Dear Colleague,

Cedars-Sinai Cancer took many exciting steps forward in 2019—including scientific discoveries that could transform cancer care far beyond our community, as well as expansion of our integrated clinical services to better meet the needs of highly diverse populations across Los Angeles.

This report highlights significant advances and strengths that contributed to the increase in our ranking in U.S. News & World Report’s “Best Hospitals of 2019-20” cancer category. We moved to 12th nationally, from 41st the year before, in rankings based on patient outcomes, patient safety, technology and reputation, among other measures.

Through an extraordinary level of innovation and collaboration in cancer biology, population science and experimental therapies, we are bringing new hope for longer survival and better quality of life to patients with the most complex and deadly cancers. Our investigators’ focus on maximizing the potential of precision medicine promises to revolutionize cancer science to advance methods of prevention, early detection and personalized therapy.

In addition to serving patients who come to our various locations for the latest treatments across the spectrum of cancer, we also reach out to diverse underserved communities through wide-ranging research and clinical initiatives dedicated to improving population health and overcoming cancer disparities.

Our exceptional team welcomes opportunities to collaborate in shaping 21st century cancer medicine. Feel free to contact me at cancerdirector@cshs.org. You can reach Cedars-Sinai Cancer physicians and researchers at 310-423-6324.

Sincerely,

Dan Theodorescu, MD, PhD
PHASE ONE Foundation Distinguished Chair
Director, Cedars-Sinai Cancer
Director, Samuel Oschin Comprehensive Cancer Institute
Professor of Surgery, Pathology and Laboratory Medicine
CANCER
HOPE

✿ Precision Imaging 4
Sharper MRIs
Head and Neck Cancers
Precision Lung Biopsies
Prostate Cancer Under Control

✿ Less Pain, More Gain 6
Leading the Robotics Revolution
Advanced Palliative Care
Latest Brachytherapy Techniques

✿ Next-Gen Therapies 8
Breaking Through the Blood-Brain Barrier
Combination Therapies
A Better Mouse Model
New Directions in Disease Modeling

✿ Fighting Disparities 10
LGBTQIA+ Outreach
Community Engagement
Cancer Screening in Korean Population
Colorectal Cancer in Latino Population
Precision Imaging

Innovations in oncologic imaging that enhance the power of precision medicine play a vital role in advancing every step of cancer care. At Cedars-Sinai, imaging scientists, radiation oncology experts and clinical scientists collaborate to develop new techniques for refining risk stratification, diagnosing cancer early, creating evidence-based treatment plans, delivering personalized therapies to precise targets, and guiding minimally invasive diagnostic and therapeutic procedures.

Sharper MRIs

**Novel Approach:** A clinical trial involving patients on prostate cancer active surveillance is evaluating the ability of a new three-dimensional, high-resolution, diffusion-weighted MRI sequence developed at Cedars-Sinai to detect changes not captured in standard two-dimensional diffusion-weighted imaging. This new technique sharpens image quality with at least a fivefold improvement in resolution.

**Potential Benefits for Patients:** Better imaging will help delineate tumor boundaries for more accurate staging. This technology could also assist clinicians in identifying tumor margins during partial-gland ablation by cryotherapy or high-intensity focused ultrasound (HIFU). And higher-resolution imaging could detect small changes in tumor size or grade over time, resulting in less reliance on serial transrectal biopsies.

**Also on the Horizon:** Research scientists at the Biomedical Imaging Research Institute (BIRI), in collaboration with urologic oncology investigators, developed a new MRI technology, MR Multitasking, to improve spatial resolution and eliminate motion-induced artifacts of prostate imaging while patients breathe freely during the scan. This technology eases the burden on patients who have difficulty with long breath holds and reduces scanning time while detecting subtle differences in tissue caused by cancer. It could prove to be applicable to any organ system and provide a valuable tool to diagnose, monitor and study a wide range of diseases.

Head and Neck Cancers

**Challenge:** Human papillomavirus (HPV)-positive oropharyngeal cancers are rising dramatically among older patients, and our researchers are working to reduce the burden of treatment on this vulnerable population.

**Strategy:** Our radiation oncologists are at the forefront of efforts to advance radiation therapy for head and neck cancers. They use the latest technology to enhance the targeting capacity of intensity-modulated radiotherapy. With better delineation of tumor target volumes, they are able to provide more precise, effective treatment with less toxicity to healthy tissues and structures.

**On the Horizon:** We are investigating whether radiation treatments can be de-intensified for older patients with HPV-related throat cancer to reduce side effects and improve quality of life, while still maintaining a high cure rate.
Precision Lung Biopsies

**LEADING-EDGE TECHNOLOGY:** Cedars-Sinai is among the first institutions in the nation to adopt the most advanced technology to perform robotic-assisted, minimally invasive peripheral lung biopsies.

**DETAILS:** Guided by a three-dimensional map of the lung and using ultrathin, flexible scopes on a platform that provides unprecedented stability, physicians are able to maneuver through very small airways that have not been accessible in conventional procedures. This technology is used not only to perform precise biopsies, but also to place fiducial markers for radiation therapy and remove small lung lesions.

