentor and their UH mentor. Students engage in a variety of international and domestic health projects in community health and tropical medicine and infectious diseases. Additionally, the MHRT program provides the opportunity to share experiences with other trainees upon returning to Hawaii and provides supporting opportunities for students to publish their research and/or present their research findings at local and national conferences.

While conducting their summer research abroad, previous MHRT students also selected a cultural project to describe their experiences while living in a different country. This year, MHRT students conducted their research while sheltering in place in their own communities. To describe and document their unique experiences conducting summer research amidst the COVID-19 pandemic and restrictions, students carried out “Photovoice and COVID-19 Projects”. Photovoice is an inquiry method used in community health and action research to document through photographs, people’s experiences on an issue, describe and reflect on the issue, and propose solutions. Tonight’s presentation includes MHRT students’ photovoice projects describing their lived experiences and impressions about COVID-19 related topics while conducting their summer research projects in their own communities while proposing solutions.

5:50 PM - 6:00 PM	Zoom login
6:00 PM - 6:05 PM	Introduction
6:05 PM - 6:55 PM	Photovoice presentation
6:55 PM - 7:00 PM	Transition break
7:00 PM - 7:35 PM	Research presentation
7:35 PM - 7:40 PM	Break
7:40 PM - 7: 55 PM	Graduate student presentation
7:55 PM – 8:15 PM	Acknowledgement and closing remarks

Amelia Arechy

Amelia Arechy is an incoming senior at University of Hawai‘i at Mānoa (UHM) pursuing a bachelor’s degree in Public Health. After graduation, she hopes to obtain her master’s in Public Health with a concentration in epidemiology. Her experience living in Micronesia and Hawai’i has helped cultivate her passion to provide quality healthcare to Pacific Islanders. In the future, she hopes to spend some time in Micronesia working in the health field. When not in class, she enjoys surfing, tasting new types of foods, and hanging out with friends and family.

Anna Davide

Anna Davide is an undergraduate senior at the University of Hawai‘i at Mānoa (UHM) double majoring in Public Health and Philippine Language and Literature with Undergraduate Certificate in Peace Conflict and Resolution. Her mentor this summer was Dr. Andrea Hermosura and Dr. Keawe Kaholokula. Upon graduation, she wishes to pursue a Medical Degree and Masters in Public Health to continue research and achieve her dream of a Family Medicine practice. In her free time, she volunteers as a speaker on her experience as a student with dyslexia for the Hawaii Branch of the International Dyslexia Association and advocates for those with learning differences. She is passionate about Filipino music and exploring cultural cuisine through home cooking.

Research Project

Identifying the Physical and Emotional Needs of Healthcare Workers in Hawaii During the COVID-19 Pandemic

Background: COVID-19 poses significant morbidity and mortality while potentially causing fear and anxiety among healthcare providers who need to treat patients with COVID-19. The uncertainty of health outcomes for COVID-19 patients exacerbated by uncertain and unpredictable experiences for healthcare workers have also led to concern about their own physical and emotional needs. Protecting the mental wellbeing of healthcare workers during emerging infectious disease outbreaks, are imperative to the capabilities of a medical workforce to provide the critical services needed. Understanding what these needs for healthcare workers are while continuing to identify what hospitals and clinics in Hawaii are doing to address their needs will help to improve the health and wellbeing of healthcare providers and ultimately, their patients.
Objectives: To evaluate the physical and emotional needs of healthcare workers providing care in Hawaii during the COVID-19 pandemic and determine to what degree these needs are being met by their clinic or hospital.
Materials and Methods: Institutional review board application was submitted to and approved by the University of Hawaii at Manoa Human Studies Program (IRB #2020-00511). A brief demographic survey and semi-structured interview questions were developed. The questions asked about - 1) participants' perspective regarding how COVID-19 has affected their sense of physical and emotional safety and wellbeing in their health care setting, 2) how their needs are being met by their employer, and 3) their ideas to ensure their physical and emotional safety. We selected interview participants through current connections and used snowball recruitment strategy. Interview participants were recruited through email, and we conducted our interviews online through Zoom, audio only because we were recording for transcription. Participants completed a demographic survey and a semi-structured verbal interview, lasting about 1 hour. We analyzed the interview data by identifying and coding for emergent themes related to participants' stressors and needs.
Results: We interviewed 15 healthcare workers. Among physicians, varying levels of worry were discussed. Participants reported their primary concern was contracting the illness at work and transmitting it to their families at home. Those who worked in group practices or hospitals reported that their place of work had done a sufficient job of supplying employees with PPE and information. A consistent stream of information added to positive mental health/morale. Practitioners reported being lucky to be working in Hawaii, or acknowledging that the situation is not as dire as that on the mainland. Improvements in increasing communication and coordination amongst the hospital groups within the state were suggested. Participants were frustrated with the public being resistant to mask wearing. Counseling seemed to be available, but was not necessary or utilized.
Conclusions: Clinics and hospitals in Hawaii should keep and continue vigilance to protect workers and patients as COVID-19 cases rise. Telemedicine should be supported and promoted in the community, especially as that is the apparent future of medicine. Further research into potential disparities concerning telehealth and basic technology fluency is warranted.

