



CEDARS-SINAI®

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CEDARS-SINAI | TECHNOLOGY TRANSFER

# FROM IMAGINATION TO INNOVATION



CEDARS-SINAI®

BASE  
MAN

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**T**he Swan-Ganz catheter, invented more than 40 years ago by two doctors at Cedars-Sinai, is one of the great success stories of medical research – a revolutionary invention still in use today. It was also a missed opportunity. The inventors sold their rights to a third party for \$10,000, and none of the hundreds of millions of dollars in revenue generated by the device ever made its way back to Cedars-Sinai or the inventors.

Cedars-Sinai’s Patent and Invention Policy was developed in response. Cedars-Sinai, through its Technology Transfer Office, was immediately rewarded with annual royalty income of more than \$1 million from licensing the first invention handled by the new program: a method for removing viruses (such as hepatitis) from blood. Since that first adventure in securing patent protection and commercializing a discovery developed in the laboratories at Cedars-Sinai, the Technology Transfer Office has shepherded a wide range of inventions from researchers and clinicians at the institution. The office has managed hundreds of patents issued by the United States Patent and Trademark Office and by patent offices around the world.

Cedars-Sinai recognizes the vital importance of the patent process in protecting the intellectual contributions that the medical center’s researchers make. The royalty income that the Technology Transfer Office brings in through licensing these discoveries is invested back into the institution’s research programs to generate a new cycle of inventions that eventually will enter the technology transfer pipeline. The Cedars-Sinai Technology Transfer Office exists to facilitate this virtuous circle of discovery and to promote the value of ideas, from imagination to innovation.

**T**he mission of the Technology Transfer Office is to protect and support the commercialization of discoveries and technologies invented at Cedars-Sinai. Through our activities, we support the development of promising inventions that improve quality of life for patients around the world.

The role of the Technology Transfer Office is to:

- promote awareness of the various avenues of intellectual property (IP) protection
- identify and capture new technologies
- evaluate whether the invention or technology has a potential market value to warrant IP protection
- secure IP protection, as appropriate
- commercialize the technology by marketing to licensees or through spin-off companies

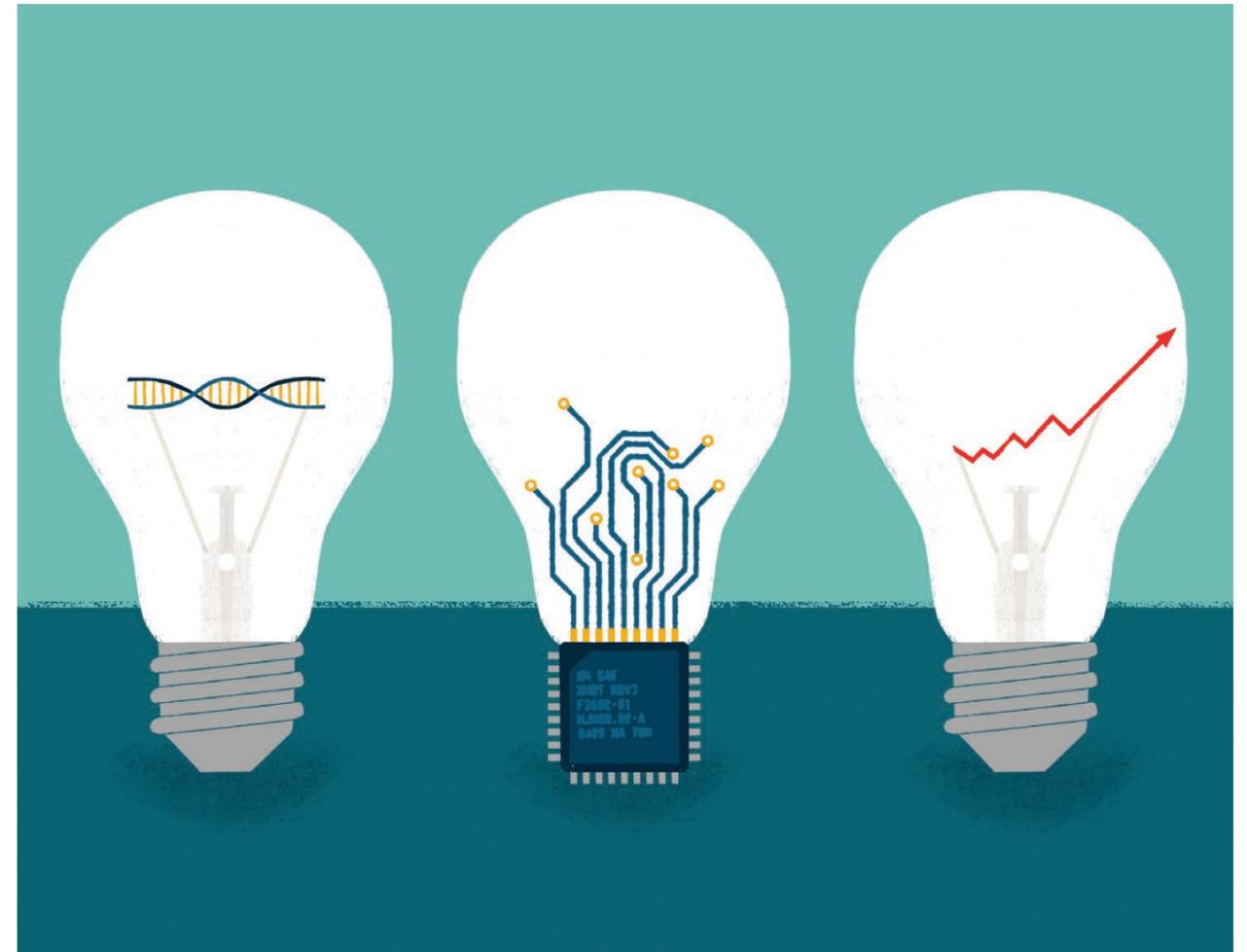
The Technology Transfer Office currently manages over 50 licenses that generate more than \$30 million per year. These diverse technologies include therapeutics, devices, diagnostics and software. We are always interested in partnerships that can help bring technologies to market. Working with industry leaders and peer institutions expands the number of opportunities to bring advances in medical technologies into markets around the world.

**CEDARS-SINAI  
BY THE NUMBERS**  
FY 2016

**\$30.5  
MILLION**

IN TECHNOLOGY TRANSFER  
REVENUE

**99** INVENTION  
DISCLOSURES



Ideas become inventions.

OUR TEAM



**EDWARD M. PRUNCHUNAS**  
*Executive Vice President  
and Chief Financial Officer*

Prunchunas has served as executive vice president of finance and chief financial officer at Cedars-Sinai since 1998. He plays an active role in the strategic direction of the Technology Transfer Office and often serves as the Cedars-Sinai representative to spin-off companies created by the program. Prunchunas currently serves on the boards of CardioVax, Otoharmonics Corporation and Stanson Health.



**JAMES D. LAUR**  
*Vice President for Legal  
and Technology Affairs*

Laur has been a member of Cedars-Sinai's Legal Affairs Department since 1991 and is the institution's senior intellectual property counsel. Since 1994, he has played a leadership role in the Technology Transfer Office, which has earned more than \$150 million in royalty income from its licensing program in the past 10 years to support Cedars-Sinai's research enterprise. In addition to managing its intellectual property portfolio, Laur has been instrumental in structuring numerous spin-off companies based on early-stage technologies from Cedars-Sinai's research laboratories, including Zynx Health Inc., Prometheus Laboratories, Savacor and Otoharmonics Corp. Laur also plays a leadership role in the institution's innovation efforts, including the establishment of the healthcare accelerator program in partnership with Techstars.



**KRISTIN A. MARTINEZ**  
*Associate Director,  
International Program*

Martinez is a certified clinical research professional responsible for the oversight, development, maintenance and reporting of all activities related to the international relationships of the Technology Transfer Office. She plays a primary role in identifying, directing and implementing projects with the office's partners around the world. Martinez also serves as internal liaison for the Technology Transfer Office's international projects. She frequently lectures at national and international meetings of research administrators.



**NIRDEŚH K. GUPTA, PhD**  
*Director, IP Portfolio and Licensing*

Gupta heads a team of marketing and licensing professionals responsible for engaging with faculty, staff, industry, and other internal and external stakeholders involved in the commercialization of intellectual property resulting from the more than \$100 million in research expenditures conducted annually at Cedars-Sinai. He is responsible for a portfolio of more than 400 technologies and leads the office in new invention procurement and assessment, patent and commercialization strategy, and business development and licensing negotiations. Gupta also oversees project selection, project management and the development of selected technologies supported through the Technology Transfer Internal Project Fund.



**PAMELA N. COLLINGWOOD**  
*Associate Legal Counsel, Legal Affairs*

Collingwood provides legal services to the Technology Transfer Office, with an emphasis on intellectual property law. Her responsibilities include drafting and negotiating contracts, license agreements and other transactional matters, drafting policies and procedures to ensure compliance with new laws and regulations, and providing general legal services to Cedars-Sinai's new business ventures. Collingwood has spoken at both national and international conferences on various topics, including best practices for licensing arrangements.



**ALEXANDER Y. CHAI**  
*Assistant Legal Counsel,  
Technology Transfer*

Chai provides legal services to the Technology Transfer Office, with a focus on corporate transactions and intellectual property law. He was previously an intern in the Technology Transfer Office and in the Legal Affairs Department. Chai's areas of responsibility include confidentiality agreements, inter-institutional agreements, royalty-sharing agreements and the full spectrum of transactional arrangements related to the development and licensing of the institution's intellectual property assets.



**WENYUE DU, PhD**  
*Senior Licensing Associate*

Du works closely with faculty and research staff to support innovation efforts. Along with her marketing colleagues, she is responsible for initial analysis and recommendations on the intellectual property, and provides assessments of inventions for commercial potential. She also develops and implements technology-specific marketing strategies for inventions. In addition, Du helps identify and connect with potential licensing and commercialization partners.



**ABHISHEK SANGAL, MBA**  
*Senior Licensing Associate*

Sangal is responsible for the management, evaluation, protection and licensing of Cedars-Sinai inventions. Along with business acumen, Sangal has broad academic and research experience in physical and bioanalytical chemistry as well as in materials science.



**JULIEN BROHAN, MSc**  
*Senior Licensing Associate*

Brohan joined the Cedars-Sinai Technology Transfer Office as senior licensing associate in April 2016. He works closely with Cedars-Sinai faculty and research staff to identify, evaluate, protect and commercialize inventions. Brohan previously served as a licensing associate for the National Center for Scientific Research, France's largest nonprofit public research organization. Along with business acumen, Brohan has a broad academic and research experience in chemical sciences. He also is registered to practice before the United States Patent and Trademark Office as a patent agent.



**ERIC SEE**  
*Assistant Manager,  
Administration and Finance*

See is responsible for managing the Technology Transfer Office and its administrative duties, including data and financials. He brings strong organizational, analytical and technology skills to the team.



**PATTY PIERSON**  
*Senior Administrative  
Services Associate*

Pierson provides intellectual property management and administrative support to the Technology Transfer Office and the faculty in the Burns and Allen Research Institute. She is responsible for updating and managing certain functions of the intellectual property process as well as researching and preparing technology transfer information and reports.



**SUSAN HUGHES**  
*Management Assistant*

Hughes provides administrative and other support services to the members of the Technology Transfer Office. She also assists in providing services to the research community as part of the office's innovation-management efforts.

**T**hrough partnerships with international institutions and corporations, Cedars-Sinai promotes the introduction of innovative medical solutions to patients around the world.

In 2000, Cedars-Sinai's Technology Transfer Office began building an international network of leading hospitals, research institutes and companies, including partners in the United Kingdom, Hong Kong, Singapore, Spain and South Korea. Today, through this network, nearly 50 institutions in more than a dozen countries share best practices and collaboratively market inventions.

These international activities allow Cedars-Sinai to:

- access global markets for new technologies
- find resources to further develop its technologies
- identify opportunities for investment or licensing in the U.S. market

### CEDARS-SINAI BY THE NUMBERS

**49** PARTNER  
INSTITUTIONS

**17** COUNTRIES

**1** WORLD



International collaboration  
encourages global innovation.

**T**he only nonclinical research department at Cedars-Sinai, the Department of Biomedical Sciences features a team of stellar basic research scientists who pursue investigations of the fundamental mechanisms of the body, the origins of disease and new technologies to advance the field.

The department is organized to encourage collaboration across multiple clinical departments to promote scientific and medical progress. Its faculty members are jointly appointed across clinical departments and specialty centers, from surgery and pathology to obstetrics and pediatrics. Education is a key mandate, with graduate research programs focused on the translation of scientific discoveries into the application of therapies and cures.

