One who mixes ingredients, drugs or medications: a pharmacist

Kāwili Lā'au

Research Edition • Volume 5, Issue 2

Focus on Research

Message from Dean Pezzuto

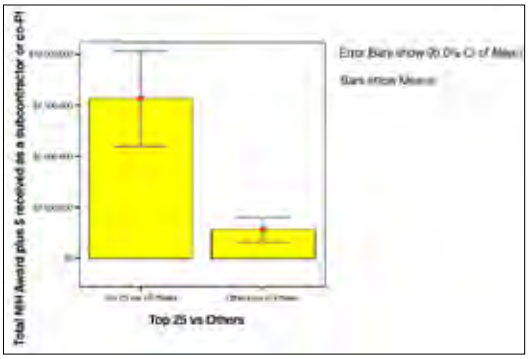
This edition of our *Kāwili Lā`au* magazine highlights some very exciting projects as well as our overall commitment to research excellence. You will discover more about the science behind the research as well as note the various publications of our entire faculty, all of which show how our College has the ability to lead and to collaborate with scientists all over the country.

While our pharmaceutical scientists are making new discoveries in the lab, our pharmacy practice faculty are engaged in health services research to transform healthcare. As the physical and economic health of our nation's population is at stake, we urge all pharmacy leaders to be part of improving patient care and the practice of pharmacy. In the College of Pharmacy at the University of Hawai'i Hilo, we welcome collaborations with local and national leaders to advance these important goals and we train our students to become the leaders of the future.

As an example of this leadership, I would like to draw your attention to the article on page 2, which describes the key role of the College of Pharmacy in a CMS Health Care Innovation Award that has the potential to improve the way pharmacists practice and are compensated nationwide. This project was initiated thanks to the vision of the leaders of the Hawaii Community Pharmacist Association (HCPA). We are proud to be partners with HCPA and our rural hospitals in alignment with the three aims of CMS: Better health, better health care, lower cost. Our application was one of 107 projects selected out of 3,000 applications. Ours is one of only a few of these projects implementing a pharmacist-driven innovation.

While our CMS-funded project demonstrates the leadership of our local independent pharmacies, we are also interested in recent initiatives involving the national retail chain pharmacies. For example, I had the pleasure of meeting with Walgreens executives in Chicago last year at a conference they hosted for pharmacy school Deans. They introduced us to the Walgreens WellTransitions℠ program designed to reduce hospital readmissions and overall health care costs while improving patient outcomes and medication adherence. Pilots of this Walgreens model are self-funded and currently underway in Maryland, Florida, and Indiana. In another example of the changing pharmacy landscape, the Rhode Island-based corporation, CVS Caremark, has become the exclusive provider of pharmacy benefit management services for Hawaii's largest commercial health insurer, HMSA. CVS Caremark processes prescription drug claims for members who have HMSA drug coverage.

Thus, in both the private and public sectors of healthcare, new models and strategies are emerging to leverage the unique expertise of pharmacists. A 2011 report by the Office of the Chief Pharmacist stated: "Failure to recognize expanded roles of pharmacists limits the potential for patients and our health care system to benefit from access to additional quality primary care services...However, in terms of pharmacist services, as the complexity or level of clinical service increases, the revenue generation potential is reduced. This is in stark contrast to the clinical services provided by other health professionals" (Giberson S, Yoder S, Lee MP. Improving Patient and Health System Outcomes through Advanced Pharmacy Practice. A Report to the U.S. Surgeon General. Office of the Chief Pharmacist. U.S. Public Health Service. Dec 2011). Through our collaboration with HCPA, we aim to change this for all patients and pharmacists.



Another one of our aims is to become a top-25 ranked College of Pharmacy. In the 2012 *US News and World Report* rankings, UH Hilo College of Pharmacy was ranked 74 out of 123 ranked pharmacy programs. One of the key correlates with top-ranking is extramural support (see graph at left). Of the 42 new pharmacy programs established in or after 2000, only three programs ranked higher than UH Hilo. One of those three is in a university that has achieved an undergraduate ranking as one of the "Top Public Schools" in the Midwest region. The other two are in universities dedicated exclusively to healthcare. Thus, the position of 74 for a pharmacy program in a small, primarily undergraduate institution currently not ranked that is categorized as a liberal arts college, is a significant accomplishment and an indication of progress toward our vision.

We hope you enjoy this special issue of *Kāwili Lā`au*. You will see another dimension of the UH Hilo College of Pharmacy – our scholarship.

Aloha,

John M. Pezzuto, PhD,
Professor and Founding Dean

Kāwili Lā'au

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University of Hawai'i Hilo

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ON THE COVER – CoP faculty who are PIs on current projects are: (clockwise from top) Drs. Dianqing Sun, Karen Pellegrin, John Pezzuto, Mahavir Chougule, Eugene Konorev, Robert Borris, Dana-Lynn Koomoa-Lange, Deborah Juarez, Leng Chee Chang, Ken Morris, Linda Connelly and Susan Jarvi.

Pharm2Pharm promises to cut down medication errors, save health care costs, involve more pharmacists

A pharmacist-care system designed to save more than $27.1 million in health care costs in Hawaii is moving forward full steam by the University of Hawaii at Hilo's College of Pharmacy (UH Hilo CoP) thanks to a $14.3 million award from the federal government.

The three-year project, called Pharm-2Pharm, is coordinated at the College of Pharmacy through its Center for Rural Health Science. Funding is being provided by the Centers for Medicare and Medicaid Services, Center for Medicare and Medicaid Innovation. Health and Human Services (HHS) Secretary Kathleen Sebelius made the second of two announcements regarding these national awards on June 15, 2012.

"This project gives us the ability to reach out to thousands of Hawaii residents and improve health care while we expand the job market for our pharmacy graduates and give our current students a heightened educational experience," said Dean John M. Pezzuto. "Meanwhile on a national level, the College of Pharmacy competed successfully against more than 3,000 other highly qualified applicants for this funding, which wouldn't have been possible without the leadership of Dr. Karen Pellegrin. With this grant, and another major federal project that she led two years ago, we are proving that the University of Hawaii at Hilo can be a model for improved health care throughout the country."

Pharm2Pharm is designed to reduce medication-related hospitalizations and emergency room visits by establishing teamwork between hospital and community pharmacists. It will involve all three rural counties in the state of Hawaii -- the Big Island, Maui and Kauai – where, according to Hawaii Health Information Corporation, there were more than 15,000 medication-related emergency room visits and more than 700 medication-related hospitalizations among elderly in 2010.

Pharm2Pharm project Maui group (left to right): Sheena Jolson, PharmD; Les Chun, MD; Ali Bairos, MD, Les Krenk, RPh; Anita Ciarleglio, PhD; Jeff Jendrysik, PMP; Karen Pellegrin, PhD

"Charges for medication-related hospitalizations and ER visits among the elderly in rural counties of Hawaii add up to about $60 million per year," said Dr. Pellegrin, who is CoP's Director of Continuing/Distance Education and Strategic Planning. "We believe that by advancing the role of the community pharmacist and improving collaboration and communication with hospital pharmacists, we can lower those costs and improve patient care."

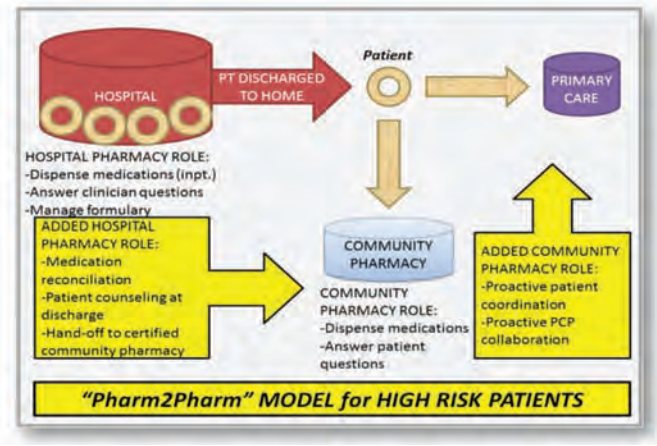
While the hospital-based pharmacists will identify those patients who will benefit the most from the Pharm-2Pharm service and begin working with them while they are in the hospital, the heavy lifting of this service rests with the community pharmacists outside the hospital, Dr. Pellegrin said. These pharmacists will see the patient within a few days of being discharged, then every month, or more often if needed, to make sure they're taking their medications properly in accordance with the physician's treatment plan. The pharmacist will also update the patient's primary care provider and let them know of any problems that might require a medication change.

The Pharm2Pharm service should be launched on Maui by early next year. The group planning the start of the program include Jeff Jendrysik, Senior Project Manager; Dr. Anita Ciarleglio, CoP Assistant Professor based on Maui; Dr. Ali Bairos, MD, Physician Leader for the CMS/Pharm2Pharm project; Dr. Sheena Jolson, PharmD, former CoP pharmacy resident who now works as a pharmacist on Maui; Dr. Lara Gomez, CoP Director of Clinical Education; and Les Krenk, RPh, who is a founding member and officer of the Hawaii Community Pharmacists Association.

Another important leader in the Maui launch is Dr. Les Chun, Chief of Clinical and Medical Affairs at Maui Memorial Medical Center, who will facilitate the implementation of the model within the Hospital. In a recent meeting with the planning group, Dr. Chun shared his experience and lessons learned from the Medicare demonstration projects he was involved with on the mainland.

"His expertise, commitment to improving patient care and support of the project have been invaluable in planning the launch on Maui," Dr. Pellegrin noted.

We expect patient satisfaction and medication safety will improve for high-risk patients within the first year, Dr. Pellegrin said. During year two, we will use health information technology to improve the communication among providers from the time a patient is discharged from the hospital. The Pharm-



2Pharm service improves patient access to care in rural areas where there are severe physician shortages and better integrates pharmacists within care teams. Hosptial pharmacists will focus on resolving medication descrepancies prior to discharge, and community pharmacists will focus on patient education and adherence.

"We can increase the chances of patients staying healthy after a hospital visit by raising the visibility and effectiveness of both community and hospital pharmacists as members of a health care team," Dr. Pellegrin said.

Hospital partners for the project are Hawaii Health Systems Corporation, which operates the only acute care hospital on Maui Island and in Kona and Hilo on Hawaii Island, and Hawaii Pacific Health, which operates the only acute care hospital on Kauai.

Infrastructure Partners include Hawaii Health Information Exchange and Hawaii Health Information Corporation.

Community pharmacy partners include from Hawaii County: Shiigi Drug Co., Ululani Pharmacy, Kamehameha Pharmacy, Oshima Store, and KTA Pharmacies; Maui County: Maui Clinic Pharmacy, Paia Pharmacy, Makawao Town Pharmacy, Rainbow Pharmacy and Molokai Drugs; Kauai County: Menehune Pharmacy, Lifeway Pharmacy-Waimea, Lifeway Pharmacy-Koloa, North Shore Pharmacy, Westside Pharmacy, Kapaa Pharmacy, Lihue Professional Pharmacy, Lihue Pharmacy, Papalina Pharmacy, Lifeway Pharmacy-Lihue.

"Basically we're trying to build a bridge between outpatients, where we already work, and the inpatient system," said Les Krenk, who owns three independent pharmacies on Maui. "Ultimately we hope to change what a pharmacist does. We will make adjustments as we go along, but it should be an exciting adventure."

Krenk said that involvement of these pharmacy partners is a strong show of support for the College, the Pharm2Pharm program, and the community.

"I personally know many pharmacists who welcome the opportunities this program presents," Krenk said. "After going through the rigors of pharmacy training, we are already on the front line with the patients to help them combat whatever disease they face, but our skills are underutilized. The real winner here will be the patients, thanks to support provided by Pharm2Pharm. Bring it on."

Other recipients of this national award included the University of Chicago and Mount Sinai School of Medicine. The first group of organizations to win the awards announced May 8 included Emory University and University Hospitals of Cleveland.

Acknowledgement of federal funding: The project described is supported by Funding Opportunity Number CMS-1C1-12-0001 from Centers for Medicare and Medicaid Services, Center for Medicare and Medicaid Innovation. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of HHS or any of its agencies.

Les Krenk (left) gives Karen Pellegrin a tour of his pharmacy in Paia, Maui.