**POTENTIAL BENEFITS FOR PATIENTS:** Diagnostic yields are much higher and the risk of complications such as a pneumothorax is lower with robotic-assisted navigational bronchoscopy than with computerized tomography (CT)-guided percutaneous lung biopsy.

Prostate Cancer Under Control

While we used to believe that patients who have received radiation to their prostate once can’t be retreated with radiation, new studies show this isn’t true. High-dose-rate brachytherapy can be used to safely and effectively retreat the prostate—either a focal area of recurrence or the whole gland. This technique allows escalation of dose directly to the tumor and sculpting of the dose away from normal tissues like the urethra, bladder and rectum. This helps to maximize control of the tumor while limiting any side effects to the nearby healthy tissues.

“Better imaging always leads to better treatment and outcomes.”

—Howard Sandler, MD, Ronald H. Bloom Family Chair in Cancer Therapeutics
Chair, Department of Radiation Oncology

**ALSO STUDYING:**

- The potential for an endobiliary brachytherapy boost to improve outcomes for patients with cholangiocarcinoma.
- The value of MRI-based radiomics of the pancreas to identify imaging characteristics such as texture, shape and signal intensity that can assist in earlier diagnosis as well as prognosis and management of pancreatic cancer.
- The potential of MRI-targeted transrectal prostate biopsy as a tool for identifying lower-risk patients appropriate for active surveillance or focal therapy.
- A system that combines two kinds of imaging—high-resolution MRI technology developed at Cedars-Sinai and positron emission tomography (PET-MRI)—with HIFU to diagnose and remove aggressive prostate tumors.
- Integration of PET/MR/CT imaging and genomic information to enable clinicians to tailor treatment to specific disease subtypes.

LEADERS

Mitchell Kamrava, MD
Radiation Oncologist, Department of Radiation Oncology

Hyung L. Kim, MD
Homer and Gloria Harvey Family Chair in Urologic Oncology in honor of Stuart Friedman, MD
Director, Academic Urology Program
Co-medical Director, Urologic Oncology Center
Associate Director, Surgical Research in the Samuel Oschin Comprehensive Cancer Institute

Debiao Li, PhD
Karl Storz Chair in Minimally Invasive Surgery in honor of Dr. George Berci
Director, Biomedical Imaging Research Institute

Howard Sandler, MD
Ronald H. Bloom Family Chair in Cancer Therapeutics
Chair, Department of Radiation Oncology
Less Pain, More Gain

CEDARS-SINAI CANCER 2019 YEAR IN REVIEW

Cedars-Sinai has long been a pioneer in developing minimally invasive procedures to improve outcomes and quality of life for patients. In cancer care, we continue to lead with early adoption of the latest robotic surgery technology as well as targeted techniques such as brachytherapy, which kills cancer cells while reducing the burden of treatment on patients.

Advanced Palliative Care

Our comprehensive approach to cancer care includes highly advanced palliative treatment that improves comfort and quality of life for patients. We use the latest endoscopic photodynamic therapy techniques to relieve airway stenosis for patients with lung and esophageal cancer, so they can breathe easier and swallow more comfortably. This targeted endoscopic procedure, usually performed on an outpatient basis, is minimally invasive and can be repeated if needed to ease symptoms for patients.

Leading the Robotics Revolution

INNOVATION: The Cedars-Sinai Division of Thoracic Surgery has developed a world-class robotic lung and esophageal surgery program using the latest emerging technologies. Our robotics experts have achieved oncologic outcomes on par with open surgery and video-assisted thoracoscopic surgery (VATS) while improving outcomes.

BENEFITS FOR PATIENTS: Our results show that length of stay is lower for patients after robotic lobectomy than after open surgery or VATS. Robotics technology provides greater magnification and dexterity that improves lymph node harvesting, increasing understanding of final pathologic lymph node status for more accurate staging and long-term treatment planning. This technology also results in less postoperative pain and faster recovery.

TRAINING RESOURCE: We provide advanced training as a part of a select group of Catalyst-designated observation sites to help surgeons from other parts of the nation and the world learn the latest techniques for robotic-assisted lobectomies and esophagectomies. We not only share technical expertise but also serve as a role model for performance improvement with a program that has achieved a high level of teamwork, standardization of procedures and protocols, and operating room efficiency.

### Length of stay (median days)

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Length of Stay (median days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open</td>
<td>7.0</td>
</tr>
<tr>
<td>VATS</td>
<td>3.1</td>
</tr>
<tr>
<td>DaVinci RAS</td>
<td>2.4</td>
</tr>
</tbody>
</table>

### In-hospital complications (%)

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Complications (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open</td>
<td>12.5</td>
</tr>
<tr>
<td>VATS</td>
<td>1.4</td>
</tr>
<tr>
<td>DaVinci RAS</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Robotic surgeries shorten hospital stays and reduce complications.
Latest Brachytherapy Techniques

PROMISING APPROACH: Among the leading-edge radiation oncology options we offer is electronic intraoperative breast brachytherapy for appropriate candidates with early-stage cancer who undergo breast-conserving therapy. This allows us to complete radiation at the same time as breast surgery.