**CEDARS-SINAI  
BY THE NUMBERS**

**11,625**  
FULL-TIME EMPLOYEES

**2,051**  
PHYSICIANS ON STAFF

**481**  
RESIDENTS AND FELLOWS



Basic research is the foundation of all discoveries.

FEATURED FACULTY



**LEON FINE, MD**  
*Chair, Biomedical Sciences*  
*Vice Dean, Research and Graduate*  
*Research Education*

Fine's principal research interest is the biology of chronic renal disease. His studies on kidney function have contributed to the understanding of adaptations of ion transport in the diseased nephron, renal hypertrophy, and the cell biology of fibrogenesis and scarring of the kidney. His current investigations include the analysis of hypoxia-mediated organ fibrosis and a theoretical approach to regenerating a chronically diseased kidney by restoring its microvasculature.



**MOSHE ARDITI, MD**  
*Executive Vice Chair, Research,*  
*Pediatrics*  
*GUESS?/Fashion Industries Guild*  
*Chair in Community Child Health*

Arditi studies infection-induced acute and chronic inflammatory diseases such as allergic asthma as well as atherosclerosis. His current investigations include innate immune mechanisms and Toll-like receptors in mouse models of pneumonia, atherosclerosis and asthma, and coronary arteritis in Kawasaki disease. His laboratory also investigates the role of the innate immune system, dendritic cells and Tregs, and IL-17 in infection-induced acceleration of atherosclerosis, sensitization for allergic asthma and colitis in mouse models. His other studies focus on chronic inflammation and lung cancer, and the role of vascular endothelial cells in lung cancer metastasis.



**BEATRICE KNUDSEN, MD, PhD**  
*Medical Director, Cedars-Sinai Biobank*  
*Director, Translational Pathology*

Knudsen's research focuses on establishing novel biomarkers for cancer treatment, with an emphasis on prostate cancer, and translating findings from the laboratory to patient care settings. She studies the response and resistance to targeted therapies against cellular kinases. As head of the Cedars-Sinai Biobank, she oversees a state-of-the-art biorepository that provides investigators with vital resources, including biospecimens for research, a pipeline of assays and digital image-analysis tools to perform quantitative measurements in tissue.



**KENNETH E. BERNSTEIN, MD**  
*Director, Experimental Pathology*

Bernstein's studies include the renin-angiotensin system — a collection of proteins important in blood pressure control — heart disease and renal disease. He uses genetic animal models to investigate the basic physiology and biochemistry of the renin-angiotensin system. His team has identified important contributions of this system to hematopoiesis, reproduction, cancer immunology, lung injury and the cardiovascular system. His current investigations examine the possibility of manipulating this system as a means of increasing immune resistance to cancer and the use of mouse genetic models to explore the physiology and biochemistry of the renin-angiotensin system in cardiovascular disease, cancer and lung injury.



**JONATHAN KAYE, PhD**  
*Vice Chair, Biomedical Sciences*

Kaye studies the biological role and mechanism of action of the thymocyte selection-associated high-mobility-group box (TOX) family of proteins. His current investigations include studying the molecular regulation of T lymphocyte development and biology; identifying a novel family of four nuclear DNA-binding factors (the first factor was designated TOX by Kaye's team); and demonstrating that TOX is a critical regulator of immune system development. By focusing on this family of proteins, Kaye and his team have identified many key biological problems relating to immune system development, regulation of immune responses, and cancer and liver metabolism.



**GEORGE Y. LIU, MD, PhD**  
*Associate Director, Infectious and*  
*Immunologic Diseases Research Center*

Liu's research primarily focuses on the diagnosis and treatment of bacterial, viral and fungal infections. Studies seek to elucidate how interactions between *S. aureus* bacteria and the host lead to a productive infection; identifying novel immune-evasion mechanisms that facilitate *S. aureus* invasion of the host; studying host antimicrobial mechanisms that keep *S. aureus* infection in check; and, ultimately, based on knowledge of host and *S. aureus* defense mechanisms, identifying novel strategies to treat infections caused by antibiotic-resistant pathogens.



**LALI K. MEDINA-KAUWE, PhD**  
*Research Scientist, Biomedical Sciences*

Medina-Kauwe's research focuses on using the cell-penetration functions of pathogen proteins to develop novel, cell-targeted nanotherapeutics. Her current investigations include studying protein-host cell interactions such as endocytic routing to direct the design of the lab's unique nanoparticles for improved therapy as well as testing these particles for cancer targeting and treatment.



**RAMACHANDRAN MURALI, PhD**  
*Director, Molecular Therapeutics Core*

Murali focuses on the molecular basis of cancer metastasis and identification of new therapeutic strategies to limit treatment resistance and cancer recurrence. He investigates the role of tumor necrosis factor receptors and epidermal growth factor receptors in breast, lung and pancreatic cancers. He employs structural biology for drug discovery and is developing molecular probes for tumor imaging and drug delivery.

5-YEAR TRENDS

TECHNOLOGY TRANSFER REVENUE

**\$30.5**  
**MILLION**  
 IN FY 2016



**C**edars-Sinai's Samuel Oschin Comprehensive Cancer Institute is home to a full range of specialty centers that diagnose and treat most forms of cancer. The rapid translation of scientific discoveries into safe, effective therapies is a core mission of the institute. Cedars-Sinai investigators are seeking more effective ways to diagnose, treat and prevent many forms of cancer – including brain, breast, ovarian, prostate, lung, thyroid, and head and neck – as well as leukemia, lymphoma, myeloma and sarcoma.

The institute supports basic and clinical research in many cancer-related areas, such as genomics, bioinformatics and cell-targeted nanotherapeutics. Key areas of investigation include cancer biology, population science and experimental therapies.



Researchers translate scientific discoveries into safe, effective cancer therapies.

**CEDARS-SINAI  
BY THE NUMBERS**  
FY 2016

**1,782**  
RESEARCH PROJECTS

**1,427**  
RESEARCH PUBLICATIONS

FEATURED FACULTY



**STEVEN PIANTADOSI, MD, PhD**  
 Director, Samuel Oschin  
 Comprehensive Cancer Institute  
 PHASE ONE Foundation  
 Distinguished Chair

Piantadosi designs and analyzes clinical trials for cancer research, and improves programs and infrastructure to facilitate clinical studies. His current investigations include new approaches to brain tumor therapy and a long-term oxygen treatment trial. He teaches the American Association for Cancer Research's clinical trial methods course in neurology, Methods in Cancer Biostatistics.



**NEIL BHOWMICK, PhD**  
 Research Scientist, Samuel Oschin  
 Comprehensive Cancer Institute

Bhowmick's current investigations include examining the role of tissue fibroblastic cells in epithelial cancer initiation and progression; understanding stromal-epithelial interactions, prostate cancer progression and mediators of metastatic progression in bone through the use of in vivo model systems; and developing biomarkers that distinguish indolent and aggressive prostate cancers.



**LELAND CHUNG, PhD**  
 Director, Uro-Oncology Research  
 Program, Samuel Oschin  
 Comprehensive Cancer Institute  
 Board of Governors Chair in  
 Cancer Research

Chung's research focuses on reciprocal tumor-stroma interaction and molecular imaging and targeting. His current investigations include molecular mechanisms and cell-signaling network regulating prostate cancer bone metastases; beta 2-microglobulin-mediated cell growth and signaling targeting in combination with ionizing radiation and chemotherapy; and cancer imaging and targeting with organic heptamethine cyanine dyes and dye-drug conjugates.



**DOLORES DI VIZIO, MD, PhD**  
 Associate Professor, Urologic  
 Oncology Research Program,  
 Samuel Oschin Comprehensive  
 Cancer Institute

Di Vizio's research includes molecular characterization by deep sequencing of circulating large microvesicles in patients with ovarian and breast cancer. She recently demonstrated that breast cancer and other tumor cells, in response to certain cues, undergo a dramatic cellular transition to a tumor cell type that migrates faster, can radically deform its outer cell membrane and sheds large, membrane-enclosed microvesicles with potent biological effects on other cells. These microvesicles contain regulatory molecules — including DNA and RNA — that are capable of promoting metastatic dissemination.



**SIMON GAYTHER, PhD**  
 Director, Molecular Epidemiology  
 Co-director, Center for Bioinformatics  
 and Functional Genomics

Gayther focuses on the identification of genetic variants that confer susceptibility to hormonal cancers, particularly ovarian cancer, using next-generation sequencing and genotyping technologies; relating germ-line genetic variation to functional targets throughout the human genome — specifically epigenetic and regulatory profiles enriched in the noncoding genome — and the susceptibility genes that drive cancer development; cell biology modeling of cancer to establish functional mechanisms underlying cancer initiation and development; and clinical translation of this research program, specifically establishing a genetic basis for risk prediction and prevention of cancer as well as the identification of novel clinical biomarkers associated with early-stage pathogenesis of disease.



**ALLEN S. HO, MD**  
 Director, Head and Neck Cancer  
 Program  
 Co-Director, Thyroid Cancer Program

Ho's research interests include head and neck cancer genomics, human papillomavirus-positive oropharyngeal cancer pathogenesis, transoral robotic surgery and thyroid cancer active surveillance.



**H. PHILLIP KOEFFLER, MD**  
 Hematologist/Oncologist, Samuel Oschin  
 Comprehensive Cancer Institute  
 Mark Goodson Chair in Oncology  
 Research

Koeffler's studies involve molecular pathogenesis of cancers with a particular focus on brain, breast, lung and pancreatic cancers as well as leukemia and lymphomas. His translational research program testing has identified a variety of novel compounds for their anticancer activity and mechanisms of action. His current investigations include studies of circadian rhythm in cancer and adaptor proteins that work in a negative fashion against cytokine receptors and the neighboring downstream proteins. Further investigations involve studying molecular defects in a variety of cancers using high-throughput analysis, including genome sequencing and single nucleotide polymorphic arrays, as well as evaluating a variety of novel drugs that have anticancer activities.



**STEPHEN J. PANDOL, MD**  
 Director, Basic and Translational  
 Pancreatic Research, Samuel Oschin  
 Comprehensive Cancer Institute

Pandol's current investigations include developing potential therapies for pancreatitis, pancreatic cancer and other diseases of the pancreas. His research efforts encompass projects to determine basic mechanisms of disease and subsequently using this information to develop new treatments.

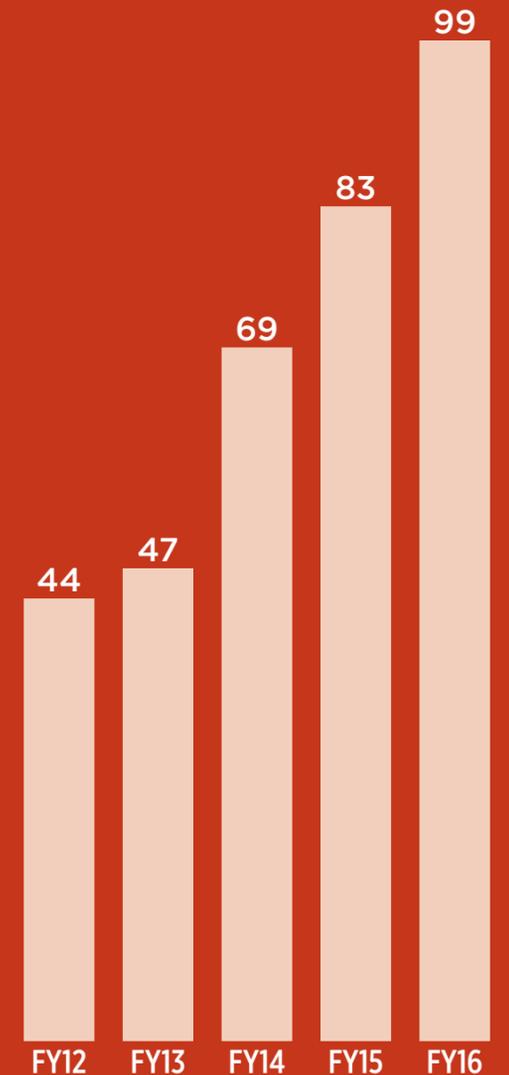


**RICHARD TULI, MD, PhD**  
 Assistant Professor, Biomedical  
 Sciences and Radiation Oncology

Tuli investigates novel radiotherapy techniques to improve outcomes and minimize toxicity, and identifies radiosensitizing agents for treating cancer. He has used animal models to evaluate a novel treatment for pancreatic cancer that combines radiation, chemotherapy and treatment with a drug to inhibit the repair of cancer cells damaged by chemotherapy and radiation. His current research focuses on PARP inhibitors, immunotherapies and other novel drugs in combination with radiation.