Mentors: Dr. Andrea Hermosura and Dr. Joseph Keawe'aimoku Kaholokula

Kamuela Werner, MPH

Kamuela Werner is a first-year graduate student in the Applied Cultural Anthropology and Museum Studies Graduate Certificate Programs at the University of Hawai'i at Mānoa (UHM). His current research and community advocacy focuses on addressing environmental racism against Native Hawaiians in Nānākuli, O'ahu. Kamuela will start his tenure as an East-West Center Graduate Degree Fellow this fall while continuing to work as a Graduate Research Assistant for the UHM Center for Oral History. "I am grateful to have been a part of the MHRT Program and commend my colleagues, advisors, and program coordinators for persevering through the COVID-19 pandemic."

Research Project

Examining Food and Housing Security During the COVID-19 Pandemic: Oahu Hawaiian Homestead Qualitative Study

Background: In the U.S., a number of states, including Hawaii, have reported Native Hawaiians and other Pacific Islanders (NHOPI) being disproportionately impacted by COVID-19. An Office of Hawaiian Affairs 2020 brief on COVID-19 and Native Hawaiian communities reported Native Hawaiians are at a greater risk of severe illness from COVID-19 due to existing medical conditions, are vulnerable to contracting and spreading the virus due to poor housing conditions, and are poised to suffer disproportionately from financial hardship. Hawaiian Homelands are lands in the State of Hawaii held in trust for Native Hawaiians of 50% or more Hawaiian blood quantum intended to support Native Hawaiian self-sufficiency and self-determination.
Objective: Per capita, Native Hawaiians are highly concentrated in areas of Oahu designated as Hawaiian Homelands. By interviewing Oahu Hawaiian Homestead leaders, this study aims to better understand how COVID-19 containment and mitigation efforts have affected the food and housing/economic security of vulnerable native Hawaiians living on Oahu Hawaiian Homesteads to inform future programs and policies.
Methods: The study is pending approval from the University of Hawaii Institutional Review Board (UH IRB), the Human Studies Program. During the UH IRB review period, the interview guide and protocol was pilot tested via Zoom with family and friends of the student investigator.
Results: Three Oahu Homestead residents with backgrounds in academic disciplines, research, and community leadership participated in the pilot test, each interview lasting about 1 hour. They suggested providing additional clearer information about the research such as providing more information about NHOPI vulnerability to COVID-19 and impacts in the introductory section of the interview guide to further grounds participants in the interview's purpose. A participant suggested using mo'olelo or stories to incite a richer discussion about COVID-19 experiences and to further elaborate on the definition of food and housing security as a means to contextualize questions.
Conclusions: Pilot testing of research instruments and procedures to be used to collect data among communities should be included to capture specific and unique community impressions and feedback about the methods. The interview guide and protocol pilot testing procedure that was conducted will enhance the face validity and community relevance of the interview questions and procedures. Pilot test feedback will be reviewed to inform and finalize an interview guide and protocol iterations.

Mentor: Claire Ing, DrPH

Magan Fosso

Magan Fosso is a fourth year undergraduate student at the George Washington University (GW) in Washington D.C. She is majoring in Biology with a minor in Psychology on the Pre-Medical Track. She aspires to become a physician working with women and children and to continue to conduct research in health disparities specifically those that affect black women. She has previously participated in laboratory research as a laboratory assistant at the GWU in the Clinical Immunology Lab. She applied to the MHRT program because she wanted to understand how to conduct a research project from formulation of the idea to carrying out/testing the idea. Though COVID-19 shifted the usual structure of this program, MHRT still taught her the skills she had hoped to gain. She has been participating in MHRT, including her research, remotely from Dallas, Texas where her family lives because of Hawaii's travel restrictions. She is passionate about fitness, cooking, and spending time with family and friends.

Research Project

Telmisartan as a Therapeutic Angiotensin Receptor Blocker for COVID-19

Background: Telmisartan is an AT1 receptor antagonist used to treat hypertension. Telmisartan is not metabolized by cytochrome P450 enzymes. Most of the oral dose is excreted unchanged in feces. The mechanism of action of the drug is to block the binding of angiotensin II to the AT1 receptors, which prevents the vasoconstriction and aldosterone-secreting effects. Telmisartan could be utilized as a therapeutic measure to treat symptomatic COVID-19 patients with hypertension. COVID-19 is a severe respiratory illness that is caused by SARS-CoV-2. The use of AT1 receptor antagonist can prevent the release of proinflammatory cytokines, which will reduce the severity of COVID-19 associated symptoms.
Objective: To understand the mechanism of action of telmisartan in the body and potential therapeutic effect among patients with COVID-19 associated hypertension.
Methods: The studies utilized in this review discussed the mechanism of action of telmisartan, telmisartan compared to other angiotensin II receptor blockers (ARB), and the use of telmisartan to treat hypertension. Google Scholar was used to search the literature which provided access to articles, theses, books, and abstracts. Most of the articles and research documents found were from sites including PubMed, Nature, WHO, clinicaltrials.gov, FDA, NIH, Mayoclinic, ScienceDirect, and Researchgate. From these websites, it was possible to screen titles, abstracts, and research papers, and a few studies were used for the systematic review.
Results: Higher blood pressure reductions have been found with higher doses of telmisartan (80 mg). The reduction of systolic and diastolic blood pressure was upto 15.5 and 10.5 mmHg. Compared to other ARB, telmisartan has the highest liposolubility, which allows for better tissue penetration. It has the highest half-life of 24 hours, reflecting a longer duration of action. It has a higher affinity for the angiotensin II type 1 receptor. It also has the ability to pass through the blood-brain barrier.
Conclusions: The literature review proved the effectiveness of telmisartan in reducing the incidence of hypertension. Studies showed evidence of the anti-hypertensive nature of telmisartan. Based upon these results we propose that telmisartan will have a similar mechanism of action in COVID-19 patients resulting in less severity of the disease.

