

Sources: *University of Pittsburgh School of Medicine Fact Book 2022/2023; University of Pittsburgh School of Medicine Annual Report 2020; University of Pittsburgh website (12/2022) and Fact Book 2021 & 2022; Pitt Research Annual Report 2021-2022; UPMC Fast Facts (12/2022); NIH RePORTER*

INSTITUTIONAL ACADEMIC, EDUCATIONAL, AND CLINICAL RESOURCES

The **University of Pittsburgh**, founded in 1787, is one of the oldest institutes of higher education in the United States. The University's five campuses include 16 undergraduate, graduate, and professional schools, which collectively offer 652 degree and certificate programs. Total enrollment in the fall term of 2022 was 33,632 students. The University employs 5,774 faculty, 671 research/ post-doctoral associates, and 8,224 staff. The main campus is in a metropolitan area with a population over 2.4 million.

The University of Pittsburgh is consistently recognized for scholarly excellence, ranking (#144) in the top 8 percent among the leading 1,799 universities in the world according to the 2023 *Times Higher Education* World University Rankings. *U.S. News & World Report* (2022-23) places Pitt (rank #67) among the top 3 percent of universities worldwide in its "Best Global Universities" list, which ranks 2000 leading universities in 95 countries based on schools' academic research and reputation. Pitt is No. 23 (Top 25) among the nation's top public schools in the 2022-23 *U.S. News & World Report* Best Colleges rankings.

Pitt ranks 11th nationally in federal science and engineering funding (FY2020), according to a report from the National Science Foundation. Since 1998 the University of Pittsburgh has annually ranked among the top 10 recipients of National Institutes of Health funding.

In an analysis of NIH funding for federal FY2022, Pitt received more than \$670 million dollars in funding placing 3rd overall, from which ~82% was awarded to the School of Medicine.

Innovation: Since its founding in 1996, Pitt's Office of Technology Management now the Innovation Institute, has spun out 226 companies that were dependent upon the licensing of technology developed at the University of Pittsburgh; a majority of them were in the life sciences.

The U.S. Patent and Trademark Office has issued 105 patents to University of Pittsburgh faculty and students in fiscal year 2022. The University of Pittsburgh has steadily moved up the list of the top recipients of U.S. utility patents among worldwide universities according to the National Academy of Inventors (NAI) and the Intellectual Property Owners Association (IPO). Among the top 100 global universities named as the first assignee on utility patents granted by the U.S. PTO, Pitt ranked #18 for the 2021 calendar year with 104 patents up from #20 in 2020 and #28 in 2019.

In the most recent five-year period (2018-2022), issued patents to Pitt inventors increased 35 percent over the previous five fiscal years (2013-2017) from 373 to 506. Startups based on Pitt discoveries have increased 54 percent in the same time period from 54 to 83, reflecting the expanded funding, mentoring, and educational resources available through the university's growing innovation and entrepreneurship ecosystem.

The progress of the Pittsburgh innovation ecosystem is getting noticed. Startup Genome, a leading policy advisory and research organization for public and private entities committed to accelerating the success of their startup ecosystems, reported in May 2022 that Pitt had jumped 10 spots in its ranking of the top 100 emerging global startup ecosystems, from 23rd to 13th. In North America, it ranked Pitt as the fifth highest emerging ecosystem.

Source: University of Pittsburgh Office of Innovation and Entrepreneurship, 2022 fiscal year impact report, and website of Innovation Institute (12/2022)

Diversity, Equity, Inclusion

University of Pittsburgh plans to increase the number of faculty to conduct research, educate students and engage in service designed to eliminate health disparities and improve wellbeing in the Pittsburgh region, nationally and around the world. One initiative — or "cluster hire" — called for the hire of 50 faculty members over four years, with the schools of the health sciences responsible for half of that total. In 12 months, 23 faculty members were hired in the health sciences; 14 in the School of Medicine (as of October 2021). Those hires bring a wealth of academic interests to Pitt — from reducing sexually transmitted diseases among young people to preclinical biomarker discovery in lung cancer.

University of Pittsburgh School of Medicine Annual Report 2021

The six **Schools of the Health Sciences** include Dental Medicine, Health and Rehabilitation Sciences, Medicine, Nursing, Pharmacy, and Public Health. Together, they currently occupy approximately 4.2 million gross square feet of research, academic, and administrative space in various buildings.