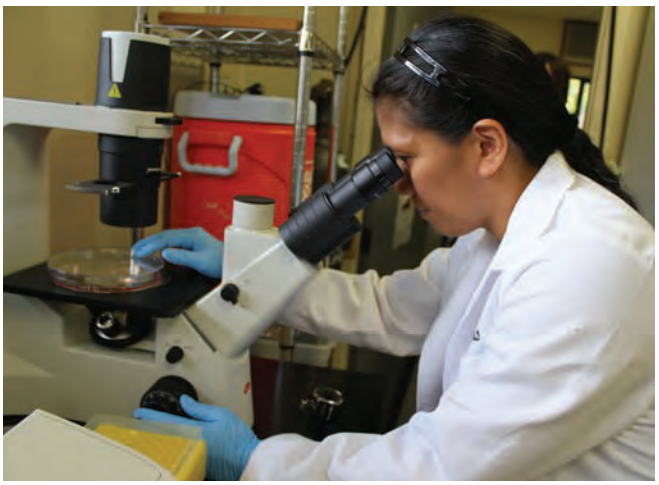
Karen Pellegrin is Director of Continuing Education and Strategic Planning, Founding Director of the Center for Rural Health Science, and a senior faculty member at the University of Hawaii Hilo College of Pharmacy. She has a strong track record of building infrastructure in support of strategic goals, and was responsible for leading the federally supported $16 million Beacon Communities grant to the Big Island of Hawaii in 2010. Prior to joining the College in 2008, she served for over seven years as an executive for Compass Point Research, a corporation with three subsidiaries providing clinical trials management and ethics review services and technology throughout the US. There she served as Vice President for Quality Management and Strategic Planning, Chief Compliance Officer, and then as its President. She began her career at the Medical University of South Carolina (MUSC), where she completed her pre-doctoral internship and post-doctoral fellowship and served as a member of the MUSC Medical Center management team and junior faculty member. She received her PhD in Clinical Psychology from the University of South Florida and her MBA from The Citadel, The Military College of South Carolina. In the classroom, Dr. Pellegrin is Course Developer, Coordinator, and Lecturer for Personal Finance and has lectured in Wellness, Prevention, and Disease Management, Pharmacy Law and Ethics, Marketing and Management, Pre-Pharmacy Orientation and a graduate psychology course called Ethics and Professional Identity.

CoP faculty member receives K01 career development award from the NCI

Dr. Dana-Lynn T. Koomoa-Lange, assistant professor in the College of Pharmacy (CoP) at the University of Hawai`i at Hilo, has received a career development award from the National Cancer Institute (NCI). This is a first for UH Hilo, and the only award of this type from the NCI to be given to a Native Hawaiian in the entire UH system.

The five-year career development award is called the "NCI Mentored Research Scientist Development Award to Promote Diversity (K01)." A National Institutes of Health (NIH) requirement of the award is that the research be performed "under the guidance of an experienced mentor, or sponsor, in the biomedical, behavioral, or clinical sciences leading to research independence." CoP Dean John Pezzuto is her faculty mentor for the grant.

"This is a highly competitive and prestigious award, one which very few in the entire University of Hawai`i system will ever have a chance to receive. Dana is a very talented scientist who is destined to be one of our stars," said Pezzuto, who is well known for his research that identified resveratrol as a cancer-fighting agent in grapes and grape products.



Koomoa-Lange's research, entitled "MYCN-induced calcium and magnesium signaling regulates neuroblastoma progression," will concentrate on finding an effective treatment strategy for advanced stage neuroblastoma (NB), an extra-cranial pediatric cancer. "This study may identify new biomarkers for advanced stage NB, and reveal novel targets for the development of more effective chemotherapeutic drugs," she stated in her proposal.

André S. Bachmann, now chair of CoP's Department of Pharmaceutical Sciences, was her mentor when she was a post-doctoral associate with the Cancer Research Center of Hawai`i (now called the University of Hawai`i Cancer Center). He has been researching neuroblastoma for the last 10 years, and said her progress shows the College's faculty mentoring efforts are working.

"I am very pleased Dana will have the opportunity to focus on treatment strategies for this dreadful disease that accounts for about 15 percent of all childhood cancer deaths each year. She is a brilliant scientist. We all hope her work will make a difference."

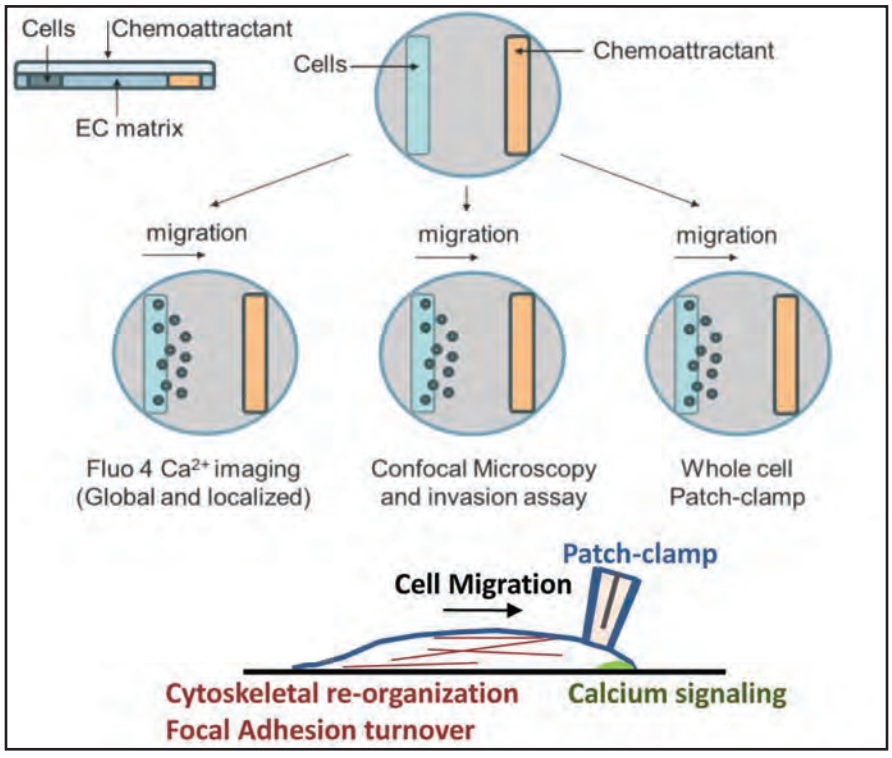
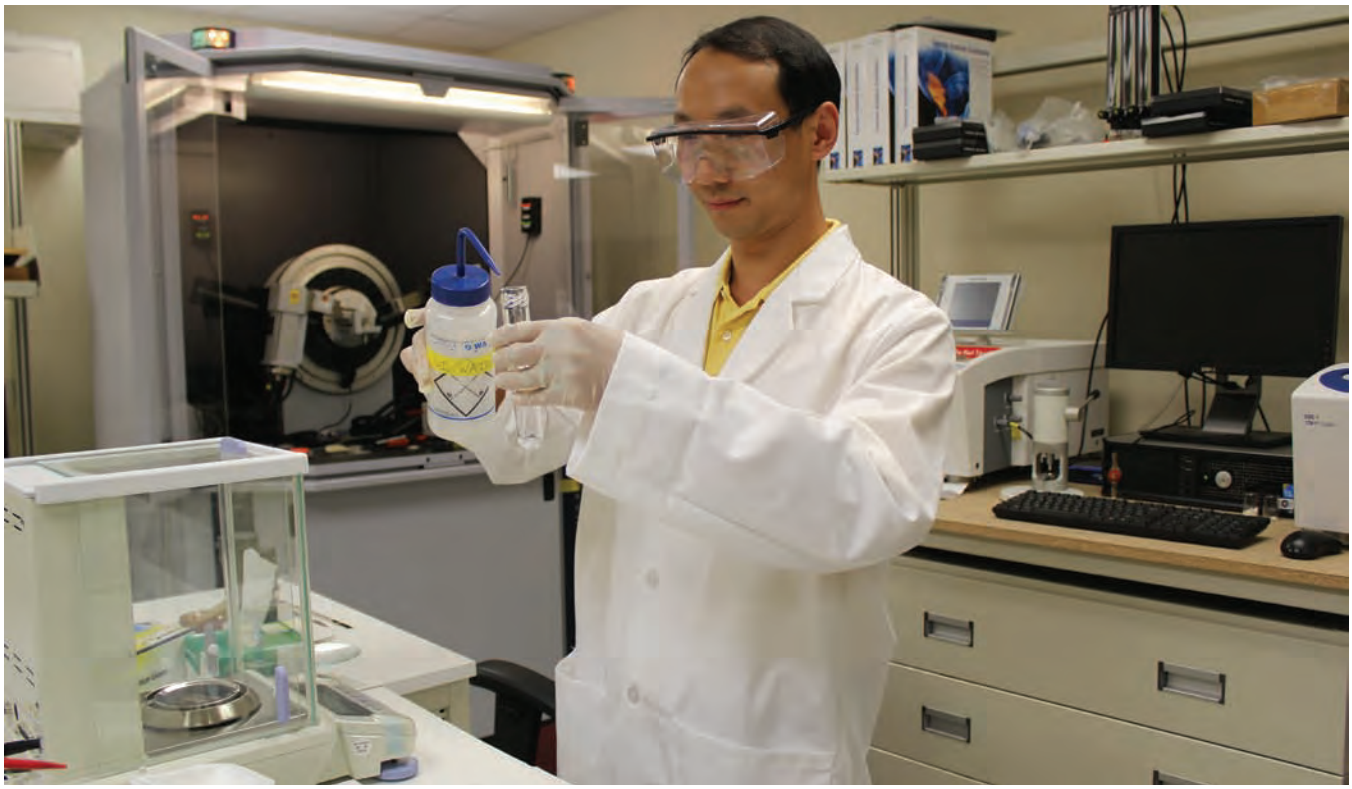


Illustration of Experimental Setup to perform multiple assays

Dr. Dana-Lynn T. Koomoa-Lange is an assistant professor in the Department of Pharmaceutical Sciences. Much of her research is focused on providing new insights into neuroblastoma and other types of cancers driven by myc expression (c-myc and N-myc). A Native Hawaiian who grew up in Hawai`i, she received her bachelor's degree in biology from the San Diego State University. She earned her PhD from the Department of Biology and Medicine (Molecular Pharmacology, Physiology and Biotechnology) at Brown University in Providence, Rhode Island, and returned to Hawai'i to work as a post-doctoral associate at the Center for Biomedical Research in Queen's Medical Center. She joined the CoP faculty in 2011. In the classroom, Dr. Koomoa-Lange teaches Integrative Therapeutics IV and Biochemistry.

NIH grant gives hope to discover new drug to fight tuberculosis



Dr. Dianqing Sun, assistant professor of pharmaceutical sciences at the University of Hawai'i at Hilo College of Pharmacy, is researching tuberculosis with a three-year grant for $406,257 from the National Institutes of Health (NIH). He was also recently awarded a $50,000 grant from the Leahi fund of the Hawai`i Community Foundation (HCF) to develop novel natural product-inspired antitubercular agents for treating pulmonary tuberculosis.

Tuberculosis (TB) is a contagious airborne disease caused by a deadly bacterium pathogen called ***Mycobacterium tuberculosis***. TB is the second leading infectious disease in the world and remains one of the biggest public health problems in the 21st century. According to the World Health Organization, it is estimated that about a third of the world's population is latently infected with TB bacteria and almost two million people die from this deadly disease annually.

"Notably, no TB specific drugs have been discovered since the introduction of Rifampin 40 years ago," Dr. Sun said. "In particular, due to the emergence and spread of drug resistant ***Mycobacterium tuberculosis***, there is an urgent need to discover new chemotype TB drugs with novel mechanism of action and low toxic properties."

"...no TB specific drugs have been discovered since the introduction of Rifampin 40 years ago,"

- Dr. Dianqing Sun

Dr. Sun's NIH research project is entitled, "Development of Piperidinols and Engelhardiones as Novel Antituberculosis Agents." The Academic Research Enhancement Award grant is supported by the National Institute of Allergy and Infectious Diseases (NIAID).

By employing approaches guided by high-throughput screening hits and inspired by natural products, Dr. Sun aims to develop small molecule piperidinol- and natural product Engelhardione-based analogues as novel antituberculosis agents. From this study, he hopes to identify promising candidates with potent in vitro activity and low toxicity for advanced in vivo efficacy and toxicity studies.

