**Rush Research Resources and Facilities**

**This document includes information for prospective research participants, sponsors, and investigators - including hyperlinks to many online resources. Investigators and staff are encouraged to select descriptions that are relevant to their needs and to edit the content according to format and length constraints.**

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[**Office of the Vice President and Vice Provost for Research**](http://www.rushu.rush.edu/servlet/Satellite?c=RushUnivLevel1Page&cid=1229277694983&pagename=ResearchAtRush%2FRushUnivLevel1Page%2FLevel_1_Audience_Portal_Home_Page)

Rush is committed to fostering centers of excellence that combine clinical, basic and population science to study areas of importance to the community. A comprehensive Strategic Plan for Research and several programs have been created to support and encourage Rush investigators involved in more than 1,600 research studies - including clinical trials of new medical and surgical therapies. The office is under the direction of Joshua J. Jacobs, MD, Vice Dean for Research, Rush Medical College, Vice Provost for Research, Rush University Medical Center, and Institutional Responsible Official. The Office helps establish and support the mission of Research at Rush which is dedicated to the pursuit of outstanding biomedical and sociobehavioral research to advance knowledge and optimize patient care.

[**Office of Research Affairs**](https://www.rushu.rush.edu/research/office-research-affairs)

At Rush, the research contributions of faculty generate meaningful publications, values-driven care, lifesaving drugs and leading-edge innovations ranging from omics-based discoveries to the next breakthrough drug or device. Continuously, our research teams progress toward measured, peer-affirmed outcomes that improve quality of life and our understanding of the human condition.

The Office of Research Affairs (ORA) exists to partner with faculty and staff as they seek funding, propose clinical studies, establish collaborations, steward funds, submit grants, negotiate industry contracts, and secure patents and licensing agreements. The ORA has organizational reporting responsibilities to the Office of the Provost (Vice President & Vice Provost for Research), and the Office of Medical Affairs (Vice President & Principal Business Officer) at Rush.

The ORA is comprised of six distinct service divisions - intent on delivering high quality service, support, and counsel to the Rush research enterprise, faculty, staff, and students. The Divisions of the ORA are:

1. [**Clinical Research Administration**](https://www.rushu.rush.edu/research/office-research-affairs/clinical-research-administration)
2. [**Innovation & Technology Transfer**](https://www.rushu.rush.edu/research/office-research-affairs/innovation-and-technology-transfer)
3. [**Institutional Animal Care and Use**](https://www.rushu.rush.edu/research/office-research-affairs/institutional-animal-care-and-use)
4. [**Research Regulatory Operations**](https://www.rushu.rush.edu/research/office-research-affairs/research-regulatory-operations)
5. [**Sponsored Programs Administration**](https://www.rushu.rush.edu/research/office-research-affairs/sponsored-programs-administration)
6. [**Technologies Supporting Research**](https://www.rushu.rush.edu/research/office-research-affairs/technologies-supporting-research)

As Rush continues to invest more in the success of our faculty researchers, we are increasing our sponsored award base, adding research participants, investing in technologies, establishing new core facilities, strengthening research protections, and continuing to invest in state-of-the-art equipment and facilities. Specific details for these Divisions follow below.

**1.** [**Division of Clinical Research Administration**](https://www.rushu.rush.edu/research/office-research-affairs/clinical-research-administration)

The division of clinical research administration within the Office of Research Affairs facilitates the operational aspects of clinical research across Rush University, including the clinical and translational science award in partnership with the University of Chicago through the Institute for Translational Medicine [Chicago ITM](http://www.chicagoitm.org) and the [cancer clinical trials office](https://www.rushu.rush.edu/research/departmental-research/internal-medicine-research/cancer-center-clinical-trials).

The [division](https://www.rushu.rush.edu/research/office-research-affairs/clinical-research-administration) sets the strategic vision for clinical research administration and provides leadership support to the enterprise and facilitates the following:

* Well-funded leading-edge research in key therapeutic areas
* Efficient study start-up that sets the pace for academic medical centers in Chicagoland
* Effective execution of clinical research-related activities
* Preferred status with key industry sponsors

Through the implementation of Chicago ITM in early 2018, this division has the support of the Trial Recruitment and Innovation Office (TRIO) to improve the time it takes to initiate new clinical trials and to mitigate roadblocks to subject recruitment.

This division supports research teams at Rush University in the following ways:

* Clinical research core support
	+ Training and Education, e.g., clinical research new hires, continuing education
	+ Assistance with operational activities from study start-up to study close-out
	+ Clinical Research Regulatory Coordinator support\*
	+ Clinical Research Nursing support\*
	+ Clinical Research Coordinator support\*
	+ Research Validation via the Synchronization (“sync”) process
* Clinical research finance support via the Research Revenue Cycle Team in Finance
	+ Training and guidance on budget development and negotiation
	+ Coverage analysis development
	+ Medicare submissions for investigational devices
	+ Industry sponsor invoicing
* Industry Sponsored Agreements support via the Office of Legal Affairs
	+ Confidential disclosure agreements
	+ Clinical trial agreements (including sub-awards)
	+ Independent contractor agreements for research
* OnCore clinical trial management system (CTMS) training and education via Research IS
	+ Training and education on how to use the system
	+ Process design and operational support

## Study start-up for industry sponsored clinical trials proceeds as follows:

## Please reach out to one of our team members to assist you with the services above in blue. Please note, the institutional review board (IRB) is a part of the Division of Research Regulatory Operations, discussed in section 3, below.

## Contact us

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**2.** [**Division of Innovation & Technology Transfer**](https://www.rushu.rush.edu/research/office-research-affairs/innovation-and-technology-transfer)

The Division of Innovation and Technology Transfer (I&TT or “IP Office”) is responsible for managing the intellectual property assets generated by research and educational activities at Rush. The IP Office seeks to guide technologies through the various stages of the commercialization process by providing services that include evaluation, protection, marketing, and licensing of intellectual property.

The IP Office protects faculty interests while advancing discoveries toward commercial development. A high-performance team with a broad range of subject matter expertise provides a full suite of support services to ensure that Rush inventions reach their fullest potential. The IP Office assists Rush faculty by:

* evaluating research results and inventions for patentability and navigating it through the patenting process
* protecting intellectual property while protecting academic priorities, interests and values
* effectively transferring discoveries and inventions from the laboratory into commercial development
* helping form collaborations with industrial partners for new sources of research sponsorship
* monitoring research and license agreements to ensure the development and commercialization of your technologies
* helping with startup formations by facilitating access to the entrepreneurial ecosystem that includes mentoring, incubators and accelerators as well as investor network

The IP Office is passionate about its role at Rush and continues to endeavor to see Rush has a strong impact on the next generation of biomedical technologies that will improve patients’ lives.