The University of Pittsburgh has surpassed a landmark of \$1 billion in research expenditures, placing the University among an elite national cohort of research peers; nearly 63% of this amount is for research in the School of Medicine. As a result of its success, the School of Medicine has invested significantly in new research infrastructure in disciplines like developmental, cellular, structural, computational and systems biology, and in faculty recruitment.

Funding from the National Institutes of Health (NIH) is considered the benchmark of overall stature among research-intensive academic health centers. Since 1998, the University of Pittsburgh has annually ranked among the top 10 recipients of NIH funding. In an analysis of NIH funding for federal fiscal year 2022, the University of Pittsburgh received more than \$670 million in funding—approximately 82% of which went to the School of Medicine.

In 2022, NIH supported 50 Ruth L. Kirschstein National Research Service Award (NRSA) Institutional Research Training Grants (T32) at the University of Pittsburgh, the vast majority awarded within the six Schools of the Health Sciences.

University of Pittsburgh Medical Center (UPMC)

[source: from [UPMC.com/about/facts](https://www.upmc.com/about/facts) 12/2022] UPMC, a \$24 billion world-renowned health care provider and insurer based in Pittsburgh, Pa., is inventing new models of accountable, cost-effective, patient-centered care. The largest nongovernmental employer in Pennsylvania, UPMC integrates 92,000 employees, 40 hospitals, 800 doctors' offices and outpatient sites, and an Insurance Services Division with more than 4 million-members, making it the largest medical insurer in western Pennsylvania.

In 2021, UPMC contributed \$1.7 billion in benefits to its communities, including more care to the region's most vulnerable citizens than any other health care institution, and paid more than \$950 million in federal, state and local taxes.

Working in close collaboration with the University of Pittsburgh Schools of the Health Sciences, UPMC shares its clinical, managerial and technological skills worldwide through its innovation and commercialization arm, UPMC Enterprises, and through UPMC International.

U.S. News & World Report consistently ranks UPMC Presbyterian Shadyside among the nation's best hospitals in many specialties and ranks UPMC Children's Hospital of Pittsburgh on its Honor Roll of America's Best Children's Hospitals (rank #6).

[alternatively]

As an integrated global health enterprise and one of the nation's leading academic health care systems, with \$24 billion in revenues, UPMC integrates 92,000 employees; more than 6,400 affiliated physicians, including more than 5,000 employed by the health system and 1,571 who are also full-time faculty of the School of Medicine; 40 tertiary care, specialty, and community hospitals; as well as specialized outpatient facilities, cancer centers, rehabilitation facilities, retirement and long-term care facilities, imaging services, doctors' offices, and a health insurance plan covering more than 4 million members.

As of August 2022, the UPMC Medical Education Program has ~ 1,500 medical residents and 450 clinical fellows in programs approved by the Accreditation Council for Graduate Medical Education.

School of Medicine: Ranked #14 (tie) of 191 in the list of Best Medical Schools for Research and #10 (tie) in Best Medical Schools for Primary Care (*US News/World Report* 2023)

The **School of Medicine** includes the following 31 departments: Anesthesiology and Perioperative Medicine; Biomedical Informatics; Cardiothoracic Surgery; Cell Biology; Computational and Systems Biology; Critical Care Medicine; Dermatology; Developmental Biology; Emergency Medicine; Family Medicine; Immunology; Medicine; Microbiology and Molecular Genetics; Neurobiology; Neurological Surgery; Neurology; Obstetrics, Gynecology, and Reproductive Sciences; Ophthalmology; Orthopaedic Surgery; Otolaryngology; Pathology;

Pediatrics; Pharmacology and Chemical Biology; Physical Medicine and Rehabilitation; Plastic Surgery; Psychiatry; Radiation Oncology; Radiology; Structural Biology; Surgery; and Urology.

The two newest of these departments —Plastic Surgery and Cardiothoracic Surgery — reflect the School of Medicine's position at the leading edge of medical education and clinical practice, as well as the recent and rapid evolution of surgical subspecialties as independent disciplines. Similar departments are still novel in American medical schools, and the same can be said of our departments of Computational and Systems Biology, Critical Care Medicine, Developmental Biology, and Structural Biology.

