**Facilities and Other Resources**

*Describe the lab space and facilities available in your Sponsor and Co-Sponsor’s labs.*

**Core Facilities**

*(you can delete those that are not relevant to your project but make sure you leave enough that it is apparent that OUHSC has great facilities)*

***OUHSC VPR Core Facilities***

**DNA Sequencing and Genomics Core**

The DNA Sequencing and Genomics facility offers an array of services aimed at facilitating the research of a variety of different investigators across a multitude of disciplines. The current services include

* MiSeq Sequencing of DNA and RNA
* DNA Sequencing with 3730xl Capillary Sequencer
* NanoString nCounter Sprint Profiler
* Fragment Analysis (includes Fragment Analysis, TRFLP, RFLP, primer extension, microsat, etc.)
* Agilent 2100 Bioanalyzer: RNA, DNA, and Protein Sample Analysis
* NanoDrop Nucleic Acid and Protein Quantitation
* High throughput PCR

In addition to these specific services, the Core staff can discuss other project needs to determine if any of the available technology can be of use. The facility has on hand several other pieces of equipment including the Agilent Bioanalyzer 2100, Covaris sonicator, and  Nanodrop ND100 spectrophotometer. The Oklahoma INBRE award (2P20GM103447) from NIH and institutional funds from the Office of the Vice President for Research provide the facility with infrastructure so that investigators can obtain functional genomic and bioinformatic data on a variety of disease models.

**Flow and Image Cytometry Core**

The Flow and Image Cytometry Laboratory provides the University of Oklahoma research community with state-of-the-art cell analysis and sorting instrumentation, and the technical expertise to best utilize this technology. The laboratory is equipped with computer workstations and a variety of computer software packages to collect and analyze data. The facility maintains a sterile hood, CO2 incubator, centrifuge, and fluorescent microscope which can be used for cell preparation and tissue culture work.

**Mass Spectrometry/Proteomics**

The Proteomics division of the Laboratory for Molecular Biology and Cytometry Research is committed to providing the highest quality services related to proteomic analysis, specifically biomolecule mass spectrometry. Several of the mass spectrometers are coupled to HPLC instruments which allows provision of additional applications to OUHSC researchers.

Services provided by the Mass Spec facility include:

* High resolution molecular weight determination
* Large biomolecular mass measurements
* LC-UV-MS analysis (qualitative or quantitative)
* Protein identification by proteolytic digest (in-gel or in solution)
* nano LC-MSMS and database search
* Peptide sequencing
* Complex proteomics analysis

**Laboratory of Biomolecular Structure and Function**

The Laboratory of Biomolecular Structure and Function (LBSF) serves scientists of Oklahoma who are interested in structural aspects of their macromolecular targets. It is one of three core facilities in the Oklahoma Center of Biomedical Research Excellence (CoBRE) in Structural Biology (OCSB) and is included in the OUHSC Vice President for Research Core Facilities. LBSF was created on the basis of the Macromolecular Crystallography Laboratory of the Biochemistry and Molecular Biology Department of OUHSC.

The LBSF provides following services:

* Advice on protein construct design, expression, and purification
* Help with protein purification (BRC 406)
* Dynamic light scattering data collection and analysis
* Crystallization set up with crystallization robot for high throughput screening
* Crystallization set up by robot or manually for crystal size optimization experiments
* X-ray crystal screening and quality evaluation
* Optimization of cryo protectant solutions
* On-site X-ray data collection, processing and evaluation
* Remote X-ray data collection at synchrotron radiation at SSRL
* Structure determination, structure refinement, structure analysis
* Design of mutant proteins based on structural information
* Preparation of figures for grant applications and publication.
* Molecular modeling and structure-based drug design (Dr. Tim Mather)
* Coming in late 2019, preparation of cryo electron microscopy grids with cryo plunger

**Animal Resources**

The Department of Comparative Medicine has 5 licensed veterinarians who oversee all animal husbandry at OUHSC