DETAILS: During breast surgery, radiation is delivered directly to the cavity where the tumor was removed over about 15 minutes. This allows the radiation to be focused on killing tumor cells where they are most likely to be and limiting radiation exposure to the rest of the healthy breast, as well as the lungs and heart.

POTENTIAL BENEFITS FOR PATIENTS: This technique provides a conformal dose to targets while limiting dose to surrounding organs to ensure greater safety and fewer side effects than in traditional external beam radiotherapy. It’s also more convenient for patients, with the entire course of radiation completed in one brief treatment during surgery rather than over a period of weeks.

ALSO ON THE HORIZON: We are increasing the use of MRI-based planning in conjunction with brachytherapy to effectively treat locally advanced cervical cancer and recurrent endometrial cancer. This approach improves the chances of controlling cancer and limiting the risk of side effects. Brachytherapy is also a valuable tool for treating skin and gastrointestinal cancers (esophageal, rectal, cholangiocarcinomas and hepatocellular cancers).

ALSO STUDYING:

✱ The use of cryoablation to treat small, low-risk breast tumors. Investigators are planning clinical trials to study this procedure as an alternative to breast surgery.
✱ The latest techniques for minimally invasive, nonsurgical approaches to treating tumors of the bone, kidney, liver, lung and spine—including chemoembolization, ethanol ablation, microwave ablation and radioembolization.
✱ How use of immunotherapy agents could alter the role of surgery in bladder cancer.
✱ Laparoscopic and robotic approaches to surgical treatment of urologic cancer.
✱ HIFU as an alternative to surgery for cancer confined to the prostate.
✱ A new, noninvasive, early-detection method of screening for lung cancer that could be more effective and safer than radiographic techniques that expose patients to potentially harmful radiation.
✱ Active surveillance as an option for treatment of thyroid cancer. Cedars-Sinai is the first West Coast hospital to investigate this wait-and-see approach as an alternative to surgery. We also have extraordinary expertise in transoral robotic surgery and minimally invasive thyroidectomy approaches.
CEDARS-SINAI CANCER 2019 YEAR IN REVIEW

Combination Therapies

CEDARS-SINAI researchers are shaping 21st century cancer medicine by developing biological therapies and techniques to maximize treatment efficacy and minimize toxicity. Through multidisciplinary research in such areas as precision medicine, nanomedicine, immunotherapy and stem cell science, we are making strides toward destroying or slowing the growth of malignant tumors and preventing metastasis of the deadliest cancers.

**Combination Therapies**

**NOVEL APPROACH:** Use of combination treatment strategies can enhance responses to immune therapy, and we are exploring this approach to more effectively treat a number of cancers—including breast cancer, which tends to be resistant to monotherapy with checkpoint inhibitors.

**PROMISING COMBINATIONS:** We are leading a large multicenter study exploring the use of cryoablation with immune therapy to treat triple-negative breast cancer. We are also studying the effectiveness of combining immunotherapy with chemotherapy plus HER2-directed therapy prior to surgery to improve cure rates for HER2-positive breast cancer.

**ALSO ON THE HORIZON:** Cedars-Sinai researchers are investigating the potential to generate a greater anti-tumor immune response, induce long-term tumor-specific memory, and improve outcomes for operable triple-negative breast cancer and hormone receptor positive disease by combining preoperative radiation therapy with pembrolizumab (pembro)-mediated immune modulation.

**Breaking Through the Blood-Brain Barrier**

**BIG PICTURE:** Our researchers have been instrumental in developing new nanotechnologies for drug delivery and targeted nanomedicine drugs to expand treatment options for cancers largely incurable with current therapies.

**MILESTONE:** A recent advance addresses the problem of how to deliver anti-cancer drugs across the blood-brain barrier to treat glioblastoma multiforme. Researchers succeeded in traversing the blood-brain barrier in laboratory mice with targeted nanoscale immunoconjugates that activated a whole-body as well as a local immune response in brain tissue surrounding the tumors. The tumor cells stopped multiplying and survival rates increased when anti-CTLA-4 and/or anti-PD-1 antibodies were attached with a natural biopolymer to a protein or peptide that enabled these checkpoint inhibitors to cross the blood-brain barrier.

**ALSO ON THE HORIZON:** Another promising Cedars-Sinai contribution to this field is the development of nanomedicines to treat HER2-positive breast cancer and its brain metastases using advanced methods of targeted drug delivery in combination with immunotherapy.
LEADERS

Julia Ljubimova, MD, PhD
Director, Nanomedicine Research Center in the Maxine Dunitz Neurosurgical Research Institute

Heather McArthur, MD, MPH
Breast Oncologist

Alain Mita, MD
Co-director, Experimental Therapeutics

Monica Mita, MD
Co-director, Experimental Therapeutics

Clive Svendsen, PhD
Kerry and Simone Vickar Family Foundation Distinguished Chair in Regenerative Medicine Director, Board of Governors Regenerative Medicine Institute

A Better Mouse Model
A new genetic engineering technique (mosaic analysis with dual recombinase-mediated cassette exchange, or MADR) reproduced in animal models the complex gene expression patterns and pathology found in tumors of patients with pediatric glioma. MADR allows for flexible and consistent somatic transgenesis and addresses the need for disease models that reflect the spectrum of heterogeneity of tumors.