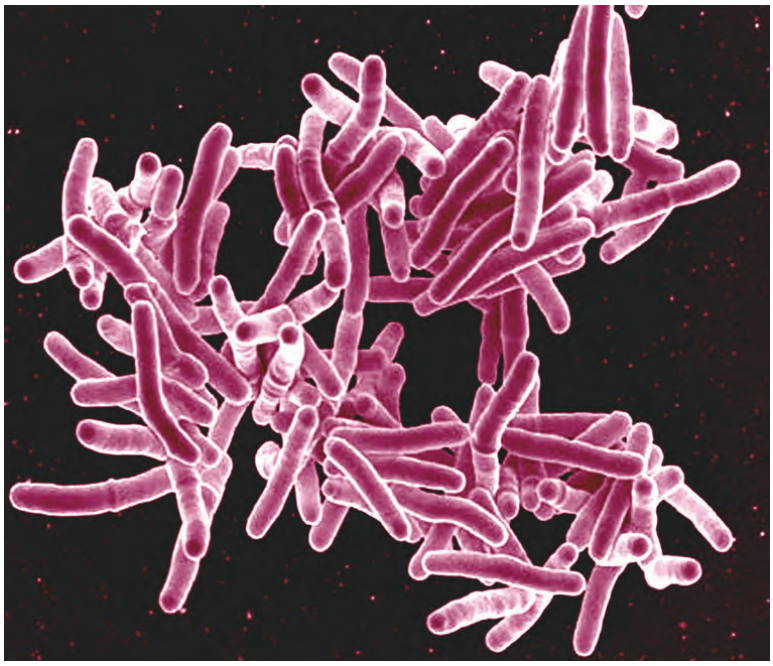
Dr. Sun says development of these novel anti-TB agents may have the potential to overcome the cross resistance that occurs with current clinically used TB drugs.

Antituberculosis evaluation related to these projects will be performed in Dr. Richard Lee's laboratory at St. Jude Children's Research Hospital, Memphis, TN. Dr. Lee was Dr. Sun's postdoctoral mentor and currently serves as his sci-

entific mentor on his research through an IDeA Networks of Biomedical Research Excellence (INBRE) grant.

"I am very grateful for Dr. Lee's continued support, and am happy this important research will allow us to work together again," said Dr. Sun.

Dr. Sun's previous research, made possible through the INBRE grant, allowed him to be successful in receiving the current NIH and HCF grants, he said. INBRE is intended to expand and develop Hawai'i's competitive biomedical research capacity by increasing collaboration between the primary research departments at UH and other academic institutions, community colleges, and other biomedical research organizations within the state of Hawai'i.



*A colorized scanning electron micrograph of **Mycobaterium tuberculosis**, the bacteria that causes TB. Credit: National Institute of Allergy and Infectious Diseases*

"We are fortunate and grateful to receive these awards," Dr. Sun said. "It enables us to continue carrying out this anti-TB drug discovery mission to combat this deadly disease. And this funding will also provide opportunities for postdoctoral scholars, graduate students, and undergraduate students to participate in meritorious biomedical research."

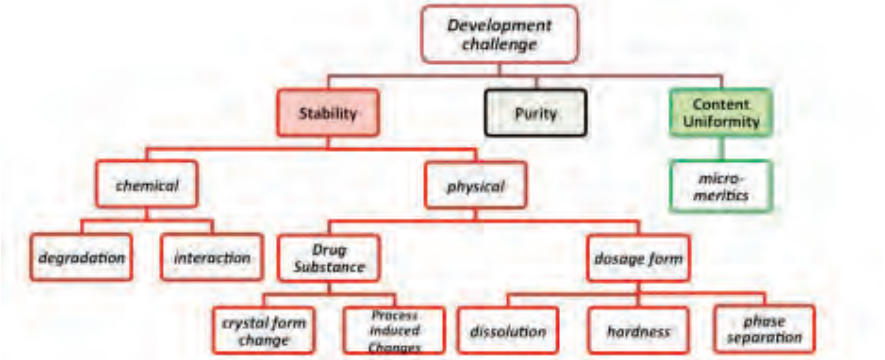
Dr. Dianqing Sun is an assistant professor of pharmaceutical sciences at UH Hilo College of Pharmacy. Research in Dr. Sun's laboratory focuses on the design and synthesis of novel small molecule and natural product based anti-infective and anti-cancer agents. The chemical approaches include classical organic synthesis, parallel and high-throughput chemistry, solid-phase organic synthesis, followed by traditional medicinal chemistry optimization of the emerging lead compounds. He received his master's degree in organic chemistry at East China University of Science and Technology, Shanghai, China, and doctor of philosophy in organic chemistry at the University of Memphis. In the classroom, Dr. Sun is Course Coordinator and Instructor in Integrated Therapeutics I, Instructor, Integrated Therapeutics II-IV, Course Coordinator and Instructor, Discovery and Development of Blockbuster Drugs and Instructor, Introduction to Pharmaceutical Sciences.

Materials science, engineering play role in formulation development

Dr. Ken Morris applies materials science and engineering principles in the research in his labs that cover a broad spectrum of uses, from basic elementary education to application in pharmaceutical manufacturing facilities to actually producing the end product.

Dr. Morris, who has been awarded more than 20 grants from the National Science Foundation and pharmaceutical companies, has recently been working with local teachers through a grant from the National Science Foundation Engineering Research Center (NSF-ERC). In addition, work in his Pharmaceutical Materials lab, being funded by pharmaceuticals and consumer healthcare giant GlaxoSmithKline (GSK), investigates general aspects of materials science in product development.

The grant from GSK Consumer Healthcare has provided $80,000 for the next year for a project entitled "Materials and Dosage Form Characterization." Aruna Utukuri, Principal Scientist, Respiratory Health New Product Development at GSK Consumer Healthcare in Parsippany, N.J., visited the Morris labs in Hilo last August. The work will address the basic science behind common challenges in formulation development to potentially improve and enhance product design.



The University of Hawai`i at Hilo's College of Pharmacy and, in particular the Pharmaceutical Materials lab, uses a tiered approach to address formulation development issues based on the predominate reasons for product recall, i.e., physical chemical stability, content uniformity and purity.

"Many challenges during product formulation development have their origin in the solid state characteristics and interactions between the active pharmaceutical ingredients (APIs), excipients, and processing stresses," Dr. Morris said. "Our lab uses a tiered approach to address common formulation development issues to aid in formulation and process design."

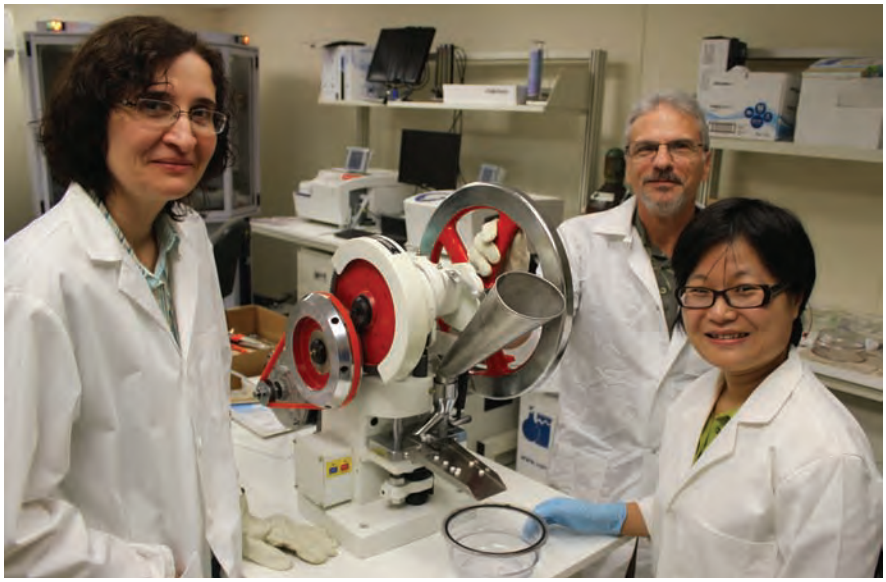
Dr. Morris together with joint PI Dr. Daniela Guendisch, have several PharmD and PhD students working in their labs as well as undergraduate engineering coordinator Xinyan Wang, who has an M.S. in organic chemistry and MBA. They focus on the characterization of raw materials, particularly drug substances, and the changes that processing and exposure may cause.

"Our work typically consists of semi-empirical modeling of phenomena using information from our advanced analytical techniques," he said. "Developing models helps anticipate challenges as well as addressing existing problems."

This past summer, Dr. Morris received a tablet press donated by Bristol Myers Squibb that allows him to extend projects to include the consideration of commercial manufacture.

Dr. Morris also recently received $30,000 from a National Science Foundation Engineering Research Center (NSF-ERC) outreach grant and an additional $50,000 for research. The program is funded through a grant from the National Science Foundation Engineering Research Center on Structured Organic Particulate Systems (NSF-ERC-SOPS), with UH Hilo as an outreach partner.

The outreach has consisted of collaborating with local school districts in an effort to give more students an understanding of engineering concepts to help them explore and possibly choose exciting careers that will help meet the expanding needs of Hawai'i. Dr. Morris

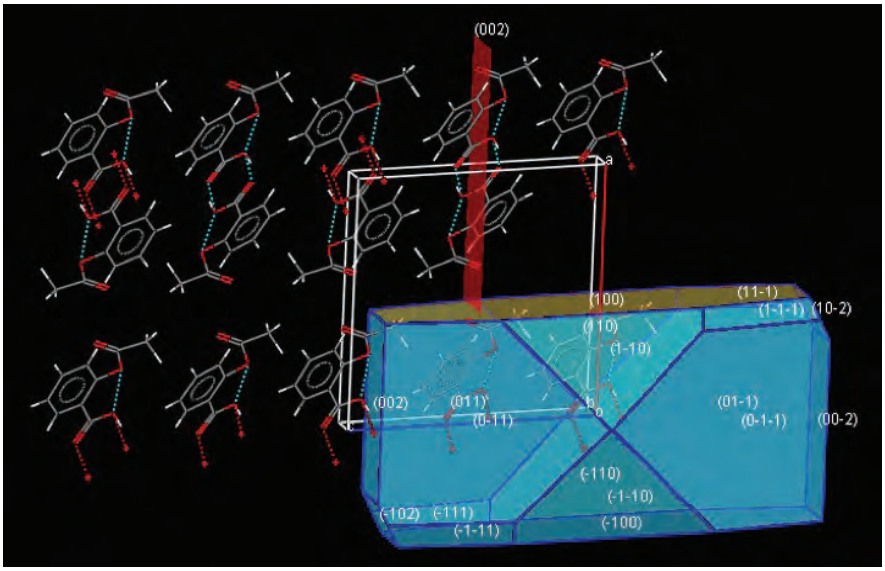


(From left) Daniela Guendisch, Ken Morris and Xinyan Wang use a small tablet press for the characterization of raw materials in the Morris Pharmaceutical Materials lab.

has conducted two sets of workshops to teachers from the Hilo-Laupahoehoe-Waiakea Complex who teach in science, technology, engineering and math, known as STEM disciplines. Collaborators include Drs. Mahavir Chougule, assistant professor in the Department of Pharmaceutical Sciences, Mazen Hamad, assistant professor in the Department of Chemistry, both at UH Hilo. Dr. Rajesh Davé, Distinguished Professor of Engineering at New Jersey Institute of Technology (NJIT), was both an instructor and advisor for the College of Pharmacy on the engineering-specific content of the workshop. The grant also partially funds graduate education in pharmaceutics for underrepresented minority students. The current recipient is Micah Glassgow from Hilo.

Micah Glassgow

"Engineering plays an important role in many careers, including pharmaceutical manufacturing," Dr. Morris said. "This represents a huge opportunity to address many issues on the Big Island from energy generation to the observatories, to roads and bridges."



Relationship between crystal structure and shape

Dr. Ken Morris is a professor in the Department of Pharmaceutical Sciences. His research involves the integration of advanced solids analytical techniques with physical chemical and engineering principles to predict the response of pharmaceutical material to processing stress. He is the past chair and current member of the Advisory Committee for Pharmaceutical Science and Clinical Pharmacology for the U.S. Food & Drug Administration (FDA). Dr. Morris received his bachelor's degree in Chemistry and Biology from Eastern Michigan University and his master's degree and PhD in pharmaceutical sciences from University of Arizona. In the classroom, Dr. Morris teaches Pharmaceutics I and II, Pharmacokinetics and PhD-level Advanced Pharmaceutics.

