Descriptions of Core Research Facilities, Research Centers, and Research Institutes

Carver College of Medicine

University of Iowa

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# Core Research Facilities and Research Service Units

## Biochemistry Stores

[*https://medicine.uiowa.edu/biochemstores/*](https://medicine.uiowa.edu/biochemstores/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

###### Biochemistry Stores is a part of the Biochemistry Department of the Carver College of Medicine at the University of Iowa. As a research supply storeroom that purchases and dispenses nearly $3 million per year in inventory, the Biochemistry Stores services: all University of Iowa research laboratory units, units of the University of Iowa Hospitals and Clinics, University of Iowa students, Veterans Affairs Medical Center, and any other facilities having funding through the University of Iowa. Biochemistry Stores stocks a broad range of research chemicals, labware, glassware, expendables, and other necessary research supplies, and uses high sales volume to negotiate the purchase of the highest quality inventory at the lowest possible prices. Products are dispensed on a walk-in basis in a quick and efficient manner.

## Bioengineering Services

[*https://medicine.uiowa.edu/bioengineeringservices/*](https://medicine.uiowa.edu/bioengineeringservices/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

Bioengineering Services provides professional maintenance of The University of Iowa Hospitals and Clinics' patient-care and the Carver College of Medicine's research equipment. Scheduled preventative maintenance, repair and pre-construction and general technical consultation services are available.

## Biological Safety Level III Laboratories

The Carver College of Medicine's Biological Safety Level III (BSL3) Laboratory facility provides researchers with state-of-the-art laboratories in which to safely study BSL3 select and non-select agents and toxins regulated by both the Centers for Disease Control and Prevention and the U.S. Department of Agriculture.  The facility has been designed to safely accommodate research, clinical, and diagnostic procedures, including animal housing areas for rodents and other small animals.  In addition to the animal areas, there are additional individual laboratories to accommodate work for tissue culture, virology, microbiology, and molecular biology. Each of the two facilities allows up to approximately 10 researchers to work simultaneously, which can be reserved using an online reservation system. Prior to using the facility, researchers undergo a rigorous training program and all work is monitored by the Director, the Responsible Officials/Biosafety Officers, and the Carver College of Medicine BSL3 Oversight Committee.

The BSL3 facility laboratories are furnished with all necessary equipment to safely perform tissue culture, virology, microbiology, and molecular biology experiments, including Biological Safety Cabinets, incubators, microscopes, centrifuges, plate readers, shakers, refrigerators, and freezers. The core uses Freezerworks as the inventory management software, which tracks all samples. Additionally, it houses a Zeiss Axiovert 200M inverted fluorescence microscope complete with an environmental chamber, allowing researchers to visualize microbe-host cell interactions and responses in real time. This powerful system provides our researchers with the unparalleled ability to perform a range of microscopy experiments that otherwise would not be possible as all BSL3 samples must be inactivated prior to removal from the laboratory.

## Biomedical Research Store

[*https://webapps1.healthcare.uiowa.edu/biostore/*](https://webapps1.healthcare.uiowa.edu/biostore/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Biomedical Research Store provides University of Iowa research investigators easy procurement of common molecular and cell biology enzymes, reagents and kits. Large volume contracts enable the store to negotiate very low prices as well as eliminate all shipping and packaging fees.

## Biospecimen Procurement and Molecular Epidemiology Resource

[*https://cancer.uiowa.edu/biospecimen-procurement-and-molecular-epidemiology-resources-biomer*](https://cancer.uiowa.edu/biospecimen-procurement-and-molecular-epidemiology-resources-biomer)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Biospecimen Procurement and Molecular Epidemiology Resource (BioMER) provides investigators with IRB-compliant, clinically annotated, quality-ensured biomaterials to facilitate cancer and non-cancer related research objectives. These materials include tissues, which are distributed as fresh, frozen, or paraffin-embedded specimens, and serum, plasma, and germline DNA, many linkable to tumor samples and clinical data catalogued in coordination with the tissue. All specimens collected using BioMER services are inventoried in Labmatrix, the enterprise laboratory information management system (LIMS) used to catalog biomaterials collected for research throughout campus. The BioMER serves as a single point of entry for investigators requesting specimens and/or related data for research use.

The BioMER is a Shared Resource resulting from the merger and expansion of the Tissue Procurement Core (TPC) and Molecular Epidemiology Resource (MER). The TPC provides research infrastructure in the form of a well-characterized bank of frozen and routinely processed neoplastic and normal tissues suitable for molecular, genetic, biochemical, and pathologic studies. The MER is a network of prospective observational data repositories that utilize highly annotated, prospective, observational data from defined cohorts of cancer patients. The BioMER supports studies that are dependent on a linkage of clinical and molecular data by using two unified biorepository consents, one each for cancer and non-cancer related studies. This allows current and future use of tissue for research, permissions to link that tissue to clinical data, and to recontact the patient for additional studies.

## Biostatistics Consulting Center

[*https://www.public-health.uiowa.edu/biostatistics-consulting-center/*](https://www.public-health.uiowa.edu/biostatistics-consulting-center/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Biostatistics Consulting Center is a unit within the Biostatistics Department of the College of Public Health. The Consulting Center experts provide statistical consulting for researchers in the Carver College of Medicine, as well as other health science researchers at the University of Iowa Colleges of Dentistry, Nursing, Pharmacy, and Liberal Arts and Sciences. The Consulting Center assists researchers with all phases of basic science, clinical, and epidemiologic research. Specifically, the Consulting Center can assist with grant proposal development, assist with study design, develop efficient data management strategies, perform appropriate statistical analysis, and assist in writing reports for scientific publication.

## Center for Biocatalysis and Bioprocessing

[*http://cbb.research.uiowa.edu*](http://cbb.research.uiowa.edu)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Center for Biocatalysis and Bioprocessing (CBB) is an interdisciplinary research center dedicated to the advancement of biocatalytic sciences. The center operates a core Microbial Bioprocessing Facility that provides expertise in both upstream and downstream bioprocesses to: a) optimize production of highly-valued biomolecules, b) scale-up bench-top processes to commercial sizes, and c) perform pilot-scale manufacturing of products at the highest level of quality control. Examples of targeted products include vaccines, enzymes, binding proteins, growth hormones, DNA, RNA, and bio-transformation products. Conventional academic biomanufacturing is performed in our Research and Process Development (RPD) suite. A distinguishing feature of the CBB core facility is the operation of a second suite that focuses on production under current good manufacturing practices (cGMP) conditions. This GMP suite offers the preparation of high quality biotechnology products produced under regulations mandated by the 2008 FDA guidance for quality manufacturing of compounds designed for Phase 1 clinical trials. The information provided by the GMP manufacturing of experimental therapeutics is suitable for Investigational New Drug (IND) applications. Fermentations can be scaled up from shake flasks to 1000 L volumes within our RPD suite and up to 300 L volumes in our GMP suite. All biomanufacturing processes are performed by professional staff trained in laboratory practices and quality control.

## Central Microscopy Research Facility

[*https://cmrf.research.uiowa.edu*](https://cmrf.research.uiowa.edu)

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The Central Microscopy Research Facility (CMRF) offers a wide variety of research services, educational/training opportunities, and instrumentation at its facility in the Eckstein Medical Research Building within the Carver College of Medicine. It specializes in biomedical imaging and offers epi- and confocal fluorescence microscopy as well as scanning, transmission, and freeze fracture electron microscopy. CMRF instrumentation also includes a Leica SP8 STED super-resolution confocal microscope, Zeiss LSM 710 and LSM 980 confocal microscopes, a Leica TIRF microscope, and an Olympus inverted epifluorescence microscope with motorized X-Y-Z stage and environmental chamber for multi-ROI time-lapse microscopy. The CMRF has a complete repertoire of instruments and services for electron microscopy including specialized staining and embedding techniques, negative staining, metal coating, and cryo-fixation for analysis with a Hitachi H-7800 TEM. A Hitachi S-4800 FESEM is available for high-resolution imaging of sample surfaces. The CMRF also provides all the instruments and materials for routine histological processing, staining, and visualization for both frozen and aldehyde-fixed tissue. In addition, the CMRF maintains licenses and expertise in data analysis with the Bitplane Imaris 3D analysis software, Huygen’s deconvolution software, and Fiji/ImageJ open-source package. The CMRF supports both the experienced and novice investigators and provides training for independent use of resources. Alternatively, all or parts of a project can be handled by the staff.

## Comparative Pathology Laboratory

[*https://cpl.lab.uiowa.edu*](https://cpl.lab.uiowa.edu)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Comparative Pathology Laboratory (CPL) works with investigators to provide tissue handling and histology services. The CPL leadership includes Dr. David K. Meyerholz DVM, PhD, DACVP (Director) and Mariah Leidinger BS, HTL-ASCP (Laboratory Supervisor), who are specialty trained in tissue handling and histotechnology techniques. The facility provides tissue handling services from necropsy, routine histotechnology services, and application of immunohistochemistry markers. The facility has four histotechnologists, and two research associates with vast experience in tissue techniques. Additionally, the CPL has access to the medical resources of over 30 physician pathologists specialized in a wide-range of tissues.

## Developmental Studies Hybridoma Bank

[*http://dshb.biology.uiowa.edu*](http://dshb.biology.uiowa.edu)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Developmental Studies Hybridoma Bank (DSHB) is a national resource created by the NIH in 1985 and housed at the University of Iowa. The DSHB stores and distributes hybridomas and the monoclonal antibodies (mAbs) they produce at cost to the general scientific community in order to facilitate scientific research. Our priorities are to 1) allow researchers to test multiple mAbs without commitment of significant funds, and continue to utilize those of interest without worry of expense; 2) relieve scientists of the time and expense of distributing hybridomas and mAbs they develop; 3) assure the scientific community that mAbs with limited demand remain available. The DSHB has over 5,000 hybridomas and recombinant antibodies obtained from a variety of individuals and institutions, including the NIH Protein Capture Reagent Program, the National Cancer Institute, the European Molecular Biology Laboratory, and the Muscular Dystrophy Association. The DSHB distributes over 65,000 samples per year to investigators around the world. University of Iowa investigators do not pay shipping costs and receive expedited on-campus distribution.

## Electron Spin Resonance Facility

[*https://www.healthcare.uiowa.edu/CoreFacilities/esr/*](https://www.healthcare.uiowa.edu/CoreFacilities/esr/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Electron Spin Resonance Facility provides expertise and instrumentation to pursue research questions dealing with oxygen free radicals, singlet oxygen, nitric oxide, and the array of related oxidants and antioxidants that influence the overall redox environment of cells, tissues, and whole organisms. To achieve these goals the facility houses two Bruker EMX ESR Spectrometers: a Sievers NOA 280i (for nitric oxide questions), and a Seahorse XF96 (to address fundamental metabolism). The facility also provides investigators with many protocols to rigously address questions in redox biology.

## Flow Cytometry Facility

[*medicine.uiowa.edu/flowcytometry*](http://medicine.uiowa.edu/flowcytometry)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The 1,200-square foot Flow Cytometry Facility is located in the Eckstein Medical Research Building (EMRB). The facility has one magnetic-based and eight laser-based instruments whose major purpose is the identification and isolation of cell populations. The two cell sorters are the Becton Dickinson Aria II and the Becton Dickinson FACS Aria Fusion that both operate in a biological safety hood allowing sorting of live human cells and cells exposed to infectious agents. The facility also has three Becton Dickinson LSR II instruments for multi-color flow cytometry analysis, a BioRad Bioplex (Luminex 200s), a Miltenyi autoMACS and two Cytek Aurora’s with 96-well plate readers. The cell sorters are operated by dedicated technicians M-F, 8am-6pm and other instruments are available 24/7 upon suitable training. The facility provides scientific and technical personnel who are available for consultation in designing experimental protocols and training in the use of bench-top instruments and software programs for the interpretation and analysis of data. Cell preparation protocols are available on the facility’s website and publication quality output is available upon request. Offline data analysis using SpectroFloTM, FlowJoTM, DiVaTM, and ModFITTM is accomplished through the facility's system of networked computers equipped with correspondingly maintained licenses. Data are also accessible remotely through the facility's dedicated file servers, which provide data storage for at least ten years.

