The Buck Institute

for Research on Aging

Buck

Live better longer.

Overview | Collaborate. Innovate. Grow.

A highly collaborative, well-resourced and inspired space to foster innovation, located just 30 minutes north of San Francisco.

The Buck Institute is the first facility in the United States wholly conceived, designed, and built to understand how normal aging contributes to the development of chronic diseases. From its inception in August of 1999, the Institute has built an organizational structure upon an interdisciplinary research model. Research efforts at the Buck target the biology of aging and its link to diseases with age as a primary risk factor, including Alzheimer's and other neurodegenerative diseases, macular degeneration, stroke, cancer and cardiovascular disease. Buck scientists use state-of-the-art equipment in stem cell research, bioinformatics, genomics, proteomics, metabolomics as well as core resources including a chemistry and mass spectrometry facility, morphology imaging core and vivarium.

LABORATORIES

The Buck Institute consists of two 65,000 square foot laboratory buildings ("Buildings 3 & 4") and one 120,000 square foot central research and support building with state-of-the-art facilities and laboratory equipment. Buildings 3 & 4 each have three laboratory floors that accommodate four PI-level laboratory directors and are equipped with state-of-the-art facilities and laboratory equipment, including a cell culture facility, dark room and common equipment rooms.

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Vivarium

The Buck Institute Animal Care and Use Program is accredited by AAALAC International. The Vivarium is a 12,000 square foot facility that houses specific pathogen-free (SPF) mice and rats. The Vivarium provides all the necessary equipment to support 4,500 cages for animals, including areas for animal surgery, tissue dissection and euthanasia. The Vivarium also houses the Mouse Phenotyping Core and all of its related assays and services (see below).

There are ten animal holding rooms, seven procedure rooms, import quarantine housing, and cage wash facilities. All animal holding rooms contain either a Class I changing station hood or a Class II biological hood. There are two chemical fume hoods. Mice and rats are housed in individually ventilated caging (IVC) systems.

The facility is monitored seven days per week by skilled husbandry and veterinary staff who provide care in keeping with 'The Guide for the Care and Use of Laboratory Animals'. Clinical oversight is provided by an ACLAM boarded Attending Veterinarian. The Buck Institute Animal Care and Use Program is accredited by AAALAC International. Industry barrier facility standards are maintained throughout the Vivarium.

Along with the Vivarium, the Animal Care and Use Program includes an Institutional Animal Care & Use Committee (IACUC) and IACUC administrative staff who provide assistance on study organization and IACUC submission.

Mouse Phenotyping

The Mouse Phenotyping and Behavioral Core measures translationally relevant pre-clinical metrics of organ function and includes an array of mouse behavioral tests for learning and memory. The Core utilizes state-of-the-art technology for visualizing soft and hard tissues in vivo, echocardiography & other imaging modalities via ultrasound, and continual monitoring of the metabolism, activity, and cardiovascular fitness of mice. Standardized assays are employed to provide insight into the physiology of multiple systems including cardiovascular, metabolic, musculoskeletal, and neurobehavioural.

SERVICES INCLUDE:

- Ultrasound, including routine echocardiography
- MicroCT scanning
- Metabolic assessment and metabolic fitness analysis
- Body composition and bone density analysis and measurements
- Muscle physiology and motor function analysis
- Fluorescent and bioluminescent live animal imaging
- A wide range of behavioral tests and measurements

EQUIPMENT INCLUDES:

- Vevo 3100 Ultrasound Imaging System
- Metabolic 60-cage System and metabolic treadmill
- DXA InAlyzer
- Doppler Pulse Wave Velocity System
- Dual 3-in-1 Muscle Physiology Systems
- LuminaS5 In Vivo Imaging System
- Retina Display Microscope with OCT
- TruScan Open field System
- Catwalk gait analysis system
- Various mazes and behavioral analysis systems

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Bioinformatics

The challenge for scientists – from genomics and proteomics to transcriptome profiling - is converting resulting data into biological insight that can mediate lifespan or other age-associated traits. The Bioinformatics team offers a collaborative service to meet this goal, supporting low-level manipulation, normalization and statistical analysis, and high-level post-processing of multiple types of biological datasets, as well as data integration, transferring, and retrieval. After collaboratively establishing the project aims with the user, the Core sets out a statistically appropriate analysis plan, generating computational pipelines, running software and algorithms, and providing formatted results and visualizations, as needed.