The University of Hawaii has an ongoing study using telmisartan or placebo in people diagnosed with COVID-19. Call Cris @ 692-1335 or cmilne@hawaii.edu for more information.

Mentor: Vivek R. Nerurkar, DMLT, MSc, PhD

Kyle Tran

Kyle Tran is a fourth-year undergraduate student at the University of Hawai‘i at Mānoa (UHM) majoring in biochemistry and mechanical engineering. His research topic is image-based reaction monitoring/classification where a microfluidic card is used as a platform to run viral infection detection tests. After the MHRT program, he will continue to work under his mentor Dr. Daniel Jenkins. Kyle hopes to pursue a career in biomedical engineering to develop prosthetic devices and artificial organs. In his free time, he loves to play basketball and videogames with his friends. His hobbies also include crafting and creating things using his 3D printer. Kyle deeply appreciates the MHRT program for providing him experience in research and introducing him to a field he strives to be in.

Research Project

The Development of a Microfluidic Card for Detection of Infectious Pathogens Using Loop-Mediated Isothermal Amplification Technique

Background: Isothermal nucleic acid-based amplification techniques, such as Loop-Mediated Isothermal Amplification (LAMP), are commonly used for portable diagnostic applications to detect infectious pathogens such as the SARS-CoV-2. Clinical diagnostics require internal controls for proper test validation. However isothermal amplification is difficult to multiplex without impairing assay performance because of vigorous reaction with amplification once a single reaction is initiated. Currently, a diagnostic card is being developed to automatically distribute samples to multiple reaction zones in the card to achieve parallel multiplexing without additional sample manipulation. Reaction wells contain freeze-dried primers and reagents to support the diagnostic assay. It is critical that the sample front does not break through the individual wells, which would result in dilution of essential reagents. It is also desirable that delivered sample “stick” in reaction wells while the fluid is subsequently withdrawn from the common fill channel to prevent diffusion of primers between wells.
Hypothesis: We hypothesize that coating the reaction wells with polyethylene glycol will enhance the hydrophilicity of the well, enabling the sample to "stick" in the desired area of the card.
Objective: The objective of this project is to design a fluidic card where diagnostic samples can be distributed into individual reaction wells accurately without any reagents being diluted or washed out.
Materials and Methods: Prototype cards were fabricated from clear polypropylene sheets by vacuum forming over a mold printed with a stereolithographic 3D printer. A dilute solution of polyethylene glycol (PEG) is pipetted into each reaction and allowed to dry to improve specific adhesion of the aqueous samples. Before loading the sample, a PCR film was placed on the card. The sample is sealed in the card after loading by removing the adhesive backing from a small portion of the film. The sample was distributed to the wells by squeezing the sealed loading zone, or by applying heat (resulting in thermal expansion in the headspace gas and increase in vapor pressure). The effectiveness of the PEG coating was evaluated by delivering samples through the fill channel to individual reaction wells, in cards with and without the PEG treatment.
Results: Reaction wells coated with PEG fill more reliably and prevent breakthroughs compared to uncoated wells.
Conclusion: PEG will help retain the aqueous sample in the reaction wells.

Mentor: Daniel Jenkins, PhD

Renn Silve Salomon, BS

Renn was born in the Philippines and moved to Hawai`i when he was 7 years old. He graduated from the University of Hawai'i at Mānoa (UHM) in Spring 2020 with a BS in Biology. Renn has been working as a student assistant at the John A Burns School of Medicine (JABSOM) in the Tropical Medicine Department. Renn is accepted in the Tropical Medicine Graduate Certificate for the Fall 2020 semester where he plans to get expose to Tropical Infectious Diseases curriculum and a potential academic option. He is also considering pursuing a Medical Degree at JABSOM. His end goal is to become a physician and give back to the community by providing free clinics and services around the island. With no prior research experience, being in the MHRT program has provided Renn with a crash course into conducting a research project. During downtime, he likes to play video games and binge watch anime.

Research Project

Development of Multiplex Microsphere Immunoassay for Detection of SARS-CoV-2 Antibodies