New Directions in Disease Modeling

BIG PICTURE: Cedars-Sinai is one of the world’s leading providers of human induced pluripotent stem cells (iPSCs), and we are using this technology to create disease models for research that could lead to new techniques for predicting, detecting and treating various types of cancer.

PROMISING DEVELOPMENT: Through in vitro conversion of iPSCs to a 3D fallopian tube epithelium (FTE) organoid model, our researchers have significantly enhanced the ability to study FTE transformation, and initiation and progression of high-grade serous ovarian cancer. Investigators in the Women’s Cancer Program are looking for novel biomarkers of early FTE cell alterations that lead to ovarian cancer in BRCA1/BRCA2 mutation carriers with the goal of early detection and targeted chemoprevention in the patients at highest risk.

ALSO ON THE HORIZON: Investigators in the Women’s Cancer Program and the Board of Governors Regenerative Medicine Institute have successfully developed a protocol to generate human mammary-like organoids from iPSCs for the study of breast cancer development. This disease-modeling technique creates the potential for personalized bioengineering of mammary tissue and the use of autologous grafts to improve outcomes in breast reconstruction.

ALSO STUDYING:

🌟 Targeted therapies for pancreatic cancer. Cedars-Sinai is one of the Clinical Trial Consortium sites in the Pancreatic Cancer Action Network’s Precision Promise Initiative, launched in 2019 to improve outcomes through multiple initiatives—including development of medications to prevent metastasis and drug resistance.

🌟 Genes associated with increased risk of ovarian cancer. In collaboration with other institutions, our researchers have identified 34 genes linked to higher risk for developing the earliest stages of ovarian cancer. This paves the way to identifying new therapies that can target these specific genes.

🌟 The immune-modulating properties of traditional cytotoxic drugs and newer targeted agents that could pave the way for combination therapies—including cancer vaccines.

🌟 How to engineer nanodrugs to adjust for individual tumor genome/proteome profiles for treatment of primary tumors and prevention of cancer recurrence.
There is no better laboratory for population science that addresses cancer disparities at a grassroots community level than a city as diverse as Los Angeles. Cancer surveillance and behavioral risk factor data have helped identify the following populations as experiencing a disproportionate burden of cancer: African American, Korean, Hispanic/Latino, Filipino and LGBTQIA+. The Cedars-Sinai Research Center for Health Equity at the Samuel Oschin Comprehensive Cancer Institute is engaged in a wide range of evidence-based, cancer-control programs to alleviate the disproportionate burden of cancer in these high-risk populations.

**LGBTQIA+ Outreach**

**BIG PICTURE:** Los Angeles has the second-largest and most diverse LGBTQIA+ population in the United States. Concentrated near Cedars-Sinai around West and East Hollywood and Koreatown, this community faces high rates of lung, breast, cervical and liver cancer as well as increasing rates of HPV-related cancers of the head, neck and anus, and elevated risk of later-stage diagnosis.

**PREVENTION:** Cedars-Sinai physicians provide HPV-prevention outreach at LGBTQIA+ Pride events in Los Angeles, and our community outreach team makes referrals to local gender-affirming healthcare providers for vaccinations and screenings. We are also working to improve care through measures such as adapting cancer screening guidelines for the trans population.

**ON THE HORIZON:** With guidance from our LGBTQIA+ Community Advisory Board and Cedars-Sinai researchers, clinicians and community outreach professionals, we are developing an LGBTQIA+ Center of Excellence that represents a major initiative to address cancer and other health disparities in this population through education, screening, policy and research.

**Community Engagement**

✱ Created the Health and Faith Initiative in collaboration with African American, Latino, Korean and Filipino churches in the greater L.A. area, as well as other community organizations, to deliver culturally sensitive talks—in their language—about population-specific cancer risk and prevention, and to connect people with local community health clinics for free or low-cost screenings.

✱ Established the South Los Angeles Cancer Coalition, a group of 15 community organizations that is strategizing to address late-stage diagnosis of lung cancer among African Americans.

✱ Formed a community advisory group to inform data-collection efforts aimed at developing culturally tailored interventions to reduce the high rate of colorectal cancer among Filipino men.

✱ Developed a train-the-trainer curriculum for health workers to increase understanding of precision medicine in at-risk communities and encourage health provider discussions on family history, genetic testing and cancer screening.
“We spent most of our lives not talking about cancer with anyone.”
—Myong Shim Lee, who participated in a cancer-education workshop at Los Angeles Onnuri Church in Koreatown and now advocates for cancer screenings in her community

Cancer Screening in Korean Population

**BIG PICTURE:** Los Angeles has the largest population of Koreans outside the Korean Peninsula, and this community faces elevated risk for a number of cancer types—including colorectal, lung, colon and breast cancers. Among the key issues that emerged in our baseline survey of the local Korean immigrant community was an extremely low breast cancer screening rate that puts Korean American women at greater risk for a late-stage diagnosis.

