



SURVIVING A PANDEMIC

Redefining Medicine



AY 2019-2020 Annual Report

Keck School
of Medicine
of **USC**

DEPARTMENT
OF MEDICINE

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ON THE COVER



We are the Department of Medicine.

A selection of our outstanding USC Department of Medicine Faculty working on the frontlines

Left to right: Michael Dube, MD from the Division of Infectious Diseases; Sarah Sheibani, MD from the Division of Gastrointestinal and Liver Diseases; Peter Marshall, MD from the Division of Pulmonary, Critical Care, and Sleep Medicine; Rishi Mehta, MD from the Division of Geriatric, Hospital, Palliative, and General Internal Medicine (Photos generously provided by Donna Brown, Peter Marshall, and Jennifer Severa)

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Chair's Message

This year's Annual Report was meant to focus on our efforts to *Redefining Medicine* with our technological and informatics modernization, our clinical and basic research approaches and collaborative efforts, and our progressive programs geared to diversify and enhance our trainees' educational experience. During the preparation of this Annual Report, however, two pandemics emerged: one medical and one societal. The last two quarters of academic year 2019-2020 were so consumed by the emergence of, and response to COVID-19 and social injustice, that it is hard to remember the seemingly idyllic times before these unprecedented challenges.

The Department of Medicine was pivotal to the innovative, collaborative, and clinically excellent response on our clinical front lines. Amazing leadership arose from the ranks, strong teamwork was the norm, not the exception, and we all worked together with a new goal in mind: *Surviving a Pandemic* in the COVID era. I am proud and optimistic as I reflect on some of the achievements of the Department of Medicine faculty, including:

- Developed protocols; led and coordinated the COVID-19 response teams at Keck, Norris, and LAC+USC hospitals while serving willingly as frontline physicians
- Established a dedicated COVID ICU at Keck
- Assessed existing skill set then trained non-intensivists in much needed common 'intensivist' procedures so they could be included in the surge plans
- Provided willing leadership in infection control, hospital policy, test stewardship, PPE guidelines, etc.
- Developed, revised, re-developed, and re-revised treatment guidelines as new data became available
- Exhibited thoughtful, professional, and patient centric stewardship of scarce COVID-19 treatments
- Quick and agile adaptation and improvement of telemedicine as a standard clinical practice modality
- Astonishingly quick development and implementation of COVID related clinical trials and other clinical research projects
- Accessibility and responsiveness to the media so that the latest information could be shared nationally and internationally
- Innovative solutions to maintain educational program requirements via online platforms
- Proposing the establishment of a 'behavioral insight committee' to help address some individuals' failure to comply with policies on physical distancing and usage of PPE
- Championing additional COVID-19 initiatives to help all services at LAC+USC, including spearheading home equipment initiatives (e.g., BP cuffs and scales)
- Great collegiality in offering to help cover in-person patient visits and make accommodations for at-risk faculty member colleagues
- Thoughtful approach to balancing fellow safety with service and education in procedure-oriented specialties



Hugo Rosen, MD

“Amazing leadership arose from the ranks, strong teamwork was the norm, not the exception, and we all worked together with a new goal in mind: Surviving a Pandemic...”

We are committed to implementing policies in collaboration with the School of Medicine, hospital systems, and community at large to reduce and eliminate biases across all racial groups.

- Staffing of a Line service at LAC+USC in order to meet the growing demand of inpatients needing IV access in the ICUs
- Successful accreditation of a newly structured Cardiovascular Medicine Fellowship program with new 1st Year Fellowship class to start in July
- Diligent work to ensure the safe delivery of drugs to cancer, chemotherapy, and other higher risk patients in a manner that provided patient safety, security, and confidence in our clinical environment
- Quick and creative solutions that enabled the continued enrollment of patients in ongoing, but structurally paused, clinical trials
- Use of remote communications technology for the continuation of critical multidisciplinary team tumor boards
- Quick adaptation of clinical practice patterns that forged our recovery to nearly pre-COVID census and patient visits

In doing these things, our faculty overtly demonstrated their deep commitment to our patients, trainees, staff, and each other. Their response also highlighted the significant innovation, ingenuity, and altruism in our Department. I know that the ideas and insights they brought forward represent the knowledge and expertise of the broader medical enterprise and will have a lasting positive effect no matter the runtime of any pandemic.

On the social front, events across the country have refocused attention on inequities and biases that occur in all sectors of our society — and medicine is no exception. As a large Department, we have the responsibility to identify opportunities where we can make changes to reduce or eliminate harm experienced by underrepresented and minority faculty, patients, and staff. Recognition of the problem in and of itself is just the first step. We are committed to taking purposeful action to ensure healthcare without bias and use quality, safety, and associated health metrics to track our progress. While requiring immediate attention, it will not be a quick fix. We are committed to implementing policies in collaboration with the School of Medicine, hospital systems, and community at large to reduce and eliminate biases across all racial groups. I encourage the sharing of any concerns of racial bias as well as any suggestions for specific actions to consider for both short and long-term improvements.

With enduring gratitude for our faculty, trainees, staff, and hospital leadership's unwavering commitment and service to our patients and our community, I look forward to witnessing the conquest of both pandemics and our part in redefining academic medical excellence.

Sincerely,

Hugo R. Rosen, MD
Kenneth T. Norris, Jr. Chairman of Medicine
Professor of Medicine, Immunology and Molecular Microbiology

Leading Infectious Diseases Policy During a Pandemic



Neha Nanda, MD from the Division of Infectious Diseases

As the Healthcare Center’s Medical Epidemiologist, I have led the development of policies, protocols, and guidelines in response to the COVID pandemic, both in our healthcare settings (Keck Medicine of USC) as well as for several schools across USC.

Specifically, at Keck Medicine of USC, I have led the development of COVID response guidelines. To ensure the safety of our healthcare workers and patients, I have relied on three guiding principles to lead my approach:

1. Adopting a conservative approach
2. Reliance on available evidence
3. Being nimble and flexible in modifying our protocols given the evolving nature of the pandemic

Earlier in the pandemic, the medical enterprise embraced the nuance of droplet versus airborne transmission of SARS-COV-2 (which has now proven to be true) because we believed in our guiding principles. This nuance served as the foundation for several protocols and practices, including personal protective equipment protocol, testing strategy, design of dedicated COVID units, design of workflows and spaces (with physical barriers) in the OR and procedural areas, and optimization of engineering controls in outpatient areas to provide adequate time for decontamination of air between patients. Other protocols that I have led the development of pertain to screening, risk stratification, and various infection prevention protocols. Given the evolving nature of the pandemic, frequent revisions of all the aforementioned protocols is a priority for me to ensure our health system is ahead of the curve. Additionally, I designed and led a prevalence study to understand the positivity rate and associated risk factors at Keck Medicine of USC.



Keck Medical Center of USC

I continue to serve on the University-wide public health policy committee for COVID-19. In that role, I led the subcommittee on the development of screening protocols and have made a significant contribution to the testing strategy that will be deployed across USC. As the Healthcare Center’s Medical Epidemiologist and an Infectious Diseases physician, I have participated in the Keck School of Medicine Research and Education Resumption Work Groups and am personally overseeing the reopening protocols of several schools.

Communication and information sharing is key during these trying times. To that end, I have represented USC on a variety of relevant media outlets at state, national, and international level in an ongoing effort to ensure our community feels safe in these unprecedented times.

“Given the evolving nature of the pandemic, frequent revisions of all the aforementioned protocols is a priority for me to ensure our health system is ahead of the curve.”

Surge Planning



Santhi Iyer Kumar, MD from the Division of Pulmonary, Critical Care, and Sleep Medicine

As COVID-19 cases started to grow in Los Angeles, it was evident that we needed a systematic process to deploy non-intensivists and non-hospitalists to the frontline. To prepare for the surge of patients, we developed a department-wide, dynamic faculty surge plan that would support care at both LAC+USC Medical Center and Keck Medical Center.

Minimizing harm and maintaining the safety of our faculty and patients formed the bedrock of our surge deployment strategy. Our process was grounded in four guiding principles:

1. Protect vulnerable faculty and trainees
2. Ensure all clinical services were appropriately staffed and not compromise non-COVID patient care
3. Prioritize faculty to areas that align closely with work they already do
4. Engage department leadership (including division chiefs program directors) who have a comprehensive understanding of clinical operations and faculty skills

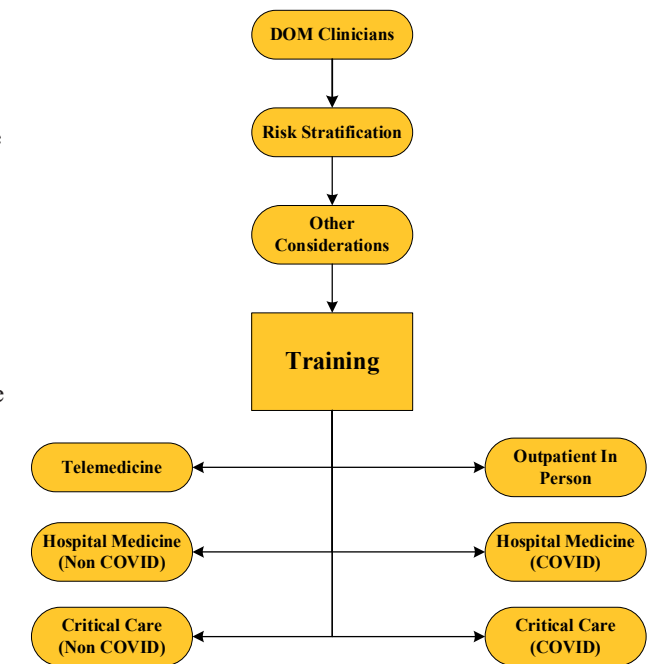
The DOM first designed and administered a brief survey for faculty to self-assess their comfort in clinical management of critically ill patients, proficiency in in EMR utilization, and risk for severe sequelae of COVID-19. We had a 93% response rate and results were confidentially shared only with the faculty member’s respective division chief.

Based on the survey, the Surge Planning Team, consisting of Drs. Santhi Kumar, Michael Wang, Andrew Young, Ajay Vaidya, May Lee, Eric Hsieh, Douglass Hutcheon, and administrator Hebe Iris Leon, then assigned faculty to specific care domains based on the individual’s suitability and sent the lists to division chiefs for review. Faculty with a high likelihood of being deployed to the intensive care units were offered “Critical Care for the Non-Intensivist” training, organized by the Division of Pulmonary, Critical Care, and Sleep Medicine. Hospitalists and intensivists worked together to design care pathways to support providers who do not usually work in those care spaces.

Each week, division chiefs provided a list of faculty members who were available for “surge duty,” which was then used to create a backup schedule by location. The backup schedule was published weekly for deployment the following week when cases were rising.

The stress experienced by the DOM was determined by the number of patients and the providers available to care for them. We also kept a pulse on the hospitalists’ and intensivists’ stress by monitoring the phase of surge (hospital bed occupancy) and loss or stretch of workforce due to illness, exposure, or expansion of services. These indicators were translated into a color-coded acuity level published weekly to department leadership and helped predict how quickly surge staff needed to be deployed.

As this pandemic persists, the DOM continues to use this strategy weekly to ensure a quick response to increasing cases and maintain high-quality patient care.



DOM Surge Planning Workflow Diagram

Hospitalists' Role in the Pandemic



Michael Wang, MD from the Division of Geriatric, Hospital, Palliative, and General Internal Medicine

From the onset of COVID-19, hospitalists of the Department of Medicine (DOM) have been pivotal to the responsive patient care, critical provider educational modules, and coordinating with Keck Medical Center (KMC) at a system level. They reorganized cohort teams for COVID-19 patients, appointing Lead Physicians who organized weekly orientation and debriefings. Hospitalists conducted regular huddles with other disciplines including ICU, PT/OT, Case Management and Social Services. Hospitalists spearheaded adjustments to Co-Management protocols with Surgical leadership and collapsed teams to create capacity for COVID. The hospitalist willingly completed training to enable them to provide ICU backup and also trained other providers to provide hospitalist backup.

In response to the rapidly evolving clinical, regulatory, and human landscape, regular COVID-related training and updates were researched and shared across the campus via DOM Grand Rounds. Moreover, DOM hospitalists delivered talks and workshops to the Keck School of Medicine (KSOM) of USC students, made regular contributions to the KSOM of USC COVID-19 Evidence-Based Summary, and provided frontline assistance in the conduct of COVID related clinical research trials.

In order to streamline the process and safely transfer patients to Keck, DOM hospitalists huddled with KMC, Critical Care, and Verdugo Hills Hospital Leadership. The improvements made included creating protocols for hospital entry, screening for COVID-19, admission criteria, visitation and discharge processes, personal protective equipment processes, KMC Treatment Guideline development, and surge-related expansion to new units. Hospitalists also helped develop, direct, and staff the Medical Evaluation Tent and lead adjustments to accommodate ETC Triage and Overflow.

KMC continues to serve as a tertiary-quaternary referral center and, along with our surgical colleagues, our hospitalists continue to manage those very complex non-COVID patients. COVID-19-related issues have inevitably arisen, and hospitalists have not only been a clinical resource for the surgeons and other specialists, but also expanded collaborations with other services such as Transplant patients with COVID-19.



Medical Evaluation Tent



Hospitalist Spotlight

Captain Morgan Hawkins

We proudly recognize Captain Morgan Hawkins Army Reserve, a deployed hospitalist that was awarded the Navy and Marine Corps Achievement Medal, Non-Article 5 North Atlantic Treaty Organization (NATO) Medal, and an Afghanistan Campaign Medal from the Navy for his leadership in organizing the COVID response in Afghanistan. In addition to his exceptional service in Afghanistan, he was also awarded the Army Commendation Medal for his service in Kuwait.

Thank you for your service!

Captain Morgan Hawkins

Digital Health

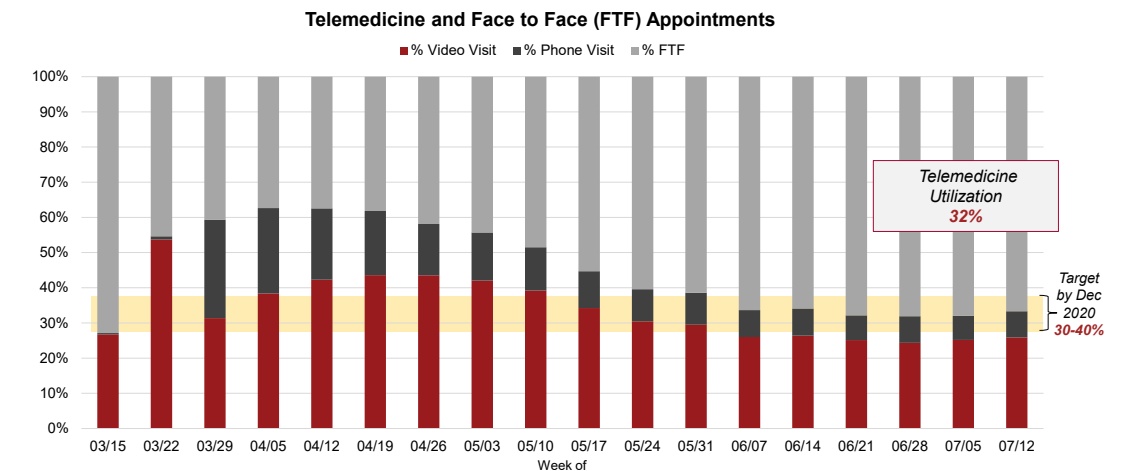


John Carmichael, MD

For years, telemedicine carried with it the promise of enhanced delivery of health care, public health, and health education with the ability to use a variety of telecommunications technologies to reach patients both near and far. Widespread use of telemedicine was hampered by limitations of insurance reimbursement, regulatory requirements, and lack of adoption by both physicians and patients who viewed the doctor-patient relationship as one that should take place face-to-face. In 2019, the Keck Medical Center of USC explored broadening the use of telemedicine through pilot programs in a variety of departments, but it clearly was not the primary method of healthcare delivery. In the months leading up to the COVID-19 pandemic, less than 2000 telemedicine visits had been conducted at Keck. This drastically changed in response to the emergence of COVID-19 and the related societal shifts employed to stop viral spread.

Beginning in March 2020, rapid changes in legislation policy and in health care delivery methodology accelerated the use of telemedicine and has made it a primary method across the country. Keck quickly worked to expand telehealth privileges for our providers, immediately credentialing them with the ability to provide care through the telehealth platform. A COVID-19 telehealth command center was launched which provided an area for training and used video enabled computers for immediate delivery of health care. Within two weeks 800 physicians, nurse practitioners, and physician assistants were provisioned and onboarded to the USC Telehealth program. This coincided with shelter-at-home orders in the state of California which drastically impacted face-to-face health care delivery options.

Care Delivery at Keck



Analysis of Telemedicine Utilization Starting in March 2020

Over the following weeks and months, video enabled telemedicine and telephone visits would comprise the majority of ambulatory healthcare delivery at Keck Medical Center of USC. Physicians, nurses, and staff worked from remote locations, safely providing care to patients. The Department of Medicine was responsible for the largest portion (40%) of these telemedicine visits.

Telemedicine is here to stay. In recognition of this reality, Keck Medicine of USC has launched an organization-wide digital health transformation program. The transformation task force is comprised of four committees devoted to information technology and interoperability, ambulatory workflow, clinical care delivery, and provider/consumer engagement. Future advances in healthcare delivery will expand beyond telephone and telemedicine and provide a variety of uses for digital health care. The committees are actively examining every aspect of the patient journey from the initial scheduling of appointments, the remote visit experience, and the follow-up care. Excellence in digital health can ensure our patients experience seamless care via telecommunications technology.

Doing Research During a Pandemic



Dr. Darcy Spicer

In the early weeks of March 2020, the reality of SARS-CoV-2 infection, also known as COVID-19, arrived in Los Angeles with a threat of an impending surge – one that would potentially overwhelm our ability to care for the patients. The clinicians who were likely to be involved in managing such patients quickly became engaged, planning for a surge and establishing guidelines for management of these patients, based on scant evidence from China and Europe. In the absence of adequately tested and approved drugs the physicians needed to rely on their best thinking with available agents to manage the disease and its complications. As a leader in medicine, it became evident to Keck Medicine of USC that there was a need to change the future using clinical research and trials. These trials needed to be coordinated, aligned, and expeditiously moved through our systems to the bedside

The following were created in response to these needs:

Ad Hoc Working Group

Experienced clinical researchers not engaged in the management of COVID-19 needed to step up to support the clinical practice community. In March, we established an ad hoc group of faculty and staff. The group included the leaders in pulmonary, critical care, anesthesia, and infectious diseases, experienced clinical trialists from oncology, hematology, and surgery, and key leadership from Clinical and Translational Institute (CTSI), Clinical Trials Office (CTO), Investigational Drug Service (IDS), and the Institutional Review Board (IRB). Together, they considered a multitude of potential agents, identified obstacles that needed to be addressed, reviewed early success and failures, aimed to assist physician investigators and clinicians in expediting the process in the system to get COVID-19 clinical trials open. Through this experience, clinicians who had little to no experience in clinical trials the opportunity to learn and become engaged.

Clinical Research Review Prioritization Committee

The Dean of the Keck School of Medicine of USC established a COVID-19 task force with one of the key committees being a Clinical Research Review Prioritization Committee. The committee consisted of:

- April Armstrong, MD, MPH (Committee Leader)
- Emily Blodget, MD
- Zea Borok, MD
- Juliet Emamaulle, MD, PhD
- Janice Liebler, MD
- Sue Martin, MD
- William Wallace, MD
- Darcy Spicer, MD (Committee Leader)
- Michael Bowdish, MD
- Thomas Buchanan, MD
- Douglass Hutcheon, MD
- Aarya Kafi, MD
- Michael Wang, MD

The committee met quickly and regularly to review and prioritize research proposals, which then moved to expeditious IRB review as well as consideration for funding from the Keck COVID-19 research funds.

The following descriptions are studies that have been pushed for expeditious IRB review:

Chimeric Antigen Receptor Targeting Spike Glycoprotein of SARS-CoV2

A specific adaptive immune response to SARS-CoV2 is required to eliminate the virus and to prevent disease progression to severe stages. However, a substantive adaptive immune response may fail to occur in all subjects, allowing the virus to propagate, resulting in massive destruction of the affected tissues, which is the main cause of life-threatening respiratory disorders at the severe stage. As an effective vaccine is unlikely to be available in the near future, there is an urgent need for novel therapeutic approaches that can boost the immune response against COVID-19 without exacerbating the immune-mediated tissue injury caused by the virus. Chimeric Antigen Receptors modified T cells (CAR-T) have been approved for

the treatment of hematologic malignancies and are being explored for treatment of infection and immune disorders. We successfully generated a prototype CAR against the receptor binding domain of the spike glycoprotein (S1-RBD) of SARS-CoV2 and demonstrated its ability to recognize target cells expressing S1-RBD. However, a major limitation of the use of CAR-T in COVID-19 is their propensity to cause “cytokine release syndrome” (CRS) that can exacerbate the immune injury caused by the virus. Other limitations of autologous and allogeneic CAR-T cell approaches, including need for individualized manufacturing, prolonged manufacturing time and high cost of the autologous products and risk of Graft versus host disease (GVHD) with the allogeneic products further limits their potential as a viable treatment strategy for COVID-19. In contrast to CAR-T, CAR-NK cells are less likely to result in excessive cytokine production, obviating most concerns related to CRS and exacerbation of COVID injury due to inflammatory response. Recent studies have shown that induced pluripotent stem cell-derived NK cells (iPSC-NK) can be produced on a large scale as a standardized cell product, allowing multiple doses to be administered from a single run, reducing the manufacturing cost. Our laboratory is now working on a project to develop iPSC-NK cells expressing CAR against SARS-CoV2 as an off-the-shelf therapy that can be used for the treatment of COVID-19. This project has been funded by the California Institute for Regenerative Medicine.

Development of Topanga Assay for detecting SARS-CoV2 specific antibodies

Serologic assays for SARS-CoV2 play an important role in understanding the virus’s epidemiology in the general population and identifying groups at higher risk for infection. Although a number of serological tests against SARS-Cov2 are commercially available, they suffer from low specificity and positive predictive values. We recently described a marine luciferase-based assay for detection of antibodies, named Topanga Assay. The assay involves a recombinant immunoconjugate, termed a Topanga reagent, comprising an antibody binding domain (e.g. a viral antigen) genetically linked to a marine luciferase. Topanga reagent can be conveniently produced in mammalian cells as secreted or cytosolic proteins that retains the functional activity of both the antibody binding domain and the luciferase. We have previously shown that Topanga assay can be performed in 96 or 384 well plates in as little as 30-45 minutes. Our laboratory is now developing Topanga reagents targeting the different antigens encoded by SARS-cov2 and use them to develop sensitive and specific serological assays for detection of antibodies against SARS-CoV2. The Topanga reagents will be used in stand-alone serological tests or combined with other Topanga reagents and assay formats to develop orthogonal assays with improved sensitivity, specificity and positive predictive values.

Dasatinib for the treatment of patients with moderate to severe SARS-CoV2 (COVID-19)

Cytokine release syndrome (CRS) is a frequent complication of treatment with Chimeric Antigen Receptor-T cells and a major cause of morbidity and mortality. Tocilizumab, an IL6 antagonist, has been approved by FDA for the treatment of CRS following CAR-T therapy. Similar to the situation with CAR-T, excessive production of cytokines plays a key role in the pathogenesis of ARDS and multi-organ dysfunction associated with infection with SARS-Cov2. Recent studies have shown remarkable efficacy of Tocilizumab in preventing clinical deterioration of patients with COVID-19. Tocilizumab has been already approved by Chinese FDA for the treatment of COVID-19 associated pneumonia and ARDS. However, Tocilizumab has limited availability and our hospital has been able to secure only a small supply. Due to the lack of availability of Tocilizumab, alternative drugs that can block excessive cytokine production are needed for the prevention and treatment of COVID-19 associated ARDS and multi-organ dysfunction. We have previously observed that Dasatinib, a Src/Bcr-abl kinase inhibitor, which has been approved for the treatment of Ph+ ALL and CML, can effectively block CAR-T induced cytokine production. Dasatinib has the advantage of ready availability, oral administration and relatively low cost. In addition, there is extensive clinical experience with this drug and it is relatively well tolerated. As Dasatinib can be easily manufactured and administered orally, it will be particularly useful for controlling COVID-19 not only in the USA but also in resource-poor countries. Therefore, in collaboration with Dr. Ann Mohrbacher (PI), we are developing a clinical trial to test the safety and efficacy of Dasatinib for the treatment of patients with moderate to severe COVID-19. Bristol-Myers-Squibb (BMS) has agreed to fund this study.

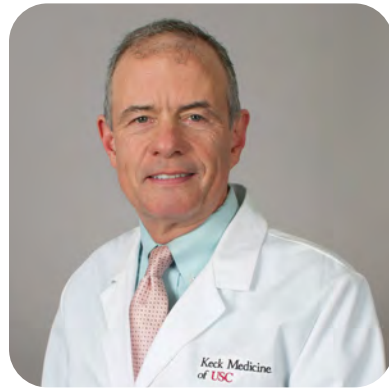


Dr. Preet Chaudhary

The three studies mentioned involve Dr. Chaudhary’s laboratory members:

- Hittu Matta, PhD
- Ramakrishnan Gopalakrishnan, PhD
- Sunju Choi, PhD
- Wei-Ying-Kuo, PhD
- Alberto Jeronimo, BS
- Bryant Bravo, BS

COVID-19 Treatment Trial



Dr. Michael Dube

Dr. Heinz-Josef Lenz (Oncology) and Dr. Michael Dube (Infectious Diseases) moved rapidly early in the local COVID-19 crisis to design, write, obtain all necessary approvals, acquire research funding, and implement a USC-based, investigator-initiated trial for treatment of moderate to severe COVID-19 in hospitalized patients. Re-purposing for COVID-19 the FDA-approved drug baricitinib, which reduces inflammation and is used for treatment of rheumatoid arthritis, the study aims to determine if baricitinib reduces the risk of needing a ventilator when combined with an antiviral drug. This study has been initiated at Keck Hospital and the LA County-USC Medical Center, with plans to open at other hospital sites. If successful, this will provide an important treatment to reduce the risk of developing critical COVID-19 illness and death. The study has received considerable support from many parts of the KSOM community, including the SC Clinical Translational Science Institute (SC CTSI <https://sc-ctsi.org/>) and the USC Norris Comprehensive Cancer Center (<https://uscnorriscancer.usc.edu/about/>).

COVID-19 Vaccine Trial

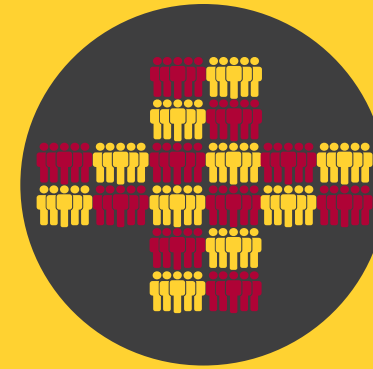
The Keck School of Medicine is part of the CoVPN Coronavirus Vaccine and Prevention Network (<https://www.coronaviruspreventionnetwork.org/>). Part of Operation Warp Speed, this project will be led locally by Drs. Edward Jones-Lopez and Dr. Michael Dube, both members of the DOM in the Division of Infectious Diseases. USC was eligible for participation in the CoVPN as a result of their long-time participation in the NIH-funded AIDS Clinical Trials Network (ACTG). Dr. Dube is the ACTG Clinical Research Site leader at USC. The first trial we will participate in is the AstraZeneca SARS-CoV-2 vaccine study which will enroll 30,000 people around the country. Locally we expect to enroll more than 500 individuals at USC. The trial focuses on enrolling those at highest risk of infection and poor outcomes from COVID-19 illness: Those aged 65 years and older, people of color, and those living or working in congregate group settings. The team is partnering with the City of Vernon, just 5 miles from the Health Sciences Campus, where a satellite outpatient site will focus on enrollment of high-risk persons from the nearby meatpacking industry. This first study is scheduled to begin in August 2020.



ACTIV-1 COVID-19 Treatment Trial

USC has been asked to participate in the ACTIV-1 COVID-19 treatment trial. ACTIV-1 is part of a public-private partnership at the NIH called Accelerating COVID-19 Therapeutic Interventions and Vaccines (ACTIV <https://www.nih.gov/research-training/medical-research-initiatives/activ>). ACTIV-1 will be conducted in the CTSA consortium (National Center for Advancing Translational Sciences). The USC site for this consortium (SC CTSI <https://sc-ctsi.org/>), is led by SC CTSI Director/Principal Investigator Thomas Buchanan, who also acts as the KSOM Vice Dean for Research. The ACTIV-1 study is an innovative “adaptive master protocol” designed to rapidly evaluate multiple therapeutic agents for the treatment of moderately or severely ill hospitalized patients infected with SARS-CoV-2. Dr. Dube of Infectious Diseases will help establish the trial at USC, enlisting junior and senior investigators from multiple Divisions to implement the trial at multiple affiliated hospitals.