Background: There are currently three main technologies available to detect SARS-CoV-2; (1) molecular, (2) antigen, and (3) serology. Molecular tests detect the presence of SARS-CoV-2 RNA, antigen tests detect the presence of viral proteins, and serological tests detect the presence of SARS-CoV-2 specific antibodies. Molecular and antigen-based testing diagnose a current infection, while serology indicates history of infection. Serology is a useful public health tool to evaluate prevalence of SARS-CoV-2 infection at a population level and to characterize the immune responses to SARS-CoV-2 that can be useful in the development of therapeutics and vaccines. Here we describe the development of a multiplex microsphere immunoassay (MIA), which can simultaneously detect IgG antibodies against spike (S) and nucleocapsid (NP) proteins from seven human coronaviruses, including SARS-CoV-2.
Objective: Develop sensitive, specific and rapid assay for detection of SARS-CoV-2 IgG antibodies in humans.
Materials and Methods: A multiplex MIA was developed by coupling microspheres with spike (S1) and nucleocapsid (NP) proteins of SARS-CoV, SARS-CoV-2, MERS-CoV, and four common cold coronaviruses (HCoV-NL63, HCoV-HKU1, HCoV-229E, HCoV-OC43). Monoclonoal antibodies specific for aforementioned cornonaviruses were used to develop the MIA and the assay was validated using a panel of five SARS-CoV-2 positive convalescent serum samples and nine serum samples collected prior to the COVID-19 pandemic.
Results: The SARS-CoV-2 mAb for S1 and NP proteins reacts with its respective antigens from both SARS-CoV and SARS-CoV-2. However, they do not react with the MERS-CoV and other common cold coronaviruses S1 and NP proteins. SARS-CoV-2 positive serum samples are positive for both the NP and S1 antibodies whereas serum samples obtained from individuals not exposed to SARS-CoV-2 are negative.
Conclusions: Data shows that, i) SARS-CoV-2 antibodies for NP have a higher median fluorescence intensity than antibodies for S1 protein, ii) the antibodies for NP have a higher cross reactivity with other coronavirus NP antigens, and iii) antibodies to the S1 protein are highly specific. Having both SARS-CoV-2 S1 and NP antigens increases the assay specificity. Further assay development is warranted using a large panel of SARS-CoV-2 positive and negative serum samples for assay validation and for determination of postive and negative predictive values.

Mentors: Lauren L. Ching, BS and Vivek R. Nerurkar, DMLT, MSc, PhD

Angela Phillips

Angela Phillips is a first generation Filipino-Australian, born and raised in New South Wales, Australia. Upon completing her high school education, she immigrated to the United States. She is now in her final year of a bachelor's degree majoring in Biology at the University of Hawai'i at Mānoa. Prior to MHRT, Angela had no research experience, but through the program has now had the opportunity to pursue research with the Filipino communities she hopes to serve in the future. Angela aspires to become an obstetrician and gynecologist (OBGYN) and provide family planning services throughout State of Hawai'i. In her free time, Angela enjoys crocheting, baking desserts, and playing with her cat Honey.

Danny Domingo, Jr.

Danny Domingo, Jr. is of Filipino ancestry and was born and raised on the island of Maui. He is an incoming senior at the University of Hawai'i at Mānoa (UHM) double majoring in Biology and Ilokano Language and Literature. He works with the Online Learning Academy at UH Mānoa as a math and science tutor and is president of the Timpuyog Organization. Danny aspires to become a physician and serve his Maui community. He spends his free time with family and friends, working out, and at the beach.

Julienne Rose Salindo

Julienne Rose Saladino is a fourth-year undergraduate student at the University of Hawai'i at Mānoa (UHM) majoring in Public Health. She is of Filipino descent, was born and raised in Kalihi, and graduated from Farrington High School. She is interested in learning about Filipino health and is currently focusing her public health capstone experience on learning about health disparities among Filipino populations in Hawaii. After graduation, she plans on pursuing a Master of Public Health degree in Social and Behavioral Health Sciences at UH Manoa. Thereafter, she plans on applying to medical school and aspires to be a family medicine physician. She hopes to work in primary care and utilize her public health background to provide community centered, quality health care to Hawaii's underserved and disadvantaged populations. During her free time, she enjoys watching YouTube videos and spending time with her sister.

Research Project

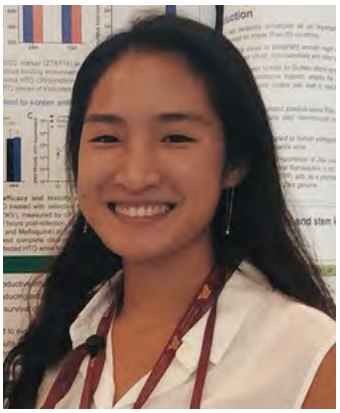
COVID-19 Impacts on Filipino Immigrants in Hawaii and Culturally Appropriate Informational Resources

Background: Racial and ethnic minorities experience higher disease morbidity and mortality. As of July 31, 2020, Filipinos constitute 18% of coronavirus disease 2019 (COVID-19) cases in Hawai'i, but only comprise 16% of the State's population. Higher rates of diseases among a particular community group may be attributed to policies and healthcare access, knowledge about prevention and screening, language access, and health literacy.
Objectives: This study aims to examine barriers to compliance with COVID-19 prevention practices and to accessing and receiving healthcare for Filipino immigrants residing on O'ahu and Maui. This study will then assess to what extent public health policies support immigrants in the prevention of COVID-19 and accessing healthcare services during the COVID-19 pandemic. Results will be used to develop culturally and linguistically-responsive efforts to support the Filipino immigrant community in Hawai'i through the COVID-19 pandemic.
Materials and Methods: An institutional review board (IRB) application to the University of Hawaii at Manoa Human Studies Program was prepared. The IRB application explained protocols that ensured research participants were adequately informed of their voluntary rights to decide to participate, that their information would be kept confidential, that the research team received human subjects training, and the information and procedures used to collect data from participants.