**OBSTACLES:** These immigrants face obstacles such as lack of health insurance and access to care, fear of being embarrassed or hearing bad news, language barriers and lack of information on screening guidelines.

**OUTREACH AND RESEARCH:** Through churches in Koreatown, we offer education on prevention and screenings as well as referrals to health clinics for screenings. We are laying the groundwork for basic science based on biospecimens from patients of Korean descent. Our advanced capabilities in stem cell science create the potential to develop induced pluripotent stem cells that could be engineered into patient-specific mammary organoids to study genetic risks and develop strategies for predicting and treating breast cancer in this population.

4.7% Breast cancer rates for Korean American women increased by 4.7% each year from 1990 to 2005.

Colorectal Cancer in Latino Population

**BIG PICTURE:** Cancer is the leading cause of death among U.S. Latinos, and colorectal cancer is the second most common and fatal cancer in this population.

**DETAILS:** Latinos have a high burden of early-onset colorectal cancer and tend to have more advanced disease when they are diagnosed compared to non-Hispanic whites. They also have a lower rate of screening and a slower decline in mortality rates.

**RESEARCH:** Through the Hispanic Colorectal Cancer Study, we are examining genetic susceptibility to this cancer as well as gene-environment interactions and other risk factors in a population that has been dangerously underrepresented in research. The study is the largest of its kind, with nearly 2,000 patients.
CANCER
RESULTS

✱ Metrics 14
Clinical Volume
Clinical Trials
Top Cancers Treated
by Anatomic Site
Research Programs Membership
Grant Funding
Patents and Disclosures
Publications
Community Outreach
and Engagement

✱ Notable Developments 18

✱ Grants, Awards,
Recruitments 20
Awards and Recognition
Notable Grants
Recruitments

✱ High-impact Publications 22

✱ Care Team Locations 24
### Clinical Volume

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer Patients Seen in FY2019</td>
<td>27,326</td>
</tr>
<tr>
<td>Cancer Surgeries</td>
<td>3,926</td>
</tr>
<tr>
<td>IP Cancer Discharges</td>
<td>3,498</td>
</tr>
<tr>
<td>OP Chemotherapy/Infusion Visits</td>
<td>35,064</td>
</tr>
<tr>
<td>OP Radiation Oncology Visits</td>
<td>22,959</td>
</tr>
<tr>
<td>OP Cancer Clinic Visits</td>
<td>55,512</td>
</tr>
<tr>
<td>OP Cancer Other Ancillary Visits</td>
<td>38,790</td>
</tr>
</tbody>
</table>

### Torrance Memorial Visits

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP Cancer Clinic Visits</td>
<td>25,532</td>
</tr>
<tr>
<td>OP Chemotherapy/Infusion Visits</td>
<td>10,131</td>
</tr>
</tbody>
</table>

### Clinical Trials

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investigator Initiated Trials</td>
<td>29</td>
</tr>
<tr>
<td>Investigational New Drugs</td>
<td>17</td>
</tr>
<tr>
<td>Phase I trials</td>
<td>13</td>
</tr>
</tbody>
</table>

- IIT’s in which Cedars-Sinai/PI holds the IND
- Active Phase 1 Trials 152 accruals in 2019

<table>
<thead>
<tr>
<th>Accruals:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Interventional Treatment Trial Accrual for CY2019:</td>
<td>389</td>
</tr>
<tr>
<td>Interventional (Non-Treatment) Trial Accrual for CY2019:</td>
<td>74</td>
</tr>
</tbody>
</table>
Top Cancers Treated by Anatomic Site

Total Newly Diagnosed Patients

4,736
Research Programs Membership

<table>
<thead>
<tr>
<th></th>
<th>CANCER BIOLOGY PROGRAM</th>
<th>CANCER PREVENTION AND CONTROL PROGRAM</th>
<th>TRANSLATIONAL ONCOLOGY PROGRAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Members</td>
<td>24</td>
<td>17</td>
<td>47</td>
</tr>
<tr>
<td>Associate Members</td>
<td>15</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
<td>22</td>
<td>60</td>
</tr>
</tbody>
</table>

Grant Funding* (Project Direct Costs)

<table>
<thead>
<tr>
<th></th>
<th>FY18</th>
<th>FY19</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCI Peer-Reviewed Projects</td>
<td>$7,704,334</td>
<td>$9,490,688</td>
<td>↑23%</td>
</tr>
<tr>
<td>Other NIH Peer-Reviewed Projects</td>
<td>$4,554,404</td>
<td>$5,061,689</td>
<td>↑11%</td>
</tr>
<tr>
<td>Other Peer-Reviewed</td>
<td>$3,775,679</td>
<td>$3,352,373</td>
<td>↓11%</td>
</tr>
<tr>
<td>Other Non-Peer-Reviewed</td>
<td>$1,192,285</td>
<td>$1,065,648</td>
<td>↓11%</td>
</tr>
<tr>
<td>Grand Total (All Projects)</td>
<td>$17,226,702</td>
<td>$18,970,397</td>
<td>↑10%</td>
</tr>
</tbody>
</table>