## Genome Editing Facility

[*https://medicine.uiowa.edu/genomeediting/*](https://medicine.uiowa.edu/genomeediting/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Genome Editing Facility provides centralized instrumentation and expertise for the generation, breeding and analysis of both transgenic and gene-targeted mice. The facility is comprised of four personnel trained in a variety of mouse embryo manipulations for producing genome-engineered mice. This includes transgenesis and CRISPR/Cas9 HDR approaches using pronuclear microinjection. Additional services include the design and validation of transgenic constructs and CRISPR/Cas9 reagents, screening of founder animals, mouse colony genotyping, and backcrossing strains. The facility also provides services and storage for embryo and sperm cryopreservation, as well embryo and mouse re-derivation and *in vitro* fertilization of cryopreserved sperm. The facility performs mouse embryonic stem cell evaluation, expansion and injection into blastocysts. The facility maintains all animals in strict specific pathogen free (SPF) barrier conditions and has three wet laboratories, a microscopy suite, a tissue culture room, and a molecular biology laboratory. The facility currently has a 100% founder success rate with nearly 300 different constructs.

## High Performance Computing (Research Services)

[*https://hpc.uiowa.edu*](https://hpc.uiowa.edu)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Information Technology Services’ Research Services department provides high-performance computing (HPC) resources, storage, scientific software, and support for members of the campus community, including:

* Argon, a locally-hosted HPC resource, which is managed by specialists who provide support and consultation services on data stewardship, compliance, scientific software, and more. It features approximately 15,000 processor cores and 300 GPU accelerators (both Infiniband and Omnipath interconnects).
* Several RS consultants serve as U.S. National Science Foundation Extreme Science and Engineering Discovery Environment (XSEDE ) Campus Champions. The XSEDE portfolio of federated, advanced computational resources and services is more diverse and powerful than a single institution could afford on its own. It is funded by the U.S. taxpayer investment, and is available at no cost to U.S. researchers and their collaborators.
* The Interactive Data Analytics Service (IDAS) is a high performance computing resource that supports large-scale and collaborative data analytics workflows involving RStudio for R, Jupyter Notebook for, but not limited to Python, and Remote Desktop. Users may access HPC resources within the IDAS interface, while performing interactive data analysis tasks with applications used for machine learning and other artificial intelligence workflows.
* Two locally-hosted storage services are available: the Research Data Storage Service (RDSS), and Large Data Storage Service (LSS). The first 5 TB on either are available at no cost to researchers who have a faculty appointment and their laboratories. Additional 1 TB increments are available upon request for a fee.

Iowa’s research computing resources are attached to the local network by 10 GB Ethernet connections, and beyond, with 100 GB connections to Internet2. Iowa’s relationship with I2 facilitates trusted (InCommon & eduGAIN via GÉANT) collaborations among researchers at 317 institutions of higher education, 59 leading corporations, 60 affiliate and federal affiliate members, 43 regional and state education networks, and more than 70 national research and education network partners in more than 100 countries.

## High Resolution Mass Spectrometry Facility

[*http://hrmsf.research.uiowa.edu/*](http://hrmsf.research.uiowa.edu/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The High Resolution Mass Spectrometry Facility (HRMSF) provides information pertaining to the molecular weight, elemental composition, and molecular structure of chemical compounds, which allows the identification and quantitative analysis of components of complex mixtures. The HRMSF can also perform tandem mass spectrometry (MS-MS) experiments, which are used to assist in structure determination of unknown molecules. Experiments can be performed by staff or by interested researchers who have completed training.

The HRMSF has three open-access instruments, one GC/MS and two LC/MS that are available to on-campus researchers who have been trained by the HRMSF staff.  Instruments include:

1) A Waters GCT Premier GC mass spectrometer used with either electron ionization (EI) or chemical ionization (CI); 2) A Thermo high resolution Q Exactive hybrid quadrupole-Orbitrap mass spectrometer with a Vanquish UHPLC system used for identification of unknowns in complex mixtures, screening, high-resolution ESI-MS, and quantitative analysis; 3) A Waters Acquity TQ-S Cronos triple quadrupole mass spectrometer with an Acquity H Class UPLC used for quantitative analysis of complex mixtures using multiple reactions monitoring (MRM) scanning techniques.

## High Throughput Screening Facility

[*https://hts.research.uiowa.edu*](https://hts.research.uiowa.edu)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The University of Iowa High Throughput Screening Facility (UIHTS) provides a high-throughput platform that integrates robotics, detection systems, and chemical/biologic libraries to enable highly flexible screening services, project management, grant assistance, and assay/technology development for investigators at the University of Iowa. Instrumentation systems allow for scalable screening approaches for drug discovery and development through screening of large chemical/biologic libraries and also facilitate molecular probe discovery for mechanism of action studies of chemical biology by screening focused and intellectually-designed compound collections. It is an *in vitro* plate-based platform for unbiased systematic research, e.g., systems cancer biology, microbiology, pharmacology, and others.

The UIHTS is equipped to perform high-throughput screening in 96, 384, and 1536-well formats with plate reader detection (Perkin-Elmer EnVision) using absorbance, fluorescence, and luminescence, including advanced FRET and BRET techniques. UIHTS is also equipped to perform high-content screening (HCS, Perkin Elmer Operetta Confocal Imaging System) to detect and quantify phenotypic changes, i.e., cell differentiation, cell migration, neurite outgrowth, and target trafficking; or by fluorescence intensities for target protein expression, transcription factor, or signaling pathway analysis. High throughput screening (HTS) and high content screening (HCS) systems are integrated with robotics for plate handling and assay execution, suitable for small- or large-scale compound library screens that are fully automated.

UIHTS holds both small molecule drug libraries and biological libraries. Current small molecule libraries include: 1) an FDA-approved drug library containing 1,018 compounds. This library is primarily used to identify drugs that can be repurposed. 2) A pathway or target selective collection (PTSC) containing 1,310 compounds for mechanism interrogation. 3) The Spectrum Library from MicroSource (MSSP) containing 2,320 structurally diverse compounds including marketed and experimental drugs as well as natural products. This library is typically the starting point of pilot screenings. 4) ChemBridge, the Diverset, a collection of 50,000 small molecules representing a wide swath of chemical space, optimized to be “drug like,” considering factors such as partition coefficient and Lipinski-like rules. 5) Maybridge Ro3 Diversity Fragment Library containing 1,000 carefully selected fragments for the optimal balance between broad coverage of lead-like diversity space and the number of fragments. 6) NIH NCI NExT collection of 83,536 small molecules, which is a general screening set that was designed to identify lead compounds for drug discovery projects. It is comprised of three non-separable subsets of the Legacy molecular library small molecule repository (MLSMR), 15 privileged scaffolds in two Diversity subsets. In addition, a natural products fraction collection from the NCI of ~320,000 fractions (part of NCI Moonshot program) is also available. Biological libraries cover the cell collections of melanoma cell lines and breast cancer cell lines, and arrayed Kinome-wide CRISPR gRNA library from Integrated DNA Technologies.

## Hybridoma Facility

[*http://hybridoma.biotech.iastate.edu*](http://hybridoma.biotech.iastate.edu)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

*This facility is available for use by Carver College of Medicine investigators through a partnership with the Iowa State University Office of Biotechnology in Ames, Iowa.*

The Hybridoma Facility of the Iowa State University Office of Biotechnology provides complete resources for raising monoclonal or polyclonal antibodies. Techniques are provided on an individual charge basis and include animal immunization, cell fusion and hybridoma culture maintenance, cell culture and maintenance of other cell lines used in biotechnology and virology laboratories, large-scale mammalian cell culture (bioreactor), blood sera collection, antibody purification and isotyping, cryopreservation and cryostorage of cell lines (-140o C), and ELISA tests.

## Iowa Institute of Human Genetics: Bioinformatics Division

[*https://medicine.uiowa.edu/humangenetics/research/bioinformatics-division*](https://medicine.uiowa.edu/humangenetics/research/bioinformatics-division)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Bioinformatics Division of the Iowa Institute of Human Genetics (IIHG) provides the expertise and computational resources to analyze complex DNA and RNA sequencing datasets. Routine analysis includes evaluation of large-scale sequencing experiments, such as variant calling from research and clinical exomes or targeted panels, quantitation and statistical evaluation of data from \*-seq experiments (*e.g.,* RNA-Seq, ChIP-Seq, ATAC-seq, Methy-DIP-seq, etc…), as well as single-cell transcriptomics from the 10x Genomics system. Staff members have diverse training in biological data analysis, and are available to work with investigators on short-term projects, grant applications, and longer-term research collaborations. The Bioinformatics group has preferred access to 560 slots of on-campus, high-performance computing with high-bandwidth dedicated storage attached to the clusters. They maintain a private, CAP- and HIPAA-compliant clinical Galaxy installation for the evaluation of clinical NGS data for the IIHG’s popular “KidneySeq” test. The group also maintains a public-facing Galaxy installation for University of Iowa researchers and licenses for analysis software including Ingenuity Pathway Analysis, iPathwayGuide, and Partek Genomic Suite. The Bioinformatics group provides educational services for researchers looking to process and analyze their data with new computational techniques. These include workshops that offer hands-on tutorial sessions that focus on different topics such as the UCSC Genome Browser, Kallisto/Sleuth and R-programming language, and building a web presence on Twitter and YouTube, as well as sponsored seminars featuring outside speakers in computational biology.

## Iowa Institute of Human Genetics: Genomics Division

[*https://medicine.uiowa.edu/humangenetics/genomics-division*](https://medicine.uiowa.edu/humangenetics/genomics-division)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Genomics Division of the Iowa Institute of Human Genetics provides a broad spectrum of technologies and resources to support nucleic acid- and genomics-based initiatives to the research and clinical communities. The Genomics Division also provides educational support in the form of scientific seminars and mini-syposiums focused on genomics-based technologies and resources. The technologies provided by the Genomics Division include:

* Genome Sequencing: Next-generation sequence data are provided with a NovaSeq 6000 that features dual-flow cells (delivering the highest throughput and lowest price-per-sample across multiple applications) and a MiSeq benchtop sequencer that permits low throughput genome sequencing.These sequencing platforms are complemented by a Covaris E220 96-well plate sonicator, SciClone and EpMotion liquid handling robots that facilitate high-throughput sample preparation, and two 10X Genomics Chromium drop-seq-based technology systems used for single-cell sequencing applications.
* DNA Sequencing: Sanger-based DNA sequencing is provided with Applied Biosystems Models 3730 (48-capillary) and 3730xl (96-capillary) DNA sequencers. Sequence data are accessed by investigators via a custom online web system.

* DNA Microarray: Array-based genotyping and methylation profiling are provided with the Illumina iScan BeadArray system.
* Nucleic Acid quality assessment: DNA and RNA quality and quantity can be assessed using a variety of systems including a Bioanalyzer, Fragment Analyzer, Qubit fluorometers, and Trinean and Nanodrop spectrophotometers.
* Quantitave DNA/RNA Analysis: For real-time PCR analysis, the facility has ABI QuantiStudio Flex 7, ABI QuantStudio 7 Pro, and ABI Model 7900 instruments and supports array card, 96- and 384-well formats. For high-throughput genotyping, the facility provides Fluidigm EP1 and BioMark systems with controllers to run the 48x48, 96x96, and 192x24 (target x sample) BioMark Dynamic arrays. Digital PCR is provided with a BioRad QX200 droplet digital PCR system, enabling ultrasensitive and absolute quantification of nucleic acid targets. The facility also provides access to the NanoString nCounter Sprint system. The NanoString platform uses an amplification-free technology to measure RNA or DNA content by hybridizing fluorescently color-coded barcode-labelled probes to the target molecules and directly counting the number of probes of each barcode that binds to its target. The platform can be used for gene expression, microRNA profiling, and copy number assessment studies.