Cross-sectional data was collected using mixed-methods (quantitative and qualitative data), involving surveys and key informant interviews with Filipino community members. A survey using existing instruments related to COVID-19 knowledge, attitudes, and behavior was created in English and Ilokano. Initial survey participants (5 seeds) and key informants were selected from existing social networks. Respondent-driven sampling (RDS) was used to recruit survey respondents, and surveys were administered online. Key informants were interviewed online or over the phone using a semi-structured interview guide. Descriptive statistics were analyzed for the survey data. Coding themes were identified for the interview data by two coders.
Results: The UH HSP provided institutional review board approval of the research project effective July 30, 2020 (IRB #2020-00506). Data collection comprised of key informant interviews and surveys commenced. Three key informant interviews were completed averaging about 30 minutes. Fifty community members from Oahu and Maui have responded to the survey.
Conclusions: Though RDS procedures have promise in recruiting survey participants, there may also be limitations. Research is ongoing. Survey data will be further analyzed to examine correlates related to barriers in COVID-19 prevention and healthcare access among Filipino immigrants in Hawaii. Themes will also be identified from survey and interview results to propose culturally appropriate methods for information dissemination.

Mentor: Dr. Angela Sy, DrPH, MPH

Boonyanudh Jiyarom, BS



Boonyanudh is a first-generation Thai-American born and raised in Los Angeles, California. She received her Bachelor of Science in Molecular and Cell Biology from the University of Hawai'i at Mānoa (UHM) in 2018. She participated in the MHIRT program as an undergraduate in 2018. She was an IDeA Networks of Biomedical Research Excellence (INBRE) and The Undergraduate Research Opportunities Program (UROP) funded student while working under Dr. Saguna Verma at the Department of Tropical Medicine, Medical Microbiology and Pharmacology, JABSOM, UHM as an undergraduate researcher. She is currently pursuing her MS research project on understanding testicular pathogenesis of Zika virus in the Verma lab. Her MHIRT project is to use her skills learned during her MS training to characterize SARS-CoV-2 pathogenesis in the testes. She plans to continue pursuing higher education in the research field, because she has high sense of curiosity for science. Outside of the lab and academics, Boonya finds time to relax through spending outdoor time with her Golden Retriever (Petri Dish). She is also a wine enthusiast and plans to be a sommelier one day.

Research Project

In Vitro Characterization of SARS-COV 2 Infection in Human Testicular Cells

Background: There is pressing urgency to understand the pathogenesis of the highly pathogenic virus severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which causes the disease COVID-19, and adverse outcomes are further compounded by older age and comorbidities. Studies from multiple countries report that males are at higher risk of infection and disease severity. Further, males with COVID19 showed mild orchitis symptoms, and significant alterations in the levels of testosterone and sperm parameters. SARS-CoV-2 enters cells by binding of its spike protein to its receptor angiotensin-converting enzyme 2 (ACE2). Interestingly, the expression of ACE2 is very high in the testes, including Leydig (LC) and Sertoli cells (SC), and its physiological functions include regulating testosterone production and local vascular regulatory system. These data collectively suggest that SARS-CoV-2 can infect testes and affect downstream functions. However, several gaps remain in our understanding of testicular infection of SARS-CoV-2.
Objective: The overall objective of this pilot study is to characterize SARS-COV-2 infection in ACE2 expressing testicular cells.
Materials and Methods: We infected SC and LC with SARS-CoV-2 at MOI 1 and used immunofluorescence assay to detect viral antigen at 48 hr after infection.
Results: Our results demonstrating positive virus signal in both these cell types provide strong evidence that both SC and LC can be infected in vitro.
Conclusions: The ongoing study will investigate the effect of infection on the antiviral response and essential testicular functions. Unraveling the mechanism in which SARS-CoV-2 causes testicular injury might provide insights into why males are more susceptible to COVID-19 and may guide therapeutic strategies.

Mentor: Saguna Verma, PhD

Kaitlin Driesse, BA, MPH

Kaitlin Driesse is a first-generation college graduate from upstate New York. She received her bachelor's degree in Biology and MS in Epidemiology, as well as graduate certificates in Global Health Studies and Public Health Surveillance and Preparedness from the University at Albany. While studying for her MS degree, she completed internships at the New York State Department of Health where she studied tick-borne disease epidemiology, and vaccine preventable disease surveillance. She also conducted a summer internship studying the gut microbiome of hematophagous arthropods at the Smithsonian Tropical Research Institute in Panama City, Panama. As a PhD student in the lab of Dr. Wei-Kung Wang, her research focuses on the antibody response to dengue and Zika viruses. Her MHRT project involves analyzing blood samples from a cohort of pregnant women during the Zika outbreak in Salvador, Brazil to determine flavivirus immune status and cross-reactive antibodies in mothers and relationship to outcomes in infants. She plans to pursue a career in global health.