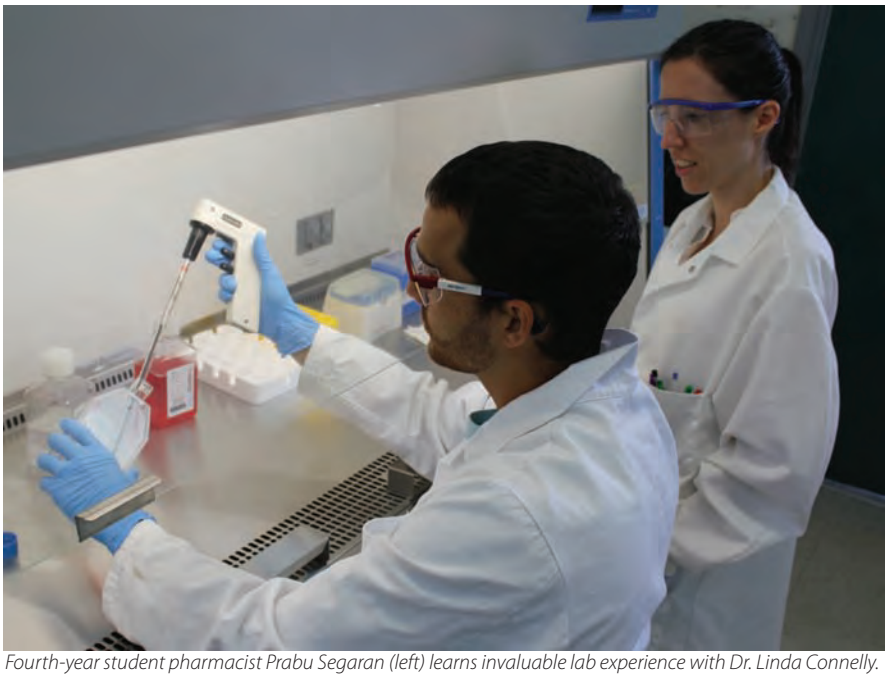
Funding allows research to continue in the Connelly labs

Assistant Professor in Pharmaceutical Science's Dr. Linda Connelly's most recent grant in the amount of $410,000 from the National Cancer Institute (NCI) is a prime example of how an initial investment can help research grow to a national level.

The U.S. Department of Health and Human Services, which administers the National Institutes of Health (NIH) under which NCI falls, announced the award to the UH Hilo researcher in August. Her research is entitled, "Osteoprotegerin in breast cancer cells: role in tumor growth and metastasis."

The funding will allow her to continue her breast cancer research that started in 2010 with College of Pharmacy support and a $7,500 seed money grant from UH Hilo. Last year, a second grant for $50,000 from the Hawai`i Community Foundation allowed the project to progress to the point of NIH funding.

"This grant fits with my lab's focus of looking at the links between inflammation and cancer," Dr. Connelly said. "It appears that inflammatory signaling pathways lead to the expression of osteoprotegerin (OPG) by breast cancer cells. In the grant we will investigate the regulation of OPG expression and its role in primary tumor growth and spread (metastasis) of breast cancer."



Fourth-year student pharmacist Prabu Segaran (left) learns invaluable lab experience with Dr. Linda Connelly.

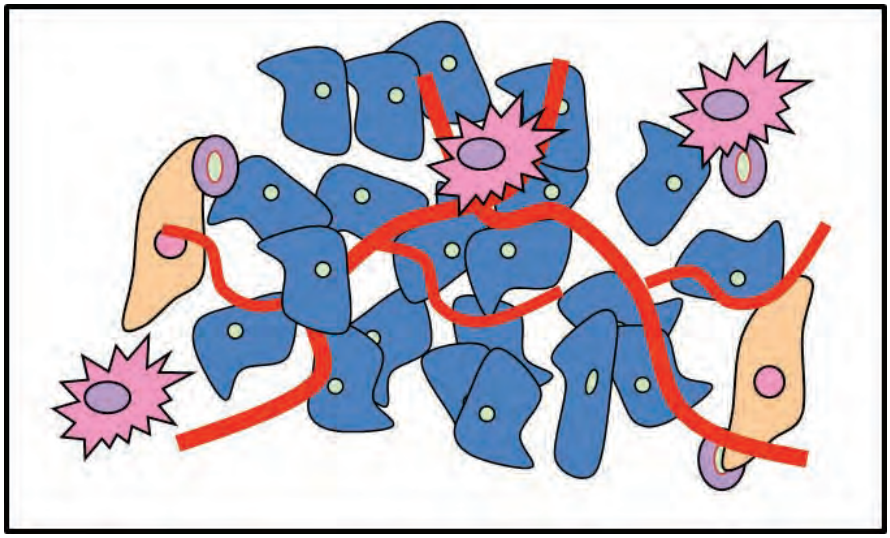
Since many patients do not respond or become resistant to current targeted therapies, identification of new therapeutic targets such as OPG will increase treatment options and improve prognosis for breast cancer patients, Dr. Connelly said.

Fourth-year PharmD student Prabu Segaran has worked in Dr. Connelly's lab since she first started doing research in Summer 2010. She said his efforts were important in contributing to the preliminary data for the grant. Also critical to getting the grant funded was work by post-doctoral associate Michael Weichhaus, who received his PhD from Robert Gordon University, a Scottish university located in the city of Aberdeen. He began working in the Connelly lab in June 2011.

"The biggest surprise coming to work in Hilo was that state-of-the-art breast cancer research was carried out at UH Hilo at all," Dr. Weichhaus said. "Personally, Linda was extremely helpful in preparing for my transition here."

Dr. Connelly was instrumental in helping Dr. Weichhaus win first prize in the recent Second Annual Postdoctoral Symposium, he said. She guided him through the preparation process and helped keep the presentation focused on a few areas of their research so they could logically connect it all together and make it flow.

"It's an exciting opportunity to work on this project," he said. "The additional funds will help us determine the validity of Linda's hypothesis and further develop her theories on breast cancer metastasis."



This diagram, illustrates the multiple cell types and the complexity of the tumor microenvironment, the study of which is a broader focus of her research.

Research in the Connelly lab has captured attention from federal legislators, including Senator Daniel K. Inouye, who said, "These funds will help medical professionals in Hawai`i with their fight against breast cancer."

On a local level, Congresswoman Mazie Hirono, from Hawai`i's second district and a member of the House Committee on Education and the Workforce, said, "Today's federal investments show that the University of Hawai`i System is leading the way to address Hawai`i's unique care challenges."

Congresswoman Colleen Hanabusa, from the first district of Hawai`i, also pointed out the importance of this research to the Hawaiian community. She said, "The grant to UH Hilo will allow the university to participate in important cancer research and explore this increasingly important area of study. In Hawai`i, Native Hawaiian women have the highest incidence rate for all types of cancer, as compared to other ethnic groups in the state. This kind of research is critical to addressing the needs of our diverse population."

Dr. Linda Connelly is an assistant professor in the Department of Pharmaceutical Sciences and is the course coordinator for the pre-pharmacy program. She also is assistant professor at the Cancer Biology Program at the University of Hawai'i Cancer Center. She received her bachelor's degree in with work placement from the University of Glasgow in the UK and her doctor in philosophy in molecular pharmacology from the Wolfson Institute for Biomedical Research, University College London, UK. She also worked as a postdoctoral fellow in the Department of Medical and Molecular Pharmacology, UCLA, and the Department of Cancer Biology, Vanderbilt University Medical Center. In the classroom, Dr. Connelly is Physiology Lecturer in Pathophysiology, Course Coordinator for Pre Pharmacy Orientation, Course Coordinator/Lecturer for Overview of Drug Classes, Lecturer/Online Course Designer for Introduction to PCAT Preparation AND Course Coordinator/Lecturer for PhD-level Cancer Biology.

Clockwise from center: Dr. Susan Jarvi, Associate Professor and Director of Pre-Pharmacy Program, Anne Txakeeyang, Student Pharmacist, Class of 2014; LaTasha Riddick, Student Pharmacist, Class of 2015; Michael Severino, Pre-pharmacy student; Kay Howe, post-baccalaureate student; Akio Yanagisawa, Student Pharmacist, Class of 2015; Steven Jacquier, PhD candidate, University of Alaska; Jill Villarosa, Student Pharmacist, Class of 2015; Peggy Farias, Research Technician.

Rat lungworm larva, slugs, snails, rats and parasites get a closer look thanks to variety of funding

A biologist by training, Dr. Susan Jarvi is working in an area that makes many people squeamish. She is investigating rat lungworm larva, slugs, snails and rats, and has most recently been awarded three separate sources of funding.

"This is the type of research that has the potential to impact quality of life in Hawai`i," said Dr. Jarvi, who is an associate professor in the College of Pharmacy and the Director of the Pre-Pharmacy Program. "One of the areas my lab specializes in is the molecular detection of pathogens. If we can develop an early detection test for rat lungworm infection, we can help people receive treatment earlier and hopefully not suffer the full effects of this devastating disease."

To that end, one of the recent awards to the Jarvi lab was $13,000 seed money from the UH Hilo Office of Research for a study entitled, "Development and optimization of quantitative PCR and ELISA tests for the detection of Hawai`i Angiostrongylus cantonensis (Rat Lungworm) in blood using a rat model."

Rat lungworm disease is considered a global, emerging infectious disease that can be potentially devastating when transferred to humans, leading to coma, agonizing pain and sometimes death. Rats are the definitive host, with slugs or snails the intermediate hosts. Slugs/snails acquire the first stage larvae from rat feces and then support parasite development to the third larval stage. Humans can become infected by ingesting the slugs or snails containing infective third-stage larvae. Larvae penetrate the intestinal mucosa then travel through the liver and lungs to the central nervous system ending up in the brain.

There is no easy way to diagnose rat lungworm disease in a human early enough to stop the progression of the disease. Dr. Jarvi's lab hopes to be able to detect the parasite in the bloodstream of rats using a molecular test called a Polymerase Chain Reaction (or PCR), as well as other antibody-based tests. Eventually, she would like to try to optimize tests for humans that might ultimately result in early detection.

Meanwhile, education is one of the tools she is using to increase public awareness about this disease. Funded by the UHH College of Pharmacy, she, along with several UHH Pharmacy students and others, is working with several local schools to try to incorporate rat lungworm disease into the second grade DOE curriculum and to teach them the value of washing and cooking vegetables through an interactive coloring book as well as class activities.

Concurrently, Dr. Jarvi was awarded $40,000 from the Victoria S. and Bradley L. Geist Foundation in Honolulu to study

continued from page 11

"Efficacy of a vaccine against Angiostrongylus costaricensis to A. cantonensis in rats from Hawai`i." This study was supplemented with an additional $33,535 from the United States Department of Agriculture (USDA-APHIS).

Her lab intends to test a vaccine developed by researchers in Spain that protects against a similar form of rat lungworm disease that doesn't invade the brain (A. costaricensis) to determine if the vaccine works for the rat lungworm disease-causing organisms here in Hawai`i (A. cantonensis) using wild rats from Hawai`i as an animal model. Because there is no animal facility at UH Hilo, she will be working with Dr. Will Pitt, Field Station Leader for the United States Department of Agriculture (USDA-APHIS).

"If we can demonstrate that this vaccine is effective, one application may be to turn it into an oral dose formulation which could be used as a rat bait," Dr. Jarvi said.

The third study recently funded in the Jarvi lab has nothing to do with rat lungworm disease, but is focused on parasites in birds entitled "A statewide targeted pathogen surveillance study: Diversity of Avipoxvirus and avian malaria (Plasmodium relictum) in native Hawaiian forest birds." Dr. Jarvi received $58,414 from the United States Fish and Wildlife Service (USFW) to conduct a statewide diversity study that will aid in the development of management strategies for endangered birds.

"My lab was the first in Hawai`i to discover that avian malaria and avipoxvirus were genetically diverse giving us the tools we needed to identify genetic variants of these pathogens, some of which may be more virulent, in local bird populations." Dr. Jarvi said.

Ms. Peggy Farias, MS, is a research technician and lab manager for the Jarvi Labs who grew up on the island of Hawai`i. She has been working with Dr. Jarvi for more than 11 years and has a vested interest in this project.

