

Animal Resources

All animal research at the University of Iowa is under the purview of the Institutional Animal Care and Use Committee (IACUC).

All uses of animals require IACUC approval by completion and submission of an Animal Care and Use Review Form (ACURF). <http://research.uiowa.edu/animal/?get=forms>

IACUC Website

The IACUC website is designed to improve the quality of research proposals that utilize animals, make the animal care and use regulatory process easier for investigators/teachers, and most importantly, to ensure the welfare of the animals. <http://research.uiowa.edu/animal/?get=home>

IACUC Training Requirements

It is required for personnel utilizing animals to complete fundamental training requirements. An educational resource was developed to guide animal users in the basic knowledge that is necessary to properly use animals at the University of Iowa. Knowledge of this material will provide a foundation for the humane use of animals in research/teaching and allow documentation of this knowledge to various regulatory agencies. <http://research.uiowa.edu/animal/?get=traininglogin>

Occupational Health and Safety Program

Personnel utilizing animals are required to be enrolled and complete a risk assessment in the Occupational Health and Safety Program. This program is designed to prevent unnecessary occupational hazards in the work environment, including the potential risks which are incurred due to contact with laboratory animals. <http://research.uiowa.edu/animal/?get=empheal>

Animal Resources

The husbandry and veterinary care of all research animals is the responsibility of the Office of Animal Resources (OAR: 335-7985). The OAR program reports to the Vice President for Research. It is centrally managed by a staff of trained animal caretakers, veterinary technicians and veterinarians. Animal facilities are located in multiple campus locations, and can accommodate multiple species of animals. To assure your animal housing needs, it is important to contact the Director, OAR, prior to:

1. Submission of grants which will utilize animals; or
2. ACURF submission to the IACUC. <http://research.uiowa.edu/animal/?get=acu>

Faculty who are being recruited and will be utilizing vertebrate animals in their research program are urged to request inclusion of the Director, Office of Animal Resources in their interview process and submit the following questionnaire:

http://research.uiowa.edu/animal/downloads/faculty_candidate_questionnaire.doc

Departments are urged to include the Director, Office of Animal Resources in the recruiting process when the faculty recruit will be utilizing vertebrate animals in their research program. In addition to the questionnaire described in the previous paragraph, departments should also complete and submit the following questionnaire: http://research.uiowa.edu/animal/downloads/faculty_recruiting-dept-info.doc

Contact Information

Paul Cooper, Director, Office of Animal Resources
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Biomedical Research Store

Facility Description

Located on the second floor of Eckstein Medical Research Building, 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. More information about the store's products and services may be found at: <http://www.healthcare.uiowa.edu/hybridomacore/>.

Products

The Biomedical Research Store provides reagents commonly used in molecular biology and tissue culture studies. The molecular biology reagents include, but are not limited to, restriction and other DNA modifying enzymes, DNA and RNA purification kits, competent cells, quantitative ("realtime") PCR chemistries and consumables, and nucleotides. The tissue culture reagents include, but are not limited to, antibiotics/antimycotics, dissociation enzymes, growth factors, media, media supplements, salt solutions, serums, transfection reagents, and endotoxin-free water.

How to Order

Products are available at the walk-up windows located on the second floor of the Eckstein Medical Research Building. The walk-up window hours are 8:30 to 11:30 am and 1:00 to 4:00 pm Monday thru Friday.

Fees & Billing

Product details and prices may be found at: www.healthcare.uiowa.edu/hybridomacore/.

Contact Information

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www.healthcare.uiowa.edu/hybridomacore

Kevin Knudtson, Ph.D., Director, Biomedical Research Store
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www.healthcare.uiowa.edu/hybridomacore

Central Microscopy Research Facilities

Facility Description

Established in 1973, the Central Microscopy Research Facilities (CMRF) are part of the Office of the University of Iowa Vice President for Research. During the past 33 years the CMRF has developed into one of the best university biomedical microscopy resources in the country. The main laboratory is located in the Eckstein Medical Research Building. The CMRF also operates a light and confocal facility in Bowen Science Building, a light and confocal facility at the Oakdale Campus and a scanning electron microscopy facility in Trowbridge Hall. CMRF services are open to investigators from all areas of the university as well as off-campus groups.

The facilities provide instrumentation and technical assistance to research programs involving the use of light and confocal microscopy, scanning and transmission electron microscopy, freeze fracture and elemental microanalysis. The CMRF also provides all solutions, supplies, and training necessary for investigators involving microtomy, including specialized staining and embedding techniques, negative staining, metal coating, autoradiography, cryo-fixation, and cryomicrotomy, enzyme cytochemistry, immuno-cytochemistry, in situ hybridization, morphometry and stereology, the preparation of material science samples for both TEM and SEM including elemental microanalysis, and other procedures. A library containing texts and a review of various applications of transmission and scanning electron microscopy is also available.

The CMRF supports both the experienced and novice investigator, and provides training to for independent use of resources. Alternatively, all or parts of a project can be handled by the staff. The facility is available to trained investigators 24 hours a day and 7 days a week. Instrumentation is reserved on a first-come, first-served basis through an on-line equipment scheduler.

Major Imaging Instrumentation

- JEOL JEM-1230 transmission electron microscope (Eckstein Facility)
 - 5-axis motorized goniometer
 - Gatan cryotransfer system
 - Gatan UltraScan 1000 2k x 2k CCD camera
 - Tomography software available
 - Negative sheet film (optional)
 - A Hitachi H-7000 transmission electron microscope is also available featuring an IXRF x-ray microanalysis system and collects images on film
- Hitachi S-4800 scanning electron microscope (Eckstein Facility)
 - 1.4 nm resolution at 1kV
 - Secondary and back scattered electron image mixing
 - 200 mm specimen diameter
 - 5-axis motorized eucentric stage
- SKY Spectral Imaging System (Eckstein Facility)
 - Karyotyping of chromosomes using FISH
 - Digital image capture

- Arcturus Laser Capture Microdissection System (Eckstein Facility)
 - Dissect out cells from paraffin or cryostat sections
 - Color image for specifically stained and fluorescently labeled cells