Research Project

Characterization of Cross-reactive Antibodies to Dengue and Zika Viruses in Pregnant Women During the Zika Outbreak in Brazil

Background: The outbreak of Zika virus (ZIKV) and associated congenital Zika syndrome in dengue virus (DENV)-endemic regions raised important questions about the effects of ZIKV infection on DENV immunity and disease outcome and vice versa, which further highlighted the need of serological tests that can discriminate different DENV and ZIKV infections. Previously we developed combined DENV and ZIKV non-structural protein 1 (NS1) enzyme-linked immunosorbent assays (ELISAs) to overcome the cross-reactivity of traditional envelope protein-based serological tests.
Materials and Methods: In this study, we used the ELISA developed in our laboratory to screen 138 serum samples collected from asymptomatic parturient women during the Zika outbreak in Salvador, Brazil and identified four serostatus groups. We further characterized the antibody responses in 32 participants including primary DENV (pDENV), secondary DENV (sDENV), primary ZIKV (pZIKV), and ZIKV with previous DENV (ZIKVwprDENV) infections by different ELISAs and neutralization tests. Using depletion experiment with inactivated ZIKV and urea test, we determined the IgG avidity to DENV.
Results: Using depletion experiments with inactivated DENV1-4 and endpoint ELISA titers, we determined the ZIKV type-specific and cross-reactive antibodies and found that pZIKV panel had high proportion of ZIKV type-specific antibodies (70-82%), whereas the ZIKVwprDENV panel had a higher proportion of DENV cross-reactive (84-98%) than non-cross reactive (2-16%) antibodies to ZIKV. After depletion with inactivated ZIKV, the ZIKVwprDENV panel had a higher proportion of ZIKV-cross reactive (42-91%) than non-cross reactive (9-58%) antibodies to DENV.
Conclusions: In contrast to a previous report of predominant ZIKV type-specific antibody following ZIKV infection, our findings showed a high proportion of DENV-ZIKV cross-reactive antibody generated among those of ZIKVwprDENV infection. The relationship of these cross-reactive antibodies to ZIKV neutralization and pregnancy outcomes remains to be further investigated.

Mentor: Wei-Kung Wang, ScD, MD

Brien Haun, BS

Brien Haun is from a low-socioeconomic background in Clearwater, Florida. He earned his associate's degree in Biomedical Sciences from St. Petersburg College as a non-traditional student. He then moved to Honolulu to pursue a bachelor's degree in Molecular Cell Biology. He worked as a research coordinator at Kapiolani Community College mentoring students in molecular biology and immunology. Currently, he is pursuing a PhD degree in Cell and Molecular Biology with an emphasis on improving antibody responses to immunization. Professionally, Brien aspires to run a research lab focused on developing therapeutics for infectious diseases. In his free time, he enjoys oceanic activities, photography.

Research Project

CoVaccine HT™ Adjuvant Potentiates Robust Immune Responses to Recombinant SARS-CoV-2 Spike S1 Immunization

Background: The current COVID-19 pandemic has claimed hundreds of thousands of lives and its causative agent, SARS-CoV-2, has infected millions, globally. The highly contagious nature of this respiratory virus has spurred massive global efforts to develop vaccines at record speeds. In addition to enhanced immunogen delivery, adjuvants may greatly impact protective efficacy of a SARS-CoV-2 vaccine.
Objective: To investigate adjuvant suitability, we formulated protein subunit vaccines consisting of the recombinant S1 domain of SARS-CoV-2 spike protein alone or in combination with either CoVaccine HT™ or Alhydrogel.
Material and Methods: BALB/c mice (n=29) were used to study the immunogenicity of 5 µg SARS-CoV-2 spike-S1 protein when mixed with CoVaccine HT™, Alhydrogel (Alum), or PBS. Mice were vaccinated twice, three weeks apart (days 0 and 21), intramuscularly. Serum was harvested at days 14, 28, and 35 and immunoglobulins were assessed using microsphere immunoassay. Antibody neutralization of wild-type SARS-CoV-2 was assessed at Bioqual (Maryland) in a BSL-3 facility. Splenocytes were harvested from a small subset of animals (n=8) at day 28 and an ELISPOT was conducted to detect INFγ expression levels.
Results: CoVaccine HT™ induced high titres of antigen-binding IgG after a single dose, facilitated affinity maturation and class switching to a greater extent than Alhydrogel and elicited potent cell-mediated immunity as well as virus neutralizing antibody titres.
Conclusion: Data suggests that adjuvantation with CoVaccine HT™ can rapidly induce a comprehensive and protective immune response to SARS-CoV-2 and allows accelerated preclinical and clinical development of a SARS-CoV-2 vaccine to mitigate the ongoing COVID-19 pandemic.

Mentor: Axel T. Lehrer, PhD

Dustin Valdez, BA

Dustin has a mixed ancestry of Filipino, Japanese, Chinese and Native Hawaiian. He was born and raised on the island of Kauai and grew up in the town of Kapa'a. He graduated from UCLA in 2014 and is pursuing graduate studies (PhD) at the University of Hawaii at Manoa in the Human Nutrition Food and Animal Sciences (HNFAS) Department. He has researched on reducing excessive gestational weight-gain for women in the Hawaii Women, Infant & Children (WIC) program. He currently is working as a graduate research assistant at the University of Hawaii Cancer Center testing accessible breast cancer screening technology for low resource women in the Pacific. In his free time, he enjoys training in taekwondo and taiko drumming.

