The UMB Handbook of Core Facilities and Resources Supporting Basic, Clinical, and Translational Research

Fall - 2008

Imaging Core Facilities and Resources

Page 10 **Confocal Microscopy Core Facility (SOM)**
John Strong (410)-706-2665 HSF Room 548
jstrong@umaryland.edu
http://medschool.umaryland.edu/confocal/contact.asp

Page 11 **Confocal Microscopy Core Facility (SOP)**
Peter Swaan, Ph.D., Director (410) 706-0103 HSF II, Room 648
pswaan@rx.umaryland.edu

Page 12 **Electron Microscope Core Facility (SOD)**
Dr. Ru-ching Hsia (410)706-7992, Dental School, HHH Room 9202
rhsia@umaryland.edu
http://www.dental.umaryland.edu/Core-imaging

Page 13 **Imaging Core (SON)**
Chris W. Ward, Ph.D. (410) 706-3618
ward@son.umaryland.edu

Page 14 **Center for Fluorescence Spectroscopy (SOM)**
Joseph Lakowicz, Ph.D., Director (410) 706-8409
Chris Geddes, Ph.D., Associate Director (410) 706-3149
cfs@cfs.umbi.umd.edu
http://cfs.umbi.umd.edu/cfs/

Structural Biology Core Facilities and Resources

Page 16 **NMR Center (SOM/SOP)**
Kristin Varney (410) 706-6085 HSF-II Basement
kvarney@umaryland.edu
David Weber, Ph.D. (410) 706-4354
dweber@umaryland.edu
http://www.umaryland.edu/nmr

Page 18 **X-ray Crystallography Core Facility (SOP/SOM)**
Edwin Pozharski, Ph.D. (410)706-1097 HSF-II, Room 516
epozhars@rx.umaryland.edu
http://www.pharmacy.umaryland.edu/PSC/xray/

Page 20 **Mass Spectrometry Core Facility (SOP)**
Peter Swaan, Ph.D., Director (410) 706-0103 HSF II, Room 648
pswaan@rx.umaryland.edu

Genomic Technologies Core Facilities and Resources

Preclinical Assay Development Core Facilities and Resources

Page 35 **Flow Cytometry Core Facility (SOM/UMGCC)**
Dean Mann, MD (410) 706-8120 BRB 7-046
dmann001@umaryland.edu
http://www.umgcc.org/research/flow_cytometry.htm

Page 37 **Veterinary Resources (UMB)**
Louis Detolla, V.M.D., Ph.D. (410) 706-8537 MSTF, Room G100
detolla@vetmed.umaryland.edu
http://vetmedicine.umaryland.edu

Page 39 **Translational Core Facility (SOM/UMGCC)**
Joseph Bryant, Ph.D. - bryant@umbi.umd.edu
Mariola Sadowska, Ph.D. - msadowska2@ihv.umaryland.edu
http://www.umgcc.org/research/translational_core_lab.htm

Page 41 **Cellular Physiology Core Facility (SON)**
Chris W. Ward, Ph.D., Director (410) 706-3618
ward@son.umaryland.edu
Susan G. Dorsey, Ph.D., Co-Director (410) 706-7250
sdorsey@son.umaryland.edu

Page 42 **Small Animal Physiology Core Facility (SOM)**
Ling Chen, MD, Ph.D. (410) 706-4920 MSTF, Room 8-16
lchen@medicine.umaryland.edu
http://medschool.umaryland.edu/smallanimal/default.asp

Page 44 **Mouse Functional and Behavioral Core Facility (SON)**
Susan Dorsey, Ph.D., Co-Director (410) 706-7250 SON 764
sdorsey@son.umaryland.edu

Page 45 **Cytokine Laboratory (SOM)**
Jeff Hasday, MD (410) 706-1508 MSTF, Room 8-61
jhasday@umaryland.edu
http://www.cytokines.com

Page 47 **Stem Cell Technology Core Facility (SOM)**
Valerie Stewart (410) 706-0454 Howard Hall, Room 582
vstewart@som.umaryland.edu
http://medschool.umaryland.edu/orags/transgenic/

Drug Development Core Facilities and Resources

Basic and Clinical Science Resources

Page 59 **Histology Core Facility (SOM/CVID)**
Elizabeth Smith, HT, QIHC (410) 706-8185 Biopark I, Room 330
esmith@som.umaryland.edu

Page 61 **Biostatistics Core Facility (SOM/UMGCC)**
Ming Tan, Ph.D. (410) 328-8505 MSTF, Room 261
mtan@umm.edu
http://www.umgcc.org/research/biostatistics.html

Page 63 **Bioinformatics Core Facility (SOM)**
Mark Pohl (410) 706-2060 Howard Hall, Room 124
mpohl@som.umaryland.edu
http://medschool.umaryland.edu/departments/bicore/

Page 65 **Pharmaceutical Research Computing (SOP)**
Ilene Zuckerman, PharmD, Ph.D. (410) 706-3266
Health Services Research, Saratoga Street Garage
izuckerm@rx.umaryland.edu

Page 66 **Cell Biological Core Facility (SON)**
Cynthia L. Renn, Ph.D. (410) 706-5736
renn@son.umaryland.edu

Page 67 **Molecular Diagnostics Laboratory (SOM)**
Richard Y. Zhao, Ph.D. (410) 706-6300
rzhao@som.umaryland.edu

Resources for Research and Compliance

Page 69 **BIORESCO**
Carol McKissick (410) 706-0322 Howard Hall, Room 664
freezer@umaryland.edu
http://cf.umaryland.edu/freezer

Page 71 **Office of Research and Graduate Studies (SOM)**
Susan Hobbs (410) 706-5485 BRB 14-021
shobbs@som.umaryland.edu Fax (410) 706-4958
http://medschool.umaryland.edu/orags

Page 72 **Research Career Development Program**
Stacie Small (410) 706-5434 BRB 14-021
ssmall@som.umaryland.edu Fax (410) 706-3103
Wendy Sanders, MA (410) 706-5434
wsanders@som.umaryland.edu

Page 73 **Center for Clinical Trials (CCT) (SOM)**
Patrice Holtz (410) 706-2328 HSF-I, Room 196
cct@som.umaryland.edu
http://medschool.umaryland.edu/cct

Page 74 **Animal Care and Use Office (ACUO) (SOM)**
Angela Peiser (410) 706-4365 HSF-1, Room 146
acuo@som.umaryland.edu
http://medschool.umaryland.edu/orags/acuo

Page 75 **Human Research Protections Office (HRPO) (SOM)**
Susan Buskirk (410) 706-5037 Biopark I, Suite 100
hrpo@som.umaryland.edu
http://medschool.umaryland.edu/orags/hrpo

Page 77 **Veterinary Resources**
Louis Detolla, V.M.D., Ph.D. (410) 706-8537 MSTF, Room G100
detolla@vetmed.umaryland.edu
http://vetmedicine.umaryland.edu

Page 78 **General Clinical Research Center (GCRC) (SOM)**
Margaret Testa (410) 328-7368 UMMC, 10th floors Wings C, D
mtesta@medicine.umaryland.edu
http://medschool.umaryland.edu/gcrc

Page 80 **Office of Research and Development (UMB)**
James L Hughes, Vice President
110 South Paca Street, 4th floor
(410) 706-6723 [Fax: (410) 706-1066]
http://www.ord.umaryland.edu

Page 81 **Environmental Health and Safety Office (UMB)**
James J. Jaeger, Ph.D., Director
714 West Lombard St.
(410) 706-7055 Fax: (410) 706-8212
After Hours Emergency, Contact University Police at 711
http://www.ehs.umaryland.edu

Page 81 **Center on Drugs and Public Policy (SOP)**
Francis Palumbo, Ph.D., J.D. (410) 706-0133
Saratoga Street Garage
fpalumbo@rx.umaryland.edu

Resources for Faculty Development and Education

Page 82 **Multidisciplinary Clinical Research Career Development Program (K12) (SOM)**
Laura Bell-Martin, Academic Coordinator MSTF, Room 314
lmartin@medicine.umaryland.edu (410) 706-6283
http://medschool.umaryland.edu/careerdev/index.asp

Page 83 **Building Interdisciplinary Research Careers in Women's Health Program (BIRCWH K12) (SOM)**
Istvan Merchenthaler, MD, Ph.D., D.Sc. Program Director
imerchen@epi.umaryland.edu (410) 706-1350
http://www.umaryland.edu/womenshealth/BIRCWH/index.html

Page 83 **MD/Ph.D. Program (SOM)**
Terry B. Rogers, Ph.D. (410) 706-3990 HSF-I, Room S-012
trogers@som.umaryland.edu
http://mdphd.umaryland.edu

Page 84 **Combined DDS-Ph.D. Program**
Norman Capra, Ph.D. (410) 706-4219
ncapra@umaryland.edu

Page 85 **Graduate Program in Life Sciences (UMB)**
Margaret McCarthy, Ph.D., Assistant Dean for Graduate Studies (410) 706-6041
Tom McHugh, Program Director, Graduate Program in Life Sciences tmchugh@som.umaryland.edu (410) 706-6041
http://lifesciences.umaryland.edu

Page 86 **Faculty Affairs and Professional Development (SOM)**
Nancy Ryan Lowitt, MD, EdM, Associate Dean for Professional Development nlowitt@som.umaryland.edu (410) 706-8633
Robertha Simpson, Academic Coordinator
rsimpson@som.umaryland.edu (410) 706-8631
http://medschool.umaryland.edu/opd/

Page 87 **Maryland Poison Center (SOP)**
Bruce Anderson, PharmD. Director (410) 706-7604
Saratoga Street Garage
banderso@rx.umaryland.edu

Page 87 **Office of Substance Abuse Studies (SOP)**
Anthony Tommasello, PharmD, Ph.D. Director (410) 706-7513
Saratoga Street Garage
atommase@rx.umaryland.edu

Page 87 **Internet Drug Information Center (SOP)**
Bruce Anderson, PharmD. Director (410) 706-7604
Saratoga Street Garage
banderso@rx.umaryland.edu

Page 87 **Peter Lamy Center on Drug Therapy and Aging (SOP)**
Bruce Stuart, Ph.D. Director (410) 706-5389
Saratoga Street Garage
bstuart@rx.umaryland.edu

Page 88 **Office of Information and Learning Technologies (SON)**
Roger Falsis (410) 706-0658
falsis@son.umaryland.edu

Page 90 **Clinical Simulations Laboratory (SON)**
Regina Twigg, MS, RN (410) 706-7898
rtwigg@son.umaryland.edu

Page 91 **Education Support Services, Office of Medical Education (SOM)**
Kevin Brown (410) 706-6613 MSTF, Room 334
kbrown@clc.umaryland.edu
http://ome.umaryland.edu

Imaging Core Facilities and Resources:

Confocal Microscopy Core Facility (SOM)

Scientific Objectives:
The aims of the Confocal Core are to offer state-of-the-art microscopy and imaging capabilities to campus researchers, and to help improve the microscopy-related skills of these scientists. Since the core was founded 10 years ago, 230 researchers have participated in the individual 4-hour training session required to operate the Zeiss LSM410 confocal microscope system, which has been the core's primary instrument. The user group represents 28 campus departments, and includes scientists from the Schools of Medicine, Dentistry, Nursing and Pharmacy, as well as other units on campus, including the MBC, IHV, and VA. The large majority, however, has been faculty, students and staff in the School of Medicine. The facility has been extremely active, with nearly 10,000 hours of use since its inception.

Instrumentation:
The new Zeiss LSM 510 META is a hyperspectral confocal microscope. It can separate fluorophores with overlapping emission spectra based on their spectral signatures, by measuring up to 32 emission wavelength bands. It also has a Ti:S laser for multiphoton applications in addition to 453, 488, 514, 543, and 633 excitation laser lines.

Personnel:
The Facility for Confocal Microscopy is managed by it's Director, who is responsible for maintaining the instrument, training new users, consulting with researchers regarding the technical aspects of sample preparation, advanced confocal techniques, data analysis, etc.

Training:
Individuals who require the instrument go through a basic training module, supplemented by various advanced modules for special techniques. These sessions, which are performed one-on-one, are arranged by appointment. The basic module is an 4-6 hour session that covers a) start-up procedures (5 min); b) description of optical path (60 min), which includes function of components, discussion of detector pinhole operation and parameters (size, alignment), concepts of numerical aperture and spatial sampling, signal optimization and spectral overlap problems; c) software and imaging (90 min), including image optimization, noise reduction, factors affecting resolution and choice of laser power, and image analysis; d) a free-time session (30 min), in which users operate the instrument independently to experiment with the various controls and prove to themselves that they are capable of operating the instrument without supervision; e) pinhole alignment (20 min), and introduction to 3D reconstruction. The session also addresses specimen preparation, and users are expected to supply samples so their suitability for confocal techniques can be assessed. The session is high-paced, but we have developed a series of training aids to ensure that the concepts are understood. According to the requirements of the investigator, additional training modules are available for z-series and 3D reconstruction, multicolor confocal microscopy, laser scanning DIC and interference reflection imaging, microscopy of living cells using the water immersion objective, high speed and xt scanning, and image analysis. We have created a 30-page "Users Guide", which provides specific instructions for operating the instrument (see website). This document is supplemented by a series of handouts that cover various advanced aspects of confocal microscopy.

Contact Information, location, hours of operation:

Zeiss 410	Howard Hall 433	Available 24/7
Zeiss 510	Howard Hall 525F	Available 24/7

Pricing:

Zeiss 410: $500.00 training (includes first five hours of scope time and must be used Within 30 days of training), $35.00 per hour.

Zeiss 510: $500.00 Training, $40.00 per hour (New service, price may be subject to change)

Oversight Committee Members:

Bloch, Robert J. (Physiology)
Lederer, W. Jonathan (MBC)
Pallone, Thomas L. (Nephrology)
Rizzo, Mark A. (Physiology)
Wade, James T. (Physiology)

Contact:
John Strong – (410) 706-2665 jstrong@umaryland.edu
http://medschool.umaryland.edu/physiology/confocal/contact.asp

Confocal Microscopy Core Facility (SOP)

A fluorescence microscopy and confocal laser scanning microscopy (CLSM) core facility is housed in the School of Pharmacy. The CLSM unit is a Nikon C1 tethered to an E800 upright and a TE2000E fully motorized microscope. The C1 can be used for most confocal applications with a wide choice of fluorochromes, such as "green" fluorescence protein (GFP) imaging, time-lapse experiments, (co-)localization studies and live-cell imaging. The C1 confocal system scans 4 channels (3 fluorescence and 1 transmitted light) simultaneously, and consists of an Argon laser (488nm) for detection of FITC, BODIPY, GFP, and Oregon Green dyes, and two Helium Neon lasers (Green (543 nm) for detection of TRITC, PI; and Yellow (594nm) for Texas Red.