Academic Year 2019-2020 Department of Medicine BY THE NUMBERS



325 Faculty
in
10 Divisions



223 Management & Staff
including
98 Research Staff



297 Trainees
189 Residents
96 Fellows
12 Postdoctorals



470
Peer Reviewed Publications



56 Federal Research Grants
with a total of
\$40M Federal Grant Support

2 COVID Research Trials
with at least 6 more waiting for activation

801 Research Trials

DOM Clinical Activities

DOM is the largest department at one of the most expansive academic medical centers in the country. The complex is comprised of LAC+USC Medical Center (LAC+USC) and the Keck Medical Center of USC (KMC). The latter includes USC Norris Cancer Hospital (Norris) and Keck Hospital of USC (KH), as well as several ambulatory venues:

- Healthcare Centers 1 and 2 (HC1 & HC2), located on the USC Health Sciences Campus
- Engemann Student Health Center, located on University Park Campus – USC
- DaVita-USC Kidney Dialysis Center
- The Arthritis Center
- USC Westside Center for Diabetes
- USC Verdugo Hills Hospital
- Keck Medicine of USC-Arcadia
- Keck Medicine of USC-Beverly Hills
- Keck Medicine of USC-Downtown Los Angeles
- Keck Medicine of USC-La Cañada Flintridge
- Keck Medicine of USC-Pasadena
- USC Norris Oncology/Hematology in Newport Beach, Buena Park, Huntington Beach, and Irvine

DOM is dedicated to providing quality, state-of-the-art patient care to both insured and uninsured patient populations.

LAC+USC Medical Center

DOM delivers a remarkable range and volume of high-quality inpatient and outpatient care at LAC+USC Medical Center. Each year its outstanding teaching programs provide direct education to 189 residents, over 80 subspecialty fellows, and approximately 200 medical students at LAC+USC.

Due to the COVID-19 pandemic, we have had to adapt and shift all our services rapidly. Our efforts in the hospital have been led by Dr. May Lee, Medical Intensive Care Unit Director and Service Chief for Pulmonary and Critical Care Medicine, as well as Dr. Douglass Hutcheon, Hospital Medicine Director. With their assistance and in partnership with LAC+USC leadership and other Intensive Care Unit (ICU) directors, we have adjusted our staffing models to care for COVID-19 patients while simultaneously providing care to our non-COVID-19 patients. By the end of June 2020, our faculty, fellows, and residents were regularly caring for over 80 COVID-19 patients on a daily basis — 40 of which were in the ICU.

Our inpatient medicine services have partnered with Dr. Josh Banerjee, Associate Medical Director for Transitions of Care, to develop and implement the Safer at Home program that has provided care coordination, enhanced discharge planning, and oxygen services to our COVID-19 patients being discharged home. This has been an extraordinarily successful program that has served as a model for the other Los Angeles Department of Health Services facilities and has safely transitioned our patients to being cared for at home while also increasing our inpatient capacity.

In our ambulatory care space, our specialty clinics have worked with Dr. Andy Lee, Associate Medical Director of Specialty Care and Clinical Innovations, to adjust to the new normal. We have implemented telephonic visits in all our clinics while



LAC+USC Medical Center

also ensuring that patients who require care in person, such as our patients receiving chemotherapy, are seen in-person when needed. By the end of June 2020, many of our specialty clinics, including Diabetes, Gastroenterology, and Rheumatology, were conducting over 90% of their visits telephonically.

Even as our care in all settings have changed, our other efforts have continued. In the third quarter of this past academic year, our general medicine service achieved a mortality index rate of 0.48. This indicates that our patients have a mortality rate much less than hospitals with similar case complexity and severity.

These are only a small number of the enumerable innovations and changes that have occurred at LAC+USC Medical Center this year. Our faculty, fellows, and residents have been extraordinary in their adaptability, resilience, and compassion in everything they do.



Keck Medical Center

Private Practice

DOM's private practice was on pace to have its busiest year to date when the COVID-19 outbreak occurred. Our private practice had to pivot quickly and skillfully. We initially had to pause a number of our elective services, including endoscopy, colonoscopy, bronchoscopy, and non-invasive cardiovascular services. We curtailed our in-person services and focused primarily on telemedicine clinical care. Each of the faculty started to modify their practices accordingly and handled the transition with great skill and professionalism. As the outbreak unfolded, we partnered with the Keck Medical Center in new and exciting ways. After making sure all safety protocols were in place for faculty, staff, patients, and visitors, we increased our in-person visits and have nearly achieved our pre-COVID patient care volumes. Deploying telemedicine has allowed for our faculty reach out not only to their established patients, but also to allow for the incorporation of new patients into to our clinical practices.

Our inpatient services at the Keck Medical Center (KMC) was also on pace for significant growth prior to the onset of COVID-19. As a result of the outbreak, the surgical volumes dropped significantly at the Keck Medical Center, leading our inpatient care to be mainly involved in the co-management of surgical patients in all the clinical settings. Moreover, our teams were quickly redeployed to fortify the ICU teams as we prepared for a surge of COVID-19 cases. We further deployed faculty to our newly erected Medical Evaluation Tent to help screen and care for patients with possible COVID-19 infection. We also cared for critically ill patients who needed to transfer to our facility for the highest level of care, including from our sister hospital, Verdugo Hills.

Cases of COVID-19 did begin to accumulate at KMC, but started to surge in the spring of 2020 at LAC+USC. Our hospitalists and critical care faculty were at the forefront of care, risking their own health and safety to attend to our COVID-19 patients. The average daily census of COVID-19 patients ultimately passed 100 per day, putting pressure on our teams. These faculty handled themselves with the highest level of professionalism, always taking care of the patients, even "hoteling" in USC-provided lodging rather than risking exposing their loved ones to COVID-19.

As our nation continues to manage the COVID-19 pandemic and as we as a Department continue to adapt to this crisis, we look towards the upcoming academic year to continue to build our programs. We are going to continue our focus on the care of complex patients, advanced cases that only the best faculty can handle, and increasing partnerships throughout our medical center as well as the local and regional medical community. We are looking to grow past our pre-COVID levels by at least 10%, but hopefully more. We are looking to lead and be at the forefront of modern medical technology, including the continued deployment of telemedicine services. We are excited for the challenges ahead. Fight on!

Lung Transplant Program



Sivagini Ganesh, MD from the Division of Pulmonary, Critical Care, and Sleep Medicine

Comprehensive team-based care throughout the transplant process

USC has assembled a multi-disciplinary team to provide comprehensive care to patients and families both prior to and after lung transplantation. Our transplant team includes thoracic surgeons, pulmonologists, specially trained members of the nursing staff, pathologists, social workers, dietitians, financial coordinators, social workers, anesthesiologists, intensive care units and physical/occupational therapists.

We offer comprehensive care and support every step of the way: Throughout the referral and evaluation process, during the waiting period, during and after surgery and as patients return to their daily activities.

Outstanding short and long term outcomes

Our program has established a reputation for accepting challenging, complex cases. We have performed lung transplants for many patients who were unable to receive

a transplant at other centers. These high-risk cases include patients in their 70's. We also accept patients who are high risk because of health problems such as scleroderma, reflux disease and severe pulmonary arterial hypertension. Despite this, the survival rate for our patients who receive a lung transplant at USC consistently exceeds the national average, according to Scientific Registry of Transplant Recipients (SRTR).

Due to the accelerated transplant rates we managed to maintain the wait times below the national average and maintaining the waitlist efficiently helped to reduce the wait list mortality than the national average.

Patient centered care

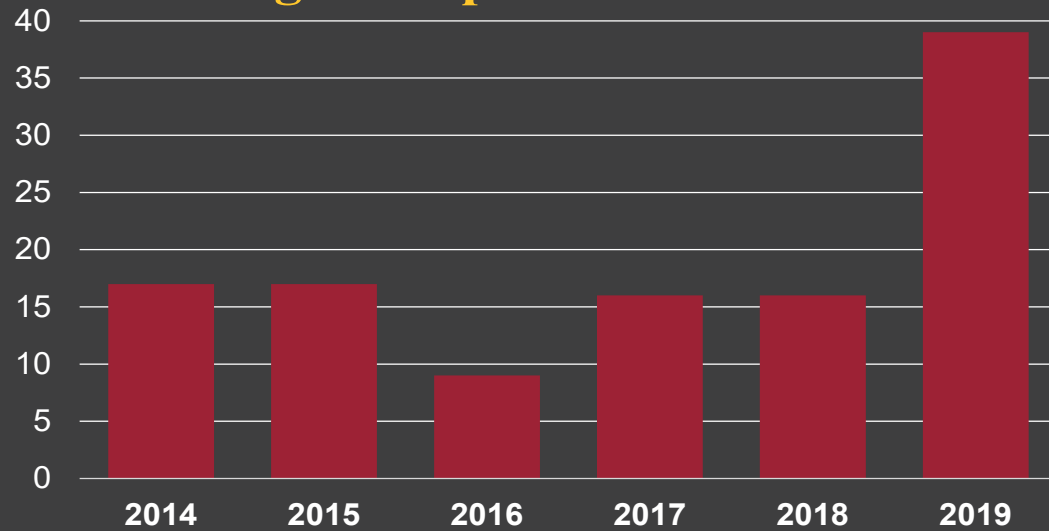
Our program ensures that patients' goals and preferences remain the center of the care. In addition, patient and family education and support allow them to better focus on their health.

Our work is possible because of the generosity of organ donors and we honor these remarkable gifts from donors and their families.

We believe the respect, dignity, integrity and empathy drive care and we expect courtesy and consideration in every interaction. The goal of the USC lung transplant Program is to work in partnership with individuals, families, and the community to promote optimal health and quality of life for recipients of all phases of transplantation.

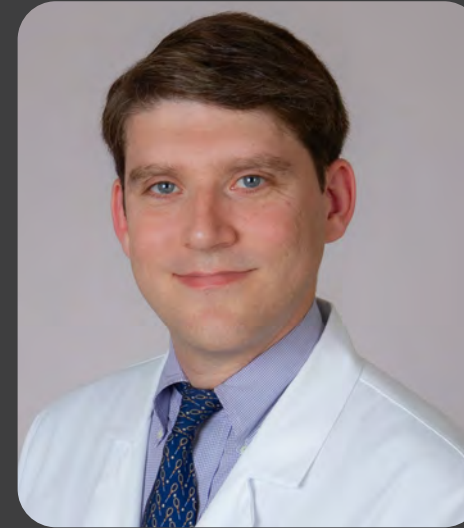
Finally, we believe that all services must be provided in a safe environment that supports health goals and enables care to be delivered with comfort and efficiency.

USC Lung Transplant Volume



USC Lung Transplant volume growth over the last 6 years. To date, we have done 26 procedures for 2020.

Heart Transplant Program



Eugene DePasquale, MD from the Division of Cardiovascular Medicine

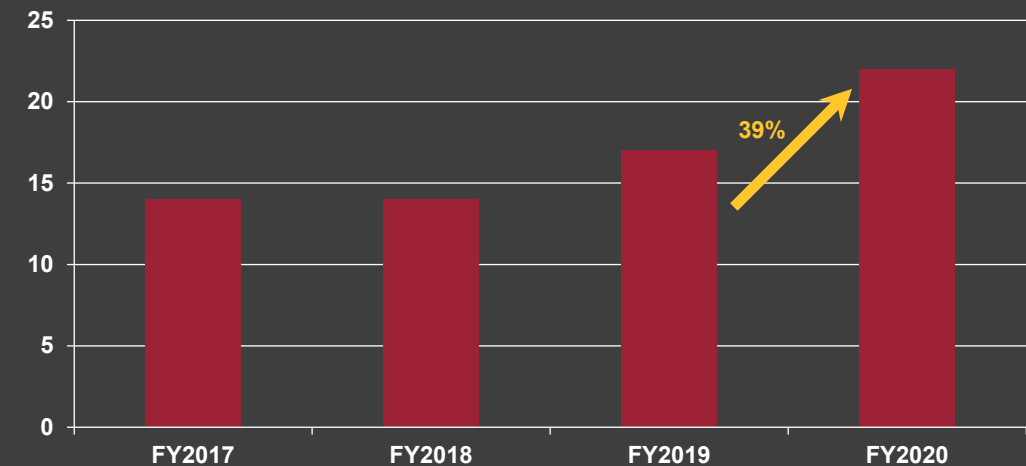
The USC Heart Failure, Heart Transplantation and Mechanical Circulatory Support Program is led by Eugene DePasquale, MD who joined in July 2019 with Michael Fong, M.D., Kruti Pandya, M.D., Joseph Rahman, M.D., and Ajay Vaidya, M.D. completing the team.

The Heart Failure Program has seen continued growth year over year with a 14% increase in outpatient visits as well as increased inpatient volumes caring for the complete spectrum of heart failure. The Heart Failure Program has received continued recognition from the Get With The Guidelines – Heart Failure with successive Gold Plus Awards from the American Heart Association. Our Heart Failure Team also comprises Hoi Yan Kwong, N.P., Carlos Sandoval, R.N. and Claire Boylan, R.N.

The USC Heart Transplantation Program has performed over 400 transplants to date, completing the 400th in June 2020. The Heart Transplantation Program, a joint collaboration between cardiovascular medicine and cardiac surgery, recently transitioned medical leadership to Dr. Eugene DePasquale and Dr. Mark Cunningham, Surgical Director. Over the past year, referrals and transplant evaluations have increased significantly. Concomitant with this, heart transplant volume has increased with 29% growth year over year. Despite advances in Mechanical Circulatory Support (MCS), the use of this technology in Southern California is underutilized compared to other parts of the United States. Despite this, the USC MCS Program has also seen growth year over year (133%). The USC MCS Program seeks to increase awareness of this therapy particularly for advanced heart failure patients who may not qualify for heart transplantation with the demonstrated improvement in quality of life and survival. In addition to our physicians, our team comprises Anthony Dan Salimbangon, R.N., M.B.A. *, Sylvia Gonzalez, R.N. (Pre-Transplant Coordinator), Ashley Cochran, N.P. (Post-Transplant Coordinator), Bonnie Rosen, R.N. (Post-Transplant Coordinator), and Uzma Qureshi, N.P. (MCS Coordinator).

The Heart Failure, Transplant and MCS section is actively involved in clinical trials and studies, such as GUIDE-HF, SHORE Registry, and Triluminate. The section also has presented at national meetings with significant representation at the International Society of Heart & Lung Transplantation, American Transplant Congress, and American College of Cardiology.

USC Heart Transplant Volume



USC Heart Transplant volume growth over the last 4 years. The program has completed 400 transplants as of June 2020.

DOM Educational Activities

The Department of Medicine continues its intensive investment in advancing educational programs at both the Graduate and Undergraduate levels. Our mission is to train physicians to be compassionate, dedicated, and well-rounded physicians by balancing academic rigor and clinical diversity with a supportive and collegial learning environment. We provide clinical training in all disciplines of internal medicine and are committed to providing an individualized training environment focused on balancing clinical autonomy with structured learning and an emphasis on scholarly activity and personal-professional well-being. Department faculty contribute extensively to medical student education and directly supervise the training of nearly 280 house officers and fellows each year.

Undergraduate Medical Education

Drs. Canceko and Johnson continue to head student education and have been recognized for their efforts. Students continue to have rotations at multiple setting including LAC+USC Medical Center, Keck Medical Center, Verdugo Hills Hospital, Santa Barbara Cottage Hospital, and Huntington Hospital. Our core clerkship rotation has been voted as highest ranked 3rd year rotation by Keck School of Medicine students during their most recent academic survey.

Graduate Medical Education

The Internal Medicine Residency Program and the Department's 16 Subspecialty Fellowship programs have complete ACGME accreditation. Our graduate medical education programs continue to recruit high quality physicians who serve as the foundation of our educational programs. Our residency program serves a diverse and complex patient population at our multiple state of the art facilities. Our faculty teach residents to provide patient-centered, evidence based, culturally sensitive care. Our residents graduate from our program, ready to become leaders, scientists, teachers, and confident physicians.



2019-2020 Chief Medical Residents
(left to right): Drs. Jenica Thangathurai, Helen Yang, and Allen Chao

The Internal Medicine Residents are led by DOM's Chief Medical Residents. Chief Medical Residents completed the program and stayed for a fourth year to gain experience in medical education. Dr. Thangathurai will next pursue a Cardiology fellowship at Harbor UCLA. Dr. Yang will next pursue a Master of Public Health at University of California, Berkeley while practicing medicine. Dr. Chao will next pursue a Nephrology fellowship at University of California, San Francisco.

Innovation

Innovation continues to power the Department of Medicine in developing a multitude of goals designed to advance our role in education and training, patient care, and research in both local and global platforms. On the education front, the Department of Medicine continues to uphold its distinguished reputation in the training and development of resident physicians and fellows. Aligned with our continued efforts to produce talented, independent physicians, the implementation of important

curriculum changes involving Global Health, patient communication, wellness, and faculty development further illustrates our commitment to cultivate and broaden each trainees' skills and knowledge to take on leadership roles in clinical, academic, and research fields. Our faculty members continue to provide a supportive environment that exposes trainees to cutting edge treatments, techniques, and technology while challenging them to engage in critical analysis.



The Internal Medicine Residency Training Program, Class of 2019

The Internal Medicine Residency Program has partnered with the Master of Science in Global Medicine Program, to develop a Global Health rotation for our residents. Current rotation sites have included Panama and the United Nations Development Programme. Our rotation is designed to expose residents to different health care systems, diseases and treatments not commonly seen in the US, and the clinical skills to diagnose and treat patients in an international setting. Through this rotation, residents will complement their training with valuable insight into research, cultural competency, policy, public and international health.

This last year we have adapted our curriculum to emphasize new and innovative ways to care and connect with our patients outside of the medical center. Telehealth visits have become an essential part of our practice models in the primary care and subspecialty clinics. We have also launched a new communication workshop series based on the Meyers-Briggs Personality Types to help our trainees better connect with patients, staff, and peer physicians.

In 2019, our Internal Medicine Residency Program partnered with the USC School of Engineering to conduct a wellness study in the Medical ICU. Nurses and physicians carry wearable technology that capture various metrics of wellness and stress throughout their day while working in the MICU. The study has been conducted both before and during the COVID-19 pandemic. We have currently gathered information on the wellbeing of over 100 physicians and 100 nurses and are actively adapting our rotation infrastructure based on the data to improve the wellness of our healthcare providers.

Our Graduate Medical Education programs have expanded our faculty development program with the introduction of a new Academic Leadership Academy with the goals of optimizing teaching confidence and skill, promoting an environment of academic inquiry and building a larger community of educators. Ten faculty per year enroll in this year long program, which is taught by seasoned educators, theory experts, and curriculum design strategists.

The Department of Medicine's drive to champion progress and breakthroughs, backed by our brilliant faculty, trainees and collaborative resources, will shape medicine and health sciences for future generations.

Graduate Medical Education

Vice Chair, Educational Affairs and Residency Program Director
Eric Hsieh, MD

Director, DOM Educational Affairs
Nancy G. Shepherd, MS Ed

Residency Coordinator
Krystle Santos, MA

Associate Residency Directors

Trevor Angell, MD
Antreas Hindoyan, MD
Cathy Jalali, PhD
Sonia Lin, MD
Joshua Sapkin, MD
Patrick Sarte, MD

Chief Medical Residents

Jenica Thangathurai, MD
Helen Yang, MD
Allen Chao, MD

Undergraduate Medical Education

Clerkship Director
Jeffrey Canceko, MD

Associate Director
Matthew Johnson, MD

Medical Student Educator
Sonya Earley, PA-C, MA, CDE

Fellows and Residents

FELLOWS

Cardiology

Pooya Banankhah, *UCLA Olive View*
Wesley Ghasem, *USC*
Wilson Kwan, *USC*
Grace Liu, *University of Texas Southwestern*
Stephen Yau, *USC*
Kristen Burton, *USC*
Jonathan Nattiv, *USC*
Peter Xu, *USC*
Lena Awar, *UCLA Harbor*
Merije Chukumerije, *USC*
Sumit Patel, *Stanford University*
Leah Raj, *Emory University*

Clinical Cardiac Electrophysiology

Kenny Kita, *USC*
Abhishek Shah, *UCSD*

Interventional Cardiology

Ashwat Dhillon, *Fairview Hospital - Cleveland*
Haroon Yousaf, *Interfaith Medical Center*

Endocrinology

Alyssa Lampe, *USC*
Maria Magyar, *UCLA Olive View*
Reshma Patel, *USC*
Jessica Chan, *Lenox Hill Hospital*

GI/Liver

Omar Bakr, *UCLA*
Ravi Kankotia, *USC*
Chanthel Kokoy-Mondragon, *NYP Columbia*
Nene Prachi, *USC*
David Herman, *USC*
Jessica Hong, *USC*
Christopher Ko, *USC*
Okeefe Simmons, *University of Texas Southwestern*
Janet Kwok, *USC*
Paul Leonor, *USC*
Michael Quezada, *USC*
Varun Takyar, *University of Arizona*

Geriatrics

Araz Melkonian, *Adventist Health Glendale*

Hematology

Chris Foss, *USC*
Robert Hsu, *University of Miami*
Darwin Roman, *University of Oklahoma*
Lan Wang, *USC*
Shi Yu, *USC*
Priya Jayachandran, *UCSF Fresno*
Nara Lee, *Rutgers*

Grace Li, *St. Luke's Hospital - Chesterfield*
Caitlin O'Neill, *USC*

Oncology

Sandra Algaze, *University of Miami, Jackson Memorial*
Stephen Dong, *Scripps Clinic & Scripps Green Hospital*
Upama Giri, *University of Tennessee*
Mindy Hsiao, *USC*
Mihee Park, *USC*
John Hu, *University of Rochester*
Yi-Tsung Lu, *John H. Stroger, Jr. Hospital of Cook County*
Ravi Patel, *USC*
Varsha Tulpule, *USC*

Infectious Diseases

Aditya Jones, *Hemet Valley Medical Center*
Brianna Rogan, *Arrowhead Regional Medical Center*
Katie Zhang, *USC*
Navid Pour Ghasemi, *USC*
Fernando Dominguez, *MetroWest Medical Center*
Patrick Wu, *Loma Linda*

Nephrology

Thanh Cao, *Valley Hospital - Las Vegas*
Annika Khine, *USC*
Tiffany Truong, *UT-Houston*
Rangashree Varadarajan, *HonorHealth*
Win Win Hlaing, *Kern Medical Center*
Jim Nguyen, *The Wright Center for GME*
Shahid Syed, *USC*
James Weltman, *Valley Hospital - Las Vegas*
Viktoriya Yanchuk, *Skagit Regional Health*

Pulmonary Critical Care

Shiqian Li, *USC*
Aniket Sharma, *University of Connecticut*
Drew Sheldon, *UC Irvine*
Wei Hsia, *UC Irvine*
Defang Chen, *University of Louisville*
Ghazal Kabbach, *Texas Tech UMC*
Christopher Ho, *McGovern Med*
Mishala Bateman, *USC*
Rodrigo Garcia-Tome, *Mt. Sinai-West*
Gregory Grandio, *University of Connecticut*
Yash Kothari, *University of Louisville*
Christine McElyea, *UCSF Fresno*
Neha Mehta, *Lenox Hill Hospital/Hofstra Northwell*
Clay Wu, *St. Mary's Medical Center - San Francisco*
Peter Chung, *University of Texas Health Science Center-Houston*

Jennifer Genova, *SUNY Downstate Medical Center*
Waasil Kareem, *Pennsylvania Hospital University of Pennsylvania Health System*
Vineeth Kumar, *Medstar Washington Hospital Center*
Jennifer Loeb, *University of Illinois-Chicago*
Stefania Pirrotta, *Mt. Sinai-St. Luke's Roosevelt Hospital*
Lucas Silqueira Hickson Cruz, *University of Connecticut*

Rheumatology

Lauren Mathias, *USC*
Stephen Myers, *Huntington*
Brendan Cerk, *UCLA Olive View*
Chuang Alice, *Santa Clara Valley Medical Center*
Jun Jenny, *UCLA Olive View*
Wang Sky, *USC*

Sleep Medicine

Anish Patel, *St. Barnabas Medical Center*
Sahar Rabiei-Samani, *Advocate Illinois Masonic Medical Center, Chicago*

Transplant Hepatology

Dupinder Singh, *University of Minnesota*

RESIDENTS

First Year

Daniel Aldea, *Boston University*
Lauren Antrim, *Cornell University*
Saul Barajas Nuno, *UCLA/Drew Medical Education Program*
Christopher Bradley, *University of Arizona*
Krithika Chennapan, *USC*
Christine Chiu, *University of Arizona*
Edward Cho, *USC*
Lillian Dawit, *George Washington University*
Michael Dittmar, *University of Colorado*
Tobias Dong, *UC Irvine*
Sami Dwabe, *UC Irvine*
Matthew Ebia, *Northwestern University*
Dominic Engracia, *Virginia Commonwealth University*
Andrew Foong, *Tufts University*
Sophia Ghaus, *Virginia Commonwealth University*
Courtney Hanlon, *Dartmouth*
Sami Hashmi, *Northwestern University*
William Hertzog, *University of Texas*
Lianne Ho, *USC*
Young Hsu, *USC*

Keck School of Medicine of USC

Jonathan Huang, *USC*
Stefano Iantorno, *Columbia University*
Chongiin Kim, *USC*
Philip Kingsford, *UC San Francisco*
Alexander Klonoff, *USC*
Justine Ko, *USC*
Moses Koo, *Rush Medical College*
Patrick Lee, *University of Cincinnati*
Vivian Lee, *George Washington University*
Ramon Lee, Jr., *University of Pennsylvania*
Jason Li, *Boston University*
Michelle Lin, *USC*
Steven Luminais, *Temple University*
Aditya Mantha, *UC Irvine*
Brett McGettigan, *University of Colorado*
Daniel Miklin, *University of Miami*
Sophie Miller, *Medical College of Wisconsin*
Hima Namboodiri, *University of Pittsburgh*
James Onwuzurike, *University of Arizona*
Jonathan Pai, *UC San Francisco*
David Panek, *UC Irvine*
Matthew Phillips, *University of Miami*
Michael Pimental, *UC San Diego*
Baljeet Rai, *Georgetown University*
Salvador Rosales, *Brown University*
Charles Shumaker, IV, *Temple University*
Preeti Singhal, *University of Texas*
Dana Toy, *Dartmouth*
Robert Tungate, *USC*
Christina Vu, *USC*
Xinyu Wang, *Washington University*
Allison Wang, *Wake Forest University*
Xiao Yu, *University of Washington*
Matthew Zabrowski, *USC*
Selena Zhou, *Mount Sinai*

Second Year

Argin Baghramian, *Drexel University*
Nora Bedrossian, *University of Arizona*
Rupan Bose, *USC*
Carlos Buitrago, *Virginia Commonwealth University*
Erica Chan, *USC*
Patrick Chang, *USC*
Denaly Chen, *Albany Medical College*
April Choi, *Case Western Reserve University*
Lydia Chow, *Tulane University*
Tyler Degener, *Drexel University*
Jaspreet Dhillon, *Ohio State University*
Cameron Furey, *Loyola University Chicago*
Christina Gaine, *USC*
Jared Geibig, *Tufts University*
Percy Genyk, *Johns Hopkins University*
Serena Ghanshani, *USC*
Alexander Gong, *USC*
Cesar Gonzalez, *USC*
Hugh Gordon, *USC*
Anahid Hamparsumian, *Case Western Reserve University*
Semi Han, *UC Davis*
Amanda Herrmann, *Rutgers University*
Liam Hilson, *University of Hawaii*
Brent Hiramoto, *Northwestern University*

Brian Horwich, *USC*
Owen Huang, *Albert Einstein College of Medicine*
Jeanney Kang, *USC*
Sheila Kapyur, *Virginia Commonwealth University*
Kevork Khadarian, *Albany Medical College*
Andrew Lee, *Tulane University*
Edward Lin, *USC*
Yao Liu, *Texas Tech University*
Deanna Lo, *Loma Linda University*
Katherine Loomis, *Michigan State University*
Julian McLain, *Rosalind Franklin University*
Rose Monahan, *University of Virginia*
Darren Morris, *Pennsylvania State University*
Ashwini Mulgaonkar, *University of Arizona*
Swathi Nallapa, *USC*
Thaer Othman, *USC*
Ashil Panchal, *Thomas Jefferson University*
Joo Hye Park, *Rutgers University*
Samantha Quon, *USC*
Mateen Saffarian, *USC*
Anjali Sharma, *USC*
Robert Tamai, *Johns Hopkins University*
Neal Tambe, *USC*
Jennifer Tang, *USC*
Alexander Tonthat, *Temple University*
Minh-Thu Tran, *Dartmouth*
Christopher Vo, *UC Irvine*
Alexandra Wong, *New York Medical College*
Gloria Wu, *USC*
Katharine Yang, *Birmingham Medical College*
Paul Yang, *USC*

Third Year

Omeed Alipour, *USC*
Shamili Allam, *USC*
Divya Ayyala-Somayajula, *USC*
Patrick Baghdasaryan, *St. George's University*
Satish Balasubramanian, *SUNY Downstate*
Hussain Basrawala, *University of South Florida*
Alexander Becka, *University of Wisconsin*
Henry Bergquist, *University of Pennsylvania*
Neil Bhambi, *Rush Medical College*
Ernesto Casillas, Jr., *USC*
Patrick Chan, *USC*
Jeremy Chang, *UC San Diego*
Edward Chau, *USC*
Jonathan Cheng, *USC*
Kathan Chintamaneni, *Medical College of Wisconsin*
Joon Young Choi, *Wayne State*
Nicole Evans, *Drexel University*
Alakh Gulati, *University of Miami*
Shida Haghighat, *University of Miami*
Karen Haiber, *University of Arizona*
Eri Joyo, *University of Missouri- Kansas City*

Jackson Kim, *Tufts University*
Naina Lalani, *University of Texas*
Alice Lee, *Rush Medical College*
Christopher Lee, *UC San Diego*
Joseph Lee, *USC*
Nathan Lim, *Boston University*
Victor Lin, *USC*
Anastasia Martynova, *I.M. Sechenov First Moscow Medical University*
Arazin Minasian, *USC*
Stefan Nguyen, *Ohio State University*
Wei Huang Ning, *USC*
Elizabeth Pan, *USC*
Ronak Patel, *University of Miami*
Janice Rivelle, *USC*
Alex Rosenberg, *Albert Einstein College of Medicine*
James Samuelson, *Sidney Kimmel Medical College*
Richard Seto, *Rush Medical College*
Shawn Shah, *USC*
Helen Shen, *Ohio State University*
Stacy Shen, *USC*
Philip Sheth, *USC*
Audrey Shi, *Temple University*
Peter Sohn, *Drexel University*
Kayvon Sotoudeh, *USC*
Liya Stolyar, *Rutgers Robert Wood Johnson Medical School*
Heywan Tesfaye, *USC*
Justin Wayne Tiulim, *USC*
Jeffrey Tran, *USC*
Karen Tsai, *Stony Brook University*
Poorva Vaidya, *Georgetown University*
Evan Vidar, *USC*
Sarah Wheeler, *USC*
Jared Wong, *Loma Linda University*
Jeffrey Yeh, *USC*

Med+Peds

Michelle Banh, *Tulane University*
Sara Bonilla-Larsen, *Wayne State University*
David Boothe, *Pennsylvania State University*
Jacqueline Cervantes, *UC San Francisco*
Lisette Cervantes, *Loma Linda University*
Ahmed Daboul, *University of Toledo*
Ammar Dahodwala, *Rowan University*
Nathan Dalrymple, *Rowan University*
Raeye Daniel, *USC*
George Fox, *Mount Sinai*
Hannah Gwin, *University of Mississippi*
Julian Hirschbaum, *A.T. Still University*
Alda Huang, *Thomas Jefferson University*
Margarita Ivanova, *USC*
Jonas Kwok, *SUNY Downstate*
Margaret Nkansah, *Albany Medical College*
Hannah Obasi, *UC San Francisco*
Tiffany Pan, *USC*
Erica Patel, *USC*
Matthew Schwartz, *Augusta University*
Sarah Soliman, *USC*
Peter Sorial Soliman, *University of Arizona*
Khanh-Van Yveline Van Anh, *Tulane University*
Eric Zuniga, *UC Irvine*

Department of Medicine Annual Report

Our Trainee Experience

FELLOWS

Ravi Kankotia, Gastroenterology PGY5

"Since the beginning of my medical education, I've sought to stay here at USC for its *distinct clinical offerings at LAC and Keck Medical Center, volume of complex pathology, and opportunities to advocate for the underserved.*"



Darwin Roman, Hematology/Oncology PGY5

"The hematology and oncology departments make a priority to ensure that fellows, residents, and medical students are exposed to and are comfortable with the *latest treatments available for patients.* Motivated faculty engage learners of all levels in comprehensive discussion of diagnosis, prognosis, treatment, and future research endeavors of specific tumor types. Focused didactics throughout the year provide fellows confidence in their ability to excel in both the hematology and oncology board exams. *Opportunities to participate in the development and execution of clinical trials* are present and are a valuable asset to the fellowship program."