## Iowa NeuroBank Core

[*https://medicine.uiowa.edu/inbc/*](https://medicine.uiowa.edu/inbc/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

Made possible through the Carver Trust and more than 200 brain donors, the Iowa NeuroBank Core is a collaborative effort of the Iowa Neuroscience Institute to facilitate human brain research. Biospecimens include human neurosurgical and postmortem brain tissue and body fluids. The NeuroBank Core also generates human postmortem tissue-derived fibroblasts for patient-specific cellular and tissue models, including neurotypical subjects (fetus and adults), and those for Alzheimer’s disease, Parkinson’s disease, amyotrophic lateral sclerosis, schizophrenia, Huntington’s disease, and more. This biorepository allows investigators to connect with de-identified clinical records, gross and histopathological imaging, and associated big data. The Iowa NeuroBank Core also provides training, services, partnership, and novel instrumentation to equip investigators with access to new technologies, including the 10X Genomics Visium spatial transcriptomics and Nanostring nCounter services for multiplex analysis, which is a joint collaboration between the Iowa NeuroBank Core, the Iowa Institute of Human Genetics (IIHG) Genomics Division, and the Central Microscopy Research Facilities.

## Magnetic Resonance Research Facility

[*https://medicine.uiowa.edu/mri/*](https://medicine.uiowa.edu/mri/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Magnetic Resonance Research Facility (MRRF) at the University of Iowa is dedicated to providing MR imaging equipment and expertise to any researcher. Two field strengths are available (3T and 7T). The MRRF currently supports more than 60 research imaging projects from fourteen different departments representing five colleges within the University of Iowa.

The MRRF currently has two research-dedicated whole-body MR scanners (3.0T GE Premier, 7.0T GE MR950) for human and large-animal imaging, and one small-animal MR scanner (7.0T GE MR901) available for research purposes. The whole body scanners are fully outfitted for fMRI imaging, including stimulus presentation software (E-Prime, Presentation, Matlab), auditory and visual stimulus hardware (Avotec), and physiological monitoring (Biopac). Additionally, an MRI Simulator is available to all researchers.

The MRRF utilizes the XNAT system for data archiving and for distribution of images to the various research projects. In addition, the facility is outfitted with a number of image analysis tools, including FSL, AFNI, 3D Slicer, ImageJ and BRAINS. The facility also has the ability to develop custom MR pulse sequences and reconstructions using the GE Epic and orchestra tools, respectively.

## Materials Analysis, Testing, and Fabrication Facility

[*https://matfab.research.uiowa.edu/about-matfab-facility*](https://matfab.research.uiowa.edu/about-matfab-facility)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Materials Analysis, Testing, and Fabrication (MATFab) facility brings together cutting-edge instruments for the physical sciences and engineering into one convenient location on campus.The MATFab facility houses instrumentation for chemical and elemental analysis, imaging, metrology, and micro and nanofabrication. Chemical and elemental analysis gives information about the composition of materials, while imaging capabilities allow us to, in some cases, map elemental and chemical composition spacially. Our fabrication facility is housed in 1500 square feet of clean room space, and has deposition and etching tools for building small structures at the micro and nanoscale, with applications in LEDs, semiconductors, microfluidics, and more. Our imaging and metrology equipment allow detailed characterization of the properties engineered into these materials.

The MATFab facility is staffed by professional scientists with backgrounds in chemistry, engineering, geoscience, and physical sciences that allows us to meet research needs across many disciplines.The MATFab Facility is managed by the Office of the Vice President for Research.

## Metabolic Phenotyping Core

[*https://medicine.uiowa.edu/diabetes/metabolic-phenotyping-core*](https://medicine.uiowa.edu/diabetes/metabolic-phenotyping-core)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Metabolic Phenotyping Core provides investigators specialized and non-invasive metabolic assays that are essential in phenotyping mouse and other animal models with diabetes, its complications, obesity, and related metabolic disorders.

The central services of the core include:

* Determining whole animal energy expenditure using Metabolic Chambers: Promethion (Sable Systems International) and CLAMS (Comprehensive Lab Animal Monitoring System, Columbus Instruments). This is a non-invasive measurement of food intake, energy expenditure, respiratory exchange ratio, and physical activity.
* Measuring whole body composition with a Bruker MiniSpec in mice and rats.
* Hyperinsulinemic-euglycemic clamp experiments to assess *in vivo* insulin action, insulin signaling, and glucose metabolism in awake mice.
* Hyperglycemic clamp experiments to assess *in vivo* pancreatic beta-cell function (i.e., glucose-induced insulin secretion) and the effect of hyperglycemia on glucose metabolism (i.e., glucose toxicity).
* Mitochondrial bioenergetics: tissue/cellular/isolated mitochondria oxygen consumption using the XFe-24 Extracellular Flux Analyzer; mitochondrial respirometry for tissue (permeabilized mouse heart and soleus) and isolated mitochondria with the O2K from OROBOROS.
* Glucose and insulin tolerance tests.

Specific equipment available at the Metabolic Phenotyping Core includes: a **Seahorse XFe-24 analyzer, two O2K from OROBOROS,** two Bruker Minispecs, and Metabolic Chambers.

## Metabolomics Core Facility

[*https://medicine.uiowa.edu/diabetes/metabolomics-core-facility*](https://medicine.uiowa.edu/diabetes/metabolomics-core-facility)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Metabolomics Core Facility provides investigators with metabolite profiling and isotope tracer analyses using high-resolution mass spectrometry interfaced with either gas chromatography (GC) or liquid chromatography (LC). The semi-targeted high resolution GC-MS protocol identifies and measures over 100 metabolites. These include TCA cycle and glycolytic/gluconeogenic intermediates as well as amino acids, sugars, neurotransmitters, and fatty acids. The high-resolution LC-MS analysis focuses on compounds that are not amendable to the high temperatures of gas chromatography such as AMP, ADP, ATP and other redox metabolites, coenzymes, nucleotides, and complex lipids.

The Metabolomics Core Facility currently has three mass spectrometers. The first is a Thermo Q Exactive GC (QE-GC), which is a high resolution/mass accuracy, hybrid quadrupole-Orbitrap mass spectrometer (R=120,000). The second is an ISQ LT GC-MS, which is a low resolution single quadrupole mass spectrometer. Each GC-MS is interfaced with a Trace 1310 gas chromatograph and autosampler. Both GC-MS instruments have electron ionization (EI) and chemical ionization (CI) capabilities utilized for metabolite profiling and isotope tracer studies, respectively. The third instrument is a high resolution LC-MS system, a Thermo Q Exactive LC. It is a hybrid quadrupole-Orbitrap mass spectrometer (R=140,000) interfaced with a Vanquish UHPLC system. The Vanquish is a ultra-high pressure liquid chromatograph (UHPLC), which includes a binary solvent pump, column heater, and autosampler. The QE-LC is capable of performing tandem mass spectrometry (MS/MS) experiments, which provides options for qualitative and quantitative applications.

## Microbiome Core

*https://cancer.uiowa.edu/microbiome-core*

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Microbiome Core provides the necessary technology and expertise for routine microbiota analysis from any given sample. Services offered include sample processing and storage, microbial DNA extraction, library preparation, metagenomic sequencing, and data analysis. Investigators can customize core services to address the needs of their research project. Standardized protocols are in place for each service and quality results are provided in a timely manner.

## Neural Circuits and Behavior Core

[*https://ncbc.medicine.uiowa.edu*](https://ncbc.medicine.uiowa.edu)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

Facilities

The Neural Circuits and Behavior (NCB) Core is located inside the Pappajohn Biomedical Discovery Building, adjacent to mouse barrier and non-barrier animal facilities. The NCB Core comprises over 1,000 square feet of space containing equipment for users to perform mouse behavior, imaging, and histology experiments.

Equipment

*Behavioral equipment:* The NCB Core has a variety of off-the-shelf and custom behavioral equipment available, including sixteen Beam Break Activity Monitoring chambers (Columbus Instruments), Elevated Plus, Elevated Zero, Forced Swim, Light/Dark box, eight Open Field arenas, Tail Suspension, Active/Passive Avoidance and Escape (Med Associates), four Fear Conditioning boxes (CleverSys), Grip Strength, Rotarod (Ugo Basile), five Acoustic Startle/Paired Pulse Inhibition boxes (San Diego Instruments), four Three-chamber Social Choice arenas, Conditioned Place Preference, four Spatial Object Recognition arenas (Noldus), four Novel Object Recognition arenas (Noldus), Barnes Maze (San Diego Instruments), T-Maze (San Diego Instruments), Y-Maze (San Diego Instruments), ten mouse nose poke Operant Conditioning boxes (Lafayette Instruments), and four touchscreen mouse Operant Conditioning boxes (Lafayette Instruments). The NCB Core has Noldus Ethovision, CleverSys FreezeScan, Matlab, and Python software available for behavior data analysis on a dedicated computer workstation.

*Electrophysiology equipment*: The NCB Core has eight Wireless Mouse amplifier systems (Pinnacle) for telemetric monitoring of EEG and EMG signals.

*Optogenetics equipment*: The NCB Core has four LED modules and a controller (Doric Lenses) for optogenetic stimulation.

*Histology/Imaging equipment*: The NCB Core also has a variety of histology and imaging equipment, including a Leica CM3025S Cryostat, Leica TCS SPE Confocal microscope, Neurophotometrics fiber photometry system, LaVision UltraMicroscope II Light Sheet Microscope, and Bruker Ultima In Vitro and Investigator In Vivo multiphoton microscopes with SpectraPhysics MaiTai HPDS TiSapphire lasers. The NCB Core has Bitplane Imaris, Fiji/ImageJ, Matlab, and Python software available for image data analysis on a dedicated workstation with Dual 8-Core Xeon processor, 512 GB RAM, 24 GB NVIDIA Quadro P6000 GPU, and 4 TB SSD RAID 0 data storage.

*Surgical equipment*: The NCB Core has two Kopf precision stereotaxis with Leica S4E dissection stereomicroscope, two isoflurane vaporizers/scavengers, two homeothermic monitoring systems, two WPI UMP3 microsyringe pumps, a Germinator 500 dry bead sterilizer, and a Somnosuite and peristaltic perfusion pump for transcardial perfusions.

## Nuclear Magnetic Resonance Facility

[*https://medicine.uiowa.edu/nmr/*](https://medicine.uiowa.edu/nmr/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Carver College of Medicine Nuclear Magnetic Resonance (NMR) Facility supports the biomedical research community with three instruments, a wide variety of NMR techniques, and the expertise to determine molecular structure and dynamics and to probe molecular interactions of a wide range of biomolecules. We offer a full spectroscopic and interpretive service, as well as assistance and training for researchers who wish to perform their own experiments. Available instrumentation includes: a Bruker Avance II 800 MHz spectrometer equipped with a TCI cryoprobe and 60 sample changer with barcode reader, a Bruker Avance NEO 600 MHz spectrometer equipped with a QCI-P cryoprobe, and a Bruker Avance II 500 MHz spectrometer with a TXI probe and 60 sample changer with barcode reader. Examples of services that can be provided by the NMR Facility include: (1) optimization of NMR sample preparation and NMR solution conditions; (2) design and development of research plans using NMR spectroscopy; (3) assistance with grant writing involving NMR spectroscopy; (4) determination of 3D structure and dynamics of protein in solution, (5) analysis of protein-ligand or protein-protein interactions; (6) structural studies of oligosaccharides and nucleic acids; (7) assistance in protein structural modeling and calculations; (8) support of drug discovery programs by conducting NMR-based screens; and (9) help with NMR data collection, processing, and analysis.