Contact information:
Peter Swaan, Ph.D., Director (410) 706-0103 HSFII, Room 648
pswaan@rx.umaryland.edu

Electron Microscopy Core Facility (SOD)

Objectives:
To provide faculty and students with low cost access to high performance transmission electron microscopy (TEM) and scanning electron Microscopy(SEM).

Applications:
- Negative Staining to visualize viruses, assembly of filaments, characterize membrane preps.
- Immunolocalization using colloidal gold to localize antibodies to specific components.
- Thin section structural analysis
- High Vacuum, Low vacuum and Environmental SEM analysis
- Cryo-SEM

Instrumentation:
- FEI Tecnai T12 transmission electron microscope with sample tilt and rotation capability
- FEI Quanta 200 scanning electron microscopy with HV,LV, ESEM and Cryo capability
- Gatan Cryo-transfer unit ALTO 2100
- Reicher Jungs Ultramicrotome
- Sputter coater
- Vacuum evaporator
- Critical Point Dryer

Personnel:
Dr. Ru-ching Hsia is PI and director of the facility.
Mr. John Strong and Ms. Tatyanna Pozharskaya are the research assistants

Contact Information and to schedule training:
Dr. Ru-ching Hsia (410)706-7992, Dental School, HHH Room 9202
rhsia@umaryland.edu

Pricing:
Training sessions for scope operation and EM techniques, $250/session
Electron microscope usage, $100 /hr (all digital images, no additional negative and developing charges)
Technical assistance, $60/hr
Year- long contracts for EM-intensive projects are available

Faculty Advisory Committee:
Dr. Patrik M. Bavoil, Chairman and Associate Professor of Microbial Pathogenesis, SOD
Dr. James Kaper, Chairman and Professor of Microbiology, SOM
Dr. Hiroaki Misono, Assistant Professor of Neural and Pain Sciences, SOD
Dr. Adam Puche , Associate Professor of Anatomy and Neurobiology, SOM
Dr. James B. Wade, Professor of Physiology, SOM

Please visit our web site for more information:

http://www.dental.umaryland.edu/Core-imaging

Imaging Core (SON)

Instrumentation:

1) BioRad Radiance 2100 confocal microscope on an Olympus IX-70 inverted microscope.
2) CCD-based epifluorescent imaging system on an Olympus IX-50 microscope.
3) Olympus IX-51 upright microscope with fluorescence capacity and Olympus DP70 12.5 megapixel color digital camera for image acquisition.

Contact:

Chris W. Ward, Ph.D., Director (410) 706-3618
ward@son.umaryland.edu

Center for Fluorescence Spectroscopy (SOM)

The Center for Fluorescence Spectroscopy (CFS) provides state-of-the-art time-domain and frequency-domain fluorescence instrumentation in studies of the structure, function, and dynamics of biological macromolecules. The CFS is supported by the National Center for Research Resources in the National Institutes of Health, with additional support from the University of Maryland School of Medicine, Medical Biotechnology Center, and the University of Maryland Baltimore Graduate School. The staff of the CFS offers an annual week-long course on the "Principles and Applications of Time-Resolved Fluorescence". This course is taught at the CFS in the beginning of each year. The CFS announces free time-domain and frequency-domain fluorescence lifetime analysis software for IBM PCs.

Research Emphases include:

1. Basic Fluorescence Spectroscopy
   - -Probe Chemistry
   - -Light Quenching
   - -Multi-Photon Excitation
2. Biochemical and Biomedical Applications
   - -Fluorescence Sensing
   - -Fluorescence Lifetime
   - -Imaging Microscopy
3. Related Projects
   - -Multi-Pulse Fluorescence
   - -Microsecond Dynamics of Macromolecules
   - -Radiative Decay Engineering

Instrumentation:

The CFS provides access to state-of-the-art time-domain (TD) and frequency-domain (FD) fluorescence instrumentation for time-resolved studies of biological macromolecules. The excitation sources are cavity-dumped and frequency-doubled ps dye lasers, or a Ti:Sapphire laser. Time-correlated single photon counting (TCSPC) is accomplished with a microchannel plate (MCP)-PMT, to provide an instrument response function near 60 ps. Frequency-domain measurements are possible up to 10 GHz using the Center's FD instrument, and a high speed MCP-PMT. Available excitation wavelengths range from UV to NIR. For less demanding applications modulated cw lasers (for FD) are available. A unique capability of the CFS will be the ability to collect and analyze both TD and FD data for the same samples, and in the future, simultaneous dual-domain (DD) analysis of the data. A Ti:Sapphire laser is now available for two-and three-photon excitation.

Novel instruments are under development for fluorescence lifetime imaging microscopy (FLIM) and for cell-by-cell lifetime measurements in flow cytometry. A FLIM instrument with a red sensitive image intensifier will soon be available for photon migration imaging of tissues and turbid objects.

Access:

Access to the CFS can be obtained by submission of a brief proposal which describes the project, its objectives, and the types of measurements required. Potential users are encouraged to consult with CFS prior to preparation of their proposals and for assistance with experimental design. The proposals will be reviewed and the individual contacted by CFS personnel within two weeks. Scheduling of experiments will be based on need, special

requirements for the experiment, and other relevant factors. For efficient use of instrument time, CFS staff will request to see the steady-state emission and absorption spectra of all samples, with appropriate blank controls, prior to scheduling and initiation of the time-resolved measurements.

Contact:

Michael Johnson, Ph.D. University of Virginia (804) 924-8607, email for software (mlj8e@virginia.edu)
Kazimierz Nowaczyk, Ph.D. Network Administrator (410) 706-7500 (kazik@cfs.umbi.umd.edu)
Mary Rosenfeld (410) 706-8409 (mary@cfs.umbi.umd.edu
Chris D. Geddes, Ph.D., Associate Director (410) 706-3149 (chris@cfs.umbi.umd.edu)
Joseph R. Lakowicz, Ph.D., Director (410) 706-8409

Structural Biology Core Facilities and Resources:

NMR Center (SOM/SOP)

Brief History:
The NMR center opened in October of 1996 with a 600 MHz NMR spectrometer in HSF I. In August of 2003, specially designed space to receive this spectrometer and an additional 800 MHz spectrometer was made available. In addition, cryoprobes were installed on both instruments once the spectrometers were in place.

Objectives:
The UMB NMR center will promote the use of Nuclear Magnetic Resonance Spectroscopy for use in research projects at the University of Maryland School of Medicine. The major objective of this center is to make sophisticated methods in NMR spectroscopy available to Principal Investigators at the University of Maryland, Baltimore in order to enhance their research efforts.

Personnel:
Dr. David J. Weber is the Director of the facility and Dr. Kristen Varney is the manager of the facility and she runs the day-to-day operation of the NMR facility that includes both 600 and 800 MHz spectrometers equipped with cryogenic probes.

Users Policies:
The Facility manager, Dr. Kristen Varney, oversees all of the users' policies for data collection and scheduling NMR time. All investigators who wish to use the NMR facility are required to give information pertinent to their NMR usage to Dr. Varney. Authorization is required for all users who wish to operate the 600 or 800 MHz NMR spectrometers. Authorization will be given for use of higher field strengths only when it is demonstrated that data collection at the lower fields are insufficient. The facility manager will recommend this authorization to the committee chairman (Dr. Weber) prior to data collection. Dr. Varney keeps both NMR spectrometers in good working condition, trains users, manages the NMR facility billing and ordering, and performs NMR related research.

Pricing:

800 MHz	$9500/500 hrs $2500/100 hrs $80/individual hr
600 MHz	$9500/667hrs $2500/133hrs $60/individual hr
Set-up fee	$200 for 3hrs or less, $50/each additional hour
New Users	50 hr ($3000-4000) grant available for new users to set-up/optimize conditions of promising new proteins

NMR time is scheduled in 24 hour (minimum) increments
Updated pricing is always listed on the NMR facility website (http://www.umaryland.edu/nmr).

What we suggest to start an NMR project:

1. Expression System/Cell types (need to grow on defined/minimal media):
   BL21(DE3)
   HMS174(DE3)
   We typically use pET expression vectors, but others are available
2. Appropriate Buffers:
   Tris (needs to be d11-deuterated for homonuclear proton only data; i.e. 2D NOESY etc) Hepes (only good for heteronuclear data; keep at 10-20 mM) Phosphate (good for proton only data and heteronuclear data)
   Deuterated buffers are also available for proton only data (i.e. 2D NOESY etc)
   If you have questions about a buffer, just give us a call**
3. Sample Conditions:
   Protein Concentration:
   We recommend a protein concentration of between 0.2mM - 2mM (less than 0.2mM is possible for some experiments, if necessary). Proteins larger than 10 kDa need to be ^{15}N and/or ^{13}C-labeled.
   Sample Volume: Samples need to be 600ul if using a standard NMR tube, or no less than 300ul if using a Shigemi tube D_2O:
   The final NMR sample must contain between 5% and 10% D_2O
   Salt Concentrations: Try to keep this LOW, if possible (<100mM total ionic strength)
4. Things to buy:
   Sample Tubes:
   Shigemi
   Wilmad

   Labeled Isotopes (^{13}C and/or ^{15}N):
   CIL for ^{13}C-glucose
   CIL for 15N-ammomium sulfate
   CIL for D20

   For questions contact Drs. Weber or Varney and/or see the NMR website:

Oversight Committee:
Dr. David Weber, Chair
Dr. Kristen Varney
Dr. Frank Margolis
Dr. John Hamlyn
Dr. James Nataro

Contact:
Kristen Varney (410) 706-6085 HSFII Basement
kvarney@umaryland.edu
David Weber, Ph.D. (410) 706-4354
dweber@umaryland.edu
http://www.umaryland.edu/nmr

X-ray Crystallography Core Facility (SOP/SOM)

Scientific Objectives:

The unique information derived from protein structure determination acts as an accelerant for subsequent biochemical studies. Thus, collaborating scientists create a cycle of structure determination and biochemistry that pushes their research forward. There exists a similar relationship with the field of computer-aided drug design (CADD), because the structural techniques are the most direct way to assess potential new drugs at the molecular level and subsequently improve there efficacy. The x-ray crystallography shared service will be most valuable in helping the Marlene and Stewart Greenebaum Cancer Center (GCC) research community bring into focus the molecular bases of defects in the machines that govern our cellular well-being and the development of drugs that combat a variety of diseases.

Personnel:

Franz St. John, Ph.D. Dr. St. John currently coordinates the activities of the X-ray Crystallography Shared Resource. Dr. St. John has extended experience as an x-ray crystallographer and is familiar with maintenance of x-ray equipment. He is also an expert in protein crystallization and has great skills in protein crystal manipulation and various aspects of cryocrystallography. As the manager of the x-ray shared service facility, Dr. St. John is responsible for both the administrative and technical operation of the resources provided by the facility. More specifically, he determines the schedule for use of the x-ray equipment, bills users for services rendered, and ensures that the equipment, including computers and their associated software packages, is properly maintained. He is also responsible for training new users on the x-ray equipment and assisting them in the structure solution process from the beginning (i.e. obtaining crystals) to the end (i.e. a final model worthy of publication). Dr. St. John has valuable expertise in data collection procedures at synchrotron facilities, both on-site and remote. Finally, he will ensure that radiation safety guidelines are strictly enforced at all times. Dr. St. John will thus serve as the primary interface between the x-ray facility and the scientific community at the Greenebaum Cancer Center, helping to guide users through the often daunting steps that turn crystals into a finished structure that helps to answer pressing scientific questions.

The decisions regarding the day-to-day operations of the x-ray crystallography shared resource are made by an internal oversight committee comprised of Drs. Eric Toth and Averell Gnatt and Edwin Pozharski. This committee meets monthly with the facility manager Dr. Hu present to discuss pressing issues pertaining to the shared resource. Their qualifications and distinct roles (in addition to their collaborative efforts on devising an operational strategy for the shared resource) are detailed below:

Eric A. Toth, Ph.D. Dr. Toth is an Assistant Professor in the Department of Biochemistry and Molecular Biology and a member of the Cancer Center's Molecular and Structural Biology program. He has worked in the field of protein crystallography for 12 years on a variety of protein systems, including adenylosuccinate lyses, DNA polymerases, and helicases. Dr. Toth has extensive experience in *de novo* protein structure determination from both data collected using standard in-house diffraction equipment and cutting edge technologies used at synchrotron facilities. Dr. Toth also has a keen interest in the computational aspects of protein crystallography and has therefore been charged with designing and overseeing the computational infrastructure of the shared resource. To

ensure that adequate disk space for all users is available and easy to manage, the shared resource purchased a 4 terabyte file server, which is currently managed by Mark Pohl, the director of the University's Bioinformatics Core Facility.

Edwin Pozharski Ph.D, Dr. Pozharski is an Assistant Professor in the Department of Pharmaceutical Sciences in School of Pharmacy. Trained in molecular biophysics, he has been working primarily in the field of protein crystallography since 2001. Dr Pozharski has extensive experience with all aspects of protein structure determination. Research in his laboratory aims at understanding of structural basis of molecular recognition, its relationship to protein function and protein dynamics. Since X-ray core facility is adjacent to his laboratory, Dr Pozharski often contributes to user support. He also maintains the protein crystallization service available at the core facility.

Averell L. Gnatt, Ph.D, Dr. Gnatt is an Assistant Professor in the Departments of Pharmacology and Experimental Therapeutics and Pathology and a member of the Cancer Center's Molecular and Structural Biology program. In addition to his training in neurobiology, Dr. Gnatt has 16 years of experience as a protein crystallographer. His focus has been primarily on the structure of the eukaryotic transcription machinery. Because of the enormity of the RNA Polymerase II complexes that Dr. Gnatt studies, he has extensive experience with data collection problems posed by large macromolecular complexes with regards to in-house equipment and synchrotron facilities.

Services:
The X-ray Crystallography Shared Service provides the following services to investigators:
* protein crystallization
* High throughput crystallization screening (~400 conditions)
* X-ray characterization of crystals
* data collection
* processing and quality analysis of data
* structure determination

Instrumentation:
* Rigaku-MSC Micromax 7 generator equipped with a Raxis-4++ image plate detector
* Oxford Cryosystems Cryocooler
* Crystal manipulation accessories, such as microscope with attached camera for crystal viewing/documentation
* Computer suite for data analysis and structure determination
* Popular x-ray diffraction data processing software suites, such as HKL2000, CCP4, CNS, and O.

Contact:
Franz St. John, Ph.D. (410) 706-1124 HSF-II, Room 514
fjstjohn@rx.umaryland.edu
http://www.pharmacy.umaryland.edu/PSC/xray

Pricing:
University of Maryland usage fees are presented below. Outside users should contact the

X-ray core manager for pricing. Users can also work in collaboration with an X ray core member by contacting the member or the core manager directly.