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**3.** [**Division of Research Regulatory Operations**](https://www.rushu.rush.edu/research/office-research-affairs/research-regulatory-operations)

The ORA supports a Division of Research Regulatory Operations (RRO) that has primary responsibility for stewarding Rush’s regulatory responsibilities as imposed by sponsors, other institutions, as well as community, local, and Federal government agencies. The Director of Research Regulatory Operations is Crista Brawley, Ph.D., Associate Vice President. The Division has responsibility to oversee the administrative effectiveness and responsiveness of regulatory committees at Rush including, among others, the IRB, IACUC, DURC, IBC, BHZD Committee, RSC, and data safety monitoring activities. Monitoring general laboratory safety is also within the purview of the RRO division. Rush’s Biological Safety Officer is a member of the RRO division staff. Additional details of the key RRO regulatory groups can be found below, throughout this document, and at the hyperlink above.

**a. Institutional Review Board**

The Rush University Medical Center IRB is an administrative body tasked with protecting the rights and welfare of human subjects research participants recruited to clinical research studies. The RUMC IRB has been AAHRPP accredited since 2012. It has 2 IRB committees that meet respectively every Monday and Wednesday.

**b. Biological Safety Program**

Since 1997**,** Rush University Medical Centerhasoperated an Institutional Biosafety Committee (IBC) to review all research activities involving recombinant or synthetic nucleic acids as required by the *NIH Guidelines* *for Research Involving Recombinant or Synthetic Nucleic Acid Molecules* (rev. 2016) and by university policy RA-IBC-001. This 10-member committee chaired by Amarjit Virdi, Ph.D. has cross-representation from the Institutional Animal Care and Use Committee (IACUC) and from the Dual-Use Research of Concern (DURC) and Biohazard (BHZD) Committees. Committee members include faculty from the departments of Microbial Pathogens and Immunity, Cell and Molecular Medicine, and the Divisions of Gastroenterology and Infectious Diseases. Other members include the Biological Safety Officer (BSO), representatives of hospital Infection Control and the Office of Research Compliance, as well as two community members who are unaffiliated with Rush. IBC business is conducted in standing monthly convened meetings. The Biological Safety Officer, Ed R. Blazek, Ph.D., SM (NRCM) pre-reviews applications to assist the investigator prior to official review by the full committee, reviews literature relevant to applications in service to the IBC, and schedules the agenda of the IBC. Applications are accepted online via the Rush Research Portal, minimizing redundant data entry by the investigator. The IBC maintains a database of approved programs as well as an informative web site, and annually updates its registration with the NIH Office of Science Policy. A mandatory web-based Biosafety Training Program for investigators and their laboratory personnel, gene transfer clinical coordinators, and IBC members has been established. Investigators or their designees are periodically retrained as required by law in the shipping of dangerous materials. All approved programs are subject to a formal amendment process for all substantive changes, and clinical programs receive annual continuing review. All laboratories of IBC-approved programs are inspected initially and periodically by the BSO.

**b. Dual Use Research of Concern (DURC) and Biohazard Committees**

Rush University Medical Center is in compliance with the *United States Governmental Policy for Institutional Oversight of Life Sciences Dual Use Research of Concern.* This policy governs all research performed with any quantity of 14 specific pathogens and one toxin, requiring the *institutional* review of such research to determine whether a risk mitigation plan is needed to minimize the chance that the research will be misapplied. If the research meets these criteria, the risk mitigation plan must be approved and enforced. Under its approved institutional policy RA-DURCBHZD-001, Rush has established the required Institutional Review Entity (IRE) called the DURC Committee, and has named an Institutional Contact for Dual-Use Research (ICDUR, Brett Williams, M.D.), who also chairs the committee. The DURC Committee will convene quarterly to review new potential DURC research and do annual continuing review of previously-approved projects. The DURC Committee has determined that no current research at Rush meets the DURC criteria to require approval of a risk mitigation plan. To oversee biological and/or biochemical hazards that do not meet the DURC criteria and also do *not* involve recombinant or synthetic nucleic acids and therefore do not require oversight by an Institutional Biosafety Committee (IBC) according to *The NIH Guidelines for Research Involving Recombinant and/or Synthetic Nucleic Acid Molecules (rev. 2019),* the same membership of the DURC Committee will constitute a Biohazard Committee. This committee will convene monthly, or as necessary, and will review and evaluate the safety of research projects that use human or animal pathogens, exempt quantities of Select Agents and other toxins, the Parkinson’s syndrome-inducing prodrug, 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP), nanoparticle preparations, and new, potentially biohazardous agents that may be developed.

**c. Radiation Safety Program**

Rush University Medical Center has a Radiation Safety Program under the direction of Radiation Safety Officer (RSO) William White. A broad-scope Radiation Safety Committee (RSC), as required by the State of Illinois, is chaired by Mark Supanich, Ph.D. All routine clinical and research laboratory aspects of ionizing radiation use, such as dose monitoring, radiation protection, nuclear medicine hygiene, and radioactive waste disposal, are managed by the RSO under oversight by the RSC. The clinical and non-clinical use of ionizing radiation for research purposes is subject to review and approval by the RSC. The RSC is also responsible for overseeing all uses of radioactive material. All research studies using ionizing radiation for treatment, guidance or localization, screening, or treatment response assessment must be submitted for radiation safety review. If the use of ionizing radiation is determined to be consistent with the Standard of Care, no further review is necessary. If the use of ionizing radiation differs from the standard of care or presents unknown or increased radiation risks, a designee of the committee will review the protocol and informed consent document and provide model radiation risk consent language if required. Some protocols, such as new uses of radioactive materials and research on children, pregnant subject or healthy volunteers may require full RSC review.

**d. Laser Safety Program**

Rush University Medical Center has a Laser Safety Program under the direction of Steven Edwards, Director, Occupation Safety, and Randall E. Johnson, Interim Laser Safety Officer (LSO), Clinical Engineering Services.  The purpose of the program is provide clinical staff, researchers, students, patients, and visitors with a safe laser use environment by managing the selection, use, and maintenance of lasers and laser-containing systems at Rush University Medical Center and Rush University Medical Group.  This program implements guidelines to ensure that no laser radiation in excess of the maximum permissible exposure (MPE) limit reaches the eye or skin of clinical staff, students, patients, and visitors. Additional guidelines ensure adequate protection against non-beam hazards that can be associated with the use of lasers: risk of electrical shock, explosions, fire, and exposure to harmful chemicals or biological hazards.  The program also conducts relevant educational programs, performs work place inspections including those used for clinical procedures, and inspects and repairs laser equipment, documenting maintenance histories to satisfy applicable regulations.  Program responsibilities are drawn from guidelines established by the American National Standard for the Safe Use of Lasers in Health Care Z-136.3-2011, and FDA CFR 1040.10.  The Program complies with the Illinois Emergency Management Agency (IEMA) regulations for acquisition, registration, use, transfer, and disposal of class 3b and 4 lasers.   A Laser Safety Committee, (LSC), as required by ANSI and IEMA is chaired by Steven Edwards.  Its purpose is to advise on laser activity and enforcement of operational policies and procedures at Rush.