## Office of Animal Resources

[*https://animal.research.uiowa.edu/office-animal-resources-oar*](https://animal.research.uiowa.edu/office-animal-resources-oar)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Office of Animal Resources (OAR) provides the expertise, care, and resources necessary for the maintenance of research animals.  The OAR's mission is preservation of the university's animal research privilege and maintenance of a quality animal research environment. The animal research facilities are comprised of approximately 140,000 square feet of housing and support space and accommodate multiple species in several campus locations.  The OAR team includes five full-time veterinarians (all are board certified by the American College of Laboratory Animal Medicine, ACLAM), five veterinary technicians and 50+ animal care technicians.  This team of skilled animal care specialists can advise and instruct researchers on appropriate methods for anesthesia/analgesia, surgery, biosampling, and euthanasia.

The university's animal research program has a PHS Animal Welfare Assurance (A3021-01), is a registered research facility with the United States Department of Agriculture (USDA No. 42-R-0004), and is fully accredited by the Association for Assessment and Accreditation of Laboratory Animal Care, International (AAALAC).

## Office of the Institutional Animal Care and Use Committee

[*http://animal.research.uiowa.edu*](http://animal.research.uiowa.edu/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Institutional Animal Care and Use Committee (IACUC) reviews all research and teaching protocols involving the use of animals and fulfills all other mandated oversight and compliance responsibilities.

Note: the information below should be in the “Vertebrate Animals” attachment, not “Facilities & Other Resources” attachment. A Vertebrate Animals attachment should be included if you answered “Yes” to the question “Are Vertebrate Animals Used?” on the R.220 – R&R Other Project Information Form. Information should include the following:

1. **Description of Procedures (Vertebrate Animals Section)**

Provide a concise description of the proposed procedures to be used that involve live vertebrate animals in the work outlined in the Research Strategy section. Identify the species, strains, ages, sex, and total number of animals by species to be used in the proposed work. If dogs or cats are proposed, provide the source of the animals.

1. **Justifications (Vertebrate Animal Section)**

Provide justification that the species are appropriate for the proposed research. Explain why the research goals cannot be accomplished using an alternative model (e.g., computational, human, invertebrate, *in vitro*).

1. **Minimization of Pain and Distress (Vertebrate Animal Section)**

Describe the interventions including analgesia, anesthesia, sedation, palliative care, and humane endpoints to minimize discomfort, distress, pain, and injury.

1. **Method of Euthanasia (Cover Page Supplement / PHS Fellowship Supplemental Form)**

Provide a justification for methods of euthanasia that are not consistent with the American Veterinary Medical Association (AVMA) Guidelines for the Euthanasia of Animals.

Recommended text from UI IACUC: Animals will be euthanized by methods consistent with the recommendations of the American Veterinary Medical Association (AVMA) Guidelines for the Euthanasia of Animals: 2020 Edition.
***Note:  If you need assistance to determine whether or not your method of euthanasia is consistent with the 2020 AVMA Euthanasia Guidelines, please contact the IACUC Office at 319-335-7985, or******iacuc@uiowa.edu(link sends e-mail)******.***

## Population Research Core

[*https://cancer.uiowa.edu/population-research-core*](https://cancer.uiowa.edu/population-research-core)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Population Research Core (PopRC) supports strong observational study designs and data collection/curation methods through the following services:

* Provides efficient use of large, cancer-related, population-based datasets and other resources. This includes the research database and its linkages provided by the National Cancer Institute’s Surveillance, Epidemiology, and End Reports (SEER) program. PopRC staff construct study cohorts, analytic variables and datasets; perform database linkages; maintain quality control; and develop database queries.
* Works with investigators of cancer biology to develop and implement appropriate design and methodology to answer population-based questions. This includes identification of appropriate data resources; development of study design, aims, and hypotheses; performance of feasibility analyses; and plans for data analysis.
* Supports population-based field research. This includes tools and systems for medical chart abstraction, recruitment/consenting of study participants, administering surveys, and participation monitoring/study management.
* Provides clinically annotated biospecimens and corresponding clinical annotation from the SEER Residual Tissue Repository and Virtual Tissue Repository in collaboration with the HCCC Tissue Procurement Core. PopRC staff establish project feasibility and develop methodology to promote efficient use of the resource.

The primary resources of the PopRC are the expertise and time of its scientific personnel and its curated and annotated population-based data.

## Protein and Crystallography Facility

[*https://medicine.uiowa.edu/crystallography/*](https://medicine.uiowa.edu/crystallography/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Protein and Crystallography Facility provides comprehensive support and infrastructure for protein production and purification, biophysical characterization, and structural studies. This includes four BioRad FPLCs for protein purification, a Wyatt NanoStar dynamic and static light scattering instrument for aggregation and protein size determination, a ForteBio Octet RED96 bio-layer interferometry system for protein:protein and protein:DNA binding studies, a thermal shift assay workflow to analyze protein stability and ligand binding using a BioRad CFX96 qPCR instrument, a SPT LabTech Mosquito nano-volume robot for setup of 96-well crystallization screens, a Formulatrix RockImager2 for imaging crystal trays, and a SPT LabTech Dragonfly liquid-handling robot for preparation of custom solution arrays. X-ray diffraction data is collected remotely by shipping to our 4.2.2 Molecular Biology Consortium beam line at the Advanced Light Source (Lawrence Berkeley National Laboratory). The Protein and Crystallography Facility also enables analysis by small-angle X-ray scattering (SAXS) in line with size exclusion chromatography (SEC) and multi-angle light scattering (MALS), whereby data are routinely collected in-person or mailed in to the 18-ID-D Bio-CAT beam line at the Advanced Photon Source (Argonne National Laboratory). Workflows for performing negative stain EM and cryo-EM are available. Screening of grids is performed on a Hitachi 7800 TEM available in the Central Microscopy Research Facility on campus. Cryo-EM grid preparation is performed using our Thermo Fisher Vitrobot Mark IV instrument. Additional cryo-EM grid screening is performed at multiple other facilities before collecting data at one of the National Centers for Cryo-EM. The cryo-EM data processing software CryoSPARC is freely available to users on the Argon HPC cluster on campus. Multiple workstations are also available in the facility and equipped with all necessary structural biology and modeling software curated by SBGrid, which provides automatic software package updates.

## Protein Facility

[*http://www.protein.iastate.edu*](http://www.protein.iastate.edu)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

*This facility is available for use by Carver College of Medicine investigators through a partnership with the Iowa State University Office of Biotechnology in Ames, Iowa.*

The Protein Facility of the Iowa State University Office of Biotechnology is open to faculty and students from the university, other educational institutions, and industry scientists. The facility offers protein/peptide sequencing, large- and small-scale peptide synthesis (Fmoc), matrix-assisted laser desorption/ionization (MALDI) mass spectrometry, SDS-PAGE/electroblotting, 2-D gel electrophoresis, isoelectric focusing (IEF), in-gel and solution digestion, tandem mass spectrometry (LC-MS/MS), ion mobility mass spectrometry (IM-MS), digital image acquisition and analysis using the Typhoon imaging system and the 2D gel documentation/analysis system, and semi-preparative, analytical and micro-analytical high performance liquid chromatography (HPLC).

## Proteomics Facility

[*https://medicine.uiowa.edu/proteomics/*](https://medicine.uiowa.edu/proteomics/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Proteomics Facility houses mass-spectrometers and supporting instrumentation for analysis of proteins and peptides. Services include protein identification, protein expression profiling, accurate weight determination for intact macromolecules and conjugates, characterization of post-translational modifications, and rapid biotyping to determine bacterial strains. Data analysis is provided using MASCOT, SEQUEST and SpectrumMill data analyses with final reporting in Scaffold or Excel format. Instrumentation includes a Bruker Autoflex III MALDI TOF/TOF, Thermo LUMOS Orbitrap, and a Thermo Q-Exactive Orbitrap.

## Radiation and Free Radical Research Facility

[*https://frrbp.medicine.uiowa.edu/research-core*](https://frrbp.medicine.uiowa.edu/research-core)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

RFRRC Core Director: Douglas R. Spitz, PhD (Oxidative Stress and Thiol Biochemistry); RFRRC Core Co-Directors: Frederick E. Domann, PhD (Molecular Biology), Prabhat C. Goswami, PhD (Radiation Biology and Cell Cycle), and Garry R. Buettner, PhD (EPR Spectroscopy and Physical Chemistry).

The Radiation and Free Radical Research Core (RFRRC) was established to provide free radical and radiation biology expertise, reagents, technologies, and analysis for investigators doing basic, pre-clinical, and clinical research. The three basic services provided by the core are: 1) Ionizing radiation services and phosphorimaging; 2) Electron paramagnetic resonance spectroscopy to measure oxygen free radicals, singlet oxygen, nitric oxide and the array of related oxidants; and 3) Antioxidant enzyme services to modify and measure molecules responsible for free radical formation and oxidative damage in cells such as anti-oxidant proteins and small molecular weight cellular thiols.

1) IRS – Ionizing Radiation Services:

Ionizing Radiation Services are available under the supervision of Co-Director (Dr Goswami) or Amanda Kalen, the research assistant responsible for the radiation unit. The Radiation Facility is located in B164 Medical Laboratories.  The radiation sources available include a 1 orthovoltage X-ray machine and an 8,148 Curies cesium-137 gamma ray source.  The x-ray unit is a microprocessor-controlled orthovoltage generator.  The unit is a Pantak Therapax DXT 300 (Pantak Inc., East Haven, CT) with maximum x-ray energy of 300 kVp.  The facility housing the new x-ray generator was extensively renovated to contain the new unit and now has the flexibility to accommodate almost any irradiation orientation and device required by the user.  The unit may be adapted for the irradiation of cells in tubes or in culture, as well as of animals in customized devices. The gamma ray source is capable of delivering low or high dose rates of monoenergetic (0.667 MeV) gamma radiation, the range being from 40-3200 cGy/minute.  The x-ray and gamma-ray facilities have been used for total body or partial body irradiation of tumors in experimental mice, rats, dogs, as well as cancer or normal cell cultures grown *in vitro.*

2) EPR – Electron Paramagnetic Resonance Services:

The EPR Facility in the RFRRC supports the basic and clinical research efforts of members of the Holden Comprehensive Cancer Center by providing the tools and expertise to detect and quantify free radicals, small molecular weight dietary antioxidants and pro-oxidants. One of the most valuable services the facility provides is consultative expertise in the study of free radicals, related oxidants and antioxidants.

*The EPR facility assists users in the detection of:*

1.  Free radicals in systems that range from solids, solutions, cells, tissues and whole animals;

2.  Nitric oxide and related metabolites;

3.  MDA/TBARS, indicators of lipid peroxidation that are detected with our fluorescence spectrometer;

4.  Fluorescent dyes, used as indicators of oxidation;

5.  UV-Vis spectroscopy: Our HP 8453 Diode Array UV-Vis spectrometer;

6.  Oxygen concentration;

7.  Oxidative stress-indicators using HPLC: *e.g*. DNA damage, antioxidants such as vitamins C and E, beta-carotene, *etc*;

8.  Cell volume measurements;

9.  Seahorse Metabolic Profiling Services.

3) AES – Antioxidant Enzyme Services:

The purpose of the Antioxidant Enzyme Services (AES) is to provide free radical biology expertise, reagents, technologies, and analysis for individual investigators doing basic, per-clinical, and clinical research. AES staff will carry out the proposed work or will advise the user and their staff on how to perform and analyze the experiments. Some of this work, particularly transfections of new cDNAs or new cell lines as well as the development of antisense reagents, will be developmental and distributed to investigators as they become available. The AES will aid in vector development and distribution, enzyme activity assays, thiol analysis, western, and quantitative RTPCR analysis. The following enzyme assays will be run: copper-and zinc-containing superoxide dismutase (CuZnSOD), thioredoxin reductase (TrxR), manganese-containing superoxide dismutase (MnSOD), catalase (CAT), glutathione transferases (GSTs), glutamyl transpeptidase (GGT), gamma-glutamylcysteine synthetase (GCS), and glutathione peroxidases (GPx, both cytosolic and phospholipid). Assays for the detection of pro-oxidant production (superoxide, hydrogen peroxide, lipid peroxidation products, etc.) will also be available. Antibodies, cDNA probes, adenoviral, and lentiviral vectors coding for primary antioxidant enzymes as well as stably and transiently transfected cells will be provided. The AES will also aid in transfecting cDNAs into cell lines of interest to investigators. The AES continues to develop and maintain novel reagents for studies in free radical biology including: antibodies, cDNAs, antisense reagents, and expression vectors for antioxidant proteins including thioredoxin, glutaredoxin, thioredoxin reductases, and thioredoxin peroxidases. This core will provide services to measure cellular redox couples including GSH/GSSG, oxidized and reduced thioredoxin, and NADP+/NADPH ratios as well an electron transport chain complex and TCA cycle activities.