Use of the Facility for authorized personnel	$50/hour; $100 maximum per day
Annual "unlimited"* diffraction use	$1,500 per year
Training by our staff	$50/hour, $25 subsequent fee (one hour minimum)
Crystal growth screening (low throughput)	$25/hour + materials
Crystal growth screening (high throughput)	$28 per plate
Optimization of Crystal Growth	$25/hour + materials
Crystal Diffraction Screening	$25/hour
X-ray Data Collection	Same as use of the facility
Data analysis	$25/hour
Protein Purification	Contact us
Other Services	Contact us

*Unlimited use is defined by the terms of the annual usage agreement.

Mass Spectrometry Core Facility (SOP)

The School of Pharmacy has a centralized Mass Spectrometry facility housed in the new Health Sciences Facility II which can be employed to readily determine the molecular mass of novel small molecules as well proteins and DNA resulting from proteomics studies. The central facility is equipped with a liquid chromatography mass spectrometer (LC/MS) and a matrix-assisted laser desorption ionization time-of-flight (MALDI-TOF) spectrometer. The Thermo Finnigan LCQ LC/MS is ideally suited for the quantitative analysis of small molecules (up to 2 kDa) in biological liquids and molecular mass determination of novel chemical entities, such as synthetic molecules resulting from a drug discovery program. The Bruker Daltonics OmniFlex™ MALDI-TOF is a mass spectrometer with reflectron and post-source decay (PSD) capabilities. This equipment can be employed to determine small molecule, protein-protein, protein-DNA and protein-RNA interactions.

Contact Information:
Peter Swaan, Ph.D., Director (410) 706-0103 HSFII, Room 648
pswaan@rx.umaryland.edu

Proteomics Core Facility (SOM)

Scientific Objectives:
The mission of the Proteomics Core Facility is to promote the understanding and use of the study of Proteomics strategies by placing the most modern gel electrophoresis, Mass Spectrometry and bioinformatics protein analysis tools into the hands of researchers. We strive to provide a central resource that is available for consultation regarding the investigator's particular research, as well as to provide an environment that fosters education, sharing of ideas and experimental knowledge. The Proteomics Core Facility is available for specialized and routine analysis of proteins and peptides.

Personnel:
Dr. Austin Yang is the Faculty Director and serves as advisor in all technical and scientific matters of the Core. He will also interview researchers with specific needs such as post-translational modifications as it relates to experiment design and or writing grant applications. Dr. Yang is Associate Professor of Anatomy and Neurobiolgy at the University of Maryland Medical School. Dr. Yang has most recently served as an Associate Professor of Pharmaceutical Sciences at the University of Southern California (USC). He completed his doctorate and post-doctorate degrees in Biological Sciences from the University of California, Irvine. Currently his group studies the effects of protein oxidation and post-translational modifications on the assembly of protein complexes and cell signaling during the course of aging and Alzheimer's disease. This research has obvious ramifications to cancer and carcinogenesis. In addition to his research, Dr. Yang spends a great deal of time advising Core personnel and researchers in areas such as experimental design and proper proteomics language in grant applications. His expertise in post-translational modifications, in particular phosphorylation is invaluable for researchers interested in detection of phosphoproteins and site-specific phosphorylation.

Dr. Nandakumar Madayiputhiya (Nandakumar MP) is a full time Research Specialist responsible for 2-D gel electrophoresis, gel imaging and differential protein expression in gels using Z3 software (Compugen). Dr. Nandakumar MP is also responsible for developing/adapting/optimizing protocols for investigators with new samples. He is also responsible for the MALDI-TOF mass spectrometer and for searching databases with data obtained from the ion trap instruments. This includes using, as necessary, websites that allow for the determination of homology and other protein variations. He also operates the Xcise robot, which picks protein spots from gels and processes them for MS analysis. In addition, he performs all in-gel and in-solution digestions, operates and maintains our state-of-the-art FPLC protein purification system.

Dr. Yunhu Wan is the core's bioinformaticist. He provides support in the area of protein identification; by training Core personnel, investigators and by running the software himself. He is very much involved in the cutting edge of bioinformatics by writing programs that help localize the site of phosphorylation in peptides thereby improving the speed with which these results can be achieved.

Instrumentation:

One and Two Dimensional Gel Electrophoresis: We offer state-of-the-art equipment from Proteome Systems Technologies, which is fully compatible with all the rest of the high-throughput platform. This includes a Shimadzu Xcise robot, which excises, digests, cleans up the proteins from the gel, deposits them on an x,y sample platform and adds the matrix as required for automated MALDI analysis.

Matrix-Assisted Laser Desorption Time-of-Flight Mass Spectrometer: The Axima MALDI-TOF mass spectrometer from Kratos/Shimadzu provides a combination of high-mass accuracy, high resolution and high sensitivity. The MS includes high-throughput sample handling using a 384-spot microtiter sample format MALDI target on an x,y stage, mass correlated acceleration and a curved field reflectron. Bioinformatics will provide protein identification based on proteolytic peptide maps.

Finnigan ProteomeX Ion Trap Spectrometer interfaced via Electrospray, and offering tandem mass spectrometry capability and TurboSEQUEST software for protein bioinformatics. This is a high-throughput system with reverse phase columns for rapid MS/MS analysis of peptides and, thereby, identification of proteins in mixtures.

Finnigan LTQ-Orbitrap offers a tremendous advantage because of its m/z accurate measurements, down to 10-2 ppm. This accuracy becomes of great advantage when trying to detect much less abundant peptides and proteins as well as when trying to determine site specific post translational modifications.

AKTA FPLC Protein Purification System from Amersham is a biocompatible, high-performance liquid chromatography system especially designed and proven worldwide for fast and easy purification of proteins on a wide variety of columns.

Compugen Z3 Software for analysis of gel arrays. This is state-of-the-art software to facilitate digitization, annotation and quantitative comparisons of gel arrays.

Contact:
Austin Yang, Ph.D. (410) 328-7588 Bressler 7-033
ayang@som.umaryland.edu
http://www.umgcc.org/research/proteomics.html

Edman Sequencing/Protein Analysis Core Facility (SOM)

Objective:
The Edman Sequencing and Protein Analysis Core provides services for the structural analysis of polypeptides for investigators in the Center for Vascular and Inflammatory Diseases and for investigators in the greater University's scientific community. Automated Edman degradation is used to obtain n-terminal amino acid sequence information from as little as several picomoles of purified proteins or peptides. When the sample contains impurities, gel electrophoresis followed by blotting onto PVDF membranes and staining with Coomassie blue can be used to isolate the protein band under study. The Core uses mass spectrometry to determine the identity of proteins following proteolytic digestion in-gel or in-solution when sufficient material is not available for Edman sequence analysis or when the n-terminus is chemically blocked. This highly sensitive technique can routinely identify gene products with as little as twenty femtomoles.

Applications of Edman sequencing include: confirmation of the n-terminus of recombinant protein constructs, identification of proteolytic cleavage sites e.g. when mapping functional domains, determining the sites of novel posttranslational proteolytic processing, and general protein identification. Additionally there are a number of modified or unusual amino acids that can be identified by Edman sequencing.

Applications using mass spectrometry are currently being expanded to include identification of binding partners e.g. ligand fishing and members of protein complexes micro-recovered from surface plasmon resonance experiments performed on Biacore chips, and analysis of certain post-translational modifications refractory to identification by Edman sequencing such as phosphorylation and glycosylation.

Instrumentation:
Applied Biosystems 494 HT automated Edman sequencer
Thermo Finnigan LCQ Advantage ion trap mass spectrometer
Waters Alliance 2695 HPLC
Waters 2996 Photodiode array detector
Applied Biosystems 140B microbore HPLC
BioRad Protean IEF Cell

Contact Information:
Brian Hampton – Program Director
Location: BioPark One Room 307 (Lab) Room 314 (office)
V: 410-706-8207
F: 410-706-8234
Email: bhampton@som.umaryland.edu

Pricing:

n-Terminal sequence analysis	$150
LC/MS protein identification	$150
SPR/LC/MS protein identification	$250*
**Price does not include Biacore chip or coupling reagents.*	
SDS-PAGE/PVDF blotting	$50
SDS-PAGE/In-gel digest	$50
HPLC w/manual fraction collection	$75

Publications that demonstrate our capabilities:

1. Tran, H., Pankov, R., Tran, S. D., Hampton, B., Burgess, W. H. and Yamada, K. M. (2002). **Integrin clustering induces kinectin accumulation.** J Cell Sci 115, 2031-40.
2. Xue, L., Tassiopoulos, A. K., Woloson, S. K., Stanton, D. L., Jr., Ms, C. S., Hampton, B., Burgess, W. H. and Greisler, H. P. (2001). **Construction and biological characterization of an HB-GAM/FGF-1 chimera for vascular tissue engineering.** J Vasc Surg 33, 554-60.
3. Xue, L., Shireman, P. K., Hampton, B., Burgess, W. H. and Greisler, H. P. (2000). **The cysteine-free fibroblast growth factor 1 mutant induces heparin-independent proliferation of endothelial cells and smooth muscle cells.** J Surg Res 92, 255-60.
4. Shireman, P. K., Hampton, B., Burgess, W. H. and Greisler, H. P. (1999). **Modulation of vascular cell growth kinetics by local cytokine delivery from fibrin glue suspensions.** J Vasc Surg 29, 852-61; discussion 862.
5. Carreira, C. M., LaVallee, T. M., Tarantini, F., Jackson, A., Lathrop, J. T., Hampton, B., Burgess, W. H. and Maciag, T. (1998). **S100A13 is involved in the regulation of fibroblast growth factor-1 and p40 synaptotagmin-1 release in vitro.** J Biol Chem 273, 22224-31.
6. Wong, P., Hampton, B., Szylobryt, E., Gallagher, A. M., Jaye, M. and Burgess, W. H. (1995). **Analysis of putative heparin-binding domains of fibroblast growth factor-1. Using site-directed mutagenesis and peptide analogues.** J Biol Chem 270, 25805-11.
7. Donohue, P. J., Alberts, G. F., Hampton, B. S. and Winkles, J. A. (1994). **A delayed-early gene activated by fibroblast growth factor-1 encodes a protein related to aldose reductase.** J Biol Chem 269, 8604-9.

BIACore Core Facility (SOM)

Scientific Objectives:
Our main scientific objective is to provide the faculty, staff and students in the School of Medicine with the latest technology for the quantitative study of real-time binding interactions, specifically with an approach that is versatile, highly sensitive, and "user friendly", with molecules that are label-free. The instrument we selected for this purpose is the Biacore 3000 Biosensor, which utilizes the optical method of surface plasmon resonance (SPR) to measure binding interactions. Using this instrument, the core and its staff can now provide accurate determinations of "on" and "off" rates for binding reactions, and, of course, the determination of affinity (association and dissociation) constants for binding. As it uses SPR, the instrument can effectively study interactions between a wide variety of molecules, including proteins, antibody-antigen, nucleic acids, lipids, peptides, drugs, as well as molecules as small as 360 Daltons. Speed, reproducibility and small sample consumption are hallmarks of experiments that utilize Biacore technology, making the core cost effective for all users.

Policy:
The policies for the use of the facility, and relevant charges, are as follows:

1. A journal entry transfer of $1000 is required before any experiments are performed.
2. Users are only allowed to make "hands-on" use of the Biacore if they have been properly trained by Biacore through the Biacore Basics class and have had enough experience that the core personnel feels comfortable that the instrument will be used without harm. (The microhydraulics of the unit are easily damaged and expensive to repair).
3. If users are properly trained by Biacore but have insufficient experience, then Ms. Catino will supervise their experiments until she feels that they can safely run the Biacore on their own.
4. If Ms.Catino is to perform or supervise the experiments, the customer will be billed for consumables as well as a charge of $50 per hour during normal working hours (9am-5pm) and $25 per hour after normal working hours (5pm-9am). If the customer is able to run the Biacore on their own then there is one rate of $25 per hour plus consumables. If the facility continues operating at 85-100% capacity, additional personnel may be needed to help operate the instrument.

Personnel:
The personnel required to operate the core facility are Dr. Katia Kontrogianni-Konstantopoulos, Assistant Professor/Core Director, and Ms. Dawn Catino, Research Specialist/Core Operator (CVs attached). Ms. Catino and Dr. Kontrogianni-Konstantopoulos have been trained by Biacore personnel to operate and maintain the instrument, and to interpret and analyze the data it can generate. Dr. Kontrogianni-Konstantopoulos and Ms. Catino regularly consult with users to design individual experiments, as well as to evaluate kinetics data.

Pricing:
Currently our price for Ms. Catino to run or supervise experiments is $50 per hour for any experiments run during normal operating hours (9-5pm) and $25 per hour for experiments run after normal operating hours (these are run on a automated program so no user is needed). Users that run the Biacore on their own are charged one rate of $25 per hour.

The equipment that is used in the Biacore facility is the Biacore 3000. In late 2004, a "Recovery Accessories Kit" was purchased. This kit is designed to facilitate the recovery of materials bound to the sensor chip, with high efficiency and in a small volume, for subsequent characterization (e.g., with MS techniques).

Contact:
Robert Bloch
biacore@umaryland.edu
http://medschool.umaryland.edu/physiology/biacore.asp

Protein Core (SOM/CVD)

Background:
The Protein Core Facility has been in the Center for Vaccine Development in one form or another for well over a decade. Known within the CVD as the Antigen Purification Unit, the lab has been producing protein and carbohydrate antigens, largely for studying sera from animal models that have been challenged with trial vaccines or vaccine components. Recently, Dr. Keith Inman was asked to re-establish the former Antigen Purification Unit with a broader mission, to include an effort in protein structural biology. Dr. Inman's appointment as Assistant Professor of Pediatrics began in July of 2004, simultaneous to his moving into lab space adequate for the task. An excellent technician joined the lab in May 2005, and the lab is now operating at full speed.