Within the School of Medicine, areas of research concentration include the biology of aging; neuroscience; vision and vision restoration; comparative effectiveness research; genome stability and tumorigenesis; regenerative medicine and biomedical device development; vascular, developmental, structural, computational, and systems biology; immunology, including immunological approaches to cancer; cancer virology; and clinical research/ clinical trials, among others.

The School of Medicine is ranked 7th in NIH funding with \$547 million in funding in 2022.

Medical and graduate education

For 2022, the School of Medicine has 2,539 regular plus 2,182 volunteer faculty members. Of these, 81 are current members of the Academy of Master Educators, an organization that recognizes and rewards excellence in medical education.

For 2022, 8,393 applications for admission were received and 931 prospective students were interviewed for a first-year class of 154 medical students.

As of the 2022-2023 academic year, the School of Medicine has 586 MD students (334 women, 57%; 252 men, 43%), 20% of whom are from groups that are underrepresented within the medical profession.

The medical school also has 394 graduate students in PhD programs (including students in the University of Pittsburgh/Carnegie Mellon University combined MD/PhD Medical Scientist Training Program), 142 students in Master's programs, and 48 students in certificate programs.

The Class of 2022 was the 16th class to complete the four-year longitudinal research project experience. Their endeavors resulted in 346 manuscripts published, 81 submitted and 86 in preparation at the time of graduation. Additional research accomplishments of the Class of 2022 included 397 presentations at national or international conferences and 200 at regional or local meetings. These new graduates received 56 national or state and 146 local awards in recognition of their research.

The Medical Scientist Training Program (MSTP) of The University of Pittsburgh and Carnegie Mellon University was established in 1983 to offer exceptionally talented individuals the opportunity to undertake a physician-scientist training program tailored to their specific research interests. This program is funded partly by the NIH MSTP. Exceptional investigators at both universities serve as potential mentors for 109 MD/PhD students who may select from among 22 graduate programs for research training. Carnegie Mellon University exists adjacent to, and within easy walking distance of the University of Pittsburgh.

Graduate Degree Programs:

Interdisciplinary Biomedical Graduate Program (PhD) offers specialized training in Cell Biology & Molecular Physiology, Cellular and Molecular Pathology, Molecular Genetics and Developmental Biology, or Molecular Pharmacology. Other programs include Center for Neuroscience Graduate Training Program (PhD); Biomedical Informatics Training Program (PhD, MS, or certificate); Joint Program in Computational Biology (PhD); Molecular Biophysics & Structural Biology Program (PhD); Integrative Systems Biology Program (PhD); Program in Microbiology and Immunology (PhD); Clinical and Translational Science (PhD).

MS or certificate programs include: Computational Biomedicine and Biotechnology Program, Clinical Research, Medical Education, Comparative Effectiveness Research.

Clinical Translational Science Institute (CTSI)

The University of Pittsburgh established the Clinical and Translational Science Institute (CTSI) in 2006 as part of a nationwide consortium of 12 institutions sponsored by NIH to speed the translation of biomedical research findings into clinical practice and evidence-based health policy. CTSI has been awarded a five-year, \$61 million renewal from the NIH marking the fourth consecutive five-year Clinical and Translational Science Award granted to the University's CTSI. [UL1 TR001857] Funding for CTSI's efforts to date tops \$400 million.

In addition to cataloging and linking COVID-19 research studies to available resources, CTSI has awarded \$900,000 to 17 research projects out of more than 150 submissions to address different aspects of the COVID-19 pandemic. CTSI also assisted the National Institute of Allergy and Infectious Diseases (NIAID) with contacting more than 400,000 potential U.S. study participants and coordinating logistics for a study to determine the spread of COVID-19 across the country.

The **Clinical Translational Science Institute (CTSI)** serves as the integrative academic home for clinical and translational scientists across the University's six health science schools, Carnegie Mellon University, and UPMC. The CTSI's primary focus is to develop, nurture, and support cadres of clinical and translational scientists by building on the University's existing clinical research training programs and supporting new comprehensive training programs. The CTSI also supports multidisciplinary translational research by providing resources and opportunities that will facilitate the translation of research findings from the bench to the bedside to the community.