## Scientific Editing and Research Communication Core

[*https://medicine.uiowa.edu/sercc/*](https://medicine.uiowa.edu/sercc/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Scientific Editing and Research Communication Core helps researchers succeed with their funding efforts and scholarship by providing resources and services to maximize the clarity of scientific documents – including grant proposals, manuscripts, and correspondence with program officers and journal editors. The core is staffed by scientists who have advanced degrees and offer detailed editorial review of writing projects based on extensive experience in both laboratory research and editing of scientific content.

Investigators can consult with core staff as they develop their writing projects and/or request in-depth advice on written drafts. Multiple levels of feedback on drafts are offered, including:

* Mechanics: proofing for grammar, typographical, and other errors
* Style and clarity: suggestions toward improving text flow
* Presentation: suggestions toward highlighting the significance of the research, and in the case of multi-author documents, achieving a single voice
* Science: pre-review from the perspective of a non-specialist reviewer; on request, feedback on how well scoring criteria for grants are covered.

Investigators receive an annotated copy of their submission and can request one-on-one meetings with core staff at any time to discuss writing strategies, clarify their meaning, or discuss potential problem spots.

Core staff also produce writing resources (including templates for specific grant types), conduct didactic teaching of scientific writing (grants and manuscripts), host scientific writing workshops, and participate in strategic planning sessions with groups of faculty.

## Small Animal Imaging Core

[*https://medicine.uiowa.edu/saic/*](https://medicine.uiowa.edu/saic/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Small Animal Imaging Core (SAIC) is a unique, world-class, multi-modal imaging research facility within the Iowa Institute for Biomedical Imaging (IIBI) and housed in the Pappajohn Biomedical Discovery Building. The SAIC occupies 5,500 square feet of space, including 7 imaging suites, 8 support rooms, and is contiguous to the primary barrier housing facility on campus. The mission of the SAIC is to provide University of Iowa Investigators comprehensive imaging support and expertise, to develop new imaging strategies that provide value-added solutions across scientific disciplines and provide the resources that enable researchers to transform their ideas into technologies that have a positive impact on society. It contains all of the instrumentation and technical services necessary for the non-invasive anatomical and physiological imaging of small animals and other biological samples.

The core instrumentation includes:

* Micro-PET (Siemens Inveon DPET)
* Micro-CT (Siemens Inveon CT (10 µm resolution)
* Micro-SPECT (Siemens Inveon SPECT)
* Optical imaging (Carestream MSFX-pro, IVIS Lumina)
* Fluorescent imaging (Carestream MSFX-pro)
* 3D X-ray/CT Microscope (Zeiss Xradia 520 Versa, submicron resolution)
* 7T Preclinical MRI (7.0T GE 901 Discovery MRI small animal scanner), separately administered through the Magnetic Resonance Research Facility core
* High-resolution micro-ultrasound imaging (Visualsonics Vevo) - administered separately
* Optical Coherence Tomography
* QScint Imaging Solutions iQID (Alpha camera) Imaging System
* Perkin Elmer 2480 Wizard Gamma Counter (1000 sample capacity)
* Epredia CryoStar NX50 H Cryostat
* Scintica iNSIGHT Small Animal Dual-Energy X-Ray Absorptiometry (DEXA) Imaging System

The SAIC operates an image-processing laboratory including four high-end workstations with a suite of multi-modality software available for use, including PMOD and Inveon Research Workspace. The SAIC administers its own 12 TB archive system, mirrored to offsite research networked storage.

## Tissue Procurement Core

[*https://medicine.uiowa.edu/tissueprocurement/*](https://medicine.uiowa.edu/tissueprocurement/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Tissue Procurement Core (TPC) collects, processes, and stores well-characterized human biospecimens (normal or tumor tissue, blood, etc.) to researchers for a variety of indications under an existing IRB-approved protocol. Fresh, frozen or FFPE specimens can be provided to investigators. Stored biomaterials are suitable for molecular, genetic, biochemical, immunohistochemical, cellular, and pathological studies. The TPC also processes blood to PBMCs and to DNA or RNA and prepares DNA from saliva.  Additionally, the TPC can assist in isolating, aliquoting, and storing liquid specimens such as CSF or plasma.

The TPC is a 2500 square foot facility that includes a wet laboratory space, office space, and a freezer farm. The freezer farm is comprised of 14 negative 80-degree Celsius freezers, three negative 150-degree Celsius chest freezers, and one liquid nitrogen CryoSafe and is accessible to staff based on badge permissions. Due to growth within the biobanking program at the institution, the TPC has acquired an additional liquid nitrogen CryoSafe, which will be installed in August of 2021. Each freezer is connected to a temperature tracking system that will alert laboratory members in the event of a meaningful shift in temperature requiring action.

## UI Pharmaceuticals

[*https://uip.pharmacy.uiowa.edu*](https://uip.pharmacy.uiowa.edu/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

University of Iowa Pharmaceuticals (UI Pharmaceuticals) is an FDA registered Contract Development and Manufacturing Organization (CDMO) specializing in pharmaceutical development, sterile and non-sterile drug product manufacturing, and analytical testing. It is the largest and longest running university facility of its kind providing contract pharmaceutical services in compliance with current Good Manufacturing Practices (GMP) for almost 45 years. UI Pharmaceuticals provides services to worldwide clients through all phases of clinical trials and commercial manufacturing. Contract pharmaceutical services include:

* + Preformulation studies
	+ Formulation and process development (including lyophilization cycle development)
	+ Clinical supply manufacturing
	+ Commercial manufacturing and testing

Analytical method development, method validation, release product testing and ICH stability studies

UI Pharmaceuticals is DEA registered for controlled substances schedules I - V and can handle most potent and/or cytotoxic substances up to and including SafeBridge Category 3.

## Viral Vector Core

[*https://medicine.uiowa.edu/vectorcore/*](https://medicine.uiowa.edu/vectorcore/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Viral Vector Core (VVC) produces and distributes a wide variety of viral vector-based gene delivery and gene editing technologies. The VVC generates common recombinant viral vectors such as adenovirus, adeno-associated virus (AAV), and lentivirus. In addition, the core produces more specialized vectors such as helper-dependent adenovirus, baculovirus, and vaccinia virus. The VVC purifies, titers, and performs quality control assays prior to vector dissemination. The core maintains a large catalog of “off the shelf” vectors for expression of common markers (e.g., Cre, GFP) without the need of a material transfer agreement (MTA). The VVC will assemble custom plasmids to generate vectors that deliver transgenes, guide RNAs, siRNAs, gene editing machinery, or base editing machinery. In addition to vector production, the VVC offers services such as consultation and planning, troubleshooting of existing projects, design and development of novel vectors, development of novel methods of virus production, and generation of RNAi expression vectors. The core has been producing viral vector for investigators world-wide since 1994 and is continually innovating.

# Research Institutes

## Iowa Institute for Biomedical Imaging

[*https://www.iibi.uiowa.edu/*](https://www.iibi.uiowa.edu/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Iowa Institute of Biomedical Imaging (IIBMI) was formed in 2007, reflecting strong institutional support for biomedical imaging and image analysis and its importance for translational medical research. The mission of the IIBI is to foster efficient and cooperative inter-disciplinary and cross-college research and discovery in biomedical imaging, and to improve training and education within the broader community at the University of Iowa. The Institute focuses on research and discovery in biomedical imaging at the University of Iowa under one umbrella, in a multi-disciplinary process, facilitating new external industry relationships, new grant opportunities, and new educational processes at the undergraduate and post-graduate levels. It is composed of an interdisciplinary group of established researchers from the Colleges of Medicine, Engineering, Liberal Arts and Sciences, and Public Health and brings together researchers from all areas of medicine, including programs in cardiovascular, pulmonary, and neurological research as well as psychiatric imaging and image analysis, and radiation treatment planning.

## Iowa Institute of Human Genetics

[*https://medicine.uiowa.edu/humangenetics/*](https://medicine.uiowa.edu/humangenetics/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Iowa Institute of Human Genetics (IIHG) is dedicated to promoting clinical care, research, and education focused on the medical and scientific significance of variation in the human genome. It collaborates with partners worldwide and is open to all faculty, trainees and staff at the University of Iowa, Iowa State University, and the University of Northern Iowa. The unique environment at the University of Iowa provides unprecedented opportunities to make progress in the discovery and translational phases of human genetics and in doing so to advance genetic research and to improve genetic-based clinical care.

The IIHG provides researchers with a state-of-the-art, high-throughoutput genetic analysis facility and supports research focused on human genetics and personalized medicine. The expertise and resources available through the IIHG enable the coordination of large-scale gene discovery with targeted gene-based and disease-based clinical diagnostics to improve disease-specific treatment.

The IIHG also develops state-of-the-art diagnostic platforms that use targeted-sequence capture and massively parallel sequencing to interrogate large panels of genes implicated in a variety of genetic diseases. This initiative, undertaken in partnership with outstanding UIHC clinicians, facilitates genome-phenome integration and cutting edge personalized genomic medicine. Patients seen from throughout the USA as part of this initiative are also offered expertise in genetic counseling as a step towards translating genetic findings into improved healthcare.

The IIHG links research and clinical missions through education for the scientific community. Opportunities include an annual bioinformatics short course, a summer internship program for genetic counselling and bioinformatics, a summer course in human genetics, sponsoring various lectures, guest speakers and scientific workshops, and an annual precision medicine conference. In addition, the IIHG hosts mini-medical school lectures and career days in human genetics, and provides online brochures and educational materials to inform the community and patients and their families about genetics testing and genetic diseases.

## Iowa Neuroscience Institute

[*https://medicine.uiowa.edu/iowaneuroscience/*](https://medicine.uiowa.edu/iowaneuroscience/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Iowa Neuroscience Institute (INI) is a comprehensive and cross-disciplinary neuroscience center within the [Carver College of Medicine](https://medicine.uiowa.edu/content/dedication-iowa-neuroscience-institute-marks-new-era-brain-research-ui). Led by Ted Abel, PhD, the INI conducts research to find the causes of — and preventions, treatments, and cures for — the many diseases that affect the brain and nervous system. This involves integrating and supporting neuroscience research on the University of Iowa campus in order to provide a framework that will encourage research collaborations among INI faculty and with colleagues at other institutions, and to convey the excitement of neuroscience research to the public, both within the State of Iowa and nationally. As such, the INI provides a mechanism for establishing collaborative opportunities for the existing neuroscience community, and is home to a substantial number of new faculty members with diverse neuroscience research interests. The INI houses world-class scientists and provides synergy within the broader neuroscience community that leads to transformative research and an intellectually stimulating environment that supports innovation in basic science, opportunities for translational application, and the ability to investigate how the nervous system mediates behavior and how this goes awry in neurodevelopmental, psychiatric, and neurological disorders. The INI sponsors multiple annual events, including both intensive workshops and seminars for researchers and visiting scientists of international renown, as well as public outreach events including artists, writers, and intellectuals whose work touches on how neuroscience can inform and improve the human condition. INI faculty also reach out to state and local legislators, educators, and community leaders to advocate for the importance of neuroscience research for the promotion of human health and the well-being of our communities.