DISCLOSURES

**99**  
 INVENTION  
 DISCLOSURES  
 IN FY 2016



Virtually every known gastroenterological procedure and treatment for digestive diseases and disorders is available at Cedars-Sinai, led by physicians who pioneered gastrointestinal endoscopy. The program is designed to promote and deliver precision medicine across a spectrum of digestive diseases.

Cedars-Sinai's digestive disease research focuses on inflammatory bowel disease, motility, pancreatobiliary and hepatology, with an overarching philosophy rooted in bidirectional translation of basic and clinical investigations to optimize and accelerate its impact in positively affecting patient care. The results of this successful initiative include strong support from federally funded programs as well as fruitful relationships with the biotechnology, medical device and pharmaceutical industries. The resulting innovations yield exciting opportunities for academic and corporate codevelopment of products and technology.

**CEDARS-SINAI  
BY THE NUMBERS**

MORE THAN  
**200**

PATENT APPLICATIONS  
RELATED TO DIGESTIVE  
DISEASES

MORE THAN  
**5** DIAGNOSTIC TESTS  
FOR DIGESTIVE DISEASES  
CURRENTLY ON THE  
MARKET USING CEDARS-SINAI  
TECHNOLOGY



Pioneering physicians investigate the organs of digestion and their related diseases.

FEATURED FACULTY



**STEPHAN R. TARGAN, MD**  
 Director, F. Widjaja Foundation  
 Inflammatory Bowel and  
 Immunobiology Research Institute  
 Feintech Family Chair in  
 Inflammatory Bowel Disease

Targan's translational and basic research is primarily focused on immunopathologic mechanisms, novel therapeutics and the translation of basic science findings for use in diagnosis, prognosis and targeted therapeutic selection in inflammatory bowel disease (IBD). His current projects include molecular and immunobiologic investigations of cytokine regulation in mucosal inflammation; combinatorial genomic investigations of IBD; immunobiologic investigations of the human/mouse correlate flagellin CBir1 in mucosal inflammation; animal investigations of the role of TLLA, the master regulator of inflammation in the mucosa; and translational investigations of antibodies to TLLA as treatment for IBD.



**JANINE BILSBOROUGH, PhD**  
 Head of IBD Drug Discovery  
 Development Unit

Bilsborough leads the IBD3 Drug Discovery and Development Unit's activities. She worked in the biotech/biopharma industry for more than 12 years. The IBD3 Drug Discovery and Development Unit is committed to predicting the success of current and future inflammatory bowel disease therapeutics through personalized medicine and directs both discovery and drug development teams in their efforts to design therapeutics for diseases such as atopic dermatitis, asthma, systemic lupus erythematus and inflammatory bowel disease.



**SHELLY C. LU, MD**  
 Director, Division of Gastroenterology

Lu investigates the molecular mechanisms of fatty liver, liver injury, liver cancer and colon cancer. She has been working in the fields of S-adenosylmethionine and glutathione metabolism for more than 20 years and has received uninterrupted funding from the National Institutes of Health since 1992. Many of her research projects have translational applications, such as identifying biomarkers that can differentiate simple fatty liver from those with more a severe form called nonalcoholic steatohepatitis; identifying biomarkers that might predict prognosis and response to chemotherapy in colon cancer; and examining agents effective in the prevention and treatment of liver and colon cancer.



**RUCHI MATHUR, MD**  
 Director, Diabetes Outpatient  
 Treatment and Education Center

Mathur's research focuses on the impact of the intestinal microbiome on metabolism. Her current investigations include defining the role of specific gut microbes in the development of obesity and insulin resistance, and studying the role of the gut-dwelling microbe *M. smithii*, which is suspected of playing a role in obesity and Type 2 diabetes. Additional studies are being pursued to confirm a link between the microorganism, obesity and prediabetic conditions by determining how efficiently subjects digest food with and without *M. smithii*.



**DERMOT P. MCGOVERN, MD, PhD**  
 Director, Translational Medicine, F. Widjaja  
 Foundation Inflammatory Bowel and  
 Immunobiology Research Institute  
 Director, Cedars-Sinai Precision Health  
 Joshua L. and Lisa Z. Greer Chair in  
 Inflammatory Bowel Disease Genetics

McGovern's research focuses on the identification of genetic variants that increase susceptibility to and affect the natural history of ulcerative colitis and Crohn's disease. His studies involve using both clinical factors and biomarkers to predict outcomes and response to therapies for these conditions. His current investigations also include identification of further susceptibility genes for inflammatory bowel disease (IBD), phenotype/genotype correlations in IBD and functional effects of IBD susceptibility genes.



**GIL Y. MELMED, MD**  
 Director, Clinical Trials,  
 Inflammatory Bowel Disease Center

Melmed studies clinical outcomes in inflammatory bowel disease. He also focuses on vaccine-preventable illnesses, disease phenotype/classification, postoperative outcomes, disease activity assessment and health-related quality of life. His current investigations include ongoing assessments of predictors of postoperative outcomes and clinical studies to determine optimization of vaccine responses among immunosuppressed patients.



**KATHRIN MICHELSEN, PhD**  
 Research Scientist, Inflammatory  
 Bowel Disease Center

Michelsen's research focuses on the role of innate and adaptive immunity in the development of intestinal inflammation. Her studies include using animal models to understand the molecular mechanism of dysregulated immune responses that lead to chronic inflammation of the mucosa. Her team uses mouse models of intestinal inflammation to conduct laboratory studies to identify molecules for eventual therapeutic interventions. Her current investigations focus on acute and chronic intestinal inflammation, the role of TLLA in differentiation of human TH17 cells and the role of TH17 cells in intestinal inflammatory processes.



**MARK PIMENTEL, MD**  
 Director, Gastrointestinal  
 Motility Program

Pimentel's research studies involve gut microbes and their relationship to function disorders of the gastrointestinal tract. Specifically, his investigations involve the association between acute gastroenteritis and small intestinal bacterial overgrowth in the pathophysiology of irritable bowel syndrome (IBS) as well as basic science, physiology and clinical and translational research. His current investigations include small intestinal bacterial overgrowth in IBS; acute gastroenteritis models of post-infectious IBS and bacterial overgrowth; and the study of gut microbe-GI motility interactions.



**ALI REZAIIE, MD, PhD**  
 Assistant Director,  
 Gastrointestinal Motility Program

Rezaie is affiliated with the Cedars-Sinai Department of Medicine and the Cedars-Sinai Digestive Diseases Center. His clinical interests include irritable bowel syndrome, anorectal dysfunction, esophageal/gastric/small bowel/colonic dysmotility and motility disorders of patients with inflammatory bowel disease.



**DAVID SHIH, MD, PhD**  
 Assistant Director, Basic Research,  
 F. Widjaja Foundation  
 Inflammatory Bowel and  
 Immunobiology Research Institute

Shih is investigating the functional effect of genetic variants of inflammatory bowel disease (IBD) genes, autophagy, and host-microbe interaction in the immunopathophysiology of IBD at the molecular and cellular levels using genetically modified mice and human tissue models. His current investigations include transgenic murine models of IBD; the role of autophagy in gut mucosal inflammation; the mechanism of fibrostenotic disease in IBD; the genotype-phenotype characterization of IBD-associated genes; and clinical outcomes of concomitant infection in IBD flare and thiopurine (6MP and azathiopurine) metabolism.

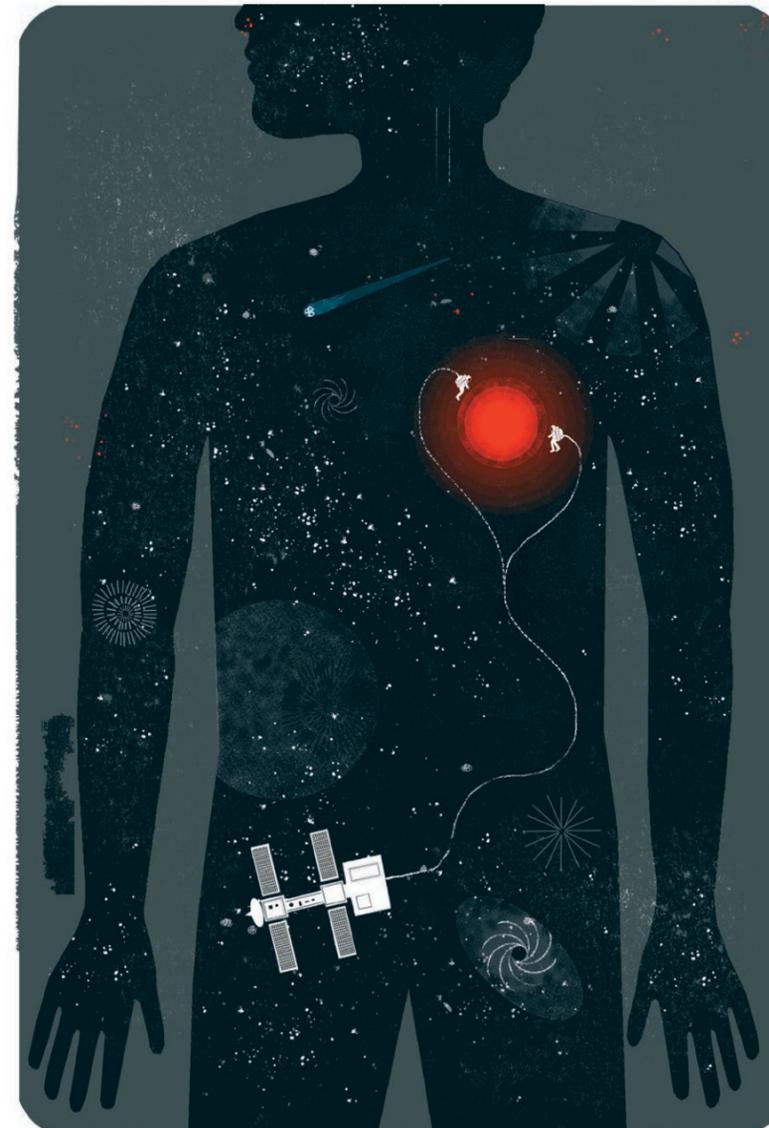
**H**ome to a distinguished team of experts, the Cedars-Sinai Heart Institute is setting new standards of excellence in cardiac care in the United States. The Heart Institute unites 16 centers and programs to diagnose and treat the full spectrum of heart conditions for all patients, from infants with cardiac malformations to adults with advanced disease. The transplant team performs the most transplants in the world.

By pursuing basic studies in molecular biology, physiology, pharmacology and biochemistry, investigators at the Cedars-Sinai Heart Institute are increasing our understanding of the causes of complex cardiac diseases and developing therapeutics to treat them. Cedars-Sinai's expert teams are investigating cardiac stem cell therapy, strategies for early detection and treatment of transplant rejection, prevention of sudden cardiac arrest, gender differences in heart disease and next-generation devices in mechanical circulatory support, including the Total Artificial Heart.

**CEDARS-SINAI  
BY THE NUMBERS**  
FY 2016

**\$54  
MILLION**  
FEDERAL RESEARCH  
EXPENDITURES

**\$8.9  
MILLION**  
CALIFORNIA INSTITUTE  
FOR REGENERATIVE  
MEDICINE FUNDING



The Cedars-Sinai Heart Institute explores the causes of complex cardiac diseases and develops new treatments.

FEATURED FACULTY



**EDUARDO MARBÁN, MD, PhD**  
Director, Heart Institute

Marbán’s research focuses on developing the therapeutic potential of resident adult cardiac stem cells (CSCs) to promote a fast track to therapeutics as well as appropriate ways to harvest and amplify stem cells. His clinical research involves autologous CSCs in patients with cardiac dysfunction, including cell-based therapy. This research supports clinical studies as well as translational work to image stem cell engraftment, proliferation and differentiation in the heart. Marbán’s other investigations include stem cells for cardiac regeneration and cardiac electrophysiology.



**JENNIFER VAN EYK, PhD**  
Director, Basic Science Research, Women’s Heart Center  
Erika J. Glazer Chair in Women’s Heart Health

Van Eyk focuses on understanding the molecular mechanisms underlying acute and chronic diseases and therapies, and the development of clinically robust circulating biomarkers, including detailed exosome constituents. Her laboratory specializes in creating robust technological pipelines to precisely quantify proteins, isoform and post-translational modifications in disease pathways. Current investigations focus on post-translational modifications and biomarker discovery in cardiovascular disorders, traumatic brain injury and ischemia-reperfusion.