CTSI-supported programs and resources extend to all six of Pitt's schools of the health sciences and, through community engagement efforts, to the Pittsburgh region. UPMC is an active partner in this initiative, providing important access to extensive clinical resources and potential research participants. CTSI also has established collaborative relationships with other Pittsburgh-area institutions, including the Urban League of Greater Pittsburgh, Carnegie Mellon University, and RAND Corporation. Through the establishment of **12 Cores**, CTSI is building institutional infrastructure, including educational, programmatic, facility, and equipment resources, to support a wide range of clinical and translational research:

- Biomedical Modeling
- Biomedical Informatics
- Biostatistics, Epidemiology, and Research Design (BERD)
- Clinical Research Facilities
- Community PARTners (Partnering to Assist Research and Translation)
- IMPaCT (Implementation to Maximize Population and Community Translation)
- Innovation
- Pilot Funding
- Regulatory Knowledge and Support
- Research Inclusivity
- Team Science and Workforce Development
- Trial Implementation and Enrollment

Research Participant Registry

CTSI Pitt+Me Research Participant Registry Recruitment Framework. The CTSI Pitt+Me® Research Participant Registry has enrolled >250K children and adults from among UPMC's >6M patients as well as community members who self-report an interest in participating in research and agree to be contacted about specific studies for which they may be eligible. Pitt+Me is a mobile-friendly, cloud-based informatics platform designed to increase participation in research through the application of research registry, study match and screening infrastructure and tools. Investigators and coordinators register new studies, manage study criteria

and follow up on participant referrals. Research participants are automatically matched to studies by the recruitment platform, which executes a weighted-matching algorithm based on age, race, gender, ethnicity, ICD-9/10 diagnosis criteria from the UPMC electronic health record, and/or self-reported preferences for research areas of interest. Study matches are sent to participants on a monthly or quarterly basis via email or US mail.

Precision Medicine Initiative

In 2016, NIH chose CTSI to help build the foundational partnerships and infrastructure needed to launch its All of Us Research Program, which aims to engage 1 million or more research participants to revolutionize how disease is prevented and treated based on individual differences in lifestyle, environment and genetics. Pitt was awarded \$4.2 million in the first year, with the potential for up to \$69 million over six years. Pitt's project, called All of Us Pennsylvania, began enrolling the first of an anticipated 100,000 to 200,000 patients in the region in mid-2017 and will fund pilot studies using accrued data to advance precision medicine.

The **Health Sciences Library System (HSLs)** at the University of Pittsburgh offers a wide array of research and information services, educational opportunities, and resources in print and electronic format to faculty, students, and researchers in the Schools of the Health Sciences.

HSLs supports instruction, research and clinical care in the health sciences for University of Pittsburgh faculty, students, and staff, and UPMC residents and fellows. Faculty librarians offer assistance throughout the research process. Classes on evidence-based searching, scholarly communication and research impact, citation management, instructional and visual design, and special topics are offered regularly and customized for courses and groups. Research and instructional services are also provided by the specialized teams of Data Services and Molecular Biology Information Services (MBIS). The MBIS runs a four-facet service with the following goals: (1) identify, procure and implement commercially licensed bioinformatics software, (2) teach hands-on workshops using bioinformatics tools to solve research questions, (3) provide in-person and email consultations on software/databases and (4) maintain a web portal providing overall guidance on the access and use of bioinformatics resources and MBIS-created webtools. HSLs licenses 17 proprietary bioinformatics software and database packages for 8,507 registered users.

Library users have access to more than 8,700 electronic journals in the health sciences, as well as 5,000 e-books and 122 databases or publisher collections of full-text information. In FY20, we added over 1,500 new resources.

HSLs provides a wide range of resources and services such as books, journals, databases, e-resources and collections, information access points, customer service and technical support, internal and external metadata creation, multimodal technology development, and document delivery services.

HSLs received nearly \$3 million in awarded grants from the National Library of Medicine to support the Regional Medical Library of the Middle Atlantic Region, the NNLM Web Services Office, and the Training and Education Center of the *All of Us* Research Program. These programs serve the broader community and engage a variety of health information stakeholders both regionally and nationally.

School of Public Health (SPH)

Founded in 1948 and fully accredited by the Council on Education for Public Health, the SPH is world-renowned for contributions that have influenced public health practices and medical care for millions of people. The School is the only fully accredited school of public health in the Commonwealth of Pennsylvania, and is one of the top-ranked schools of public health in the United States. The SPH boasts the third largest endowment among schools of public health, and is ranked 6th nationally for NIH funding.