## University of Iowa Institute for Vision Research

[*http://ivr.uiowa.edu/ButlerVisionResearchFund*](http://ivr.uiowa.edu/ButlerVisionResearchFund)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Institute for Vision Research leverages interdisciplinary research across four colleges and eight departments at the University of Iowa and is committed to finding answers that will help patients suffering from blinding eye diseases. As part of the Institute for Vision Research, the UI’s clinical stem cell transplantation program aims to restore useful vision to people with advanced stages of retinal degenerations—ranging from common conditions such as age-related macular degeneration to rare genetic forms of retinitis pigmentosa. The program seeks to use stem cells derived from the patient’s tissue, correct gene mutations, and transplant them into the patient’s retina to restore vision.

## University of Iowa Institute for Clinical and Translational Science

[*https://icts.uiowa.edu*](https://icts.uiowa.edu/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The University of Iowa Institute for Clinical and Translational Science (ICTS) was established in 2007 to house the University’s Clinical and Translational Science Award (CTSA), to be an integrated academic home for clinical and translational science, and to create a catalytic infrastructure for nurturing the broad spectrum of T1 – T4 translational science. The ICTS' unique overarching academic structure provides a multidisciplinary matrix for facilitating and supporting clinical and translational science throughout the University's colleges as well as the University of Iowa Hospitals and Clinics. In addition to NIH funding, the University of Iowa provides substantial investments in support of the goals of the ICTS.

The ICTS is housed within the UI Hospitals and Clinics and includes 14,000 square feet of administrative and educational facilities and 20,000 square feet for the Clinical Research Unit. The administrative space includes three conference rooms equipped with video conferencing capabilities to support administrative meetings, classes, research seminars and presentations by visiting professors.

The ICTS offers several resources to support innovative clinical and translational investigation. These resources include:

### Biomedical Informatics (BMI) Component

[*https://icts.uiowa.edu/investigators/biomedical-informatics-core*](https://icts.uiowa.edu/investigators/biomedical-informatics-core)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The University of Iowa Institute for Clinical and Translational Science’s Biomedical Informatics Core (BMI) helps in the capture, management and analysis of human subject data. BMI maintains an enterprise data warehouse for research that contains data from electronic medical records linked to a growing number of external data including bio-sample data, genomic data, and cancer registries. Investigators can use tools such as TriNetX to explore this data. BMI provides access to REDCap for collaborative and compliant data capture and management and to UI BioSHARE to manage information about bio-samples. BMI supports multi-institutional medical record data queries via PCORnet and TriNetX and submits data to the National Covid Cohort Collaborative. BMI has a team of developers to assist with custom application development, especially for mobile device applications and for exploring new techniques such as Natural Language Processing (NLP). See our website to learn about consulting and training.

### Biostatistics, Epidemiology, and Research Design Core (BERD)

BERD plays a major service role in the ICTS, but also has extensive experience in statistical and study design innovations. BERD combines both service and innovation as they facilitate research design and biostatistics expertise for credible evidence generation across the spectrum of CTR*.* BERD team members have methodological expertise in health care research and can be provided in either consultative or collaborative frameworks. The team has an established consultation service that includes help to develop research protocols and enhance methodological planning, training opportunities, provide new methodological innovations, design and analysis of clinical and translational research studies across the T1-T4 spectrum, and apply innovative approaches to study design, data collection, and statistical analysis in a variety of areas including adaptive clinical trial design and comparative effectiveness research.

### ICTS Clinical Research Unit

The CRU is a 20,000 square foot state-of-the-art facility for inpatient and outpatient studies that has 22 exam and consultation rooms, a seven-bay infusion suite, a procedure room, a specimen processing laboratory, one inpatient bed, and dedicated staff. A specialized facility, the Human Brain Lab includes an acoustically and electrically shielded Faraday cage for detailed neuroelectrophysiology research monitoring. This unique facility was designed for research on refractory epilepsy, but also is used for a broad range of research on human brain function. The CRU also houses a unique Research Clinic for the patients of Dr. Michael Shy with heritable peripheral neuropathies. The clinic provides routine care, supports research protocols, and is serving as a model for establishing other rare disease clinics.

Early Phase Trials Unit: The Early Phase Unit in the CRU can accommodate inpatient and outpatient studies. The unit is staffed by infusion-trained nurses who provide services in a designated infusion suite, as well as in other areas of the hospital when it is not feasible or convenient to move patients to the CRU. The unit supports both investigator-initiated and industry-initiated trials and offers (1) safety monitoring with close physician and nursing oversight; (2) comprehensive drug administration capabilities; and (3) performance of pharmacokinetic and pharmacodynamic analyses in conjunction with clinical pharmacology faculty in the College of Pharmacy.

Mobile nursing services were established to support clinical research in inpatient areas and UI offsite areas with a goal of expanding and supporting clinical research services within and outside the main campus.

ICTS Phenotyping Laboratories: The CRU also includes an analytical laboratory for assaying biological markers that are not assessed by the hospital laboratory and several other specialized phenotyping labs.

* The ICTS Human Brain Research Laboratory (Director, Dr. M. Howard) includes an acoustically and electrically shielded room for detailed neuroelectrophysiology research monitoring. This unique facility was designed to analyze neurosurgically-treated refractory epilepsy but is now being used to investigate a broad range of studies analyzing human brain functions.
* The ICTS Bionutrition Body Composition Laboratory the BOD POD body composition tracking system is an air displacement plethysmograph which uses whole-body densitometry to determine body composition (body fat and fat-free mass). The BOD POD is a complete system with a dedicated computer system, the ability to measure thoracic gas volume, and estimated resting metabolic rate.
* The ICTS Cardiovascular Physiology Laboratory (Director, Dr. G. Pierce) tests regional blood flow, small blood vessel function, systemic hemodynamics, and sympathetic neural recordings. Analytical techniques include plethysmography, laser Doppler probing, infrared oxygenation, pneumotrace strain gauge, impedance cardiography, and nerve recordings with variety of stressors.
* The ICTS Pulmonary Physiology Laboratory (Director, Director, Dr. A. Comellas) includes a pulmonary function and exercise testing facility and a human exposure chamber equipped for exposure delivery, and monitoring. Services include pulmonary functions (spirometry, diffusion capacity, whole body plethysmography, airway resistance, bronchial provocation, nitrogen washout, single breath nitrogen elimination, maximum respiratory pressures), cardiopulmonary exercise testing, methacholine challenge, sputum induction, and exhaled nitric oxide analysis. Bronchoscopy services and equipment are also performed within the CRU in the procedure suite.
* The ICTS Bone Density Laboratory (Director, Dr. J. Schlechte) uses dual-energy x-ray absorptiometry (DEXA) and peripheral quantitative computerized tomography (PQCT) to measure bone density.

### Engagement, Integration, and Implementation (EII) Core

The EII Core supports engagement and integration of stakeholder perspectives through expertise in qualitative methods and patient and community engagement in research. Staff provide consultation on the design, conduct, analysis, and dissemination of qualitative methods for research grants and projects. ICTS also provides access to MAXQDA, a qualitative data management and analysis software program. The Core organizes the ICTS state-wide Stakeholder Advisory Board (SAB), which is composed of 17 community members across Iowa who represent patient advocacy groups, hospitals, nonprofits, and state and local agencies. The SAB is available for consultation on all aspects of research from design to dissemination and focuses on the integration of community perspectives in the research process. EII staff are also available to assist research teams in developing their own patient or community advisory boards. The EII Core has expertise in the field of implementation science and provides consultation on research design, conceptual models, strategies, and mechanisms of change.

To integrate special populations, the Core has expertise in developing a clinical cohorts encompassing communities and participants representing a variety of races, ethnicities, degree of rurality, and conditions of research interest across the lifespan. Patient level data from many different populations along with biosamples are available to interested investigators for novel collaborations. The Core has significant expertise in the management, harmonization, and development of site-specific data-warehousing and biorepositories and can assist in the development of the above resources specific to an investigator’s needs.

Overall, the Core has significant expertise in the bidirectional translation of projects from basic to clinical science and can consult on the development of such translational science programs.

### Mobile Technology Lab

The Mobile Technology Lab currently supports a remote bi-directional data-collection platform that is flexible and easy to use.

The platform can support the delivery of short surveys and collect responses. It can also support the bi-directional transfer of photos as well as short audio and video files. Finally, the platform can collect data from remote sensors and send messages based on sensor readings.

Our current platform is designed to support pilot and exploratory studies and is ideal for collecting preliminary data for proposals or small studies. In addition, our platform can be customized to support larger, externally funded projects, including multi-center projects.

### Research Coordinator Core

ICTS has an established Research Coordinator Core. The Research Coordinator Core can provide support for all phases of human research. They can assist investigators who do not have the resources or desire to hire and manage their own research staff. The Research Coordinator Core can provide both licensed and non-licensed support for conducting studies. They provide “full service” support from study feasibility through study closeout. Services include assistance with study identification and feasibility, budget development, budget negotiations, contract initiation support, preparation of IRB applications and informed consent documents, subject recruitment, project coordination, management of data and report forms as well as study closeout.

The coordinators have extensive training in GCP, research conduct, research ethics, handling of biological specimens, and standard clinical research protocols. The team can provide specialized support for outpatient and inpatient protocols outside the CRU.

### Regulatory Core

The ICTS Regulatory Core helps investigators navigate the regulatory requirements process by collaborating with researchers to work directly with the IRB and other regulatory agencies. The ICTS Regulatory Core provides training, services, education, and other resources to anyone at the University of Iowa that is doing research.

The ICTS Regulatory Core can support researchers in the following areas:

* Early Regulatory Development: Interaction to develop a regulatory plan. This can include sIRB assistance prior to grant submission, FDA IND/IDE consultation or submission, feasibility visits with sponsors, assistance with protocol and Data Safety Monitoring Board creation, and clinicaltrials.gov consultation or submission.
* Regulatory Submissions and Maintenance: We can prepare, submit, and maintain HawkIRB, commercial IRB, and sIRB submissions. We can also assist investigators, coordinators, and study staff in their submissions.
* Education and Training: We can provide individual or group regulatory education and training to researchers and study staff or study groups.
* FDA Inspections: The ICTS Regulatory Core can be a resource to researches and study staff when preparing for an FDA inspection or preparing and implementing responses to the FDA inspection.

### Workforce Development

The primary goal of the ICTS Workforce Development Core is to train motivated and talented scholars, community members, and research professionals for careers and engagement in translational science. ICTS delivers educational offerings that are designed to be customizable across our workforce audience. Some of our education programs are broadly applicable to our workforce population, while others are targeted to specific audience(s).

KL2 Program

The NIH KL2 Career Development Award is designed to identify and train outstanding junior faculty campus-wide who seek a career in clinical and translational research. KL2 awardees are guaranteed 75% protected time to devote to their training and research activities. In addition to K awardees, the ICTS also maintains a cohort of Translational Science Scholars. These translational science scholars join the cohort of KL2 scholars and participate in the Critical Thinking courses facilitated by the ICTS as well as an 8-week mentoring academy and monthly K-Club discussions.

Master of Science in Translational Biomedicine

ICTS also administers the Master of Science in Translational Biomedicine, available to post-doctoral fellows and junior faculty with an appointment at the University of Iowa. The M.S. program is designed to teach students how to move biomedical discoveries into clinical applications and beyond. It is tailored for individuals who have completed training in one area of biomedicine and wish to apply their expertise to the T1-T4 research spectrum.

Academy for Research Professionals

Research is also supported by the Academy for Research Professionals and the Clinical Lecture Series, focused on training and continuing education for research support staff. Topics include Good Clinical Practice, research ethics, handling of biological specimens, and standard clinical research protocols.

Team Science Training

Team Science trainings are provided for investigators in collaboration with the Tippie College of Business, and focus on team composition and assembly, team process facilitation, and leadership. Team Science trainings are integrated into the Masters in Translational Biomedicine as well as our Pilot Grant Program.