Live Specimen Imaging Suite Instrumentation

- Xenogen IVIS 200 (Eckstein Facility)
 - *In vivo* bioluminescence and fluorescence imaging
 - Single cell sensitivity for in-vitro use
- Olympus IX81 Inverted Microscope (Eckstein Facility)
 - Motorized stage
 - Video and high resolution digital image capture
 - Highly efficient detection of weak fluorescence
 - Fixed and live sample imaging
 - WeatherStation environmental containment system

Other Instrumentation and Preparation Equipment

- Asylum Research atomic force microscope
- Kratos Axis Ultra photoelectron spectroscopy system
- Bal-Tec HPM-101 high pressure freezer
- Balzers 301 freeze fracture system
- Leica automated cryosubstitution unit
- 2 glass Leica knifemakers
- Diamond knives
- Reichert Ultracut E ultramicrotome
- 3 Leica UC6 ultramicrotomes
- Leica FC6 cryochamber
- Pelco microwave tissue processor
- 8 paraffin microtomes
- 5 microm cryostats
- 2 Ventana automated tissue processors
- 2 Sakura automated slide stainer
- Dako automated immunostainer
- BOC-Edwards vacuum evaporator
- Emitech sputter coater
- Polaron critical point dryer
- Oxford Vibratome
- Leica sliding microtome
- Centrifuges
- Ovens
- Digital darkroom and image editing workstations

Training

The CMRF offers formal courses to students with projects in microscopy during the fall and spring semesters. These courses include:

- Microscopy for Biomedical Research
- Scanning Electron Microscopy for Materials Research

- Advanced Microscopy

Training is also available on an individual basis at any time and the use of the instrumentation does not require completion of formal coursework.

Facility Use & Availability

A secure, web-based reservation system allows approved investigators to schedule instrument time. The main facility is staffed Monday through Friday 8 am to 5 pm. Instrumentation is available 24/7 following training.

Fees & Billing

A full listing of instrument and service rates is available upon request.

Contact Information

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www.uiowa.edu/~cemrf

Comparative Pathology Facility

Facility Description

The Comparative Pathology Laboratory (CPL) is the animal research support core for the Department of Pathology in the University of Iowa Roy J. and Lucille A. Carver College of Medicine. The mission of the CPL is to provide veterinary pathology services and support to scientists investigating animal models of disease. The CPL primarily serves research faculty within the University of Iowa and UI Carver College of Medicine, however, services are also available for use to investigators outside of The University of Iowa.

The CPL Facility is directed by a veterinary pathologist, a Diplomate of the American College of Veterinary Pathologists, trained in comparative pathology. In addition, the CPL retains the services of pathologists with expertise in specific organ and animal-model pathology.

The comparative pathologist is a fundamental resource when working with animal models of human disease. The pathologists can contribute to experimental design, model section/application, interpretation of data, and pathological interpretation. Researchers investigating animal models at UI are encouraged to partner early with the pathologist during the planning a project to optimize its success.

Histotechnology Services

- Formalin-fixed tissues
 - Formalin-fixed tissue processing for paraffin-embedding
 - Paraffin-embedding
 - Microtome sectioning from paraffin-embedded blocks
 - Routine (H&E) and special staining of tissues
 - Decalcification of bones/tissue prior to processing

- Frozen tissues
 - OCT-embedding
 - Cryosectioning of OCT-embedded blocks
 - Routine (H&E) and special staining of tissues

- Immunohistochemistry (primary antibodies supplied by investigator)
 - Protocol development
 - Antigen retrieval
 - IHC slide processing

Microscopic Examination Services

The CPL provides microscopic examination services including histopathologic examination for routine stains, special stains, immunohistochemistry and in situ hybridization. The Facility also provides morphologic characterization of lesions and neoplasms. Digital microscopy images may be captured, analyzed by morphometric software and/or stored at the Facility for up to 30 days. Written reports can also be obtained from Facility staff.

Consultation/Education Services

Consultation services include professional support for experimental design, animal

model optimization, comparative pathology, literature review, pathology nomenclature, and manuscript/grant writing support.

Getting Started

Investigators wishing to use the Comparative Pathology Laboratory Services will need to complete a Service Request Form located on the Facility website at:
www.healthcare.uiowa.edu/cpl/service.html.

Fees & Billing

The fee structure of the CPL is based upon charging University of Iowa faculty for only the direct costs associated with pathology services. A full listing of rates is available on the facility website.

Contact Information

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Core Pathology Research Laboratory

Facility Description

The Core Pathology Research Laboratory provides services for the processing, embedding, sectioning, and tinctorial and immunohistochemical staining of tissues. Expertise in the handling of fresh, frozen and fixed cells and tissues is the building block of the laboratory.

The laboratory primarily serves the faculty and staff of the Department of Pathology, but is available to provide services for a fee to outside investigators.

Services

- Processing of fresh, frozen or fixed specimens
- Embedding of specimens
- Sectioning
- Tinctorial Staining
 - A complete variety of common tinctorial stains are available for use. If a special stain is required, the Laboratory can accommodate most requests.
- Immunohistochemical Staining

Equipment

- Automated Tissue Processor
Processes fixed tissues through a series of alcohols, xylenes, and paraffin wax, thus enabling the tissue to be thin sectioned for staining and microscopy
- Tissue Embedding Station
With the use of metal molds, processed tissue can be placed into permanent paraffin wax blocks.
- Rotary Microtome
Operator creates thin tissue sections from fixed, processed, paraffin-embedded tissues. Section may then be mounted on glass microscope slides for staining.
- Cryostat
A freezing microtome that allows the operator to create thin tissue sections from unfixed, fresh tissue.

Fees & Billing

A listing of services and UI Faculty rates are available at the Laboratory website:
http://www.healthcare.uiowa.edu/pathology/path_folder/research/corelab/index.html.