The School is considered a leader in the field of women's health research and is one of the original sites for the Women's Health Initiative, the largest research study in the world to focus exclusively on women's health. It is also the site of broad-based research programs to better understand and treat HIV infection: the Pitt Men's Study is part of the longest-running national study of the natural history of AIDS. In the area of human genetics, the SPH is attempting to identify the links between genes and disease through initiatives ranging from basic laboratory research to clinical applications.

The SPH consists of seven departments that address today's most critical public health issues, each with faculty who have made national and international contributions to public health. These departments include

Behavioral and Community Health Sciences, Biostatistics, Environmental and Occupational Health, Epidemiology, Health Policy and Management, Human Genetics, and Infectious Diseases and Microbiology. Research centers and institutes within the school, such as the Center for Minority Health and the Center for Public Health Practice, provide resources to the community and link scholarly activity with practical application.

UPMC CHILDREN'S HOSPITAL OF PITTSBURGH/LAWRENCEVILLE CAMPUS

Scientific Environment

The UPMC Children's Hospital of Pittsburgh is among the nation's leading children's hospitals providing state-of-the-art clinical care and basic science. In 2020-2021, it ranked 9th on the *U.S. News & World Report's* Honor Roll of America's Best Children's Hospitals. It is also recognized for achieving four pediatric subspecialties in the national top 10, including: Cardiology and Heart Surgery (2nd), Diabetes and Endocrinology (7th), Gastroenterology and GI Surgery (9th), and Pulmonology (10th).

Laboratory

The Rangos Research Center, located on the 10-acre hospital campus, is comprised of 10 floors and 300,000 square feet of open laboratories with seven floors dedicated to biomedical research activities. The facility supports biomedical research, including pediatric cancer, diabetes, heart disease, liver failure, childhood infection and inflammatory disease, genomics, immunology and neuroscience, among other fields.

Utilizing an open laboratory concept, the center is designed for optimal collaboration between researchers and shared use of resources, which is vitally important in supporting major research advances in the 21st century. Each laboratory bay consists of 900 sq. ft. including tissue, fume and equipment alcoves as well as program rooms, dark rooms, environmental rooms, equipment corridor, faculty offices, and state of the art conference facilities designed for optimal collaboration between researchers and shared use of resources. The flexible laboratory space can accommodate 70 principal investigators.

Core facilities within Rangos include 2 flow cores, 2 confocal/microscopy cores, histology core, metabolic core, gnotobiotic animal core (main campus), animal imaging (CT and MRI), and sequencing/bioinformatics cores.

Clinical

UPMC Children's Hospital of Pittsburgh (CHP) is a 313-bed regional pediatric referral center, providing comprehensive primary and specialty care to children. CHP is a state-of-the-art hospital that opened in 2009. It is the only hospital in western Pennsylvania devoted solely to the care of infants, children, and young adults. CHP has a broad referral base with a catchment area population of ~5.5 million, which includes patients from the tri-state area (Pennsylvania, Ohio, and West Virginia). A Pediatric Clinical and Translational Research Center is also located onsite to facilitate clinical studies, in cooperation with the Clinical and Translational Science Institute at the University of Pittsburgh School of Medicine. In FY20, CHP provided 11,022 inpatient stays, 6,823 observation stays, 109,915 ED and express care visits, 19,901 surgical procedures, and >1 million outpatient visits. CHP achieved Magnet Recognition® status from the American Nurses Credentialing Center (ANCC), among only 6% of hospitals nationwide to have achieved this prestigious status. CHP leads the way in advanced technology as the first pediatric hospital in the U.S. to achieve Stage 7 recognition from HIMSS Analytics for its electronic medical record, and has been recognized by KLAS, an independent health care research organization, as the number one pediatric hospital in its use of health care information technology.

INSTITUTIONAL RESEARCH RESOURCES AND CENTERS

The **Center for Medicine and the Microbiome (CMM)** was established to foster innovative basic, translational, and clinical research in the microbiome. The Center, led by Alison Morris and Barbara Methe, is comprised of MD and PhD researchers in multiple disciplines who will work together to understand the role of the microbiome in health and disease and to apply this knowledge to develop novel diagnostic and therapeutic strategies. Such a center is important given that microbiome research is a rapidly expanding field that will

impact multiple areas of human health and radically alter our understanding of many disease processes. The Center will benefit the University of Pittsburgh specifically by providing a home for interdisciplinary studies of the microbiome and integrating work of basic and clinical scientists with access to large clinical cohorts in order to efficiently test new ideas and rapidly disseminate pioneering treatments.