Iowa Mentoring Academy

ICTS is leading an initiative at the University of Iowa to implement the Iowa Mentoring Academy (IMA). The IMA offers at least one session per semester. The curriculum is based on the Entering Mentoring program and addresses the new National Institute of General Medical Sciences (NIGMS) guidelines regarding the preparation of mentors involved in training grants. Upon the completion of mentor training (attending 6 of 8-hour long sessions), participants will receive letters of recognition.

## University of Iowa Pappjohn Biomedical Institute

[*https://medicine.uiowa.edu/pbi/about-institute/*](https://medicine.uiowa.edu/pbi/about-institute/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Pappajohn Biomedical Institute (PBI) is a scientific community seeking to understand the fundamentals of biology and disease and to extend our discoveries into real-life applications that improve human health. PBI members hold academic appointments in departments across the university, and many conduct their research in the hub of the PBI, the Pappajohn Biomedical Discovery Building (PBDB). The PBDB has an open-floor layout to reduce barriers between scientific and technological specialties and to enable our scientists, engineers, physicians and trainees across disciplines to see, hear, and learn from each other on a daily basis. The institute is arranged thematically, with floors dedicated to neuroscience, diabetes, cardiovascular, neurodegeneration, auditory, and lung biology research. This environment catalyzes discovery and innovation.

# Research Centers

## Carver Family Center for Macular Degeneration

[*https://www.carverlab.org/*](https://www.carverlab.org/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Carver Family Center for Macular Degeneration is dedicated to providing non-profit genetic testing for rare eye diseases to meet a societal need. Most of the diseases being studied by the Center are so rare that commercial tests would be unlikely to be viable for the long term. As a result, many individuals affected with these diseases and their families would have little access to molecular information. Genes that are available for screening by the Center have previously been extensively studied in the research laboratories of Dr. Edwin Stone and Dr. Val Sheffield at the University of Iowa. By incorporating this research information into test design, the Center is able to offer genetic tests that provide the most clinically relevant information to patients and their families while keeping the tests affordable.

## Center for Auditory Regeneration and Deafness

[*https://medicine.uiowa.edu/center-auditory-regeneration-and-deafness*](https://medicine.uiowa.edu/center-auditory-regeneration-and-deafness)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Iowa Center for Deafness and Auditory Regeneration is designed to create and develop new therapeutic regimens to treat persons with hearing loss. The Center brings together investigators in the Departments of Otolaryngology—Head and Neck Surgery, Anatomy and Cell Biology, Communication Sciences and Disorders, Biology, Physiology and Biophysics, Neurosurgery, Radiology, and the College of Engineering, and is composed of several units including: Auditory Molecular Genetics Laboratories, Auditory Digital Signal Processing Laboratories, Auditory Signal Transduction Laboratories, Auditory Electrophysiology Laboratories, Human Auditory Neurophysiology Laboratory, Micro CT Laboratory, and Cochlear Implant Development Laboratories. The Center enables unique, new, and translational research initiatives by providing the organizational structure to coordinate multidisciplinary research teams, lead the recruitment of needed molecular developmental and signal transduction neuroscientists, and develop focused integrated research questions from the periphery to the central nervous system

## Center for Bioinformatics and Computational Biology

[*https://genome.uiowa.edu/home/index.php*](https://genome.uiowa.edu/home/index.php)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Center for Bioinformatics and Computational Biology (CBCB) aims to catalyze the development of new areas of study and expand research opportunities in informatics areas related to the basic biological sciences and applied medical research. The CBCB was founded in 2002 as a joint enterprise spanning the Colleges of Engineering and Medicine, and involves faculty from 5 Colleges, 7 Afilliated Centers/Institutes/Cores, and more than 19 departments. It serves as a coordinating home for interdisciplinary research, undergraduate, pre- and post-doctoral training, faculty recruitment, and professional development. At the hub of an inherently interdisciplinary field, the goal of the CBCB is to assist in overcoming traditional disciplinary hurdles to collaboration and assist in utilizing state of the art instrumentation and analysis methods needed by 21st century biomedical and basic science research. The CBCB has extensive data storage and processing capabilities, as well as a wealth of installed and maintained software analysis tools to enable research and experiment execution at the leading edge of modern biomedical research.

## Center for Gene Therapy

[*https://medicine.uiowa.edu/genetherapy/*](https://medicine.uiowa.edu/genetherapy/)

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The ultimate goal of the Center is to foster scientific advancement in gene therapy by providing a focal point for gene therapy research at the University of Iowa. Through centralized core facilities, research meetings, and pilot grants, the Iowa Center for Gene Therapy provides a supportive, interactive, and collaborative environment at the University of Iowa that enables the expansion of new initiatives in gene therapy-based research. The Center supports five research core facilities: Vector Core, Animal Models Core, Comparative Pathology Core, Cells and Tissue Core, and Clinical Core. These research cores provide equipment, reagents and expertise at a substantial discount to facilitate the research efforts of Center members. The Center hosts a weekly gene therapy seminar, periodic guest seminars, and an annual retreat/symposium. The "work in progress" format of the weekly meetings and retreat provide excellent opportunities for the informal exchange of ideas through which innovative approaches for gene therapy can be developed. In addition, the Center’s pilot program provides seed money for research on cystic fibrosis in areas relevant to the NIDDK mission. Such research applications should be considered innovative and may potentially be high risk. These applications are funded for one or two years and have a maximum funding limit of $65,000 per year.

## Center for Immunology and Immune-Based Diseases

[*https://medicine.uiowa.edu/immunologycenter/*](https://medicine.uiowa.edu/immunologycenter/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The mission of the Center for Immunology and Immune-Based Diseases is to achieve an integrated and multidisciplinary approach to the study of immunology in its diverse manifestations. The Center coordinates and facilitates interactions among members of the UI biomedical research community in order to advance education, research, and clinical applications in immune-related diseases. Members include scientists engaged in basic and applied research, education, and clinical studies of immunology and immune-based diseases across the University of Iowa campus community, and thus comprise a diverse group of investigators with a shared interest in immunology in its broadest sense and a collective expertise necessary to advance the understanding of the multifaceted roles of the immune system in biology. Many Center members have conducted corporate-sponsored research projects, as well as collaborative projects that involve multiple institutions. Additionally, Center members use a large number of *in vitro* and *in vivo* models of immune responses that may be useful as models for testing pharmaceuticals. The Center holds a monthly Research in Progress seminar in an informal discussion format to allow investigators to receive feedback on grants in the planning stage, novel preliminary findings, or challenging research problems. The Center also holds an annual retreat that enables opportunities for members to establish new collaborations and exchange ideas on research projects.

## Craniofacial Anomalies Research Center

[*https://medicine.uiowa.edu/craniofacial/*](https://medicine.uiowa.edu/craniofacial/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

Since its establishment in 1990, the University of Iowa Craniofacial Anomalies Research Center (CARC) has been focused on the identification of genes that contribute to, and the development of treatments for human cleft lip and palate (CL/P), craniofacial anomalies, and dental/oral disorders. The human genetics team based at this Center is harnessing the latest technology to make discoveries in human genetics, which have yielded qualitative and quantitative advances in understanding the etiology of orofacial clefting (OFC), craniosynostosis, dental defects, and pertubations in craniofacial growth. The Center includes clinicians and researchers from multiple departments within the Carver College of Medicine, College of Nursing, College of Dentistry, College of Liberal Arts and Sciences, College of Pharmacy, and College of Public Health. The Center has made many important contributions to the genetic underpinnings of craniofacial anomalies and researchers are currently investigating the causes of clefting by determining how genetics, family history, and the environment may influence the risk of having a child with CL/P. In addition, investigators within the Center are also interested in understanding how quality of life, school, and well-being are affected by having CL/P and related craniofacial malformations. Studies related to acid reflux and healing for patients with clefts are being developed in addition to investigating language and brain function in infants with oral clefts. Center researchers are using adult progenitor cells and gene therapy to regenerate alveolar and palatine bone as well soft tissues to deliver better patient care. These new translational approaches fit with the NIH personalized medicine strategies. The Center holds weekly workshops to encourage collaborations with researchers across the nation and mini-symposia on craniofacial and dental research.

## François M. Abboud Cardiovascular Research Center

[*https://medicine.uiowa.edu/cardiovascular/*](https://medicine.uiowa.edu/cardiovascular/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The François M. Abboud Cardiovascular Research Center (ACRC) was established in 1974 as the first major University of Iowa multidisciplinary, biomedical research initiative. ACRC investigators have made fundamental discoveries that have led to a greater understanding and more skillful management of heart disease and stroke. Key research themes include: arrhythmias and sudden cardiac death; atherosclerosis and vascular biology; cardiomyopathies and muscular dystrophies; cardiovascular genetics and development; cystic fibrosis, pulmonary hypertension, and other lung diseases; diabetes and obesity; hypertension; inflammation; lipids; metabolism; neurological and neurovascular diseases; stroke; transplantation and mechanical assist device therapy; and valvular heart disease. Ongoing studies include basic, translational, clinical, and outcomes research.

The ACRC models a culture of collaboration, team research and mentoring that has been emulated across the UI campus and adopted by most successful academic research institutions. It is is comprised of over 100 researchers and fosters collaborative partnerships among programs, investigators, and cores within and outside the university in areas such as drug, device, and biotech development. Over the years, members have been awarded more than $500 million in federal grant support and trained more than 1000 predoctoral and postdoctoral fellows. The work of ACRC scientists has paved the way for innovative diagnostics, medicines, and treatment strategies while nurturing new generations of dedicated investigators.

## Fraternal Order of Eagles Diabetes Research Center

[*https://medicine.uiowa.edu/diabetes/*](https://medicine.uiowa.edu/diabetes/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Fraternal Order of Eagles Diabetes Research Center (FOE DRC) at the University of Iowa (UI) is focused on advancing knowledge of the pathophysiology of diabetes and its complications through cutting edge research. The FOE DRC actively recruits and supports the brightest and most creative diabetes researchers in the country to achieve the goal of being on the forefront of innovative diabetes research and to push the boundaries of what is already known. The FOE DRC plays a pivotal role in institutional efforts to drive translational initiatives that will impact diabetes care and increase public awareness of the importance of the current diabetes epidemic. The FOE DRC provides research scholar awards to tenure track scholars who show outstanding promise in the field of diabetes/obesity research, and a pilot project program to assist investigators hoping to establish or further advance their career in diabetes/obesity research. In addition, the FOE DRC has a T32 training grant that fosters the development of trainees in member laboratories. The FOE DRC also oversees two Core facilities:  1) the Metabolic Phenotyping Core, which provides investigators specialized and non-invasive metabolic assays that are essential in phenotyping mouse and other animal models with diabetes, its complications, obesity, and related metabolic disorders; and 2) the Metabolomics Core Facility, which provides investigators with metabolite profiling and isotope tracer analyses covering a number of metabolic pathways using high resolution mass spectrometry interfaced with either gas chromatography (GC) or liquid chromatography (LC).

## Helen C. Levitt Center for Viral Pathogenesis and Disease

[*https://medicine.uiowa.edu/research/centers-programs-institutes/helen-c-levitt-center-viral-pathogenesis*](https://medicine.uiowa.edu/research/centers-programs-institutes/helen-c-levitt-center-viral-pathogenesis)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Helen C. Levitt Center for Viral Pathogenesis and Disease at the University of Iowa supports interdisciplinary activities directed to understanding the role of viruses in human disease by: supporting educational opportunities for trainees in virology, viral-related immunology, and pathogenesis to strengthen virology research; developing new approaches to viral disease prevention, diagnosis and treatment; and improving professional and public understanding of the nature and impact of viral diseases. The Center is comprised of faculty and trainees from the Departments of Internal Medicine, Microbiology and Immunology, Pediatrics and Pathology. A weekly journal club provides a platform for students to present their own work and to discuss papers containing key research advances for the group. The Center supports visiting speakers, and a bi-annual “All Iowa Virology Symposium” joining virologists from the University of Iowa, Iowa State, and other schools, industry, and institutions in the Midwest. Finally, the Center provides travel funding for graduate students, postdoctoral trainees, and faculty to present their work at national and international virology-related meetings.

