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These seven programs lie at the heart of the cancer center's mission to move cancer research forward.

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Pooled expertise enhances the rigor, quality and capacity of our research.

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The Of ce of Cancer Disparities Research focuses on groups where cancer hits hardest.

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With support from the Case Cancer Council, researchers investigate some of cancer's greatest mysteries.

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The Of ce of Cancer Trainee Education and Research equips students and faculty with the skills they need to move medicine forward.

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Investigators set their sights on improving the treatment of brain tumors and cancers that strike women, teens and young adults.

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Three new cutting-edge additions advance cancer care throughout the region.



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a t r o i t t i a l a r t i

LEADERS

Sanford D. Markowitz, MD, PhD
Zhenghe John Wang, PhD

This program is dedicated to translating basic science discoveries of genetic and epigenetic causes of GI cancers into novel approaches for risk assessment, detection, prevention and treatment.

The program's ab10zv

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LEADERS

Alexandru Almasan, PhD

Bingcheng Wang, PhD





Hematopoietic Oncology

LEADERS

Jaroslav P. Maciejewski, MD, PhD
Marcos de Lima, MD • Alex Y. C. Huang, MD, PhD

This research program is dedicated to improving the understanding of molecular pathogenesis and characterization of hematopoietic disorders through research that investigates the evolution of hematologic neoplasms and the role of the immune system in cancer immune response. The goal is to translate laboratory findings into innovative, patient-specific approaches for diagnosis and therapy.



LEADERS

James P. Babilion, PhD
Zhenghong Lee, PhD

The multidisciplinary Cancer Imaging Program integrates imaging research with the study of cancer biology to investigate carcinogenic mechanisms using imaging; design new targeted therapies; and develop innovative imaging modalities to improve patient care. Biologists, medical oncologists, radiologists and pathologists across all research programs are actively engaged to accomplish these goals.

INNOVATIVE DISCOVERIES: Program members have driven several highly impactful advances in nanomedicine, including the seminal work by Drs. Nicole Steinmetz and Agata Exner. Dr. Steinmetz used imaging to develop plant-virus nanoparticles that stimulate the host immune response to eliminate tumors in mice and dogs. Dr. Exner developed novel ultrasound contrast agents that are able to identify tumor tissues and aid in the detection and staging of prostate and other cancers.

In addition, there is the work being done with magnetic resonance fingerprinting by Drs. Vikas Gulani, Mark Griswold and Nicole Seiberlich. This novel method for magnetic resonance imaging is based on random magnetic wave generation and allows for quantitative assessment of MR data. MR fingerprinting is being tested in clinical trials, including the evaluation of approaches in patients with breast, liver, prostate and GI cancers.

COMMUNITY IMPACT: The Cancer Imaging Program has impacted the greater Cleveland community by using MR fingerprinting approaches to develop a noninvasive, highly sensitive, low-cost grading scheme for prostate cancer that will be implemented in a local prostate screening clinic. The initiative is led by Drs. Lee Ponsky, Gulani and Griswold.

Operational Control

LEADERS

Gregory S. Cooper, MD
Susan A. Flocke, PhD

Dedicated to establishing interventions that reduce the incidence of cancer and improve outcomes, program mem-

DIRECTOR

Analisa DiFeo, PhD

CO-DIRECTOR

Daniel Lindner, MD, PhD

This facility provides immune-deficient mice and professional consultation regarding animal-model selection for investigators, and performs human xenograft studies. Expanded patient-derived xenograft (PD pa studies.

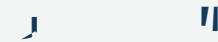
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DIRECTOR

Drew J. Adams, PhD

This shared resource designs and optimizes high-throughput assays tailored to specific research projects, and provides screening services across chemical libraries to identify small molecules that may be candidates for innovative cancer therapeutics.



RESEARCH HIGHLIGHTS: The group's support drives sciR



Populations that experience disparities often do not have access to or receive high-quality health-

care. The American Cancer Society is committed to addressing these disparities and improving the health of all people.