The **Center for Research Computing (CRC)** is focused on increasing the productivity of Pitt researchers through the application of advanced computing. In addition to supporting research in fields such as engineering, chemistry and genomics, Pitt CRC—a resource for the entire University community—adds value to work in biostatistics, economics, and linguistics, among many other areas. The CRC offers access to cutting-edge computer hardware and software, workshops, and consultation on refining projects at the code level – such as stronger algorithms to take advantage of parallel processing – and at the level of improving the user experience for researchers who begin taking advantage of high performance computing using a familiar graphic user interface.

The **Center for Vaccine Research (CVR)** is housed in the Biomedical Science Tower 3 (BST3), which is located on the main campus of the University of Pittsburgh. The CVR is composed of two components — the Vaccine Research Laboratory (VRL) and the Regional Biocontainment Laboratory (RBL) — and has 18,000 square feet of laboratory and office space. Building on the University's existing strengths in the study of virology and immunology with an emphasis on emerging infections and HIV, the CVR engages a cross-section of scientists from an array of disciplines in infectious disease research. Under the leadership of Director Paul Duprex, PhD, the CVR is expanding its footprint in the area of vaccine research and development by expanding its team of world-class investigators. The CVR activities span basic research on molecular mechanisms of infectious diseases to the development of diagnostics, therapeutics, and vaccines. Moreover, the CVR supports interdisciplinary research efforts across the University and UPMC focused on emerging infections that threaten human health. A balance of basic, translational, and clinical research; emphasis on collegiate interaction; visionary leadership; and a synergistic environment are among the unique features that contribute to the unparalleled potential of this world-class research center.

The **Genomics Analysis Core** provides bioinformatics analysis for most types of genomic data including gene expression, copy number and methylation microarrays and next generation sequencing (NGS) data from whole genome, whole exome, targeted exome and RNA Seq.

The **Genomics Research Core** is equipped with state-of-the-art instrumentation and provides a variety of standard as well as customized genomic analyses to University researchers. The services include Sanger DNA sequencing, Next Generation sequencing of DNA and RNA, RNA/DNA extraction, purification and QC services, gene expression microarrays, whole transcriptome human and mouse microarrays, miRNA microarrays, TaqMan real-time PCR and Nanostring digital expression profiling for mRNA and miRNA, candidate gene and whole genome SNP array genotyping and NanoString CNV analysis.

The **Health Sciences Metabolomics and Lipidomics Core** is located in the Department of Pharmacology & Chemical Biology. The core provides assistance with projects that range in size from isolated experiments to major collaborations involving global analyses related to metabolites and lipids, and metabolic flux studies. The core has working relationships with C3M, CMM and the Small Molecule Biomarker Core in order to facilitate highly collaborative research involving endocrinology and metabolism, the microbiome and quantitative biomarker analysis.

The **Health Sciences Sequencing Core at CHP** provides central support for Illumina next generation sequencing for RNA, DNA, FFPE and low input applications to the University of Pittsburgh research community. The core was established by a cooperative agreement between the University of Pittsburgh Schools of Health Sciences and the UPMC Children's Hospital of Pittsburgh.

Imaging Resources

Pitt has a variety of imaging cores using varied technologies. A partial listing includes:

- Biological Sciences Microscopy and Imaging Facility
- In Vivo Imaging Facility (IVIF) - Preclinical PET and PET-CT (Hillman Cancer Center)
- In Vivo Imaging Facility (IVIF) – Preclinical MRI (Hillman Cancer Center)
- In Vivo Imaging Facility (IVIF) – Preclinical Optical Imaging (Hillman Cancer Center)

- In Vivo Imaging Facility (IVIF) – Preclinical Ultrasound Imaging (Hillman Cancer Center)
- Center for Biological Imaging (CBI)
- Center for Ultrasound Molecular Imaging and Therapeutics
- Department of Neurobiology Microscopes
- Cryo-electron Microscopy (CryoEM) Facility
- Division of Laboratory Animals Research (DLAR) Imaging
- High Content Screening (HCS) Imaging Resources
- Laboratory of Physical Molecular Biology (chromatin fiber imaging)
- Magnetic Resonance Research Center (MRRC)
- Near Infrared Spectroscopy (NIRS) Brain Imaging Laboratory
- Neuroscience Imaging Center (NIC)/Neuroimaging Laboratory
- Ophthalmic Imaging Research Laboratory
- Pittsburgh NMR Center for Biomedical Research
- Positron Emission Tomography (PET) Facility
- Animal Imaging Core Facility (Rangos Research Center)
- Cell Imaging Core I and II Laboratories, (Rangos Research Center)
- Regional Biocontainment Laboratory (RBL) Clinical Imaging Core
- Nuclear Magnetic Resonance (NMR) Facility (Structural Biology)