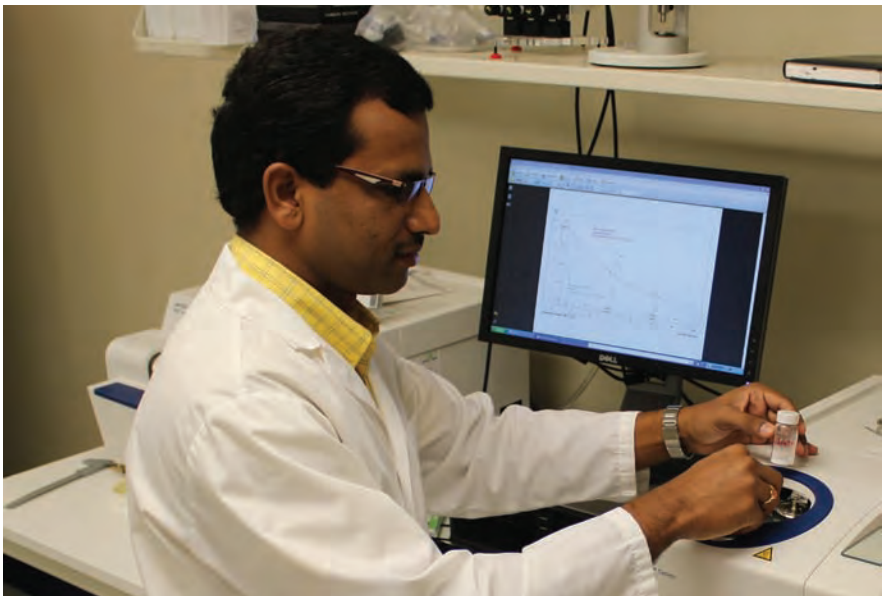
"Through this project, we will be able to provide federal and state agencies and other conservation groups with the data needed to help make more informed decisions regarding translocation of endangered birds" Ms. Farias said. "This has important conservation implications in minimizing the spread of potentially more virulent pathogens when moving birds across the state."

Rats are the definitive hosts of Angiostrongylus cantonensis (rat lungworm). The L1 larvae are excreted in rat feces, which are eaten by slugs and snails (intermediate hosts). The larvae develop into L3 stage in slugs. The Jarvi lab isolated the L3 larvae shown here from an infected semi-slug.

Dr. Susan Jarvi is Director of the Pre-Pharmacy Program and an associate professor in the College of Pharmacy. She studies host-parasite and parasite-parasite interactions and influences on transmission and virulence of infectious disease. She received her bachelor's degree from Fitchburg State University in Massachusetts, her master's in Veterinary and Animal Sciences (Genetics) from the University of Massachusetts, Amherst and her Ph.D. in biology (Immunogenetics)from the Department of Biology, Northern Illinois University, DeKalb. She was a postdoctoral fellow at the Beckman Research Institute of the City of Hope National Medical Center Duarte, CA, and at the Molecular Genetics laboratory of the Smithsonian Institution, Washington DC. In the classroom, Dr. Jarvi teaches Pharmaceutical Immunology and several electives including Genetics and Pharmacology of Malaria.

Grants fund research on treatment options for asthma and lung cancer

Dr. Mahavir Chougule received $8,600 in May this year for his seed grant proposal entitled "Development of targeted nanocarrier system for the treatment of lung cancer" from the University of Hawai`i at Hilo Research Council. In addition, he received a $35,000 grant from the Hawai'i Community Foundation (HCF) for a research project entitled "Targeted Nanocarriers of siRNA for the Treatment of Asthma" and a $16,492 grant from the Center for Magnesium Education & Research for a research project entitled "Transdermal permeation of Magnesium supplement cream formulations across skin.



"One of the major research focuses in our lab is to find the newer effective and safer therapeutics options for treatment of asthma and lung cancer using novel drug delivery approaches," Dr. Chougule said.

Asthma is a complex disease that requires long-term and multiple therapies. Approximately 20 million Americans and more than 100,000 Hawai'i residents are suffering from asthma. Although, the asthma mortality rate has declined over the past 10 years, in Hawai'i it remains above the national average.

Currently available treatment options such as antihistamines or steroids are nonspecific and therefore, more targeted approaches are needed for effective manage the asthma, according to Dr. Chougule. A recent national asthma survey found that the asthma healthcare is suboptimal and that the disease remains poorly controlled, despite continued advances in asthma therapies. Therefore, there is compelling need to develop more effective treatment strategies for improved outcome in the treatment of asthma patients, he said.

"Over the past few years small interfering RNA (siRNA) delivery systems for the treatment of diseases including asthma have generated tremendous interest owing to their therapeutic efficacy," Dr. Chougule said. "However, the clinical utility has been limited due to their in vivo rapid degradation. To overcome this obstacle, in the HCF project, we are evaluating the innovative encapsulation and delivery mechanisms using gelatin nanocarriers." The HCF project is a collaborative research project with Dr. Peter R. Hoffmann, Associate Professor at the John A. Burns School of Medicine, University of Hawai'i at Manoa.

The Seed Grant project is based on safer delivery system of siRNA and chemotherapeutic agent for the treatment of lung cancer. Lung cancer accounts

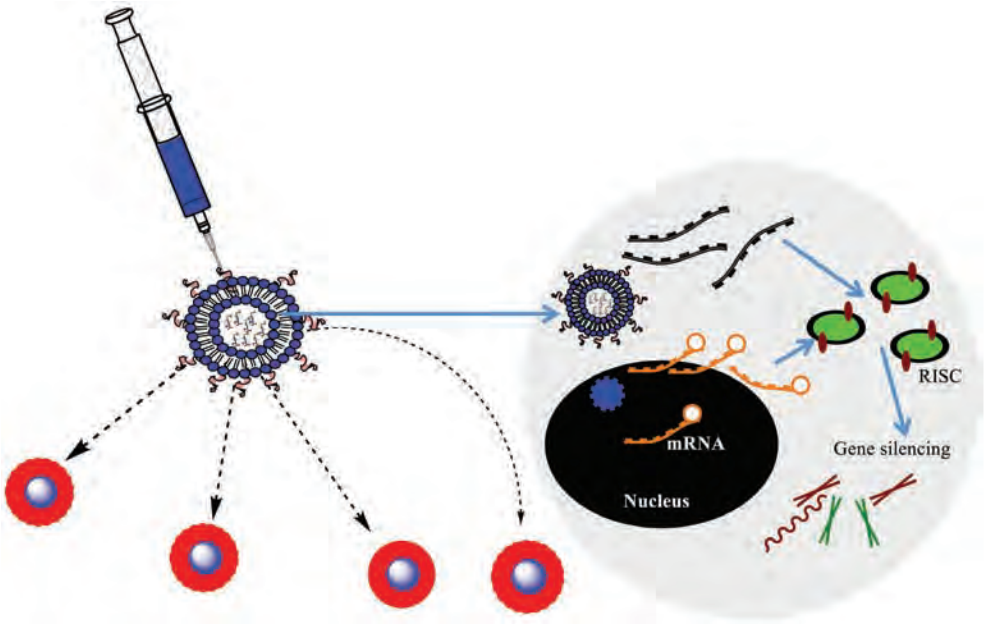


Illustration of targeted delivery of siRNA and / drug loaded nanocarriers for specific delivery to site of action that enhances the efficacy and limits the side effects to normal cells.

for more deaths than any other cancer in the United States and is the leading cause of death among cancer patients in Hawai'i. He said that the poor survival rates in the lung cancer patients are due to limited efficacy of current systemic or oral chemotherapy and associated side effects. The studies in the Chougule labs will establish the platform for developing the nanocarrier based delivery systems for treatment of cancer.

Dr. Chougule is also working on the Center for Magnesium Education & Research funded project to investigate the permeation of topical Magnesium cream formulation across human skin in order to explore the topical use of Magnesium for treatment of hypomagnesemia.

Dr. Mahavir B. Chougule is an assistant professor in the Department of Pharmaceutical Sciences in the College of Pharmacy. His research is focused on delivery of therapeutic agents and targeted nanoparticles for the treatment of asthma and cancer while minimizing the associated adverse side effects. He received a bachelor's degree in pharmacy from Amravati University, and a Master's degree and doctorate from the Maharaja Sayajirao University of Baroda, India. In the classroom, Dr. Chougule teaches Pharmaceutics and Introduction to Pharmaceutical Sciences.

Federal grants aid health economist at CoP

Dr. Deborah Taira Juarez, a health economist, participates in several projects involving collaborative research with other researchers at the University of Hawaii. Her work combines investigative research, education, training and networking.

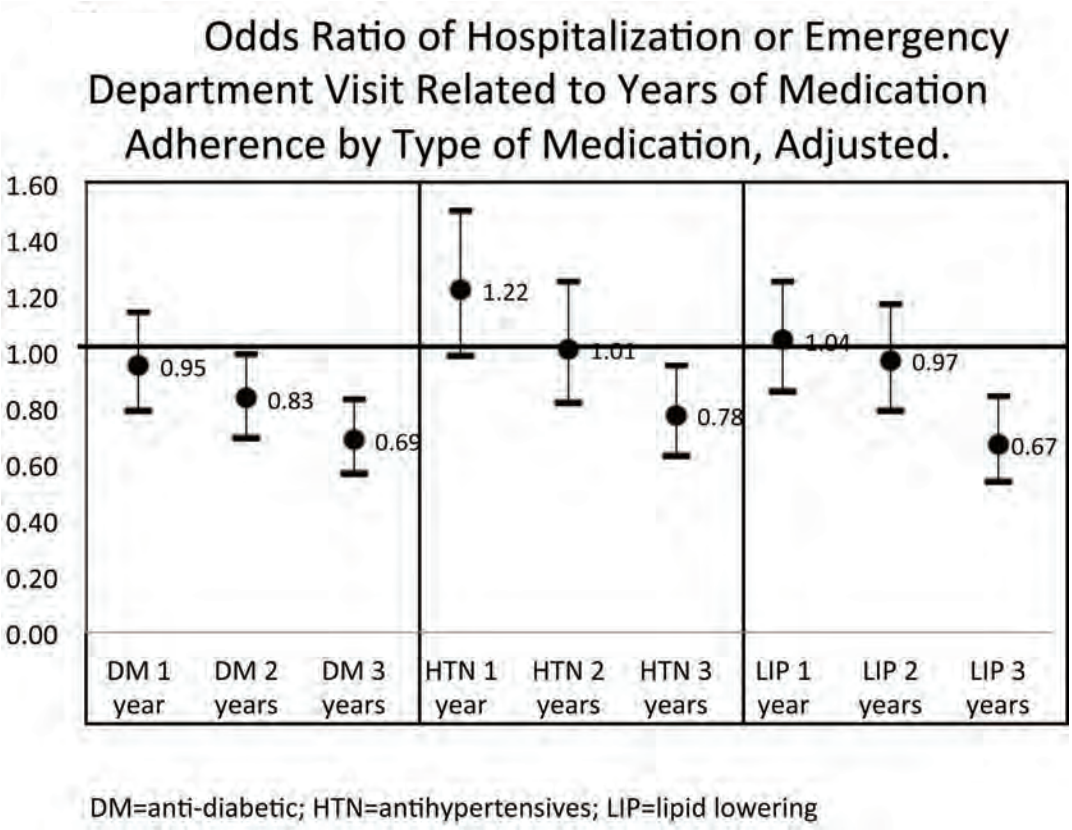
She is currently a co-investigator on a grant funded by National Institutes of Health (NIH) National Center on Minority Health and Health Disparities. The project is entitled "Comparative Effectiveness Research (CER) Approaches to Eliminate Cardiometabolic Disparities (ECD) in Native and Pacific Peoples."