 **4.** [**Division of Sponsored Programs Administration**](https://www.rushu.rush.edu/research/office-research-affairs/sponsored-programs-administration)

The Division of Sponsored Programs Administration (SPA) provides assistance to faculty and staff in obtaining and managing sponsored awards that support research activities. SPA is charged with accepting grants and contracts for sponsored programs funded by federal and state agencies, foundations and other public agencies, and providing guidance to assure proper stewardship of funds that are received. In addition, SPA prepares and negotiates sub-awards for collaborative research.

The mission of SPA is to provide superior guidance and support to faculty, staff, and administration in the pursuit of funding and collaborations reviewing and approving proposals submitted to all sponsors, for interpreting, negotiating, and for research, education and outreach.

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**5.** [**Division of Institutional Animal Care & Use – Comparative Research Center**](https://www.rushu.rush.edu/research/office-research-affairs/institutional-animal-care-and-use)

Rush is committed to excellence in patient care, education and research. In its commitment to excellence in these areas, the institution acknowledges the need for continued use of animals in teaching, research and testing, and the undeniable link of animal research to the advancement of biological and medical knowledge. Information and experience that are gained through the use of animals has improved, and will continue to improve, the quality and length of human and animal life.

Rush is committed to the judicious and humane care and use of animals in teaching, research and testing. The use of animals at Rush is a privilege granted through the Institutional Animal Care and Use Committee (IACUC), with moral, scientific and legal obligations for humane care and treatment of the animals.

Rush will comply with all applicable provisions of the Animal Welfare Act, other federal statutes and regulations relating to animals and any state statutes and regulations related to animals. As the institution receives federal funding and has an approved "Assurance of Compliance with Public Health Service (PHS) Policy on Humane Care and Use of Laboratory Animals," all persons will strictly adhere to the provisions of the PHS policy and the Rush PHS assurance. As the PHS policy covers all vertebrate animals, the institution's policies and procedures will apply to all vertebrate animal use, regardless of the funding source. Rush is also guided by the "U.S. Government Principles for the Utilization and Care of Vertebrate Animals Used in Testing, Research, and Teaching," detailed in the PHS policy. All animal care and use will follow the Guide for the Care and Use of Laboratory Animals (Guide). In situations where the regulations enforcing the Animal Welfare Act are specific and more restrictive than the PHS policy, these regulations will take precedence over the PHS policy.

The [Comparative Research Center (CRC)](http://iris.rush.edu/crc/index.html) is located in state-of-the art facilities in the RUMC, Cohn Building and occupies approximately 23,300 gross square feet. The Comparative Research Center is responsible for implementing the Rush Animal Care and Use Program and managing animal care facilities in accordance with the Guide. The Center's functions include procurement, care and maintenance of all animals used in research, teaching and testing, and the provision of professional advice to research and teaching staff.

Periodic assessment of the effectiveness of the CRC is provided at multiple levels by numerous sources including, but not limited to: semiannual program review and inspection of the facility by the Institutional Animal Care and Use Committee; annual performance reviews of CRC personnel; annual unannounced inspections by a USDA Veterinary Medical Officer; triennial site visits by the AAALAC International Council on Accreditation; and annual reporting to the USDA, Office of Laboratory Animal Welfare (OLAW) and AAALAC.

**6.** [**Technologies Supporting Research**](https://www.rushu.rush.edu/research/office-research-affairs/technologies-supporting-research)

The ORA works closely with the Office of Information Services at Rush to support key research administration technologies including the Rush Research Portal, OnCore – Clinical Trial Management System, eRAM – electronic Rush Animal Management, Faculty Profiles, Inter- and Intranets for Research, LINK, interfaces with sponsor databases, and other network and infrastructure-related needs of faculty and staff. The key technology application within the ORA is the Rush Research Portal described below. Highlighted below are the three applications involving research administration.

The [**Rush Research Portal (RRP)**](https://www.rush.edu/researchportal) is a key methodology to manage many aspects of the clinical research and sponsored programs submission process. All new clinical research studies and animal research studies are submitted electronically through the RRP. IRB studies that were active prior to September 17, 2007 (legacy studies) have been uploaded into the system. One of the many benefits of the RRP is its accessibility via the Internet, allowing a streamlined approach to the submission, review and approval of research projects, even if the necessary people are not physically here at Rush. The system will notify department approvers, IRB staff and/or other study staff as the project advances through the system. In addition, Grants, Contracts, COI, IBC and Radiation Safety submissions can now be created and submitted through the RRP. This will allow an even more central review and oversight of all research projects. To obtain a login ID for the RRP, all users are required to attend training. Training is available every Friday in Jelke 602A at 10 a.m. Additionally, all users are required to complete their mandatory training prior to having their study reviewed by the IRB.

The [**OnCore – Clinical Trial Management System**](http://www.oncore.rush.edu) is a system used to streamline and standardize clinical research administration, specifically: coverage analysis, budgeting, subject enrollment, subject visit tracking, and sponsor invoicing. The OnCore system supports these workflows through a series of standard sign-offs/statuses at both the protocol level as well as for specific components within study start up (such as approvals for CAs and Budgets). It also has task management features, which allow automated notifications to be sent as various activities are completed and awaiting the next task.  It is integrated with the Rush Research Portal to ensure that study data as well as regulatory information within the OnCore system is updated based on information managed in the Portal. Additionally, OnCore is integrated with Epic to support clinical research billing compliance through the association of subjects and studies. Lastly, it is integrated with Link to provide monthly financial information related to revenue generation and cash receipts for sponsor invoicing.

**eRAM – electronic Rush Management System** is a new system that is being implemented within the Comparative Research Center (CRC). The application will help streamline protocol submissions to the IACUC board, as well as automate animal ordering within the CRC. The facility will be utilizing barcoding workflows for animal census management, which will aid in animal ordering and monthly billing that will be maintained within the system. eRAM can also track training requirements and provide overall increased visibility for PIs, Lab Techs, and Administrators for animal protocols.

**7. Research Shared Services – Basic Biological Sciences**

Research Administration Shared Services is a model of organization which strives to deliver maximum levels of administration support and service in the most efficient and responsive way. We support faculty by providing assistance to faculty in all aspects of research. We currently offer support in Pre- Award and Post- Award Administration, as well as Lab Services and Regulatory assistance.

Research Administration Shared Services was first implemented in the Office of Basic Biological Sciences (OBBS) Departments at the end Fiscal Year 2017. As Shared Services continue to grow and mature within the Basic Sciences, services may be extended to other departments, centers, and research units beyond the Basic Sciences departments. The Director of Research Shared Services is Kristin Moody, MBA.

8. [**The Rush Research Mentoring Program**](https://www.rushu.rush.edu/about/faculty-affairs/rush-mentoring-programs)

The Research Mentoring Program was established July 26, 2006 in order to provide advanced mentoring by funded NIH investigators to an ever-growing population of young faculty. The goal of the program is to prepare junior faculty members at Rush and Stroger Hospital of Cook County to lead funded programs of translational research.