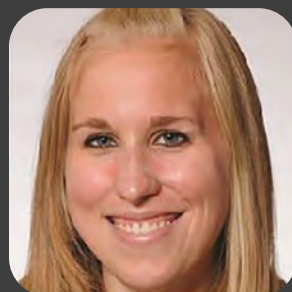
Grace Liu, Cardiology PGY5

"Since starting cardiovascular disease fellowship at USC, I have been really impressed by the focus on trainee education here. The educational mission is felt throughout each rotation, from the meticulous EKG teaching on the consult service to the supervised independence we are granted in the cath lab. We are lucky to have *attendings that are not only master educators but altruistic teachers that truly care about your growth and development* into a well-rounded cardiologist. On top of that, these attendings so freely offer their time and energy to answer a question or solve a clinical dilemma at any time of the day (or night), for which I am so appreciative of!"



Annika Khine, Nephrology PGY5

"I am pretty happy with my fellowship training. One thing I've learned from fellowship is that it is very important to find a mentor who is available, advocates for you, and at the same time, challenges you to be better. *I feel extremely grateful to have such a mentor at USC Nephrology.*"



Alyssa Lampe, Endocrinology PGY5

"The *opportunity to train in a wide range of clinical settings* at USC has given me given me experience in treating not only classic presentations of common endocrine issues, but also rare and complex cases. The mentorship I have received from the faculty at USC has allowed me to build my knowledge base, participate in research and translate complicated pathophysiology into treatment plans. I have the *autonomy to develop therapeutic alliances with my patients with the guidance of supportive supervising physicians.* As a fellow at USC, I also am able to impart what I'm learning to residents and medical students on my team. I feel confident that the clinical, teaching and research experiences I continue to have at USC will prepare me for practice in whichever setting I choose."

RESIDENTS

Saul Barajas, PGY2

"The Internal Medicine program at LAC+USC is a unique program for various reasons. The program allows one the *opportunity to rotate through different hospital facilities with different patient population.* This opportunity allows one to interact with patients, family members, and health care providers from all walks of life, which is truly an invaluable experience to have as a practicing physician in a culturally rich society. Second, one sees *an array of diverse pathology from common diseases to rare diseases.* Didactics are very important, and the program emphasizes and is committed to our lifelong learning. The opportunities to learn and teach in this program are endless. One has the responsibility to learn, do, and teach whether one is an intern, resident, or attending and this can be reflected in our rounds, procedures, and didactics."

David Panek, PGY2

"During my medical school education, I learned mostly through study. In general, I would be presented with a topic and then learn that topic through lectures and readings. On the other hand, my residency education has been more *geared toward learning through experience.* Not uncommonly, I have been tasked with caring for a patient with a condition or diagnosis with which I have little experience. Through guidance, trial, and sometimes error, I've learned much more about managing illnesses than I could probably learn from lectures and reading. Though our program does place a strong emphasis on formal education, *the strength of our program's education lies in the vast breadth of patient experience.*"



Dana Toy, PGY2

"One of the highlights of medical education at USC has been the *learning that occurs beyond the conferences.* At the beginning of my residency, I was introduced to several faculty mentors working on various projects ranging from bench to bedside. The opportunity to work directly with faculty has been an invaluable source of learning and mentorship. It has also been an *important resource for my aspirations to be in academic medicine.*"



Courtney Hanlon, PGY2

"On the interview trail for residency I often heard the expression "you must rely on your training" in difficult clinical situations. I chose USC for the *rigor of clinical training, the greater community that we serve, and the unlimited opportunities after graduation.* As an aspiring subspecialist I am inspired by quality research opportunities and mentors, and as an out queer resident I feel fully supported and engaged in my community at work. I am fully confident that I can rely on the complex clinical reasoning, leadership experience, and compassionate doctoring required of every resident here at USC."

Michael Dittmar, PGY2

"When I reflect on my educational experience at USC - morning reports, noon conferences, afternoon didactics, procedural workshops all come to mind. Each of these sessions are led by experts in their respective fields to ensure that I am getting the most up to date clinical practice knowledge. Then you get to dive into the clinical setting and put that knowledge to practice, with enough supervision for patient safety but enough leniency for you to establish your own practice style and growth as an independent physician. *The underlying theme of the educational experience, and what makes USC shine brightest in LA, is its dedication to its underserved population.* Despite the frustrations that come along with working within the confines of a county health system, being able to apply this top-notch education to care for patients that could not receive care otherwise, makes this educational experience truly fulfilling."



Minh Tran, PGY3

"LAC+USC Medical Center has been an incredible learning and training experience for me. Every day, our medicine teams, nurses, and support staff strive to provide the best healthcare to the most vulnerable patient population in Los Angeles. We are now living and working through unprecedented times due to COVID-19. I am inspired by our administrators, attendings, and co-residents' tireless dedication to better ourselves against this battle. Now, more than ever, *I am appreciative of my program's mission of providing the best clinical education and training to provide the best possible care for our patients.*"



Anjali Sharma, PGY3

"At LAC+USC Internal Medicine Residency, I have been able to receive a *hands-on education.* Though the majority of my learning has been through taking care of patients and working with the fellows and attending physicians, I have also learned a lot from the interesting cases presented during morning report. I appreciate the *procedural workshops that allow for us to practice and become comfortable with a variety of procedures* and hope that this will continue to be expanded upon since it has been very useful to me. I also enjoy the didactic lectures since the majority of them focus on topics that are directly applicable to management of patients who we care for on a daily basis. I hope that the residency program will continue to improve on and focus on making educational materials that are both accessible as well as guideline-based."

DOM Research Activities

Research is a central activity and a force multiplier for the multifaceted missions of the Department, medical center and University. Since 2018, significant investments have been made in the research infrastructure, including physical renovation of wet lab space and new opportunities for centralized services, such as biorepository and biostatistics for faculty members and trainees within the DOM.

There are reasons for optimism for making a big leap in the DOM rankings in a relatively short period of time with implementation of the right strategies that will include developing a pipeline of homegrown talent and aggressively recruiting established multi-disciplinary investigators from other research centers who “move the needle.” It is worth noting that, per DOM faculty member, Keck is much more efficient at obtaining NIH dollars than most of programs on the Blue Ridge ranking list.

The DOM will build on the considerable strengths of existing programs listed below.

Basic/Translational Science

- The **Center for Molecular Pathways and Drug Discovery**, focuses on accelerating the pace of drug discovery and the development of less toxic and more effective therapies for the treatment of cancer and other diseases.
- The **Circulating Tumor Cell Research Center** is a state-of-the-art, multi-platform facility for the capture and analysis of peripheral blood circulating tumor cells.



*7th Annual Diabetes and Obesity Research Institute (DORI) Symposium
From left to right: Dr. Thomas Buchanan, Dr. Michael Goran,
Pao Gasol, Dr. Scott Kanoski, and Dr. Kathleen Page*

- The **USC Diabetes and Obesity Research Institute (DORI)** supports research to address the world-wide epidemic of obesity and type 2 diabetes. Unique features of research conducted by DORI members are transgenerational effects of maternal diabetes, diabetes in youth, racial and ethnic determinants of obesity and diabetes, and the relationship between metabolic disorders and Alzheimer’s disease.
- The **Gehr Family Center for Implementation Science** creates innovative collaborations to develop and promote sustainable, efficient, clinical-quality improvement strategies.
- The **Gehr Family Center for Rare Blood Disorders** conducts translational research into blood diseases such as myelodysplastic syndromes, which can lead to leukemia and AML, the most common adult acute leukemia.
- The **Hastings Center for Pulmonary Research (HCPR)** strives to be a leader in lung biology and disease research.

- The **Lupus Center** uses information gained by laboratory bench research to serve as the basis for the development of prototype treatment strategies for a wide variety of autoimmune diseases.
- The **Research Center for Cell Therapy** will strengthen and expand the existing capabilities of cell based therapies by bringing together basic, translational and clinical investigators working on developing novel cell based therapies for the treatment of hard-to-treat diseases, such as immunodeficiency disorders, autoimmune disorders, genetic diseases and in-born errors of metabolism.
- The NIH-Sponsored **Research Center for Liver Diseases** provides a major institutional resource for multidisciplinary and interdepartmental investigations, educational seminars and start-up grant funding opportunities in liver diseases.
- The **USC/UKRO Kidney Research Center** is dedicated to the belief that collaboration among scientists is key to understanding and eliminating chronic kidney disease (CKD).
- The **Will Rogers Institute Pulmonary Research Center** continues to contribute significant advances in research related to lung injury and pulmonary edema.

Large Scale Clinical Trial Centers

- The **Atherosclerosis Research Unit** conducts studies designed to assess the benefits of a wide variety of therapeutic interventions for prevention and reversal of atherosclerosis.
- The adult **AIDS Clinical Trials Group (ACTG)** has become one of the nation’s leading centers in carrying out NIH-sponsored AIDS clinical trials in adult populations.
- The **Keck Diabetes Prevention Initiative** develops treatment programs for the epidemic of obesity and type II diabetes occurring in the medically underserved populations of Los Angeles.
- The **Southern California Clinical and Translational Science Institute (SC CTSI)** provides a broad range of services and support to promote clinical and community trials, develop new methods to enhance the efficiency and effectiveness of clinical research, provide training in clinical and translational research, and disseminate research findings to improve clinical care and community health.



The USC NIH Research Center for Liver Disease Director (since 1995), Dr. Neil Kaplowitz (right), discusses opportunities and innovations with the new Director, Dr. Hugo Rosen (left)

Developing a Pipeline of Investigator-Trainees, Recruiting Established Investigators and Building Bridges

Most of the DOM divisions try to obtain T32 training grants. This year, both Gastroenterology and Pulmonary/Critical Care submitted applications. Having T32 training grants will also attract the absolute best substrate for fellowship candidates and will have far-reaching effects for the entire DOM and campus. In the interim, we have worked to create a culture conducive

to achieve these goals, including a Medicine Scholars Fellowship that divisions compete for in order to provide specialty fellows with > 75% protected time as would occur with traditional T32 funding. Fellows are encouraged to seek out diverse research opportunities in basic, translational, patient-centered or health services research; we have found training committees to be indispensable for the success of young investigators. As part of the program, each fellow will apply for an NIH-F32 grant and ultimately, K award.

For the USC Divisions that already have a cadre of investigators that could realistically compete for a T32, the DOM will identify an individual within that division to steward this process, providing both administrative and ongoing financial support. For USC divisions that lack the critical mass of investigators, the DOM will work with Division Chiefs to identify research stars, including PhD scientists, to recruit.

The DOM has allocated resources to recruit interdisciplinary research faculty from outside institutions to catalyze new collaborations in order to bridge scientific/clinical disciplines within the DOM and broader USC research community, accelerating discovery in a variety of fields of interest to the DOM. Ideal candidates will be associate or full professors with publications in high-impact journals and a record of NIH RO1 funding. The candidates should have expertise in research areas that would enhance at least two scientific/clinical disciplines and create the possibility for novel program development and Program Project Grant applications. The DOM should also leverage the strengths of other Departments, the USC School of Public Health to expand the mentorship and scope of trainees interested in health outcomes research; historically, this strategy has been shown to strongly position fellows for success in academic medicine. The DOM is committed to working with University Park Campus, including the MESH program, in order to operationalize convergence across multiple disciplines including biomedical engineering and other strong programs on the main campus. The NIH has made translational research, i.e., combining basic science and clinical investigation to translate scientific discoveries into clinical applications, a priority across most of its Institutes. The DOM will continue to take advantage of the unique and diverse patient populations served by our teaching hospitals and clinics, as well as the leadership talents of our faculty.

New Federal Grants Awarded to DOM Faculty

Principal Investigator	NIH Grant Number	Study Title
Bugacov, Elena	F31DK122777	Transcriptional Programming in the Maintenance and Commitment of Nephron Progenitors
Yassine, Hussein N	R01AG067063	ApoE; ABCA1 and Endosomal Dysregulation in AD
DeLeve, Laurie D	R01DK100580	Liver Sinusoidal Endothelial Cell Progenitor Cells (sprocs) and Chronic Liver Disease
Rosen, Hugo Ramon	R01DK117004	Innate Immunity, Cholesterol, and NASH Pathogenesis
Shaker, Anisa	R01DK118065	The Role of Human Esophageal Myofibroblasts in Regulating the Epithelial Response in GERD
Terrault, Norah A	U01DK061738-19	Nonalcoholic Steatohepatitis Clinical Research Network (NASH CRN)
Cannon, Paula M	U19HL156247	Novel Hematopoietic Stem Cell Engineering and Transplantation Approaches for HIV Cure
Wang, Rongfu	R01CA101795-13	Novel Strategies for Intervention of Inflammatory Diseases And Cancer
Setiawan, Veronica	R01CA209798	Investigating the Cause of Racial/Ethnic Disparity in Pancreatic Cancer Incidence
Setiawan, Veronica	R01CA228589	Understanding the Determinants of Racial/Ethnic Disparities in Liver Cancer and Chronic Liver Disease in Understudied and High-Risk Populations
Dou, Yali	R01GM082856-10	Function of MLL In Transcription Regulation

Research Programs Highlights

Yassine Lab

The Yassine lab specializes in how changes in lipid metabolism and nutrition affect cognition and the risk of developing Alzheimer's disease (AD). The lab has an interest in studying how carrying the APOE4 allele, strongest genetic risk factors for developing AD, affects lipid metabolism, the response to the diet; combining basic science with clinical trials.



Dr. Hussein Yassine

The Yassine lab demonstrated that lower levels of serum omega-3 fatty acid docosahexaenoic acid (DHA) associated with greater amyloid deposition in cognitively healthy older adults, but not in patients with dementia (*Yassine et al, JAMA Neurology, 2016*). Using PET scans, the team reported an increased brain DHA uptake in APOE4 suggesting a deficit in brain DHA delivery in younger healthy APOE4 carriers decades before the onset of AD (*Yassine et al Alz Research & Therapy, 2017*). These findings led to a pilot randomized clinical trial demonstrating that APOE4 reduces DHA brain delivery and metabolism in persons at risk of developing AD (*Arellanes et al, EbioMedicine, In Press*). Actively, the team is investigating whether higher doses of DHA can slow cognitive decline in person at risk of AD such as APOE4 carriers (NCT03613844).

Using molecular studies, the lab identified that apoE apolipoproteins aggregate in endosomes, affecting lipid transport (*Rawat et al. Journal of Neuroscience, 2019*). In cerebrospinal fluid, APOE4 carriers had decreased capacity to carry lipids by the ABCA-1 transporter, and that this lipid carrying capacity was lower in persons with Alzheimer's compared to healthy controls (*Yassine et al, JAMA, 2016*).

Dr. Hussein Yassine is the co-chair of the Alzheimer's Association Professional Interest Area in Nutrition, Metabolism and Dementia. He leads the Research and Education Core of USC's Alzheimer's Disease Research Center (ADRC). His research is supported by R01AG055770, R01AG054434, R01AG067063 from the National Institute on Aging, NIRG-15-361854 from the Alzheimer's Association and GC-201711-2014197 from the Alzheimer's Drug Discovery Foundation.

More information can be found at www.yassinelab.com

Ryan Lab

The Ryan laboratory is part of the Hastings Center for Pulmonary Research (HCPR) with a research program focused on the regulation of airway stem cells in the repair and regeneration of human lungs. We apply patient-derived iPSC, primary lung epithelial cells and state-of-the-art gene editing technologies to a) model and study mechanisms of lung development and disease with a focus on mechanisms of mucociliary clearance, and b) investigate approaches for tissue regeneration and stem cell-mediated repair of the airway epithelium. We hope to elucidate the cellular and molecular mechanisms governing the contribution of lung stem cells to regeneration and, in addition, to elucidate the genetic, epigenetic, cellular and molecular factors contributing to disease development and pathogenesis of rare lung diseases, such as Cystic Fibrosis (CF) and primary ciliary dyskinesia (PCD). As such our research emphasis is on the proximal conducting airways comprising of the trachea, bronchi, and bronchioles. The epithelia in these airways of the lung are lined by dense fields of motile cilia that provide the function of mucociliary clearance protecting the airways from inhaled pathogens and particulates.



Dr. Amy Ryan

The lab's first NIH funded project is focused on the extensive functional characterization of induced pluripotent stem cell (iPSC)-derived multiciliated cells, using them to delineate the cellular signaling that governs multiciliogenesis and to understand the functional complexity of mutations causative for ciliopathies. In an extension of this work we are combining ex vivo, in vitro and in silico models, in collaboration with Dr. Eva Kanso (Viterbi), to understand how region-specific airway organization and ciliopathy-causing genotypes, impact functional mucociliary clearance throughout branches of the proximal airways. There is currently no established model that is able to accurately predict the relationship between genotype, cilia motility, mucociliary clearance, and respiratory phenotypes and, therefore, many genotype-phenotype relationships remain unexplained. As part of a Cystic Fibrosis Foundation Consortium focused on epithelial stem cells, we are interested in targeting lung basal stem cells, as the major stem cell of the proximal airways, as cell therapy or for gene-targeting in vivo. We are particularly focused on identifying

what defines the basal stem cell, how similar iPSC-derived basal cells are to primary airway basal cells and how these basal stem cells regulated by their immediate cellular niche, including interactions with immune cells (macrophages and neutrophils) in more complex multicellular in vitro models. We recently established human Airway Lung-Chips, a vascularized microfluidic organotypic lung model which features physiological airway tissue architecture and defense functions and enables the real-time observation, sampling, and manipulation of clinically relevant responses, including cytokine release, gene and protein expression, and circulating immune cell recruitment. We will be using the Lung-Chips to study basal stem cell regulation by both healthy and diseased niches.

As our research interests are focused on lung function, we have been particularly interested in the pulmonary pathogenesis of SARS-CoV-2, the virus responsible for causing the novel coronavirus infections disease, COVID-19. While a number of organs are infected the significant mortality rates ensue due to lung related pathogenesis. Host-viral interactions are important not only for viral replication, but also for subsequent cellular responses/damage and, therefore, understanding these cellular mechanisms in relevant and functional lung cells is vital in determining both acute and chronic changes leading to pulmonary dysfunction. We are using in vitro models and Airway Lung-Chips to evaluate viral replication, cytotoxicity, cytokine release and tissue remodeling in airway epithelia, and lung endothelial vasculature in response to live SARS-CoV-2 infection and to understand how impairment of airway defenses contribute to alveolar-capillary membrane dysfunction and recruitment of inflammatory cells. In collaboration with Drs Zea Borok, Hyungjin Eoh and Beiyun Zhou we are studying the involvement of ER stress and cellular metabolism in response to SARS-CoV-2 infection in order to elucidate the role of this pathway in viral pathogenesis and subsequent cellular injury.

Saito Lab

Dr. Takeshi Saito is an Associate Professor of Medicine, Division of Gastrointestinal and Liver Diseases. He is a well-established physician-scientist who is committed to translating discoveries in molecular microbiology and immunology into clinical hepatology. Currently, his laboratory is supported by multiple federal grants as well as industry funding. He is an associate editor of scientific journals such as Digestive Diseases and Sciences and Journal of Interferon and Cytokine Research. Dr. Saito also serves as a standing study section member for The American Gastroenterological Association and American Association for the Study of Liver Diseases. At USC, he serves as a director for the Cell Isolation and Culture Core within the USC Research Center for Liver Diseases. In addition, he serves as a standing member for the Institutional Biosafety Committee (IBC). Dr. Saito is a recipient of numerous awards, including but not limited to AASLD Liver Scholar Award, Interferon and Cytokine Research (ISICR) Young Investigator Award, and Baxter Foundation Faculty Fellow Award. Dr. Saito is highly

committed to teaching and mentoring activities for his post-doctoral scholars as well as medical fellows, residents, and students. He currently mentors five post-doctoral scientists, one undergraduate student, and three medical residents.



Dr. Takeshi Saito

Dr. Saito's laboratory's core competencies are the innate immunology of liver diseases. His current research interests are the following: (1) the interplay between virulence of hepatotropic viral pathogens and antiviral immune response of the liver, (2) the viral evolution of resistance to antiviral therapy, (3) the identification of novel proviral and antiviral host factors that determine the organotropism of viral infection, (4) the role of micronutrients in the regulation of innate hepatic immunity. In these research programs, Dr. Saito's laboratory employs an array of in vitro and in vivo research tools, including the humanized liver chimeric mouse model. As a physician-scientist, Dr. Saito's research program has the unique opportunity to bridge basic science and clinical liver disease. The below describes three research program in his laboratory.

Hepatocytes Regulation of Hepatitis Viruses

Hepatocytes, the parenchymal cells of the liver, is the target cell type of hepatotropic viruses such as hepatitis C virus (HCV). Recently, the antiviral therapy against HCV infection has undergone a paradigm shift from interferon-based regiment to direct-acting antivirals (DAAs), which enabled the eradication of the pathogen in nearly all cases with minimal toxicities. However, the improvement in antiviral therapy is expected to have a modest impact on the global pandemic as the majority of affected people are unaware of their infection status. Moreover, the number of new HCV infections in the US has been tripled over the last five years due to a significant increase in injection drug users, especially among young adults. Thus, it is crucial to establish a definitive prevention strategy to mitigate the disease burden of HCV infection. Towards this goal, Dr. Saito's laboratory employs a humanized liver chimeric mice model. Using this highly physiological in vivo study tool, his laboratory focuses on defining the host response against HCV during the acute infection and how it bridges the activation of adaptive immunity. This research project is supported by R01 funding from NIDDK.

In current standard of care, the clearance of HCV following DAA treatment is determined by the undetectable HCV RNA in the serum for 12 weeks from the end of

DAA treatment, referred to as sustained virologic response (SVR) 12. Dr. Saito's laboratory discovered that some patients who attained SVR12 with DAA continue to have HCV replication in the liver or PBMC. This entity is now recognized as occult HCV infection (OCI), which was featured by Thomson Reuters Health News. Dr. Saito now studies the clinical implication of OCI, whether it leads to the progression of liver disease. This work is supported by funding from NIAID.

Role of Micronutrients in the Regulation of Spontaneous Bacterial Peritonitis (SBP)

SBP is one of the most devastating complications of cirrhosis. Portal hypertension in cirrhosis predisposes to the translocation of gut bacteria to the systemic circulation, followed by influx into the peritoneum. The onset and clinical outcomes of SBP are determined by the interplay between the pathogenesis of translocated microorganisms and the potency of peritoneal anti-bacterial immunity. Accordingly, inadequate immune response tilts the scale towards bacterial virulence and the subsequent development of SBP. To date, our understanding of SBP pathogenesis remains mostly underdeveloped, especially on the significance and the regulatory mechanism of peritoneal anti-bacterial immunity. Dr. Saito's laboratory has discovered that the anti-bacterial function of peritoneal macrophage (PM) is severely impaired in patients with cirrhosis. His laboratory discovered that vitamin A insufficiency in cirrhosis is the underlying mechanism in this event. His laboratory recently found that vitamin A governs the expression of GATA6, the master transcription factor of PM. Currently, his group investigates the mechanism of how GATA6 expression regulates the anti-bacterial innate immunity of PM with the ultimate goal of developing a novel therapeutic strategy that mitigates the clinical burden of SBP

Identification of Shred and Distinct Mechanisms of Hepatotoxicity in ALD and NAFLD

Alcoholic liver disease (ALD) and non-alcoholic fatty liver diseases (NAFLD) constitute two significant metabolic liver diseases. Both ALD and NAFLD results in a substantial degree of lipid accumulation in the hepatocytes. The excessive amount of lipid accumulation is thought to play a critical role in the hepatotoxicity. Dr. Saito's laboratory investigates the similarity and differences in the pathophysiology of these two conditions. To this end, his laboratory utilizes freshly isolated human hepatocytes (HH) extracted from humanized liver chimeric mice (HLCM). The HLCM-derived HH treated with alcohol, or lipoglutotoxicity condition is applied to omics approaches. The ultimate goal of this research program is to develop a novel preventative strategy that can be used for both ALD and NAFLD. This research program is funded by PhoenixBio, the leading company for the mass production of HLCM.

Atherosclerosis Research Unit

Howard N. Hodis, M.D. is currently the Harry J. Bauer and Dorothy Bauer Rawlins Professor of Cardiology, Professor of Medicine, Preventive Medicine and Molecular Pharmacology and Toxicology, and

Director of the Atherosclerosis Research Unit (ARU). Dr. Hodis' overarching interest is to understand the biology of atherosclerosis and cardiovascular disease including prevention and intervention. Dr. Hodis has authored or co-authored more than 250 peer-reviewed publications, delivered more than 300 invited presentations, received peer-nominated awards for outstanding clinical and basic science research, translational contributions, outstanding teaching, inducted into the prestigious Association of American Physicians and has served on dissertation committees and co-mentored more than 50 MD/PhD and graduate students.

The ARU at the University of Southern California



Dr. Howard Hodis

(USC) is a multi-disciplinary research program with emphasis on athero-biology and cardiovascular disease, seeking to understand the etiology and progression of these aging processes in the context of prevention and intervention. Since vascular disease is an aging process associated with many conditions, the ARU programmatic approach is integrative biology in practice and highly collaborative in application. ARU research involves a broad array of disease processes that converge either as a cause of or result from atherosclerosis and cardiovascular disease, such as Alzheimer's disease/dementia, menopause, diabetes, obesity, bone metabolism, HIV, cancer and others. As one of the longest established programs of its type, the ARU at USC has been a leading center in athero-biology research. Pioneering investigation of atherosclerosis interventions include research that conclusively demonstrated for the first time that coronary artery atherosclerosis can be reversed in humans. The ARU is a "home-grown" internally developed program that has garnered continuous external funding for over 50 years.

A special emphasis of the ARU program is women's health research. This includes investigative pursuits of menopause and interventions such as hormone replacement therapy (HRT) relative to the aging process for reducing atherosclerosis progression. In this regard, the ARU conducted the only randomized controlled trial designed to specifically study the menopausal HRT timing hypothesis; this trial provided the first evidence to support the hypothesis that early initiation of HRT close to menopause in contrast to initiation distal to menopause reduces progression of atherosclerosis in healthy postmenopausal women (*N Engl J Med* 374:1221-1231, 2016). These results provide an

underlying explanation for clinical studies that show HRT reduces cardiovascular events in younger postmenopausal women. ARU research concerning the impact of newer novel hormone therapy on atherosclerosis progression in postmenopausal women continues.