Scientific Objectives:
It is the mission of the Protein Core Facility (PCF) at the Center for Vaccine Development (CVD) to support and advance research capabilities at the CVD and elsewhere by providing high quality protein and antigen purification support, and to facilitate access to structural biology resources. Current and planned services of the Protein Core Facility include construction and optimization of expression systems, protein purification, protein folding, and a number of analytical techniques. The latter include protein quantitation and purity analysis (e.g., endotoxin detection), bioinformatics analysis, and aid in beginning structural biology projects.
A major goal of the Protein Core Facility is to provide researchers with purified antigen for use in vaccine research. The chief concern for our products is immunogenic purity. Emphasis is placed on careful monitoring and removal of bacterial endotoxin and other immunogens from recombinant protein preparations, while minimizing epitope degradation (for example, deamidation or improper folding). Another key component of our mission will be to bridge the gap between protein discovery and structural biology. We will offer fee-for-service optimization of protein expression, protein refolding, and sample preparations necessary for NMR and X-ray crystallography projects. Our approach to expression optimization will be through high-throughput screening of vectors, host strains, and culture conditions. Host organisms will initially be standard Escherichia coli expression strains, but will ultimately include other systems, such as yeast, insect, and mammalian cells, and cell-free systems. After expression conditions have been worked out, purification protocols can then be developed and optimized by the PCF, the lab originating the work, or elsewhere. PCF purification strategies include screening conditions for refolding, where required. Finally, when sufficient quantities of purified, properly folded protein can be obtained for structural studies, we will offer to screen conditions for NMR and/or crystallization.

Personnel:
Keith G. Inman, Ph.D., Director. Dr. Inman's training in Protein NMR and methods of protein purification and analysis were completed in the laboratory of Dr. David Weber, in the Department of Biochemistry and Molecular Biology, School of Medicine, University of Maryland, Baltimore. Following completion of his Ph.D. in 2003, he trained briefly as a post-doctoral fellow under Jim Nataro in the Department of Pediatrics, also at the School of Medicine and Center for Vaccine Development, working on various proteins of Gram-negative pathogens, while beginning to set up the PCF. As Director of the lab, Dr. Inman will be responsible for designing purification and refolding schemes and overseeing their implementation, as well as scheduling the work and price schedules for the PCF with guidance from the Faculty Advisory Committee as required.

Jason E. Savage, M.S., Research Assistant. Mr. Savage received his Master's degree in August 2004 and has been with the PCF since May 9, 2005. His background is in Molecular Biology, having worked on an RNA virus of Drosophila melanogaster. Protein purification is not something he has extensive experience with; however, he is familiar with the principles involved in most of the techniques involved and is quickly becoming adept at running our FPLC and lab operations in general. Mr. Savage's duties will include performing most of the routine protein purifications for the Core, as well as maintain laboratory inventories and equipment under the close supervision and guidance of the Director.

Tatiana C. da Silva, M.S., Research Fellow (temporary). Ms. Silva has been working for the Protein Core Facility since August of 2004, dividing her time between Core projects and those of Dr. James Nataro. Her background is in organic synthesis and pharmaceutical sciences, and was hired originally to bridge a gap between technicians. Her tenure with us is probably nearly complete, when she finishes her current project for a contract with SIGA Technologies.

Instrumentation:

1. ÄKTAprime FPLC. Amersham Biosciences (now GE Healthcare\
2. DU640 Spectrophotometer. Beckmann Instruments, Inc.
3. Tangential Flow Apparatus. "Flexstand" from Amersham Biosciences.
4. Tangential Flow Apparatus. "Quixstand" from Amersham Biosciences.
5. Analytical balance, .01 mg. Scientech SM128D.
6. Sorvall RC-5B. GS-3 and SS-34 rotors.
7. Criterion electrophoresis and electroblotting system.
8. Hybridization oven.
9. Multitron shaker/incubator, two-unit.
10. Microtiter plate shaker, 4-plate, for high-throughput screening of conditions for protein expression or refolding. (On-order.)

Contact Information:
Keith G. Inman, Ph.D. (410) 706-5335 HSFI, Room 433
kinman@umaryland.edu

Genomic-Related Core Facilities and Resources

Biopolymer/Genomics Core Facility (SOM)

Scientific Objectives:
The primary objective of the Biopolymer/Genomics Core Facility is to enable and advance institutional science through the services offered. These services include DNA sequencing, genotyping, DNA/RNA synthesis, and gene expression studies that utilize microarray or real-time PCR technology. In addition to these genomics-related services, the Facility offers peptide synthesis and purification, and custom characterization and purification of proteins and peptides as well as other molecules. Established in 1987, the Biopolymer/Genomics Core Facility is an integral resource for the University of Maryland School of Medicine, and serves as a Shared Service for the Marlene and Stewart Greenebaum Cancer Center and as the University of Maryland School of Medicine's General Clinical Research Center's Genomics Core Facility. The facility operates with state-of-the-art instrumentation and an extremely knowledgeable, well-experienced staff.

Hours: Monday through Friday 7:00am – 5:30pm

Services	**(Average Turnaround Time)**	**Instrumentation:**
DNA and RNA Synthesis	(24 hours)	ABI models 3900 and 394 Synthesizers
DNA Sequencing	(24 hours)	ABI models 3730XL and 3100 Sequencers
Genotyping/SNP analysis	(Depends on method used)	ABI 3730, Affymetrix GeneChip 3000 system, ABI 7900 Fast Real-Time PCR
Microarray services		
-Affymetrix	(3-5 Days)	Affymetrix GeneChip System 3000
-Custom Arrays	(3-5 Days)	GenePix printer, GeneScan scanner
Peptide synthesis	(1-2 weeks crude, 2-3 weeks purified)	2 Rainin Symphonys
Custom Protein Purification	(Inquire)	multiple Beckman HPLC systems
Custom Protein Analysis	(Inquire)	multiple Beckman HPLC and CE systems
Assay Development	(Inquire)	HPLC's, CE's, BioMek

Instrumentation:
Available for investigators to use (first come, first serve):
- Storm 860 Phosphorimager (Howard Hall 550)
- Wallac Victor 2 Microplate Reader (Howard Hall 550)
- Applied Biosystems 7900 Fast Real-Time PCR system (Howard Hall 564)
- Genescan 5000 fluorescent glass slide scanner (Howard Hall 564)

Staff (areas of expertise):
Nick Ambulos, Ph.D. (All Services) nambulos@umaryland.edu or biopolym@umaryland.edu
Patricia Campbell, Ph.D. (Peptide syn, protein analysis and purification) pcamp001@umaryland.edu
Jing Yin, DDS (Microarray services) jyin@umaryland.edu
Kevin Rossomando (DNA synthesis and DNA Sequencing) kross001@umaryland.edu

Pricing (As of 2/1/07):

DNA Synthesis (Synthesis up to 150mers):

Scale	Cost/base
40nM	$0.40
0.2µM	$0.75
1.0µM	$1.50
10.0µM	$10.00

HPLC Purification (regardless of scale of synthesis): $50.00 per oligonucleotide
$100.00/oligo for 10µM

RNA/SiRNA Synthesis (0.2uM scale) $5.00/base (includes HPLC desalting)

DNA Sequencing

Full Reaction samples performed by Core:	$8.00/sample
Full Reaction (full 96 well trays) performed by core:	$600.00/tray
Ready-to-Run* samples:	$3.00/sample
Ready-to-Run* full 96 well trays:	$75/tray
Primers (for primer-walking projects)	$8.00/primer

Peptide Synthesis

(Charge/Amino Acid)	10uM	25µM	50µM	100µM	250µM
Crude Peptide	$5.00	$15.00	$20.00	$30.00	$35.00
75-95% Purity		$25.00	$30.00	$40.00	$45.00
95% or better Purity		$35.00	$40.00	$55.00	$65.00

Microarrays

Affymetrix Gene Expression	$350.00 per sample (Investigator provides arrays)
Affymetrix Gene Mapping	Inquire for specific product
Glass slide array processing	$300 per slide for 2 color dye labeling
	$250 per sample for amplification
	$20 per slide for scanning
	Custom slide printing (Inquire)

Misc.

I-cycler or 7900 Fast Real-Time PCR machine use	$30.00 per run
Analytical HPLC	$25.00 per run
MALDI-TOF Mass Spectrometry	$25.00/sample

All other services, please inquire for cost estimate

Please visit our web site for modified bases or labels that can be incorporated into oligonucleotides or modification that can be made to synthetic peptides.

Faculty Advisory Committee:

Meredith Bond, Ph.D., James Galen, Ph.D., Steven Munger, Ph.D., Alan Tomkinson, Ph.D., Paul Welling, MD, Alan Smith, Ph.D. (ad hoc; former director of the Protein/Nucleic Acid Core, Stanford)

Transgenic Core (SOM)

Scientific Objectives: The main objective of the Transgenic Core Facility at UM-SOM is to provide the expertise, equipment, and technology to produce and preserve genetically modified mouse models for researchers. A second objective is to provide advice and consultation to investigators in the design of transgenic experiments, analysis of transgenic models, and maintaining transgenic colonies. A third objective is to constantly examine and test new techniques and expand the range of services available to the community.

Personnel:

Director: Valerie J. Stewart, M.S.

Ms. Stewart trained in micro-injection techniques in the laboratory of Dr. Fred Alt at Columbia University in New York, beginning in 1990. She later moved with Dr. Alt to Children's Hospital, Boston, and worked concurrently as lab manager and transgenic supervisor, with two assistants. In 1995, she moved to the Lerner Research Institute, Cleveland Clinic Foundation, Cleveland, Ohio, to establish a Transgenic/Knockout Mouse Facility there. In April 2003, she was recruited to establish the Transgenic Core Facility at the University of Maryland School of Medicine. She has 15 years experience in micro-injection techniques, and 8 years as a core facility director.

Research Assistant: Dennis J. Wilson, M.S.

Dennis Wilson has 18 years experience working in a laboratory environment. He spent 6 years working peripherally on transgenic swine and mouse projects at the American Red Cross. He spent 5 years at Johns Hopkins managing a hybridoma facility. He has been training for the past year under Ms. Stewart, and has produced several transgenic founders and knockouts on his own. His expertise in PCR has led to his developing a DNA purification/PCR genotyping service for the Transgenic Core Facility.

Instrumentation:

Micro-Injection

Two Xenoworks micro-injection systems with Olympus IX-71 inverted microscopes equipped with DIC and phase contrast optics
Two Nikon SMZ-1000 dissecting scopes
Nikon SMZ-645 microscope for animal surgery
Nuaire 425 biological safety cabinet for animal surgery
Sutter P-97 pipet puller
GlassWoRx F-1200 DeFonbrune type microfuge

Electroporation

Bio-Rad Gene Pulser XCell system with Shockpod chamber

Cryopreservation

FTS Bio-Cool III controlled rate freezer
Taylor-Wharton HC34 liquid nitrogen cryogenic refrigerator

Tissue Culture

Two Sanyo incubators
Nuaire 425 biological safety cabinet
Olympus CKX41 inverted microscope

Pricing:

Pronuclear injection	$2000 B6C3, FVB strains
	$2800 C57Bl6 strain
Other strains	$2500 + $1000 fee + extra mouse costs
Lentiviral injection	$1000
ES cell injections	$3000 at least 80 blasts
ES cell targeting	$4000

No guarantee with any injections, but repeats done as warranted.

Faculty Advisory Committee:

Dr. Frank Margolis	Dept. of Anatomy and Neurobiology	UM School of Medicine
Dr. Krishna Chandrasekaran	Dept. of Anesthesiology	UM School of Medicine
Dr. Mike Vogel	Dept. of Psychiatry/MPRC	UM School of Medicine
Dr. Meenakshi Chellaiah	Dept. of Biomedical Sciences	UM Dental School
Dr. Toni Antalis	Dept. of Physiology/UMBBioPark	UM School of Medicine
Dr. Amy Fulton	Dept. of Pathology	UM SOM/UMMS

Contact:
Valerie Stewart (410) 706-0454 Howard Hall, Room 582
vstewart@som.umaryland.edu

Molecular Biology/Functional Genomics Core (SON)

Instrumentation:

1) Stratagene Robocycler
2) Two MJ Research Thermal Cyclers
3) Two GeneSpring GX7.3 individual licenses for analyzing microarray data
4) Southern Blot/PCR genotyping services
5) Gene targeting vector design and construction services

Contact:
Susan Dorsey, Ph.D., Director (410) 706-7250 SON 764
sdorsey@son.umaryland.edu

Preclinical Assay Development Cores and Resources

Flow Cytometry Core (SOM/CVD)

Scientific objectives:
The primary goal of the CVD flow cytometry/cell sorting Core Laboratory is to ensure that University of Maryland investigators whose research projects require the use of a flow cytometer have access to such instrumentation. As this equipment is very expensive and very time-consuming to become trained on, it is much more efficient to have a facility with a dedicated operator(s) to run the equipment. Established in 1991, this facility has state-of-the-art equipment and a highly-trained and experienced staff.

Measurements/Services:
1. Characterization of cell subpopulations by multichromatic flow cytometry (up to 10 simultaneous fluorochromes plus forward and side light scatter parameters). This is a state-of-the-art flow cytometry system.
2. Measurement of intracellular cytokine levels and other molecules and determination of the expression of cytokine and chemokine receptors in defined cell populations by multichromatic flow cytometry.
3. Measurement of serum/supernatant cytokine levels using commercially available bead kits, such as the BD Pharmingen cytometry bead array (CBA) assay kit.
4. Cell cycle analysis as determined by propidium iodide or 7-AAD staining and measurement of cell proliferation by CFSE, PCNA, BrdU and Ki67 staining.
5. Determination of apoptosis in individual cells as measured by TUNEL staining, simultaneous staining with Annexin V and propidium iodide, and subG0/G1 peak analysis using DNA dyes such as propidium iodide or 7-AAD.
6. Measurement of expression of green fluorescence protein (GFP) in transiently or stably transfected eukaryotic and prokaryotic cells.
7. Physical isolation of cell subpopulations by flow cytometric cell sorting (2 and 4-way) based on expression of GFP and/or other markers defined by multichromatic monoclonal antibody staining.
Experiments should be scheduled as far in advance as possible. Generally it takes about two weeks to be fit into the schedule.

Instrumentation:
Beckman Coulter Epics Elite ESP flow cytometer and cell sorter
DakoCytomation MoFlo flow cytometer and cell sorter with 4-way sorting and up to 12 parameters (capable of 10 colors plus forward and side scatter; this is state of the art).

Personnel:
Marcelo Sztein, M.D.
Leader, CVD Immunology Group and Chief of the Cellular Immunology Section and Flow Cytometry Core Laboratory. Holds an appointment as tenured Professor, Division of Infectious Diseases and Tropical Pediatrics, Department of Pediatrics and secondary appointments in the Departments of Medicine and Microbiology and Immunology
Has 24 years experience in flow cytometry and has been director of the CVD's Flow Cytometry Core Laboratory since its inception in 1991.

Has over 30 years of experience in the study of molecules involved in the regulation of cellular, humoral, innate and mucosal immunity, with particular emphasis on the understanding of the mechanisms underlying the generation of immune responses to infectious agents in humans and animal models.

Regina Harley, M.S.

Has been Lab Supervisor of the CVD Flow Cytometry Core Laboratory since November 1999.

Lab Supervisor of the University of Rochester Cancer Center Flow Cytometry Facility for 10 years prior.