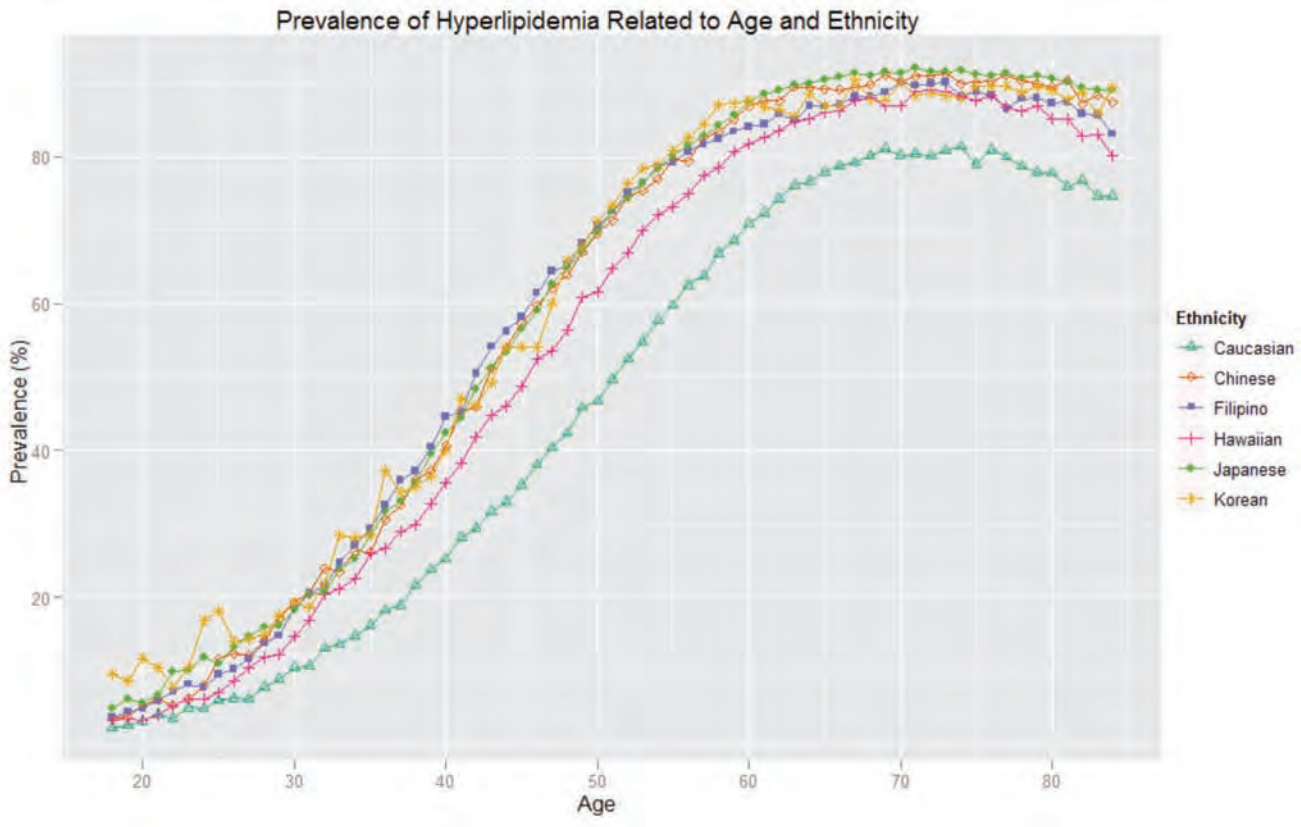
"This grant has several parts," Dr. Juarez said. "One is a randomized controlled trial that compares the effectiveness of self-management education and financial incentives for patients and physicians to usual care in patients with diabetes. Another part is setting up a diabetes registry and a third is teaching a course in comparative effectiveness analysis."

Dr. Juarez also is a co-investigator on a research study funded by the Department of Health and Human Services (DHHS) Agency for Healthcare Research and Quality.

"As part of the study, we have enhanced a large dataset that contains all hospital admissions in Hawaii by incorporating laboratory values," she said. "The goal is to explore the relationship between getting to goal on laboratory values (such as HbA1C and cholesterol) and hospitalizations as well as to examine lab values post-hospitalization."

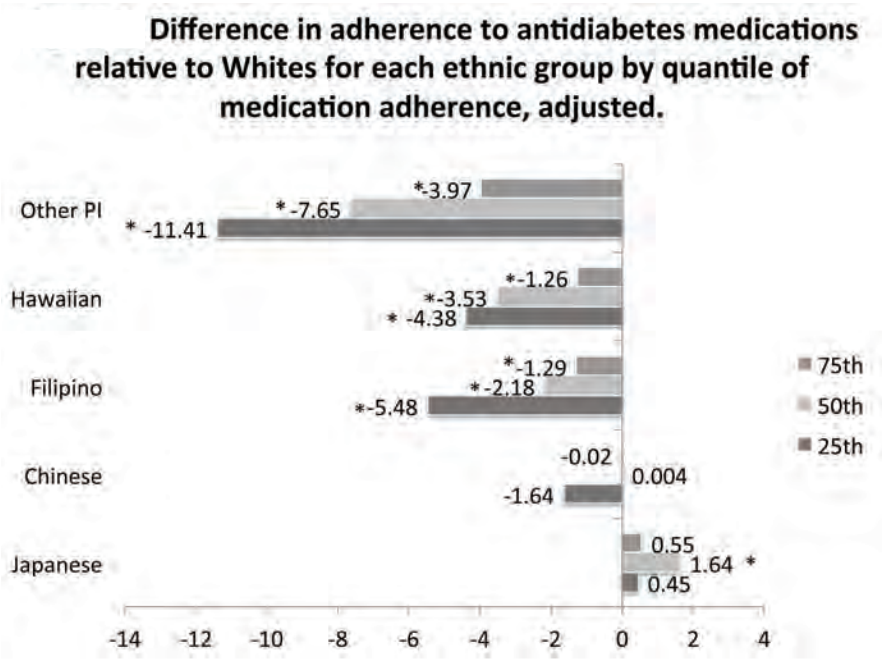
Another role Dr. Juarez plays is the Director of Project Development Division (of the Research Coordinating Center) for the RCMI Translational Research Network. This grant is funded by the NIH National Center on Minority Health and Health Disparities. The goal is to promote networking among researchers





from minority institutions.

Beginning in December, Dr. Juarez became director of the Research Training and Education Core for the Center for Native and Pacific Health Disparities Research for the five year grant period. The Principal Investigator for the center grant is Dr. Marjorie Mau, an endocrinologist with the Department of Native Hawaiian Health. As part of this project, she has already been working to develop on online course entitled "Community 101 for Researchers," which will inform researchers of issues they should consider when working with Native Hawaiian and Pacific Islander communities.



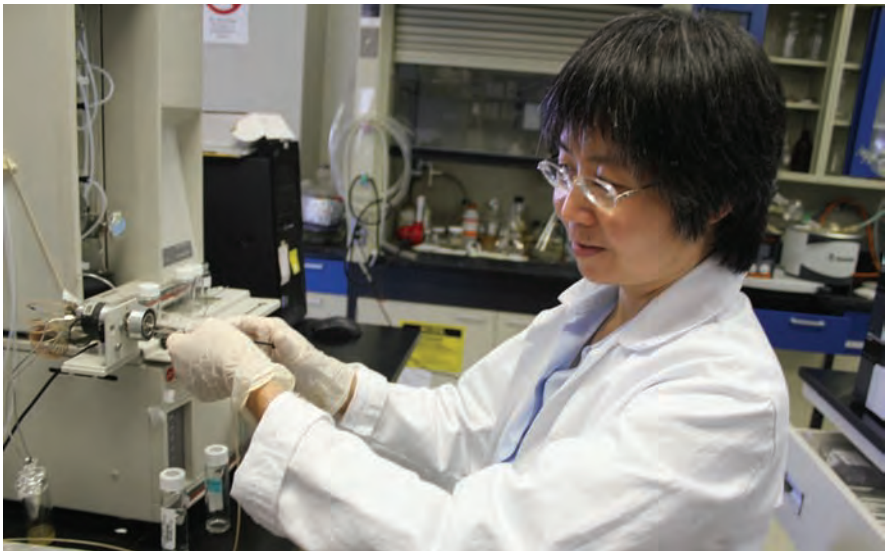
Dr. Deborah T. Juarez is an associate professor in the Department of Pharmacy Practice based in Honolulu. Her research has focused on medication adherence, cost-effectiveness of cardiovascular interventions, and health disparities, particularly involving Asian and Pacific Americans. She worked at The Health Institute at the New England Medical Center examining outcomes from the patient perspective and has spent ten years working at Hawaii Medical Service Association (an independent licensee of the Blue Cross and Blue Shield Association) analyzing large administrative datasets, including cost and lab data. Dr. Juarez received her bachelor's degree from Amherst College, her master's in public affairs (MPA) from the Woodrow Wilson School of Domestic and International Affairs, Princeton University,, and her Doctor of Science (ScD) in Health Economics from the Harvard School of Public Health. In the classroom, Dr. Juarez teaches Pharmacoeconomics.

BRIDGES program funds research on common berry that may play role in treating cancer

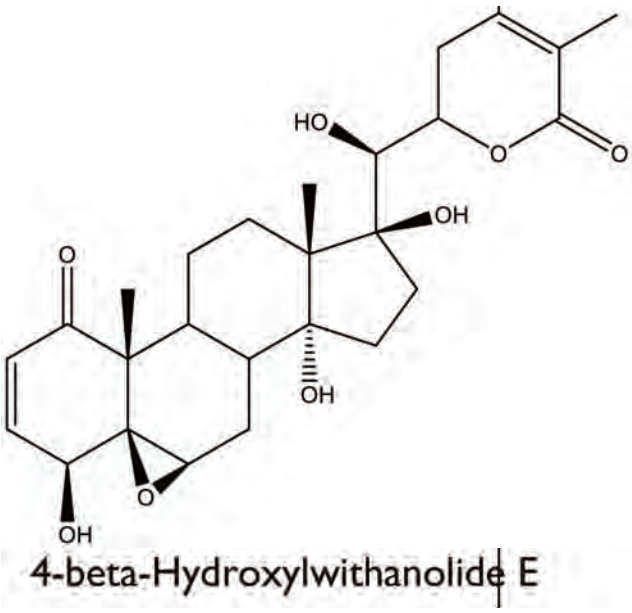
Dr. Leng Chee Chang's research aims to find a natural product treatment for cancers with fewer side effects and lower toxicity than current therapies. She recently gained pilot project funding from the Biosciences Research Infrastructure Development for Grant Enhancement and Success (BRIDGES) Program from the National Institutes of Health (NIH).

The research is entitled "Potential of Physalis peruviana (poha) in the Treatment of Breast Cancer." Her collaborator for this project is Dr. James Turkson, Professor and Program Director of Experimental Therapeutic Program, University of Hawai`i Cancer Center, John A. Burns School of Medicine.

"Current options for breast cancer treatment are limited to surgery, chemotherapy, and radiation, which involves the removal of the solid tumor but doesn't stop micrometastasis, or the spread of cancer to other areas of the body," Dr. Chang said. "We are investigating the use of a medicinal plant to see if it can address the inhibition of new cancer cells as well as yield new insights into the use of new chemical compounds as novel anticancer drugs."



Dr. Turkson's lab is focused on Stat3 as a cancer chemotherapeutic molecular target. In recent year, Signal transducer and activator of transcription (Stat)3 has been shown to be a promising therapeutic target in human cancers. Constitutively active Stat3 is activated in a variety of human cancers, including breast and lung cancers. Strong evidence shows that malignant cells become susceptible to Stat3 inhibition and undergo apoptosis, due to their dependency on aberrantly-active Stat3, whereas, normal cells do not harbor aberrant Stat3 activity. Thus, inhibitors of aberrantly-active Stat3 might be useful as novel anticancer therapeutics.



4-beta-Hydroxylwithanolide E


Poha plant and berries

The plant, Physallis peruviana is a rich natural source of withanolides, and is widely grown in Taiwan, where it is used as a folk medicine for treating cancer and leukemia, Dr. Chang said. The fruit, known as the poha berry in Hawai`i, is eaten fresh or used for jam making. "Mr. Sam E. Lorch, Lani ko Honua Berry Farm, has graciously agreed to provide us larger amount of plant materials and poha fruits for study," she said.

"While preliminary data are encouraging, there remains work to identify the bioactive components, determine the mechanisms for the antitumor cell effects and the critical role of the abnormal Stat3 function," according to Drs. Chang and Turkson.