Contact Information

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DNA Facility

Facility Description

The University of Iowa DNA Facility, centrally located in the Eckstein Medical Research Building adjoining the medical school, provides a broad spectrum of services and resources designed to make the techniques of recombinant DNA technology readily available to the University of Iowa research community. The primary objective of the DNA core's services is to enable investigators to obtain accurate results from the samples they provide. The services are operated with equal emphasis given to quality, expediency and affordability. Trained scientists who are able to offer technical support, training, and consultation related to sample preparation and data interpretation staff the core. The activities and services of this core focus around 7 major areas of support:

1. DNA Sequencing and Genotyping,
2. Custom Oligonucleotide Synthesis,
3. DNA microarray using both the Affymetrix GeneChip system and the custom spotted array using the microscope slide format,
4. Molecular Biology Computing,
5. Real-Time PCR
6. Genome Sequencing, and
7. Biacore Molecular Interaction.

Each of these areas of support is described in detail below. Additional details about the services can be found at the DNA Facility's web site at: <http://dna-9.int-med.uiowa.edu>.

Services

- **DNA Sequencing/Genotyping Service**
The DNA Sequencing/Genotyping Service is a fee-for-service operation. The service maintains 2 Applied Biosystems autosequencers that include a Model 3730 and a Model 3730xl instrument. For DNA sequencing, investigators submit DNA samples to the DNA Facility and the sequencing service then performs the sequencing reactions, loads and runs the reactions on an autosequencer, and analyzes and provides the sequencing data. The DNA Sequencing Service uses a fluorescent dye-terminator chemistry, which is a modification of the Sanger-dideoxy method of DNA sequencing, to generate sequencing products for loading the fluorescent automated DNA sequencers. For genotyping, investigators provide their PCR products, the core adds the sizing ladder and loads and runs the reactions. The result files can be easily transferred to floppy disks or a remote computer or obtained from the DNA Facility web server for analysis and are in a format compatible with most sequence analysis software packages.
- **Custom Oligonucleotide Service**
The DNA Facility has negotiated with commercial oligonucleotide synthesizing companies to provide custom oligonucleotides for University of Iowa investigators at a bulk-rate discount. Investigators submit their oligonucleotide requests to the DNA Facility electronically over the Internet by using a web browser or by e-mail. All the synthesis options (e.g., scales, purification, and modifications) offered by the commercial vendor are available to the investigators. The DNA core then compiles the investigators' orders into a single order and sends it to the vendors as a single large order request. The synthesized oligonucleotides are delivered

to the core, and the core then delivers the oligonucleotides to the investigator. Oligonucleotides ordered through the facility are routinely used for DNA sequencing, in vitro mutagenesis, amplification of DNA by the polymerase chain reaction (PCR), hybridization, anti-sense studies, cloning, gene construction, and many other applications.

- DNA Microarray Service

The DNA Facility provides DNA microarray services using the Affymetrix GeneChip System and/or the custom spotted array using the microscope slide format on a fee-for-service basis. The Affymetrix Genechip Service presently maintains 2 Model 3000 GeneChip Scanners (with the 7G upgrade for high density array scanning), 2 Model 450 GeneChip fluidics stations, and GeneChip Model 640 hybridization oven. Both scanning instruments can be used to process and analyze the new small feature size arrays including the whole genome expression arrays, 500K mapping arrays, exon arrays and tiling arrays. Investigators using the Affymetrix expression arrays may submit either purified total or polyA RNA and the Microarray Service will then prepare their sample for hybridization to the expression array by performing the cDNA synthesis and in vitro transcription (IVT) reactions. Alternatively, the investigator may elect to perform their own the cDNA synthesis and IVT reactions and provide the core a sample that is ready to hybridize to the Affymetrix array. Following hybridization, the core scans the array and provides preliminary analysis of the data using the Affymetrix Analysis Suite software. These data are provided in Microsoft Excel, tab-delimited text, and Affymetrix .cel formats that are compatible with most commercial or freeware microarray analysis programs.

The DNA Facility also offers services for the printing and analysis of custom spotted arrays using the microscope slide format on a completely full- to self-serve basis. The core maintains the Perkin Elmer ScanArray Model 4000XL and Axon Model 4000B slide format microarray scanners and a Genomic Solutions custom microarray printer. The investigator may provide templates (oligonucleotides, cDNA, PCR products, etc.) for printing or may use the core's preprinted slides for analysis of human, mouse and rat genomes (see <http://genome.uiowa.edu/NHLBI/nhlbi.html> for content). The core will perform or assist the investigator in the set up and run of the microarray printing processes, the labeling of samples, the hybridizations, and the array scans. The results are provided in a Microsoft Excel and/or tab-delimited text formats for use with most commercial or freeware microarray analysis programs.

- Molecular Biology Computing Service

The Molecular Biology Computing Service provides computer-based nucleic acid and protein analysis resources and support on a fee-for-service basis. The DNA Facility, in cooperation with the University of Iowa Information Technology Services (ITS), provides and supports the Accelrys, Inc. Wisconsin software package. This comprehensive LINUX server-based package is a compilation of over 170 programs used for nucleic acid and protein sequence analysis. The Wisconsin package can be accessed via a telnet, X-windows, or web browser interface. No fee is charged for access to the Wisconsin package. The DNA Facility also maintains a variety of commercial personal computer software packages used for nucleic acid and protein sequence analysis including: Vector NTI (Invitrogen), Sequencher (GeneCodes), and Primer Express (Applied

Biosystems). The types of analyses include, but are not limited to sequence retrievals, restriction enzyme analysis, sequence alignments, PCR and DNA sequencing primer design, and secondary structure analysis. The facility personnel are available to perform, instruct, or assist in the use of the sequence analysis programs.

The core also maintains licenses for a number of commercial microarray analysis software packages including ArrayAssist (Stratagene), Partek Genomics Suite (Partek), Pathway Architect (Stratagene), and Ingenuity Pathway Analysis (Ingenuity Systems). Facility personnel will assist in the use of the software. Personnel are also available on a collaborative basis for more in-depth bioinformatics support.