Research Project

Evaluation of Accessible Early-Detection of Breast Cancer Screening Technology for Women in the Pacific

Background: Breast cancer is the most common type of cancer for women worldwide. However, there is a large health disparity in breast cancer detection for women in the Pacific. A large proportion of female breast cancer cases in the Asia-Pacific regions are only detected after symptoms appear, which leads to higher mortality rates than women in the US and Europe. While mammography is the current gold standard for breast cancer screening, there are sufficient barriers such as cost and training that prevent it from being adopted in low resource areas. Therefore, a low-tech and easy-to-use alternative is needed to aid in breast cancer detection. One such device is the iBreast Exam (iBE) which is a tactile hand-held imaging device that can directly measure local relative elasticities of breast tissue. The stiffness of normal breast fat and fibroglandular tissue are similar, but malignant tumors can exhibit a 3-6 fold increase in stiffness and high-grade invasive ductal carcinoma show up to a 13-fold increase in stiffness compared to fibroglandular tissue. Therefore, the iBE detects tumors by finding areas of localized increased stiffness compared to the background breast tissue.
Objective: To characterize the iBE device in terms of tumor detection properties using phantoms with tissue-like elasticities to understand the detectability of malignant lesions in terms of size, depth, and surrounding breast stiffness.
Materials and Methods: A testing apparatus was constructed to test the iBE device to ensure consistent positioning and pressure application. In total, five types of breast phantoms were created of various stiffnesses which was controlled by altering gelatin concentration (3%, 4%, 5%, 6%, 7%). The test tumors were created from the same gelatin material and cut into various sized cubes (2mm, 4mm, 8mm, 16mm, 20mm, 25mm). Finally, each tumor and breast phantom type was tested at 0.5 cm depth increments (0.5 cm to 5 cm).
Results: Testing shows that the iBE can detect tumors as deep as 2 cm, but only if the lesion is greater than 1 cm in diameter. The smallest sized tumor the iBE could detect was 8 mm in diameter but only at a depth of 0.5 cm.
Conclusions: The iBE shows promise for detecting breast lesions that are greater than 1 cm in diameter and at most 2 cm deep in tissue, but these limitations may affect its usefulness as an early breast cancer detection resource.

Mentor: John Shepherd, PhD

Lauren Ching, BS

Ms. Ching is a Graduate Assistant and Ph.D. candidate in the Department of Tropical Medicine, Medical Microbiology, and Pharmacology at the John A. Burns School of Medicine. Her research expertise is in molecular biology, virology, and tissue culture. Her research project is aimed at investigating the immunopathogenesis of Kawasaki disease (KD) in clinical samples to identify novel therapeutic targets, and potential biomarkers of disease to improve the diagnosis of KD. She is also involved in other research projects in the laboratory that focuses on the development of novel immunodiagnostics for sero-surveillance of medically important flaviviruses (ie. ZIKV, DENV, WNV, JEV, HCV), and coronaviruses (ie. SARS-CoV, MERS-CoV, SARS-CoV-2, etc.).

Andrea Hepuapoʻokela Hermosura, PhD

Dr. Andrea Hepuapoʻokela Hermosura, PhD is a Native Hawaiian Assistant Professor in the Department of Native Hawaiian Health at the John A Burns School of Medicine and a licensed clinical psychologist at the Queen's Medical Center and the Physician Center Mililani. She graduated from the University of Hawaiʻi at Mānoa with PhD in Clinical Psychology in 2014. She has been very involved in the assessment and training of non-technical skills (i.e., leadership, teamwork and communication, situational awareness, decision making) for healthcare providers as a way to enhance the culture of safety, create a just culture, and improve patient safety and quality. Her research focuses on ways to better understand determinants of health, such as racism and implicit bias that contribute to the health disparities experienced by Native Hawaiians and Pacific Islanders (NHPI) compared to the other racial and ethnic groups in Hawaii. Ultimately, these findings will help to develop culturally safe interventions to improve the healthcare quality of and safety for NHPIs.

Claire Townsend Ing, DrPH

Dr. Ing is an Assistant Professor in the Department of Native Hawaiian Health (DNH), John A Burns School of Medicine, University of Hawaiʻi at Mānoa (UH Mānoa). Her long held academic and research interests are in health disparities informed by a social determinants framework. She received a BA in Anthropology from Pomona College, a MPH in Health Behavior and Health Education from University of North Carolina at Chapel Hill, and a DrPH in Community-based and Translational Research from the UH Mānoa. Dr. Ing served as the coordinator for several community-based participatory research (CBPR) projects in the DNH. Dr. Ing was awarded a K01 from NHLBI to examine the use of systems science and community-based participatory research to understand and address cardiovascular health disparities in Native Hawaiians. She collaborates with community and academic partners to adapt, test, and disseminate two culturally congruent, evidence-based health promotion programs.

Daniel M. Jenkins, PhD, PE

Dr. Jenkins is a Professor in the Department of Molecular Biosciences and Bioengineering of the College of Tropical Agriculture and Human Resources, having joined the UH Manoa faculty in 2002. He received his PhD in Biological and Agricultural Engineering from the University of California at Davis. His research focuses on a wide array of instrumentation and control systems related to agriculture and environment, with a heavy emphasis in portable and affordable molecular diagnostics for plant and animal disease. Dr. Jenkins teaches undergraduate and graduate courses in the Biological Engineering program, and has served as research advisor for numerous minority undergraduates who have gone on to complete advanced degrees and work in biomedical and other high-tech industries.

Joseph Keaweʻaimoku Kaholokula, Ph.D.