To help junior faculty members become independent researchers, the program relies on two primary mechanisms: good mentoring and resource infrastructure. Mentees are paired with at least one externally funded, experienced, and committed lead mentor who works very closely with the mentee on her/his research project; many mentees also have interdisciplinary mentoring teams. The program’s resources include: statistical analysis, professional grant writing and manuscript editing, graphics consultation, communication skills workshops, monthly “in-house study section” meetings, weekly mentee writing groups, monthly workshops and seminars on a variety of research-related and grant-writing topics, professional development seminars, a lending library, and an annual symposium.

Mentees are nominated to the program by their section heads/chiefs with the commitment of least 20% protected research time. In addition, mentees are expected to dedicate an additional 20% of their personal time for research. The program has two translational research tracks – clinical and laboratory-based. Each track meets monthly where mentees discuss their research in progress.

The program has enjoyed university-wide popularity and success. In the past twelve years combined, mentees (either as principal investigators or as co-investigators/collaborators) have secured or were instrumental in securing close to $88 million in awards, 40% of which are from the NIH. Also, over 2000 manuscripts have been published by mentees to date, since their joining the program. The program has more than 80 active mentors. The program director is Amarjit Virdi, Ph.D.

For a full description of the program, visit the website at [www.rushu.rush.edu/mentoringprogram](http://www.rushu.rush.edu/mentoringprogram)

**9. Library**

The Rush University Library and Archives is a collaborative learning and research commons with a strong teaching mission. Our knowledgeable and engaged staff provide access to authoritative health sciences resources, and teach our students, faculty, and staff how to use them effectively. We fully commit to providing high quality instruction, services, and space for our diverse community, as we connect our work in the Library to the Rush University Medical Center mission of delivering the best patient care possible.

*Services offered.* The Library’s Reference Department provides information services to all members of the Rush community. By appointment, we offer individual assistance with our research databases, creating effective search strategies, bibliographic management software, and more. There is a steadily growing demand for library participation in systematic reviews, and our librarians are happy to offer support depending upon demand and staff availability.

*Access to Library materials.* Through the Library’s [home page](https://rushu.libguides.com/libraryhomepage), RUMC students, faculty, and staff can access more than 9,900 full-text electronic journals, 14,900 electronic books and 125 databases. The Library Director is Scott Thomson, MS, MLIS, AHIP.

10. [**Office of Research Compliance (ORC)**](https://www.rushu.rush.edu/research/office-associate-provost-research/office-research-compliance)

The Office of Research Compliance promotes a culture of compliance, research integrity and high-quality research within the Rush community. We function within Corporate Compliance with reporting relationships with the Office of the Vice Provost and Vice President for Research. To promote this culture of compliance, we partner with the Office of Research Affairs, Legal and the University.

## Programmatic Elements

Oversight of the regulatory, ethical and compliance aspects of all preclinical and clinical research conducted at Rush is a complex, multidimensional undertaking. We advise and consult the research community on navigating regulatory complexities. Our mission is to support each operational area in its primary responsibility to ensure compliance. The following content areas are the focus of the Office of Research Compliance (ORC) program:

* Human subject protections (biomedical and social/behavioral)
* Animal use protections
* Research privacy and security
* Regulatory compliance
* Assessments of scientific integrity
* Investigate non-compliance
* Conflicts of interest (individual and institutional)
* Research misconduct
* Questionable research practices
* Financial management associated with funded research

## Research Compliance Program

The ORC incorporates the seven fundamental elements of an effective compliance program (issued by the Office of Inspector General (OIG)) through review and implementation of policies and procedures, conducting effective education and training, routine and for cause audits, establishing a hotline and responding promptly to detected offenses and undertaking corrective action.

**Core Functions**

* ***The Evaluation Quality Improvement Program (EQuIP)*** identifies areas of investigator /research team vulnerability regarding adherence to regulatory requirements, protocol, organization, and record keeping.  This audit/review process highlights areas requiring education, and fosters enhanced communication between research administration and the research community.  Data gathered during the EQuIP project provides ORC with an understanding of gaps in knowledge that can later be addressed through policy and training programs for the research community. Results of EQuIP, directed audits, and periodic compliance reviews are reported to the Chief Compliance Officer, the Vice President and Vice Provost for Research, and the Institutional Review Board (IRB) in cases involving human subjects research, and in certain instances, to the Office of Legal Affairs and/or the Audit Committee of the Board of Trustees.

* ***Research Conflict of Interests (COI).*** The Office of Research Compliance is responsible for the administrative collection, review and management of financial and other interests that have the potential to impact an individual’s professional or the Institution’s research and clinical responsibilities at RUMC. The goal of this program is to develop and maintain processes for identifying and managing external interests in conjunction with the Conflict of Individual and Institutional Interest in Research (COIIIR) Committee and Conflict of Interest Clinical (COIC) Committee that has the potential to impact an individual’s or the Institution’s professional, clinical or research responsibilities.
* ***Research Misconduct.*** The AVP of Research Compliance serves as the Research Integrity Officer (RIO) for RUMC and is responsible for receiving and processing all allegations of Research Misconduct. In addition reporting annually to DHHS’s Office of Research Integrity about allegations and investigations of Research Misconduct. Research Misconduct means fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results.Reporting suspected research misconduct is a shared and serious responsibility of all members of the academic community. Any person who suspects research misconduct has an obligation to report the allegation to the RIO. Allegations are handled under procedures described in RUMC’s policy titled [*Research Misconduct: Policy For Review and Reporting Allegations*](http://inside.rush.edu/policies/_layouts/listform.aspx?PageType=4&ListId=%7b03025EBA-6A43-4CD0-B2BF-0EE1D6A47790%7d&ID=8945&ContentTypeID=0x01006120BC59C77D074E8AC97A185E25195700FE83CC7F43C1744D974E005DEA966CAB). All reports are treated confidentially to the extent possible, and no adverse action will be taken, either directly or indirectly, against a person who makes such an allegation in good faith.
* ***Research Compliance Education and Training.*** The Office of Research Compliance offers a variety of educational opportunities in research compliance. As an entryway into research at RUMC, Rush mandates participation in the Research Compliance Onboarding Training Session. A wide variety of research compliance topics are covered allowing for face-to-face interaction with new personnel and opening the dialogue between compliance and the research community. The Collaborative Institutional Training Initiative (CITI Program) aka CITI Program is the primary web-based tool for mandatory training and education and is managed by ORC Coursework includes Biomedical Research, Social/Behavioral Research, Data/Specimen Research, Responsible Conduct of Research, Good Clinical Practices, Laboratory Practices and more. In addition, the ORC provides one-on-one and group training opportunities covering all aspects of research compliance. The ORC is responsible for Responsible Conduct of Research (RCR) training at Rush.

The ORC aims to assist the research community in navigating the complex regulatory matrix of research requirements. Our experienced team members are available for consultation.