BRANCH Lab

Dr. Katie Page is the principal investigator of the BRANCH Lab for Brain Regulation of Appetite, Nutrition, Cognition and Health at Keck USC and Co-Director of the Diabetes and Obesity Research Institute. Her research program has two major components: (i) neuroendocrine regulation of appetite and feeding behavior (funded by NIH R01DK102794 and R21DA042272); (ii) maternal-fetal programming for obesity and diabetes (funded by NIH R01DK116858 and American Diabetes Association). Her research has been recognized by Outstanding Investigator Awards from the Endocrine Society (2012), Western American Federation for Medical Research (2012), the American Diabetes Association Pathway Accelerator Award (2013), the American Heart Association (2014), and the Western Society for Clinical Investigation (2019). She has received external grant funding from the National Institutes of Health, the American Diabetes Association, the American Heart Association, and the Doris Duke Charitable Foundation.



Dr. Kathleen Page (third from the left) and Team

Her work has made important contributions to our understanding of the neuroendocrine regulation of energy homeostasis and feeding behavior in humans. Her work was the first to show that differential brain, hormonal and appetitive responses to fructose compared to glucose consumption may promote overeating behavior in humans. These research findings were published in JAMA (2013) with an accompanying editorial and in the Proceedings of the National Academy of Science (2015), and the findings have been featured on NPR, The New York Times, AAAS, NBC Nightly News, ABC, CBS, Reuters, and USA Today. Current studies in her laboratory are aimed at understanding effects of sugar and non-nutritive sweeteners on brain appetite pathways, eating behavior and obesity risk. Related manuscripts published in 2020 include: (1) Clark KA, Alves JM, Jones S, Yunker AG, Luo S, Cabeen RP, Angelo B, Xiang AH, Page, KA. Dietary fructose intake and hippocampal structure and connectivity during childhood. *Nutrients*

2020,12, 909; (2) Yunker, AG, Patel, R., Page, KA. Effects of non-nutritive sweeteners on sweet taste processing and neuroendocrine regulation of eating behavior. *Curr Nutr Rep* 2020; (3) Zhang, X, Melrose, AJ, De Santis, O., Luo, S., Page, KA., Hsu, E., Monterosso, JR. Fasting may increase incentive signaling for non-food rewards. *Nutrition Research* 2020.

Her team is also conducting longitudinal studies in children to determine how prenatal exposure to maternal obesity and gestational diabetes affect metabolism and brain development in offspring. Children in the BrainChild Cohort were born at Kaiser Permanente Southern California with documentation of exposures during pregnancy and health outcomes throughout childhood. The studies use a pioneering approach that combines functional and structural magnetic resonance imaging with metabolic phenotyping in childhood and early adolescence, a critical period of growth and brain development. Related manuscripts published in the last year include: (1) Page KA, Luo S, Wang X, Chow T, Alves JM, Buchanan TA, Xiang AH. Children exposed to maternal obesity or gestational diabetes during early fetal development have hypothalamic alterations that predict future weight gain (*Diabetes Care* 2019; 42 (8) 1473-1480; (2) Alves, JM, Luo S, Chow T, Herting M, Xiang AH, Page KA. Sex differences in the association between prenatal exposure to maternal obesity and hippocampal volume. *Brain Behav* 2020 Feb;10(2); (3) Alves, JM, Zink J, Chow T, Luo S, Belcher BR, Xiang AH, Page KA. Contributions of prenatal exposures and child lifestyle to insulin sensitivity. *J Clin Endocrinol Metab*, 2020 April.

Her long-term vision is to identify mechanisms and markers of disease in people at highest risk for obesity and diabetes, whether related to in utero exposure to maternal metabolic disorders or other environmental influences, and to develop at test interventions to prevent obesity and its related complications.

Lenz Lab

Dr. Heinz-Josef Lenz is Professor of Medicine and Preventive Medicine, the J Terrence Lanni Chair for Cancer Research, Associate Director for Clinical Sciences at the USC Norris Comprehensive Cancer Center and Co Chair of the TACS Program. Dr. Lenz is recognized for expertise in Gastrointestinal (GI) oncology, early drug development and translational research. He is founding Chair of the Translational Medicine Subcommittee in GI. Dr. Lenz has been the Co-PI of the U01 CA 062505 for the last 20 years and has served as the USC PI and the leader of the GI Program of the NCI UM1 (CA62505, PI: Dr. Lenz, Dr. Newman, City of Hope, Dr. Primo Lara, UC Davis) since its inception. Through the UM1 and UG1, he has extensive experience in developing and leading multidisciplinary teams, bringing together molecular biologists and pharmacologists with clinical investigators in laboratory-directed trials of new anticancer agents. Under the leadership, USC has assumed a prominent scientific leadership role within the UM1 California Cancer Consortium, which includes UC Davis, City of Hope Medical Center and Stanford University. Dr. Lenz is member of the NCI GI Steering Committee, member of the Gastroesophageal Task Force, member of the Clinical

Trial Planning Committee for Gastroesophageal Cancer and member of the Investigational Drug Steering Committee (IDSC), is a highly accomplished physician-scientist who has a well-established national and international reputation as an expert in molecular genetics of CRC and early drug development. He was the first to measure intratumoral RNA levels associated with efficacy of 5-FU and oxaliplatin and led the first prospective randomized Phase II trials using gene expression from FFPE specimens. He also discovered that primary tumor location of colorectal cancer (CRC) is an independent predictive and prognostic marker, now in the NCNN guidelines. His paper on Consensus Molecular Subtyping identified novel subgroups that are predictive and prognostic in CRC, now used globally in drug development.



Dr. Heinz-Josef Lenz (middle) and Team

DSCR1 a promising target for cancer therapeutics

Interestingly, various studies have revealed that Down Syndrome individuals have a considerably low risk for solid cancer tumors and other angiogenesis related diseases, while they have higher risk for leukemia. Since Down syndrome individuals have full or partial trisomy of chromosome 21 the low risk for solid cancer tumors has been proposed to be in connection with the extra inherited genes. One of such identified gene, Down Syndrome Candidate Region 1 (DSCR1) gene, belong to a family of evolutionary conserved proteins located on the chromosome 21. DSCR1 is known to regulating calcineurin-mediated signaling pathways. DSCR1 gene product, calcipressin-1, has been demonstrated to play a crucial role in reducing cancer risk by suppressing angiogenesis. Angiogenesis is a vital step in CRC development and metastasis. VEGF is a key molecule in tumor angiogenesis and activates calcineurin to dephosphorylate and activate the transcription factor NFAT. Calcipressin-1 negatively regulates VEGF-mediated angiogenesis via the calcineurin pathway. Compelling evidence suggests a strong association between the overexpression of DSCR1 gene and the inhibition of angiogenesis and suppression of cancer cells growth. Furthermore, studies have shown that an extra transgenic copy of DSCR1 alone could significantly reduce the tumor growth in mice. Our findings in over 600 patients suggest that the DSCR1 rs6517239 polymorphism is associated with the efficacy of FOLFIRI-bevacizumab in mCRC patients. These preliminary data emphasize the role of DSCR1 as a potential therapeutic for targeting VEGF dependent angiogenesis. We have successfully identified an 80 amino

acids segment of calcipressin-1 that is required for binding to calcineurin through in vitro testing and are collaborating with Dr. Faribouz to validate the function of this protein. We submitted a number of grant applications including Tower Grant and Ming Hsieh to develop this novel compound against NFA. Future plan is to submit a R01. Inhibition of circadian networks.

Inhibition of circadian networks

Dr. Lenz initiated a collaboration with Dr. Steve Kay who develops small molecules modulating circadian clock proteins in mouse and human. Lenz's group showed that single nucleotide polymorphisms (SNPs) in circadian clock genes predict outcomes in metastatic colorectal cancer (mCRC) patients receiving first-line FOLFIRI plus bevacizumab in two Phase III clinical trials (*ASCO abstract, JCO, 2018*). Lenz and colleagues showed a core component of the positive limb of the circadian pathway (ARNTL/BMAL1) is involved in bevacizumab resistance in CRC via regulation of VEGF-A and interaction with REV-ERBa, one of key druggable clock components (*Burgermeister EBioMedicine, 2019*). Lenz also showed that SNPs in a core negative regulator (CRY1) predict therapeutic response in MSI-high CRC patients treated with regorafenib (submitted to ESMO 2020). Kay showed that REV-ERBa and REV-ERBβ have potent anti-tumor activities (Dong Cancer Discovery, 2019) leading Lenz and Kay (GER) to test REV-ERB selective agonists in CRC cell lines; SR9009 and SR9011 showed efficacy in specific KRAS-mutant and wt cell lines. Supported by Cancer Center they are testing clock agonists in 2D/3D model systems. They received the first Transformational Team Award from the Norris and planning to submit a R01.

Molecular Classification of colon cancer

With specimens from a randomized first-line Phase III clinical trial in over 2,400 mCRC patients (with USCF and UNC). Lenz and colleagues identified Consensus Molecular Subtypes that are highly prognostic for overall and progression-free survival (Lenz *J Clin Oncol, 2019*) and provided evidence for the prognostic role of tumor mutational burden, microsatellite instability, and BRAF mutations (*Innocenti J Clin Oncol, 2019*). Integrating molecular analysis with his prior work demonstrating the prognostic value of primary tumor location (Loupakis *JNCI, 2015*), Lenz reported for the first time that, compared to CRC, appendiceal adenocarcinomas exhibit lower mutation rates in TP53, APC, and PIK3CA. Further, alterations associated with immune checkpoint inhibitor response (MSI-high, TMB-high, PD-L1 expression) varied depending on side of primary tumor (Tokunaga *Clin Cancer Res, 2019*). This work led to a paradigm changing report that RAS wt patients with left-sided tumors had a markedly better prognosis than those with right-sided tumors, and that first-line FOLFIRI plus cetuximab benefitted patients with left-sided tumors only (Tejpar *JAMA Oncology, 2017*). These data show that molecular subtyping of colorectal cancer may become an critical tool to accelerate drug development.

Quality and Safety

The mission of the Quality and Safety arm of the Department of Medicine (DOM) is to foster a culture of safety and systems improvement by engaging faculty, trainees, and staff in quality and safety initiatives across the health system. In collaboration with the Keck Medical Center of USC and Keck School of Medicine (KSOM), we aim to increase the involvement of the DOM physicians in quality and safety initiatives as well as provide faculty and trainees the skills needed to lead quality and safety projects. The Quality and Safety program also facilitates care delivery optimization across divisions and departments at KSOM by bringing together key stakeholders to develop processes that ensure high quality communication and best practices.

This year, the Department of Medicine has engaged in several initiatives to embed a culture of safety into daily work.

TeamSTEPPS Implementation in the Intensive Care Units and Procedural Areas



Dr. Ricardo Juarez and Dr. Santhi Kumar at a TeamSTEPPS training session

Developed by the Agency for Health Research and Quality and the Department of Defense, TeamSTEPPS is a set of teamwork skills shown to improve communication, teamwork, and team performance among health care professionals. These tools provide a framework to train teams on basic teamwork skills so that they can anticipate patient safety issues, recognize warning signs to prevent errors, and respond effectively together to optimize patient care while minimizing adverse outcomes.

Multidisciplinary clinical teams underwent a half day training where they practiced high quality communication skills and discussed behaviors that supported psychological safety, intentional leadership, and safety culture in their local environments. With that knowledge in hand, small groups are working together to design tools tailored to their local environments.

In addition to supporting a culture of safety, the teamwork skills that make up TeamSTEPPS support an environment of civility, openness, and shared learning. These practices keep our patients and providers safe and are necessary building blocks in creating the culture we aspire to have at the bedside.

“[T]he teamwork skills that make up TeamSTEPPS support an environment of civility, openness, and shared learning.”

Supporting Quality and Safety Education and Projects

Increasing the knowledge base in quality and safety of our DOM trainees is a key objective of the Quality & Safety Program. This year, we piloted an 18-month Quality and Safety Curriculum within the Division of Pulmonary/Critical Care Medicine where trainees had didactic, simulation-based teaching coupled with specific projects in their arenas. We also offered Quality Improvement consultation across the department so that clinicians could discuss their projects, including design, barriers, scope, timeline, and data acquisition.

In the future, the Quality and Safety arm of the Department has the goal of formalizing a Morbidity and Mortality review process within the department and expanding quality and safety education.

Faculty Compact

Developed in response to insights gained by the DOM Faculty Retreat in 2018, the Faculty Compact is a document that explicitly describes the relationship and mutual expectations between the Department and its faculty. It serves as the cornerstone to develop and sustain the culture we aim to build together by describing the necessary behaviors needed by both the Department and faculty to actualize our mission and live our core values.



Faculty Compact Working Group

Left to right: Dr. Michael Karp, Dr. Andrew Young, Dr. Kausar Hamiduzzaman, Dr. Santhi Kumar, Dr. Vivian Mo, Dr. John Carmichael, and Hebe Iris Leon

A working group comprised of representative faculty from across the Department and one administrator developed the Faculty Compact by reviewing information from the retreat as well as physician compacts from other organizations and identifying gaps between our current and aspirational cultural states. Over a course of three months, the group developed multiple drafts, shared them with Department leadership, including Division Chiefs and Vice Chairs, and incorporated them into the final document.

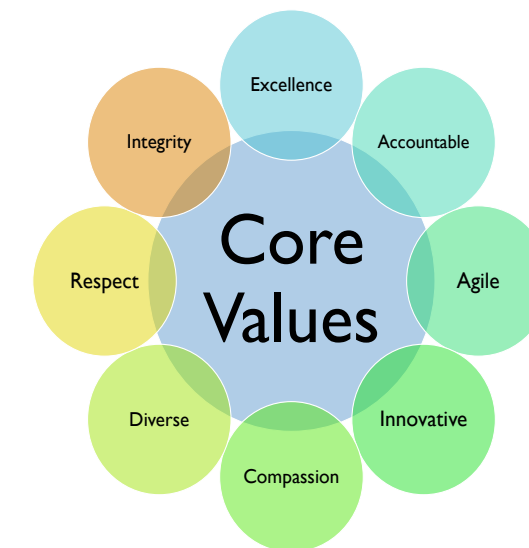
The compact describes the expectations by using six pillars as the framework for both the faculty and the Department:

- Foster Excellence
- Patient-Focused
- Support Innovation
- Compassion & Respect
- Collaborate
- Listen & Communicate

Across all pillars, the Faculty Compact emphasizes accountability, modeling respect, patient centeredness, and an openness to change and improvement. In September 2019, the Compact was introduced to the faculty at a meeting by the Vice Chair of Quality and Safety, Dr. Santhi Kumar.

As a living document, the Faculty Compact aims to grow and support the Department as we adapt to the ever-changing landscape of medicine. It grounds our strategy, our processes, and our goals so that we can build our future together.

With the Compact’s tenets in mind, the Faculty Compact Working Group and Division Chiefs identified opportunities to close the gap between our current and future state. Among them were optimizing workflow in the inpatient and outpatient care spaces and re-examining policies, processes, and procedures within divisions and across the department. Work being done by various groups within the department continue to engage our faculty in the Department’s cultural evolution.



“As the Department of Medicine, we aim to provide high value, person-centered care by innovating service delivery at the bedside and by revolutionizing medicine through cutting-edge research. Rooted in compassion, respect, and integrity, together we will train the next generation of physician leaders and transform the way people experience health and healthcare.”

Faculty Compact Preamble

DOM Task Forces

In response to the Faculty Retreat in 2018, the Department of Medicine created Task Forces for Research, Mentoring and Career Development, and Equity and Diversity to address the faculty's concerns and improve the processes currently in place. These task forces were a main component in increasing communication between the Department and the Divisions.

Research Task Force Members

- Leonardo Clavijo, MD, PhD
- Kathleen Page, MD
- Anthony El-Khoueiry, MD
- Ling Shao, MD, PhD
- Amir Goldkorn, MD
- William Stohl, MD, PhD
- Kenneth Hallows, MD, PhD

Objectives

1. Help plan training and facilitate mentoring of the incoming research-oriented internal medicine residents
2. Improve research-related, cross-departmental communication and collaboration
3. Increase DOM support for faculty research
4. Make recommendations to the DOM to create a research development road map

Mentoring and Career Development Task Force Members

- Laurie DeLeve, MD, PhD
- Zea Borok, MD
- Michael Wang, MD
- Donald Feinstein, MD
- Afsaneh Barzi, MD, PhD
- James Buxbaum, MD

Objectives

1. Develop approaches to facilitate the career development of DOM faculty at all stages of their careers
2. Explore the feasibility of mentoring in a very large department, where one-on-one mentoring may not be feasible



Mentoring and Career Development Task Force Meeting
Left to right: Dr. Michael Wang, Dr. Laurie DeLeve, Dr. Zea Borok, Dr. Afsaneh Barzi, Dr. Donald Feinstein (not pictured) and Dr. James Buxbaum (not pictured)

Equity and Diversity Task Force Members

- Jorge Nieva, MD
- Morgan Hawkins, MD
- Núria Soler Pastor, MD, PhD
- Eric Hsieh, MD
- Aneesah Smith, MD
- Liyun Yuan, MD, PhD
- Jose Luis Gonzalez, MD
- Shannon Mumenthaler, PhD

Objectives

1. Review DOM level C-Change Data from Faculty Affairs
2. Identify opportunities from DOM demographic data
3. Examine and review best practices from like-sized institutions with robust recruitment and retention blueprints
4. Identify opportunities for synergy with other Task Forces
5. Implement change

Medical Oncology Expansion

To enhance the cancer care that occurs in community settings, NCI-designated cancer centers like the one at Norris Cancer Hospital, have been building community relationships and partnerships that not only increase clinical growth, but also improve access to clinical trials for patients seeking cancer care. Due to the frequent visits required for chemotherapy, some patients may find it difficult to travel to the Health Science Campus for their treatment. The development of a community networks not only expands the USC/Norris and Keck USC brand awareness in the but also provides the local convenience patients seek.

In 2009 The Department's Medical Oncology Division began its first community network experience with when Drs. David Agus and Mitchell Gross joined USC and opened an office in Beverly Hills that included chemotherapy infusion services. Two years later the Division added oncologists, Drs. Mark McNamara and Cynthia Martell started seeing patients in Pasadena. This location includes an infusion center as well, and is utilized by several other specialty groups from USC, including gynecology oncology.

After the success of the early expansions, USC initiated outreach clinic conversations with Hoag and an outstanding Hematology Oncology group was identified in Newport Beach in 2014. This six-physician group is led by Dr. Vandermolen, a luminary oncologist in Orange County. This group has brought unique clinical expertise, an outstanding reputation at Hoag and in Orange County, and has helped establish USC/Norris as the premier Medical Oncology provider in Orange County. Initially, the facility included a medical office and an infusion treatment center in Newport Beach, and an office in Irvine. In 2015, with the addition of oncologist Dr. Dianna Hanna, a clinical trials program was started at the Patty and George Hoag Cancer Center. Dr. Hanna is a graduate of our program and focuses on GI malignancies. Additional expansion of services include Phase I trials by Dr. Jacob Thomas, the addition of Dr. David Burtzo and Dr. Umair Ghani for an office in Huntington Beach, and infusion services at the Huntington office in 2018.



Newport Beach Treatment Center
(top left to right): Ellen Young, Helen Hong, Crystal Martine-Hoang, Lorena Zavala, Jodie Ramirez, Son Huynh
(bottom left to right): Maria Lourdes, Katie Ho, Vanessa Hawkins, Quyen Bui



One of eight infusion bays for chemotherapy treatments at Buena Park's Oncology clinic

In December of 2018, we were very happy to add Dr. Henry Wang to head up our Medical Oncology presence in the new Arcadia facility with an infusion center. Another new recruit, Dr. Jenny Zhou, will be joining Dr. Wang later this summer.

Also in 2018, Drs. Sang Hoon Ahn and Clan Han joined the faculty and now lead the USC/Norris licensed infusion center and radiation oncology facility in Koreatown. Additionally, a location in Buena Park has been opened, with an infusion center and radiation oncology facilities planned to begin in the near future. Two additional medical oncologists Drs. Joome Shim and Nara Lee are joining this group this summer.

These expansion efforts resulted in a substantial 3.4 fold growth of services in the Division's physicians can provide. Efforts are ongoing to extend our clinical trials to several of these locations to not only increase enrollment, but to also broaden the diversity of the patients who participate in our clinical research.

Cardiovascular Medicine Community Clinic Services



Antreas Hindoyan, MD

When planning expansion of clinical services to a new community setting, it can be very important to understand that practicing Medicine in a specific community requires a level of shared values and community connection. The successful growth of the Cardiovascular Medicine Pasadena and La Cañada practices have been based on those connections.

One of the Cardiovascular physicians that sees patients at the La Cañada, Pasadena, and Verdugo Hills locations is Dr. Antreas Hindoyan, who was raised in the area. Dr. Hindoyan attributes the values he learned and witnessed in the San Gabriel Valley to his ability to tailor innovative therapies to the unique characteristics and preferences of individual patients.

Dr. Hindoyan stated, “I was brought up in a family that owned a restaurant. Working at the restaurant exposed me to remarkable individuals from all walks of life. Individuals who were on the frontiers of science, politics, sports, and education and who helped explain the past and mold the future. A lot of these people also enjoyed a good cheeseburger.”

Other Cardiovascular Medicine faculty that provide clinical care at this community locations are Drs. Helga Van Herle, Leonardo Clavijo, and Ray Matthews who partner with Sean Hart, RN in providing exceptional patient care.

The Pasadena office has a Cardiovascular Thoracic Institute (CVTI) suite that provides a robust menu of noninvasive cardiac testing, including echocardiography, exercise and pharmacologic stress testing, and noninvasive arrhythmia monitoring.

Cardiovascular medicine care in the community is one example of a successful partnership between the San Gabriel Valley and the University of Southern California, and one that is especially meaningful to Dr. Hindoyan.

“The University of Southern California provided my education and training as a young doctor. Now as faculty, it is an honor to empower my education and utilize the resources of a great institution to bring cutting edge care to the community that I love.”



Keck Medicine of USC Pasadena

“The University of Southern California provided my education and training as a young doctor. Now as faculty, it is an honor to empower my education and utilize the resources of a great institution to bring cutting edge care to the community that I love.”

Antreas Hindoyan, MD

Representative High Impact Publications

Click on publication to be directed to PubMed.

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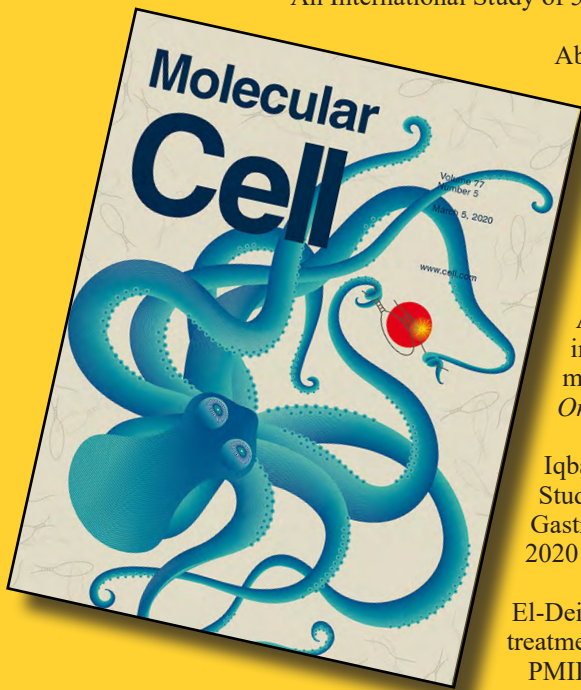
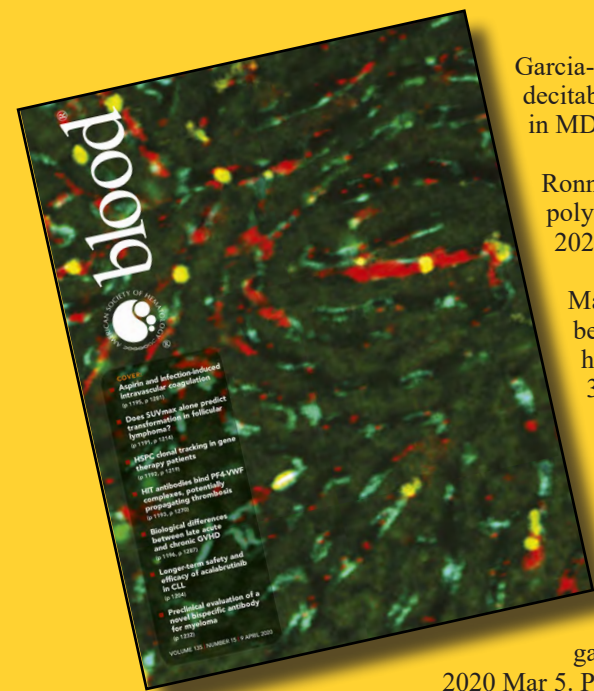
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Cardiovascular Medicine



Hugo Rosen, MD
Interim Division Chief
Professor of Medicine
Kenneth T. Norris, Jr.
Chairman of Medicine



Vivian Mo, MD
Clinical Operations Lead
Clinical Associate Professor
of Medicine
Chief Medical Officer, USC
Care Medical Group

“A revolution is coming – a revolution which will be peaceful if we are wise enough; compassionate if we care enough; successful if we are fortunate enough – but a revolution which is coming whether we will it or not. We can affect its character; we cannot alter its inevitability.”

Robert Kennedy

The Division of Cardiovascular Medicine strives for excellence in clinical care, scholarly activity, and ongoing education of its fellowship trainees. The Division prides itself at being at the forefront of offering new technologies, devices, invasive therapy, and innovative diagnostic imaging in addition to treating patients with guideline-directed medical therapy. From a research and scholarship perspective, in the past year we have seen active enrollment in 34 clinical trials, with 38 faculty publications, 14 fellows publications, 20 submitted abstracts and presentations, and 2 chapters/textbooks published. Finally, we proudly welcomed in a new class of Cardiology Fellows on July 1, 2020 after receiving new accreditation for the Cardiovascular Medicine Fellowship Program.

Dr. Hugo Rosen, Chair of the Department of Medicine, currently serves as the interim Chief of the Division and a search for a new Division Chief was undertaken in the past year. During this time of transition, Dr. Rosen and several Cardiology faculty members formed a Task Force to address the work that a division chief would usually and singularly be responsible for. Under the Task Force, there are eight committees and each one is led by a Cardiology faculty member with five to six committee members. Fundamental categories of Operations, Career Development, Recruitment, Research & Scholarship, and Education are each represented by a committee. Furthermore, committees such as Professionalism, Wellness, and Gender & Diversity were also included to address modern and ongoing issues relevant to the way physicians work and relate to each other as well as how to meet their own professional and personal needs. Each committee convenes monthly to address relevant matters through discussion and action. This shared governance model has allowed faculty members to play an active role in the work and evolution of the division through the lens of transparency and accountability. Under a new Division Chief,

this Task Force hopes to continue its work in a manner that is supportive and pursuant of the vision of the new Chief.

Division Highlights

USC Wilshire Cardiology

In the past year, 11 additional faculty members made a welcome addition to the Division in the form of USC Wilshire Cardiology. This practice is located in downtown Los Angeles and staffed by highly-trained and experienced cardiologists who specialize in the fields of interventional coronary, peripheral vascular disease, structural heart disease, electrophysiology, and noninvasive cardiology.

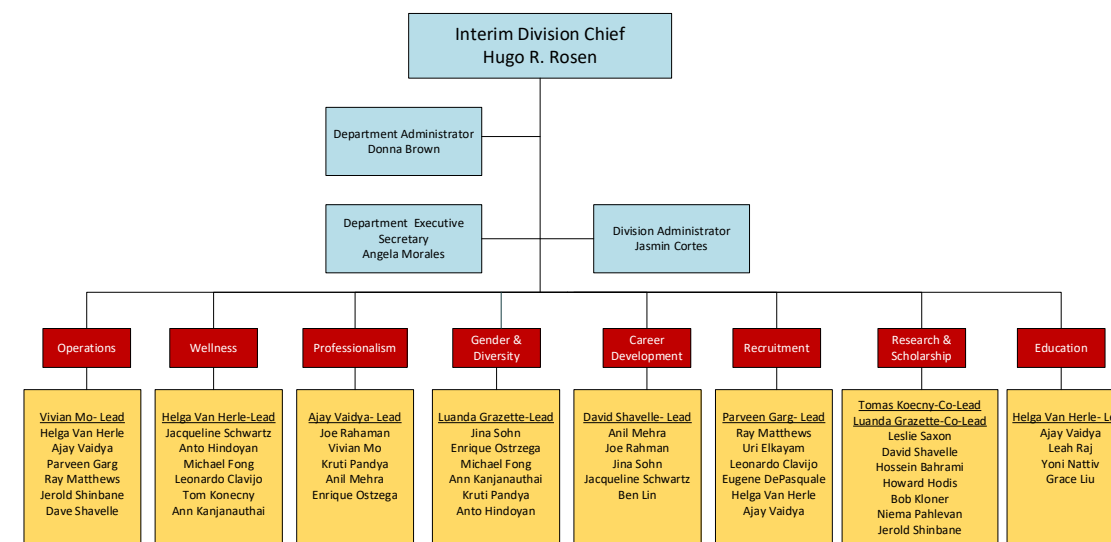
This center draws high-complexity referrals from a wide geography and continues to grow in its capability, scope, and size. It not only provides evaluation and treatment of complex ischemic heart disease, but also offers peripheral interventions for those with critical limb ischemia and endovascular repair of aortic aneurysms. Additionally, the cardiac electrophysiologists perform a high volume of radiofrequency ablations (300-400 annually) in patients with atrial fibrillation, ventricular tachycardia, and other cardiac arrhythmias.

Lastly, the USC Wilshire Cardiology group has taken part in a large number of national landmark trials and its faculty includes nationally renowned leaders in their fields. It also continues to educate the future cardiologists by training two cardiac electrophysiology fellows and three interventional fellows a year.