Has had professional training on all of the flow cytometers in the CVD Core Laboratory as well as others.

Has extensive experience in all of the services listed above, including multichromatic flow cytometry, cell sorting (2- and 4-way), CBA assays, cell cycle analysis, measurement of cell proliferation, determination of apoptosis, measurement of expression of green fluorescence protein (GFP), etc.

Cathy Storer, B.S.

Has over 20 years of experience in analytical flow cytometry, including complex multicolor analysis, CBA, proliferation, etc.

Pricing:

All sample analysis and cell sorting is done by Core Laboratory personnel and is charged at a rate of $75.00/hour, rounded up to the nearest half hour. Sorting has an additional flat 2-hour set-up charge ($150.00).

Laboratory Policies:

The "Rules and Regulations" form (Revision May 10, 2005) is available at the CVD Flow Cytometry Core Laboratory.

Contact:

Marcelo Sztein, MD (410) 706-5328 HSF I, Room 456
msztein@medicine.umaryland.edu
http://medschool.umaryland.edu/orags/flowlab.asp

Flow Cytometry Core Facility (SOM/UMGCC)

Scientific Objectives:
To provide state-of-the-art flow cytometry services for investigators in the program in oncology and campus wide at the University of Maryland School of Medicine.

Instrumentation:
Bench top Analyzers: The Shared Services Facility has one FACScan and one BD-LSR cytometer for use by both technician assisted and user independent data acquisition/analysis. The FACScan has a fixed 488nm argon laser and three-color capabilities. The BD-LSR has three lasers (Argon 488nm, Helium-Neon 633nm, and Helium-Cadmium 325nm for ultraviolet excitation). The LSR has six fluorescence detectors, multiple pulse processing capabilities, and parameter ratio capabilities (i.e. Calcium flux applications).
Cell Sorters: The Facility has two cell sorters: A FACSVantage SE with the Turbosort module and a CloneCyte attachment for single cell cloning. This sorter is equipped with two lasers; one Krypton-Argon Ion mixed gas enterprise laser that provides a 488nm and 355nm excitations, and one Helium-Neon laser tuned to 633nm. The sorter has six detectors available for use in complex analysis and cell sorting. The second sorter is an SE with digital electronics (Fascia option). It is equipped with three lasers: one Argon-Ion 488nm, one Krypton-Ion 405nm and one Helium-Neon 633nm. The instrument has eight detectors, Turbo sort capabilities, and the conceited attachment for single cell cloning. It is also equipped with an aerosol containment system for sorting of potentially biohazard us samples.

Personnel:
Dean L. Mann M.D. Director
The cancer center flow cytometry facility was established as a shared resource in 1998 when Dr. Mann became director. He has more than 25 years experience in flow cytometry and was co-director of the first flow cytometry facility at the NCI, NIH. Over the years he has establish collaborations with numerous investigators at the NIH and more recently at the University of Maryland employing this technology to generate data that has been published in peer reviewed scientific articles.
Neil J Hardegen B.S. Program Director
Mr. Hardegen assumed his current position at the University of Maryland in January 2005. From 1993 to the end of 2004 he was manager of the Fluorescence Activated Cell Sorter and Imaging Core at the National Institute of Dental and Cranial- facial Research, NIH, Bethesda MD. There he was responsible for all aspects of flow cytometry including preparation of probes, data acquisition, and multi-parameter cell sorting and data analysis. He was also responsible for training of professional and technical staff on the use of flow cytometric instrumentation and assisting with experimental design. Mr. Hardegen is trained on a variety of flow cytometry instruments made by different companies.
Dayton Nance B.S. Research Assistant
Mr. Nance was first employed as a Research Assistant in 1998-2000 conducting experiments that required flow cytometric expertise. From April 2002 to June 2003 he was employed full time in the Cancer Center flow cytometry core receiving formal training by BD in the use of their analytic and cell sorting instrumentation. He rejoined the Core operation as a part time employee in April 2004 and full time in August of that year. He has expertise in all aspects of multi-parameter flow cytometry data acquisition and cell sorting.

Services	**Turnaround Time**	**Instrument Type:**
Acquisition/Analysis		
Immunophenotyptic Assays	daily	FACScan or BD-LSR
Proliferation Assays	daily	FACScan or BD-LSR
DNA Cell Cycle	daily	FACScan or BD-LSR
Apoptosis Assays	daily	FACScan or BD-LSR
Stem Cell Discrimination	daily	Vantage or BD-LSR
Special Requests	daily	Depends on request
Type:		
Cell Sorting/Analysis		
Sterile or nonsterile	daily	Vantage SE or DIVA
Based upon immunophenotyptic staining	daily	Vantage SE or DIVA
Based upon fluorescent proteins	daily	Vantage SE or DIVAStem
Cell Discrimination	daily	Vantage SE or DIVA
Special Requests	daily	Depends on request

Pricing (Effective July 1, 2005) FY06

Service	Operator	Fee
Data Acquisition	Facility Operator	$100/hr
	Investigator	$50/hr
Data Analysis	Facility Operator	$40/hr
	Investigator	$20/hr
Cell Sorting	Facility Operator Only	$150/hr

Additional services are available upon request for any investigator needing assistance with sample preparation and staining. This service will be charged at the Flow Operator's Rate.

Faculty Advisory Committee:

Douglas Ross, M.D., Ph.D., Professor, Medicine
Thomas MacVittie, Ph.D., Professor, Radiation Oncology
Miriam Smyth, Ph.D., Assistant Professor, Pathology
David Scott, Ph.D., Professor, Surgery
Dean Mann, M.D., Professor of Pathology and Director of Immunogenetics
Neil Hardegen, B.S., Program Director, Flow Cytometry Facility

Contact:
Facility (410) 328-3915
Dean Mann, MD (410) 328-5512 *dmann001@umaryland.edu*
http://www.umgcc.org/research/flow_cytometry.htm

Veterinary Resources (UMB)

Services provided and turnaround time:
The staff of Veterinary Resources will provide numerous technical services on a variety of species. Rodents are the most frequently used animal models on campus. Because of this, the staff commonly provides technical assistance on a fee-for-service basis for rodent blood withdrawal, administration of anesthetics, tail clipping, breeding, and weaning to support investigators in their research activities. In an attempt to help investigators preserve specific mouse strains, our staff can also re-derive transgenic mice that may have been infected by adventitious pathogens. We have experience developing mouse monoclonal antibodies to specific determinants, and developing polyclonal antibodies in rodents, rabbits and other species, including small molecule antibodies in llamas. Turn around time is specific to each project, and each project is custom tailored to fit the need of the investigator. All technical requests are conducted in a reasonable time.
Before starting any research project, our program typically provides assistance with any of the following: special caging or experimental techniques, selection of appropriate animal species to carry out specific animal techniques, animal models of human diseases, anatomical and physiological peculiarities of animals used in research, techniques of anesthesia, analgesia, chemical restraint, and dosages, techniques of blood and other sampling and drug or chemical administration, pathological and clinical effects of intercurrent animal disease, estimates of animal purchase prices and future per diem rates. Support may also be provided for surgery, pathology and radiology on a number of species, including large animal studies. Our experience and ability to assist investigator needs, as they relate to laboratory animal medicine, is very extensive. Inquiries and prior arrangements can be arranged by contacting our office. Through pre-research consultations, budgeting for such support can be included in research grant applications.

Location, hours of office operation:
MSTF G-100
10 South Pine Street
Standard business hours: 8am-5pm

Pricing:

ANIMAL SPECIAL COLLABORATION/SUPPORT:

Mouse Weaning, Tail Clipping and Bleeding (Including cost of anesthesia)	Technician Fee: $49 /hour
Tissue Processing for All Species	Technician Fee: $49 /hour
Euthanasia for All Species (i.e. administration of anesthesia solution and carcass disposal)	Technician Fee: $49 /hour

* Any other special support will incur a technician fee of $58 dollars/hour, plus the cost of any additional materials, anesthesia or time.

VETERINARIAN SUPPORT

Veterinarian	Surgical/Medical Support	$151 /hour
	After 5PM or before 8AM.	$228 /hour
Vet Tech	Surgical/Medical support	$62 /hour
	After 5PM or before 8AM	$92 /hour

ANESTHESIA MACHINE RENTAL

Isoflurane Anesthesia Machine Rental	$65 /session + anesthetic Drug cost

ROOM USE:

Surgery Room Use (typically large species use) – maintenance only (non-disposables inclusive: EKG, IV pump, etc.)	$87 /session
Necropsy Room Use – maintenance only	$67 /session

NECROPSY:

Rodent, Complete Necropsy	$51 First animal, $20 ea add
Histopath/slides	Cost + 25%
Non-Rodent, Complete Necropsy	$280 /session
Histopath/slides	Cost + 25%
Non-Rodent, Necropsy Minimal	$162 /session
Histopath/slides	Cost + 25%

PROVISION OF SUPPLIES:

Research Supplies	Cost + Overhead (25%)
Surgical Supplies	Cost + Overhead (25%)
Pharmaceutical Supplies	Cost + Overhead (25%)
Tissue Processing Supplies	Cost + Overhead (25%)

MISCELLANEOUS:

Histopathology Slide Review and Report	Cost + overhead (25%)
Radiograph/X-Ray Film Support	$58 /first plate
Re-Derivation Service Fee	Please call to discuss

ANIMAL ORDERING SERVICE:

Telephone and Handling Fee	$4.55 /Animal Order
Emergency/Rush Order Fee	$48.65 /Animal Order
Cancellation Fee	$38.30 /Animal Order
Requisition Fee Schedule (% of total purchase cost) excludes primates	10.71% of Total Purchase Cost
Primate Requisition Fee	$24.28 /Primate

* Fees after hours will be at a rate of 1.5 times the standard charged to cover based on labor overtime expenses.

Training available through the core:
We offer training on numerous animal procedures. The most frequently requested training is our Humane Animal Handling. To inquire about specific training procedures, please contact us directly.

Contact:
Louis Detolla, V.M.D., Ph.D. (410) 706-8537 MSTF, Room G100
detolla@vetmed.umaryland.edu
http://vetmedicine.umaryland.edu

Translational Core Facility (SOM/UMGCC)

Services Provided:

Proliferation/cytotoxicity assays: The TCL provides a spectrum of established *in vitro* proliferation assays that are all automated and run in a multi-well format to enable high-throughput testing of potentially novel and established anticancer agents in cell-based screens. Over 120 permanent tumor and normal cell lines are available, which have been characterized for a large number of currently highly attractive molecular targets. Proliferation assays that can be performed with these cell lines include the MTT assay (methyl tetrazolium assay, detecting mitochondrial function), the SRB assay (measuring total cellular protein, assay used by the NCI 60 cell line screen), and the propidium iodide (determining total DNA content).

The MTT assay is further employed for drug combination studies that are performed based on the fixed IC50 ratio method by Chou and Talalay. For processing the data resulting from combination studies, we have the Calcsyn software package available that enables us to determine combination indices and other relevant parameters with ease. A unique proliferation assay format that is available through the TCL is the human tumor stem cell assay (HTCA). This assay is a soft agar based procedure performed in 24-well plates. The use of a semi-solid matrix enables only the growth pluripotent cell populations/colonies, which are thought to be most relevant for tumor metastasis and development of drug resistance. We have a custom-made tumor colony counter (Microbiology Systems International, Frederick) available to us which allows for automated colony counts and thus rapid processing of a readout that would be very cumbersome if counting by eye is required. Another major advantage to speed is the possibility, to not only grow cancer cell lines in the HTCA, but also to be able to grow single cell suspensions from human tumor xenograft tissues and patient tumor material for tumor stem cell isolation and chemosensitivity testing.

In vivo nude mouse assays: The TCL has an IACUC approved umbrella animal use protocol "Animal Models for Studying Tumor Biology and for the Evaluation of Pharmacodynamic and Pharmacokinetic Endpoints of Novel and Experimental Cancer Therapies" approved for three years (#0405001, till May 2008).

Any tumor line or drug can be used in the following approved procedures considered key in preclinical anticancer drug development:

- Determination of the maximal tolerated dose (MTD) of a novel agent
- Establishment of human tumor xenografts or murine tumor lines from model cell lines (e.g. target transfected) and tissues
- Tumor efficacy experiments in traditional s.c. nude mouse xenografts of a test compound *versus* standard agents alone or in combination

Determination of pharmacodynamic endpoints in xenograft efficacy models using serum or tumor tissue based parameters: Because it is very complicated and difficult to obtain IACUC approval for investigators without prior and documented experience or experienced personnel in the field of animal research, the TCL offers a fast and easy option to perform grant-related or contract-related *in vivo* experiments. New cell lines or drugs only require a notification of the animal care and use office through the submission of an amendment. The latter is mainly concerned with safety information and is assured fast track review and approval within days. A LABCAT Tumor Tracking & Measurement Software version 8.0 for tumor data acquisition and processing is available which enables electronic, professional raw data documentation, statistical data evaluation as well as high quality graphical data presentation.

Analyses of pharmacodynamic (PD) endpoints in tumor or surrogate tissues and cell lines: Sample collection and processing for PD analyses is the core business of the TCL. TCL services comprise the development of biochemical, molecular or cellular assays that are tailored and validated according the translational research question associated with a clinical trial, the development of standard operating procedures including instructions for research nurses and collection logistics. Assay technologies are first adapted to handling of micro quantities of patient materials by optimizing the procedures with human tumor xenograft and mouse tissues. They are mostly based on immunohistochemistry or immunofluorescence for tracking of target expression at various time points in cytospins or tissue microarrays. Western blotting for qualitative and quantitative evaluation of protein expression and real time PCR for mRNA expression are also frequently used. Mechanism of action studies of novel, molecular anticancer agents.

Equipment and procedures which are unique to the TCL include:

- High-throughput plate reader for fluorescence, luminescence, and UV/VIS detection
- Fully automated high-throughput colony counter for tumor stem cell assays (Microbiology International)
- Leica DM4000 microscope with fluorescence light and phase contrast light sources, cooled camera with monochrome and color filters, automated x,y,z stage, and imaging software (Openlab, Improvision)
- A LABCAT Tumor Tracking & Measurement Software version 8.0 for tumor data acquisition and processing.
- An IACUC approved umbrella animal use protocol "Animal Models for Studying Tumor Biology and for the Evaluation of Pharmacodynamic and Pharmacokinetic Endpoints of Novel and Experimental Cancer Therapies" for following procedures considered key in preclinical anticancer drug development exists (#0405001): determination of the maximal tolerated dose (MTD) of a novel agent; establishment of human tumor xenografts or murine tumor lines from model cell lines (e.g. target transfected) and tissues; tumor efficacy experiments in traditional s.c. nude mouse xenografts of a test compound *versus* standard agents alone or in combination; determination of pharmacodynamic endpoints in xenograft efficacy models using serum or tumor tissue based parameters.