SERVICES INCLUDE:

- Experimental Design (Project/Objective Planning)
- Data Collection and Storage Services
    - Access to Linux or RStudio Server
- Wide array of Data Analysis
- Core-Assisted Learning/Knowledge Extraction of data.

EQUIPMENT INCLUDES:

- Temperature-controlled server space
- Server (Dell PowerEdge R740, Inc.)
    - 80-core - Intel(R) Xeon(R) Gold 5218R CPU @ 2.10GHz
    - 1.5T RAM DDR4 memory
    - APC Smart UPS SRT 2200 VA – 1.8kW

Flow Cytometry

The Flow Cytometry Core, a fully equipped P2* containment-level tissue culture lab, provides comprehensive support and instrumentation for analytical flow cytometry, cell sorting, and magnetic cell separations. In addition to instrument training and operator support, the Core can consult on experimental design, tissue processing, cell isolation strategies, and data analysis. A collection of several hundred fluorophore-conjugated mouse and human-specific antibodies, as well as many other standard reagents are available.

SERVICES INCLUDE:

- Preparation of cell suspensions for analysis
- Antibody and reagent panel design
- Tissue/cell staining for visualization
- A wide variety of analytical flow applications
- Multiple types of cell sorting
- Magnetic separations for pre-enrichment of target populations
- Post-acquisition data analysis and presentation
- Multiplex cytokine assays using bead arrays

EQUIPMENT INCLUDES:

- 5-laser Cytek Aurora spectral flow cytometer
- 5-laser Cytek Aurora CS spectral cell sorter
- High-throughput sampling and plate sorting capability
- Data analysis workstation
- Secondary aerosol containment for P2/P2* sorting
- Fully equipped P2 tissue culture laboratory
- FlowJo and SpectroFlo software for data analysis and presentation

Metabolomics

The Metabolomics Core performs analysis of metabolites from biofluids and tissue extracts from vertebrate and invertebrate animal models. The Core workflows offer robust LCMS methods, meticulous validation with external standards, and integrated data analysis. Additionally, the Core has the capacity to develop targeted assays for metabolic pathways of interest from any model organism and can also perform comprehensive metabolic flux analysis workflows in cell culture, biofluids, and invertebrate disease models. Custom assays for small molecule drug screening and metabolism are offered using mass spectrometry and diode array detectors.

SERVICES INCLUDE:

- NAD+ metabolome analysis
- Purine and pyrimidine analysis
- Central carbon metabolism analysis
- C13-Metabolomic Flux analysis
- Biocrates p400IDQ Metabolomics assays
- HPLC-UV detector based drug screening
- Drug metabolism and pharmacokinetics assays
- Custom-developed assays

EQUIPMENT INCLUDES:

- QExactive Orbitrap Mass Spectrometer
    - Thermo Vanquish UPLC
    - Vanquish Diode array detector
- Sciex 4000 QTRAP mass spectrometer
    - Shimadzu prominence UFLC
- Olympus IX70 fluorescent microscope
- Bio-Rad 1 and apparatus

Morphology and Imaging

The Morphology and Imaging Core specializes in histological, high-content, live-cell, and *in vivo* microscopic imaging. In addition to microscopy, bioenergetic assays such as cell respirometry are provided. The Core provides expertise on many aspects of light and transmission electron microscopy from sample preparation through imaging to data analysis. The full-service laboratory optimizes protocols for histology, cytochemistry, immunostaining, *in situ* hybridization, functional imaging and image analysis.