**ROBERTA GOTTLIEB, MD**  
Director, Molecular Cardiobiology  
Research Scientist, Heart Institute  
Dorothy and E. Phillip Lyon Chair in Molecular Cardiology in honor of Clarence M. Agress, MD

Gottlieb researches myocardial ischemia and cardioprotection, with a focus on mitochondria and autophagy. She uses biochemistry, microscopy and molecular physiology tools in cell, rodent and porcine models to understand and mitigate ischemic injury with a goal of developing therapeutics for use in humans.



**TIMOTHY D. HENRY, MD**  
Director, Division of Cardiology  
Lee and Harold Kapelovitz Chair in Research Cardiology

Henry’s research interests include interventional cardiology and acute myocardial infarction and novel approaches, including stem cell and gene therapy for patients who are not candidates for standard revascularization techniques. He is the principal investigator for one of just five National Institutes of Health clinical cardiovascular stem cell centers.



**RAJENDRA MAKKAR, MD**  
Director, Interventional Cardiology and Cardiac Catheterization Laboratory, Heart Institute  
Stephen R. Corday, MD Chair in Interventional Cardiology

Makkar’s current investigations focus on cell therapy for myocardial repair; percutaneous coronary interventions for left main coronary artery stenosis; percutaneous mitral valve repair using edge-to-edge and coronary sinus approaches; and aortic valve repair.



**P.K. SHAH, MD**  
Director, Oppenheimer Atherosclerosis Research Center  
Shapell and Webb Family Chair in Clinical Cardiology

Shah’s research focuses on molecular mechanisms of atherosclerosis and novel therapeutic strategies to prevent and reverse the condition. His current investigations include the role of novel genes (tenascin and pleiotrophin) in atherosclerosis, plaque neovascularity and intraplaque hemorrhage, and the potential role of peritoneum-derived progenitor cells and vasculogenesis. Additional investigations in Shah’s lab include immune modulation of atherosclerosis with apoB100 peptides and their potential mechanism of action; gene transfer of apoA-I Milano using AAV vectors for atherosclerosis modulation; and modulation of atherosclerosis by plant-derived apoA-I Milano.



**ROBIN SHAW, MD, PhD**  
Wasserman Foundation Chair in Cardiology in honor of S. Rexford Kennamer, MD

Shaw studies the molecular mechanisms of heart arrhythmias and heart failure progression. He focuses on cardiac ion channel formation and trafficking, with particular emphasis on Connexin43 gap junctions and L-type calcium channels. In a “cell-to-bedside” approach, he translates basic findings into novel diagnostics and therapeutics for failing hearts.



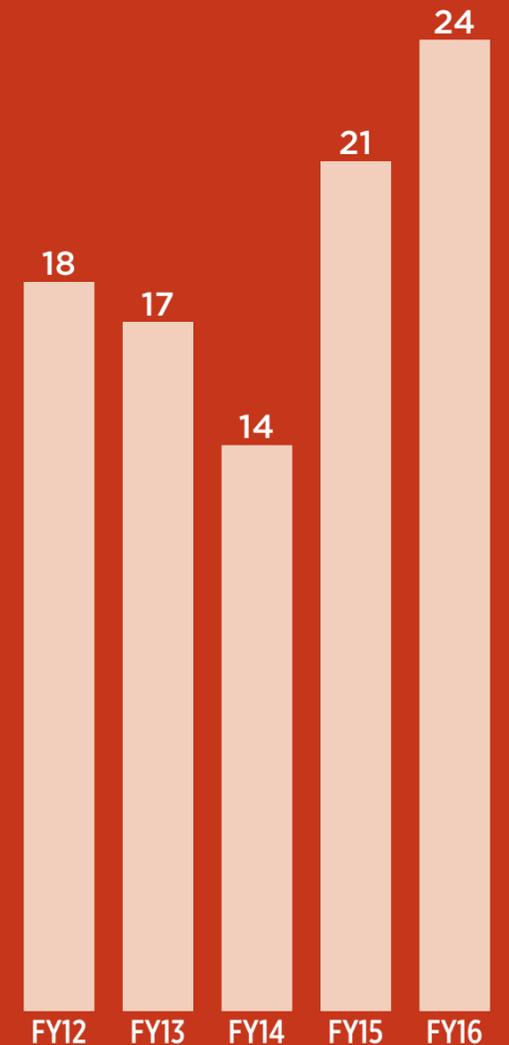
**RONALD VICTOR, MD**  
Director, Center for Hypertension, Heart Institute  
Burns and Allen Chair in Cardiology Research

Victor’s research focuses on the neural mechanisms of hypertension and the ways that hypertension affects special populations, including African-Americans. One recent study involves a novel partnership between barbers and clinical pharmacists in the Los Angeles area to improve hypertension management for African-American men. Other research interests include studying the effects of alternative tobacco-related products on coronary endothelial function; validating a novel, noninvasive method of measuring cardiac sympathetic nerve activity; and testing the effectiveness of phosphodiesterase type 5 inhibitors and nitric oxide donors to slow disease progression in limb and heart muscles of patients with Duchenne or Becker muscular dystrophy.

PATENTS

24

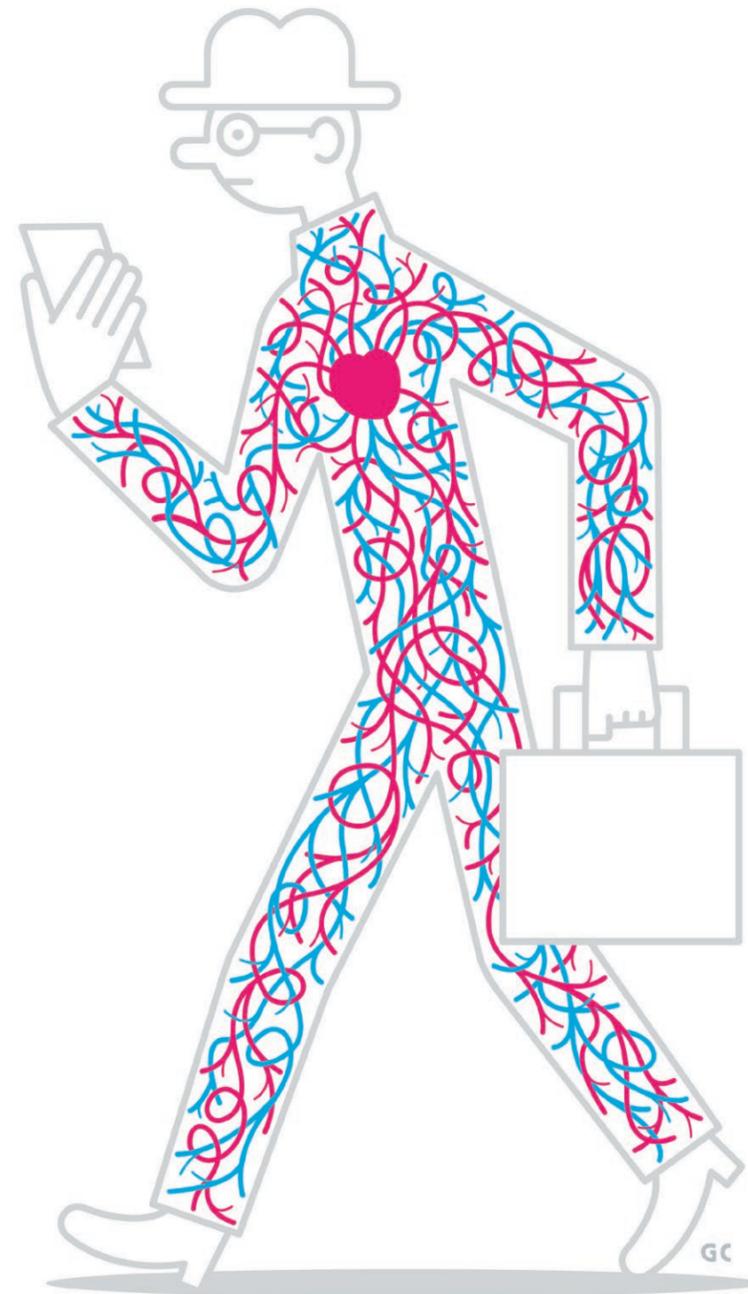
PATENTS GRANTED IN FY 2016



**I**nnovation in imaging is the hallmark of Cedars-Sinai's Biomedical Imaging Research Institute, an interdisciplinary program that brings together scientists and physicians to develop and apply novel, state-of-the-art imaging technologies that can translate to clinical significance.

The program builds on Cedars-Sinai's clinical and research strengths in key areas of cardiovascular imaging, oncology and metabolic imaging, neuroimaging, MRI and spectroscopy, with a focus on diabetes and obesity, skeletal regeneration and stem cell therapy.

The Artificial Intelligence in Medicine program is developing software to enable computers to process and analyze three-dimensional images of the heart as effectively as an experienced human operator.



Novel, state-of-the-art imaging technologies can translate into clinical significance.

**CEDARS-SINAI  
BY THE NUMBERS**  
ARTIFICIAL  
INTELLIGENCE  
IN MEDICINE (AIM)  
PROGRAM:

MORE THAN  
**\$125**  
**MILLION**  
ROYALTIES TO DATE

**19** SOFTWARE  
LICENSES

FEATURED FACULTY



**DANIEL S. BERMAN, MD**  
*Chief, Cardiac Imaging and Nuclear Cardiology  
 Medical Director, Artificial Intelligence in Medicine Program*

Berman's studies involve the development and validation of clinical applications of cardiac imaging; development of computer-based tools for imaging analysis and interpretation; and use of systematic, prospectively designed databases and randomized clinical trials to analyze the impact of information from cardiac imaging studies on health outcomes. His current investigations include development of automatic quantitative assessment of noncalcified plaque with coronary CT angiography; detection of inflamed/vulnerable coronary plaque using positron emission tomography/CT; automatic quantitative analysis of noninvasive cardiac imaging studies; optimizing image quality and reducing radiation with cardiac CT and nuclear cardiology studies; and developing methods for quantitatively analyzing myocardial perfusion and function using cardiac MRI in women with chest pain.



**ROHAN DHARMAKUMAR, PhD**  
*Associate Director, Biomedical Imaging Research Institute*

Dharmakumar studies imaging-based interrogation of myocardial oxygenation; cardiac stress testing with inhalational CO<sub>2</sub>; noninvasive characterization of myocardial infarction; post-infarction iron and its relation to cardiac arrhythmias; myocardial bleeding and risk of heart failure; magnetic targeting of therapeutic substrates; and integrated positron emission tomography and MRI for ischemic heart disease.



**GUIDO GERMANO, PhD, MBA**  
*Scientific Director, Artificial Intelligence in Medicine Program*

Germano is developing software to enable computers to process and analyze 3-D images of the heart in much the same way as an experienced human operator. His studies involve applying artificial intelligence techniques to the measurement of parameters critical to understanding the state and behavior of the human heart. Current investigations in Germano's lab include the creation of new artificial intelligence techniques to accurately determine the location of the heart from 3-D tomographic images, estimate epicardial and endocardial boundaries, and quantify heart perfusion and function in a completely automated fashion.



**DEBIAO LI, PhD**  
*Director, Biomedical Imaging Research Institute*

Li specializes in the development of novel magnetic resonance techniques for research and clinical needs and improve early detection and characterization of heart disease. He is developing fast MRI to acquire high-resolution views of coronary arteries; detect the presence and characterize the composition of atherosclerosis; measure blood flow and blood oxygen levels in the heart muscle; and guide vascular interventional procedures for cardiac disease treatments.



**V. KRISHNAN RAMANUJAN, PhD**  
*Director, Two Photon Imaging Core Facility  
 Research Scientist, Surgery*

Ramanujan's major focus is defining the fundamental role of mitochondrial dysfunction in breast cancer etiology, progression and metastasis. He utilizes a multidisciplinary approach, including high-resolution optical-imaging techniques, enzyme kinetic modeling, molecular biology tools and structure-based rational design of small-molecule regulators. His translational projects include development of imaging tools for early detection of breast cancer signatures, development and validation of biomarker panels of candidate mitochondrial proteins for tumor staging, and development and implementation of an intraoperative tumor-margin detection device.