## Holden Comprehensive Cancer Center

[*https://cancer.uiowa.edu/*](https://cancer.uiowa.edu/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The mission of the Holden Comprehensive Cancer Center (HCCC) is to decrease the pain and suffering caused by cancer in Iowa, surrounding communities, and around the world through improved cancer prevention and treatment based on the three interdependent missions of research, clinical service and education. The HCCC has been a recognized cancer center at the University of Iowa since 1980 and is Iowa's only NCI-designated comprehensive cancer center, a designation it has held since 2000. The HCCC coordinates cancer-related patient care, research, and education across many departments and colleges at the University of Iowa. Researchers and treatment specialists meet regularly in one of 15 multidisciplinary oncology groups, 2 of which have received special recognition and funding support from the NCI in the form of a specialized program of research excellence (SPORE). Research programs within the HCCC include: 1) Cancer Genes and Pathways; 2) Experimental Therapeutics; 3) Free Radical Metabolism and Imaging (FRMI); and 4) Cancer Epidemiology and Population Science. The HCCC provides its members with subsidized access to state-of-the-art services and resources available through the core facilities at the University of Iowa. The facilities provide quality products and services that enhance the research efforts of HCCC investigators to foster basic and translational research. In addition, the HCCC operates a tissue repository to preserve and catalog cancerous tissue samples for use by researchers and currently has tumor samples from more than 50,000 patients. The HCCC also operates an Oncology Registry that contains a record of the history and treatment of patients with cancer and precancerous conditions.

## Huntington’s Disease Society of America Center of Excellence

[*https://medicine.uiowa.edu/psychiatry/research/huntingtons-disease-center-excellence*](https://medicine.uiowa.edu/psychiatry/research/huntingtons-disease-center-excellence)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The mission of the Huntington's Disease Society of America Center of Excellence at the University of Iowa is to strengthen the relationship between clinical treatment and research for individuals affected by Huntington’s disease. The Center take an innovative approach to integrating clinical services, education, outreach, and research opportunities in order to benefit individuals with Huntington’s disease in a personal way as well as advance scientific efforts in the field of Huntington’s disease research. The Center supports several Huntington’s disease studies, including: observational studies and clinical trials. The Center also supports the Huntington’s Disease Clinic at the University of Iowa Hospitals and Clinics, which provides people with Huntington’s disease and their families with comprehensive medical, psychological, and social services as well as physical therapy, occupational therapy, and genetic counseling.

## Iowa Comprehensive Lung Imaging Center

[*https://www.i-clic.uihc.uiowa.edu*](https://www.i-clic.uihc.uiowa.edu/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Iowa Comprehensive Lung Imaging Center (I-CLIC) represents a group of investigators with a common interest in the use of quantitative imaging techniques to better understand the normal lung and the permutations leading to and defining pathologic states. The Center includes investigators in the departments of Physiology, Medicine, Radiology, Anaesthesiology, Mathematics, Electrical Engineering, Biomedical Engineering, and more. The I-CLIC is home to the Advanced Pulmonary Physiomic Imaging Laboratory (APPIL), which seeks to broaden the understanding of basic physiology and pathophysiology of the lung along with pulmonary disease co-morbidities using quantitative imaging. The APPIL also strives to translate emerging insights from image-based methodologies into tools that are applicable to the broader research community and clinical practice in order to improve the diagnosis, phenotyping, and treatment of lung disease. In addition, APPIL serves as the Radiology Center for a number of NIH-sponsored multi-center studies seeking to utilize imaging as a biomarker for assessing pathology and predicting outcomes. These research efforts are supported by a 2500 square foot CT imaging research facility strategically located between the patient areas of the University of Iowa Hospitals and Clinics, the NIH-supported Clinical Research Unit, and the Animal Care Facilities of the College of Medicine. The imaging facility houses a Dual Energy, Dual Source Multiple Detector Computed Tomography Scanner (Siemens SOMATOM Force) and several MicroCT scanners including an ultra-high resolution MicroCT (Zeiss Xradia 520 Versa) capable of interior tomography of lung specimens with a voxel size down to sub-micron dimensions. In addition, there is other imaging equipment, comprehensive physiologic monitoring, a fully equipped pulmonary function laboratory including spirometry, body plethysmography, and DLCO assessment along with data analysis software, and computer clusters.

## Lung Biology and Cystic Fibrosis Research Center

[*https://medicine.uiowa.edu/pbi/lung-biology-cystic-fibrosis-research-center*](https://medicine.uiowa.edu/pbi/lung-biology-cystic-fibrosis-research-center)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The goal of the Lung Biology and Cystic Fibrosis Research Center is to advance fundamental knowledge related to the causes of disease and to develop new treatments. For more than four decades, basic and clinical scientists and trainees at the University of Iowa have brought a broad and multidisciplinary approach to bear upon a variety of pulmonary diseases, and their research has changed the lives of patients and brought international recognition. Areas of research expertise in this center include airway epithelial cell biology, animal models, antimicrobial peptides, asthma, COPD, cystic fibrosis, lung development, genomics, gene therapy, host defense, host-pathogen interactions, imaging, ion transport, respiratory infections, stem cell biology, and virology. Lung Biology and Cystic Fibrosis Research Center investigators are committed to making advances that will impact the lives of those affected by lung disease. The center supports several cores including: the *In Vitro* Models and Cell Culture Core, the *In Vivo* Imaging Core, the Clinical Research Core, the Bioinformatics Core, the Gene Transfer Vector Core, the Electrophysiology Core, the Histopathology Core, and the Imaging and Microscopy Core. These cores provide specialized expertise, develop new methodologies, attract new scientists, and serve as a catalyst for CF research. In addition, the Center supports fellowships in CF-related research, and interacts closely with the Clinical Center to facilitate translation of basic science to patients and to encourage clinical research.

## National Ferret Resource and Research Center

[*https://medicine.uiowa.edu/nfrc/*](https://medicine.uiowa.edu/nfrc/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The major goal of this Center is to provide an NHLBI-focused, centralized resource for genetic modeling in the ferret, with a focus on the distribution of biologic resources to study ferret models of cystic fibrosis and the generation of new ferret models of lung disease. In addition, the Center also forms collaborative partnerships targeting diseases of other organs. The Center has developed CRISPR/Cas9 technologies that make it possible to genetically engineer ferrets by any strategy that has been applied in mice. For example, this technology has enabled the creation of conditional *CFTR*-knockout (KO) ferrets (i.e., tissue- or cell-type specific protein deletion), G551D- and ΔF508-*CFTR* mutant ferrets (models of the most common CFTR mutations in human CF), *SERPINA1*-KO (AAT-KO) and *SERPINA1*-PiZZ (AAT-PiZZ) ferrets (which mimic the loss of a protein, or its most common mutation, associated with alpha-1 antitrypsin-deficient lung disease), ROSA-Cre-reporter ferrets (enable lineage tracing), and CreERT2-driver ferrets (enable cell type-specific or temporal control of gene expression). Thus far, over 20 distinct genetic ferret models that are directly relevant to the lung have been generated. Collectively, these models will make it possible to address very sophisticated questions based on temporal regulation of gene expression, lineage tracing of stem cells, and the ablation of genes in specific cell types. The Center has also cataloged ferret reagents that are of general use and available through the Center or commercial sources, including: cDNAs, bacterial isolates, primary airway cells from disease models, and recombinant viruses for use in ferrets. In addition, the Center has gathered information on >100 commercially available antibodies that work in ferret tissue samples (by Western blotting, immunostaining, ELISA, and immunoprecipitation), and in some cases has generated new antibodies. The Center continues to catalog antibodies evaluated by other investigators to assist the broader community in finding needed reagents. An initial draft of the ferret genome has been deposited in Ensembl and has enabled the first ferret microarrays on cystic fibrosis ferret lung samples and improved protein identification in ferret proteomics research. The Center is working to provide publically accessible databases and downloadable files with improved annotation of the Ensembl gene and protein IDs (i.e., mass spectrometry Mascot files and excel files).

## Neuroendocrine Tumor SPORE center

[*https://medicine.uiowa.edu/net-spore*](https://medicine.uiowa.edu/net-spore)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The University of Iowa and the Holden Comprehensive Cancer Center houses the first and only Specialized Program of Research Excellence (SPORE) in carcinoid and neuroendocrine tumors. This SPORE enables academic, industry, and philanthropic organizations to partner with the National Cancer Institute (NCI) to increase the length and quality of life for children and adults with these rare cancers. The University of Iowa NET SPORE program contains four core services with specific objectives.

* *The Administration Core* maintains excellent communication between all participating NET SPORE investigators and staff and to optimize investigators’ access to additional resources within the University of Iowa and externally. The Administration Core also assures that patient advocates participate in conferences and annual retreats and are included in all key decisions.
* *The Biospecimens Core* obtains high-quality and carefully annotated biospecimens in sufficient quantity to enable our investigators to tackle highly significant scientific questions relating to these perplexing tumors.
* *The Biostatistics and Bioinformatics Core* provides statistical design, collaborative analysis, and data management support for each of the Iowa NET SPORE projects, developmental projects, and career enhancement awardees. The Biostatistics and Bioinformatics Core builds a synergistic interaction with investigators through data gatekeeping and with all project groups through data analyses, information sharing, data form development and processing, data collection and entry, data archiving, quality control, and clinical trial data safety monitoring.
* *The Clinical Research Core* enables investigators in each SPORE project to bring the fruit of their scientific research to a clinical endpoint that will benefit patients both now and in the future. The Clinical Research Core is the direct translational link between research projects and clinical research emanating from these projects.

## Wellstone Muscular Dystrophy Specialized Research Center

[*https://medicine.uiowa.edu/mdsrc/*](https://medicine.uiowa.edu/mdsrc/)

*Website provided for reference only; hyperlinks/URLs are not typically allowed in NIH grants*

The Wellstone Muscular Dystrophy Specialized Research Center (MDSRC) is engaged in research on various forms of muscular dystrophy and is designed to accelerate progress toward effective treatments for this disease. The Center fosters synergistic collaboration and coordination of research activities, and promotes side-by-side basic, translational, and clinical research. It is one of six NIH funded centers nationwide and serves as a focal point for research collaborations, communication, resource sharing, and training of the next generation of muscular dystrophy researchers and clinicians. The overall goal is to advance understanding of the various muscular dystrophies arising from the abnormal processing of dystroglycan (dystroglycanopathies), with a focus on translating research discoveries on the structure and function of dystroglycan into clinical applications for the diagnosis and treatment of patients with dystroglycan-related muscular dystrophy. The University of Iowa MDSRC is composed of 2 projects and 3 cores. The specific objectives of the MDSRC projects are to (1) gain mechanistic insights into the dystroglycanopathies to facilitate the rational design of novel diagnostic and therapeutic strategies and (2) determine the natural history of the dystroglycanopathies to optimize clinical care as well as inform and enhance clinical trial design. The Center’s three cores help to achieve these objectives and include:

* *An Administrative Core* that coordinates the activities within and outside the Center and promotes an interactive and collaborative research environment. This core also educates and engages patients and patient advocates by hosting an annual conference and tours of MDSRC laboratories.
* *A Muscle Tissue/Cell Culture/Diagnostic* *Core* that serves as a national tissue and cell culture resource for research and provides state-of-the-art diagnostic testing for patients seen at the University of Iowa Hospitals and Clinics and nationwide. This infrastructure provides key support for projects in the Center and for clinical trials of neuromuscular disease, especially Duchenne muscular dystrophy.
* *A Research Training Core* that supports year-long fellowships for medical students.