* Total animal housing and support space is over 125,000 sq.ft., with a state-of-the-art Rodent Barrier Facility that has over 19,000 sq.ft. of animal housing and support space including procedural and surgery suites with anesthesia machines, necropsy room with table and biosafety cabinet, and eye core.
* Has BSL-2 animal housing for infectious disease models
* Has BSL-2 animal housing for xenograft models
* Animal imaging equipment includes: IVIS Spectrum Imaging System, Carestream In-Vivo Xtreme Imaging System, Vevo 2100 Ultrasound Imaging Machine, and Quantum Q-vet digital X-ray system.
* Rodent irradiation core
* Procyte Dx veterinary hematology analyzer

**BioSafety Level 3 Facility**

Located on the first floor of BRC North, the BSL-3 suite offers two laboratories with a total of 6 class II B2 Biosafety cabinets, CO2 incubators, centrifuges and microscopes for *in vitro* work with Risk Group 3 agents or large volume culture (> 10L) work with risk group 1, 2, and 3 agents.

Support lab space is also available with tissue culture (BSL-2) equipment including a biosafety cabinet and CO2 incubators as well as a chemical fume hood and space for solution preparation.

***Stephenson Cancer Center Cores***

**Biostatistics and Research Design**

The Biostatistics and Research Design Shared Resource (BRD SR) provides biostatistical and research design consultation and support for SCC members. For new projects, the BRD SR supports SCC members through all phases of project development, including the design, implementation, conduct, analysis, and reporting of results.

Involvement of BRD SR members in a project allows assistance in refining the question of interest, defining covariate and outcomes of interest including the best way to measure these data, developing databases and data collection forms (paper or electronic), and grant writing. The BRD SR provides expertise in REDCap survey and data collection instrument development, creation and analysis of complex survey sampling frameworks, novel analysis methods such as Geographic Information Systems (GIS) spatial analysis, and grant and manuscript writing.

**Molecular Imaging Core**

The Molecular Imaging Core provides non-invasive optical imaging services to Stephenson Cancer Center members and other investigators at OUHSC and neighboring institutions.
Services

* Training and consultation
* Preclinical tumor models
* Experimental design and data analysis

**Biospecimen and Tissue Pathology**

The core’s biospecimen bank currently contains over 30,000 aliquoted samples collected since 2008, including tissue, blood, plasma, serum, cell and buccal samples. The Core utilizes an IRB-approved Universal Consent that allows patients at the Stephenson Cancer Center, OU Physicians or OU Medical Center to donate tissue or blood to the Biospecimen Bank.

The Biospecimen and Tissue Pathology Shared Resource at the Stephenson Cancer Center provides the following services to members and other interested investigators:

* Specimen procurement for prospective and archived materials
* Storage of human tissue, blood and other types of specimens
* Distribution of fresh, frozen and paraffin-embedded specimens to approved investigators
* Prospective and retrospective annotation of specimens with demographic, pathological staging and clinical information
* Consultation with designated pathologists and researchers for protocol development and specimen evaluation
* The core also provides specimen collection, processing and shipping services to a large and active clinical research program at the Stephenson Cancer Center.

***Oklahoma Shared Clinical and Translational Research***

The OSCTR provides a number of research resources to aid in the development and execution of clinical and translational research for investigators at OSCTR partner institutions.

The **Biostatistics, Epidemiology, and Research Design (BERD)** core is built on the strengths of our OUHSC College of Public Health partnered with genetic epidemiology (OMRF), bioinformatics (OMRF, OU-Tulsa) and geospatial/temporal analytics (OU-Norman) to provide unique consulting, training and methodology development for OSCTR investigators. The BERD provides expertise, collaborative support and training to students, trainees, faculty members and health care professionals at all of the partnering institutions. The Consultative and Collaborative Support Unit of the BERD will provide collaborative support and consultative service in the disciplines of epidemiology, biostatistics, and informatics during the planning, implementation, conduct, analysis and reporting of clinical, translational and community-based research studies.