USC Echocardiography

Ben Lin, MD, PhD joined the faculty in September 2019 as the Director of Echocardiography. He was most recently the Director of Interventional Echocardiography at the Yale University School of Medicine and has also given invited lectures

Cardiology Division Task Force Structure



Cardiology Division Task Force Structure

internationally on topics such as three-dimensional echocardiography, myocardial strain imaging, and percutaneous mitral valve repair.

Ben Lin, MD, PhD and Jina Sohn, MD have established the USC Echocardiography Research Center. They are directing multiple active projects utilizing advanced techniques such as three-dimensional echocardiography, speckle tracking, and myocardial strain imaging to improve patient care and study novel concepts in cardiovascular mechanics and physiology.

Niema Pahlevan, PhD has dual appointments in the Division of Cardiovascular Medicine and the Department of Aerospace and Mechanical Engineering. He is collaborating with our clinical cardiologists on a variety of interdisciplinary projects focused on the noninvasive assessment of cardiac function based on novel methods for hemodynamic measurement and analysis.

Clinical Activities

LAC+USC Medical Center

The Division of Cardiovascular Medicine has an active clinical practice at LAC+USC, which includes a 10-bed Coronary Care Unit (CCU) with telemetry capabilities, consultative services, and an outpatient cardiology clinic. They provide 24-hour consultation services for general cardiology, interventional cardiology, and electrophysiology. The Cardiac Catheterization and Electrophysiology laboratories are under the supervision of the Division, with programs in interventional cardiology and electrophysiology. The Division also supports the ST-Elevation Myocardial Infarction (STEMI) Receiving Center at LAC+USC and the program currently holds the number one position for fastest door-to-balloon time in Los Angeles County.

Keck Medical Center of USC

The Division provides two service lines, General Cardiology and Heart Failure, at Keck Hospital of USC which serves as a large receiving center of tertiary referrals from other hospitals near and far. In this most recent year, we have seen the Heart Failure program grow in the patients being referred and treated for advanced heart failure, transplant consideration, and mechanical circulatory support. Furthermore, we continue to provide advanced diagnostic and therapeutic cardiovascular services in the way of coronary and peripheral interventions and percutaneous therapy for structural heart disease jointly through the Cardiovascular Thoracic Institute and the Vascular and Structural Heart Disease Program. Lastly, our Electrophysiology Program excels at catheter ablation for atrial fibrillation, ventricular tachycardia, device implantation, and pacemaker and lead extractions.

Cardiovascular Thoracic Institute (CVTI)

The CVTI is an institute model comprised of the division of cardiovascular medicine, cardiothoracic surgery and vascular surgery. This unique patient care delivery model allows patients to access care at any delivery point and receive a comprehensive multidisciplinary assessment concluding with the best therapy plan for that individual patient.

Structural Heart Disease Program

The Structural Heart Disease Program at the Keck Medical Center of USC applies a multidisciplinary approach to the management of patients. It includes interventional cardiologists, cardiac surgeons, cardiovascular imaging experts, cardiac anesthesiologists, and advanced care nurse practitioners. Percutaneous aortic valve implantation forms the core of the program. To date, over 600 percutaneous aortic valve implants have been performed. Outcomes are carefully tracked and despite a challenging referral group remain excellent.

Electrophysiology Program

The Electrophysiology Program at USC specializes in all aspects of cardiac rhythm management, including sophisticated diagnostic modalities for patients with symptoms ranging from dizziness to palpitations to sudden cardiac death. Electrophysiologists in the division perform a high volume of procedures involving implantable cardiac devices including pacemakers, defibrillators, and cardiac resynchronization devices. Catheter ablations are also done using the latest 3D mapping system and imaging technologies to treat the entire range of arrhythmias, including supraventricular tachycardia, atrial flutter, atrial fibrillation, endocardial and epicardial ventricular tachycardia. Weekly clinical conferences are held to educate young cardiology trainees and EP fellows on the fundamentals of electrophysiology, and the range of services and procedures at USC made possible by staying at the front of cutting-edge technologies. Finally, the division has a well-established research program that is heavily involved in clinical trials for novel catheter or implantable devices used to advance treatment options in the field.

Vascular Medicine Program

The Vascular Medicine Clinical and Training Program at USC integrates the specialties of vascular surgery, preventive cardiology and interventional cardiology to bring the best preventive and curative therapies to patients at risk for, or suffering from, peripheral vascular disease.

Center for Body Computing

The USC Center for Body Computing (USC CBC) is the digital health research and innovation center for the Keck Medicine of USC medical enterprise. With a mission to modernize health care through technology and to make healthcare more personal, affordable, and accessible to all, the USC CBC collaborates with inventors, strategists, designers, investors, and visionaries from health care, entertainment and technology to serve as an international

leader on digital health and wearable technology. The purpose of these collaborations is to advance virtual and digital health opportunities in partnership with industry and non-profit organizations.

High Risk Coronary Intervention

Patients are referred from all over the Los Angeles basin for percutaneous coronary revascularization with hemodynamic support to Keck Medical Center of USC. These cases are frequently turned down by community cardiologists. Our experienced team brings an exemplary skill set to bare on these challenging cases with excellent outcomes.

Research Activities

The division has a robust clinical research program with a group of certified coordinators operating through our Clinical Research Unit (CRU). A wide variety of high quality, scientifically ground-breaking protocols are expertly and ethically conducted. Protocols range from NIH funded studies, to multicenter trials to physician generated trials. USC is nationally recognized for the high-quality cardiac research it produces.

Educational Activities

Cardiovascular Medicine Fellows

The mission of the multifaceted and multidisciplinary USC Cardiovascular Medicine Fellowship Program is to educate fellows in the comprehensive assessment and management of patients with cardiovascular disease processes. The program includes a rich, comprehensive experience that combines clinical training at LAC+USC, Keck Medical Center of USC and the Cardiovascular Thoracic Institute. The educational experience extends to the education and training of Internal Medicine house staff, USC medical

students, physician assistant students, and visiting medical students.

We are proud to welcome an accomplished group of new fellows, the Class of 2023! We have graduated an excellent class of fellows from the Class of 2020 who are completing subspecialty training or starting their careers at various institutions across the country. Our fellows have collectively and individually achieved many great accomplishments over the past year. A sampling of the prominent publications and presentations can be seen below. We have had fellows strive for new personal accomplishments including selection to the prestigious Healthcare Administration Scholars Program. The fellows, led by our chief fellows for this year Drs. Jonathan Nattiv and Kristen Burton, have actively taken important roles in continual improvement of the training program. Our new cardiovascular fellowship program has seen multiple improvements with this coming year including a robust didactics and conference schedule, several prominent grand rounds speakers, new mentorship firms, wellness activities, fellows retreat, heart failure research group, and multiple new rotations. The fellowship is excited to recruit the next great group of cardiovascular leaders at USC through the Match this fall.

Division Accomplishments

- Ranked #11 in Cardiology in the nation by U.S. News and World Report for 2019
- New ACGME-accreditation for cardiovascular medicine fellowship starting July 2020
- Successful recruitment of 4 new faculty members in electrophysiology, echocardiography, and heart failure
- Explosive growth in the number of cardiac transplants and mechanical circulatory support devices/procedures performed
- Dr. Parveen Garg awarded AHA Transformational Project Award of \$300K to investigate novel identification of myocardial scar tissue using arterial spin-labeled MRI

Honors and Awards

Jerold Shinbane, MD

Outstanding teaching in year 2 of medical school curriculum
Top Doctor 2020 in Los Angeles and Pasadena magazines

Parveen Garg, MD

Co-investigator on NIH/NHLBI grant to form a novel, highly innovative Linked Clinical Research Center to efficiently execute clinical trials and develop training platform for the next generation of implementation scholars in CV disease

Enrique Ostrzega, MD

Promotion to full Professorship in Clinical Medicine and recipient of Golden Apple award chosen by the Cardiology fellows

Selected Faculty Publications

Towbin JA, McKenna WJ, Abrams DJ, ... **DePasquale E**, et al. "2019 HRS expert consensus statement on evaluation, risk stratification, and management of arrhythmogenic cardiomyopathy." *Heart Rhythm*. 2019;16(11), e301–e372. PMID: 31078652

Garg PK, Guan W, Karger AB, et al. "Lp(a) (Lipoprotein [a]) and Risk for Incident Atrial Fibrillation: Multi-Ethnic Study of Atherosclerosis." *Circ Arrhythm Electrophysiol*. 2020;13(5):e008401. PMID: 32302223

Posada-Martinez EL, Ortiz-Leon XA, Ivey-Miranda JB, ... **Lin BA**, et al. "Understanding Non-P2 Mitral Regurgitation Using Real-Time Three-Dimensional Transesophageal Echocardiography: Characterization and Factors Leading to Underestimation." *Journal of the American Society of Echocardiography*. 2020;33(7), 826–837. PMID: 32387034

Dhillon AS, Caro J, Tun H, ... **Shavelle DM, Clavijo LC**. "Therapeutic Window of Clopidogrel and Ticagrelor in Patients With Critical Limb-Threatening Ischemia." *Journal of Cardiovascular Pharmacology and Therapeutics* 25, no. 2 (2020): 158-163. PMID: 31550912

FACULTY

Professor

Anil Bhandari, MD
David Cannom, MD
Uri Elkayam, MD
Howard N. Hodis, MD
Robert A. Kloner, MD, PhD
Ray V. Matthews, MD
Enrique L. Ostrzega, MD
Leslie A. Saxon, MD
Jerold S. Shinbane, MD

Professor Emeritus

L. Julian Haywood, MD

Associate Professor

Steven Burstein, MD
Leonardo C. Clavijo, MD, PhD
Rahul N. Doshi, MD
Michael W. Fong, MD
Parveen K. Garg, MD
Luanda P. Gazette, MD
Ivan C. Ho, MD
Guy S. Mayeda, MD
Vivian Mo, MD, MHA
David M. Shavelle, MD
Helga Van Herle, MD, MS, MHA

Assistant Professor

Edward E. Abdullah, MD
Hossein Bahrami, MD
Eugene C. DePasquale, MD
Christina H Economides, MD
Antreas Hindoyan, MD
Juliana Hwang-Levine, PharmD
Somsupha Kanjanathai, MD
Tomas Konecny, MD, PhD
David Laughrun, MD
Ben Lin, MD
Bruce L. Macrum, MD
Anilkumar O. Mehra, MD
Kruti Pandya, MD
Joseph Rahman, MD
Jacqueline Schwartz, MD
Jina Sohn, MD
Ravi K. Sureddi, MD
Ajay Vaidya, MD, MPH
Jessica Weiss, MD
Andrew Zadeh, MD
Katrine Zhiroff, MD

ADMINISTRATOR

Jasmin Cortes



Dr. Jina Sohn performing an echocardiogram

Endocrinology and Diabetes



Thomas A. Buchanan, MD
Division Chief
Professor of Medicine
Vice Dean for Research
Director of the Southern California Clinical and Translational Science Institute (SC CTSI)
Co-Director, Diabetes and Obesity Research Institute

“Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less.”

Marie Curie

The Division of Endocrinology and Diabetes is a leader in research, patient care, and training in endocrinology, diabetes, and related conditions. Clinical care and training cover all aspects of adult endocrinology, with special emphasis in diabetes, thyroid disorders, pituitary disorders, adrenal disorders, lipid disorders, calcium disorders, and metabolic bone disease. Division research programs focus on the pathogenesis and treatment of gestational and type 1 and 2 diabetes, use of technology in diabetes, prevention of type 2 diabetes, trans-generational impacts of maternal diabetes, obesity and appetite regulation, management of thyroid and pituitary disorders, and the role of lipids in the pathogenesis of Alzheimer’s disease. All of these activities expand knowledge and provide state-of-the-art care for our patients.

Clinical Activities

LAC+USC Medical Center

Endocrine Clinics

Outpatient endocrine clinics are devoted to diabetes, disease of the pituitary, thyroid, adrenal disorders of bone and calcium metabolism. The primary purpose of these clinics is to provide consultation and develop treatment plans for patients referred with endocrine problems, with the eventual goal to return the patients to their primary care physicians for long-term care. The Endocrine-Pregnancy clinic at LAC+USC provides care to pregnant women affected by endocrine diseases, the most common of which are diabetes mellitus and thyroid disorders.

Roybal Diabetes Complex Care Clinic

The Roybal Complex Care Clinic provides specialist diabetes care to patients with complex type 1 and type 2 diabetes referred from Los Angeles County Department of Health Services (LAC DHS) Primary Care Medical Homes and Community

Partner clinics. The clinic provides a multifaceted approach to care with emphasis on optimizing lifestyle and psychosocial contributors to disease as well as the use of evidence-based medications and technology.

USC Community Diabetes Initiative

This is a research center that has existed for 20 years at the Roybal Comprehensive Health Center, which focuses on research and programs for the underserved. It has been funded through the NIH, Helmsley Charitable Trust, JDRF, ADA and others.

Thyroid Cancer Clinic

This clinic is designed to provide care for patients with thyroid cancer. In addition, patients with other endocrine diseases, including those patients with pituitary disease and disorders of bone and calcium are seen in this clinic.

Intensive Diabetes Management Clinic

This continuity clinic at the Roybal Diabetes Center provides trainees with experience in the intensive management of complicated cases of diabetes. The primary focus is on type 1 diabetes, but challenging cases of type 2 diabetes are part of the case mix. The clinic provides a venue for state-of-the-art patient management by a specialized team of providers in a large public health system.

Keck Medicine of USC

Division of Endocrinology and Diabetes faculty provide clinical care for private patients at multiple locations:

Health Sciences Campus

The USC Division of Endocrinology and Diabetes provides assessment and management services for patients with a variety of endocrine disorders, especially in the areas of diabetes, thyroid disease, pituitary diseases, adrenal disorders and disorders of calcium and bone metabolism.

USC Westside Center for Diabetes

This fully functional clinic provides



Dr. John Carmichael discusses some pituitary cases with fellows

advanced care to individuals with type 1 and type 2 diabetes, pre-diabetes, thyroid, bone, adrenal and other endocrine diseases. Services include diabetes education and management, and use of advanced diabetes devices, including artificial insulin delivery systems.

USC Westside Center for Type 1 Diabetes Research

This facility focuses on medication and technology research in people with type 1 diabetes. A variety of different clinical trials are on-going, including studies on novel oral medications for the treatment of type 1 diabetes.

USC Thyroid Diagnostic Center

This program specializes in cytopathology, nuclear medicine and the surgical subspecialties in the diagnosis and management of thyroid diseases.

USC Pituitary Center

The USC Pituitary Center is a unique clinical and academic program that is fully dedicated to the treatment and evaluation of patients with pituitary tumors and other disorders affecting areas of the hypothalamus and pituitary gland.

Keck Medicine of USC – Pasadena

This practice is dedicated to the investigation and management of osteoporosis and diseases involving the skeleton and mineral metabolism.

USC Endocrine Services Laboratory

The USC Endocrine Laboratory has become nationally and internationally known for its unique approach to measuring Tg and Tg antibodies, which are used as tumor-marker tests for managing patients with differentiated thyroid cancers.

Educational Activities

Educational activities are designed to achieve excellence in clinical care while providing extensive experience in teaching and participation in research. Fellows present at grand rounds, monthly Keck Case Conferences, weekly thyroid conferences, and as a new addition, participate in telemedicine. They are deeply involved in the training of

residents and medical students on clinical rotations. All fellows conduct supervised research with faculty members and are expected to present at national meetings. This year we are adding a new training track for individuals interested in pursuing an academic career in Endocrinology and Metabolism.

The overall goal of our training program is to provide broad and comprehensive clinical and didactic training in endocrinology and metabolism, as defined by the ACGME. Our fellows participate in the following clinical and didactic activities, including an increased focus on remote telemedicine and telehealth.

Inpatient Consultative Services

LAC+USC Medical Center

Endocrinology and Diabetes inpatient consultative service provides consultative care across a full spectrum of adult endocrine diseases for 100-200 patients each month. The service rotation provides trainees with experience in the management of inpatients with diseases of the hypothalamus, pituitary, thyroid, adrenals, gonads, parathyroids and bone and mineral metabolism; fluid-electrolyte and acid-based disorders; endocrine emergencies; hormone producing neoplasms; treatment of endocrine neoplasia; and endocrine physiology in systemic diseases, as well as all aspects of diabetes including diabetic ketoacidosis and management of diabetes in hospitalized patients.

Keck Medical Center of USC

The Division of Endocrinology and Diabetes provides full consultative services to Keck Hospital of USC (KH) and USC Norris Cancer Hospital (Norris). KH’s busy neurosurgical service and provide fellows with considerable experience in the diagnosis and perioperative management of pituitary and hypothalamic disorders. Consults from Norris are primarily for the management of diabetes (including patients on enteral and parenteral nutrition), hormone-secreting neoplasia and endocrine abnormalities in systemic disease. Besides routine endocrine and diabetes consults (see above), fellows also gain experience in transplant and cystic fibrosis related diabetes.

Endocrine Subspecialty Experience

These activities provide trainees with diagnosis and management experience in the care of ambulatory patients with a variety of endocrine and metabolic disorders. Fellows spend two to three months each year attending specialty clinics to obtain training in the following areas: hyperlipidemias, reproductive endocrinology, pediatric endocrinology and endocrinology of pregnancy (including diabetes).

Research Activities

Elizabeth O. Beale, MD

Dr. Beale's research interest is in non-pharmacological approaches to the management of diabetes and related comorbidities. Her research relates to developing a minimally invasive alternative to gastric bypass surgery. She has received grants from the Coulter Foundation for this work.

John D. Carmichael, MD

Dr. John Carmichael specializes in clinical trials for pituitary disease. The USC Pituitary Center, with Dr. Carmichael as Principal Investigator, regularly participates in multi-center international clinical trials in growth hormone deficiency, acromegaly, and Cushing's disease. Current investigator-initiated trials for prolactinomas, and novel methods of hormone measurement are ongoing. Dr. Carmichael also collaborates with Dr. Gabriel Zada in studies of the genetics of pituitary tumor aggressiveness.

Jonathan LoPresti, MD

Dr. LoPresti works in collaboration with Carole Spencer, PhD on the role of thyroglobulin and thyroglobulin antibodies in the management of patients with differentiated thyroid cancer.

Kathleen A. Page, MD

Dr. Page researches how health conditions such as obesity and diabetes are impacted by the functions of the brain. Specifically, she is interested in understanding how the brain regulates appetite and eating behavior, and in identifying early life determinants of obesity, diabetes, and cardiovascular disease.

Anne L. Peters, MD

Dr. Peters is the USC site Principal Investigator for the NIH Look AHEAD Study, a multicenter study designed to assess the benefits of weight loss and exercise on cardiovascular disease risk in patients with type 2 diabetes. The East L.A. cohort offers a unique subset in this national study to show that lifestyle interventions, if done correctly, can succeed in a variety of populations. She is working on phase 2/3 trials on a new compound, known as TTP399, which is a novel liver-selective glucokinase activator.

Carole Ann Spencer, PhD

Dr. Spencer's current research focuses on the clinical

utility of using different methodologies for measuring serum thyroglobulin (Tg) and Tg autoantibody (TgAb) as tumor-markers for differentiated thyroid carcinomas (DTC).

Hussein N. Yassine, MD

Dr. Yassine has a strong interest in lipid metabolism and runs the Lipid Clinic at LAC+USC. The Yassine Lab is focused on the role of the omega-3 fatty acid docosahexaenoic acid (DHA) in Alzheimer's disease, and the mechanisms that regulate its delivery to the brain with a focus on the role of APOE4.

Symposia

Drs. Buchanan and Page, Co-Directors of Diabetes Obesity Research Institute (DORI), led the nationally recognized DORI's 7th annual symposium, which hosted one international and ten national speakers with over 200 attendees for the two-day event. Presenters included former Los Angeles Lakers and 6-time NBA All-Star Pau Gasol, president of the Gasol Foundation for childhood obesity research.

Dr. John Carmichael from the Division of Endocrinology and Diabetes and Dr. Gabe Zada from the Department of Neurosurgery partnered to lead the 5th Annual Southern California Pituitary Symposium, furthering education in pituitary tumors and disorders.

The Division's long-standing thyroid symposium, one of the top in the country, was officially renamed the USC Peter A. Singer Thyroid Symposium after its founder and long-time director, Dr. Peter Singer. Now in its 41st year, the symposium was directed by division members, Drs. Caroline Nguyen and Trevor Angell. Nearly 200 people heard the latest updates in thyroid care from local and national speakers.

Division Accomplishments

- Anne Peters, Professor of Clinical Medicine, was granted the Clinical Scholar designation, given to a highly select group of physician-scientists who have performed work of considerable impact in clinical and translational research.
- Hussein Yassine was promoted to Associate Professor of Medicine and granted tenure, in recognition for his field-leading research at the intersection of lipid metabolism and Alzheimer's disease.
- The Endocrine Division saw a 15% increase in grant funding from the previous year.
- The Division made a rapid and successful transition to telemedicine in response to the COVID-19 pandemic. At Keck Medical Center, patient volumes are within 15% of volumes seen during the six months before

the pandemic and they continue to rise. At LAC+USC Medical Center, the transition to telemedicine has resulted in a dramatic reduction - from 33% to 10% - in the no-show rates for patient encounters.

- Endocrine Division faculty members continue to excel, earning five Top Doctor Designations in LA Magazine, 3 Top Doctor Awards in Pasadena Magazine, one America's Top Doctor honor, one Castle Connolly America's Top Doctors Award and one Exceptional Women in Medicine Award; one Faculty Teaching Award, one Clinical Endocrine Society Laureate Award and one Outstanding Investigator Award.

Honors and Awards

Trevor Angell, MD

Top Doctor, LA Magazine
Social Media Editor, Journal Thyroid
Chair of the Program Evaluation Committee, LAC+USC Internal Medicine Residency

Braden Barnett, MD

Annual Teaching Incentive Award, Division of Endocrinology and Diabetes, Keck School of Medicine of USC
Top Doctor, LA Magazine

John Carmichael, MD

Top Doctor, LA Magazine
Top Doctor, Pasadena Magazine

Jonathan LoPresti, PhD, MD

Faculty Teaching Award, Keck School of Medicine of USC
Top Doctor, Pasadena Magazine

Caroline Nguyen, MD

Top Doctor, LA Magazine

Kathleen Page, MD

Outstanding Investigator Award, Western Association of Physicians, Western Society of Clinical Investigation
Standing Member, National Institutes of Health Clinical Investigation of Diabetes and Obesity Study Section

Anne Peters, MD

America's Top Doctors, Book Series
America's Top Doctors, Castle Connolly
Exceptional Women in Medicine

Peter Singer, MD

Endocrine Society Laureate Award, Endocrine Society
Top Doctor, LA Magazine
Top Doctor, Pasadena Magazine

Hussein Yassine, MD

NIH R01: ApoE, ABCA1 and endosomal dysregulation in AD
NIH R01: Targeted physical and cognitive activity in a VR environment in older adults at risk for Alzheimer's disease.
Judy Pa, PI

FACULTY

Professor

Thomas A. Buchanan, MD
Jorge H. Mestman, MD
Anne L. Peters, MD
Peter A. Singer, MD
Carole Ann Spencer, PhD

Associate Professor

John D. Carmichael, MD
Jonathan S. LoPresti, PhD, MD
Kathleen A. Page, MD
Charles F. Sharp, Jr., MD
Hussein N. Yassine, MD

Assistant Professor

Trevor Angell, MD
Braden Barnett, MD
Dina Block, MD
Elizabeth O. Beale, MD
Shan Luo, PhD
Caroline T. Nguyen, MD

Clinical Instructor (Practitioner)

Donna J. Miller, MSN, FNP-C, CDE
Reiko Sasaki, MS, RN, NP-C, CDE

ADMINISTRATOR

Roxanne G. Odom



Dr. Hussein Yassine laboratory team

Front row from left to right: Ashley Martinez, Jian Sima, Scholastica Cruz, Isabella Cordova, Jazmin Martinez
Back Row from left to right: Shaowei Wang, Arthur Ter-Zakarian, Hussein Yassine, MD, Angad Thakral

Gastrointestinal and Liver Diseases



Norah A. Terrault, MD, MPH
Division Chief
Professor of Medicine
Neil Kaplowitz Chair, Liver Research

“Embrace change; envision the opportunities”

Dr. Norah Terrault began her tenure as Chief of the Division in March 2019. Faculty recruitment has been a high priority with 6 new faculty members added over the past 1.5 years, reflecting growth of clinical and research programs. Other exciting developments include the building of new GI Endoscopy unit, slated to start in 2020 and completion of renovations for the GI and Liver Diseases Clinical Research Center.

Clinical Activities

The full spectrum of GI and liver disease care is provided at both LAC+USC and Keck Hospital. LAC+USC is the referral center for Los Angeles County Department of Health Services for all advanced endoscopic procedures. Keck Hospital is a referral center for cases regionally, including the central coast, Nevada, and Arizona. The USC Transplant Institute performed 127

liver transplants in 2019-2020 and was the second highest center in the U.S. in performance of living donor liver transplant. Keck Gastroenterology and GI surgery was ranked 15th in U.S. Best Hospitals for 2020.

LAC+USC Medical Center

The Division has 3 separate inpatient consultative teams – two for Gastroenterology and one for Hepatology Consults. Additionally, outpatient consultations and follow-up care is provided in three clinics weekly, with an HCV treatment clinic and Inflammatory Bowel Disease (IBD) clinic embedded within these outpatient services. A full range

of endoscopic procedures are provided in the Endoscopy Suite in the Diagnostic and Treatment Building at LAC+USC – with more than 8,500 procedures performed in the last academic year. The Division performs a variety of advanced procedures, including endoscopic retrograde cholangiopancreatography (ERCP), endoscopic ultrasound (EUS), and deep enteroscopy and is the referral source for the entire LA County Department of Public Health. A core component of managing the high volume of referrals is use of e-consults, which streamline the appropriate evaluation of patients with GI and liver conditions.

Keck Medical Center of USC

Divisional activities at Keck Hospital of USC (KH) encompass inpatient and outpatient services in gastroenterology and hepatology. The program is a referral center for Norris/KH, but has also received cases from the San Gabriel Valley as well as the central coast, Nevada, and Arizona. Our advanced endoscopists provide regional expertise in complex pancreatobiliary disease and gastrointestinal malignancy, with procedures including ERCP, EUS, radiofrequency ablation of Barrett’s esophagus, large mucosal resections in colon and stomach, and peroral endoscopic myotomy (POEM). Clinical partnerships with surgery ensure that patients receive optimal management of foregut diseases, inflammatory bowel disease and GI cancers.

Liver outpatient services are conducted by 10 hepatologists, with specific expertise in liver cancer, viral hepatitis, alcohol-associated liver disease, fatty liver, and autoimmune diseases. A multidisciplinary tumor board for liver cancer facilitates care amongst hepatology, oncology, surgery, and interventional radiology to optimize coordination of treatment.

The USC Liver Transplantation Program at KH provides pre- and post-transplant care to patients with end stage liver disease and portal hypertension. Liver replacement options include deceased and live donor liver

transplantation. In 2019, the Liver Transplant Program performed a total of 127 adult transplants: 104 from deceased donors and 23 from living donors. The adult living donor liver program is the largest in the Western US and second largest in the nation. Dr. Helen Han, a transplant hepatologist, is the Director of the Living Donor Liver Program. A team of nine transplant hepatologists provide care for patients on the waiting list and who have undergone liver transplant. The high acuity of patients is reflected by more than 50% of transplanted patients having a model-of-end stage (MELD) score of 30 or higher. Yet, USC’s one and five year post-transplant survival is above national averages.

Educational Activities

Faculty contribute to education at the medical student, resident, and fellow levels. Dr. Brian Kim, a clinician-educator, is the Clerkship Director for medical student education in Hepatology and System Chair in Medical Student Education for GI and Hepatology as well as the Program Director for the Advanced Fellowship in Transplant Hepatology. Dr. John Donovan is the Director of the GI Fellowship Program, which includes 12 fellows, and Drs. Helen Han and Sarah Sheibani serve as Associate GI Fellowship Directors. These individuals are the leadership team for education within the GI Division with all faculty serving as clinical educators, research, and career mentors, and contributing to the education mission in GI/Liver diseases at USC and beyond.

GI Fellowship

The USC GI and Liver Diseases Fellowship Program is committed to providing excellent clinical training in consultative gastroenterology and hepatology, and diagnostic and therapeutic endoscopy. Fellows are matched

to a 3-year general gastroenterology and hepatology training program that is conducted at LAC-USC and Keck Hospital, providing a unique opportunity to practice in a safety-net hospital and private practice environment. Currently, we accept 4 fellow per year, but starting in 2021 the program will be expanded to 6 fellows per year, reflecting the growth of the GI program and its capacity to provide comprehensive fellowship training in GI and liver diseases. Fellows participate in inpatient and outpatient GI and liver disease consultation services at LAC+USC and KH. Fellows receive expert training in endoscopic procedures, including capsule endoscopy, deep enteroscopy, radiofrequency ablation, EUS, and advanced biliary endoscopy. During the 3 years of GI training, each fellows typically completes at least 1000 upper endoscopies and 600 colonoscopies with 125 ERCPs completed by selected fellows, making our graduates extremely competitive due to their expert endoscopic skills. Operating in one of the most ethnically, culturally, and economically diverse cities in the U.S., the USC GI/Liver fellowship engages fellows in quality initiatives and research focused on underrepresented minorities and health disparities. Fellows are expected and supported to participate in research and other scholarly activities. Fellows receive education on research methods from their mentors, with the recent addition of “work-in-progress” monthly meeting used to provide ongoing feedback to both mentors and mentees. Additionally, Ms. Jennifer Dodge, a biostatistician with extensive clinical research expertise joined the faculty this year, providing new opportunities for partnership in clinical research activities. In the past year, our fellows’ research contributed to 23 publications, including case reports in such prestigious journals as the New England Journal of Medicine.