Five years ago, the Case Comprehensive Cancer Center established a Community Advisory Board to help advise the center and its investigators on cancer disparities and to facilitate community engagement in outreach and research. "The goal is to improve the health of the community," says Monica Webb Hooper, PhD, associate director for Cancer Disparities Research. "Membership is diverse to ensure that the community's voice is heard with regard to addressing the cancer burden."

The board includes representatives from the American Cancer Society, Asian Services in Action, Case Western Reserve University, Cleveland Clinic, Cleveland State University, the Cuyahoga County Board of Health, The Gathering Place, Medical Mutual, MetroHealth Medical Center and University Hospitals, as well as cancer survivors.

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The Case Cancer Council is a volunteer leadership group dedicated to advancing and accelerating cancer research by providing expertise, guidance and resources to support investigator initiatives at the Case Comprehensive Cancer Center. It was formed to promote and publicize the work of the 370 researchers who work tirelessly to discover new cancer treatment protocols, as well as earlier and more effective detection tools, with the ultimate goal of successfully treating cancer at its earliest possible stage. Of course,

"I am proud to lead this council, composed of community leaders with a demonstrated interest in supporting cancer research, which strives to support the Case CCC's research mission," says Peter H. Weinberger, chair of the Case Cancer Council and managing partner at Spangenberg Shibley & Liber. "We meet several times a year to discuss the impact of our researchers and to create a strategy

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You can help move cancer research forward. Contact Kristy Short at 216.368.0768 or kristy.short@case.edu to learn more about joining the council.

The Case Comprehensive Cancer Center provides rigorous training in cancer research and career enhancement activities through the Office of Cancer Trainee Education and Research (OCTER), led by Mark Jackson



William Schiemann, PhD, and Ruth Keri, PhD, lead this team of 23 basic breast or ovarian cancer biologists and 20 physician scientists/clinical researchers, all focused on breast, ovarian and endometrial cancer etiology, genomics, detection and treatment. These investigators are working on topics ranging from basic molecular mechanisms to new therapeutic approaches, and are advancing women's cancer research in the following ways:

- Jame Abraham, MD, is leading a clinical trial studying multiple drugs that target an aggressive form of breast cancer. The clinical research team is also examining whether applying tamoxifen to the skin might treat early breast cancer.
- Population scientists are studying how genetic variation, exposure to risk factors and healthcare disparities impact breast cancer susceptibility.
- Analisa DiFeo, PhD, leads a group that has created a gynecological cancers biobank with more than 100 samples. The biobank allows researchers to study genetic alterations in patient tumors and to test new drugs.
- A project funded by the University of Pittsburgh's Specialized Programs of Research Excellence (SPORE) is focused on identifying a new driver of ovarian cancer aggressiveness and determining if it could be used as a biomarker for early detection.



The brain tumor initiative, led by Justin Lathia, PhD, and Jill Barnholtz-Sloan, PhD, focuses on basic, clinical and translational research that leads to improved diagnosis and prognosis, and novel drug development. The multi-institutional initiative's work integrates basic biology, imaging, use of human tissues and genomics, and new therapeutics. The research centers on:

- Basic biology of brain tumors, including brain-tumor-initiating cells. Discoveries in this area include hypoxia signaling, alterations in connexins and changes in the tumor microenvironment.
- Causes and risk factors for brain tumors. The initiative participates in international

brain tumor epidemiology consortia, bringing access to the largest brain tumor epidemiology dataset worldwide. With this dataset, researchers can study sex-, age- and race/ethnicity-specific genetic risk factors to help explain related differences in brain tumor incidence.

- Better diagnosis and prognosis using imaging and large-scale data. Magnetic resonance fingerprinting and studying DNA, RNA and proteins help build better understanding of options for adults and children with brain tumors. Investigators participated in The Cancer Genome Atlas project, which has changed the diagnosis of gliomas worldwide via the World Health Organization.