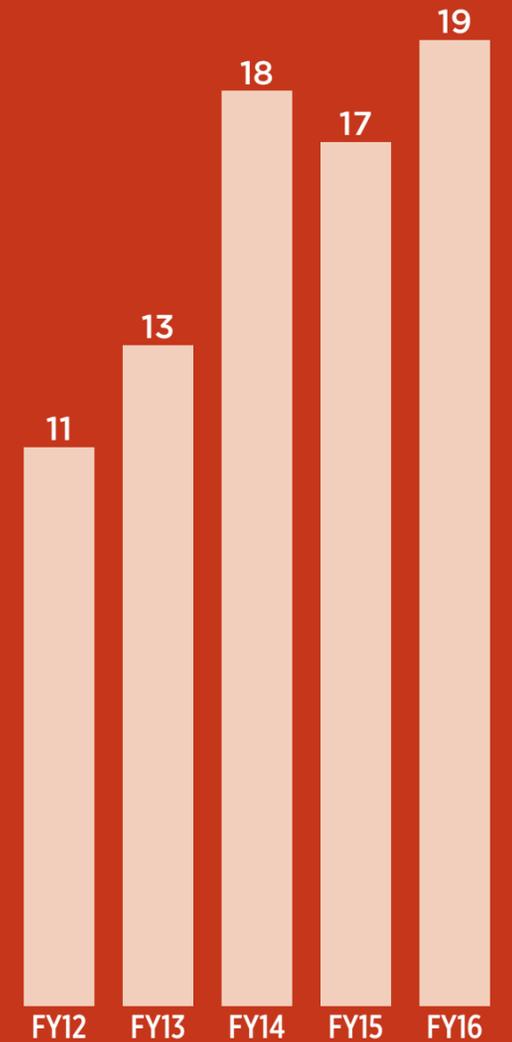
**BEHZAD SHARIF, PhD**  
*Research Scientist, Biomedical Imaging Research Institute  
 Assistant Professor, Department of Biomedical Sciences*

Sharif's research involves developing MRI-based biomarkers that accurately characterize myocardial blood flow abnormalities and applying them in diagnostic/mechanistic studies of ischemic heart disease with a focus on coronary microvascular/endothelial dysfunction. His work uses a multidisciplinary approach for development of innovative MRI data acquisition and reconstruction techniques involving imaging physics, signal processing and computational sciences to devise methods that achieve optimal precision for visualization/quantification of underlying dynamics in the cardiovascular system — all geared toward addressing ongoing challenges in cardiology.

5-YEAR TRENDS

TOTAL AIM PROGRAM SOFTWARE LICENSES (CUMULATIVE)

**19**  
 LICENSES  
 IN FY 2016



**T**he Department of Medicine at Cedars-Sinai is consistently recognized as a leader across medical disciplines and attracts the finest physicians and scientists to its clinical, research and academic programs. Department investigations support clinical efforts by focusing on interdisciplinary and translational work. The department is also a global hub for kidney transplantation research, with laboratories dedicated to transplant immunobiology and immunotherapy.

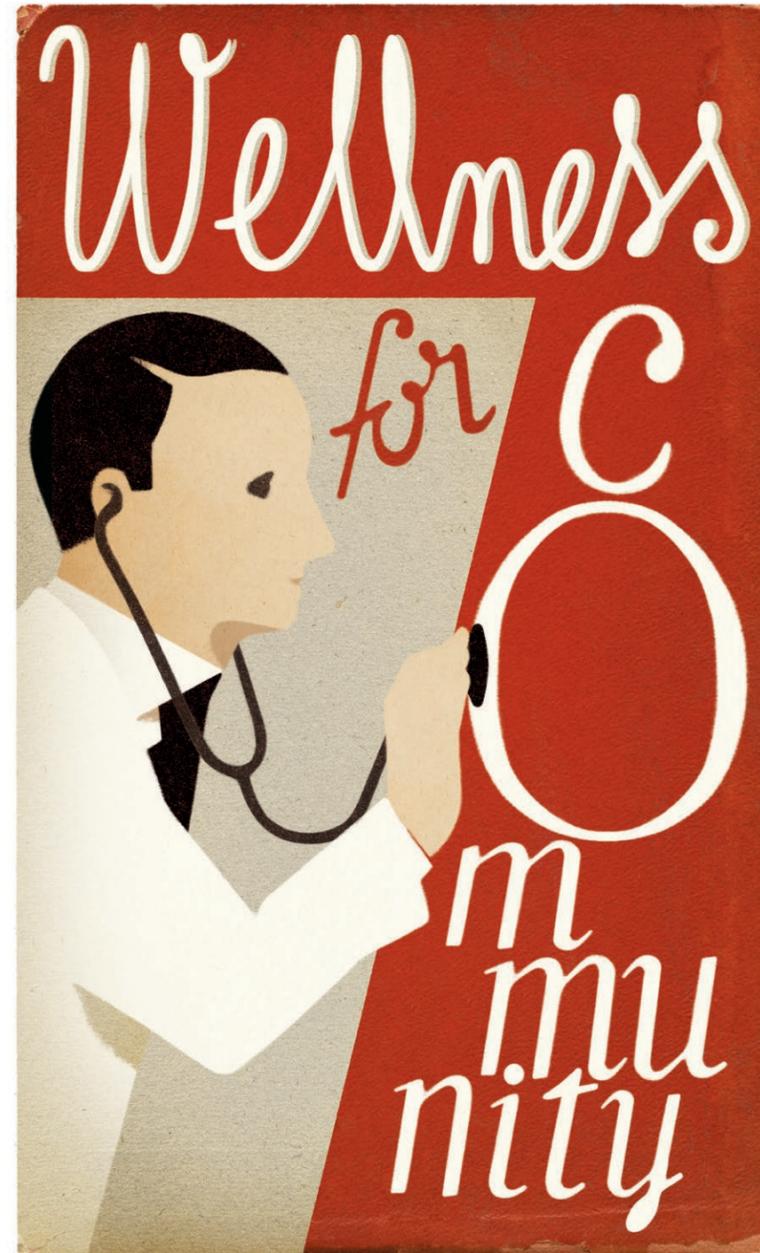
The Department of Medicine serves many Los Angeles neighborhoods through a broad spectrum of community benefit activities that include providing access to essential healthcare to those in the greatest need, empowering communities to become healthier and educating the next generation of physicians, nurses and other hospital staff.

**CEDARS-SINAI  
BY THE NUMBERS**

**886**  
LICENSED BEDS

**47,320**  
ADMISSIONS PER YEAR

**1,911**  
OUTPATIENT VISITS PER DAY



The Department of Medicine brings healthcare into underserved communities.

FEATURED FACULTY



**PAUL W. NOBLE, MD**  
*Chair, Department of Medicine  
 Vera and Paul Guerin Family  
 Distinguished Chair in Pulmonary  
 Medicine*

Noble's clinical expertise and research focus on unraveling the mechanisms underlying chronic lung inflammation and idiopathic pulmonary fibrosis, and developing novel treatments for these disorders. His research receives significant support from the National Heart, Lung, and Blood Institute at the National Institutes of Health.



**RICHARD N. BERGMAN, PhD**  
*Director, Diabetes and Obesity  
 Research Institute and  
 Alfred Jay Firestein Chair in  
 Diabetes Research*

Bergman, whose research focuses on the causes of diabetes, pioneered the use of engineering technology to understand the mechanisms leading to development of the disease. He developed the "minimal model," which describes how insulin reacts in the body and which has become the standard for determining causes of diabetes. Clinical testing using this model is now the most powerful predictor of future development of Type 2 diabetes. Bergman's laboratory also was the first to demonstrate insulin's indirect control of liver glucose production and the importance of insulin transport from blood to the cells in patients with insulin resistance syndrome.



**MARK GOODARZI, MD, PhD**  
*Director, Endocrinology, Diabetes  
 and Metabolism*

Goodarzi's research focuses on the genetic determinants of insulin resistance and related conditions, using a population genetics approach. These efforts involve insulin resistance and clearance and atherosclerosis in Latinos; polycystic ovary syndrome; and phenotyping of insulin resistance by physiologic infusion studies. His current investigations include genetic factors in polycystic ovary syndrome, particularly genes involved in adrenal androgen excess and response to metformin therapy; the role of energy-related genes in insulin clearance; and genetic factors affecting the insulin system and subclinical atherosclerosis in Latinos and other populations.



**CORY HOAGBOAM, PhD**  
*Research Scientist, Department  
 of Medicine and Women's Guild  
 Lung Institute*

Hogaboam's research focuses on elucidating innate and adaptive immune mechanisms that drive chronic lung diseases, including asthma, hypersensitivity pneumonitis, chronic obstructive pulmonary disease and idiopathic interstitial pneumonias such as idiopathic pulmonary fibrosis. He is particularly interested in understanding how lung structural cells are impacted by these disease processes. His current investigations include cellular and molecular immune mechanisms that regulate the pulmonary growth and persistence of allergic and viral signals in a number of experimental murine models of allergy, asthma and pulmonary remodeling, and the use of human lung diagnostic biopsy tissues and isolated human cell populations to explore the etiopathogenesis of clinical disease.



**STANLEY C. JORDAN, MD**  
*Director, Division of Pediatric and  
 Adult Nephrology*

Jordan developed a process that uses intravenous immunoglobulin to reduce the risk of transplanted organ rejection in difficult cases in which other medications have failed. He also created a technique to detect post-transplant lymphoproliferative disorder (PTLD) in its earliest stages, when intervention is most effective. PTLD is a form of cancer that can have catastrophic effects on children who receive donated organs. For more than two decades, Jordan has performed extensive research into various aspects of immunology and transplantation, funded by dozens of research grants and awards, including two prestigious grants for National Institutes of Health-controlled clinical trials in kidney transplantation.



**BRENNAN SPIEGEL, MD**  
*Director, Health Services Research  
 in Academic Affairs and  
 Clinical Transformation*

Spiegel oversees a team that studies how digital technologies — such as wearable biosensors, smartphone applications and social media — can be used to strengthen the patient-doctor bond, improve outcomes and save money. His lab also conducts psychometric, health-economic, epidemiologic and qualitative research across a wide range of healthcare topics. As a member of the U.S. Food and Drug Administration's Gastroenterology Field Advisory Committee, Spiegel focuses on developing valid and reliable endpoints for clinical trials.



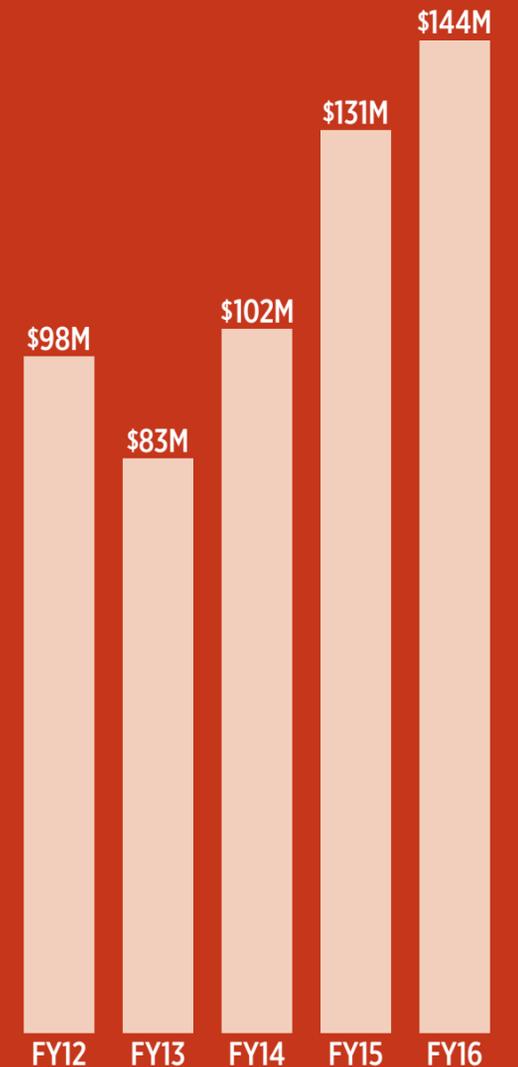
**BARRY R. STRIPP, PhD**  
*Director, Lung Stem Cell  
 Research Program  
 Bram and Elaine Goldsmith Chair  
 in Gene Therapeutics Research*

Stripp's research focuses on understanding cellular and molecular mechanisms of lung injury and repair. His laboratory has defined microenvironments within bronchiolar airways that maintain a population of adult tissue stem cells. His current research is aimed at understanding the molecular regulation of the bronchiolar stem cell hierarchy. Further investigations in his lab include signaling mediated by conditional stabilization of the protein  $\beta$ -catenin, which has been found to expand the pool of lung stem cells in vivo. Future studies will aim at understanding molecular mechanisms by which stabilized  $\beta$ -catenin regulates the stem cell compartment and exploit this strategy for development of cell and molecular therapies to correct epithelial reparative disorders.