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 [**Research Core Laboratory Facilities**](https://www.rushu.rush.edu/research/office-associate-provost-research/core-research-facilities?c=RushUnivLevel2Page&cid=1260198526365&pagename=Rush/RushUnivLevel2Page/Level_2_Audience_Portal_Page&rendermode=preview)

All the scientific cores have pricing structures that are advantageous for Rush investigators and will therefore allow greater productivity per grant expenditure than comparable external facilities operated by neighboring universities or commercial laboratories. With rare exceptions, investigators can receive training to operate these facilities independently, thereby reducing the labor charges associated with larger projects.

**1. MicroCT/Histology Core (MCTHC).**

Micro-computed tomography (MicroCT, µCT) is a non-destructive, x-ray based technique used to construct three-dimensional images of objects with natural or contrast-enhanced radio-opacity. The laboratory has been used by investigators from Rush and extramural investigators from several universities across the U.S for *ex vivo* imaging of bone, cartilage, nerve, vascularity, and various biomaterials. There are two µCT scanners in the lab. The microCT40 (Scanco Model 40) has a nominal best resolution of 6 μm with a real resolution of ~9 μm (45-70 kVp); reconstructed image matrix of either 1024 x 1024 or 2048 x 2048; field of view up to 37 mm and maximum scan length of 7 cm. The microCT50 (Scanco Model 50) has a nominal best resolution of 0.5 µm with a real resolution of ~1 µm (45-90 kVp) and a maximum scan length of 16 cm and field of view of 48 mm. Reconstructed image sizes can be as large as 8190 x 8190. Both instruments have an open VMS operating system; complete imaging software for data acquisition, online/offline reconstruction, 3D visualization and animation, 2D and 3D trabecular bone histomorphometry, and a database for tracking specimen processing and archiving. Images can be exported in DICOM and TIFF formats and the morphometric data can be readily downloaded to Excel spreadsheets. The histology core provides support for preparing ground or thin sections from plastic-embedded, undecalcified bone specimens (often containing a metal implant) and paraffin embedded, decalcified specimens. Undecalcified samples are embedded in methylmethacrylate during a 4 week process and can be sectioned using an Isomet 5000 linear precision saw and ground to ~100 µm thickness and/or polished to a mirror finish using a Phoenix 400 grinder/polisher. Decalcified samples are processed in paraffin using a Leica TP1020 automatic processor and embedded using a Leica Arcadia H automatic paraffin embedder. Thin, undecalcified sections are cut to a specified thicknesses (approximately 6 µm) using a tungsten carbide blade on a Leica RM2255 microtome. Paraffin sections are cut using low profile disposable blades. A variety of histological stains are available for both undecalcified and decalcified sections. The lab also has the ability to perform histochemistry and immunohistochemistry. The MicroCT/Histology Core is facilitated by Rick Sumner, Ph.D., chair of the Department of Cell & Molecular Medicine.

**2. Flow Cytometry Core (FCC).**

***Instrumentation:*** The Rush University Medical Center flow cytometry core facility currently operates four Becton-Dickinson instruments: one dual-laser FACSCalibur, one three-laser FACSCanto II, one three-laser BD-LSR II analyzer and one four-laser BD LSR Fortessa. The FACSCalibur flow cytometer is an end user-operated instrument with two lasers, permitting measurement of four fluorescent and two light-scatter parameters. Trained users prepare and acquire/analyze their own samples using a Macintosh G4 computer and either CellQuestTM or FlowJo software. The FACSCanto II flow cytometer is an operator-assisted instrument with three lasers (405 nm, 488 nm, and 633 nm), permitting measurement of eight fluorescent and two light-scatter parameters. The LSR-II flow cytometer is a three-laser (405 nm, 488 nm, and 633 nm) instrument capable of measuring up to twelve parameters (10 fluorescent and 2 light-scatter), and is operator-assisted. The LSR Fortessa flow cytometer is a four-laser (405 nm, 488 nm, 561 nm, and 640 nm) instrument capable of measuring up to eighteen parameters (16 fluorescent and 2 light-scatter), and is operator-assisted. Trained users bring samples to the facility and are assisted on their acquisition/analyses using PC-based FACS DiVa software. The facility staff will assist investigators in the use of the flow cytometers and data analysis software programs, FlowJo (Tree Star Inc.) or FACS DiVa for the purpose of data analysis or graphics production.

***Services***

* Immunophenotyping
* Cell viability/apoptosis
* Intracellular protein staining
* Multiplex assays for detection of cytokine and chemokines
* Cell tracking and proliferation
* Cytotoxicity
* DNA or RNA analyses

The flow cytometry core was established in the Department of Microbial Pathogens and Immunity and is under the direction of Alan Landay, Ph.D.

**3. Rush Proteomics Core (RPC)**

The Rush Proteomics Core (RPC) offers a wide range of services for designing, conducting as well as analyzing researches related to proteomics. These services include the identification of proteins including antigens, profiling of serum and plasma proteins, detection of novel serum and tissue biomarkers indicative of diseases, analysis of post-translational modifications, characterization of protein-protein interactions, and identification of molecular pathways involved in health and disease. The RPC supports the research of both junior and senior investigators and assists clinical/translational researchers in conducting laboratory procedures.

**RPC services include:**

We offer consultations on experimental design, guidance on choosing the most appropriate platform for specific research objectives and data interpretation, training for self-service activities, performance of procedures as needed and post-experiment analysis. Specific services include the following:

* One- and two-dimensional gel electrophoresis and Western blot
* Computer-aided image capture and analysis
* Protein isolation and high-resolution protein analysis
* Extraction of proteins from formalin-fixed paraffin-embedded  (FFPE) archived tissues for profiling of proteins for which no fresh sample is available
* Production and purification of recombinant proteins, using E. coli
* ELISA assay for biomarkers, hormones, proteins and lipids from many biological fluids, including dried blood spots
* Bioinformatics support, using analytic software for gels and Western blots
* Biomarker-discovery algorithms and protein-database searches
* RPC personnel also teach in several graduate-level courses to introduce basic proteomics methodology to students and young investigators.

The RPC facilitator is Dr. Animesh Barua, Ph.D. and the facility is managed by Moumita Majumder, PhD.

**4. Rush microRNA and Gene Expression Core (RMGEC).**

The microRNA and Gene Expression Core facilitates research on the determination of molecular pathogenesis and diagnosis of disease, development of disease-targeted drug and molecular monitoring of treatment efficacy.

RMGEC is equipped with Applied Biosystems advanced quantitative PCR instruments, Thermo Fisher ViiA 7 and 7900HT Fast real-time PCR systems with 96- and 384-well capabilities, Bio-Rad MJ Research Dyad and PTC 200 PCR systems with multi-block thermals for routine PCR applications, ChemiDoc XRS with Quantity One software for gel imaging and quantitation, and NanoDrop technology for accurate measurement of quality and quantity for DNA and RNA.

The services provided by RMGEC covers all aspects of miRNA and gene expression analysis, from DNA/RNA/miRNA preparation, to microarrays, miRNA and gene profiling, functional annotation analysis, and validation studies. RMGEC will also do next generation sequencing and data analysis. It facilitates research at all levels, from clinical diagnostic studies to cutting-edge basic, discovery research. The RMGEC facilitator and staff provide consultations to help researchers, especially newcomers to genetics and molecular biology studies. The spectrum of support ranges from investigator training in operation and troubleshooting of the apparatus to experimental design/optimization. The RMGEC encourages collaborations with researchers, and will provide support to researchers during their grant application and help to enhance their miRNA and gene expression components of the grant proposals.