The **Innovative Technologies Development (ITD) Core** provides cutting edge gene targeting strategies using various methods, including CRISPR-Cas9 gene targeting in mice, classical transgenesis using transgenic vectors, and gene editing in cell lines using CRISPR.

The **Peptide and Peptoid Synthesis Core** provides standard and custom services for peptide & peptoid synthesis, purification and characterization including certified peptides for clinical trials.

The **Pitt Biospecimen Core (PBC)** provides Pitt researchers with excess tissue materials obtained from clinical procedures performed at UPMC hospitals. The main purposes of the PBC are to provide a mechanism to simplify and streamline the process of research tissue accrual, storage and disbursement and to provide efficient research pathology support services. Services provided by PBC include human tissue and biological specimen procurement, honest broker services, research histology, annotation of clinical data, and tissue microarray services. The PBC contains a variety of solid tissues, cell aspirates, blood, peripheral blood mononuclear cells, as well as other clinical samples. Solid tissues are available from various disease states from sources including the gastrointestinal tract, liver, and lung.

Pittsburgh Supercomputing Center (PSC) is a joint effort of Carnegie Mellon University and the University of Pittsburgh. Established in 1986, PSC is supported by several federal agencies, the Commonwealth of Pennsylvania and private industry and is a leading partner in XSEDE (Extreme Science and Engineering Discovery Environment), the National Science Foundation cyberinfrastructure program. PSC provides university, government and industrial researchers with access to several of the most powerful systems for high-performance computing, communications and data storage available to scientists and engineers nationwide for unclassified research. PSC advances the state of the art in high-performance computing, communications and data analytics and offers a flexible environment for solving the largest and most challenging problems in computational science.

The **Small Molecule Biomarker Core** uses state-of-the-art instrumentation to provide quantitative analysis of specific analytes in clinical samples and method development for analytes where a method does not currently exist. The highly sensitive and specific techniques employed by the Core provide accurate quantitation for multiple biomarkers from the same sample, which maximizes the ability to link basic science with clinical outcomes.

The **Transgenic and Gene Targeting Core** provides a broad, comprehensive range of services to Pitt investigators, including generation of gene edited mice, transgenic mice, ES cell microinjection into blastocysts to create germline competent chimera, cryopreservation and long-term storage of mouse sperm/embryos, recovery of mouse lines from cryopreserved germplasm, in vitro fertilization for mouse line rescue and re-derivation of pathogen free mouse strains.

The **Unified Flow Core** manages flow cytometry equipment and cores at each Pitt campus (Oakland, Bridgeside Point II, Children's Rangos Research building, and Hillman Cancer Center) and provides state-of-the-art flow cytometry and cell sorting services to the entire University of Pittsburgh research community as well as researchers at neighboring institutions. A skilled staff provides help with instrument setup, data analysis, and consultation for experiment design. Training is available to enable investigators and their staff to run the analytical cytometers themselves.

ANIMAL RESOURCES

University of Pittsburgh Institutional Animal Care and Use Committee (IACUC)

The University of Pittsburgh (Unit #000496) is Fully Accredited (updated March 2020) by the Association for the Assessment and Accreditation of Laboratory Animal Care International (AAALAC), affirmed via AAALAC's website <http://www.aaalac.org/>. The day-to-day care of animals is managed through the Division of Laboratory Animal Resources (DLAR) and overseen by the Institutional Animal Care and Use Committee (IACUC).

The DLAR provides education, training, veterinary and animal husbandry care, and associated administrative services to support the institution's animal-based research programs conducted within the Schools of the Health Sciences at the University and veterinary support to animal-based research programs conducted within the School of Arts and Sciences.

Biomedical Research Resources: [HSCRF Resources Portal \(pitt.edu\)](https://www.hscrf.org/resources)

All cores: https://www.resources.pitt.edu/index.html?all_cores=1