- **Real-time PCR Service**
The DNA Facility houses 4 “real-time” or kinetic PCR instruments: 1 Model 7900, 1 Model 7500, and 2 Model 7000 Applied Biosystems sequence detection systems. Investigators are charged a flat fee per run. Access to the instruments is obtained by reserving a time slot through the core’s real-time PCR on-line calendar reservation system. The investigator then brings his/her PCR reactions that have already been set up in a 96-well plate and ready to be loaded on the instrument at the appointed time. The DNA Facility loads the instrument, collects data, and performs preliminary data analysis. Alternatively, the investigator can elect to perform these tasks themselves. A hard copy “Experimental Report” and/or an electronic version of the data in the form of a Microsoft Excel workbook file are provided. Additional data analysis is the responsibility of the user, however, core personnel are available to assist and/or advise users in performing further analyses. In addition, the core houses and advises in the use of real time primer and probe design software. Two full time employees and the director assist the real-time PCR users in their primer/probe design, instrument setup, data collection, and downstream analyses.
- **Genome Sequencing**
The Genome Sequencer FLX System uses an innovative twist on pyrosequencing-based reagent technology that enables massively parallel sequencing in high-density microwell plates. The instrument can be used to generate more than 100 million bases per 7.5-hour instrument run with an average yield of greater than 400,000 reads per run. Accuracies can be achieved that are greater than 99.5% over 200 bases per read, with reads averaging 200 to 300 bases. Following alignment, consensus accuracies of greater than 99.99% can be obtained. There are several possible types of experiments that can be done on this platform including: 1) de-novo sequencing of an organism; 2) re-sequencing; 3) expression profiling (similar to a sage library); 4) exon capture re-sequencing (in conjunction with Nimblegen microarrays); and 5) deep sequencing (looking for rare somatic or population mutations).
- **Biacore Molecular Interaction Service**
The Biacore Molecular Interaction Service is located in Room 238 of the Eckstein Medical Research Building and provides customized and user-driven biomolecular analysis services to university researchers. The Biacore Model 3000 instrument utilizes Surface Plasmon Resonance (SPR) technology to

examine biomolecular binding events on a chip surface. The basic principle involves immobilization of a ligand on a sensor chip followed by delivery of an analyte by a microfluidic system. Any protein, DNA, RNA, lipid, carbohydrate, polysaccharide, cell, virus, drug, drug like molecule (organic or inorganic) can be used as the ligand or analyte. Since the detection system is based on measuring total mass on the sensor chip surface, neither ligand nor analyte need to be tagged. In addition to identifying binding partners to a target molecule, SPR also provides quantitative data on:

1. Specificity: How specific is the binding between two molecules?,
2. Concentration: How much of a given molecule is present and active?,
3. Kinetics: What is the rate of association and dissociation?, and
4. Affinity: How strong is the binding?

Users are initially billed for a training session and then are assessed an hourly rate for subsequent use of the instrument.

Fees and Billing

A complete list of DNA Core Facility fees and discounts is available upon request.

Contact Information

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Editing and Speech-coaching Services

Description

Working on the final draft of a paper or proposal? Preparing for a talk in the hospital or at a meeting? Paul Casella, consultant to the faculty of the CCOM is available to assist faculty by:

- editing documents, providing feedback and meeting with authors
- coaching speakers to be more effective teachers and presenters and
- leading seminars for faculty groups.

These services are supported by the Carver College of Medicine Office of Faculty Affairs and Development and are available at no cost.

Services

- **Editing**
Send attached documents to paul-casella@uiowa.edu: manuscripts for publication, abstracts, grant proposals, book chapters, slides—anything written. Turn-around time is about 2 weeks. Authors will receive:
 - An electronic file with comments and edits marked using the “Track Changes” feature,
 - A review that assesses the overall structure of the manuscript, including ways to strengthen the paper’s clarity and reasoning, and
 - The opportunity to meet with Paul to review the suggestions and ask questions.
- **Speech-coaching**
Contact Paul to schedule a one-hour coaching session to improve your public speaking skills. In each session, the speaker gives part of a talk, reviews the video with the coach, is offered suggestions to improve verbal and non-verbal communication skills, and has a chance to practice the changes. The participant keeps the tape. At the conclusion of the session, the participant will be able to:
 - Give a more effective presentation,
 - Minimize distracting delivery skills and emphasize good delivery qualities to allow for an effective exchange of information, and
 - Teach others how to be more effective speakers.
- **Seminars**
Seminars are available for faculty groups of all sizes. Topics include Writing for Publication, Speaking for Success, Writing Grant Proposals, and others designed for specific groups and purposes.

About Paul Casella

Paul Casella is a writer, teacher, editor, and producer. He is a graduate of Dartmouth College and the Iowa Writers’ Workshop. Since 1988, Paul has worked with health professionals to improve the clarity and effectiveness of their manuscripts for publication, formal presentations, slides, posters, videos, and other media for scientific purposes. He has led effective writing and speaking skills seminars for physicians nationally since 1993, and has provided these services on behalf of the Carver College of Medicine

Office of Faculty Affairs and Development since 2000.

Contact Information

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<http://www.healthcare.uiowa.edu/faculty/facultyaffairs/consultantserv.html>

Electron Spin Resonance Facility

Facility Description & Mission

The Electron Spin Resonance Facility (ESR) is addressing research at the interface between free radical biology and medicine, a dynamic area that will blossom in this new century. The Facility was founded on this vision and is designed to address the emerging research opportunities at these crossroads. We provide the 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.

Our primary goal is to advance the fundamental understanding of free radical biology so that human health can be improved through innovative approaches in the prevention and treatment of disease.

Instrumentation

- Bruker EMX ESR Spectrometer
 - 25 cm magnet, 90 dB X-band bridge
 - data system
 - TE, TE-double, and TM cavities: liquid nitrogen variable temperature system
 - liquid helium variable temperature system
 - gaussmeter with in-cavity probe
 - EIP-625A microwave frequency counter

- Bruker EMX ESR Spectrometer
 - 25 cm magnet, Xband bridge
 - data system
 - HS cavity with aqua-X system

- Varian E-4 ESR Spectrometer
 - TE and TM cavities
 - liquid nitrogen variable temperature system
 - Micro-Now gaussmeter

- Fisher Scientific 10 cubic foot incubator
- Jounan 312 refrigerated centrifuge
- HP 8453 diode array UV/VIS spectrophotometer
- Perkin Elmer LS-50B fluorescence spectrometer with Windows interface
- YSI oxygen monitor system
- STDB II spin-trapping database
- Cahn 21 electrobalance
- Oriel PhotomaxR xenon light source with 1/8 m monochromator
- Siever 280 nitric oxide analyzer
- World Precision Instruments nitric oxide electrode detection system
- World Precision Instruments oxygen electrode detection system
- Innovative Instruments nitric oxide electrochemical detection system
- Coulter Counter Z-2 for counting, sizing and size-distribution determinations