The RMGEC facilitator is Dr. Animesh Barua, Ph.D. and the facility is managed by Moumita Majumder, PhD.

**5. Rush Biomarker Development Core (RBDC)**

The Rush University Biomarker Development Core provides a cost-effective and rapid means to evaluate protein biomarkers (such as cytokines, growth factors, and autoantibodies) in any biological specimen and for any size project on a fee-per-service basis, ranging from small projects evaluating single analytes to large clinical trials screening hundreds of candidate biomarkers for clinical value. Examples of biological samples include: dried blood spot extracts, serum, plasma, synovial or cerebrospinal fluids, urine, tissue or cell lysates, and conditioned media.  All evaluations can be performed with either absolute or relative quantitation using the Luminex xMAP immunobead platform by highly-experienced laboratory staff. This platform permits simultaneous quantification of up to 500 analytes from low microliter volumes of sample with performance that meets or exceeds those of ELISA assays. Early disease detection and monitoring of disease progression and treatment response monitoring are just a couple examples of potential applications. Commercial kits are available for a wide array of potential analytes by multiple partners of the Luminex Corporation. Consultation with our facility director will help you identify the most effective means to meet your research objectives. We also offer services for custom assay development and validation for any analyte not currently available through commercial sources.

The director of the RBDC is [Jeffrey A. Borgia](http://www.rushu.rush.edu/servlet/Satellite?ProfileType=Short&c=RushUnivFaculty&cid=1200925132399&pagename=Rush%2FRushUnivFaculty%2FFaculty_Staff_Profile_Detail_Page), Ph.D. and the facility is managed by Cristina Fhied. For questions please contact Cristina Fhied 312-942-2210.

**6. The Rush Cancer Center Biorepository Core**

The Rush Biorepository Core is a strategic resource within the Rush Research Core System designed to provide key infrastructure to support the accrual and optimal long-term preservation of biospecimens from individuals being evaluated or treated at Rush, or one of our clinical partner institutions. The strategic accrual of these resources will provide Rush investigators with subject cohorts necessary to support specific translational biomedical research studies, as well as an opportunity to play leadership roles in the innovation of novel preventative, diagnostic and therapeutic approaches that will serve as the foundation by which we will be able to offer the latest in individualized therapy to our patients.

***Equipment capabilities.*** The Rush Biorepository Core is intended to provide comprehensive infrastructure to support patient enrollment, patient tracking, specimen processing, and long term cryopreservation. Clinical Research Coordinators are responsible for guiding all patients through the process of enrollment and tracking their specimens through acquisition, processing, and long-term archiving. Medical technologists and technicians are responsible for specimen processing and long term cryopreservation. Cases are catalogued using CloudLIMS, which provides a platform for comprehensive inventory management with numerous reporting options. Finally, the entire facility (including our freezer farm) are monitored 24/7 by our Checkpoint monitoring system, which alerts laboratory personnel immediately in the event of malfunction in any component of the cryopreservation facility. Sufficient backup cryopreservation units are available to accommodate catastrophic instrument failure that may jeopardize specimen integrity.

***Services offered.*** Investigators at Rush have been archiving biospecimens (surplus tumor/tissue from surgeries, serum, plasma, plasma buffy coat) to support its Thoracic Oncology Research Program since 2004. Standardized biobanking protocols consistent with recommendations provided in the *NCI Best Practices for Biospecimen Resources* (published by the Office of Biorepositories and Biospecimen Research at the National Cancer Institute) have been employed from the beginning. The leadership of the RUBC regularly attends scientific meetings and seminars focused on biobanking sciences to ensure that the latest advances are integrated into its standard practices.

***Project initiation.*** The RUBC invites all groups at Rush (and otherwise) interested in biobanking specimens for either current or planned research projects to come in for a no-cost preliminary consultation. In this meeting, we will identify the key components to form a new collection effort, including the types of biospecimens desired, optimal protocols for processing and archiving biospecimens based on anticipated analyses, the scope of collection, and relevant regulatory issues. A quote is developed from this meeting that will permit the collection effort to commence in a timely manner and will include any additional infrastructure that may be needed to support patient recruitment, biospecimen collection, annotation, processing, and long-term cryopreservation.  Investigators at Rush can also partner with the RUBC to access biospecimens already collected as part of our ongoing initiatives. We will provide guidance to help these investigators determine the suitability of existing collections of patient materials for their studies. Please contact us concerning this process and the anticipated cost structure for accessing the desired resource.

**Core director:** [Jeffrey A. Borgia, PhD](https://www.rushu.rush.edu/faculty/jeffrey-borgia-phd)
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**7. Rush Bio Specimen Freezer Facility**

Rush has a centrally-located, 2500-square foot freezer facility. The facility includes a mixture of cryogenic storage units, -80°C mechanical freezers (many with liquid nitrogen backup cooling), -20°C freezers, and refrigeration units for large tissue samples. At present, 59 units are operating, but this number will increase to 114 units and the foot print will expand to 5400 square feet when the second phase of the facility opens in 2014. Units are digitally monitored to give automatic notification of temperature excursions or mechanical failure to both maintenance personnel and to the response tree established by the investigator. Access to the facility is electronically controlled and monitored. This facility provides improved security for specimen collections including an Alzheimer’s brain tissue library, and preserves space in the investigators’ laboratories.

**8. IM Research and Drug Discovery Imaging Core**

The IM research CORE facilities consist of multiple state-of-the-art imaging, liquid handling, high-throughput, and other analytical equipment. The list of equipment includes High-Content Screening (HCS) Systems, Electron Microscopy (TEM/SEM), Confocal Microscopy, Live-Cell Imaging, and Flow Cytometry. The facilities housing the equipment were entirely renovated in 2013 and early 2014 as part of Dr. Jochen Reiser and Dr. Vineet Gupta’s research laboratories and occupy space on the 1st and 7th floors of the Cohn building.

***8A. High-Content Screening (HCS) Systems:*** The Core oversees the operation of a Perkin Elmer Opera HCS System, which offers the ultimate in high throughput, speed and resolution – making it the ideal solution for flexible, scalable assay development and robust screening. The Opera system utilizes Acapella high content imaging and analysis software and offers solutions for apoptosis, calcium flux, cell cycle, cell differentiation, cell migration, cell proliferation, cell shape changes, cytoskeletal rearrangement, cytotoxicity, fluorescence in situ hybridization (FISH), lipid droplet analysis, neurite outgrowth, protein expression, receptor activation, RNAi screening, signaling pathway, and transcription factor analysis . The HCS facility also has a Perkin Elmer JANUS automated workstation - a liquid handling robot that provides real-time and future adaptability for augmented throughput, plate capacity and dynamic volume range. It includes a gripper ‘pick and place’ robotic arm for automatic ‘on the fly’ switching of heads for optimal precision pipetting and performance. JANUS NanoHead dispense heads, with proprietary Modular Dispense Technology (MDT) enhance assay miniaturization with 384-tip processing down to 50 nL with C.V.s less than 13%. Also in the HCS facility, a BioTek plate washer is available for washing cells in 96- and 384-well plates.