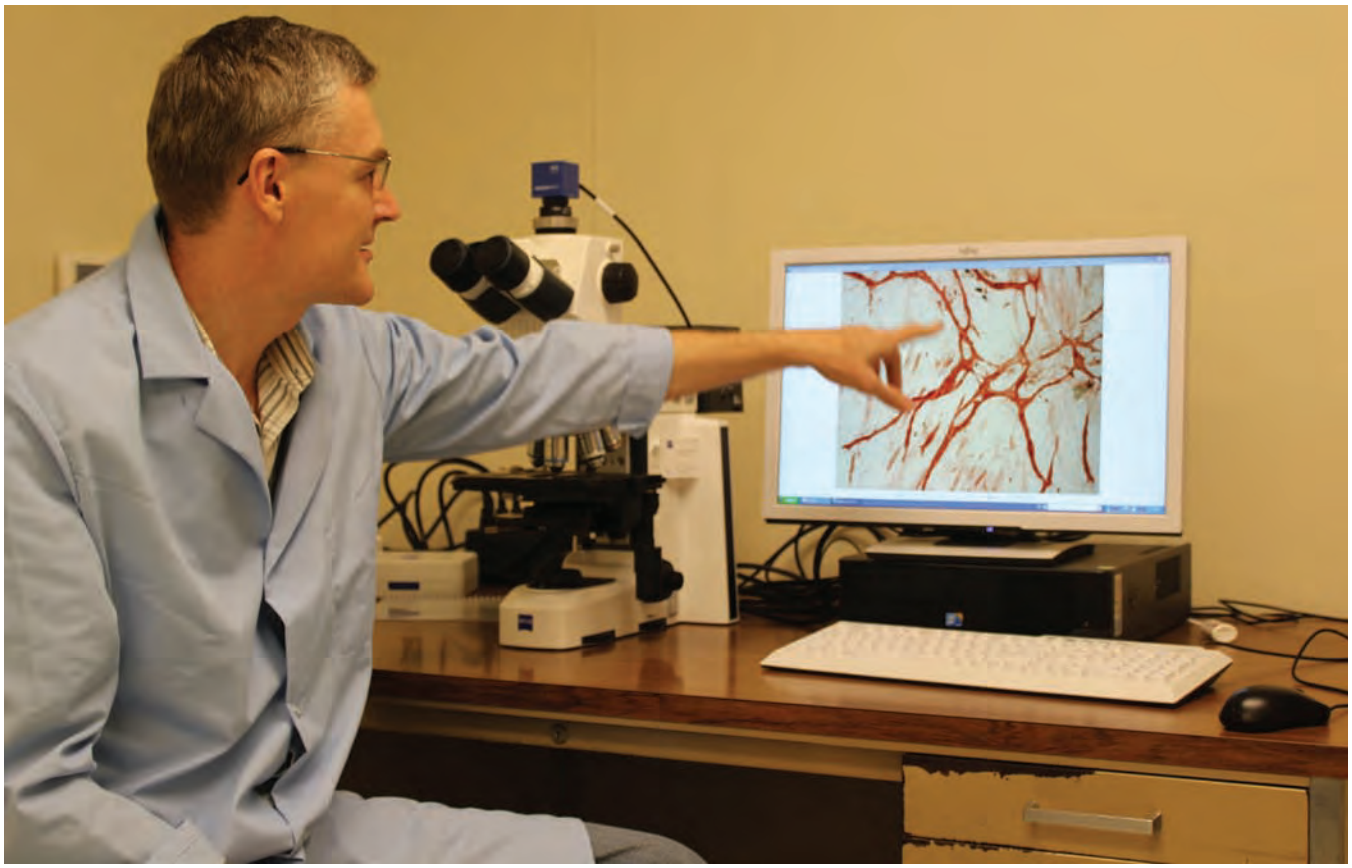
By targeting a type of cancer that afflicts African Americans more than any other part of the population, this research addresses the health disparities in minorities in the United States, Dr. Chang said.

According to the National Cancer Institute, minority populations have higher overall incidence rates of cancer than the overall population regardless of social economic status. In regard to breast cancer, African-American women are at higher risk for triple-negative breast cancers (TNBC), and have lower overall survival rates.

"Additionally, triple-negative breast cancers (TBC) are characterized by a lack of estrogen and progesterone and do not respond to current hormone therapies, such as tamoxifen," Dr. Chang said. "We can by make a difference by providing accessible options for effective anti-cancer drug options."

"Given the current US economic climate, improving and promoting local products could be particularly important in enhancing the economic well-being of Hawai'i, and possibly lead to sustainable development," Dr. Chang said. "The low cost of poha should increase access to its use as an alternative treatment for cancer treatment and cancer prevention for local people in Hawai'i, and may provide an alternative to the purchase of currently approved but expensive anticancer drugs. The phytochemicals in poha fruits render them safe to be considered as a natural and functional food."

Dr. Leng Chee Chang is an assistant professor in the Department of Pharmaceutical Sciences. Her research interests include the isolation, identification, and biological evaluation of compounds from higher plant and microbial origin, particular compounds useful as chemotherapeutic agents, as well as Raf Kinase inhibitors from Streptomyces species and endophytic fungi. She received her master's degree in Natural Products Chemistry from the University of Malaysia and her PhD in Pharmacognosy from the University of Illinois at Chicago. She was an Intramural Research Training Fellow at the Laboratory of Bioorganic Chemistry, NIDDK, National Institutes of Health in Bethesda, Maryland. In the classroom, Dr. Chang is Course Coordinator and Instructor for Biochemistry I, PhD-level Biochemistry and Herbal medicine and has lectured in History of Pharmacy and Complementary Medicine.

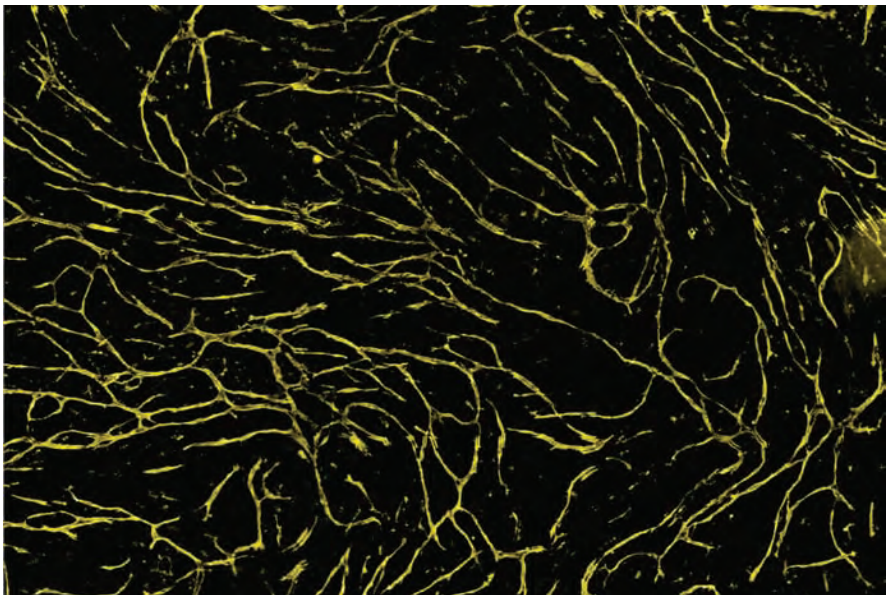


Cardiovascular complications from anticancer therapy research receives funding

Dr. Eugene Konorev, assistant professor, Department of Pharmaceutical Sciences, received a grant in the amount of $49,993 from the Ingeborg V.F. McKee Fund of the Hawai`i Community Foundation. The grant will fund research on "Inhibition of Cardiac Vascular Network Formation by Targeted Anticancer Drug Sorafenib."

"One of the research directions in our lab is cardiovascular complications of anticancer therapy," Dr. Konorev said. "The development of novel cancer treatment in the past decade has dramatically improved the prognosis of cancer patients. Certain types of cancers are or will become in the near future manageable diseases, similar to other chronic conditions."

Patients with cancer live longer now, while the disease is controlled with modern medications, he noted. It especially applies to young cancer survivors since childhood cancers generally have much better outcomes.



Vascular network formed in a cell culture by human cardiac endothelial cells.

According to Dr. Konorev, "In many cases we start seeing the situation when complications of anticancer therapy, especially cardiovascular complications, might be of greater risk to patients than the malignancy itself. If cancer is effectively controlled, then prevention or treatment of associated

cardiovascular complications will likely become a primary concern."

He writes: For several years I have been involved in studies of cardiovascular complications of doxorubicin and other anthracycline antibiotics. It has been known for decades that doxorubicin causes the development of cardiomyopathy. Doxorubicin cardiomyopathy responds poorly to therapy and often progresses to fatal congestive heart failure. We and others focused on cardiomyocytes, the contractile cells in the heart, as primary targets of doxorubicin. In my INBRE project that was funded last year, I am testing the hypothesis that doxorubicin will have deleterious effects on cardiac microvasculature. Heart is a highly aerobic organ and may be vulnerable to microvascular defects caused by doxorubicin. We are studying therefore effects of doxorubicin on primary human cardiac microvascular cells and their ability to form vessels in the in vitro co-culture system. We will be also studying the role of microvascular changes in the development of doxorubicin cardiomyopathy using in vivo mouse model.

We believe this project will help optimize cancer chemotherapy with doxorubicin. Additionally, we will obtain new information regarding the mechanisms of development of doxorubicin cardiomyopathy that will likely be applicable to other forms of dilated cardiomyopathies. Assays and approaches developed in these studies will be used to mechanistically evaluate angiogenic action of other natural products, to screen natural product libraries for potent pro- and antiangiogenic compounds, and to design novel agents and approaches to the treatment of cardiac and neoplastic conditions.

Dr. Eugene Konorev is assistant professor in the Department of Pharmaceutical Sciences. He studies mechanisms of apoptosis in cardiomyocytes and endothelial cells as underlying factors in the development of cardiomyopathies and heart failure. He received his M.D. and his PhD from Kursk Medical University, Russia. In the classroom, Dr. Konorev teaches Introduction to Pharmaceutical Sciences and Pathophysiology Pharmacology components of Integrated Therapeutics I and II.

Federally funded INBRE program helps the College of Pharmacy expand research in Hawaii

The University of Hawaii at Hilo's College of Pharmacy joined forces two years ago with the University of Hawaii at Manoa to strengthen a project that received $9 million in federal funding over three years. The project, funded by the National Institute of Health (NIH) has allowed the collaboration to continue expanding and improving biomedical research in Hawaii.

The funding comes from NIH's National Center for Research Resources (NCRR) project called the IDeA Networks of Biomedical Research Excellence (INBRE) program, which originally began in 2001. At that time, a $6 million grant helped establish The Biomedical Research Infrastructure Network (BRIN) at UH Manoa.

The previous focus upon epidemiological research was replaced with an emphasis upon natural products and neuroscience research to create INBRE II.

"This funding helps invigorate and strengthen biomedical research capacity not only for the College of Pharmacy but for the entire state," said John M. Pezzuto, Dean of the College of Pharmacy. Pezzuto joins Eric Holmes, Director of Research Operations, and David Haymer, Professor of Cell and Molecular Biology, both from the UH Manoa John A. Burns School of Medicine, to lead the collaborative research program centered on new research themes.

Dr. Karen Pellegrin (left) and Dean John Pezzuto direct the UH Hilo College of Pharmacy Research Innovation Core (COPRI) for the INBRE grant.

Administrative, Bioinformatics, Research, and Training and Education centers on the project are based in Honolulu. In Hilo, together with Karen Pellegrin, Pezzuto directs the UH Hilo College of Pharmacy Research Innovation Core (COPRI), which will interact with the broader Research Core and Training & Education Core.

This leadership team assembled researchers, mentors, and other collaborators who have been addressing basic science research areas as they build upon the established multi-disciplinary network, provide support at participating institutions, offer research opportunities that serve as a "pipeline" for students, and enhance science and technology knowledge of the state's workforce.

Mentoring plans will allow each investigator to blossom in their career as they expand their knowledge and experience in scientific research. In turn, each investigator will increase their exposure to novel, innovative projects while striving to obtain independent funding status.

> ***"This funding helps invigorate and strengthen biomedical research capacity not only for the College of Pharmacy but for the entire state,"***
>
> *- John Pezzuto*

Projects have included work on diseases such as malaria, cancer and diseases affecting the central nervous system. Among the junior investigators based in the College of Pharmacy who are working on research funded by INBRE are Drs. Eugene Konorev, Aaron Jacobs, Susan Jarvi, Danielle Guendisch, and Dianqing Sun.