- ESA CoulArray HPLC system with ec-array, UV-Vis diode array and fluorescence detectors
- World Precision Instruments free radical analyzer

Contact Information

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Flow Cytometry Facility

Facility Description

The 1,000-square foot Flow Cytometry Facility is located in the Eckstein Medical Research Building (EMRB). The facility has one magnetic-based and six laser-based instruments whose major purpose is the identification and isolation of various cell populations. The laser-based instruments accomplish this by the use of antibodies to which various colors or dyes have been attached and are directed at molecules known to exist on the cell surface. By using several colors attached to different antibodies, one can identify and purify cells that express any given configuration of various molecules.

Services

- High-speed sorting
- Multi-parameter analysis
- High-efficiency purification of cell subsets
- Quantification of cytokines, gene expression, micro RNA
- Training and assisting investigators and laboratory personnel in the use of software programs for the interpretation and analysis of data
- Individual training of investigators and laboratory personnel in the use of bench-top instruments
- Consultation for experimental design
- Online instrument scheduling provided through web-browser interface
- All data stored on dedicated 1 terabyte server managed by University of Iowa Information Technology Services

Instrumentation

- Becton Dickinson FACS DiVa
Allows nine color detection in addition to two light scatter measurements from 488 nm, 600 nm, and 351-364 nm (UV) or 406 nm excitation. Pulse height, width, and area can be collected for all parameters. Time can be collected as an additional parameter for cell kinetics experiments. Data is stored in linear mode and all logarithmic transformations are done with software allowing accurate compensation of fluorochrome emission overlap post acquisition. Cells can be sorted at rates up to 50,000 per second with purities of 99 percent. Single and multi-cell deposition into 96-well plates is provided for cloning.
- Becton Dickinson LSR II
Allows eight color detection in addition to two light scatter measurements from 488 nm, 633 nm, and 355 nm (UV) excitation. Pulse height, width, and area can be collected for all parameters. Time can be collected as an additional parameter for cell kinetics experiments. Data is stored in linear mode and all logarithmic transformations are done with software allowing accurate compensation of fluorochrome emission overlap post acquisition.
- Becton Dickinson FACS Calibur
Allows four color detection in addition to two light scatter measurements from 488 nm and 635 nm excitation. Pulse width and area are available for doublet discrimination and accurate DNA analysis. The instrument is located at the Oakdale Campus satellite lab.

- Becton Dickinson FACScan
Allows three color detection in addition to two light scatter measurements from 488 nm excitation. Pulse width and area are available for doublet discrimination and accurate DNA analysis. Two instruments are available on the Health Care Campus and one at the VAMC satellite lab.
- BioRad BioPlex
Bead based flow cytometry system for investigating protein expression, genomics or immunodiagnostics. Multiplexing technology allows up to 100 analytes per sample to be quantified in a 96-well format (100 analytes per well). System advantages include ease of use, short turn-around time, and small sample size.
- Miltenyi autoMACS
Magnetically sorts up to 2×10^8 cells from a maximum starting population of 4×10^9 . Uses CPU control of separation strategy for positive selection of target cells or depletion of unwanted cells.

In addition to identification and isolation of various cell populations using antibodies, flow cytometry can analyze:

1. cell proliferation response to drugs or treatments, such as those used in chemotherapy,
2. cell physiological properties, such as calcium flux and pH,
3. DNA content and integrity, and
4. chromosomes

Offline data analysis using FlowJo™, Cellquest™, and ModFIT™ can be done through the Facility's system of networked computers. Investigators equipped with IBM or Mac-compatible PCs can perform analysis at their laboratories or offices by accessing data through the Facility's dedicated 1 terabyte file server.

The facility provides scientific and technical personnel who are available for consultation in designing experimental protocols. Cell preparation and publication quality output are available upon request.

Facility Use & Availability

A secure, web-based reservation system allows investigators to schedule instrument time. The facility is staffed Monday through Friday, 8 am to 8 pm and is available 24/7 following training.

Fees & Billing

A full listing of instrument and service rates is available through the Flow Cytometry website at www.medicine.uiowa.edu/FlowCytometry/charges.html.

Contact Information

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Gene Targeting Facility

Facility Description

The Gene Targeting Core Facility (GTCF) at the University of Iowa was established with generous support from the Bioscience Initiative and College of Medicine on July 1st, 1998. It is one of the several core facilities operated and supported by the Roy J. and Lucille A. Carver College of Medicine.

GTCF provides technical and research services to investigators on the University of Iowa campus and elsewhere for the generation of gene knockout mouse models. These services include:

- consultations on developing strategies for gene targeting and design of targeting construct,
- generation of targeted ES cells,
- microinjections of targeted ES cells, embryo transfer and generation of chimeras, and
- breeding of chimeras for germline transmission to pass on the designed genomic changes to the next generation.

Over the past nine years, GTCF has worked with more than 40 investigators on this campus on over 180 different research projects and generated more than 50 lines of mutant mice through gene targeting via DNA homologous recombination.

Procedures

1. Meet with facility personnel to discuss vector design and targeting strategy
2. Produce targeting vector
3. Develop and confirm clone screening strategy
4. Provide 50 to 100 mg of linearized targeting vector DNA in a concentration above 0.5 mg/ml
5. Inform facility of desired ES cell line
6. Inform investigator of alphabetical designation of the project
7. Place project into electroporation queue
8. Thaw appropriate ES cell line and culture to produce sufficient cells for electroporation
9. Electroporate ES cells with targeting vector
10. Culture ES cells using appropriate selection medium
11. Pick individual surviving ES cell colonies
12. Culture ES cell clones to confluency in a 96-well plates
13. Harvest cells, for both survival freezing and DNA analysis
14. Isolate DNA and screen clones for correctly targeted genomic allele
15. Thaw and expand targeted clones to confluency in a 100 mm dish
16. Freeze in liquid nitrogen, four to eight vials of each targeted clone
17. Perform cytogenetic analyses of the targeted clones
18. Provided additional ES cell sample for confirmation of each targeted clone
19. Move confirmed clones into microinjection queue
20. Microinject two targeted clones
21. Judge pups for level of apparent ES-cell contribution based on coat color
22. Mate chimeras to C57BL/6

23. Evaluate chimera offspring for germline transmission
24. Genotyping of DNA and identification of heterozygote

Fees & Billing

A complete list of additional services and associated fees are located on the facility website.