Advanced GI/Liver Fellowships

Two advanced training fellowships are available: transplant



Dr. Yuri Genyk (left) and Dr. Helen Han (right) speaking to a nondirected living donor, Tony (sitting)



Gastrointestinal and Liver Diseases Faculty

hepatology (up to 2 positions annually) and advanced endoscopy (1 position annually). Both are relatively new programs; this year saw the first graduate from the advanced Transplant Hepatology fellowship (Dr. Dupinder Singh) and there are two fellows (both from outside USC) who have been selected for the year 2020-21 with the number of applicants increasing each year. The advanced endoscopy fellowship started this year with Dr. Alexander Nguyen being the first fellow to enter this ACGME-approved program. In 2021, the interventional endoscopy fellowship will expand to two fellows to include training of a pediatric advance endoscopist in collaboration with the Children’s Hospital of Los Angeles. These additions speak to the expertise and clinical opportunities for training provided by USC Keck Hospital and LAC+USC.

Our recent graduating fellows have joined GI practices at UCLA, City of Hope, and established GI practices throughout California contributing to an ever-growing Trojan family of GI and Liver gastroenterologists and hepatologists.

Research Activities

Faculty members of the Division are actively engaged in basic, clinical, and translational research. In the laboratory, the areas of gut and liver injury, animal models, and cell and molecular biology are actively investigated. In addition, strong clinical/translational research was conducted by Division members in esophageal diseases, gastrointestinal malignancies, inflammatory bowel disease, pancreatic diseases, and liver diseases (fatty liver, viral hepatitis, alcohol, and drug induced liver disease). A total of 21 faculty (from the total of 33) had research awards in this past year, totaling nearly 7 million dollars, and representing an increase of 32% over the prior year. A total of 14 faculty have NIH-funding with 5.5 million in research awards from federal funding sources.

This NIH-funded USC Research Center for Liver Diseases (RCLD) started in 1995 and entered its 5th cycle ending in 2021. The Center focuses on research in Liver Disease with 4 major themes: 1) viral hepatitis and liver cancer, 2) steatohepatitis and fibrosis, 3) hepatotoxicity and mitochondrial pathobiology, 4) immunology, repair, regenerative medicine, and developmental biology and offers core facilities for support, training, and research applications in cell culture, cell and tissue imaging and analytical-metabolic approaches, as well as an extensive base of shared instrumentation. Directorship of the RCLD transitioned from Dr. Neil Kaplowitz to Dr. Hugo Rosen in the past year and revamping of cores was undertaken with the establishment of a new (T3B) Translational, BioStatistics, BioRepository, and BioInformatics core which is subsidized by the Department of Medicine.

Funding for clinical research networks is a particular focus of the division to enhance translational opportunities and collaborations across academic centers. The NIH-supported consortia activities within the GI/Liver Disease include the non-alcoholic fatty liver disease network (Terrault, PI), hepatitis B research network (Terrault, mPI), Southern California alcoholic hepatitis network (Stolz, site PI), NIDDK drug-induced liver disease (Stolz, PI), acute pancreatitis trials called SHARP and SVI (Buxbaum PI), and the well-established multiethnic (MEC) cohort (Setiawan PI).

Division Accomplishments

- Ranked 15th in Gastroenterology in US Best Hospitals for 2020
- Fellowship expansion (from 4 to 6 per year starting 2021; total increasing from 12 to 18 over the next 3 years) and advanced endoscopy and transplant hepatology fellowships launched
- 32% increase in research funding over the prior year reflecting increases in both NIH, foundation, and pharmaceutical research endeavors
- Notables: Anisa Shaker secured her first R01, establishing the division’s bench program in esophageal disease; James Buxbaum’s acute pancreatitis research program garnered new invitations to participate in 2 new UOIs related to treatment of acute pancreatitis; Dr. Wendy Setiawan awarded Jane and Kris Popovich Endowed Chair of Cancer Research
- USC Liver Transplant Program, with Dr. Jeffrey Kahn as medical director, had a banner year with 127 transplants performed and the 2nd highest number of living donor liver transplant in the U.S.

Honors and Awards

James Buxbaum, MD

Associate Editor of Gastrointestinal Endoscopy
American Society of Gastrointestinal Endoscopy (ASGE) Standards of Practice Committee
International Association of Pancreatology Acute Pancreatitis Guidelines Committee
Initiation of USC as a site of the SpHincterotomy for Acute Recurrent Pancreatitis (SHARP)
UO1 (1U01DK116743) and renewal as site of the Stent versus Indomethacin for Preventing Post ERCP Pancreatitis (SVI) UO1 (3U01 DK 104833-04S1)

Laurie DeLeve, MD, PhD

Sheila Sherlock Visiting Professorship, University of Pennsylvania
Visiting Professor, George C. Washington University, Councilor, Governing Board, American Association for the Study of Liver Diseases, 2017-2023 (expected President AASLD 2022) Associate Editor, Hepatology, 2016-2021
New R01: Liver sinusoidal endothelial cell progenitor cells (sprocs) and chronic liver disease (PI), R01 DK100580

Lily Dara, MD

Selected to attend and present research at the AASLD-EASL Masterclass

John Donovan, MD

President, LAC+USC Attending Staff Association

Cheng Ji, PhD

Renewal 1R01DA042632-04

Jeff Kahn, MD

Best Doctor (GI), Los Angeles Magazine 2020
Top Doctor (GI), Pasadena Magazine 2020

Neil Kaplowitz, MD

Southern California GI Society Lifetime Achievement Award

Brian Kim, MD

USC Internal Medicine Residency Subspecialty Faculty Teacher of the Year 2018-2019

Rushabh Modi, MD

Rising star, Top Doctor (GI) 2020

Veronica Wendy Setiawan, PhD

Jane and Kris Popovich Endowed Chair in Cancer Research

Sarah Sheibani, MD

Gastroenterology & Hepatology Fellowship Teaching Award - 2019-2020

Edy Soffer, MD

Best Doctors in America (2020)

Norah Terrault, MD, MPH

Councilor, Governing Board, American Association for the Study of Liver Diseases, 2018-2024 (expected President AASLD 2023) Associate Editor, Hepatology Communications
Advisory board member, The Task Force for Global Hepatitis Elimination
Elected committee member for AST research network committee
Renewal of UO1 NASH CRN with USC as new site

Jacques Van Dam, MD, PhD

U.S. patent “Integrated Ultrasound and Optical Coherence Tomography (OCT) endoscope for diagnosing cholangiocarcinoma and cystic neoplasms of the pancreas”



From left to right: Dr. Prachi Nene (1st year fellow), Chris Galindro (LAC+USC GI Nurse), and Dr. Paul Lenore (3rd year fellow) during an endoscopy procedure

FACULTY

Professor

Laurie D. DeLeve, MD, PhD
Lucy Golden-Mason, MD
Andrew F. Ippoliti, MD
Neil K. Kaplowitz, MD
Surinder Mann, MD
Hugo R. Rosen, MD
Edy E. Soffer, MD
Norah A. Terrault, MD, MPH
Jacques Van Dam, MD, PhD

Associate Professor

James L. Buxbaum, MD
John A. Donovan, MD
Tse-Ling Fong, MD
Cheng Ji, PhD
Jeffrey A. Kahn, MD
Michael Kline, MD
Takeshi Saito, MD, PhD
Andrew A. Stolz, MD
Veronica Wendy Setiawan, PhD
Thomas M. Zarchy, MD
Shuping Zhong, PhD

Assistant Professor

Lily Dara, MD
Jennifer L. Dodge, MPH
Helen Han, MD
Caroline Hwang, MD
Greg Idos, MD
Saro Khemichian, MD
Brian Kim, MD
Rushabh Modi, MD
Ara Sahakian, MD
Anisa Shaker, MD
Ling Shao, MD, PhD
Sarah Sheibani, MD
Tin Aung Than, MBBS, PhD
Sanda Win, MD, PhD
Zhang-Xu Liu, MD, PhD
Liyun Yuan, MD, PhD
Kali Zhou, MD, MAS

ADMINISTRATOR

Eli P. Chou, MPH

Geriatric, Hospital, Palliative and General Internal Medicine



Michael S. Karp, MD, MHA
Division Chief

Clinical Associate Professor of
Medicine (Clinician Educator)

“Excellence during turbulent times”

The Division of Geriatrics, Hospital, Palliative and General Internal Medicine (GHPGIM) had a remarkable and unprecedented academic year ending in June 2020. We started the year focusing on increasing our commitment towards medical education, patient care, and academic scholarship. The Division was producing significant growth in all these areas until early in 2020 when the COVID-19 outbreak forced a shift in our mission. Our private practice was steadily growing as compared to previous years, particularly as we expanded our services beyond the Health Sciences Campus. Once the COVID-19 pandemic became a reality, we had to quickly shift gears and lead our campus in its response. Medical education had to be reprioritized, clinical care modified, and some scholarship put on hold. The pandemic allowed us to pivot in new directions, moving up timetables and we shined as a result. Expanding the use of telemedicine for all 3 pillars of our mission created new and exciting opportunities. We created entirely new ways to serve our patients, both via telemedicine and with new in-person capabilities. The sense of teamwork amongst the faculty and staff never seemed higher. A great sense of pride was achieved as we adapted to the changing healthcare landscape. All the while, we never lost sight of the goals we have set forward. To sum up in a word, we strived for excellence and I believe we have achieved it.

Clinical Activities

LAC+USC Medical Center

Outpatient Care

During the 2020 academic year, faculty continued to provide supervision of residents as they provided care to upwards of 35,000 patients a year in the General medicine continuity clinic. Faculty also provided supervision of comprehensive care to the elderly population in the

Geriatric Clinic, which received approximately 4,000 visits per year. This year saw a dramatic shift in the nature of the care delivered as the COVID-19 outbreak occurred. Our faculty had to work with administrative and clinical personnel to quickly shift patient visits to a telemedicine format. This required the medical residents to quickly develop the skillsets necessary to perform telephonic visits with patients. Our faculty guided them through the process in a way that allowed for excellent patient care. A small percentage of patients still needed to be seen in person, but many were more the adequately handled at home and had their care needs met. All the while the faculty and trainees continued to work with pharmacy, nursing, information systems and hospital information management to develop multidisciplinary approaches to numerous medical problems such as Type 2 diabetes mellitus, congestive heart failure, and chronic pain.

Inpatient Care

Our faculty members were building on successes of the 2019 academic year as they focused on goals and metrics important not only to them, but to the administrative team as well. Goals such as decreasing length of stay, improving operational efficiency through refining patient flow, reducing denied days, and optimizing the utilization of limited inpatient resources were all projects that required significant faculty contribution. Once COVID-19 took hold, our faculty had to work with hospital leadership to develop protocols of all types – from how to don/doff PPE, to how to safely discharge patients who recovered from COVID-19 and everything in-between. Our faculty were active on many committees to help guide, optimize, and study the care provided to these patients. All the while they were putting their health on the line to care for patients suffering from a potentially deadly disease. They reassured those at risk, cared for them, and rose to the challenge. The LAC+USC Medical Center had a significant surge in

terms of the COVID-19 census and our faculty handled themselves with class and grace.

Our Medicine Consult Service continued to provide ongoing medical care to inpatients on surgical services. The service evaluated patients for transfer to LAC+USC and facilitated the flow of patients within the hospital. This service continues to actively work with hospital leadership on improving transitions of care. We are excited by all they have done and we are planning to expand this service in the next academic year creating dedicated surgical co-management teams. Our hope is to build on what our Medicine Consult service has already done to improve the care of these patients to an even higher degree.

Adult and Pediatric Palliative Care

The Palliative Care Services continued to care for seriously ill patients in all units of the hospital, including the Emergency Department, all active medicine-surgery wards and ICUs. The Palliative Care team includes dedicated nurses, chaplains, nurse practitioners and social workers to support the inpatient consult team. Our volumes continued to rise, handling upwards of 40 inpatient consults per day along with building our outpatient Palliative Care presence. They supervise the administration of chemotherapy, stem cell collection and other procedures. The Division is also responsible for an active Stem Cell Transplantation (SCT) program managed through Norris. The Division has expanded the program to include allogeneic transplantation in addition to autologous. Candidates for stem cell transplantation are screened at Norris. The Division also performs peripheral blood stem cell collections, which totaled over 150 over this past academic year.

Private Practice

The GHPGIM faculty were on pace to conduct a record number of outpatient visits prior to the onset of the COVID-19 pandemic. Our care continued to be centralized on the USC Health Sciences Campus in the Healthcare Center 2 (HC2) building. We were continuing to expand efforts in our satellite locations including those located at Keck Medicine of USC-Downtown Los Angeles, La Cañada Flintridge, Beverly Hills, Pasadena and University Park Campus. As the COVID-19 outbreak unfolded we temporarily had to close some locations and have nearly 100% of our outpatient clinical visits conducted via telemedicine, both video and audio visits. As we shored up those systems and were able to better assess the safety of patients returning to our in-person venues, we started to reopen those sites in a safe manner. At the close of the academic year we were very nearly at our pre-COVID levels in terms of average daily census. We are looking to incorporate telemedicine technology as part of our usual operations going forward, with a plan for at least 30% of our visits to be conducted via this strategy in the long term.

The Section of Adult and Pediatric Palliative Care continued to grow and to see inpatient consults at both the Keck Hospital and the Norris Cancer Center. The service also continued to expand their outpatient presence, in partnership with faculty from multiple disciplines, including the Hematology and Medical Oncology teams, Cardiology, Neurology, and numerous surgical services.

Hospital Medicine Program

The Hospital Medicine Program (HMP) became a key player at the Keck Medical Center as the year unfolded.



Physicians participating in the Los Angeles County Care Harbor, a free medical event for the community
From left to right: Katherine Frishe, MD, Loni Tang, MD, Alexander Connolly, MD, Michael Wang, MD, and Aneesah Smith, MD



*Dr. Sunita Puri with her book "That Good Night"
The book has been listed on Amazon as a Best Seller and has been chosen as Book of the Week in People Magazine*

At the start of the year, the program continued with its core mission including management of complex medical inpatients, resident training, and co-management of surgical inpatients. The co-management service in particular continued to have a strong presence working on length of stay, improved coding and documentation, improving quality and safety, reducing medical complications, and optimizing patient flow. Like many other teams within our Division, they had to shift quickly as COVID-19 emerged. Early in the outbreak many elective surgeries were canceled freeing up our faculty to help manage the increase in COVID suspect (PUIs) patients and those with documented infection. Our team managed patients in our newly constructed Medical Evaluation Tent. As previously mentioned, these faculty put their own health at risk to serve those most in need. They shined during this time, setting an example for all to follow. All the while, they continued to staff the Evaluation and Treatment Center (ETC) and provided rapid response coverage for the hospital campus (Rapid Response Team).

Educational Activities

Internal Medicine Residents

Faculty members in the Division of GHPGIM are responsible for the supervision of Internal Medicine Residents as they care for patients at LAC+USC on the Inpatient Medicine Wards service, at Keck Hospital, and daily within the LAC+USC Primary Care Clinics. The Division of GHPGIM believes that one of its core missions is to train the next generation of young physicians and allied health personnel to make sure they are prepared to meet the challenges presented by the ever-changing nature of medicine as well as the aging of the American population.

Research Activities

Gehr Family Center for Health Systems Science

The Center is funded by a generous gift from Norbert Gehr to the Gehr Center founder David Goldstein. Mr. Gehr wanted his gift to support Dr. Goldstein's efforts to establish a nationally renowned Health Systems Science program on the Health Sciences Campus. The Center's charge is to identify more effective ways to implement "best practices" in real-world settings, to be thought leaders in the field of Health Systems Science, and to provide medical trainees with opportunities to conduct mentored Health Systems Science research.

Division Accomplishments

- Swift COVID-19 response across all campuses and settings
- Adaption of clinical, education, and scholarly missions during COVID-19 outbreak
- Further development of population health care through Value Based Services Organization (VBSO)/USC Health plans
- Continued growth of clinical and scholarly programs/grants
- Best metrics of clinical care at LAC+USC Hospital (Length of Stay, Observed/Expected ratio, etc.)

Honors and Awards

Jose Gonzalez, MD

Traditional Plaque Award - Reducing Opioid Prescribing in Primary Care, 33rd Annual County of Los Angeles Productivity and Quality Awards Program
Quality Leaders Award: Ambulatory Care Redesign Award - Curbing the Opioid Epidemic in Primary Care, California Health Care Safety Net Institute Affiliate of the California Association of Public Hospitals and Health Systems (CAPH).
Special Achievement Award: Leadership in Curbing the Opioid Epidemic, LAC+USC Primary Care Oscars
Faculty Advisor Award, Latino Medical School Association. Keck School of Medicine at USC

Michael Hochman, MD

White Coat Ceremony Speaker, USC Chan Division, Occupational Therapy

Jennifer Marks, MD

Inducted as Fellow to American College of Physicians

Andrea Ida Elise, MD

Mentorship Award from the Pediatric Hospital Medicine Fellowship

Andrew Young, DO

Teaching Award, Internal Medicine Residency Program

Stephanie K. Zia, MD

Society of General Medicine Appreciation Award for Outstanding Commitment & Leadership
Elected as the Society of Hospital Medicine Los Angeles Chapter President
Invited to join the American College of Physicians Region 1 Governor's Council

Arek Jibilian, MD

Top Doctor, Los Angeles Magazine

Douglass B. Hutcheon, MD

Hero of the Week (9/13/2019), LAC+USC Medical Center, Los Angeles, CA

Sharon Orrange, MD

Los Angeles Times "Super Doctors"

FACULTY

Professor

Kurt M. Hong, MD, PhD
Barbara Turner, MD
Michael D. Wang, MD

Associate Professor

Ron Ben-Ari, MD
John L. Brodhead, Jr., MD
Julia Cassetta, MD
Nida Hamiduzzaman, MD
Diana C. Homeier, MD
Michael Hochman, MD
Eric P. Hsieh, MD
Jose L. Gonzalez, MD
Matthew S. Johnson, MD
Michael S. Karp, MD, MHA
Jennifer Marks, MD
Sharon E. Orrange, MD
Seth A. Politano, DO
Patrick E. Sarte, MD
Aaron Storms, MD
Gregory L. Taylor, MD
Carin van Zyl, MD
Andrew Young, DO

Assistant Professor

Haig H. Aharonian, MD
Kevin A. Bechler, MD
Emily Beers, MD
Shyam Bhansali, DO
Hillel Bocian, MD
Linda Calvillo-King, MD
Jeffrey B. Canceko, MD
Alexander Connelly, MD
Katherine Frishe, MD
Morgan Hawkins, MD
Douglass Hutcheon, MD
Arek Jibilian, MD
Matthew Jung, MD
Ronald Kall, MD
Cameron Kaplan, PhD
Huda Khaleel, MBChB
Shazia S. Khan, MD
Michael Kwak, MD
Edward S. Lee, MD
Sonia Lin, MD
Justin Liu, MD

Andrea Lu, MD
Anna Martinez, MD
Andrea Ida Elise Matho, MD
Rishi Mehta, MD
Nabeel Najmuddin, MD
Anuj Ohri, MD
James E. Pacino, MD
Arpna Patel, MD
Radhika Prabhakar, MD
Sunita Puri, MD, MS
Kavita Renduchintala, MD
Justin Rice, MD
Sonali Saluja, MD
Joshua D. Sapkin, MD
Aneesah Smith, MD
Jasmine Smith, MD
Loni Tang, MD
Arnold Tsai, MD
Bryce D. Turner, MD
Mabel Vasquez, MD
John Vo, MD
Khang Vo, MD
Carrie Ward, MD
Vickie Wu, MD
Shijun Cindy Xi, MD
Marshall Yuan, MD
Stephanie Zia, MD

Clinical Instructor

Vahe Arabian, PA-C
Sonya L. Earley, PA

ADMINISTRATOR

Jennifer K. Severa, MPA

Hematology



Preet Chaudhary, MD, PhD
Division Chief
Professor of Medicine
Bloom Family Chair in Lymphoma Research
Director for Bone Marrow Transplant

“Even COVID-19 could not slow the meteoric growth of the Division of Hematology and only made it stronger.”

In the past year, the Nohl Division of Hematology and Center for the Study of Blood Diseases continued its journey towards becoming the premier center in the world in the areas of malignant and non-malignant hematology, stem cell transplant and next generation cellular therapies. The division performed a record 150 blood and marrow transplants. Our program had the highest 1-year survival among all adult allogeneic stem cell transplant programs in California and one of the highest in the nation. The division also made huge strides in the areas of cell therapies and developed several novel assays and designs for next generation chimeric antigen receptors, positioning it as the world’s leader in next generation cell therapies.

In the past year, the Jane Anne Nohl Division of Hematology and Center for the Study of Blood Diseases continued its growth in the areas of clinical practice, teaching and research. Members of the Division are conducting research in several areas of benign and malignant hematology, stem cell transplant and next generation CAR-T therapies. In particular, Division faculty members have special research strengths in the areas of adoptive cellular therapy, including next generation CAR-T, viral associated malignancies,

molecular pathogenesis of hematological malignancies and development of novel molecular targeted approaches for the treatment of malignant and non-malignant hematological disorders. Members of the Division are also involved in a number of innovative investigator-initiated and National Cooperative Group (e.g., SWOG, AMC) sponsored clinical studies.

The Division is responsible for multiple clinical services at Los Angeles County + USC Medical Center

(LAC+USC), USC Norris Cancer Hospital (Norris) and Keck Hospital of USC (KH). At Norris, the Division is responsible for a busy inpatient service and the Bone Marrow/Stem Cell Transplantation (BMT) service, which successfully performs transplantation on patients with acute leukemia and other hematologic malignancies. The Division is experiencing increases in new outpatient visits, admissions and clinical efficiency (reduced length of stay) at Norris and LAC+USC. A substantial number of cases are placed into peer-reviewed clinical trials with accompanying translational research protocols, thus bringing innovative treatment strategies and therapeutic reagents to patients.

Clinical Activities

LAC+USC Medical Center

At LAC+USC, the Division conducts inpatient services for severely ill patients with hematologic malignancies and patients receiving chemotherapy. Additionally, the Division maintains a consultation service and seven outpatient half-day clinics.

Keck Medical Center of USC

USC Norris Cancer Hospital

Faculty see patients on a daily basis where they supervise the administration of chemotherapy, stem cell collection and other procedures. The Division is also responsible for an active Stem Cell Transplantation (SCT) program managed through Norris. The Division has expanded the program to include allogeneic transplantation in addition to autologous. Candidates for stem cell transplantation are screened at Norris. The Division also performs peripheral blood stem cell collections, which totaled over 150 over this past academic year.

Keck Hospital of USC

The Division of Hematology is responsible for seeing patients with various hematologic conditions on a consultative basis at KH. One fellow and one faculty are assigned to this rotation on a monthly basis.

Clinical Studies

Recruitment into clinical trials from all hospitals affiliated with Norris Comprehensive Cancer Center (Cancer Center) was strong over the past year. The Division of Hematology conducted clinical trials from a number of targeted therapies as well as immunotherapy products. Plans are underway to open clinical trials in chimeric antigen receptor modified T-Cells.

Educational Activities

The faculty are responsible for the education of approximately 84 interns and 120 residents each year.

Medical Students

The Division’s course in Hematology and Clinical Immunology involves approximately six weeks per year as part of a newly developed curriculum. In addition, the Senior Clinical Hematology Elective takes two to four students for a four- to six-week elective on the Hematology Consultation Service.

Research Activities

The Division is actively involved in basic, translational and clinical research in benign and malignant blood disorders. Active areas of basic and translational research in the Division include next generation CAR-T for the treatment of blood cancers, solid tumors and COVID-19, novel assays for determining the expression and activity of CAR-T cells, serological assays for COVID-19, molecular pathogenesis of multiple myeloma, lymphoma and AML, development of targeted therapies for hematologic malignancies, cancer drug resistance, and clotting and bleeding disorders. In the area of clinical research, the Division is conducting clinical trials involving conventional agents, novel drugs and immunotherapy for the treatment of benign and malignant blood disorders and COVID-19.

Recognitions

Center for International Blood and Marrow Transplant Research (CIBMTR) listed the USC BMT Program as the best one year survival among the programs performing Adult Allogeneic Transplants in California.

Division Accomplishments

- The USC Blood and Marrow Transplant (BMT) program performed over 150 transplants in 2019, a record high for the program.
- According to the 2018 Center Specific Survival Report published by the Center for International Bone Marrow Transplant Registry (CIBMTR), the USC Blood and Marrow Transplant Program had the highest 1 year survival among the adult allogeneic transplant programs in the state of California.
- Dr. Preet Chaudhary was the Keynote speaker at Immuno-Oncology Summit in Boston (August 5-9, 2019) and gave a presentation on the topic of “Novel Luciferase-based Assays for determining the expression of CAR-T and cytotoxicity of adoptive cell therapies”

Honors and Awards

Ilene C. Weitz, MD

Promotion to Professor
Speaker at ASH Symposium 2019—Rare Diseases-PNH and Cold Agglutinin Symposium

Casey L. O’Connell, MD

Appointed Member, Haemostasis and Malignancy Scientific Subcommittee, International Society of Thrombosis & Haemostasis (2016-2020)
Reappointed Member, Educational Affairs Committee, American Society of Hematology
Appointed Member, Hematology-focused Fellowship Steering Subcommittee, American Society of Hematology (2020-2023).

Caitlin O’Neill, MD

Received Broad Center for Regenerative Medicine & Stem Cell Research 2020 Fellowship Award
(Mentor: Dr. Casey O’Connell)

Preet Chaudhary, MD, PhD

Received an award from the Ming Hsieh Institute to develop next generation chimeric antigen receptors for the treatment of lymphoma

FACULTY

Professor

Preet M. Chaudhary, MD, PhD
Yali Dou, MD
Parkash S. Gill, MD
Howard A. Liebman, MD
Ilene C. Weitz, MD

Professor Emeritus

Donald I. Feinstein, MD

Associate Professor

Kevin Kelly, MD, PhD
Ann F. Mohrbacher, MD
Casey L. O’Connell, MD
Caroline I. Piatek, MD
Vasu Punj, PhD
Anil Tulpule, MD

Assistant Professor

Hittu Matta, PhD
Zaw Win Myint, MD
George Yaghmour, MD

Clinical Instructor (Practitioner)

Keera Bhandari, PA
Michell Cadiz, NP
Erin Combs, NP
Kristin Horwood, NP
Susie Lee, PA
Hannah Prawat, PA
Jennifer Russell, NP
Lakshmi Savitala-Damerla, PA
Kim Schiff, NP

ADMINISTRATOR

Janette España



Dr. Casey O’Connell presenting at the 61st Annual American Society of Hematology (ASH) Meeting

Infectious Diseases



Michael Dubé, MD
Interim Division Chief
Professor of Medicine

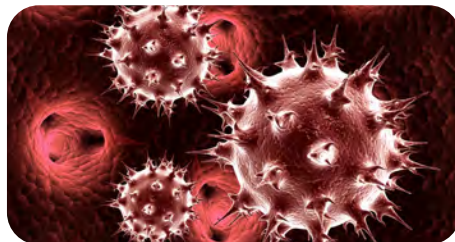
“In times of stress and danger such as come about as the result of an epidemic, many tragic and cruel phases of human nature are brought out, as well as many brave and unselfish ones.”

William Crawford Gorgas

I am excited that the Division has made important contributions to the fight against COVID-19. In addition to helping lead clinical trials for the treatment of COVID-19, it was a tremendous privilege to be named in May as a site in the nationwide Coronavirus Prevention Network (CoVPN), which will allow Keck to offer vaccine and other prevention studies to those we serve in the surrounding communities.

An important research mission of the Division of Infectious Diseases (ID) for more than three decades has been to investigate strategies to prevent and treat HIV and its complications. The NIH-supported AIDS Clinical Trials Group (ACTG) is a major focus of research in the Division; USC was one of the original 12 sites funded by the Division of AIDS in 1986. The Division also remains a lead member of the California Collaborative Treatment Group (CCTG), which is funded by the State of California. The CCTG is the largest collaborative HIV clinical research consortium in California and has been continuously funded at USC for more than 2½ decades.

The Division contributes tremendously to patient care and housestaff training in the Rand Schrader Health and Research Clinic for HIV, which includes several specialty services to manage a number of common complications that continue to plague the HIV population. For example, the Hepatitis Clinic evaluates and treats HIV patients (about 30%) co-infected with HBV and HCV at increased risk for liver related complications.



Clinical Activities

Keck Hospital of USC, Norris Cancer Center, and LAC+USC Medical Center

The ID Service provides in-patient consultations at these hospitals.

Rand Schrader Health and Research Clinic

ID faculty and fellows provide comprehensive HIV care of patients in this Clinic.

New Clinical Programs Initiated in 2019-2020

- Dr. Neha Nanda, Infection Control Officer at Keck hospitals, has continued to implement novel approaches to antimicrobial stewardship and surveillance. She led the health system policy development through the COVID pandemic. She coordinates and oversees daily in-hospital rounds with different ID faculty and pharmacists. Metrics showed that these approaches decreased *C. difficile* disease and empiric usage of broad-spectrum antibiotics.
- An antimicrobial stewardship and blood culture surveillance service (ID attending, ID fellow, pharmacists) who round daily was implemented. Dr. Noah Wald-Dickler developed a training syllabus for ID fellows rotating on the service and the clinical experience provides the basis for evaluation of fellow performance in antimicrobial stewardship, a mandated ACGME training for ID Fellows.