Services Provided:

* formulation of research questions that are well-defined, measurable, and answerable
* consultation on design and planning of research projects
* development of valid and efficient research designs
* identification of sufficient sample sizes
* guidance on the selection of measurement methods and instruments
* development of case report forms, databases, and online data capture tools
* data processing and programming
* creation of data and safety monitoring plans
* troubleshooting research design and data analysis issues
* data analysis and reporting
* creation of publication-quality summary tables and figures
* systematic review and meta-analysis

**OSCTR Research Navigator service:** To assist junior investigators, or other investigators new to clinical research, across Oklahoma, a Navigator service is located within the OSCTR to serve as an initial point of contact to integrate with institutional services (e.g. IRB, grants accounting, ORA, etc) and clinical research services (as above) to help develop new and ongoing clinical research efforts of junior investigators.

**Biostat/Epi and Research Design Consultations:** OUHSC biostatistics and epidemiology faculty funded by the OSCTR are available for initial consultations on data analysis and research design. After the initial consultation, additional assistance may be available depending on its alignment with OSCTR goals and  investigator status.

**Clinical Trials/Research:** Through a subcontract with the Oklahoma City Area Inter-Tribal Health Board, OSCTR funds a full-time staff member to help tribal and IHS health systems expand the availability of clinical trials to tribal patients. OSCTR also provides physical space and dedicated personnel to assist with clinical research projects for junior OSCTR investigators.

**Registries and Repositories:**Through a subcontract with the Oklahoma Medical Research Foundation, the OSCTR provides opportunities to assist with development of registries and repositories of clinical research information and/or samples from patient or healthy control tribal populations which are be managed and controlled by junior investigators or teams of CTR scientists.

**Special Populations Unit:** Dr. Lancer Stephens continues his work with tribes and OSCTR researchers to identify collaborative research projects that respond to tribal health priorities and advance scientific knowledge. He is be available to help forge new collaborations, identify potential interested tribal partners and facilitate education/recruitment of tribal populations on clinical research studies.

**Community Engagement:** Through work with OKPRN, OSCTR is developing practice-based research networks in pediatrics and tribal health which mirror the successful family practice OKPRN network. Services will also be available to provide education and assistance for housestaff (and faculty) members to participate in translational think tanks and in academic activities to develop a research question, critically review the literature and develop publications answering those questions.

**Pilot Projects:**The OSCTR identifies and funds five pilot projects each year ($50,000/year in direct costs) to support clinical and translational research projects which focus on health issues of concern to Oklahomans.  Individuals are encouraged to work with statistical, research design and clinical OSCTR consultants in the development of these proposals. Funded (and meritorious but unfunded) investigators will be assigned a mentoring team to assist with the project and procurement of additional national funds for the continuation of the research/ career development.

**Training:** OSCTR provides training in various aspects of clinical and translational research for junior investigators and scientists new to clinical research. This training spans (1) integrating CTR concepts, lectures and mentoring to undergraduate research programs, (2) providing a renovated clinical scholars research experience for students between the 1st and 2nd years of medical school in CTR, (3) supporting the MS in Clinical Investigation and considering the development of a PhD in Clinical Investigation, (4) mentoring junior investigators in Oklahoma to career development awards (e.g. K08, K23, national foundation awards), and (5) providing the OSCTR Scholar program which provides an intensive one week CTR experience partnered with development of a clinical research project for external funding.

***College of Pharmacy Core***

**The Research Imaging Facility** at the OU College of Pharmacy in Oklahoma City provides services to researchers in the entire state of Oklahoma.

Its services include:

* Brain glucose metabolism using F-18-labeled fluorodeoxyglucose (FDG) and PET
* Cell proliferation imaging with F-18-labeled fluoro-L-thymidine (FLT) and PET
* Cell trafficking in vivo by PET or SPECT
* Peptide radiolabeling, biodistribution and pharmacokinetics
* Radiolabeling of nanoparticles and their biodistribution
* Imaging tumor growth and proliferation in animal models of various cancers
* Hypoxia imaging in tumors or cerebral tissue (F-18-FMISO and PET)
* Apoptosis imaging using radiolabeled Annexin V and SPECT or PET
* Noninvasive infection and inflammation imaging

In order to provide comprehensive services to the OUHSC investigators, the imaging equipment and Biomarker Generator are supported by a team with unique nuclear medicine, imaging, radiochemistry and analytical expertise. The entire infrastructure is supported by an on-campus nuclear pharmacy operation that fulfills both research and clinical radioactivity needs. Radiolabeling services include development of radiolabeling methods suitable for specific projects and synthesis of radiolabeled compounds for conducting in vitro and in vivo studies.