Getting Started

To begin a project with the Gene Targeting Core you will need an account number, which will be provided to you upon contacting the facility (a request form is located on the facility website). Investigators will also need:

- A map of the targeting strategy, including the endogenous gene locus, the targeting vector showing the selectable markers, arm lengths and locations, and the deletion region and the targeted locus.
- A screening strategy, including the diagnostic enzymes and probes for Southern blot analyses, PCR primer sequences and locations and the size of the amplified region for PCR screening (Southern blot is still needed for final confirmation).
- The facility would like to inspect an autoradiograph or a PCR gel.
- Linearized targeting vector, about 100 mg in no more than 200 ml. DNA does not need to be further
- purified after digestion with restriction enzyme(s).
- A recombinant DNA registration form is needed for facility files (contact Carol Showalter at the Health Protection Office at 5-9553 for information). It is a good idea to start ACURF (contact Tina Neill-Hudson at 5-7985 for information), although it is not needed at this stage. We have protocol to cover the making of knockout mice.

Contact Information

Baoli Yang, M.D., Ph.D., Gene Targeting Core Facility Director
463 Medical Research Facility
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(319) 384-8639 (Laboratory)-
(319) 384-8663-
baoli-yang@uiowa.edu
<http://www.medicine.uiowa.edu/gtcf>

Gene Transfer Vector Core Facility

Facility Description

The Gene Transfer Vector Core (GTVC) overall objective is to support investigators in the use of gene transfer technologies. The Vector Core facility utilizes molecular biology techniques to engineer and develop viral vectors based on multiple vector systems necessary for gene transfer in research experiments or pre-clinical studies. Vector core staff and investigators allow for cross fertilization of ideas, technical advancements, and innovations in vector design.

Services

The University of Iowa Carver College Of Medicine GTVC brings together investigators interested in developing and using, viral and non-viral vectors for gene transfer with specialists in the area of vector construction by:

- Consultation with the Principal Investigator to plan and develop transfer vectors to fit individual projects requirements
- Assist investigators with troubleshooting existing projects
- Design and development of novel vectors
- Develop novel methods of virus production such as the RapAd™ System for adenovirus production
- Generation of RNAi expression vectors
- Purify, concentrate, and perform quality control on preparations of recombinant adenovirus, adeno-associated virus (AAV), moloney murine retrovirus, lentivirus
- Maintain and distribute standard cell lines and stocks of recombinant reporter viruses

Fees & Billing

The Gene Transfer Vector Core services and products are provided at cost for investigators affiliated with educational institutions. A detailed description of services and prices is available upon request.

Contact Information

Beverly Davidson, Ph.D., Director, Gene Transfer Vector Core
Maria L. Scheel, Laboratory Manager, Gene Transfer Vector Core
221 Eckstein Medical Research Building
(319) 335-6726- ph
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maria-scheel@uiowa.edu
www.uiowa.edu/~gene

Hybridoma Facility

Facility Description

The Hybridoma Facility of the Iowa State University Office of Biotechnology provides valuable resources for scientists who need monoclonal or polyclonal antibodies but do not have appropriate equipment or who are not experienced in antibody production techniques. A wide array of procedures can be customized to meet the researcher's individual requirements. These 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 labs; large-scale mammalian cell culture (bioreactor); blood sera collection; antibody purification and isotyping; cryopreservation and cryostorage of cell lines (-140o C); and ELISA tests. The hybridoma projects are usually screened and selected by the client; however, the facility can do the screening and/or training of lab personnel when needed. A hybridoma project usually requires three to five months for completion. The following timetable is used for general planning of a hybridoma project:

- Mouse immunization- 4-6 weeks
- Selection of primary hybridomas after cell fusion- 2 weeks
- Expansion and freezing of primary hybridomas- 2 weeks
- Cloning and screening of clones- 2 weeks
- Expansion and freezing of clones- 2 weeks
- Bioreactor fluid production- 4 weeks

Services

- Monoclonal antibody production
- Polyclonal serum production
- Bulk antibody production
- Hybridoma maintenance
- Antibody isotyping
- Antibody purification
- Antibody conjugation
- Subtractive immunization
- RNA isolation for phage display

Contact Information

Paul Kapke, Ph.D., Director, Iowa State University Hybridoma Facility
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Ames, Iowa 50010
(515) 294-9837
(515) 294-0453
pakapke@iastate.edu
www.biotech.iastate.edu/facilities/hybridoma

Mass Spectrometry Facility

Facility Description

The High Resolution Mass Spectrometry Facility (HRMSF) provides information pertaining to the molecular weight, elemental composition, and molecular structure of a compound. The Facility performs high resolution mass spectrometry (HRMS) experiments or accurate mass measurements to determine the elemental formula of new synthetic molecules and natural products. The HRMSF can also perform tandem mass spectrometry (MS-MS) experiments, which are used to assist in the structure determination of unknown molecules. We have two open access instruments (GC/MS and LC/MS) that are available to on-campus researchers who have been trained by the HRMSF staff. Presently the Facility serves researchers in over thirty research groups from five different colleges within the University of Iowa.