***8B. Electron Microscopy:*** The Core Facility can provide researchers access to a scanning electron microscope with transmission electron microscopy (TEM) capabilities. Services include critical point drying and gold coating of EM samples. The Zeiss Sigma HDVP Electron Microscope is a high definition imaging system capable of producing ultra high resolution images with a resolution of up to 1nm. This scope features both high vacuum and variable pressure modes, and is equipped with five different detectors including: a secondary electron detector, a back scatter detector, an in-lens detector, a variable pressure secondary electron detector, and a scanning transmission electron microscopy (STEM) detector to image TEM tissue sections. This instrument has an acceleration voltage range of 1kV-30kV and scan speeds up to 50ns per pixel. The SmartSEM software is capable of 4-D imaging, elemental mapping, remote viewing, and is user friendly, offering a number of customizable preferences unique to each user. Atlas Imaging software is also included, and enables automatic site to site scanning for mosaic compositions. The room has been outfitted for magnetic interference cancellation, electrical stability, and vibration reduction.

***8C. Confocal and Live Cell Microscopy:*** The Core includes a Confocal Facility, which is equipped with a Zeiss LSM 700 including two spectral channels and a live cell imaging workstation . The confocal microscope is based on an Axio Observer Z1 motorized inverted microscope with four laser excitation lines from four solid-state diode lasers: 405nm, 488nm, 555nm, and 635nm. The instrument is equipped with a motorized scanning stage with controller. It also has the Zeiss Definite Focus controller for extremely precise focus control during long-term conditions where focus drift is a problem. The Live Cell Imaging microscope is based on a Zeiss Axio Observer D1 inverted microscope and is equipped with an XL-3 Incubator heated stage fitted with a CO2-supplied cover plate. This incubation system enables precise temperature control and CO2 supply for the specimen enabling extended imaging experiments. The instrument uses the Zeiss ZEN Windows-based software, which is user-friendly and logical. The IM Research CORE facilities are available for use by the RUMC community and outside users under the directorship of Steve Mangos, Ph.D. Access to the facilities is restricted by swipe card access, which is only granted to approved, trained users and staff. A 1 hour training and certification program is required for all users and is available through the IM Research CORE Facilities Director.

**9. Bioinformatics/Biostatistics Core**

The Rush Bioinformatics and Biostatistics consists of a growing team of clinical data analysts, statisticians, bioinformatic scientists and devops engineers. The mission of the core is to support the educational, clinical and translational research programs at Rush. This includes but is not limited to: education, outreach, statistical consultation, clinical data extraction, genomics (germline, cancer and microbiome analyses), data engineering & database development, general programming needs & technology development, high performance computing and/or cloud computing resources. RUSH maintains an Enterprise Data Warehouse comprised of clinical and administrative data derived from our EPIC Electronic Medical Record and associated clinical IT systems. This single source EDW supports all clinical, research, and operational needs and contains administrative data for greater than 10 years and clinical data back to 2007. In partnership with the biorepository, RUMC maintains the genomic sequencing data of thousands of Rush patients consented for research use. RUMC currently uses Epic for nearly all clinical and revenue cycle applications across the enterprise, including inpatient, ambulatory, ED, operating room, oncology, pharmacy, registration/scheduling, professional billing, facility billing and patient portal activities. RUMC has extensively customized Epic to support quality measurement, decision support, and interactions with our patients through the patient portal implementation. A patient portal application is available to serve as a means of communication with, assessing the health outcomes of, and recruiting patients for participation in studies. The core actively incorporates external databases or provides programmatic access to external data sets which can provide regional, national or study-specific insight into populations

Core staff can provide rigorous analysis on a wide array of studies – data extracted from medical records, and cross-sectional and prospective study of population and clinical studies of health outcomes, and assist with interpreting statistical findings. Staff also perform power analysis and sample size calculations, prepare the data analysis sections for grant applications, create randomization schemes for the study, assist in planning the data collection procedure, write and review statistical sections of manuscripts prior to publication, and provide statistical education and mentorship for study design concepts and interpretation of study findings. The Core also provides access to data for researchers from the electronic record and external data sets for linkage and/or analysis. The director of the Bioinformatics Core is Casey Frankenberger, Ph.D.

**10. The Clinical Retrovirology Research Laboratory (CRRL)**

The Clinical Retrovirology Research Laboratory (CRRL) at Rush University is a core specimen processing laboratory. This laboratory will provide the resources for the establishment of the COVID-19 Biorepository.

The CRRL operates under good clinical laboratory practices (GCLP). Specimen management and tracking is done using the Web-based laboratory data management software (Frontier Science, Buffalo, NY, WEB LDMS); specimens generated for NIH-sponsored clinical trials as well as for internal work done for other investigators at Rush is tracked using the WEB LDMS. All the CRRL members have been trained on the proper use of the WEB LDMS and the quality of the CRRL LDMS database is monitored by Frontier Science. The use of WEB LDMS eliminates the potential loss of data due to computer failures, and ensures that the CRRL staff has access to all the current updates of the WEB LDMS in real-time.

The WEB LDMS is a comprehensive computerized specimen management system designed to provide bar-code labeling, optical archiving, inventory, and retrieval of specimens. All specimens generated by the CRRL are logged into the WEB LDMS computer and tracked through specimen management, storage, and shipping modules. In addition, labels are generated by the LDMS, using the barcode label and format that identifies each unique specimen by participant, date, visit, specimen type, and derivative. The LDMS is also used to print storage, shipping, assay and specimen reports and create processing tallies.

As part of the NIH funded ACTG clinical trial network, the CRRL has access to standardized operating procedures for processing a range of clinical specimens for use in both internal and external projects. The CRRL staff members have experience in processing blood into plasma, serum, viable and nonviable cellular fractions according to the DAIDS Cross-Network Virology and PBMC Processing SOPs. The CRRL staff members are proficient in lymphocyte cell separations from both whole blood and leukopaks and have experience working with genital specimens, anal, oral, and nasopharyngeal swabs, cerebrospinal fluid, fecal, and urine samples.

As part of the NIH-funded clinical trials networks, the CRRL has participated in NIAID-sponsored Immunology Quality Assurance (IQA) Program for PBMC cryopreservation since 2004. The CRRL was also certified for leukopak processing in 2018 which includes real-time monitoring of cell viability and recovery. These highly trained staff members will be responsible for receiving, processing, storing and shipping specimens that are collected for the Biorepository.