***Robert M. Bird Health Science Library (BHSL)***

The BHSL is staffed with faculty librarians and library technicians

Services include:

* Provide expertise in developing and executing complex search strategies across multiple resources for systematic reviews or any comprehensive research project
* Provide access to over 150 databases and 5,200 electronic journal titles
* Assist with citation verification for research activity and output
* Collaborate on grants as co-investigators or consultants
* Teach/train both affiliated and unaffiliated users through credit courses, embedded classes, workshops and one-on-one consultations
* Field copyright inquiries and direct people to appropriate resources
* Provide outreach as a Resource Library in the National Network of Libraries of Medicine, National Library of Medicine, NIH
* Identify, review, evaluate, recommend and purchase electronic resources such as publications, collaboration tools, citation managers
* Consult on creation and design of user interfaces
* Interlibrary loan materials not available in the library’s print or electronic collections.  Document delivery to your desktop of articles or book chapters.
* Provide access to research tools such as Journal Citation Reports, Web of Science, Endnote and Quosa (document manager)
* Coordinate and manage technology and training resources (rooms with Windows computers for group classes, videoconferencing, remote interactive smart board)

***Dean McGee Eye Institute Research Core Facilities***

The OU Vision Research Facilities have a state-of-the-art Vision Research Core designed to aid investigators in their vision research. These Modules are funded by a Core grant from the National Institutes of Health / National Eye Institute (P30EY027125) and an unrestricted grant from Research to Prevent Blindness to the Dean McGee Eye Institute.

**Cellular Imaging Module**

The **Cellular Imaging Module** is located in the ground level of the research facility at DMEI. The facility includes an Olympus MVX10, a macroview-fluorescence microscope system, and the Olympus FV1200 confocal system.  The stage of the FV1200 is designed to accommodate an environmental chamber for live cell/tissue imaging.  The MVX10 system is equipped with a fully motorized stage and the CellSens software for creating stack images and large montages using the multiple image alignment function of the software.

**Live Animal Imaging Module**

Instrumentation and technical assistance provided by the **Live Animal Imaging and Functional Analysis Module** are used for imaging and functional analysis of research animals (rodents, rabbits, and chicks). The Modules contain instrumentation similar to that used in the ophthalmology clinic for patient care, so the findings of analyses of vision disorders in animal models can be translated to human disease.

The LAI Module has two locations on the OUHSC campus, one at DMEI and one at the Biomedical Sciences Building across campus. Each location contains a complement of the instruments used in analyzing vision in small animal models.

**Genotyping Module**

For researchers who use complex genetically modified mouse models, genotyping is the most tedious and time-consuming process and has zero error tolerance. The **Genotyping Module** provides fast, accurate, and convenient genotyping service to the mouse research community in the OUHSC campus.  This service is based on conventional PCR and gel electrophoresis methods, and we achieve technical efficiency through our streamlined operation and quality control.

***Nathan Shock Center Core Facilities***

The Oklahoma Nathan Shock Center integrates aging research across the three major research institutions in Oklahoma City: the University of Oklahoma Health Sciences Center, the Oklahoma Medical Research Foundation, and the Oklahoma City VA Medical Center. The Oklahoma Nathan Shock Center focuses on the newly-developing field of Geroscience and on providing investigators across the nation with unique and innovative assays that are accessible to the entire research community studying aging and Geroscience.

**Mulitplexing Protein Quantification Core**

The Core has developed panels of protein assays that allow investigators to interrogate entire pathways such as antioxidant proteins, β-oxidation, glycolysis, TCA-cycle, and others with new assay panels continuously being developed.  Second, assays for proteins involved in any pathway can be designed and validated for proteins from any animal.  The Core provides two services:

* Quantification of proteins in various pathways for tissues/cells from laboratory rodents as well as other animal models.
* Develop panels of proteins to pathways for individual investigators.  These panels of proteins can be developed for almost any animal.