SERVICES INCLUDE:

- Laboratory services
- Tissue processing, embedding, and sectioning
- Histological stains
- Immunohistochemistry or immunocytochemistry
- Functional and high content imaging
- Microscopy
    - Conventional
    - Laser scanning confocal and two-photon
    - Transmission electron
- Image processing services
    - Bitplane Imaris
    - Image Analyst MKII

EQUIPMENT INCLUDES:

- Leica CM1950 cryostat
- RMC MT7000 ultramicrotome (Diatome Diamond Knives)
- Leica TP1020 automated tissue processor
- Epredia Embedding Station
- Leica RM2155 Automated Rotary Microtomes
- Dual-view Nikon E400 microscope
- Zeiss LSM 980, 780, 700, and 7MP
- Nikon Eclipse Ti PFS, Nikon-SRRF
- Zeiss Axioscan 7
- Agilent Seahorse XFe24 and XFe96

Reproductive Biology Hub

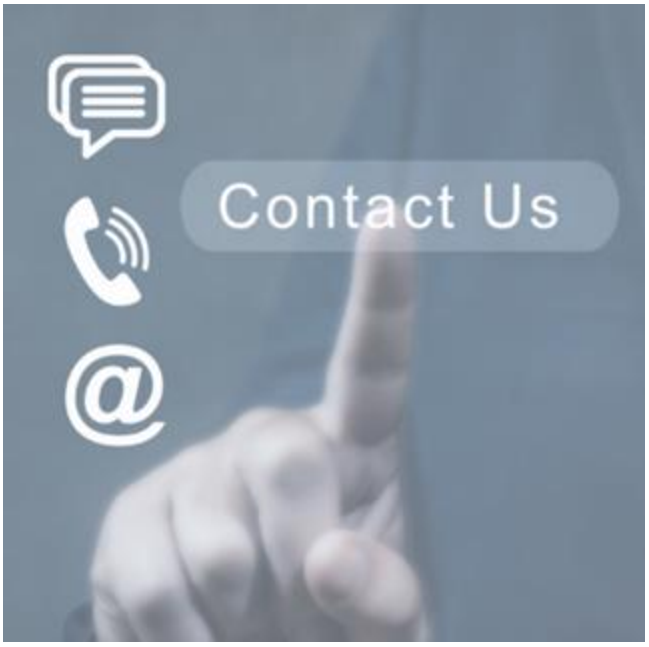
The Reproductive Biology Hub (the Hub) is embedded in the Center for Healthy Aging in Women. The mission of the Hub is to enable, support, and promote cross-disciplinary collaborations between the fields of reproductive science and aging to advance our understanding of the mechanisms underlying female reproductive aging. The Hub has expertise to support studies involving gamete, gonad, early embryo, and reproductive tract biology across mammalian model systems (mouse and human). Techniques include, but are not limited to, collection and culture of reproductive cells and tissues, in vitro maturation and in vitro fertilization, embryo and follicle culture, fluorescence microscopy and live cell imaging, 3D whole-mount analysis, histological and morphological tissue analyses, and fertility trials.

SERVICES INCLUDE:

- Project design consultation
- Reproductive tissue collection for morphological, quantitative and molecular analyses
- Gamete collection for *in vitro* maturation and fertilization assays
- Reproductive endocrine function intervention and assessment
- Data analysis, and training as relevant
- Assistance with animal protocols

EQUIPMENT INCLUDES:

- Wide-stage Dissection Microscopes (Leica M165 on TL5000 Base with Heated stage and Camera) in a Labconco purifier horizontal clean bench
- Box Incubators: Thermo Scientific Heracell VIOS 160i Tri-Gas CO2 Incubator, 100% Copper
- EVOS Cell Imaging System
- Zeiss Stereo Discovery V12 Microscope
- Azure 600 Imaging System
- ACD RNAscope oven
- CFX384 Touch Real-Time PCR Detection System



The Buck Institute welcomes the opportunity to support research efforts by providing access to these key resources and facilities. To find out more about our available vivarium and lab space, as well as accessing the Buck research cores, please visit our website and complete the inquiry form. A member of the Buck Business Development team will reach out to discuss next steps.