*Includes research and training grants

Patents and Disclosures

<table>
<thead>
<tr>
<th>PATENTS</th>
<th>DISCLOSURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>Assessment</td>
</tr>
<tr>
<td>Europe</td>
<td>Licensed (Exclusive)</td>
</tr>
<tr>
<td>Total</td>
<td>Marketing</td>
</tr>
</tbody>
</table>

6
Publications

<table>
<thead>
<tr>
<th></th>
<th>FY18</th>
<th>FY19</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>247</td>
<td>257</td>
</tr>
<tr>
<td><strong>Intra-Programmatic</strong></td>
<td>26%</td>
<td>26%</td>
</tr>
<tr>
<td><strong>Inter-Programmatic</strong></td>
<td>18%</td>
<td>17%</td>
</tr>
<tr>
<td><strong>Collaborative</strong></td>
<td>35%</td>
<td>34%</td>
</tr>
<tr>
<td><strong>High Impact</strong></td>
<td>12%</td>
<td>11%</td>
</tr>
</tbody>
</table>

**Notes:**
The intra-/inter-programmatic publication counts are included in the intra-programmatic and inter-programmatic publication counts.
Collaborative metrics capture collaborations between Cedars-Sinai Cancer members.
High-impact publications are publications in journals with impact factors greater than 15.

Community Outreach and Engagement

<table>
<thead>
<tr>
<th>Population at Risk</th>
<th>Science-Based Cancer Information Dissemination</th>
<th>Number of Participants in Interventions</th>
<th>Number of Events</th>
<th>Number of Participants in Cancer-Screening Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Korean American Adults in Greater Los Angeles</td>
<td>1,061</td>
<td>587</td>
<td>16</td>
<td>49</td>
</tr>
<tr>
<td>Latino/Hispanic Adults</td>
<td>1,195</td>
<td>651</td>
<td>18</td>
<td>147</td>
</tr>
<tr>
<td>Total</td>
<td>2,256</td>
<td>1,238</td>
<td>34</td>
<td>196</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Population at Risk</th>
<th>Intervention</th>
<th>Total LGBTQIA+ Community Members Counseled</th>
<th>Total Referred to Gender-affirming Clinics</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGBTQIA+</td>
<td>Use of counseling, small media and referral to local gender-affirming healthcare providers to obtain vaccinations and anal cancer screenings</td>
<td>768</td>
<td>250</td>
</tr>
</tbody>
</table>
**CLINICAL INFRASTRUCTURE**

✱ **Major Cancer Center Opens in South Bay** The 38,000-square-foot Donald and Priscilla Hunt Cancer Center opened at Torrance Memorial Medical Center, a Cedars-Sinai affiliate, in December 2019. The center offers specialized care for more than 60 types of common, rare and complex cancers as well as access to clinical trials. It opens the door for greater collaboration as Cedars-Sinai and Torrance Memorial share cancer expertise, innovations and resources to achieve the best possible outcomes for patients.

✱ **The Angeles Clinic & Research Institute Expands** The Angeles Clinic & Research Institute, a Cedars-Sinai affiliate that develops new therapies and provides personalized care for many cancer types, has nearly completed a 38,000-square-foot expansion and renovation at 11800 Wilshire Blvd. The project includes expansion of the infusion and research centers and the addition of a surgical oncology suite as well as a CT/SPECT and interventional radiology suite. The renovations are expected to be completed in spring 2020.

✱ **San Fernando Valley** We now offer specialized treatment for all cancer types in the San Fernando Valley, ensuring a continuum of comprehensive, multidisciplinary care during every phase of the healing process. Our medical building in Tarzana houses a number of specialties, including Medical Oncology/Hematology, Breast Cancer Surgery and Radiation Oncology as well as Gynecological Oncology, Family Medicine and Orthopaedics.

✱ **State-of-the-Art Radiation Oncology Services** Our new Radiation Oncology center in Tarzana is equipped with the most current technologies to deliver precise treatment for a wide range of cancers, including the most complex cases. Our team is skilled in a range of specialized procedures, including SpaceOAR Hydrogel, Deep Inspiration Breath Hold, the Varian TrueBeam Linear Accelerator and an Olympus Endoscopy tower.

✱ **Renovations Enhance Cancer Services in Beverly Hills** Cedars-Sinai Tower Hematology Oncology Medical Group, an affiliate of the Samuel Oschin Comprehensive Cancer Institute, has completed renovations that include doubling the size of its infusion area and expanding its pharmacy and lab spaces in Beverly Hills. The diverse group of specialists in this research-based practice addresses the full spectrum of oncology and hematology problems.

**OPENING SOON**

✱ Preparations are underway to move into a new 44,000-square-foot cancer center in summer 2020. The state-of-the-art facilities in the Advanced Health Sciences Pavilion at Cedars-Sinai will include a fully automated lab with the latest technology and a pharmacy to support chemotherapy and cellular therapy protocols. There will also be a nurse visit room to expedite appointments and an interactive playroom for pediatric patients.