The CRRL consists of laboratories with Biosafety Level 2 (BSL2, 860 Jelke) and CRRL staff are also responsible for the maintenance of the Biosafety level 3 (BSL3, 1183 Jelke) containment facility (see **11** below). BSL2 facilities may be used for specimen receipt and specimen processing, while the BSL3 facility may be used for specimen processing and virus propagation and testing. The CRRL currently maintains (-80°C) freezers and LN2 freezers in a freezer facility that is maintained by CRRL staff members. New freezers will be added to accommodate the expanding needs of the core. Specimen processing is performed in biological safety cabinets (BSC) located in Room 860 of the Jelke Building (700 ft3) which contains three 6 ft biosafety cabinets (BSC) and a 4°C refrigerator, a -30°C freezer.

The core director: James W. Bremer, PhD (James\_W\_Bremer@rush.edu, 312-942-3308)

Core Administrator: Cheryl Jennings (cheryl\_jennings@rush.edu, 312-942-5954)

**11. COVID-19 Biorepository**

This biorepository is collecting samples from human subjects, including blood samples, oropharyngeal (OP) and nasopharyngeal (NP) swabs, tissues, bodily fluids, stool, urine and other residual samples that may be collected as part of clinical care. The biorepository is using the resources of the Clinical Retrovirology Research Laboratory. The biorepository web page is <https://www.rushu.rush.edu/research/covid-19-science/covid-19-non-clinical-trials-rush/rush-covid-19-biorepository>. The director is Alan Landay, PhD (alanday@rush.edu).

**12. The Biological Safety Level 3 (BSL3) Laboratory**

The BSL3 facility (JS 1183) is a negative pressure biohazard containment facility that consists of an anteroom (90 ft2) and laboratory (430 ft2). The facility was totally renovated in 2011 to conform to current Biosafety in Microbiological and Biomedical Laboratories (CDC-NIH, BMBL, 2007) standards for handling RG3 agents, large volume isolation of RG2 agents, as well as new and uncharacterized pathogens when found or genetically modified human pathogens as described in the current NIH OBA current guidelines covering “Recombinant or Synthetic Nucleic Acid Molecules.” The facility would be invaluable as a support laboratory during a pandemic or bioterrorism event. The facility would also be useful for BSL2+ risk level experiments such at the propagation of drug-resistant *Mycobacterium* ***tuberculosis****.* The facility is recertified annually to meet current CDC/NIH requirements. The facility is connected to RUMC emergency power and is designed to maintain containment and security during emergency conditions. All exhaust from the BSL3 is HEPA filtered before it is vented to the outside. A Steris pass-through steam sterilizer between the vestibule and main laboratory is equipped with appropriate biosafety collar, one-way pass through control, and backup steam generator. The main laboratory consists of two work areas. One area has two biological safety cabinets (BSC), one 4 foot and one 6 foot, the other area has a single 6 foot BSC; all three BSCs are vented to the outside via the HVAC system. A single 3 foot BSC is also available. The BSCs are certified annually by an outside contractor. A dual chambered 37°C CO2 incubator is also available in the BSL3 laboratory. Additional shared equipment includes a 4°C refrigerator (24 ft3), a -30°C freezer (24 ft3), a -80°C freezer (20.4 ft3), one high capacity table top centrifuge (refrigerated), three micro-centrifuges (two refrigerated), and two microscopes, one inverted scope for cell culture. The refrigerator, the two freezers, the incubators, and the room are equipped with micro-sensors that continuously monitor temperature and wirelessly transmit their data to a centralized computer as part of a Siemens Checkpoint System, which automatically alerts specified people to any problems. The BSL-3 Laboratory is available for use by the RUMC community under the directorship of James W. Bremer, Ph.D. and administrator Cheryl Jennings. Access to the BSL-3 facility is restricted by swipe card access which is only granted to approved, trained staff. A 4-hour training and certification program is available and required of all users.

**13. Neighboring University Core Research Facilities**

In addition to the in-house Cores described above,Rush researchers have access to Core facilities at both the University of Chicago through the joint Institute for Translational Medicine project of the two universities and the University of Illinois at Chicago. External Core Director contact information and laboratory locations are available on the respective web sites. The UIC labs are all within walking distance of the Rush campus.

*13A.* [***University of Chicago******(Office of Shared Research Facilities)***](https://osrf.bsd.uchicago.edu/)

* + [Advanced Electron Microscopy: Cryopreservation and Tomography](http://tomocryo.uchicago.edu/)
	+ [Animal Resources Center](http://surgery.uchicago.edu/specialties/transplantation/research/core/)
	+ Gnotobiotic Research Animal Facility
	+ [Biophysics](http://biophy.uchicago.edu/)
	+ [Biostatistics](http://health.bsd.uchicago.edu/Biostatistics-Laboratory)
	+ [Cellular Screening Center](http://cscenter.uchicago.edu/)
	+ Center for Research Informatics
	+ [cGMP Laboratory](http://cgmp.uchicago.edu/)
	+ [Genomics](http://genomics.uchicago.edu/)
	+ [Human Imaging Research Office (HIRO)](https://hiro.bsd.uchicago.edu/)
	+ [Human Immunological Monitoring](http://him.uchicago.edu/)
	+ [Human Tissue Research Center (HTRC)](http://htrc.uchicago.edu/)
	+ [Imaging, Computing, and Repository](http://icar.bsd.uchicago.edu/)
	+ [Integrated Light Microscopy](http://digital.bsd.uchicago.edu/)
	+ Cytometry Antibody Technology
	+ Pharmacology
	+ [Proteomics Core](http://proteomics.uchicago.edu/)
	+ [Transgenic/ES Cell Technology](http://transgenic.uchicago.edu/)
	+ [X-ray Reconstruction of Moving Morphology](http://xromm.uchicago.edu/)
	+ [Integrated Small Animal Imaging Research Resource](http://isairr.bsd.uchicago.edu/)
		- [Electron Paramagnetic Resonance Imaging](http://epri.uchicago.edu/)
		- [Magnetic Resonance Imaging and Spectroscopy](http://mris.uchicago.edu/)
		- [Optical Imaging](http://oicf.bsd.uchicago.edu/)
		- Ultrasound
		- [PET/SPECT/CT Tomography](http://petspectct.bsd.uchicago.edu/)
		- [Veterinary Technology](http://ivt.bsd.uchicago.edu/)

*13B.*[***University of Illinois at Chicago******(Research Resources Center)***](http://www.rrc.uic.edu/)

* Bioanalytics, Biophysics and Cytomics Division
	+ Biophysics
	+ Flow Cytometry
	+ High Throughput Screening
	+ Mass Spectrometry
	+ Nuclear Magnetic Resonance
* Genome Research Division
	+ Genome Research
	+ Research Informatics
* Scientific Imaging and Nanotechnology
	+ Cardiovascular Research
	+ Electron Microscopy
	+ Fluorescence Imaging
	+ Nanotechnology
	+ Preclinical Imaging
	+ Research Histology and Tissue Imaging
* Research Support Division
	+ Scientific Computing
	+ Scientific Instrument Shop
	+ Scientific Store Room (supplies and reagents are stocked for immediate pickup)
	+ UI Health Biorepository

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