Instrumentation

- **Micromass Autospec**
The Micromass, Inc. Autospec system is a double-focusing magnetic-sector mass spectrometer with capabilities for electron ionization (EI), and electrospray ionization (ESI). Accurate mass measurements are performed on the Autospec using the ionization methods listed above. This instrument is operated solely by HRMSF staff due to the complexity of its operation.
- **ThermoFinnigan Voyager**
The Voyager is a single quadrupole mass spectrometer in which samples are introduced into the instrument either by a gas chromatography (GC) or a solids-probe (or DIP). Both EI and chemical ionization (CI) capabilities are available. After a brief training session, interested University researchers have the opportunity to analyze their own samples on Voyager. Organic and inorganic chemistry graduate students and postdocs, as well as many of the Natural Products and Medicinal Chemistry graduate students are trained to operate Voyager each year.
- **ThermoFinnigan LCQ Deca**
The LCQ consists of a Surveyor liquid chromatograph (LC) interfaced with a quadrupole ion trap (Q) mass analyzer. The Surveyor LC has an autosampler and a diode array detector. Samples can be introduced via the LC or by direct injection. Ionization methods available are ESI and atmospheric pressure chemical ionization (APCI). Nanospray capabilities are available. With the ion trap mass analyzer, we can perform tandem mass spectrometry (MS-MS) and MS_n experiments that can assist in the elucidation of molecular structures and sequence of peptides, proteins, and other biomolecules. The LCQ Deca is also available as an open access instrument to University researchers who complete a training course.

Services

- Nominal mass ESI-MS
- Accurate mass measurements or HR-MS
- GC-MS
- Solids Probe-MS for thermally unstable or organometallic compounds

- LC-MS
- Tandem MS or MS-MS for structure elucidation

Consultation/Education Services

The HRMSF staff is available for consultation with researchers to develop mass spectrometry strategies to resolve research problems. Most samples require 45 to 60 minutes of analysis time, which leads to typical costs of \$45-\$60 per sample.

Fees & Billing

A complete listing of facility fees is located at <http://research.uiowa.edu/vpr/units/hrmsf.htm>

Contact Information

Lynn M. Teesch, Ph.D., Director, High Resolution Mass Spectrometry Facility
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lynn-teesch@uiowa.edu
<http://research.uiowa.edu/vpr/units/hrmsf.htm>

Nuclear Magnetic Resonance Facility

Facility Description

The Nuclear Magnetic Resonance Facility supports the biomedical research community with an 800 MHz instrument, a wide variety of techniques and the expertise to solve research problems. A full spectroscopic and interpretation service is offered, as well as assistance and training for researchers who perform their own experiments. Techniques for working with biological molecules in challenging media, high resolution spectra, and multidimensional spectra are facility specialties.

Example applications of NMR spectroscopy include:

- Determining three-dimensional structures of proteins in solution
- Monitoring the fate of a chemical species as it is processed by a cell culture
- Identifying and quantifying components in a mixture
- Characterizing the dynamics of ligand binding and aggregation in solution

Instrumentation

- Fully automated Avance II 800 MHz US2
 - 5 mm 800 MHz CryoProbe
 - Triple resonance 1H (15N/13C)
 - XYZ gradients
 - 5 mm TXI 1H (15N/13C/D) with XYZ gradient
 - 5 mm BBO BB-1H/D with XYZ gradient
 - B-ACS 60 sample changer and barcode reader
- Fully automated Avance II 500 MHz US2
 - 5 mm TXI 1H/D (15N/13C) with Z gradient
 - 5 mm BBO BB-H/D with Z gradient
 - B-ACS 60 sample changer and barcode reader
- Automated liquid handling center
 - Tecan Genesis
 - LiHa
 - Mettler SAG285
 - Hudson plate crane with five plate stacks
 - Scorbot ER-7 robotic arm
- Unity Inova 600 MHz Oxford AS600
 - 5 mm triple resonance (HCN) probe with PFG
 - 5 mm broadband probe with PFG
 - XYZ gradients
 - 4 RF channels

Fees & Billing

A complete list of fees is available upon request.

Education and Training

The Facility offers workshops that include talks, instrument tutorials and hands-on software exercises. Small-group training is offered continuously. In addition the Facility

offers lectures for inclusion in existing classes, seminars geared to departmental series and informal presentations at group meetings. Topics generally focus on local applications of NMR, but can include more general discussions of theory and practice.

Contact Information

Andrew Fowler, Ph.D.
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andrew-fowler@uiowa.edu
<http://www.mednmr.uiowa.edu>

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Protein Facility

Facility Description

The Facility offers amino acid analysis, protein/peptide sequencing, large and small scale peptide synthesis (Fmoc), matrix-assisted laser desorption/ionization (MALDI) mass spectrometry, analytical ultracentrifugation, circular dichroism, SDS-PAGE/blotting, 2-D gel electrophoresis, isoelectric focusing (IEF), in-gel digestion/peptide mass fingerprinting, digital image acquisition and analysis using the Typhoon imaging system and the 2D gel documentation/analysis system, and preparative, analytical and micro-analytical high performance liquid chromatography (HPLC).

Services

- Amino acid analysis
- Analytical ultracentrifugation
- Circular dichroism
- High performance liquid chromatography
- MALDI mass analysis
- Peptide synthesis
- Protein/peptide synthesis
- SDS-PAGE and electroblotting
- 2D gel electrophoresis
- Isoelectric focusing (IEF)
- In-gel digestion/mass fingerprinting
- Typhoon imaging system/2D gel documentation and analysis

Instrumentation

- Applied Biosystems 420A PTC amino acid analyzer
- Applied Biosystems 494 Procise protein/peptide synthesizer
- Applied Biosystems 432A Synergy peptide synthesizer
- Advanced ChemTech Model 396 multiple peptide synthesizer
- Thermo BioAnalysis Dynamo MALDI mass analyzer
- Applied Biosystems DE-Pro MALDI mass analyzer
- Beckman System Gold high-performance liquid chromatographs
- Amersham Pharmacia IPGPhor IEF unit
- Amersham Pharmacia DALT 2D electrophoresis system
- Molecular Dynamics Typhoon 8600
- Amersham Pharmacia image scanner
- Genomics Solutions ProGest
- BioRad minigal and blotting apparatus
- Software for the analysis of 1D and 2D gels is also available. The Protein Facility also oversees the use of the Beckman Optima XL-A analytical ultracentrifuge and a Jasco-710 spectropolarimeter.

Fees & Billing

A complete listing of service rates is located online at http://www.biotech.iastate.edu/service_facilities.