5-YEAR TRENDS

EXTERNAL RESEARCH EXPENDITURES

**\$144**  
**MILLION**  
 FY 2016



Cedars-Sinai is dedicated to expanding the fields of neurology and neurosurgery by conducting advanced research and providing leading-edge, compassionate care for patients with disorders of the brain and the neurologic system.

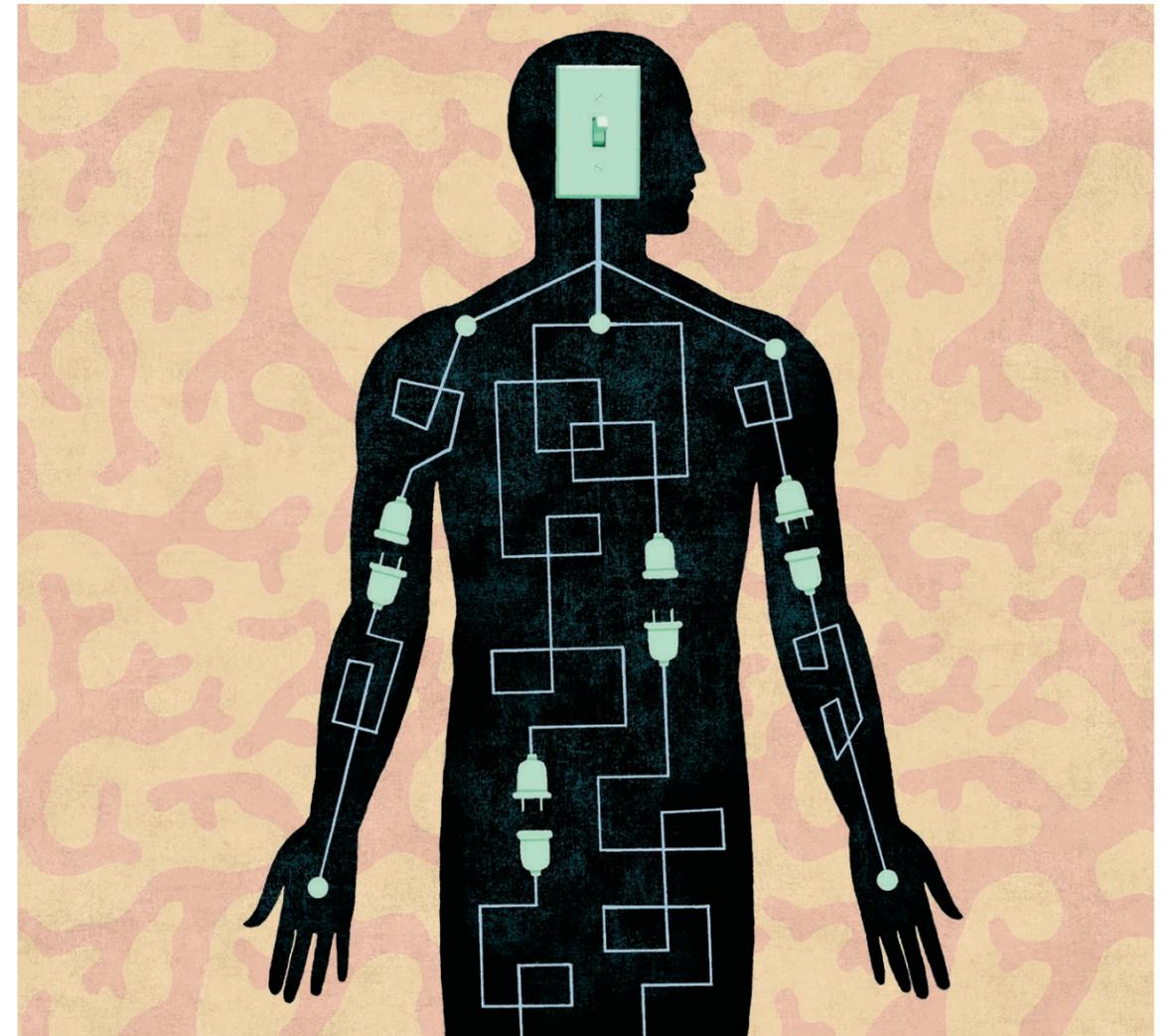
This world-class team is exploring a range of complex neurological conditions, including brain tumors, amyotrophic lateral sclerosis (ALS), stroke, Alzheimer's disease and multiple sclerosis. The neurosciences program is committed to multidisciplinary collaboration to further its research goals, leading to better treatment options for patients and more comprehensive expertise for physicians and faculty.

**CEDARS-SINAI  
BY THE NUMBERS**  
PROJECTED 2016  
AUTM RANKINGS\*

TOP  
**20** IN LICENSING  
REVENUE OF  
184 REPORTING  
INSTITUTIONS

TOP  
**5** IN LICENSING  
REVENUE OF 24  
PEER INSTITUTIONS

\*BASED ON DATA FROM  
THE 2014 SURVEY BY THE  
ASSOCIATION OF UNIVERSITY  
TECHNOLOGY MANAGERS (AUTM)



Neurosciences at Cedars-Sinai unite the field's best minds with leading-edge technology.

FEATURED FACULTY



**KEITH L. BLACK, MD**  
*Chair, Department of Neurosurgery*  
*Director, Maxine Dunitz Neurosurgical Institute*  
*Director, Johnnie L. Cochran Jr. Brain Tumor Center*  
*Ruth and Lawrence Harvey Chair in Neuroscience*

Black's research includes designing ways to open the blood-brain barrier to deliver chemotherapeutic drugs directly to brain tumors; developing vaccines to enhance the body's immune response to brain tumors; using gene arrays to develop molecular profiles of tumors; employing optical technology for brain mapping; and using focused microwave energy to noninvasively destroy brain tumors. His current research includes neuroregeneration and nanotechnology for drug delivery. Additionally, Black's laboratory is studying the early detection of Alzheimer's disease using a simple eye exam. The team discovered that beta-amyloid protein plaques accumulate in the retina, where they can be spotted before they accumulate in the brain, and created an investigational device that allows these plaques to be seen in the eye. The system is in clinical trials at several sites across the country.



**PRAMOD BUTTE, MBBS, PHD**  
*Research Scientist, Neurosurgery*

Butte's research focuses on developing novel intraoperative imaging/visualization technologies to achieve near-complete tumor excision. Butte has been studying fluorescence lifetime spectroscopy for guided therapy of brain tumors and the intraoperative delineation of primary brain tumors using time-resolved fluorescence spectroscopy.



**PATRICK D. LYDEN, MD**  
*Chair, Neurology*  
*Carmen and Louis Warschaw Chair in Neurology*

Lyden has conducted extensive research into cerebrovascular disease and potential treatments for stroke. He is heading clinical trials evaluating post-stroke hypothermia therapy in a variety of patient populations and circumstances, using the rapid, controlled cooling of a patient's body temperature to reduce long-term neurological damage. He also is exploring whether this advanced cooling technique might be valuable as a way to treat a wide variety of neurologic injuries, from stroke to head trauma.



**MOISE DANIELPOUR, MD**  
*Director, Pediatric Neurosurgery Program*  
*Medical Director, Center for Pediatric Neurosciences*  
*Vera and Paul Guerin Family Chair in Pediatric Neurosurgery*

Danielpour is a renowned expert in in-utero surgical treatment of birth defects and investigation of neurological complications in patients with skeletal dysplasia, dynamic foramen magnum stenosis and spinal stenosis. He uses minimally invasive surgical technology in the care of children with central nervous system diseases, including pediatric hydrocephalus. He also studies the molecular pathogenesis of pediatric brain tumors, immunotherapy for brain tumors and stem cell therapy for neonatal leukomalacia secondary to germinal matrix hemorrhage.



**JULIA LJUBIMOVA, MD, PhD**  
*Director, Nanomedicine Research Center, Neurosurgery*

Ljubimova's research focuses on engineering new biodegradable materials with potential utilization as drug carriers or drug-delivery systems in biomedical and pharmaceutical fields, in addition to the design and testing of a new, nanopolymer, anticancer molecular delivery system that specifically conveys drugs to tumor cells using a targeting monoclonal antibody. This novel system releases tumor growth-inhibiting agents specifically into cancer cells without affecting normal surrounding cells. Current investigations in her lab include a drug-delivery system to pass through the blood-brain barrier to deliver drugs to brain tumors and the ability to simultaneously block several cancer-specific tumor markers by using biodegradable nanoconjugates for brain and breast tumors, as well as cancer-specific drug targeting.



**PADMESH RAJPUT, PhD**  
*Research Scientist, Neuroscience*

Rajput's translational and preclinical research focuses on establishing effective therapeutic approaches for stroke therapy, determining the role of thrombin and thrombin receptors in the pathophysiology of stroke, understanding the role of therapeutic hypothermia in stroke, and developing new therapeutic and diagnostic approaches using microRNA and exosomes in ischemia.



**UELI RUTISHAUSER, PhD**  
*Director, Human Neurophysiology Research*

Rutishauser investigates the neural mechanisms of learning and memory at the level of single neurons in humans. His lab helped pioneer the technique of human single-neuron recordings and continues to advance the tools, methods and surgical techniques that allow such experiments. His recent work has focused on the neural mechanisms of memory-based decision-making in the human hippocampus and the representation of faces and emotions in the human amygdala.

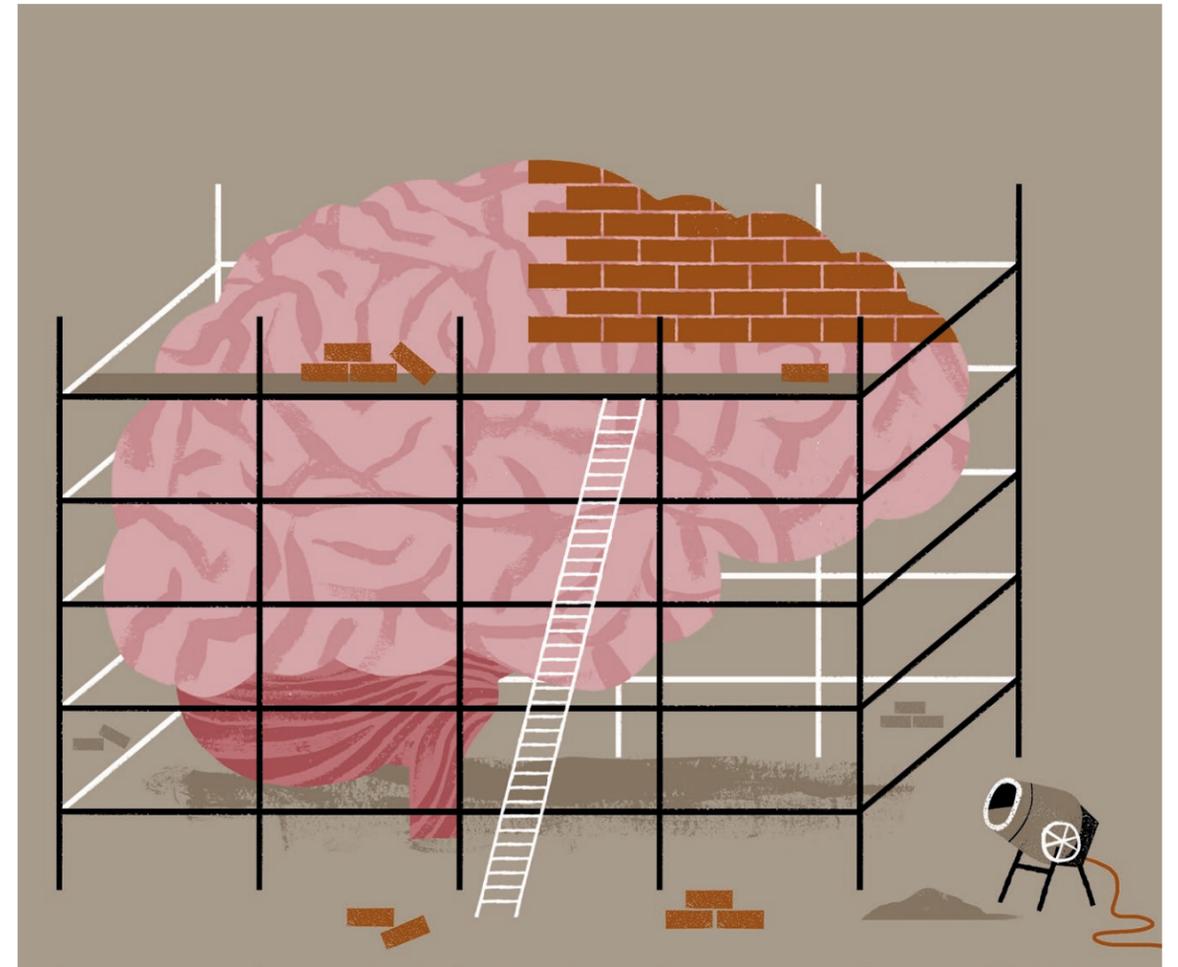


**MICHELE TAGLIATI, MD**  
*Director, Movement Disorders Program, Neurology*  
*Steven D. Broidy Chair in Movement Disorders*

Tagliati's expertise includes various types of movement disorders such as tremor, dystonia, chorea, tics and Parkinson's disease. He is a pioneer in deep-brain stimulation and an authority on the use of botulinum toxin injection therapy for the control of involuntary muscle contractions. Recent projects have included the largest follow-up record of patients with the most common form of hereditary dystonia — a movement disorder that can cause crippling muscle contractions — and a study that identified variables that affect bioelectrical impedance.