Educational Activities

The training experience is provided by highly experienced faculty on the general, transplant, and ortho ID consultation services

at Keck and Norris hospitals along with general ID consultation and antimicrobial services at LAC+USC Medical Center. Unparalleled opportunities for training in HIV medicine are also available at the Rand Schrader Clinic, which provides complete primary and specialty HIV care for approximately 2000 HIV infected individuals. LAC+USC and the Rand Schrader Clinic provide care for a largely underserved minority population (60-70% Latinos and 12-15% African-Americans). The clinical and racial/ethnic diversity makes the ID fellowship program at USC one of the truly unique programs in the United States.

Research Activities

Faculty Research Areas

Emily Blodget, MD has completed research on the incidence and outcomes of multi-drug resistant infections and impact of antibiotic prophylaxis in patients awaiting liver transplantation.

Michael Dubé, MD is leading several important clinical trials of treatment and prevention of COVID-19 and has established USC as a research site in the NIH-funded Coronavirus Prevention Network. He is the Clinical Research Site Leader for AIDS Clinical Trials Group (ACTG) research at USC and is the USC PI of the California Collaborative Treatment Group, currently performing a 4-year study of PrEP linkage and adherence in transgender persons. He is a scientific thought leader in HIV complications, chairs studies and serves on important committees in the ACTG. He also conducts studies of the microbiome in HIV.

Brenda E. Jones, MD is the USC Principal Investigator of the tuberculosis diagnostic study, “Evaluation of the 4th Generation Quantiferon Test for the Detection of Tuberculosis Infection”.

Dr. Edward C. Jones-López, MD, MSc has published extensively on several aspects of tuberculosis (TB) and has led several multinational teams of investigators conducting ground-breaking studies on TB transmission and novel diagnostics. At USC, he is leading the Phase III Oxford

University/ Aztra-Zeneca COVID-19 vaccine study that will seek to enroll 500 volunteers locally.

Neha Nanda, MD heads Healthcare Epidemiology/Infection Prevention and Antimicrobial Stewardship at Keck and its affiliated hospitals and clinics, which provide opportunities for research in healthcare associated infections and strategies to impact physician behavior in antimicrobial prescribing.

Brad Spellberg, MD is investigating the immunology, vaccinology, and host defense against highly resistant Gram-negative bacilli, including *Acinetobacter* and carbapenem-resistant *Enterobacteriaceae* infections.

Noah Wald-Dickler, MD is conducting research in antimicrobial stewardship outcomes.

Darren W. Wong, MD is an expert in the management of orthopedic infections and collaborates with the surgical services in both the provision of clinical care and combined research endeavors. He also has focus on gram-negative resistance, particularly carbapenem-resistant *Enterobacteriaceae* (CRE) infections with recent completion of a multi-center ARLG funded CRE epidemiological and outcome study.

Division Accomplishments

- Establishment of USC as a site for the Coronavirus Prevention Network
- Consultant to the State of California Governor’s COVID-19 Academic Advisory Board
- Print and broadcast media resource for the COVID-19 pandemic
- Successful antimicrobial stewardship programs at Keck and LAC-USC

Honors and Awards

Jean Gibb, MD
Fellowship Teaching Award

FACULTY

Professor

Michael P. Dubé, MD
Brad Spellberg, MD

Associate Professor

Emily Blodget, MD
Brenda E. Jones, MD
Neha Nanda, MD

Assistant Professor

Jean Gibb, MD
Edward Jones-Lopez, MD
Nicholas Skandalis, PhD
Darren W. Wong, MD

Instructor of Research Medicine

Brian M. Luna, PhD

Clinical Instructor of Research

Noah Wald-Dickler, MD

ADMINISTRATOR

Erika Anaya

Nephrology and Hypertension



Kenneth R. Hallows, MD, PhD
Division Chief
Professor of Medicine
Director, USC/UKRO Kidney
Research Center

“Pursuing new opportunities for growth and excellence in a time of change and uncertainty”

The Division of Nephrology and Hypertension is committed to providing comprehensive up-to-date medical care to patients with a variety of kidney diseases, hypertension, renal failure, fluid and electrolyte disturbances and transplantation of the kidney, kidney-pancreas and kidney-liver. The Division operates both in the public sector at LAC+USC Medical Center (LAC+USC) and in the private sector at Keck Hospital of USC (KH), USC Norris Cancer Hospital (Norris) and DaVita-USC Kidney Dialysis Center (DaVita-USC). Recently, the Division has seen significant growth in the numbers of both fellows and faculty members, with faculty numbers doubling over the past five years. Moreover, the number of kidney transplants performed has continued to expand considerably over the past year with the program maintaining top-tier ratings of excellence in outcomes. Finally, the educational, mentoring, and research programs of the Division remain robust and are recognized in awards from the Keck School of Medicine and a recent rise to #13 in the US News and World Report 2019-20 nationwide rankings in Nephrology.

Clinical Activities

LAC+USC Medical Center

At LAC+USC, the Division of Nephrology has two consult services, each with an attending, fellow, medicine residents and students, and manages approximately 160 consultations per month. The Division provides more than 7,000 acute hemodialysis treatments annually, as well as continuous renal replacement therapy (CRRT) for fluid, electrolytes and metabolic support of acutely ill patients in the intensive care units.

Chronic Kidney Disease Clinics

The Division of Nephrology and Hypertension provides highly specialized care for many underserved patients in Los Angeles County who have all aspects of kidney disease, hypertension, kidney stones

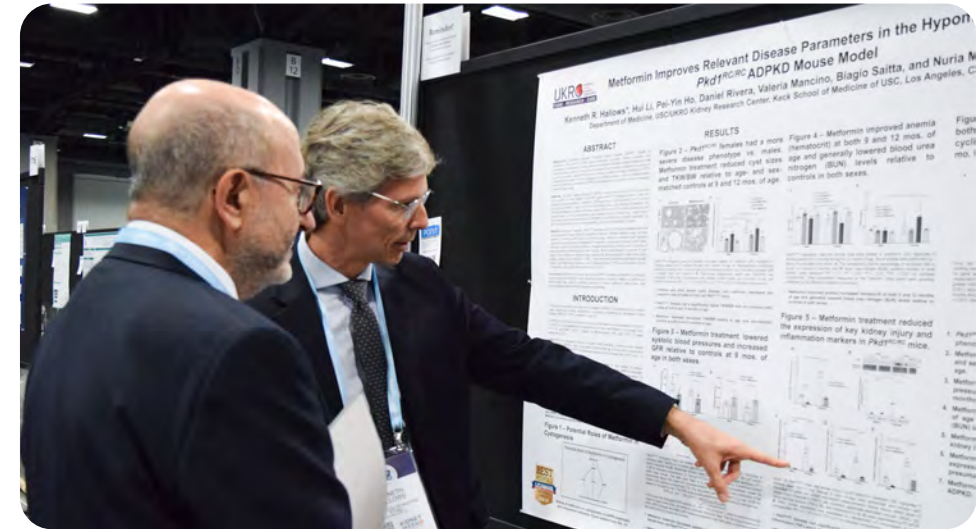
and prior kidney transplants. The mission of the Chronic Kidney Disease Clinics is to educate patients about their kidney diseases to prevent the progression to end-stage renal disease and treat its complications. The faculty also provide ambulatory training and education for medical students, medicine interns, residents and nephrology fellows. Finally, the clinics provide care for many long-term kidney transplant patients on multiple immunosuppressive medications. The Division sees 30 to 50 patients per session in the general renal outpatient clinics.

Private Practice

At Keck Hospital and Norris, Nephrology and Hypertension faculty members admit private patients and provide consultations to patients with kidney diseases, fluid and electrolyte disturbances, acid-base disorders and hypertension. Nephrology faculty provide renal replacement therapy and consultation services at Keck Hospital and Norris. In addition, faculty work very closely with the kidney, pancreas, heart, lung and liver transplant surgeons to provide care to patients with end-stage renal disease who require living-related, living-unrelated or cadaveric kidney transplants. Faculty care for more than 350 patients with end-stage renal disease at DaVita-USC Kidney Center. As the largest outpatient dialysis facility on the West Coast and one of the largest academic dialysis units in the country, DaVita-USC Kidney Center is recognized as a model for the community for its efficiency, quality of care and dedication of staff.

USC Hypertension Center

The USC Hypertension Center is a comprehensive clinical program for the diagnosis and management of patients with secondary and resistant forms of hypertension. The Center specializes in the diagnosis and management of renovascular hypertension, pheochromocytoma and primary aldosteronism, and in the management of resistant hypertension and orthostatic hypotension.



Dr. Kenneth Hallows presenting his poster at the American Society of Nephrology Conference

USC Kidney Transplant Center

The Kidney Transplant Program at USC is the fastest growing program of its kind in Los Angeles. A total of 163 kidney transplants were performed in 2018. The first simultaneous lung-kidney transplant was performed at Keck in 2018, furthering collaborations between different transplant specialties at the multi-organ transplant institute. The center has performed close to 2000 transplants since its inception and has consistently been ranked highly for its quality. The recent Scientific Registry of Transplant Recipients (SRTR) outcome published by the United Network of Organ Sharing (UNOS) placed Keck's transplant program as one of only 30 centers out of 300 transplant centers in the US with outcomes significantly better than expected. Moreover, last year it was one of only a handful of programs with a 5-star rating on the UNOS 5-tiered outcomes analysis. The transplant center participates in several clinical trials, including cutting-edge studies of tolerance and novel therapeutic agents, and was a lead on one of the largest global trials ever conducted in kidney transplant recipients.

Educational Activities

The Nephrology Fellowship Program is designed to provide training in all fields of Nephrology, including abnormalities of fluids and electrolytes, glomerulonephritis, tubulointerstitial nephritis, renal vascular diseases, dialysis and transplantation. During rotations, fellows are exposed to all aspects of clinical nephrology, including dialysis and transplantation. Fellows are also involved in a variety of clinical and basic research in the fields of hypertension, treatment of acute and chronic kidney disease, progression of renal disease and management of dialysis.

Research Activities

The Division of Nephrology and Hypertension is committed to basic, translational, clinical and population research. Current areas of basic and translational investigation include the mechanisms of hypertension, acute kidney injury, acid regulation and its role in CKD, polycystic kidney disease and metabolomic biomarkers, kidney cancer, and the noradrenergic control of blood pressure in kidney disease. Clinical research areas include the testing of novel therapeutics in polycystic kidney disease, mechanisms and management of vascular calcifications in dialysis patients, detection and management of cardiovascular disease in dialysis patients, prevention of progressive renal disease in African-Americans, and new experimental therapeutics in kidney transplantation. There is also a growing research program in the health economics of kidney disease. The Division has also developed an urgent-start peritoneal dialysis program, which is the largest of its kind in the country. In addition, research is ongoing to enhance assessment of intravascular volume and response to ultrafiltration in critically ill patients.

The Division's USC/UKRO Kidney Research Center (KRC) is supported by private funding (principally the University Kidney Research Organization (UKRO)), federal grants from the National Institutes of Health and US Department of Defense, and University grants and supporting funds.

Division Accomplishments

- Ranking of #13 nationwide in U.S. News and World Reports for Nephrology programs (2019-20)
- Our Division's faculty have again been recognized collectively in the medical school for their excellence in teaching in receiving the Outstanding Year II Course Award for the Renal Systems Course.
- The Kidney Transplant Program at USC is continuing to grow with an institutional record total of 195 kidney transplants performed in 2019, including 24 combined kidney with other organ transplants and 38 living donor transplants.
- Our kidney transplant program has been one of only a handful of programs with a 5-star rating on the UNOS 5-tiered outcomes analysis.
- We have successfully recruited four additional clinical faculty, including two new mid-level practitioners, which has more than doubled our faculty size over the past four years. This growth has afforded expansion of our clinical services while maintaining top-notch patient care in all areas of nephrology.

Honors and Awards

Eugene Lin, MD

Guest Editor for Seminars in dialysis (Dialysis Care Policy Issue)
Editorial Board member for Seminars in Dialysis

Vito Campese, MD

Ordine Della Stella D'Italiano (Order of the Star of Italy)

Zhongwei Li, PhD

Dean's Pilot Grant Award

Yan Zhong, MD

Awarded One Legacy and UKRO Foundation Grants



Dr. Arshia Ghaffari educating about dialysis

Oncology

“The practice of medicine is an art, not a trade; a calling, not a business; a calling in which your heart will be exercised equally with your head.”

William Osler

COVID-19 did not reduce the need to treat cancer; it increased the complexity of caring for the patients. Division members demonstrated their strengths and resilience, adapting rapidly to continue to manage our cancer patients at USC Norris Cancer Hospital, LAC+USC Medical Center, the Keck Medical Center and Norris Oncology offices in Beverly Hills, Pasadena, Newport Beach, Huntington Beach, Arcadia, Irvine, Koreatown, and Buena Park. Our cancer treatment trials continued – giving patients access to participate in therapeutic studies; the need to change the future by developing superior cancer treatment remains. The experience of the oncology faculty in clinical trials enabled them to assist other faculty in combating COVID-19 by designing and testing potential agents.

The Division of Oncology sections include Gastrointestinal Malignancies under the leadership of Heinz-Josef Lenz (Symba Iqbal stepping into this position in 2021), Genitourinary Malignancies under David Quinn, Solid Tumors under Jorge Nieva, Women's Malignancies under Janice Lu, Phase I program under Anthony El-Khoueiry, and Cancer Genetics Service under Julie Culver at USC/Norris, and Charite Ricker at LAC+USC.

Clinical Activities

Our division members provide direct cancer patient consultation and care; educate students; and teach, supervise and mentor residents and fellows in the management of the cancer patient at multiple locations. We lead and participate in multiple tumor boards each week ensuring patients managed by the USC faculty have thoughtful multidisciplinary care.

The application of novel treatment strategies has been crucial to the successful management of patients with metastatic cancer. The integration of clinical trials

involving such novel therapeutics within our practice and teaching activities has enabled us to be successful in this regard.

LAC+USC Medical Center

The Division is responsible for daily subspecialty focused outpatient clinics, an inpatient consultative service for patients with solid tumors, and a busy daily Infusion Center/Day Hospital. Each section of the Division rotates and provide daily attending rounds for consult patients in the Inpatient Tower. Our efforts to reduce admissions for elective chemotherapy accomplished stepwise over the past 6 years have been very successful, with a marked reduction. Today the vast majority of chemotherapy regimens are delivered in our infusion center, which has been satisfying to patients and providers.

Private Practice

USC Norris Cancer Hospital – Outpatient Clinics and Day Hospital

The Division of Oncology faculty provide subspecialty care at the USC/Norris Outpatient Clinics and the USC/Norris Health Care Center. During FY2020, Oncology faculty saw a total of 20,527 new and follow-up clinic visits in the outpatient setting. Treatment across Norris consisted of 11,754 visits.

Keck Hospital/Norris Cancer Hospital – Inpatient Service

During FY2020, Oncology faculty were responsible for 690 admits, and 3,543 inpatient days. The average length of stay was 5.1 days.

Keck Hospital – Consultation Service

At Keck Hospital, one fellow and one faculty are assigned to our consult team which provides inpatient consultations for all tumor types. The team consulted on 193 patients last year.

USC Norris Westside Cancer Center

The Cancer Center offers the latest in



Darcy Spicer, MD

Division Chief

Associate Professor of Clinical Medicine

FACULTY

Professor

Kenneth R. Hallows, MD, PhD
Elaine M. Kaptein, MD
Mitra K. Nadim, MD

Professor Emeritus

Shaul G. Massry, MD
Vito M. Campese, MD

Associate Professor

Arshia Ghaffari, DO
Saeid M. Nosrati, MD
Nuria M. Pastor-Soler, MD, PhD
Yasir A. Qazi, MD
Biagio Saitta, PhD
Miroslaw J. Smogorzewski, MD, PhD

Assistant Professor

Kausar Hamiduzzaman, MD
Hui Li, MD
Zhongwei Li, PhD
Eugene Lin, MD
May Lwin, MD
Thin Thin Maw, MD
Roshan Rajani, MD
Sapna Shah, MD
Hui Yi Shan, MD
Neeraj Sharma, MD
Santhi Voora, MD
Yan Zhong, MD

Clinical Instructor (Practitioner)

Melissa Alvarez, NP
Catherine Guillen, PA-C
Sarah Masters, NP
Jenese Silva, PA-C
Michael Tuanqui, NP

ADMINISTRATOR

Rachel Lim

treatments from a range of specialties, all focused on the oncologic care of patients with prostate cancer. It strives to bring new therapies to patients and is advancing the clinical care of prostate cancer through novel clinical trials.

Keck Medical Center of USC in Pasadena

The Pasadena office offers treatments in all aspects of both hematologic and oncologic care for residents of the San Gabriel Valley. Patients are offered participation in the many clinical trials being conducted by the Division.

Keck Medicine of USC in Orange County

USC Norris Oncology/Hematology locations in Orange County are located in Huntington Beach, Newport Beach and Irvine. Advanced treatment and clinical trial opportunities are available to Orange County residents in their local communities. Keck Medicine is working in collaboration with Hoag Hospital to continue expanding a higher level of comprehensive cancer and oncology services throughout Southern California.

Keck Medicine of USC in Koreatown and Buena Park

Keck Medicine of USC acquired the LA Cancer Center hematology and oncology practice in Koreatown and Buena Park. These university-based practices predominantly serve a large Korean-speaking population. Patients were temporarily being seen at USC Norris Cancer Hospital while their offices were being upgraded and renovated until the clinics were reopened in Fall 2019.

Keck Medicine of USC in Arcadia

Keck Medicine of USC opened a hematology and oncology practice in Arcadia towards the end of 2018. This expansion offers another location for care in the San Gabriel Valley.

Clinical Trials

A substantial number of patients are entered into peer-reviewed clinical trials with accompanying translational research protocols, thus bringing innovative treatment strategies and therapeutic agents to patients.

Recruitment into clinical trials from all hospitals affiliated with the Cancer Center was strong, with 376 cases recruited in FY2020. Adult patient recruitment was represented by study type as follows: 246 interventional therapeutic studies; 97 interventional non-therapeutic; and 33 to non-interventional studies. Enrollment by ethnicity was 26 % Hispanic or Latino for interventional therapeutic trials; 53.6% for interventional non-therapeutic and 33.3% for non-interventional. Enrollment by gender was 44.7% female for interventional therapeutic trials; 53.6% female for interventional non-therapeutic and 24.2% female for non-interventional studies.

Educational Activities

Division of Oncology faculty are responsible for the education of approximately 52 interns and 120 residents on rotation each year. These individuals have been assigned to either the Consult Service at LAC+USC or the inpatient service at Norris Hospital or Consult Service at Keck Hospital. During daily rounds, the house staff are exposed to the entire spectrum of malignant diseases and the patient's natural history.

Fellowship training activities include involvement in the design and conduct of early-phase clinical trials, bedside teaching, tumor boards, and lectures designed to illustrate principles of the biology of cancer and its management. These activities are augmented by faculty mentorship of fellows who may want to participate in specific scholarly research projects associated with particular disease sites or malignant disease processes.

Research Activities

Research programs received substantial funding from the NIH and other peer-reviewed grant support, as well as industry-funded studies. The Division increased its emphasis on translational research based on fundamental concepts of molecular biology. This approach has been predicated on the emerging knowledge of the molecular correlates of anticancer drug resistance, increased understanding of the genes associated with familial and sporadic patterns of malignancy (colorectal and breast cancer, in particular), the immunological basis of tumor response and resistance, and a more precise assessment of the pharmacology of novel anticancer compounds.

Selected Programs

The joint USC Norris/HOAG phase I program, under the leadership of **Anthony El-Khoueiry, MD**, has continued to grow and expand. With more than 30 active clinic trials, the program offers a wide range of cutting-edge and first-in-human therapies including novel immunotherapeutic agents and targeted therapeutics. The program achieved several milestones such as enrolling the first patient worldwide on 4 new first-in-human and first-in-class trials.

Jacob Thomas, MD delivered two oral presentations about a novel intra-tumoral immune stimulant agent to international audiences at the Society for Immunotherapy for Cancer (SITC) and the American Society of Clinical Oncology (ASCO) annual meetings. He has been selected by National Cancer Institute's Cancer Therapy Evaluation Program (NCI CTEP) to be a lead member of the Project Team to design and conduct a nationwide immunotherapy clinical phase I/II trial with Ipatasertib for patients with advanced head and neck cancer.



Dr. Henry Wang at the Arcadia clinic

Diana Hanna, MD is leading the HOAG component of the phase I program and has been able to recruit more than 50 patients per year to early phase trials in a community setting, thereby bringing novel therapeutic options to South Orange County community. She has launched 3 investigator initiated phase I trials with a focus on colon and pancreatic cancers.

Evanthia Roussos Torres, MD, PhD joined the division in Fall 2019 to pioneer research in novel immunotherapeutic combinations for breast cancer such as her work investigating checkpoint inhibition in combination with epigenetic therapy. Her translational and basic science research has made important contributions to our understanding of the tumor immune microenvironment. In her short time with USC, Dr. Roussos Torres was also awarded a Wright Foundation Translation Grant and two Norris Comprehensive Cancer Center Tumor Microenvironment Program Pilot Awards. She was most recently awarded the Tower Foundation Career Development Award for this work and will continue to use tumor immunology combined with translational genomics to design rational clinical trials in immunotherapy for breast cancer.

Shannon Mumenthaler, PhD and her lab is applying novel microfluidic-based organ-on-chip models to investigate the impact of the tumor microenvironment on colorectal cancer progression. This work has resulted in an NCI-scored R01 grant in the 8th percentile, which will support the development of chips for personalized medicine using patient biopsy samples and identify novel drug targets that focus on disrupting tumor—stromal interactions.

Anthony El-Khoueiry, MD has continued to grow the hepatobiliary cancers research program with multiple clinical trials for all stages of disease. Continuing to

build on his seminal Lancet publication that led to the approval of Nivolumab, he is now investigating multiple combinations to enhance the activity of immune checkpoint inhibitors in HCC; as such, he is the lead investigator on a phase I trial combining pembrolizumab and regorafenib and a phase IB combining epigenetic and immunotherapies as part of a Stand up to Cancer/ Van Andel Institute grant. He has established multiple collaborations to investigate biomarkers to personalize HCC therapy; he is co-PI on a U01 grant evaluating predictors of response to immunotherapy in HCC and has established a prospective blood sample repository in collaborations with Drs. Rosen and Golden. He has been involved in the approval or NCCN listing of 3 drugs for hepatobiliary cancers including Nivolumab, Cabozantinib, and Ivosidenib.

Under mentorship of **Heinz-Josef Lenz, MD**, postdoctoral fellows from his laboratory were awarded 6 Merit Awards from ASCO and ASCO GI in the last year. Dr. Lenz successfully competed to renew his UM1 in collaboration with City of Hope, Stanford, and UC Davis. In collaboration with Dr. Steve Kay he received the first Translational Team Accelerator Initiative award from the Cancer Center for their work on clockproteins.

Rongfu Wang, PhD joined USC in Fall 2019 with a secondary faculty appointment in Department of Medicine, Division of Medical Oncology. He currently oversees research labs at both Norris Comprehensive Cancer Center and Children's Hospital Los Angeles. Dr. Wang's research interest and expertise are focused in the areas of cancer antigen discovery, cancer immunology, and immunotherapy, innate immune signaling and regulation, and epigenetic regulation of stem cells and cancer.

Amir Goldkorn, MD and his laboratory developed multiparametric liquid biopsy capabilities combining

analysis of single circulating tumor cells (CTCs) and matched plasma cell-free DNA (JCI Insights 2019), as well as rapid RNA sequencing of CTCs (Int J Cancer 2020). These techniques have been implemented in national multi-center phase 3 trials and culminated in a new R01 scored at 8th percentile. In a related oral presentation at this year's American Society of Clinical Oncology meeting, Dr. Goldkorn presented his group's findings that men with metastatic prostate cancer and low CTC counts had nearly 9-fold odds of complete response to first line hormonal therapy and 4-fold odds of continued response at 2 years.

Sarmad Sadeghi, MD, PhD has a pembrolizumab + sEph4-HSA multicenter trial is near completion of accrual in two cohorts and is in review for breakthrough designation by the FDA. The double blind randomized post immunotherapy metastatic renal cell carcinoma study with axitinib ± OX40 Ab is 40% accrued and will soon undergo its first interim analysis. He is chair of SWOG s1937 eribulin with or without gemcitabine will open nationwide in October of 2020 for metastatic urothelial carcinoma after immunotherapy.

Jorge Nieva, MD published 3 key manuscripts establishing the fundamentals on use of objective metrics to quantify performance status in cancer patients. Performance status is the best predictor of outcomes in cancer and a key metric for enrollment in clinical trials, but is highly subjective and prone to bias. As part of the Cancer Moonshot, in cooperation with the Viterbi School of Engineering and Dornsife College, Dr. Nieva leveraged video gaming technology and artificial intelligence to quantify the fitness of patients to undergo rigorous cancer therapies.

Divison Accomplishments

- Dr. Nieva successfully launched a collaboration with Southern California's largest HMO oncology services provider to bring cancer clinical trials to the more than 1 million covered lives in their network. This program, which was piloted in lung cancer has expanded to include head and neck and skin cancer with plans to expand to other tumor types. The collaboration expands the mandate of the cancer center to service our community by providing clinical trial access to the large managed care population in Los Angeles County that previously could not access clinical trials.
- Dr. Syma Iqbal completed and published in JCO her multicenter randomized, phase II study in patients with HER2-negative, advanced esophagogastric cancer demonstrating the superiority of fluorouracil, leucovorin, and oxaliplatin (FOLFOX) versus a non-platinum-containing regimen of irinotecan and docetaxel (IT) regimen. The evaluation of ERCC1 in patients with upper GI tumors was thwarted by an overwhelming predominance of low ERCC1 mRNA expression. Nonetheless for all patients and for those with low ERCC1 expression, FOLFOX was superior in efficacy to IT.
- We now offer universal genetic counseling and testing for newly diagnosed breast cancer patients in the breast multidisciplinary clinic. Significantly we are now in our 12th year of offering services for cancer genetics at LAC, a patient population that is traditionally underserved and typically left without access, to be an amazing accomplishment reflecting the long-term and foundational support that medical oncology has provided.



Dr. Sang-Hoon Ahn speaking to a patient

- Drs. Jacek Pinski and Page Asawa's Institute for Arts in Medicine (IAM) together with USC Norris Comprehensive Cancer Center draws on a network of renowned art therapists, scientists, physicians, and arts practitioners to deliver an integrative model of patient care, research and access to the arts that values the health of patients and underserved populations. The new institute is led by experts in the fields of research, clinical treatment and community programming providing virtual arts engagement during the pandemic and beyond.

Honors and Awards

Jorge J. Nieva, MD

Associate Editor: Frontiers in Oncology
Plenary Speaker AACR (April 2019)

Heinz-Josef Lenz, MD

Member, Department of Medicine Task Force for Mentoring and Career Development
Editorial Board, ESMO Open
Editorial Board, Oncogene
Renewed grant UM1 2020-2025
Ongoing grant UG1 2019-2025
Got TTAP, Ming Hsieh and Whittier Grant from Cancer Center
Oral presentation in Colon Cancer at European Society for Medical Oncology
Invited Grand Rounds Speaker at Emory University
Keynote Lecture at Annual Meeting of Israeli Society of Clinical Oncology and Radiotherapy
Keynote Lecture at COG, Beijing
Lecture at the Sino American Conference (Shenzhen University)
Continue AD Clinical Sciences
Now Co Leader of TACS program (1/2020)

FACULTY

Professor

David B. Agus, MD
Stephen B. Gruber, MD, PhD
Heinz-Josef Lenz, MD
Janice Lu, MD, PhD
Louis A. Vanderمولen, MD
Rongfu Wang, PhD

Associate Professor

Sang-Hoon Ahn, MD
Greg R. Angstreich, MD
Paige Asawa, PhD, MFT
Afsaneh Barzi, MD, PhD
Anthony B. El-Khoueiry, MD
Amir Goldkorn, MD
Mitchell E. Gross, MD, PhD
Syma Iqbal, MD
Jerry S.H. Lee, PhD
Mark V. McNamara, MD
Minh D. Nguyen, MD
Jorge J. Nieva, MD
Jacek K. Pinski, MD, PhD
David I. Quinn, MD, PhD
George Semeniuk, MD
Darcy V. Spicer, MD
Henry Wang, MD

Assistant Professor

David M. Burtzo, MD
Qian Chen, PhD
Anishka D'Souza, MD
Diana L. Hanna, MD
Dilruba N. Haque, MD
James S. Hu, MD
Gino In, MD
Umair Ghani, MD
Clan Hahn, MD
Reginald Hill, PhD
Irene Kang, MD
Kian Kani, PhD
Jonathan Katz, PhD

Paul Macklin, PhD
Cynthia L. Martel, MD, PhD
Shannon M. Mumenthaler, PhD
An Nguyen, MD
Evanthia Roussos Torres, MD, PhD
Daniel L. Ruderman, PhD
Esha Sachdev, MD
Sarmad Sadeghi, MD, PhD
Jacob Thomas, MD
Bing Xia, MD
Changsheng Xing, PhD
Shigang Xiong, MD, PhD
Haris Zahoor, MD
Motao Zhu, PhD

Instructor of Clinical Medicine

Julie Culver, MS
Frances Oh, MS
Charite N. Ricker, MS

Clinical Instructor (Practitioner)

Monica Averia, NP
Breidi Calloway, NP
Yixuan (Clarissa) Chang, NP
Lilia Frausto, NP
Karen Julien, NP
Taline Khoukaz, NP
Kristi Lara, PA
Ju Lee, NP
Michael Luther, PA
Tina Soo, NP
Ron Stein, NP
Tania Vartanians, PA

ADMINISTRATOR

Timothy Chung

Pulmonary, Critical Care, and Sleep Medicine



Zea Borok, MD
Division Chief
Professor of Medicine
Ralph Edgington Chair in Medicine

I have never been more proud to lead this Division that has been at the forefront of dealing with the challenges of COVID-19. The teamwork has been truly incredible and is a testament to each individual and the power of collaboration!