Other equipment includes:

- Equipment for RNA expression/DNA analyses (PCR, Real-time PCR, electrophoresis)
- Equipment for protein expression analyses (Western blot, ELISA)

Personnel:

The TCL has scientific personnel, which is well experienced in protein-protein interaction studies, creation of stably transfected cell lines that express targets of interest and the use of cell biology, proteomic and genomic analyses before and after drug treatment. This expertise is made available to small biotech and pharmaceutical companies that have limited laboratory capacities or lack qualified laboratory personnel.

The TCL is located in room BRB 9-020G-H (800 square feet), on the 9th floor of the Bressler Research Building.

Contact:
Joseph Bryant, Ph.D. - bryant@umbi.umd.edu
Mariola Sadowska, Ph.D. - msadowska2@ihv.umaryland.edu

http://www.umgcc.org/research/translational_core_lab.htm

Cellular Physiology Core (SON)

Instrumentation includes:

1) Sutter P97 pipette puller
2) AxoClamp 200B
3) Aurora Scientific in vitro muscle contractility system
4) Two tissue culture hoods and two cell culture incubators

Contact:

Chris W. Ward, PhD, Director (410) 706-3618
ward@son.umaryland.edu
Susan G. Dorsey, PhD, Co-Director (410) 706-7250
sdorsey@son.umaryland.edu

Small Animal Physiology Core Laboratory (SOM)

Rats and mice have long been animals of choice for many types of physiological and pathophysiological experiments. New in vivo technologies, including high-frequency ultrasound imaging (so-called "ultrasound biomicroscopy") and telemetry techniques, combined with advances in mouse genetic engineering, have greatly expanded opportunities for studying the molecular mechanisms of diseases in rodent models. However, application of these new technologies requires both delicate equipment and specialized surgical/experimental skills.

A Small Animal Physiology Core (SAPC) Facility has been established at the University of Maryland School of Medicine. Using a VisualSonics high-frequency (20-55 MHz) ultrasound system and DSI telemetry system, the professionally-staffed SAPC can help investigators to phenotype rats and genetically engineered mice. While SAPC has a primary focus on cardiorespiratory phenotyping, its techniques can be extended for other research areas, including cancer (e.g. tumor visualization), neuroscience (e.g. microinjection), organ transplantation (e.g. transplanted heart function), and development (e.g. fetal heart function).

The SAPC is directed by Dr. Mordecai P. Blaustein who chairs the Steering Committee that sets policy and provides scientific and financial oversight for the SAPC. Dr. Ling Chen manages the day-to-day SAPC operations and provides guidance and assistance with core activities. The SAPC provides either full services in accord with the investigator's contractor's protocol, or training and assistance for investigators who are, themselves, interested in using the facilities and equipment available in the SAPC.

Description of Selected Services:

Tailcuff Measurement of Blood Pressure: The tailcuff technique can be used for low-cost, high throughput, serial measurements of blood pressure in conscious rats and mice. Kent Scientific system is available, which consists of an occluding tailcuff, blood pressure (BP) sensors , rodent holders, and a computer-controlled inflation pump. Measured parameters include systolic pressure, diastolic pressure, mean BP, and heart rate. There is good correlation between tailcuff and intra-arterial BP in anesthetized animals (Chen et al. Am J Resp Crit Care Med, 2005; 172:915). Nevertheless, tailcuff measurements in conscious animals may be more variable, and may be confounded by animal stress attributable to handling and heating.

Cardiovascular Measurements in Chronically Implanted Animals**:** Chronic implant technique permits cardiovascular phenotyping in conscious and freely-moving animals, without the confounding effects of anesthesia, acute surgery, and animal handling. Moreover, this technique provides continuous beat-to-beat measurements over a prolonged period (i.e., days for implanted fluid-filled catheters, weeks for implanted telemetry devices, and months for implanted flow probes). It can be used to measure the effects of circadian rhythms, for example, BP variability during dark (high activity) and light (low activity) periods. Finally, the technique offers opportunities for sequential experiment designs that can reduce the number of genetically engineered animals required.

The following procedures can be performed in SAPC:

- Chronic sampling of arterial and/or venous blood through implanted fluid-filled catheters;
- Arterial or venous pressure measurements through implanted fluid-filled catheters;

• Arterial or venous blood pressure, ECG, EEG, EMG, locomotor activity and temperature, through implanted telemetry devices (Data Sciences International);
• Cardiac output and organ blood flow with implanted flow probes (Transonics Systems).

Cardiovascular Measurements in Anesthetized Animals: Invasive catheter-based approaches provide complimentary in vivo characterization of the cardiovascular phenotype. Under isoflurane anesthesia, high fidelity catheters (e.g., Millar Mikro-tip catheters) are used for measurement of arterial and central venous BP, and left and right ventricular pressure. Cardiac output is measured by either thermodilution technique (Cardiomax III from Columbus Instruments or Vigilance from Edwards Lifesciences) or by flow probe technique (Transonic System).

Major cardiovascular indices that can be measured include:

• *Indices of Global Cardiovascular Function* - BP, heart rate, and cardiac output
• *Indices of Cardiac Load* - central venous pressure, left and right ventricular end-diastolic pressures or volumes, total peripheral resistance
• *Indices of Cardiac Contractility* - left and right ventricular contraction rates (dP/dtmax), left ventricular fractional shortening
• *Indices of Cardiac Relaxation* - left and right ventricular relaxation rates (-dP/dtmax)

Ultrasound Biomicroscopy: Echocardiography is a leading method for imaging the cardiovascular system because it is non-invasive, versatile, high throughput, and well suited for serial measurements. Clinical echocardiographic systems, with frequencies of 8-12 MHz, provide low spatial resolution that preclude the study of the small and fast-beating mouse heart. Our VisualSonics Vevo 770 system offers high frequency (20 to 55 MHz) imaging and spatial resolution of ~30 microns. The system can produce images at near-microscopic resolution, and is therefore called ultrasound biomicroscopy.
The SAPC Vevo 770 system is used for in vivo observation of cardiac morphology and hemodynamics in mice and rats. For example, two-dimensionally (2D)- guided M-mode and Doppler echocardiography can be used to determine the geometry and blood velocity in the four heart chambers and large thoracic vessels (aorta, pulmonary artery/vein).
SonoSite Elite ultrasound system equipped with comprehensive cardiac software and three transducers (2-10MHz). This portable system can be used for on-site echocardiography or other organ ultrasound from rats to large animals including pigs, monkeys and sheep.

Additional applications of the Vevo 770 system include:

• Developmental Studies: Detailed in vivo visualization of the same mouse from as early as embryonic day 5.5 through neonate to adulthood.
• Cancer Research: Measurement of tumor size (volume) and shape by high-resolution 3D visualization; measurement of blood flow in and around tumors with pulse-wave Doppler.
• Organ/tissue Perfusion: Untargeted micro-bubbles can significantly enhance image quality of organ and tissue blood pools.
• Molecular Imaging: Targeted contrast agents with appropriate ligands that bind to specific biomarkers can be used to quantify expression of these biomarkers (e.g., P-Selectin, an inflammatory marker, or VEGFR2, an angiogenic marker).
• Neurobiological Research: Ultrasound-guided needle injections and extractions, study of embryonic or neonatal brain development, study of cell lineage, and study of progressive neural degenerative diseases associated with mouse models.

Ex Vivo Heart Perfusion: The classic Langendorff perfusion and the working heart preparation are powerful model systems for studying cardiac function without such confounding factors as variation of loading conditions, changes in systemic neurohormonal activation, pericardial constraint, and cardiac-vascular interactions. The preparations enable the study of heart pacing rate, coronary flow or pressure, and temperature under controlled conditions.

Animal Models: Animal models that mimic human cardiovascular diseases are necessary for studying pathogenic mechanisms and the effects of intervention. Human diseases such as chronic heart failure are usually complex syndromes that include cardiac, hemodynamic, neurohumoral, and peripheral alterations. No animal models mimic all of these changes; nevertheless, well-designed animal models are applicable to specific pathogenic aspects of human diseases.

The following is a selected list of animal models that SAPC can provide:

- *Acute myocardial ischemia, infarction, or ischemia and reperfusion* - Coronary artery ligation
- *Chronic myocardial ischemia and heart failure* - Coronary artery ligation
- *Pressure Overload* - Aortic banding
- *Volume Overload* - Aortico-caval fistula; Aortic Insufficiency
- *Toxic cardiomyopathy* - Administration of cardiac toxins and other agents, such as monocrotaline, adriamycin, catecholamine, and aldosterone. The drugs can be delivered orally, subcutaneously, by gavage, or by chronically implanted osmotic minipumps.
- *Hypoxia* - Chronic sustained hypoxia; Chronic intermittent hypoxia

Contact:
Dr. Ling Chen – SAPC Manager (410) 706-4920 FAX: (410) 706-0274
Email: lchen@medicine.umaryland.edu
Dr. Mordecai Blaustein - Core Steering Committee Chair (410) 706-3345
Email: mblaustein@som.umaryland.edu
Katherine Frankel - Core Administrator (410) 706-7567
Email: kfrankel@som.umaryland.edu

Mouse Functional and Behavioral Core Facility (SON)

Instrumentation:
1) Columbus instruments mouse grip strength system
2) USCD Paw thermal Stimulator
3) Two Stoelting von Frey Hairs and elevated wire mesh platforms

Contact:
Susan G. Dorsey, Ph.D., Co-Director (410) 706-7250 sdorsey@umaryland.edu

Cytokine Lab (SOM)

Introduction:
The University of Maryland Cytokine Core Laboratory (CCL) was established March 31, 1995 The CCL is an academic-based fee-for-service laboratory dedicated to providing a high quality, low cost cytokine and growth factor measurement service. The CCL has performed cytokine assay services for many University of Maryland intramural investigators and many extramural investigators from across the United States, including NIH intramural investigators, and from several other countries. The CCL's operating model utilizes ELISA and multianalyte assays (Luminex technology) that are constructed and optimized in-house using individual high-quality commercial reagents, rather than pre-packaged kits. The CCL currently obtains immunologic reagents from five different vendors, which provides the flexibility to choose the best performing reagent combinations and optimize each cytokine assay. This operating model also avoids dependence on a single vendor, should problems with reagent delivery or quality control arise. Every effort is made to continue using the same reagents for each assay to provide high inter-assay reproducibility over time. Cross-lot (and if necessary cross-supplier) validation/calibration of reagents is routinely performed. The use of robotics to set up assays insures high precision and high throughput. The pricing structure of the CCL is based on high volume and low profit margin. The high volume also allows us to negotiate for lower reagent costs, providing further reductions in the final price of our assays. The CCL has experience in handling orders from multiple investigators with sizes of orders that vary up to 2000 samples per order and up to 6000 samples per year from individual investigators. In FY 2004, the CCL processed 60,000 samples from over 100 different investigators. The CCL is proud of its large number of repeat customers and its growth through "word of mouth" advertising by satisfied customers.

Instrumentation:
The CCL utilizes the following major equipment located in its MSTF laboratory: Biomek 1000 robotic workstations (3 units), BioTek automatic plate washers (3), Molecular Devices Thermo Max microplate reader, Luminex 100 Multianalyte System (1 with 1 additional back-up on campus), walk-in coldroom, Forma –80°C freezers with generator and liquid nitrogen back-up and audible and automated telephone temperature alarms (2 units with additional back-up unit available), plate shakers (3 units), and incubators (2 units).

Personnel:
The laboratory is directed by Dr. Jeffrey D. Hasday, Professor of Medicine, Pathology, and Biochemistry & Molecular Biology at the University of Maryland School of Medicine and a senior scientist with 20 years experience in cytokine research. The laboratory is supervised by Ms. Lisa Hester, B.S./M.B.A. who has 8 years experience as the CCL supervisor. Ms. Hester is responsible for the day-to-day operation of the laboratory, generating work schedules, assigning work to the laboratory staff, reviewing all data for potential technical errors, communicating with individual investigators, assuring maintenance of records of sample receipt date, type of sample, storage of sample (frozen vs. fresh), condition of sample on arrival, and assays requested, as well as quality control data, including equipment calibration records, validation of new reagent lots and lots stored for more than 6 months, and troubleshooting of technical problems and discussing these with Dr. Hasday. The current staff also comprises one full-time technician experienced with performing immunoassays, Marilynn Gordon, B.A., who is also responsible for monitoring Good Laboratory Practice procedures, including bi-annual measurement of normal control values. Beth Guizzardi is the Account Manager.

Assays Available:
HUMAN: IL-1alpha, IL-1beta, IL-2, IL-3, IL-4, IL-5, IL-6, IL-7, IL-8, IL-10, IL-12(p70), IL-12(p40), IL-13, IL-15, GMCSF, IFN-gamma, TNFalpha, Eotaxin, MCP-1, RANTES, MIP-1alpha, IP-10

MOUSE: IL-1alpha, IL-1beta, IL-2, IL-3, IL-4, IL-5, IL-6, KC, IL-10, IL-12 (p70), IL-12 (p40), IL-13, GMCSF, IFN-gamma, TNFalpha, MCP-1, RANTES

Pricing:

Number of Cytokines	10-20 samples*	21-200 samples*
3 plex	$44.00	$40.00
4 plex	$49.50	$45.00
5 plex	$55.00	$50.00
6 plex	$59.50	$54.00
7 plex	$64.00	$58.00
8 plex	$68.00	$62.00
9 plex	$72.50	$66.00
10 plex	$77.00	$70.00
*Price is per sample		
11-22 plex	$7.70/cytokine/sample	$7.00/cytokine/sample
Minimum of 10 Samples		

Please call for bulk discounts
All on campus customers will receive a 10% discount off of the above pricing.

Contact Information:
Lisa Hester, Lab supervisor (6-1508) MSTF 8-64A
Lhest001@umaryland.edu
http://www.cytokines.com

Stem Cell Core Facility (SOM)

A Human Stem Cell Core is currently being established on the University of Maryland School of Medicine's campus, as part of the Transgenic/Knockout Core Facility. This proto-core is under the direction of Valerie Stewart, M.S., who also directs the animal work done by the Transgenic Core. All work is done in the facility in Howard Hall, room 581, with the assistance of Dennis Wilson, research specialist in the Transgenic Core.

The HSC Core has begun by concentrating on embryonic stem cells (hESC), but will be extending services to adult stem cells in the future. Our goal is to establish a bank of human embryonic stem cell lines which will be made available to UM-SOM researchers (under certain restrictions required by licensing requirements). The facility will provide the cells themselves, murine feeders if required, and assistance in planning projects utilizing these unique and important cells. The facility will also provide essential training in the culture, characterization, expansion and differentiation of these cells. We will also be growing embryoid bodies, and directing differentiation of the resultant cells down the various pathways, as requested by investigators.