✱ We are creating a new Breast Health Center scheduled for completion by spring 2020 featuring 30,000 square feet of the latest in breast imaging, staffed by specialized breast surgical and medical oncologists. The space will feature a boutique for women with specialists to fit wigs, mastectomy garments and much more, as well as mult specialist areas to provide patients with other services such as yoga classes, lymphedema programs and a zen garden—all located in a newly renovated building to aid in the recovery of breast cancer patients.
RESEARCH INFRASTRUCTURE

- The Cedars-Sinai Board of Governors Innovation Center, now in development at the Pacific Design Center, will provide the tools clinical scientists need to take the science of personalized medicine to the next level. Investigators will have access to the most advanced technology available to identify the genomic profile of various cancers and other illnesses and develop customized therapies targeting those specific disrupted genes or cell functions. They also will focus on new tools for assessing a patient’s disease risks so physicians can prevent, detect and diagnose illnesses earlier.

STRATEGIC INITIATIVE DEVELOPMENT

- Hematology-Oncology Division Reorganized
  We have restructured the Hematology-Oncology Division by establishing two divisions, Hematology-Cell Therapy and Medical Oncology, in order to grow clinical volumes and clinical and translational research.

- Boost for Data Science
  We initiated development of an institutional Data Sciences Center that will strengthen our ability to predict, identify and treat cancer, and will also serve the entire Cedars-Sinai community.

COMPANY NEWS

- New Mass Cytometry Core
  The Mass Cytometry Core was established in summer 2019 to house CyTOF and Hyperion technology—a major advance for immunology and inflammation researchers at Cedars-Sinai in addition to those studying cancer immunology.

EDUCATION AND TRAINING

- New Career Development Programs Launched
  Among new education programs launched in 2019 are the K Club, which promotes junior faculty development; Be a Blessing: Bringing Cancer Research to the School and Community, which offers summer internship opportunities to high school students; and a program to train community health workers. We also established a Cancer Clinical Scientist Development Award to motivate clinicians to conduct research.

CLINICAL TRIALS

- Creating a Hub for Clinical Trials
  We have reorganized the Cedars-Sinai Cancer Clinical Trials Office to create an optimal structure for a hub of networked clinical trials serving the entire Cedars-Sinai Health System. At any given time, we have approximately 140 cancer clinical trials in progress. The highly trained professional research personnel in this central office support faculty and industry sponsors throughout the lifecycle of a protocol.

- Standardizing Protocols
  As part of our ongoing effort to ensure the highest-quality cancer care and research, we have standardized systemic oncology therapy treatment protocols systemwide for over 500 standard-of-care protocols and over 100 research clinical trials.

- Elected to International Research Consortium
  Cedars-Sinai Cancer was elected as a new member of the Myeloproliferative Neoplasm Research Consortium (MPN-RC). The MPN-RC is an international, multi-institutional nonprofit consortium funded by the National Cancer Institute to coordinate, facilitate and perform basic and clinical research investigating the genetic and cellular mechanisms of Philadelphia chromosome (Ph) negative myeloproliferative neoplasms. The goal is to develop novel therapeutic strategies to improve the management of patients with these types of diseases.

CLINICAL SERVICE LINE

- Enhancing Patient Support and Infrastructure
  We have established new patient and family support services across the health system. We also initiated development of infrastructure for Commercial and Research CAR-T Cell Therapy with expected opening in the second quarter of FY2020.
Awards and Recognition

✱ Arash Asher, MD, received the Spirit of Hope Award from the Magnolia Council of the Tower Cancer Research Foundation for his work as the director of Cancer Survivorship and Rehabilitation at Cedars-Sinai Cancer and development of unique cancer survivorship programs including Emerging from the Haze and the GRACE program.

✱ Mark Faries, MD, was commended for his commitment and contribution to Cancer Care Ontario’s Program in Evidence-based Care. Faries was specifically recognized for his participation as a targeted peer reviewer on GL #8-6 Version 2 surgical management of patients with lymph node metastases from cutaneous melanoma of the trunk or extremities.

✱ Jayoung Kim, PhD, received the 2019 Korean-American Women in Science and Engineering Outstanding Woman Scientist Award.

✱ Zul Surani received the Tower Cancer Research Foundation Award for LGBTQ Initiatives.

✱ Dan Theodorescu, MD, PhD, Phase ONE Foundation Distinguished Chair in Oncology and director of Cedars-Sinai Cancer, was selected by the Society for Basic Urologic Research to be its 2019 Meritorious Achievement Award Winner. Theodorescu was also elected to the Association of American Physicians.

✱ Cedars-Sinai Cancer’s ranking rose in U.S. News & World Report’s “Best Hospitals 2019-20” from No. 41 to No. 12 in the nation.

Notable Grants

✱ The National Cancer Institute awarded a five-year PO1 grant to our Liver Metastasis Working Group for the only coordinated, multi-investigator effort nationwide to focus on the causes of and approaches to addressing liver metastasis from cancers of the prostate, pancreas and colon. Successful completion of this research program will lead to new treatment targets for patients with liver metastasis.