**B**ringing together research faculty and clinicians to provide a true bench-to-bedside service is one of the key strengths of the Board of Governors Regenerative Medicine Institute. It encompasses seven major programs of investigation: brain, eye, pancreas/liver, blood, gut, lung and skeletal.

Work within each of these programs benefits from the institute's core facilities, with a focus on generating induced pluripotent stem cells (iPSCs) and differentiating them into various tissues of the human body. The iPSCs are used to increase understanding of human disease through modeling – for neurodegenerative disorders such as ALS and Huntington's disease – and to provide a foundation for preclinical studies aimed at establishing and validating cellular-therapeutic approaches to human illness, including novel ways to regenerate organs and transplant stem cells for tissue repair.



Stem cells can repair tissue and regenerate organs.

**CEDARS-SINAI  
BY THE NUMBERS**  
PROJECTED 2016  
AUTM RANKINGS\*

TOP  
**5** IN LICENSING  
REVENUE PER  
RESEARCH  
DOLLAR SPENT, OF  
180 INSTITUTIONS

TOP  
**5** IN LICENSES  
WITH EQUITY, OF  
22 INSTITUTIONS

\*BASED ON DATA FROM  
THE 2014 SURVEY BY THE  
ASSOCIATION OF UNIVERSITY  
TECHNOLOGY MANAGERS (AUTM)

FEATURED FACULTY



**CLIVE SVENDSEN, PhD**  
 Director, Board of Governors  
 Regenerative Medicine Institute  
 Kerry and Simone Vickar Family  
 Foundation Distinguished Chair in  
 Regenerative Medicine

Svendsen's research focuses on modeling and treating neurodegenerative disorders such as amyotrophic lateral sclerosis and Parkinson's disease using a combination of stem cells and powerful growth factors. His current investigations include translational research programs and basic research into induced pluripotent stem cells that replay disease processes in vitro. He is examining some of the mechanisms underlying the disease process and starting to screen drugs that might reverse or slow down degeneration.



**VAITHILINGARAJA  
 ARUMUGASWAMI, MVSC, PhD**  
 Director, Viral Vector Core Facility

Arumugaswami's research focuses on the molecular mechanisms of cancer-causing hepatitis C virus (HCV) replication and developing a human pluripotent stem cell-based, ex vivo gene-therapy strategy for regenerating hepatitis C-damaged liver, and on disease modeling HCV and HIV pathogen-host interactions using human induced pluripotent stem cell (iPSC)-derived primary cells. His current investigations include translational research on developing a stem cell-based therapy for regenerating hepatitis C-damaged liver; developing a genetic circuitry based on a pathogen-induced therapeutic gene-expression system in patient-specific iPSC lines; and developing strategies for whole-liver organ engineering utilizing natural liver scaffolds and microfluidic bioreactors.



**ROBERT H. BALOH, MD, PhD**  
 Director, Neuromuscular Medicine,  
 ALS Program  
 Ben Winters Chair in Regenerative  
 Medicine

Baloh examines the molecular mechanisms of neuromuscular diseases. He uses in vitro and animal modeling, based on insights from human genetics, to develop novel therapeutic agents, with particular interests in Charcot-Marie-Tooth disease (CMT) and amyotrophic lateral sclerosis (ALS). To investigate mechanisms of motor neuron disease/ALS, he explores the role of mutations in the repeat expansion in the C9ORF72 gene and point mutations in the TARDBP gene, using human-induced pluripotent stem cell (iPSC)-derived motor neurons and mouse models. To investigate CMT, he studies the mechanism of mutations in the mitofusin 2 gene in axonal CMT and the use of iPSC-derived Schwann cells from patients with CMT type 1A (the most common genetic form) to model the disease in vitro and for use in potential transplantation therapy in humans.



**JOSHUA BREUNIG, PhD**  
 Director, Confocal Microscopy Core

Breunig investigates the molecular controls of neural stem cell behavior in the brain, specifically exploring the signaling pathways governing the differentiation of stem cells into neurons and glia. This information then is translated into strategies for replacing specific populations of neurons lost after injury and disease. His lab also seeks to discover the mechanisms regulating the pathological differentiation of neural stem cells into brain tumor progenitors. This work has succeeded in introducing patient-specific mutations to create analogous tumors in animal models using next-generation glioma models created by Breunig and his colleagues. From these cancer cells, the team is uncovering the developmental origins of tumorigenesis and is researching new, more targeted treatments to halt the progression of these malignancies.



**DAN GAZIT, PhD**  
 Director, Skeletal Regeneration and  
 Stem Cell Therapy Laboratory

Gazit's research involves stem cell-based skeletal tissue engineering and regenerative medicine; using adult stem cells derived from various human tissues for the regeneration of bone, cartilage, tendon/ligament and the intervertebral disc; combining isolated stem cells with differentiation-inducing genes and biodegradable scaffolds that may lead to novel therapeutic solutions for patients suffering from nonunion fractures, osteoarthritis, tendon tears, osteoporosis and spine disorders; developing novel tracers and multimodality imaging systems for stem cell tracking in vivo, using smart biomaterials for the enhancement of stem cell survival and differentiation; and injecting genetically modified mesenchymal stem cells to treat osteoporotic vertebral fractures and intervertebral disc degeneration.



**ZULMA GAZIT, PhD**  
 Associate Director, Skeletal  
 Regeneration and Stem Cell Therapy  
 Laboratory

Gazit studies the use of adult stem cells derived from various tissues of the human body for the regeneration of bone, cartilage, tendon/ligament and the intervertebral disc, and combining stem cells with differentiation-inducing genes and biodegradable scaffolds that may lead to novel therapeutic solutions for patients suffering from nonunion fractures, osteoarthritis, tendon tears, osteoporosis and spine disorders. Her investigations focus on stem cells isolated from different tissues, including the degenerated intervertebral disc and maxillofacial bones; generation of induced pluripotent stem cells and differentiation to mesenchymal type; and studies of the extracellular matrix-stem cell interaction and its plausible effects on differentiation pathways.



**ALEXANDER LJUBIMOV, PhD**  
 Director, Ophthalmology Research  
 Laboratory

Ljubimov's research focus involves gene therapy for diabetic corneal stem cells; generation of corneal epithelium from induced pluripotent stem cells (iPSCs) for limbal stem cell-deficiency therapy; inhibition of protein kinase CK2 to block pathological retinal angiogenesis; and miRNA in normal and diabetic cornea. His investigations include gene therapy for diabetic keratopathy using organ-cultured corneas with a focus on stem cells; generation of corneal epithelium from iPSCs for limbal stem cell deficiency; and miRNA changes in diabetic corneas.



**DHRUV SAREEN, PhD**  
 Director, Induced Pluripotent Stem  
 Cell Core Facility

Sareen focuses on characterizing pathways involved in motor neuron degeneration in the spinal muscular atrophy patient and amyotrophic lateral sclerosis-induced pluripotent stem cells (iPSCs); optimizing small-molecule-assisted differentiation protocols for various neuronal cells from iPSCs; and developing high-content screening tools using spinal muscular atrophy patients' iPSCs to discover novel therapeutic compounds. Further studies involve overseeing the generation of various diseased and healthy "footprint-free" iPSCs from various somatic tissues.



**SHAOMEI WANG, MD, PhD**  
 Research Scientist, Board of Governors  
 Regenerative Medicine Institute

Wang's research focuses on cell-based therapy for retinal degeneration and optic nerve neuropathy, the mechanisms of stem cells in rescuing vision and immunological responses when injecting human cells into the eyes of animal models.

**R**esearch in the Department of Surgery supports clinical efforts by emphasizing interdisciplinary and translational work. Over the past 10 years, the department's Research Division has experienced substantial growth in federal funding for basic science and translational medicine.

Full-time academic surgeons and surgical scientists augment the department's cutting-edge translational efforts, enriching the nationally respected surgical residency and fellowship programs and offering the most complex surgical services. Primary areas of investigation include urologic oncology, stem cell applications (orthopedics, ophthalmology and organ replacement) and molecular imaging.



Interdisciplinary and translational work moves surgical innovations from bench to bedside.

**CEDARS-SINAI  
BY THE NUMBERS**  
FY 2016

**10** LICENSE AGREEMENTS

**7** OPTION AGREEMENTS

**79** CONFIDENTIALITY AGREEMENTS

FEATURED FACULTY



**BRUCE GEWERTZ, MD**  
*Chair, Surgery*  
*Vice Dean, Academic Affairs*  
*Vice President, Interventional Services*  
*H & S Nichols Distinguished Chair*  
*in Surgery*

Gewertz's basic science research centers on ischemia, reperfusion injury and intracellular messaging by reactive oxygen species. His clinical science interests include cerebrovascular disease (especially intraoperative neurophysiologic monitoring and outcome analysis), aortic aneurysmal disease and mesenteric ischemic syndromes. Current investigations in his lab include studying the cellular mechanisms leading to changes in microvascular permeability and intracellular signaling by free radicals and cytokines.



**MICHAEL FREEMAN, PhD**  
*Vice Chair of Research, Surgery*

Freeman's research focuses on uro-genital tract physiology, with a strong emphasis on prostate cancer, and on cancer progression to lethal disease. Further research involves molecular studies of bladder cancer, breast cancer, smooth muscle regulation and dysfunction, and interstitial cystitis/pelvic pain syndrome. Current investigations include lipid and cholesterol metabolism in cancer, the "amoeboid" tumor phenotype, chromatin structure and androgen regulation, and signaling mechanisms in urologic diseases.



**ARKADIUSZ GERTYCH, PhD**  
*Assistant Professor, Pathology and*  
*Laboratory Medicine/Surgery*

Gertych employs 2-D/3-D image cytometry for high-content analysis and screening, bioimage informatics, automated derivation of quantitative features from medical and biomedical images, machine learning, and numerical characterization and recognition of cellular phenotypes for computer-aided diagnoses in digital pathology.



**PHILIP FRYKMAN, MD, PhD**  
*Associate Director, General*  
*Pediatric Surgery*

Frykman focuses on the basic mechanisms of Hirschsprung's disease (HSCR). As a pediatric surgeon-scientist, he investigates the biological mechanisms underpinning the reasons some children with HSCR develop severe, life-threatening enterocolitis (HAEC). Through decade-long studies, his lab has made important contributions by developing robust animal models of HAEC, creating and validating a murine histopathological enterocolitis scoring system to study the foundational biology of HAEC. His lab delineated the immunobiology of the immune disorder in HAEC, showing that lymphopenia is not a result of an endothelin and receptor signaling deficit but rather is secondary to endocrine physiologic and gut microbial alterations caused by intestinal stasis. Currently, Frykman works to characterize the intestinal bacterial and fungal microbiota of children with HSCR, with particular interest in defining the differences in those who develop HAEC. He also is examining the roles of fungi and antifungal innate immunity in HAEC. Frykman's lab is exploring targeted antifungal therapy as a novel, rational treatment for children suffering from HAEC.



**ALI KHOYNEZHAD, MD, PhD**  
*Director, Thoracic Aortic*  
*Surgery Program*

Khoynzhad's research focuses on reducing spinal cord injury after endovascular and open aortic operations. His team is evaluating pathophysiological pathways of aortic aneurysm and dissection as well as developing novel, standardized in vitro and in vivo models that can be translated into clinical practice. In vitro models are sensor-equipped and will display common diseases such as aneurysms and dissections of the aorta. The team also is investigating novel technologies to treat ascending aortic and aortic root disease, with the aim of improving indications for endovascular therapeutics. They are developing in vitro and in vivo testing of new endovascular or intracardiac treatment options for aortic disease and aortic valve disease, combining medical knowledge with advanced bioengineering.