Contact Information

Joel Nott, Manager, Iowa State University Protein Facility
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protein@iastate.edu
www.protein.iastate.edu

Protein Crystallography Facility

Facility Description

X-ray crystallography is the primary method for determining three-dimensional structures of biological macromolecules. The goal of the facility is to provide the necessary support and infrastructure to enable individual investigators to initiate structural studies. This includes facilities for protein characterization (dynamic light scattering), crystallization (technical advice, environmental rooms and stocks of special crystallization materials), data collection (facility is fully equipped for data collection and processing) and structure determination and refinement (computer programs for data analysis and structure determination).

Services

- Protein purity analysis by dynamic light scattering
- Set-up of crystallization screens using commercial and facility-made conditions
- Preliminary screening of crystals
- Data collection of quality crystals at facility x-ray source and synchrotrons
- Data processing using popular packages such as d*TREK and XDS
- Structure determination using MR, MIR, MAD, SAD techniques and software such as ccp4, CNS, SHELX, and PHENIX
- Structure refinement and fitting using Refmac, Coot, O
- Structure visualization and analysis using PyMol, Sybyl

Instrumentation

- X-ray Instrumentation
 - Rotating anode (RU-H3R) Rigaku generator (1.54Å)
 - R-AXIS IV++ Rigaku x-ray detector
 - Rigaku X-stream for cryogenic (100K) data collection
 - 4DX Systems Microspectrophotometer for absorption measurements on single crystals
- Dynamic Light Scattering Instrument
 - DynaPro (Protein Solutions/Wyatt Technology) with temperature control
- Crystallization Instrumentation
 - Tecan Genesis liquid handler RSP 150/8 for crystallization well solutions preparations
 - TTP LabTech Mosquito for setting up crystallization drops
 - Imaging system for visualizing crystallization drops post set-up
- Data Workstations
 - Linux and Unix-based workstations with stereo 3-D capability for processing and visualization are available for investigator use.
- Data Storage and Archiving
 - A multi-Terabyte file system using swappable drives is available.

Synchrotron Access

The Carver College of Medicine has also invested a 1/10 share in the 4.2.2 synchrotron

beam line located at the Advanced Light Source in the Ernest Orlando Lawrence Berkley National Laboratory. The synchrotron is tuned to produce high intensity X-ray radiation and the beam line end station is setup to collect X-ray diffraction data to determine three dimensional structures of proteins that are hard to carry out at home. Reserved time is available at this remote facility and will enable researchers to carry out crystallographic structure determinations faster at much higher quality.

Fees and Billing

A complete list of Crystallography Facility fees is available upon request.

Contact Information

S. Ramaswamy, Ph.D., Director, Crystallography Core Facility
4-612 Bowen Science Building
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s-ramaswamy@uiowa.edu

Lokesh Gakhar, Ph.D., Manager, Crystallography Core Facility
4-611 Bowen Science Building
(319) 335-7671- ph
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Paul Rogers, B.S., Maintenance, Crystallography Core Facility
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Tissue Procurement Core

Facility Description

The goal of the Tissue Procurement Core Facility is to make available human tumor tissue for current cancer research studies and to store frozen human tumor tissue for current and future cancer research studies. The Core 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 pathological studies.

Guidelines

Investigators who are interested in obtaining human tissue samples from the Facility should begin by contacting Patricia Palechek (phone: 319-335-8211, pager: 3005, or e-mail: patricia-palechek@uiowa.edu). You will be asked several questions regarding tissue type desired and requirements regarding specimen preservation (fresh, frozen, formalin fixed, etc.) to determine whether appropriate samples are presently stored in the procurement archives. If appropriate samples are not available and the request will require prospective collection of tissue samples, Barry De Young, MD, Facility Director, will contact you to discuss issues pertaining to feasibility of collection.

All requests for tissue will ultimately require submission of a completed application form and a signed Usage Agreement form (forms available at the Facility website).

Completed applications will be forwarded for review to the Tissue Utilization Committee. The Committee will recommend approval or disapproval. Priority will be given to those studies that are supported by peer reviewed funding or foster collaborative work within the Cancer Center.

Contact Information

Barry R. De Young, M.D., Tissue Procurement Core Director

143 Medical Research Center

(319) 335-8211- ph

barry-deyoung@uiowa.edu

<http://www.uihealthcare.com/depts/cancercenter/research/tissueprocurement.html>

Transgenic Animal Facility

Facility Description & Services

The Facility has, as its prime purpose, provision of centralized instrumentation and expertise in the generation, breeding and analysis of transgenic animals in support of research initiated by collegiate investigators. The Facility functions by providing supplies, well-maintained equipment, and consultant expertise. The transgenic animal facility is a fee-for-service core facility of the Roy J. and Lucille A. Carver College of Medicine. The main goal of the facility is to generate and subsequently identify transgenic mice requested by investigators in the biomedical sciences at the University of Iowa and Iowa State University.

Animal breeding and husbandry is provided by an Animal Care Unit integrated directly into the transgenic facility with dedicated personnel experienced in the handling and maintenance of transgenic mice. An additional service includes the rederivation of transgenic strains from other institutions.

The Facility will be primarily concerned with providing the largest number of investigators with transgenic animals as needed for their research programs. Investigators, or staff whom they support, should prepare transgene constructs before submitting those constructs to the transgenic Facility for microinjection. User laboratories should be prepared to receive and maintain transgenic animals when delivered by the Facility. All investigators must have prior University Animal Care and Use Committee (IACUC) and Recombinant DNA approval for the experiments proposed and that approval must be on file with the Animal Care Unit and the Transgenic Facility Director.

The Facility staff will perform all manipulations required to generate transgenic animals for the investigator and will identify founder transgenic animals by PCR amplification using primers supplied by the user. The Facility will deliver a minimum of three to five independent transgenic founders per construct. Upon request, the Facility Director will provide consultation to investigators regarding the breeding of transgenic lines and will maintain, if the investigator so chooses, a database of breeding records. Progress reports will be maintained within the Facility relative to all ongoing projects, together with all data required for proper contribution of the Facility to published reports or grant applications by investigators.

Fees & Billing

A complete list of facility fees and discounts is available online at: www.medicine.uiowa.edu/transgenic.

Contact Information

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