✱ A scientific team led by Cedars-Sinai investigators received a $10 million grant from the U.S. Department of Defense to study risk factors and behaviors that contribute to pancreatic diseases and to develop potential treatments and lifestyle recommendations to prevent them. Investigators will examine how certain types of pancreatitis develop due to lifestyle factors such as alcohol abuse and smoking. Their goal is to use this enhanced understanding to develop new experimental therapeutics to prevent the development of pancreatic cancers.

✱ With funding from a National Cancer Institute T32 grant, we have established a postdoctoral research fellowship program in prostate cancer that provides training in translational, transdisciplinary research related to prostate cancer biology, disease intervention and prevention. Fellows are mentored by our leading clinical scientists as they develop grant proposals, conduct research and write papers for high-impact publications.
Recruitments

We recruit the best of the best in all areas of cancer care and research to leverage our existing strengths and take on new challenges. For example, among our most recent recruits is a stellar team of population health and cancer disparities experts who are aggressively fighting cancer at the community level to improve health equity for underserved populations.

We have also established numerous multidisciplinary disease research groups to build and maintain a portfolio of high-quality cancer studies. They work together to enhance clinical research outcomes and make the most promising new cancer therapies available to patients at an accelerated pace. Every new recruit strengthens our ability to advance medical science in ways that align with National Cancer Institute priorities for clinical cancer research.

Appointments and Executive Recruitments

Joan August, MS
Vice President for Cedars-Sinai Cancer

Marie Malikowski, MHA, RN
Executive Director of the CCTO

Zul Surani
Associate Director for Community Outreach and Engagement, Cedars-Sinai Cancer

Warren Tourtellotte, MD, PhD
Associate Director for Shared Resources, Cedars-Sinai Cancer

New Recruitments

Katelyn Atkins, MD, PhD
Staff Physician I, Radiation Oncology

Natasha Banerjee, MD
Hematology/Oncology Specialist
Valley Oncology Medical Group

Yufei Chen, MD
Staff Physician I, Surgery

Justin Darrah, MD
Staff Physician I, Medicine

Catherine Grasso, PhD
Research Scientist I, Surgery

Monica Jain, MD
Staff Physician I, Surgery

Akil Merchant, MD
Staff Physician II, Medicine
Director of Mass Cytometry Core

Surasak Phuphanich, MD
Staff Physician III, Medicine

Nathan Punwani, MD, MPH
Staff Physician I, Medicine

Charles Rosser, MD, MBA
Staff Physician II, Surgery
Medical Director, CCTO

Keith Syson Chan, PhD
Research Scientist II, Pathology

Kristin Taylor, MD
Staff Physician I, OB/GYN

James Turkson, PhD
Research Scientist III, Medicine

Ju Dong Yang, MD
Staff Physician I, Medicine


INDEX: Names in bold purple are Cancer Biology; names in bold green are Cancer Prevention and Control; names in bold blue are Translational Oncology.

### Funding Highlights

✱ Increased cancer research funding by 10%
✱ Increased NCI peer-reviewed funding by 23%
✱ Awarded first cancer-focused training grant: NCI T32 Multidisciplinary Training Program in Prostate Cancer
✱ 11 new cancer-focused awards from DOD
✱ More than 20 multi-project grants including seven U-series grants, four P01s, and more than half a dozen multi-PI R01 and DOD awards
✱ Submitted numerous complex proposals including two multi-project competitive P01s to NCI, 10 multi-PI applications, and one T32 institutional training application. Three are funded and eight are pending review.
✱ Provided seed funding totaling $560,000 to support new multi-PI/team/SPORE development projects.
If you have a patient you would like to refer to one of our programs, please contact us at 310-423-8030 or visit cedars-sinai.org/cancer. Our physicians will work with you to understand the unique needs of your patient and develop the best treatment plan—and will be available for additional consultations and procedures as needed.

Our care teams are committed to making the path to treatment easier for all patients. We provide locations throughout the greater Los Angeles area, including some that are open 24 hours a day.

Beverly Hills
Cedars-Sinai Cancer
200 N. Robertson Blvd.
Beverly Hills, CA 90211

Tower Hematology Oncology
9090 Wilshire Blvd.
Beverly Hills, CA 90211

Los Angeles
Samuel Oschin Comprehensive Cancer Institute and Center
8700 Beverly Blvd.
Los Angeles, CA 90048

The Angeles Clinic and Research Institute
11800 Wilshire Blvd.
Los Angeles, CA 90025

Marina del Rey
Marina del Rey Hospital
4650 Lincoln Blvd.
Marina del Rey, CA 90292

Santa Monica
The Angeles Clinic and Research Institute
1919 Santa Monica Blvd.
Santa Monica, CA 90404

Tarzana
Cedars-Sinai Cancer
18133 Ventura Blvd.
Tarzana, CA 91356

Torrance
Torrance Memorial
Hunt Cancer Institute and Center
3330 Lomita Blvd.
Torrance, CA 90505

West Hills
Cedars-Sinai Cancer
23101 Sherman Pl.
West Hills, CA 91307

We are continually expanding. Call us at 1-800-CEDARS-1 or visit cedars-sinai.org for our most up-to-date locations. To find a doctor at Torrance Memorial, call 310-891-6717 or visit torrancememorial.org