In addition to UH Manoa and UH Hilo, the funds provides support to researchers and student enrichment programs at Chaminade University, Honolulu and Hawaii Pacific University, Kaneohe. It also funds projects and programs at outreach institutions Kapiolani Community College, Honolulu, Leeward Community College, Pearl City, Maui Community College, Kahului, and Windward Community College, Kaneohe.

A competitive renewal for this program has been submitted to the NIH.

NSF EPSCoR funds environmental research using biomedical tools

CoP's Associate Dean for Research Robert "Bob" Borris is in the midst of the fourth year of a five-year National Science Foundation (NSF) grant worth $750,000 that applies the concepts of metabolomic research to various environmental questions. According to Dr. Borris, this type of research, while not related to pharmaceuticals, uses many of the same tools used to study biomedical processes.

"In order to qualify for NSF funding, we needed to craft our proposal as an environmental study because NSF doesn't directly fund biomedical research," Dr. Borris says. "When we applied for it, the College was only in our first year of existence. We decided it was a good way to collaborate with other researchers in the UH system and beyond, generating useful scientific data."

The grant is part of a $20 million University-wide award from NSF's Experimental Program to Stimulate Competitive Research (EPSCoR). More than four years ago, Dr. Borris wrote a proposal that would apply metabolomics to problems in environmental science using methods originally developed for use in drug development.

According to Dr. Borris, "We need to keep things in perspective. The projects are basically applications of a family of techniques developed for drug discovery to other areas like chemical biology where they have not found broad application. We have the ability to look at biological responses to diverse groups of chemical signals like pheromones, attractants and repellants, which are analogous to the way the human body responds to drugs."

Through the grant, Dr. Borris has been able to hire a post-doctoral associate, Dr. Ben Clark, who earned his PhD from The University of Queensland, Brisbane, Australia. Dr. Clark has been working in the Borris labs since March 2011.

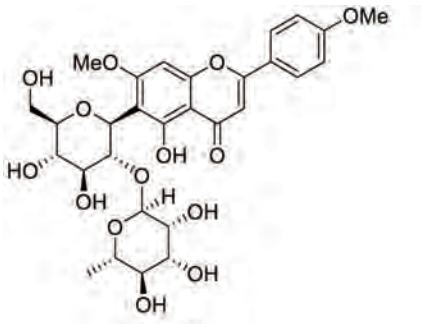
"I'd never worked with plant metabolites before, and there were also opportunities to do some metabolomic and chemotaxonomic work, which was pretty intriguing to me," says Dr. Clark, who is in the process of searching worldwide for a faculty position. "I'd be very keen to incorporate metabolomic and chemotaxonomic aspects into my future work, though I don't know if I will continue to study plants or return to the microbial world."

Drs. Ben Clark (left) and Robert "Bob" Borris

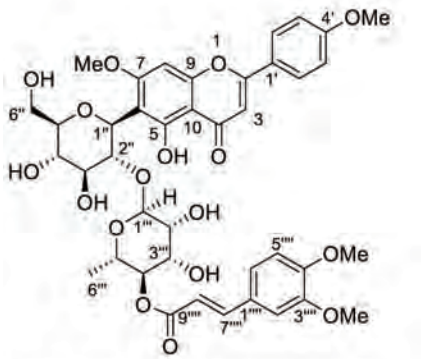
The EPSCoR grant at UH supports four research programs. Dr. Borris' project is part of the Ecological Genomics and Metabolomics (ECOGEM) team, which is investigating how natural populations of marine and terrestrial species respond to environmental changes across space and time.

According to the Hawai`i EPSCoR website, the goal is "to advance understanding of how human activities and natural events affect Hawaiian ecosystems by characterizing the biodiversity, genetic heterogeneity and phenotypic diversity of indicator species at the molecular, genetic and phenotypic level." In addition, the ECOGEM team is exploring how plant and insect species and populations respond to environmental change across space and time.

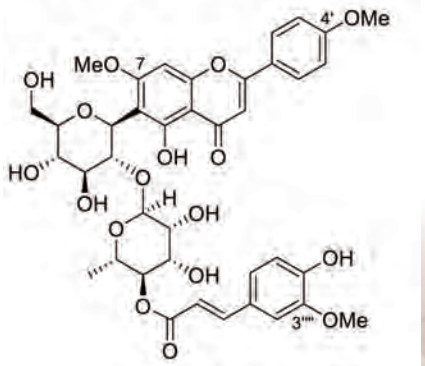
Collaborative efforts include working



embinin (**1**)



4'''-(3,4-dimethoxycinnamoyl)-embinin (**2**)



4'''-ferruloyl-embinin (**3**)

with the College of Agriculture to get samples. This research also has many ties to our island community, Dr. Borris says. For example, one of the plants they've been examining in the lab is a marine macro alga that is a common local food ingredient that could be purchased at the KTA. This plant was included in the study at the request of members of the EPSCoR community advisory panel, he says.

"This alga is known to have four distinct genetic lines," he explains. "So one of the questions we're asking is this: can we identify which genetic lineage is present on each of the populations of this plant? If we can develop a metabolic fingerprint, we should be able to identify each of the populations, which will help to define the progression of these introduced lines as they move. That's important because it may allow us to model the spread of invasive new strains in our environment, and may also allow us to pinpoint some metabolic difference that provides an ecological advantage to a particular strain."

In the future, he plans to examine other variables, such as rising temperature of the water. "It's a hook into the other projects. Answer one question and ask five more," he says.

Other endeavors in the Borris lab include research on infectious diseases, both in humans and animals, leading to the discovery of natural sources of new antibiotics and antifungals. He is planning to expand current work with local herb farmers, where he is quantitatively analyzing compounds in turmeric and other crops that may allow farmers to increase the dollar value of their crops.

"We'll have to seek more funding from NSF, NIH and other sources to continue the projects we've got going now because NSF doesn't encourage carrying over the same projects from one grant cycle of the EPSCoR program to the next," he says. "We're always actively thinking about what we want to continue, and where we can have the greatest impact."

Dr. Robert Borris is Associate Dean for Research in the College of Pharmacy. His current research focuses primarily on the chemistry of terrestrial plants and microorganisms. He received a bachelor's degree in biology from Loyola University and another bachelor's degree in pharmacy and a doctorate in pharmacognosy from the University of Illinois at the Medical Center. In the classroom, Dr. Borris teaches Pharmaceutical Calculations and has presented lectures in Toxicology, Drug Information and Tropical Conservation Biology.

Novel pigments from Anthurium species

From left: Goody Calcal from Oahu, Elecia Fa'aiuaso from American Samoa, Jessica Penaranda from Guam, and Matt Chen from Oahu, are all third-year students at UH Hilo who are enrolled in The Steps Towards Excellence in Pharmacy (STEP) program through CoP, funded through the US DOE. They plan to apply for admission to the PharmD program in the fall of 2014 and become members of the class of 2018.

Hawaii's College of Pharmacy in final year of $1.5 million award from U.S. Department of Education

The University of Hawaii at Hilo's College of Pharmacy (CoP) is in the final year of a $1.5 million congressionally directed grant that is beginning new health care initiatives in Hawaii and the Pacific region. The funding was awarded in 2010 from the U.S. Department of Education.

"Thanks to this congressionally-directed support provided by the Department of Education, we have been able to significantly accelerated the pace of fulfilling our mission of improving health care in Hawaii and the Pacific region," said John M. Pezzuto, Dean of the College of Pharmacy. "The new educational opportunities provided by this support are extraordinary. The activities described in the application are not easy but we are keeping our promises. These are the types of actions that make a top 25 ranked College, and that's what we intend to be."

Key objectives CoP has been accomplishing with the congressionally directed grant are:

(1) Provide support for Pacific Island students toward completion of Pre-Pharmacy academic requirements. Specific goals are to continue current collaboration with administrators/educators/advisors at the University of Guam and American Samoa Community College as they further develop Pre-Pharmacy Programs. This year, additional support has been provided for stipends for the Pre-Pharmacy program.

(2) Create a guaranteed admissions program for students from underserved communities. The Steps Towards Excellence in Pharmacy (STEP) program provides students from underserved communities and populations the opportunity, guidance and mentorship to achieve their academic potential with successful completion of the PharmD Program at the UHH CoP.

(3) Support a Pacific region-based advanced pharmacy training. Fourth-year pharmacy students will perform six week clinical rotations in Guam, Saipan, American Samoa, and Alaska.

(4) Develop community partnerships and further engagement opportunities.

(5) Manage critically important conferences and administer continuing education.

(6) Continue development and foster a general pharmacy practice residency program that will provide advanced clinical pharmacy training in general pharmacy practice as well as specialty areas in the institution, ambulatory care and community pharmacy practice settings.

(7) Leverage technology to advance pharmacy practice in rural settings, including Health Information Technology education for pharmacists.

(8) Establish joint psychopharmacology initiatives to enhance rural healthcare education. Funds would be used to conduct a needs assessment in Hawaii and Wyoming, both of which have

continued from page 24

similar health care challenges, in order to identify ways to improve healthcare in rural areas in these states.

(9) Continue development of a physical therapy program. No such program currently exists in the State of Hawaii.

(10) Development of a simulation and chemistry platform to train pre-pharmacy, pre-engineering, and PharmD students. The overall goal is to provide hands-on experience in how new drugs are evaluated for activity and characterized to determine how they are best incorporated into dosage forms.

The late Senator Daniel K. Inouye

(11) Explore partnerships with communities on the mainland to help improve the state of rural health care.

Just prior to his death in December, the late U.S. Sen. Daniel K. Inouye said: "I have watched the College of Pharmacy grow over the past few years, and it is very gratifying to see what a critical difference it is making in Hawaii and throughout the Pacific. Improvement in health care is very important to me and I am very glad we can help the College of Pharmacy fulfill its critical mission. I know the financial support will be put to good use and the College will continue to make us proud."

"I have watched the College of Pharmacy grow over the past few years, and it is very gratifying to see what a critical difference it is making in Hawaii and throughout the Pacific,"

The late Senator Daniel K. Inouye

John Pezzuto became the Founding Dean of Hawai`i's College of Pharmacy in 2006. He is widely recognized for discovering the anticancer properties in resveratrol, a compound in grapes and grape products. His current research interests are predominately in the areas of biology-driven natural product drug discovery and characterization, with primary emphasis in the fields of cancer chemotherapy, cancer chemoprevention, malaria, and AIDS. He has been supported by the National Institutes of Health continuously since 1977.Dean Pezzuto received his bachelor's degree in chemistry from Rutgers University, and PhD in biochemistry from the University of Medicine and Dentistry of New Jersey. He performed two years of postdoctoral work in the Department of Chemistry at Massachusetts Institute of Technology, where he was the recipient of a postdoctoral fellowship from the National Cancer Institute.

Dean Pezzuto named Fellow of AAAS

College of Pharmacy Dean John Pezzuto has been named a Fellow of the American Association for the Advancement of Science (AAAS).

Election as a AAAS Fellow is an honor bestowed upon AAAS members by their peers. The announcement will be formally made in the AAAS News & Notes section of the 30 November 2012 issue of Science.

Pezzuto was honored "for distinguished service in the advancement of pharmacy and pharmaceutical education, and pioneering work in the field of natural product inhibitors of cancer." He is widely recognized for discovering the anti-cancer benefits of reserveratrol in grapes and grape products.

The tradition of AAAS Fellows began in 1874. Currently, members can be considered for the rank of Fellow if nominated by the steering group of their respective sections (which are noted on the Fellows list), by three Fellows, or by the Association's chief executive officer. Each steering group then reviews the nominations of individuals within its respective section and forwards a final list to the AAAS Council, which is the policymaking body of the Association.

AAAS has nearly 120,000 individual and institutional members and 261 affiliates, serving 10 million scientists in fields ranging from plant biology to dentistry.

This year 702 members have been awarded this honor by AAAS because of their scientifically or socially distinguished efforts to advance science or its applications. From the section on pharmaceutical sciences, only 12 New Fellows will be appointed this year, including Pezzuto and his close collaborator from Purdue University, Mark Cushman.

New Fellows will be presented with an official certificate and a gold and blue (representing science and engineering, respectively) rosette pin on Saturday, February 16, from 8 to 10 a.m. at the AAAS Fellows Forum during the 2013 AAAS Annual Meeting in Boston, Mass.

"This prestigious group has confirmed what we already know about John Pezzuto," said UH Hilo Chancellor Donald O. Straney. "He's a dedicated, prolific researcher who attracts positive, national attention to UH Hilo, and we're fortunate that he is here."

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