Dr. Joseph Keawe Kaholokula is Professor and Chair of the Department of Native Hawaiian Health at the John A. Burns School of Medicine and a licensed clinical psychologist. He has a strong commitment to achieving health equity and improving the health of Indigenous communities. His research involves developing community and culturally relevant health promotion programs to address diabetes and cardiovascular disease inequities in Native Hawaiians and Pacific Islanders using community-based participatory research. His research also examines how biological, psychosocial, and sociocultural factors interplay to affect NHPI risk for and management of chronic diseases. His work has had a local, regional, and national impact bringing systemic improvements to health care delivery, clinical outcomes, and policy through community-based research efforts. Dr. Kaholokula is member of the National Advisory Council on Minority Health and Health Disparities, NIH. On a local level, he serves on boards of organizations with a mission to improve population and Native Hawaiian health including the Queen's Health Systems and Hawaiʻi Public Health Institute. As a Native Hawaiian, he is passionate about improving the health of Native Hawaiians and Pacific Islanders and has made a life-long commitment to improving their social and cultural determinants of health.

Axel T. Lehrer, PhD

Dr. Lehrer is an Associate Professor in the Department of Tropical Medicine, Medical Microbiology and Pharmacology, and is a biochemist with training and experience in molecular biology, virology and immunology. For over ten years, he worked in the biotech industry mainly on the development of recombinant subunit vaccines against infectious diseases. Dr. Lehrer's laboratory researches the preclinical development of a recombinant subunit filovirus vaccine. He is interested in the development of assays to analyze cellular and humoral immune responses against vaccines and natural filovirus infections with a particular focus on defining correlates of protection. Furthermore, he is trying to identify and characterize the roles of various filoviral proteins on induction of severe disease.

Vivek R. Nerurkar, DMLT, MSc, PhD

Dr. Nerurkar is a Professor and Chair of the Department of Tropical Medicine, Medical Microbiology and Pharmacology at John A. Burns School of Medicine. He joined the University of Hawaii at Manoa in 1994 to develop the Research Centers in Minority Institutions Program, NCRR supported Retrovirology Activity following a five-year appointment as a Visiting Fellow and Visiting Associate of the NINDS, NIH. His major area of research interest is in infectious diseases, specifically the study of pathogenesis of orphan diseases and orphan microbial agents. Over the past three decades he has conducted research in the diverse but related areas of virology, specifically neurovirology.

John Shepherd, PhD

Dr. Shepherd has a 30-year background in quantitative imaging. His academic research involves developing novel biomarkers for a variety of imaging modalities including dual-energy X-ray Absorptiometry (DXA) scan for bone density and body composition, mammography for breast density and tissue textural measures as risk factors for breast cancer, and 3-D optical whole body scanning for quantifying body shape as a risk factor for metabolic diseases. Methods include principal component analysis, shape and appearance modeling, deep learning, and artificial intelligence approaches. While at the University of California-San Francisco, he accumulated over 4 million mammograms for the study of breast cancer risk from imaging and was one of the first to show that volumetric breast density measures are a stronger risk predictor than areal density measures. He holds four patents in quantitative imaging. His group has been expert consultants for the NHANES study DXA component for 20 years.

Angela Sy, DrPH

Dr. Sy conducts community based participatory research (CBPR) and program evaluation with a focus on priority public health issues among Asian and Pacific Islander communities. She is the Program Administrator and Evaluator of the Minority Health Research Training Program (MHRT). She also serves as co-investigator of a National Institutes of Health funded Indigenous Samoan Partnership to Initiate Research Excellence. Dr Sy has taught research and community health courses including research methods, CBPR, qualitative methods, program evaluation, and needs assessment. She is also a faculty member of the UHM Undergraduate Honor's program where she teaches Senior Honors Thesis Proposal (Introduction to Research Methods).

Saguna Verma, PhD

Professor in the Department of Tropical Medicine, Medical Microbiology and Pharmacology, University of Hawaii, is a formally trained virologist and immunologist. Her research uses both in vitro and in vivo models to understand mechanisms that inhibit or enhance protective immunity to viruses including transmigration of across different blood-tissue barriers, and leverage this information to identify novel targets for immunotherapies. The focus of her ongoing research is to understand why and how newly emerging RNA viruses (Zika, Ebola and SARS-CoV-2 viruses) can infect testes and affect downstream functions. In addition, she is also actively involved in teaching and mentoring graduate and medical students and serves on several NIH study sections and editorial boards of scientific journals.

Wei-Kung Wang, MD, ScD

Dr. Wang is a Professor in the Department of Tropical Medicine, Medical Microbiology and Pharmacology, and is a physician scientist with training in internal medicine, infectious diseases and molecular virology. Dr. Wang's research aimed to understand the pathogenesis and antibody responses following flavivirus infection and facilitate the development of vaccines and serodiagnosis. Previously he demonstrated the quasispecies nature of dengue virus in humans and mosquitoes, and identified key residues and neutralizing epitopes on envelope proteins using virus-like particles. With his discovery of critical fusion loop residues contributing to flavivirus cross-reactivity, he has developed new serological tests to distinguish dengue, Zika and other flavivirus infections, which laid the groundwork to exploit flavivirus surveillance and immunopathogenesis in endemic regions.

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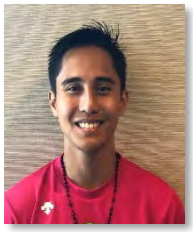

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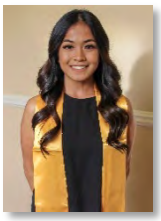

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