Supported by a \$6.7 million philanthropic gift and endowment, this initiative, led by John Letterio, MD, focuses on cancers in 15- to 30-year-olds. The gift has been pivotal in elevating AYA cancer research in northeast Ohio. In fact, Case CCC will be one of the featured institutions in the upcoming AYA Cancer Congress. Recent research highlights include:

- The development of unique inhibitors that have the potential to disrupt an enzyme and could target many cancers, particularly brain tumors.
- Research in mouse models examines how cells from a primary tumor spread to the lung and what they need to grow there.



- Studies of how the HER2 protein, found in medulloblastoma and osteosarcoma, might be targeted with immunotherapy.
- Investments in adolescent and young adult tissue biorepositories that increase representation and identify unique characteristics for this age group.

- Two new researchers have been added to the team: Lewis Shi, PhD, a specialist in immunotherapy

CASE WESTERN
RESERVE UNIVERSITY



Case Western Reserve University, one of the country's leading private research institutions, offers forward-thinking educational opportunities in an inspiring cultural setting. Faculty engage in teaching and research in a hands-on environment across arts and sciences, dental medicine, medicine, nursing and social work programs.

With the 485,000-square-foot Health Education Campus scheduled to open in 2019, the university continues to be at the forefront of medical education. The new facility will allow students from the schools of medicine, dental medicine and nursing to work side-by-side in a common building with a shared goal – to improve the quality of patient care. This collaborative, team-based education approach will create efficiencies, reduce cost of services and, most important, cultivate future healthcare professionals who prioritize a patient-centered approach to multidisciplinary care.

The technology available at the Health Education Campus will be just as innovative as the curriculum. Notably, the Microsoft HoloLens will bring holograms and mixed reality into the classroom to enhance medical students' understanding of anatomy and physiology through a digital anatomy curriculum.

UNIVERSITY HOSPITALS
CLEVELAND MEDICAL CENTER



The UH Cleveland Medical Center is a nationally ranked hospital and home to some of the most prestigious oncology clinicians and researchers in the nation. Now, the medical center lays claim to Ohio's first Proton Therapy Center, one of only 24 in the nation, and the only one located on-site at a full-service children's hospital, UH Rainbow Babies & Children's Hospital. The technology, effective for certain types of pediatric and adult solid tumors, allows radiation oncologists to precisely target tumors with a maximum amount of radiation while minimizing the radiation that reaches healthy tissues and organs.

The Proton Therapy Center utilizes a next-generation proton beam delivery system, the MEVION S250 — a compact, efficient and cost-effective model with DirectDose™ beam-modulating technology — to shape and regulate the proton therapy beams. The model's six-degree robotic couch allows the patient to be positioned at the optimal treatment angle.

Compared with traditional radiation therapy, additional benefits of this non-invasive, outpatient procedure include using the technology with chemotherapy or surgery, and with sedation during treatment sessions. It may also lower the risk for radiation-induced secondary cancers, developmental delays and growth abnormalities.

CLEVELAND
CLINIC



Cleveland Clinic, a nonprofit, academic medical center that integrates hospital care with research and education, has pioneered many breakthroughs in cancer research and care over its long history. Now, the new Cleveland Clinic Taussig Cancer Center will continue this tradition of innovation.

Opened this year, the 377,000-square-foot facility features 126 exam rooms, 98 treatment rooms and comprehensive clinical and support services. In addition, all outpatient services – including teams of medical and radiation oncologists, surgeons, nurses, genetic counselors and social workers – are in one location, leading to increased collaboration, communication and research among physicians and care providers improving the experience and clinical outcomes of patients with cancer.

Designed with the patient in mind and based on feedback from cancer patients, the new Taussig Cancer Center is organized by cancer type, features sources of natural light throughout the entire facility, and includes purposefully-designed details to make the patient experience as convenient, healing and welcoming as possible.