**Targeted DNA Methylation & Mitochondrial Heteroplasmy Core**

The Targeted DNA Methylation & Mitochondria Heteroplasmy Core provides researchers with state-of-the-art novel technologies that we have developed to address fundamental questions of how genomes change with age. DNA methylation is a major regulator of gene expression; studies show that DNA methylation patterns change with aging, and these changes can be caused by a wide variety of environmental stimuli at any point in the lifespan.  On the other hand, increases in mutations and deletions in the mitochondrial genome (mtDNA) with age have been known for some time, but the field has struggled because assays have lacked coverage across the entire mitochondrial genome and have limited quantitative accuracy. This Core provides Geroscience researchers with unique assays of DNA methylation and mtDNA heteroplasmy not present in individual laboratories.

**Integrative Redox Biology Core**

The Integrative Redox Biology Core of the Oklahoma Nathan Shock Center will provide investigators with a coordinated and comprehensive evaluation of the molecules, pathways, and systems that contribute to oxidative metabolism and oxidative stress using analyses of frozen samples from a wide variety of model species (e.g. invertebrates, rodents, exceptionally long-lived species, and humans). These analyses include state-of-the-art measures of redox and energy balance as well as oxidative damage and mitochondrial function. The Integrative Redox Biology Core provides the following services:

* Redox Status:  The levels of GSH/GSSG, NADPH/NADP+, NADH/NAD+ are measured using ion pairing reverse phase HPLC and quantified using electrochemical, fluorescence, or UV/VIS detection.
* Oxidative Damage: Oxidative damage in lipids, DNA, and proteins is measured by the levels of  F2-isoprostanes,  8-oxo-deoxy guanosine, and  protein carbonyls, respectively.

**Discovery Bioinformatics Core**

The Discovery Bioinformatics Core of the Oklahoma Nathan Shock Center provides support in statistics and bioinformatics for data analysis. The Core is experienced in the processing and analysis of data from microarrays, ChIP-seq, RNA-seq, and genomic sequencing and has Ingenuity Pathway Analysis licensed. More importantly, the Core has novel software, developed by Dr. Wren, to assist researchers in discovering and interpreting biological changes that accompany aging.  These software and bioinformatics tools allow investigators to analyze data they have gathered as well as discover new genes and genomic regions relevant to aging using predictive methods. The Core will also provide the following services using software developed by Dr. Wren’s group.

* Bioinformatics and statistical analysis
* Literature-mining
* Gene function prediction
* Prior experimental correlations
* Gene expression changes with age

***The Harold Hamm Diabetes Center Core Facilities***

**Diabetic Animal Core**

The Diabetes Animal Core provides HHDC members with induction, monitoring and maintenance of diabetic animals and coordinates the sharing of diabetic animal tissues. Services include: 1) Technical support and consultation for induction of diabetes in animal models; 2) Supply diabetic animal tissues for research; 3) Breed and maintain commonly used diabetic animals for research.

**Histology and Imaging Core**

The Histology Core provides HHDC members with tissue processing, embedding, sectioning, and histochemical and immunohistochemical staining of mounted slides, for both paraffin embedded and cryo-preserved tissue preparations. The core facility has trained histology technicians who will work with the researchers to accomplish these goals. In addition the core provides quality state of the art instrumentation and expertise to obtain microscopic images with light, epifluorescent, and Nomarski optics; to provide the software for morphometric analysis and to produce publication quality images.

***Oklahoma Medical Research Foundation***

OMRF hosts several Core Facilities that are available to OUHSC researchers. These include:

BIACORE, Clinical Genomics Center, Clinical Immunology Laboratory, DNA Sequencing,

Flow Cytometry, Gnotobiotic Mouse Core, Human Antibody Core Facility, Imaging Core Facility, Myositis Testing, NMR Core Facility, PDX-PCT Core Facility, Quantitative Analysis Core Facility