**ERIC J. LEY, MD**  
*Director, Surgical Intensive Care Units*

Ley's investigations include in vivo and translational effects of beta-adrenergic blockade on traumatic brain injury. In addition, his clinical research includes optimizing resuscitation to improve outcomes after trauma and exploring discrepancies in complications and outcomes at teaching trauma centers versus non-teaching trauma centers.



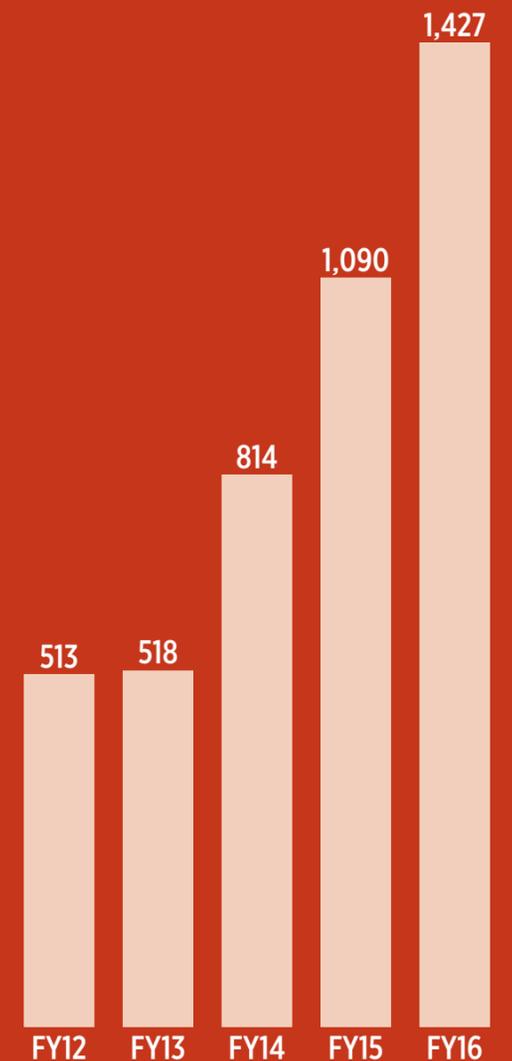
**WEI YANG, PhD**  
*Director, Biomarker Discovery Platform*

Yang's research focuses on developing and applying leading-edge proteomics technologies to discover novel cancer biomarkers; elucidating the molecular mechanisms underlying cancer progression to lethal diseases; and identifying novel anticancer therapeutic targets. His lab has developed powerful shotgun proteomics technologies that enable deep profiling and accurate quantification of the proteome, the palmitoyl-proteome and the phosphoproteome. Moreover, Yang and his colleagues have applied these leading-edge technologies to illuminate the molecular basis of cancer progression in cell culture models and determine the expression, palmitoylation and phosphorylation levels of thousands of proteins in formalin-fixed, paraffin-embedded cancer specimens, creating a treasure trove for cancer biomarker discovery.

5-YEAR TRENDS

PUBLICATIONS

**1,427**  
 RESEARCH  
 PUBLICATIONS  
 IN FY 2016



**W**ith some of the top clinical and research centers in women's health in the United States, Cedars-Sinai is uniquely positioned at the forefront of translational discovery to improve health and wellbeing for all women. Current areas of investigation include breast cancer, maternal-fetal medicine, reproductive endocrinology and fertility, women's cancers and women's heart disease. The associated clinics and laboratories are dedicated to elucidating diseases that affect women and exploring novel, gender-specific treatments and therapies.

The growing recognition that diagnosis, progression and treatment of disease can differ for men and women reinforces Cedars-Sinai's longstanding imperative to increase awareness of the need for female-specific research. The Barbra Streisand Women's Heart Center at the Cedars-Sinai Heart Institute, the Linda Joy Pollin Women's Health Program and Research for Her® are a few of the efforts at Cedars-Sinai that advance the understanding of women's health issues and provide further training in clinical care and research to medical students, residents, fellows and visiting faculty from around the world.

**CEDARS-SINAI  
BY THE NUMBERS**

**1,312**

RESEARCH STUDY  
PARTICIPANTS ENROLLED  
THROUGH CEDARS-SINAI'S  
RESEARCH FOR HER®



Cedars-Sinai transforms practices by responding to the growing body of scientific data that show the importance of gender balance in research.

FEATURED FACULTY



**SARAH J. KILPATRICK, MD, PhD**  
*Chair, Department of Obstetrics and Gynecology*  
*Associate Dean, Faculty Development*  
*Helping Hand of Los Angeles Chair in Obstetrics and Gynecology*

Kilpatrick is a nationally renowned expert in maternal-fetal medicine and women's health. Her specialties include high-risk pregnancy and preterm delivery as well as pregnancy complications such as diabetes, hypertension and thyroid disorders. Her research focuses on the management and outcomes of preterm birth, maternal morbidity and mortality, and hypertension in pregnancy.



**BETH Y. KARLAN, MD**  
*Director, Women's Cancer Program, Samuel Oschin Comprehensive Cancer Institute*  
*Board of Governors Chair in Gynecologic Oncology*

Karlan's research involves ovarian cancer-specific biomarkers for early detection, prognostication and targeted/individualized therapy, and inherited cancer susceptibility. Her current investigations include ovarian cancer molecular signatures, risk predictors and prevention, and BRCA-associated tumor biology. Under Karlan's leadership, the Women's Cancer Program works to bring the most innovative laboratory discoveries directly to women with breast or other gynecologic cancers.



**C. NOEL BAIREY MERZ, MD**  
*Director, Barbra Streisand Women's Heart Center*

Bairey Merz's research focuses on heart disease in women, preventive cardiology, coronary physiology/pathophysiology, advanced cardiac imaging and alternative/complementary medicine approaches to heart disease. Her current investigations include measuring the effects of traditional acupuncture on heart disease; reproductive hormones and preclinical cardiovascular disease; aldosterone blockade in women with heart disease; cardiac MRI; coronary microvascular disease and endothelial function; and estrogen levels and heart disease.



**SANDRA ORSULIC, PhD**  
*Director, Women's Cancer Biology, Samuel Oschin Comprehensive Cancer Institute*

Orsulic's research focuses on understanding the genetic and epigenetic changes leading to the initiation and metastatic spread of ovarian cancer; generating suitable preclinical models for testing therapies that target specific biochemical pathways; and identifying recognizable histological or molecular markers that could be used for early cancer detection. Her investigations include the development of animal models of ovarian cancer; molecular characterization of cooperating biochemical pathways in ovarian cancer initiation; and identification and functional characterization of key genes that promote ovarian cancer progression and metastasis.



**XIAOJIANG CUI, PhD**  
*Research Scientist, Women's Cancer Program, Samuel Oschin Comprehensive Cancer Institute*

Cui's primary focus is deciphering biochemical and genetic mechanisms of cancer metastasis and therapeutic resistance and utilizing them to identify markers for predicting metastasis risks and potential targets for therapeutic interventions. He is working to develop effective anticancer therapies based on these targets.



**MATTHEW SIEDHOFF, MD**  
*Research Scientist, Urogynecology and Pelvic Reconstructive Surgery*

Siedhoff's interests include studying patient outcomes, working with a local, national and international community of providers that treat benign gynecologic conditions, and providing patients with superior, personalized care. Siedhoff is a sought-after expert in evidence-based laparoscopic, hysteroscopic and robot-assisted surgery.



**CHRISTINE S. WALSH, MD**  
*Physician-Scientist, Division of Gynecologic Oncology*

Walsh examines the genomic and molecular pathogenesis of ovarian cancer to identify novel biomarkers for disease prediction and prognosis as well as targets for new treatment strategies. Her current investigations include studies of genes in DNA repair pathways and cell-signaling proteins. Walsh's goal is to identify novel molecular targets that can be inhibited in order to restore platinum sensitivity to chemo-resistant ovarian cancers and to improve the prognoses of women affected with this lethal malignancy.



**WOLF RUPRECHT WIEDEMEYER, PhD**  
*Research Scientist, Women's Cancer Program, Samuel Oschin Comprehensive Cancer Institute*

Wiedemeyer focuses on genes and molecular pathways that control proliferation and drug resistance in advanced epithelial ovarian cancer. He has a particular interest in cyclin E (CCNE1), a frequently amplified gene in serous ovarian cancers. Using genetic and pharmacological approaches, he investigates how CCNE1-amplified tumors can be targeted therapeutically. His lab uses mouse models of ovarian cancer, cell line models and xenografts of primary human ovarian cancers to study tumor evolution following targeted therapies.

Every year, the Cedars-Sinai Technology Transfer Office invests \$1 million in research and innovation through its Internal Project Fund. The fund has fostered development of more than 25 endeavors, leading to numerous breakthroughs. The Technology Transfer Office's focused use of this fund has resulted in a successful start-up, two executed licenses and two licenses currently under negotiation. Here are just a few examples of the pioneering advances facilitated by the Technology Transfer Internal Project Fund.

**IRRITABLE BOWEL SYNDROME DIAGNOSTICS**

*Fund Use:* Irritable Bowel Syndrome (IBS), which affects more than 40 million people in the United States, has historically been hard to diagnose. When a Cedars-Sinai gastroenterologist created two fast and accurate blood tests, the Technology Transfer Office provided funds for market research and licensing negotiations.

*Outcome:* The tests, now marketed as IBSchek™ by Commonwealth Laboratories, provide quick and concrete diagnosis of IBS and an important royalty stream to Cedars-Sinai. Royalties are expected to grow significantly over time.

**MECHANICAL VALVE REPLACEMENT DEVICE**

*Fund Use:* Mechanical devices are critical to keeping a patient's blood flowing while waiting for a donor heart. In some cases, they may even serve as a permanent replacement. The Technology Transfer Office engaged a clinical research organization to prototype a mechanical heart valve replacement device for testing in animal models.

*Outcome:* The prototype is in Phase II of refinement and testing. If results are positive, the office will present the device to leading companies for licensing consideration. A new company may be launched for production and marketing.

**NOVEL PANCREATIC CANCER INHIBITORS**

*Fund Use:* Pancreatic cancer's tendency to rapidly spread throughout the body makes it especially deadly. The Technology Transfer Office supported Cedars-Sinai's Pancreatic and Biliary Diseases Program in designing and synthesizing small-molecule drugs to target and treat pancreatic cancers.

*Outcome:* The program successfully designed and synthesized 10 novel drug compositions that could target cancerous cells. Tests indicated that one compound was especially effective in cells and animal models of pancreatic cancer.

**NEW THERAPEUTIC TARGET FOR IBS**

*Fund Use:* Investigators at Cedars-Sinai have identified a protein as a potential target for treating IBS. To help turn their ideas into therapies, the scientists engaged a contract research organization to design a drug-screening assay for identifying a small-molecule agonist capable of bonding with the protein.

*Outcome:* Discussions are underway with industry executives for a spin-off that will further develop the assay for drug screening and precision treatments for IBS.

**LUNG CANCER SCREENING**

*Fund Use:* The earlier lung cancer is diagnosed, the more lives can be saved. The Technology Transfer Office is supporting a proof-of-concept clinical trial that tests a novel assay's ability to detect early lung cancer using human sputum, the mix of saliva and mucus coughed up from the respiratory tract.

*Outcome:* The clinical trial was completed in March 2016. Preliminary analysis suggests that the new technology holds great promise as a next-generation diagnostic tool.

**3RD STREET DIAGNOSTICS**

*Fund Use:* Biomarkers and assays are crucial to achieving earlier and more accurate diagnoses of patients' conditions. To maximize the potential of these numerous and invaluable biological indicators developed in Cedars-Sinai's laboratories, the Technology Transfer Office sought ways to aid investigators in refining their innovations to aid patients more quickly.

*Outcome:* The Technology Transfer Office developed 3rd Street Diagnostics, a business unit to market existing biomarkers and assays developed at Cedars-Sinai to major diagnostic companies, as well as to license technologies from other academic institutions. 3rd Street Diagnostics is in the process of developing a revolutionary test for early detection of pancreatic cancer.



*“All of these ideas were either born or are being developed right here at Cedars-Sinai. It is our conviction that if we provide scientists and clinicians with extraordinary opportunities to follow educated hunches, the tools to test them and the resources to bring them to life, we can nurture ideas into real solutions that profoundly improve human life.”*

— SHLOMO MELMED, MD EXECUTIVE VICE PRESIDENT, ACADEMIC AFFAIRS AND DEAN OF THE MEDICAL FACULTY  
HELENE A. AND PHILIP E. HIXON DISTINGUISHED CHAIR IN INVESTIGATIVE MEDICINE

COVER ILLUSTRATION: FROM IMAGINATION TO INNOVATION BY GARY BASEMAN, LOS ANGELES, CALIFORNIA

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