Future plans include expanding the lines available, and manipulating culture conditions such as growing the stem cells on Matrigel or other matrices, and growing the cells in xeno-free medium. Currently the only line available is the H9 line from WiCell, originally isolated by Dr. James Thompson. The H1 line is under expansion. Next we plan to obtain two of the UCSF lines and two of the ESI lines and bank those.

The facility has set up a memorandum of understanding (MOU) with the National Stem Cell Bank (NSCB) at WiCell, under which PIs at UM-SOM can obtain hESC lines from the bank. Each PI must execute a simple letter agreement for each line with the NSCB. The facility currently holds SLAs for H1 and H9, as well as a Core Facility Addendum to these agreements, which allows us under certain conditions to help PIs utilize these lines.

The lines mentioned above are all federally approved lines, certified by the NIH to follow the guidelines established by President Bush in 2001, and work on these lines is eligible for federal funding.

A chargeback system has not yet been established.

Contact:
Valerie Stewart (410) 706-0454 Howard Hall, Room 582
vstewart@som.umaryland.edu

Drug Development Core Facilities and Resources

Pharmacokinetics Biopharmaceutics Laboratory (SOP)

Scientists within the Pharmacokinetics-Biopharmaceutics Laboratory (PBL) are recognized experts in pre-clinical and clinical pharmacokinetics, pharmacodynamics, human drug metabolism, and clinical efficacy evaluations. Over the last 15 years, the PBL has performed over 50 clinical pharmacology studies including bioavailability, bioequivalency, pharmacokinetic, pharmacodynamic, and special populations (e.g., renal dysfunction, women, menstrual cycles, genetic polymorphism). The PBL was instrumental in performing the fundamental studies that are the basis for the following FDA Regulatory Guidances including: SUPAC-MR (Scale Up and Post Approval Changes for Modified Release Formulations), SUPAC-IR (Scale Up and Post Approval Changes for Immediate Release Dosage Forms) and In Vitro-In Vivo Correlation (IVIVC). Each of these guidances have been supportive in streamlining the drug development process. As stated, the PBL has conducted numerous pre-clinical, translational and clinical studies in collaboration with the Pharmaceutical Industry, NIH and the FDA. Further, the laboratory currently holds grants and/or contracts that focus on mechanisms of drug delivery, disposition, drug efficacy and surrogate biomarker assessments.

Contact:
Natalie Eddington, Ph.D., Director (410) 706-6710 Pharmacy Hall, Room 730
neddingt@rx.umaryland.edu

Industrial Pharmaceutics Laboratory (SOP)

Scientists within the Industrial Pharmaceutics laboratory are internationally recognized researchers in the design and optimization of oral dosage forms including capsules, tablets and emulsions. Research performed in this laboratory was instrumental in developing Regulatory Guidances for the Food and Drug Administration. In addition, these scientists have authored over 150 referred articles in systematic formulation development and focusing on understanding both the principles of the drug delivery system and how the interplay of formulation and process variables impacts on dosage form manufacturability and drug delivery performance. The laboratory is equipped to perform preformulation research, excipient screening, physical characterization of polymorphs, formulation of capsules and tables and the evaluation of these dosage forms using USP dissolution apparatus.

Contact:
Stephen Hoag, Ph.D., Director (410) 706-6865 Pharmacy Hall, Room 620
shoag@rx.umaryland.edu

Clinical Pharmacology Unit (SOP)

The Clinical Pharmacology Unit (CPU) in the Department of Pharmacy Practice and Science, School of Pharmacy is a multi-disciplinary clinical research resource for UMB investigators, contract research organizations (CROs) and pharmaceutical industry. The CPU designs and conducts Clinical Pharmacology trials focusing on PK/PD, drug metabolism, renal function evaluation, and drug-drug interactions. Data obtained from clinical trials (Phase I-IV) are analyzed using NONMEM, WinNonlin, and SAS.The CPU also provides consultation for regulatory submissions, provides scientific input for clinical protocols, clinical development plans, investigator brochures, and clinical pharmacology sections of IND and NDA submissions. The CPU independently develops clinical pharmacology analysis plans, evaluates clinical trial data using advanced exploratory data analyses techniques, performs clinical trial simulations and applies novel pharmacometric principles to clinical trial data.

Faculty:

Kenneth Bauer, PharmD., Ph.D., Associate Professor
Department of Pharmacy Practice and Science
Thomas Dowling, PharmD., Ph.D., Associate Professor
Department of Pharmacy Practice and Science
Natalie Eddington, Ph.D., Professor and Dean of the School of Pharmacy
Department of Pharmaceutical Sciences
James Polli, Ph.D., Associate Professor
Department of Pharmaceutical Sciences

Research Services

The Clinical Pharmacology Unit offers:
Expertise in drug administration and drug-drug interactions resulting in recommendations aimed at maximizing the response and minimizing toxicity to the compound.

Information specific to the compound's administration routes, dosage, dose administration times, and concomitant medications with due consideration of clinical effect, disease condition, clinical toxicity, and the proposed biologic response markers.

Ability to offer recommendations on optimal time points to test each compound's effectiveness, efficacy and safety in administering the compound to humans.

Models for testing and projecting the drug pathway based on the concomitant drugs and the disease state.
Data analysis and reporting of the Pharmacokinetics of the compound(s) based on clinical trial intermediate and clinical outcomes data.
Scientific analysis of Pharmacodynamic Reports about the compound(s) and results for application to the Clinical Trial design and clinical results.
Pharmacogenetic study of Clinical Trials, and provide compounded analysis of these data.
Evaluate and report Industry-provided clinical trial data using advanced analytical techniques.
Clinical trial outcome simulations based on the data provided by the Industry.
Pharmacometric modeling to clinical pharmacology studies to better inform the anticipated human-drug interaction.
Reports and publications on data analyses as requested.

Preparation of Clinical Pharmacology sections of the Food & Drug Administration recommendations for Investigational New Drugs and New Drug Applications, and Investigator Brochures.
Clinical Pharmacology expertise to investigators in academia and in industry.
The Clinical Pharmacology Unit (CPU) in the Department of Pharmacy Practice and Science is a multi-disciplinary clinical research resource for UMB investigators, contract research organizations (CROs) and pharmaceutical industry. The CPU designs and conducts Clinical Pharmacology trials focusing on PK/PD, drug metabolism, renal function evaluation, and drug-drug interactions. Data obtained from clinical trials (Phase I-IV) are analyzed using NONMEM, WinNonlin, and SAS.
The CPU also provides consultation for regulatory submissions, provides scientific input for clinical protocols, clinical development plans, investigator brochures, and clinical pharmacology sections of IND and NDA submissions. The CPU independently develops clinical pharmacology analysis plans, evaluates clinical trial data using advanced exploratory data analyses techniques, performs clinical trial simulations and applies novel pharmacometric principles to clinical trial data.

Research Capabilities
The Clinical Pharmacology Unit Lab is capable of:
Conducting Renal Function Studies (GFR and ERPF) for baseline and post-intervention periods in a variety of patient populations including chronic kidney disease, heart failure, and liver disease.

Developing laboratory assays to test drug plasma concentrations, intermediate biomarkers and Clinical Trial clinical endpoints. (GLP is needed to validate and conduct assays in the Unit Lab;

Conducting the validated assay on samples provided by Industry to test the absorption, distribution, metabolism, and elimination of the drug in the Clinical Trials subjects; and

Employing targeted in vitro and in vivo animal study techniques to test cell uptakes, transport, liver metabolism, and animal pharmacokinetic distribution and toxicology as surrogate studies in the preclinical examination of the compound prior to human testing.

Contact:
Kenneth Bauer, PharmD., Ph.D., Director
(410) 706-3274
kbauer@rx.umaryland.edu

Center for Nanomedicine and Cellular Delivery (SOP)

Research in the center is focused on the development of diagnostics for rapid monitoring, targeted cancer therapies, localized drug delivery, improved cell material interactions, scaffolds for tissue engineering, and gene delivery systems. Nanomedicine aims at controlling the rate and / or location (at the organ, tissue, cellular or subcellular levels) of drug release. This is particularly important to enhance the delivery of potent agents to their target while minimizing toxicity to other normal tissues. By targeting the delivery of therapeutic agents to their target site it is possible to maximize efficacy of drugs and reduce toxicity. Often compounds that are highly toxic fail to reach clinical trials because of their adverse effects. By linking the discovery effort with appropriate nanomedicine delivery strategies at the early stages of drug discovery, there is a chance to "salvage" some of the highly potent drugs by targeted delivery. By and large controlled delivery systems are comprised of some polymeric biomaterial that controls the rate and / or site of drug release. The faculty in the center have over ten years of experience in polymeric, targeted and cellular delivery of drugs.

Contact:
Peter Swaan, Ph.D., Director (410) 706-0103 HSF II, room 648
pswaan@rx.umaryland.edu
http://www.pharmacy.umaryland.edu/nanomedicine

Computer Aided Drug Design (SOP)

The rapid identification of novel therapeutic agents for specific disease states is potentially the greatest step forward in health care that will occur in the 21st century. This potential is largely predicated by the availability of the human genome, along with the genomes of other organisms, including pathogenic species. The fields of genomics and proteomics will allow for this information to be used to identify novel molecular targets for the treatment of a wide variety of disease states. Fueling this process are developments in the biological, chemical and physical sciences. Advances in biochemistry, cell biology and molecular biology facilitate the identification of novel biological target molecules, and, importantly, the means to experimentally measure the activity of those target molecules. Advances in structural biology have allowed for the determination of the 3-dimensional (3D) structures of biological target molecules via the techniques of nuclear magnetic resonance (NMR) or X-ray crystallography, with over 16,000 3D structures currently available in the Protein Data Bank. Computer-aided drug design (CADD) approaches can use the information in the 3D structures of biological target molecules to identify chemicals with a high potential for binding to the biological target molecules. These chemicals may then be obtained and experimentally assayed to select those with the desired biological activity. The selected compounds are referred to as lead compounds and may then be subjected to additional structural optimization via structural biology, CADD and novel organic synthetic methods to obtain compounds with improved activities. Both the lead compounds and their optimized analogs represent chemical entities with a high probability of being developed into therapeutic agents and, therefore, are of great interest to pharmaceutical companies.
The University of Maryland, Baltimore, including the School of Pharmacy, contains a collection of scientists of varied backgrounds, including computational chemistry, structural biology, biochemistry, molecular biology and cellular biology that, in combination, represent the expertise required for CADD based studies. The CADD Center provides collaborative opportunities for biologists to apply CADD approaches to their research programs. These efforts focus on 1) the identification of chemical compounds with the desired biological activity and 2) structural optimization of the identified compounds to enhance their desired biological activity. Chemical compounds created from these steps will have the potential to be developed into research tools and/or therapeutic agents. Successful outcomes of this approach will include publication in scholarly journals and patent submissions on the biologically active compounds, laying the foundation for external funding via federal, private or industrial sources.

Contact:
Shijun Zhong, Ph.D.
szhong@rx.umaryland.edu
Alex MacKerell, Ph.D., Director (410) 706-7442
amackere@rx.umaryland.edu
http://www.pharmacy.umaryland.edu/CADD

High Throughput Screening (HTS) Core Facility

Scientific Objectives: The goal of the High Throughput Screening (HTS) Core is to assist University of Maryland researchers in identifying compounds to further both cellular and biochemical studies of their systems and potentially produce lead compounds with the aim of further drug discovery and development. The Core will assist the project investigators to develop and adapt their assays into more automated HTS formats by providing them access to automated liquid handling equipment, sensitive high throughput detectors, and diverse libraries of small drug like compounds for screening using either *in vitro* or *in vivo* assays.

Personnel and Contact Information:

David J. Weber, Ph.D., Facility Director, dweber@umaryland.edu, 6-4354

Paul T. Wilder, Ph.D., Facility Manager, pwild001@umaryland.edu, 6-4353

Compound Libraries:

ChemDiv 40,000
Currently, the HTS Core has a library of 40,000 diverse chemical compounds purchased from Chemical Diversity Labs (ChemDiv). The 40,000 compounds were selected from ChemDiv's ~600,000 compound collection, which consists of ChemDiv's internal synthesis efforts (CombiLab: ~420,000) as well as procurement from laboratories around the world (International Diversity Collection: ~180,000), to represent maximal chemical and structural diversity. The compounds are 10 mM in DMSO.

Spectrum Collection
Through collaboration with Dr. Weber's lab, access to the Spectrum Collection of 2000 biologically active and structurally diverse compounds gathered from marketed and experimental drugs and natural products. The compounds are 10 mM in DMSO.

Maybridge HitFinder Collection
Individual 96-well microplates can be purchased from the Maybridge (Trevillet, Tintagel, Cornwall, U.K.), HitFinder Collection, each with 80-compounds, lyophilized powder, 1 □mole each, and can purchased individually for smaller screen as needed. The complete Maybridge Hitfinder collection consists of 14,400 drug-like compounds that have been selected by the company to represent the diversity of the complete Maybridge Screening Collection by using a clustering algorithm based on standard Daylight Fingerprints and Tanimoto similarity and they generally follow the Lipinski's rule of 5.

The HTS core will continue to add additional compounds to the library collection to enrich structural diversity in addition to building a fragment library.

Pricing:

The cost of screening with compounds from the ChemDiv 40,000 or the Spectrum Collection is as follows:

Screens of 40,000 compounds	$0.30/cmpd + supplies
Screens of 20,000 < X < 40,000	$0.35/cmpd + supplies
Screens of 10,000 < X < 20,000	$0.40/cmpd + supplies
Screens of 5,000 < X < 10,000	$0.45/cmpd + supplies

The compound pricing simply reflects the cost of replenishing the compound library; however, since each assay is very individual and may use different assay plates, media, reagents, etc..., and require varying time and equipment, the final costs cannot be fully determined until the final HTS version of the specific assay is set.

Equipment:

Beckman-Coulter Biomek FX
The Biomek FX Laboratory Workstation is a flexible automated liquid handling system with a large work surface accommodating most any high throughput job size. The system comes configured with 96-channel multichannel pipetting capabilities simplifying high throughput automation in 96- or 384-well format.

Beckman-Coulter Biomek NXp (Weber Lab*)
While the Biomek NXp is a smaller instrument then the FX it is equipped with a Span-8 pipetting head providing the highest range of microplates and containers being able to aliquot to and from 6, 12, 48, 96, and 384 well plates, test tubes, Eppendorf tubes, and various other costume container including the ability to “cherry pick” select wells from microplates.

BMG FluoroStar Microplate Reader
A lens based fluorescence microplate reader capable of measuring intensity changes in a range of microplates including 96- and 384-well plates.