The Division of Pulmonary, Critical Care and Sleep Medicine (PCCSM) strives towards excellence in all three academic missions, providing exceptional clinical care, robust basic and clinical research programs and outstanding opportunities for training of the next generation of clinicians in our highly sought-after fellowship programs.

Division faculty and fellows provide services in seven Intensive Care Units, two at the LAC+USC Medical Center, four at the Keck Hospital of USC, and one at the USC Norris Cancer Hospital. They also care for patients with complex advanced pulmonary diseases in both the inpatient and outpatient settings, as well as perform many state-of-the-art pulmonary procedures.

Basic science and translational research areas in the Division include airway and alveolar epithelial cell biology, pulmonary fibrosis, stem cell biology and regenerative medicine, and gene regulation in lung injury and repair. Clinical research areas include cystic fibrosis, pulmonary hypertension, sleep medicine, ILD, asthma, lung cancer and bronchoscopy, medical education, and outcomes in critical care. Division faculty and fellows have also been actively engaged in leading several COVID-19-related clinical trials.

Clinical Activities

LAC+USC Medical Center

The Division of PCCSM operates a 40-bed Medical Intensive Care service at LAC+USC with two separate teams. The Division provides consultative services to inpatients and intensive care units of other divisions and departments, including internal medicine, surgery (including trauma), neurology, neurosurgery, burns, emergency medicine and cardiology. The Division also provides outpatient pulmonary consultative

services (in-person and virtually) to support the Los Angeles County Department of Health Services. In addition, we provide advanced bronchoscopic, pleural, and other procedures for both inpatient and outpatient populations.

Keck Hospital of USC

The Division cares for inpatients with a wide spectrum of acute and chronic lung diseases and critical illness in the KH Intensive Care Units.

Our intensivists support the heart and lung transplant program by providing perioperative care of this complex patient population with co-management of advanced heart failure patients. We co-manage patients in the neurosurgical ICU and provide consultative services for other critical care units. The Division also leads the Code Blue and Rapid Response teams at Keck Hospital.

In response to the COVID-19 pandemic, and in partnership with nursing and administration, the Division led the establishment of a closed COVID ICU with processes designed to optimize the care of patients and the safety of providers. Division faculty assumed a leadership role in establishing a COVID ICU team to deliver best practices care to critically-ill COVID patients.

In addition, we have pulmonary subspecialty inpatient teams which care for complex advanced pulmonary disease patients with cystic fibrosis, pulmonary hypertension, lung transplantation, interstitial lung diseases, and end-stage COPD.

USC Norris Cancer Hospital

The Division of PCCSM operates the Intensive Care Unit at Norris Hospital, provides pulmonary consultative services to floor patients, and leads emergency responses in the form of Code Blue and



Dr. Santhi Kumar discussing a case with a fellow

Rapid Response emergencies for both the inpatient and outpatient clinic areas. The Division of PCCSM also supervises and directs the acute care nurse practitioner program at the USC/Norris Cancer Hospital, including their oversight of sepsis management throughout the entire hospital. Our division also provides outpatient pulmonary consultative services and interventional pulmonary support for the cancer hospital.

Special Clinical Services

The Division of PCCSM has established several clinical Programs of Excellence, each of which offer specialized treatment for various pulmonary disorders, as well as an outstanding educational setting for fellow education.

The **USC Center for Advanced Lung Disease (CALD)** is a program that deals with the diagnosis and treatment of all types of complex lung diseases. Our #12 ranking by US and World Report reflects the expertise and care that is provided by our elite multidisciplinary team. The combined expertise of our social worker, respiratory therapist, dietician, pharmacist, nurses, and physicians supports the management of complex patients with chronic lung disease to ensure that they can achieve the best possible quality of life.

Within CALD, there are several subspecialty clinics, including an **Interstitial Lung Disease (ILD) Center of Excellence** led by Dr. Toby Maher who is internationally known for his research and expertise in this field. In addition to involvement in Idiopathic Pulmonary Fibrosis (IPF) clinical trials, we have established a monthly conference for multidisciplinary discussion and management of ILD patients involving key members from pulmonology, radiology, pathology, and rheumatology. This multidisciplinary ILD board is in-line with national best-practice recommendations regarding the diagnosis and management of ILD.

The **Anton Yelchin Adult Cystic Fibrosis (CF) Center** provides direct care and consultation for adult CF patients. Under the leadership of Dr. Adupa Rao, the CF Center

received an unprecedented gift of \$1 million from the Yelchin family to name the CF Center in memory of their son Anton. A multidisciplinary care team provides care from a nurse practitioner, pharmacist, respiratory therapist, dietician, and social worker alongside a CF physician. The entire team is made of nationally recognized experts in their field, with a combined experience of more than 75 year of CF care. The center provides excellent clinical care and an opportunity to participate in the latest drug trials. During the pandemic, innovations and adaptations included close telemedicine follow up, home IV antibiotics, and the use of home spirometry to decrease the need for clinic visits for clinically stable patients.

We have also developed an innovative **Post-COVID Pulmonary Clinic**, which meets a new and growing need across the nation. COVID-19 survivors have not only persistent lung damage, but also other issues which require multidisciplinary care. Given our successes with similar multi-system disease states, such as cystic fibrosis, we are well positioned to care for this new subgroup of patients.

Due to the complex and fragile nature of patients seen at CALD, telemedicine visits are not always sufficient. Thus, we have re-designed the clinic to also support in-person visits with a high-level of safety measures incorporated. Providers wear full PPE and there is a new comprehensive cleaning process (disinfection of all surfaces with bleach, UV light sterilization) and increased airflow turnover in all rooms between each patient

The **USC Sleep Disorders Center** has seen continued growth and expansion and now occupies a separate area at KH with full staff support.

This year, Drs. Grbach, Castriotta and Dasgupta of the Sleep Disorders Center welcomed Lesley Killion Baber, CRNP, to the Sleep Disorders staff. As the USC Sleep Disorders Center remains a regional leader in providing non-CPAP alternatives for the treatment of Sleep Apnea, Mrs. Baber organizes the sleep device clinic for patients who have been implanted with the Upper Airway

Stimulation device or Phrenic Nerve Stimulation device. Since the pandemic forced the division to restructure its outpatient care, the Sleep Disorders Center created a novel solution incorporating telemedicine consultations with home sleeps studies (and select in-lab studies) to continue patient access to care. As our inpatient and outpatient sleep services continue to expand, we will engage this year with the USC Cardiology Electrophysiology department in joint research studies.

The **USC Interventional Pulmonary (IP) Program** provides a full spectrum of services for the minimally invasive diagnosis, staging, and management of lung cancer, benign airway disease and pleural procedures. The IP program was established in 2015 with the recruitment of Dr. Mahdavi as the first IP fellowship trained and IP board certified faculty member. The rapid rate of growth of the IP program led to the need to recruit a second IP faculty member. Dr. Diana Yu joined the IP program in November 2019. With her dedicated time and effort to expand the already established program, we now have approval from AABIP to start an IP fellowship program in July 2021. The IP fellowship will be supported by Keck Hospital and has been approved by the LAC+USC Graduate Medical Education office.

The **USC Multidisciplinary Lung Cancer Program** includes several faculty members from PCCSM who actively participate in the evaluation, diagnosis, and management of patients with thoracic cancers. Drs. Chang, Yu, and Mahdavi provide pulmonary expertise and advanced bronchoscopy/interventional pulmonary services for lung cancer patients, as well as other solid organ malignancies, at the LAC+USC Medical Center, Keck Medical Center, and the Norris Cancer Hospital. They are key members of the USC Thoracic Tumor Board as well as the USC Lung Cancer Screening Program and each have their own private clinics based at the cancer center.

Educational Activities

The **PCCM Fellowship Program** is a rigorous 36-month ACGME-accredited combined fellowship in pulmonary and critical care medicine. We recruit seven new fellows per academic year for a total of 21 fellows. Fellows rotate through three teaching hospitals (LAC+USC Medical Center, Keck Hospital of USC, and USC Norris Cancer Hospital) during their three years of training. This provides a unique and unparalleled experience of training in three different hospital systems with varying patient populations and needs.

The fellows are expected to also engage in Quality Improvement Projects and basic science or clinical research, both of which are requirements for graduation. Our training program also includes **two 1-year subspecialty fellowship tracks in Sleep Medicine** (2 fellows per year) and **Interventional Pulmonary** (1 fellow per year, starting 2021).

Research Activities

Basic and clinical research remain a major focus of the Division's interests and activities. The Division has a strong and expanding basic science research enterprise with a focus on lung injury, repair and regeneration. A number of investigators study pulmonary structure and function at the organ, tissue, cellular and molecular levels.

Hastings Center for Pulmonary Research

The Hastings Center for Pulmonary Research (HCPR) was established in 2014 with an initial gift of \$7.5 million over 5 years to create a center of excellence for lung research at USC under the direction of Dr. Zea Borok. The major goals of the HCPR are to recruit a cadre of excellent lung scientists, create a collaborative environment for study of lung disease and provide training opportunities for the next generation of scientists. In 2018, the Hastings Foundation renewed their commitment to support the HCPR for an additional ten years. Investigators in the HCPR interface with clinicians in the Division to advance translational research activities.

Special Basic/Translational Research Activities

Zea Borok, MD has a research program that is broadly focused on cell and molecular biology of the alveolar epithelium in the context of lung injury, repair and fibrosis. Her studies, which are funded by NIH/NHLBI, provide important insights into mechanisms that regulate repair of the alveolar epithelium following injury and could lead to the development of novel therapeutic approaches for lung fibrosis by preserving the epithelium. Her recent work has focused on the role of a tight junction protein, claudin-18, in regulating lung progenitor cell proliferation and tumorigenesis, identification of genes and proteins that are specifically expressed in lung type I cells and epithelial-fibroblast interactions. She has several important collaborations including with Dr. Beiyun Zhou to study the role of endoplasmic stress in alveolar epithelial cell injury and lung fibrosis, with Drs. Ite Offringa and Crystal Marconett in transcriptional and epigenetic regulation of alveolar epithelial cell differentiation, with Dr. Parviz Minoo in studies of lung development and with Dr. Amy Ryan on generation of pulmonary neuroendocrine cells from induced pluripotent stem cells (iPSC) as well as the role of claudin-18 in iPSC differentiation.

Toby Maher MD, PhD runs a translational program of research focused on biomarker discovery and early phase clinical trials for patients with scarring disorders of the lung. In addition, his laboratory research has identified the role played by bacteria in the lung (microbiome) in the development and progression of fibrosis through interaction with the host immune system.

Amy Ryan (Firth), PhD and her research group use primary lung cells and state-of-the-art gene-editing and

stem cell approaches in iPSC to study mechanisms of human lung biology in a disease-, gene- and patient-specific manner.

Beiyun Zhou, PhD focuses her research on alveolar epithelial cell biology in general, and specifically delineation of mechanisms regulating AEC differentiation and plasticity in the context of lung injury and fibrosis. Most recently she has been focusing on the role of endoplasmic reticulum stress in alveolar epithelial cells in pulmonary fibrosis.

Ya-Wen Chen, PhD and her research group use lung cells generated from human pluripotent stem cells to study human lung development, disease modeling, lung injury repair and regeneration.

Special Clinical Research Activities

Richard G. Barbers, MD focused his research on the role of abnormal repair processes (which include inflammatory and immune mechanisms) in airway fibrosis (remodeling) in asthma. Dr. Barbers collaborates with Omid Akbari, PhD on the innate immune system and autophagy mechanisms in asthmatics. He is co-PI on two NIH grants related to these topics.

Ahmet Baydur, MD is the Director of the LAC+USC Outpatient Clinics and Pulmonary Rehabilitation Program and thus is the leader of a QI study that focuses on the reduction of asthma morbidity in African Americans and Hispanic/Latinos through evaluation of the effects of education in the use of inhalers.

Richard Castriotta, MD is the PI for clinical research projects regarding a novel nebulized antiviral agent for

COVID-19, and the differences in circulation time in patients with Cheyne-Stokes respiration. Both involve mentoring of pulmonary/critical care fellows. He is a co-investigator for studies involving sleep apnea and arrhythmias, and also for the use of oxygen in the management of central sleep apnea. Between July 2019 and June 2020, he published 7 papers in peer-reviewed journals, all as either first author or senior author. One of these recently published (in June) about COVID-19 already has 24 citations. He has an h-index of 20 and i10-index of 31.

Ching-Fei Chang, MD is the PI and/or Senior Author of numerous studies focusing on various aspects of bronchoscopy, lung cancer, and medical education. She is on the American Cancer Society's taskforce on lung cancer in women and has a special research interest in lung cancer health disparities in women and Asians. She is also co-PI on an upcoming study looking at long-term pulmonary function deficits in COVID-19 survivors, as well as the prevalence of asymptomatic carriage of COVID-19 among pulmonary and critical care practitioners.

Sivagini Ganesh, MD is involved in wide variety of research projects in pulmonary hypertension, Interstitial Lung Disease and Lung Transplantation. Her involvement in translational research has given her the opportunity to collaborate internationally through registries that are currently recruiting patients with pulmonary hypertension. Dr. Ganesh's motivation is to improve patient's quality of life with Novel treatment options for ILD/PH, COPD/PH as well as Sarcoidosis/PH patients.

Santhi Iyer Kumar, MD is the medical director of the Keck MICU service. In this role she is responsible for the operations of both the COVID and non-COVID ICU and



Dr. Peter Marshall walking with a patient at Keck Hospital of USC

has been involved in both observational and randomized control trials involving COVID care and therapy. She is also a TeamSTEPPs master trainer for the health system and studies the impact of team training on safety culture in the intensive care unit.

May Lee, MD is the Program Director for the PCCM Fellowship, and the Director of the LAC+USC Medical Intensive Care Unit. Thus, she is involved in various critical care and medical education research projects. She is currently involved in several trials of therapeutics in the treatment and management of COVID-19, a member of an International Task Force to develop guidelines on COVID-19, and is the primary investigator on a study of health disparities in COVID-19. In addition, she has been involved in a DHS-wide initiative of Time Limited Trials to Reduce Non-Beneficial Intensive Care Unit Treatments Among Critically-ill Patients with Advanced Medical Illnesses. She has also been involved in several medical education research projects which are currently in press.

Janice M. Liebler, MD has been involved with numerous research projects. Her clinical research is mainly focused on critically ill patients suffering from COVID and non-COVID diseases. The impact of the global pandemic has been felt all throughout the world and much of Dr. Liebler's time and energy has most recently been focused on the ongoing worldwide emergency of COVID-19. She is the co-PI for studies of Ravulizumab, Baricitanib study and DAS181 in COVID-19 patients. She is also a participant in the COVID task force of the American Thoracic Society, which is a large multidisciplinary group of clinicians from academic medical centers who evaluate evidence and give recommendations for various aspects of COVID-19 patient care.

Adupa P. Rao, MD is participating in an observational study that collects information acquired in the care of cystic fibrosis patients to address quality improvement initiatives and examine dynamic health case issues, including nutritional status, infection control, pulmonary treatment and/or metabolic issues rapidly and effectively.

Division Accomplishments

- Frontline leaders in the early preparation for COVID-19 and creation of a COVID ICU at the Keck Medical Center which allowed for a seamless transition and best-practices management of COVID-19 patients
- Frontline leaders in managing the enormous numbers of COVID-19 patients at LAC+USC with only limited resources available
- Rapid incorporation of telemedicine into our practice and strategic deployment of our PCCM workforce during the early stages of the pandemic
- Growth of the USC lung transplant program from 16 to 36 transplanted cases per year
- Official designation as a Center of Excellence for Bronchoscopic Lung Volume Reduction (one of only 2 sites in Southern California)
- Approval and establishment of a new Interventional Pulmonary Fellowship Program

Honors and Awards

Zea Borok, MD

Member, Scientific Advisory Board, Max Planck Institute for Heart and Lung Research, 2020-2024

May Lee, MD

Voted "Teacher of the Year" 2020 by Internal Medicine Residency Program

Brett Lindgren, DO

Voted "Teacher of the Year" 2020 by PCCM Fellowship Program

Super Doctor, Southern California Magazine

Richard Barbers, MD

Ahmet Baydur, MD

Ching-Fei Chang, MD

Richard Castriotta, MD

Sivagini Ganesh, MD

Ricardo Juarez, MD

Janice Liebler, MD

Richard Lubman, MD

Renli Qiao, MD, PhD

Adupa Rao, MD

FACULTY

Professor

Richard G. Barbers, MD

Ahmet Baydur, MD

Zea Borok, MD

Richard Castriotta, MD

Janice M. Liebler, MD

Toby Maher, MD

Renli Qiao, MD, PhD

Associate Professor

May M. Lee, MD

Richard L. Lubman, MD

Peter Marshall, MD

A. Purush Rao, MD

Beiyun Zhou, PhD

Assistant Professor

Ya-Wen Chen, PhD

Ching-Fei Chang, MD

Raj R. Dasgupta, MD

Sivagini Ganesh, MD

Vincent X. Grbach, MD

Aarya Kafi, MD

Santhi Iyer-Kumar, MD

Ricardo H. Juarez, MD

Keith Killu, MD

Brett Lindgren, DO

Ramyar Mahdavi, MD

Amy L. Ryan (Firth), PhD

Bassam Yaughmour, MD

Diana Yu, MD

ADMINISTRATOR

Ian Quiza, MBA

Rheumatology

"A problem is a chance for you to do your best."

Duke Ellington

In its entire storied history, the Division of Rheumatology had never faced a "problem" like the Covid-19 pandemic, so never in its entire storied history had it achieved its most impressive "best" until this past academic year. Despite unprecedented physical and emotional obstacles to our faculty, trainees, and patients, we continued to meet our tripartite mission of patient care, education, and research with grace, perseverance, and aplomb.

Overview

The Division of Rheumatology is focused on patient care, education, and research. On the research front, the Division has historically been strong in the area of systemic lupus erythematosus (SLE). On the patient care front, the Division provides broad clinical services, both face-to-face and via telemedicine, at Los Angeles County + USC Medical Center (LAC+USC) and Keck Hospital of USC (KH). On the education front, the Division leverages the diverse clinical resources of LAC+USC, Rancho Los Amigos (RLA), and KH to provide outstanding training for medical students, Internal Medicine residents, and Rheumatology fellows. Children's Hospital of Los Angeles (CHLA), a USC-affiliated institution, serves as an invaluable resource for pediatric rheumatology. The Division's

many accomplishments during the past year reflect the skills and creativity of dedicated faculty.

Clinical Activities

LAC+USC Medical Center

The clinical service consists of active inpatient and outpatient consultation services, including two general Rheumatology outpatient clinics per week supervised by Rheumatology faculty, four general Rheumatology outpatient clinics staffed entirely by Rheumatology faculty, and one clinic specifically for patients requiring ultrasonographic evaluation, supervised by Rheumatology faculty. Physicians handle approximately 10,000 outpatient visits annually. In addition, they consult on 500+ inpatients at LAC+USC each year and continue to have an active working relationship with the Department of Orthopedics at the Arthritis Service at RLA in the management of patients needing joint replacement and rehabilitation.

Private Practice

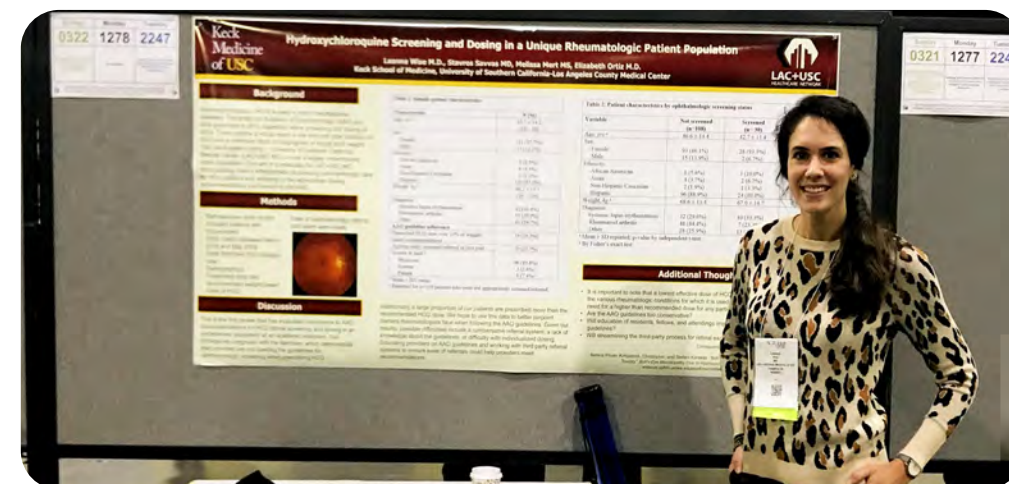
Faculty treat more than 100 different types of arthritis and rheumatic conditions at the USC Healthcare Center and satellite offices. More than 5,000 patients are seen each year. Physicians develop and present an annual community education symposium



William Stohl, MD, PhD

Division Chief

Professor of Medicine



Dr. Leanna Wise presenting her poster as a first author at the American College of Rheumatology Conference



Rheumatology Faculty on a Zoom call to congratulate the Rheumatology Fellows' on their graduation

on rheumatic diseases. The Rheumatology faculty continues to provide oversight to the unique rehabilitation and chronic care services offered at RLA.

Educational Activities

The Division of Rheumatology is strongly committed to the education of medical students, house staff, and postgraduate fellows. The curriculum for house staff and fellows is continually updated to reflect new insights into pathogenesis and treatment of rheumatic diseases.

Dr. Stavros Savvas directs the Rheumatology Fellowship Training Program. The Rheumatology Fellowship emphasizes patient care for a broad range of rheumatic diseases and understanding the role of the immune system in the pathogenesis of autoimmune diseases. New and expanded programs in musculoskeletal ultrasonography, led by Dr. Shuntaro Shinada, highlight the Division's commitment to being at the educational forefront of Rheumatology.

The research component of the fellowship combines the expertise of a team of basic science-oriented faculty and clinical faculty with the exceptional resources in rheumatic diseases available at teaching hospitals. The research laboratories occupy ~1,500 square feet of space and are located in the Hoffman Medical Research Building, in close physical proximity to LAC+USC and KH.

Research Activities

Dr. Stohl continues to direct several clinical trials to study the effectiveness of various novel B cell-targeting biologic agents in patients with SLE. SLE is a disorder of generalized autoimmunity in which immune regulation fails. Drs. Stohl and Jacob have taken advantage of the extraordinary clinical and research resources at the USC Health Sciences Campus to study immune regulation in human SLE. Dr. Stohl's efforts are primarily focused on B cells, while Dr. Jacob's focus is primarily on genetics. The Division's research activities are not limited to SLE. Drs. Arkfeld, Christianakis, Ehresmann, Panush, Savvas, Shinada, Taylor-Albert, and Wise have been investigating new strategies to treat patients with rheumatoid arthritis and other inflammatory arthritides. In addition, Dr. Stohl maintains an ongoing collaboration with investigators in the Department of Ophthalmology to examine the early events in Sjögren's syndrome.

Division Accomplishments

- Recruitment of Dr. Elizabeth Taylor-Albert to our faculty
- Recruitment of Dr. Leanna Wise to our faculty
- A patient-oriented conference at USC hosted by USC Rheumatology had ~200 in attendance.
- 100% pass rate by Rheumatology fellowship graduates on the ABIM exam in Rheumatology.
- Matched again with top candidates to our Rheumatology fellowship program

FACULTY

Professor

Daniel G. Arkfeld, MD
Chaim O. Jacob, MD, PhD
Richard S. Panush, MD
Francisco P. Quismorio, Jr., MD
William Stohl, MD, PhD

Associate Professor

Glenn R. Ehresmann, MD

Assistant Professor

Stratos Christianakis, MD
Tracy Nguyen-Oghalai, DO
Elizabeth Ortiz, MD
Stavros Savvas, MD
Shuntaro Shinada, MD
Elizabeth Taylor-Albert, MD
Leanna M. Wise, MD

ADMINISTRATOR

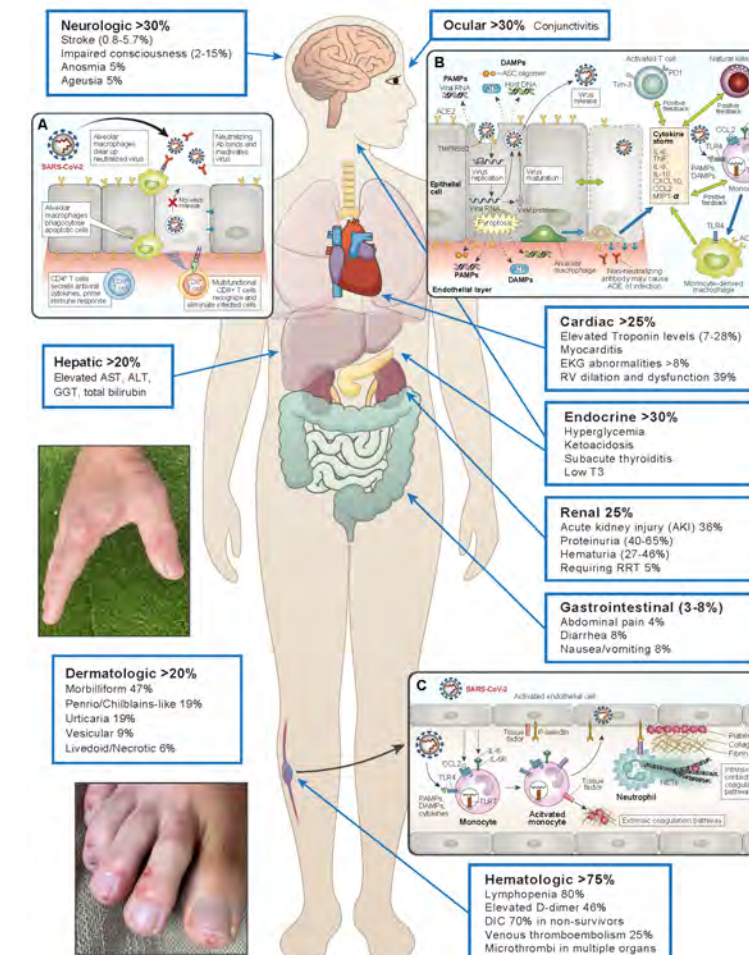
Gabriela Gutierrez

Preview of Academic Year 2020-2021

Keck Medicine of USC

U.S. News and World Report Rankings

Specialty Rankings			
	2018-2019	2019-2020	2020-2021
HONOR ROLL	—	16	18
Cancer (Keck Hospital of USC)	17	21	26
Cardiology & Heart Surgery	45	11	15
Gastroenterology & GI Surgery	—	13	15
Geriatrics	17	6	7
Nephrology	35	13	21
Pulmonology & Lung Surgery	—	—	12



A multidisciplinary approach to COVID-19

More details to come next year...

THANK YOU TO OUR PHILANTHROPIC PARTNERS

Philanthropy drives all of our missions, and especially in current times, is more important than ever. Our community is healthier because of the hardworking and dedicated faculty and staff in the Department of Medicine at the Keck School of Medicine of USC and people across the world live better lives as a result of our research and high quality education and training programs. The important work that we do is only possible due to the extraordinary support of our dedicated philanthropic partners.

On behalf of everyone in the Department of Medicine, we thank all of our grateful patients, friends, and corporate and community partners, who have collectively contributed more than \$14 million to support our clinical, research, training, and community engagement efforts over the last year.

To learn more about how you can make a gift or grant, establish a corporate partnership, or make a legacy gift, please contact a member of the development team.



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SCAN ME

LEADERSHIP ORGANIZATION

DEPARTMENT LEADERSHIP

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Vice Chair, County Affairs: Ron Ben-Ari, MD
Vice Chair, Educational Affairs: Eric Hsieh, MD
Vice Chair, Quality and Safety: Santhi Kumar, MD
Vice Chair, Translational Research: Lucy Golden, PhD
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Manager, Research and Financial Reporting: Anh Hwang
Manager, Research: Matthew Kirk

DIVISION CHIEFS

Cardiovascular Medicine: Hugo Rosen, MD
Endocrinology and Diabetes: Thomas Buchanan, MD
Gastrointestinal and Liver Diseases: Norah Terrault, MD
Geriatric, Hospital, Palliative and General Internal Medicine: Michael Karp, MD
Hematology: Preet Chaudhary, MD, PhD
Infectious Diseases: Michael Dube, MD
Nephrology and Hypertension: Kenneth Hallows, MD, PhD
Oncology: Darcy Spicer, MD
Pulmonary, Critical Care and Sleep Medicine: Zea Borok, MD
Rheumatology: William Stohl, MD, PhD

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Endocrinology and Diabetes: Roxanne Odom
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Nephrology and Hypertension: Rachel Lim
Oncology: Timothy Chung
Pulmonary, Critical Care, and Sleep Medicine: Ian Quiza
Rheumatology: Gabriela Gutierrez

Learn more at keck.usc.edu/medicine

“With enduring gratitude for our faculty, trainees, staff, and hospital leadership’s unwavering commitment and service to our patients and our community, I look forward to witnessing the conquest of both pandemics and our part in redefining academic medical excellence.”

Hugo Rosen, MD, Chair, Department of Medicine



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