BMG PolarStar Microplate Reader (Weber Lab*)
A lens based fluorescence microplate reader capable of measuring fluorescence intensity and polarization, FRET, TR-FRET, and luminescence in a range of microplates including 96- and 384-well plates.

Bruker NMR with the B-ACS 60 Automatic Sample Changer (NMR Center*)
The HTS Core is currently housed at the NMR Center in the basement of HSFII that is home to a 800 MHz Bruker NMR equipped with an automatic sample changer, for 60 samples, making it an ideal instrument for screening fragment libraries. Collaboration with the NMR Center is possible to setup fragment screens if the investigator has a suitable target protein, see the NMR Center core description for more details on NMR.

Other
Miscellaneous equipment and lab space for performing both in vitro and cell based assays are available in the HTS facility in the basement of HSFII (located in the NMR Center) including a Forma Series II water jacketed CO_2 incubator, a 4ft biological safety Cabinet,

inverted microscope, -20° C freezer, 4° C refrigerator, and a Thermo HN II centrifuge w/ microplate carrier

*NOTE: These instruments are owned and maintained by the Weber Lab or part of the NMR Center therefore their availability may be more limited.

Basic and Clinical Science Resources

NICHD Brain and Tissue Bank for Developmental Disorders(SOM)

Scientific Objective:
The Bank serves as a resource for human tissue to support basic and medical research. The focus of the Bank is the collection of brain and systemic tissue from individuals with developmental disorders as well as controls. The Bank has collected tissue from over 3000 individuals. Over 60,000 brain and peripheral specimens are available as either formalin fixed or frozen samples stored at –80^{o}C.

Services:	Average Turnaround Time
Human tissue, fixed or frozen	7-14 days

The tissue is distributed only with demographic information. It does not have any donor identifiers.

Transfer of tissue requires a Material Transfer Agreement obtainable at the web site. The Material Transfer Agreement requires: signature of as IRB official or a copy of a letter indicating that your study has been approved or exempted by the IRB.

A handling fee of $75 is charged per tissue sample.

Personnel:
H. Ronald Zielke, Director
Melissa Larkins, Outreach Coordinator
Robert D. Vigorito, Tissue Coordinator
Robert Johnson, Assistant Tissue Coordinator

Over 650 researchers in 18 countries have received tissue from the Bank. Over 400 publications have been published on research based on tissue received from the Bank.

Contact:
H. Ronald Zielke, Ph.D. (410) 706-1755 Bressler, 13th floor
btbumab@umaryland.edu
http://btbank.org

Dermatopathology/Histology Laboratory (SOM)

Mission:
To provide high quality histology slides in a timely fashion, and to assist accurate diagnosis of our clinical dermatopathology services. The lab also provides reliable material to assist research projects on campus. The Laboratory is ASCP certified and follows all CLIA regulations. A comprehensive quality assurance plan was established for the histopathology laboratory to ensure high quality services.

Facilities:
The laboratory occupies about 2000 square feet of space. The Histology Core Laboratory is located on the 6th floor of 405 W. Redwood Street. It is a non-profit laboratory owned and operated by the Department of Dermatology. The laboratory is open from 8:30 am to 5:00 pm, Monday through Friday, and closed on weekends and regular campus holidays.

Instrumentation:
Shandon Excelsior Tissue Processor, Hiscentre 3 Embedding Center, Finess 325 microtome, Varistain Gemini automatic slide stainer, Consul versatile automatic cover slipper, Olympus BX41 microscope with Qcolor 3 digital camera.

Services Provided:

1. Routine process and H&E stain
2. Routine process and unstained slides
3. Tissue processing and embedding
4. H&E staining only
5. Frozen section
6. Microscopic diagnosis
7. Special Stains, including PAS, Gram, mucin, AFB, Fite, Giemsa, Melanin, Elastin, Trichrome, etc.
8. Immunohistochemistry stains including Cytekeratin, S-100, HMB-45, Smooth Muscle Actin, Vimentin, B- and T-lymphocytic markers, and any other cell markers with antibodies provided.
9. Immunofluorescent slides, including direct and indirect immunofluorescent stains, immunoblotting, etc.
10. Digital photography of microscopic image.

Specimen Requirements:

1. Tissue processing and embedding: Tissue fixed in 10% formalin > 10 volume of the specimen
2. Routine H&E stain: Formalin fixed tissue or unstained slides
3.
4. Frozen section: Speciments in Michelle's Medium
5. Microscopic diagnosis: Fresh or formalin fixed tissue, paraffin block, stained or unstained slides.
6. Special stains: Paraffin block or unstained slides
7. Immunohistochemistry stains: Paraffin block or unstained slides
8. Immunofluorescent Studies: Tissue in Michelle's Medium (Direct) or Serum (Indirect)

Personnel:
Gary Goldenberg, MD , a dermatologist and a board certified dermatopathologist is the director of the laboratory.
Bahram Sina, MD, a senior dermatologist and board certified dermatopathologist, is the laboratory consultant.
Sharon Andres, RN., MBA is the Senior Clinical Administrator of the Department of Dermatology.
Alla Malinina, the laboratory supervisor, assists with laboratory management.
Anthony Gaspari, MD, Chairman of the Department of Dermatology, supervises the overall operation.

Schedule of Fees:

Service	Turnaround (Hours)	Unit	Prices
Routine process and H&E stain	24	Slide	$$12.00
Routine process and unstained slide	24	Slide	$7.00
Tissue processing and embedding	24	Block	$6.00
H&E stain only	2-6	Slide	$3.00
Frozen section without stain	2-6	Slide	$15.00
Frozen section with H&E stain	2-6	Slide	$20.00
Histochemistry stain	24	Slide	$18.00
Immunohistochemistry stains	48	Slide	$20.00*
Immunofluorescent studies	48	Slide	$20.00
Microscopic diagnosis	24	Case	$30.00
Photograph (Microscopic digital image)	24	Picture	$5.00

- $20.00 for the first slide, $10.00 for each additional slide

Contact:
Gary Goldenberg, MD. (410) 328-6098 405 W. Redwood St., 6th floor
ggoldenberg@som.umaryland.edu

Histology Core Facility (SOM/CVID)

The Histology Core provides high quality histological services in a cost conscious and collaborative manner to investigators in the Center for Vascular and Inflammatory Diseases and to the greater University's scientific community. The range of services performed in the core include necropsies and perfusion of research animals, histochemical processing of tissues and cells, paraffin embedding and frozen sections, microtomy and cryotomy sectioning, routine and special staining to visualize cellular and subcellular structures, as well as optimization of antibodies against newly discovered antigens for immunohistochemistry on frozen and paraffin sections. Consultation service is also available to provide advice concerning tissue processing, embedding orientation, and routine or special staining.

Instrumentation:

- Renaissance automatic tissue processor
- Leica EG 1160 embedding center
- Microtome cryostat and rotary microtomes for paraffin and frozen sections
- Nikon Eclipse E 400 microscope with DS camera.
- Arcturus Pixcell II Laser Capture Microdisection microscope

Personnel:

Elizabeth P. Smith, HT (ASCP), QIHC
Location: BioPark One Room 330 (Lab) Room 317 (office)
V: 410-706-8185 (Office), 410-706-8231 (Lab)
F: 410-706-8234
Email: esmith@som.umaryland.edu

Publications that demonstrate our capabilities:

1. Tjurmin AV, Anayeva NM, Smith EP, Gao Y, Hong MK, Leon MB, Haudenschild CC: **Studies of the histogenesis of myxomatous tissue of human coronary lesions.** Arterioscler Thromb Vase Biol 1999; 19(1):83-97.
2. Zhan X, Haudenschild CC, Ni Y, Elizabeth P. Smith, and Huang C: **Up-regulation of cortactin expression during the maturation of megakaryoctyes.** Blood 1997; 89(2):459-462.
3. Ristimdki A, Narko K, MacPhee M, Smith E, Haudenschild CC, Hla T: **Tumorigenic transformation of immortalized ECV endothelial cells by cyclooxygenase-1 overexpression.** J Biol Chem 1997;272(34);21455-21460.
4. Hastings GA, Coleman TA, Haudenschild CC, Stefansson S, Smith EP, Barthlow R, Cherry S, Lawrence DA: **Neuroserpin, a potential regulator of motor learning and neural survival, specifically inhibits tissue plasminogen activator.** J Biol Chem 1997; 272(52):33062-33067.
5. Qian, Jiahua, Burkly, Linda C, Smith, Elizateth P, Ferrant, Janine L, Hoyer, Leon W, Scott, David W, Haudenschild, Christian CC: **Role of CD154 in the secondary immune response: the reduction of splenic GC and anti-factor VIII inhibitor titer.** Europ J Immunology 2000, 30: 2548-2554
6. Manuel Yepes, Maria Sandkvist, Mike K.K. Wong, Timothy A. Coleman, Elizabeth Smith, Stanley L. Cohan and Daniel Lawrence: **Neuroserpin reduces cerebral infarctvolume and protects neurous from ischemia-induced apoptosis.** Hemostasis, Thrombosis and Vascular Biology > Blood, 15 July 2000 Vol. 96 No.2 p. 569-576

7. Liu, Chatherine H., Chang, Sung-Hee Narko, Kristi, Trifan Ovidiu, Wu, Ming-Tao, Smith, Elizabeth, Haudenschild, Christian, Lane, Timothy, Hla, Timothy: **Overexpression of Cyclooxygenase-2 is Sufficient to Induce Tumorigenesis Transgenic Mice.** Journal of Biological Chemistry, May 25, 2001 276:18563-18569
8. Grainne A. McMahon, Eric Petitclere, Steingrimur, Stefanson, Elizabeth Smith, Michael K.K. Wong, Randa J. Westrick, David Ginsburg, Peter Brooks, Daniel A. Lawrence: **Plasminogen Activator Inhibitor-1 Regulates Tumor Growth and Angiogenesis.** The Journal of Biological Chemistry Sept. 7 2001 Vo. 276 No. 36 pp. 33964 – 33968
9. Li, Yansong, Tondravi, Mehrdad, Liu, Jiali, Smith, Elizabeth, Haudenschild, CC, Kaczmareck, Michele, Zhan, Xi: **Cortactin Patentiayes Bone Metastasis of Breast Cancer Cells.** Cancer Research, Sept. 15, 2001 61:6906-6911
10. Manuel Yepes, Elizabeth Moore, Sharron A.N. Brown, Heather N. Hanscom, Elizabeth P. Smith, Daniel A. Lawrence, and Jeffrey A. Winkles: **Progressive Ankylosis (Ank) Protein is Expressed by Neurons and Ank Immunohistochemical Reactivity is Increased by Limbic Seizures.** Laboratory Investigation Feb. 2003 Vol. 83, No. 7, p. 1025 - 1032

Biostatistics (SOM/UMGCC)

Scientific Objectives:
The mission of the Biostatistics Shared Service is to promote clinical, epidemiological, and laboratory investigations of cancer through applications of statistical science of the highest quality. The University of Maryland Greenebaum Cancer Center (UMGCC) statisticians strive to provide a central resource of state-of-the-art statistical science that is easily accessible to all members of the Program in Oncology. Members of the Service collaborate with study investigators in the design and analysis of (1) Phase I, II and III clinical trials of cancer; (2) Laboratory-based studies, including in vitro and animal experiments; (3) Epidemiological studies, including population studies on cancer disparities intervention research. Aside from the Shared Service activities, statisticians carry out methodological research in biostatistics to provide innovative solutions to problems arisen from investigations in the Cancer Center. The expertise of the core faculty covers many areas of biostatistics, bioinformatics and computational biology as demonstrated by their extensive publications in these areas.

Services and Technologies Provided:
The Biostatisticians and Bioinformatician collaborate with UMGCC investigators and provide them access to state-of-the-art statistical science, bioinformatical analysis of high-dimensional data and data mining and sound statistical reporting in all areas of statistical experimental design, analysis and modeling and stochastic modeling, including:

Study Design. This applies to both laboratory experiments (e.g., xenograft models) and clinical trials. Statistical evaluation of sample sizes needed to achieve study objectives, endpoint and control selection, randomization and statistical power analysis and simulation.

Interim Analyses and Monitoring for Clinical Trials. Interim analyses consistent with statistical principles for multiple testing and sequential analyses.

Statistical Analysis. Analysis plan is provided in the protocol (before data collection takes place) and followed. Statisticians assess whether the data satisfy model assumptions implicit in the analysis software to ensure the most appropriate statistical methods are used for analysis.

Statistical Programming. Major statistical software are available including SAS, Splus, Stata, StatXact and East. The Biostatistics Shared Service also develops computer programs for complex statistical problems.

Biostatistics Training. Introductory seminars are provided on biostatistics tailored to cancer clinical investigators and fellows in hematology and oncology. The goal is to enhance understanding of biostatistical concepts and thus to improve clinical protocol.

Reports and Publications. Statistical design and analyses reports are communicated to investigators via memoranda. The memoranda for a project document study design, data source, statistical methods and analysis summaries and is written in a form appropriate for the statistical section for that project (e.g., a manuscript or a grant application).

Specialized Software:
LpLog:
Performs Lp ($p < 1$) regularized logistic regression for high dimensional data including that from the microarray gene expression data where the number of observation can be far less than the number of covariates. It consists of a Readme file and a suite of MatLab functions.
Download LpLog http://www.umgcc.org/research/LpLog.zip

SynStat:

Provides the entire statistical modules for the design (sample size and dose selection) and analysis of two-drug combination studies. It consists of a Readme file and three Splus/R functions.
Download SYNSTAT http://www.umgcc.org/research/SYNSTAT.zip

Personnel:
Ming T. Tan, Ph.D., is professor of Epidemiology and Preventive Medicine and Head of the Division of Biostatistics of the University of Maryland Marlene and Stewart Greenebaum Cancer Center (UMGCC).
Hongbin Fang, Ph.D., is a UMGCC faculty biostatistician and an assistant professor of Epidemiology and Preventive Medicine.
Olga Goloubeva, Ph.D., M.Sc., is a UMGCC senior cancer biostatistician.
Guo-Liang Tian, Ph.D., is a UMGCC faculty biostatistician and an instructor of Epidemiology and Preventive Medicine
Zhenqiu Liu, Ph.D., is a UMGCC faculty biostatistician and an assistant professor of

Policies of Operation:
Statistical support is available to all UMGCC members. A high priority is given to peer-reviewed, funded research projects and the preparation of grant applications. Support for other projects will be provided as time permits. The initiation of biostatistics consultation and collaboration from the Shared Service is via completing a biostatistics project request form. A statistician will contact the principal investigator upon receipt of the completed form.
To forge collaboration, members of the Biostatistics Shared Service attend the cancer center program working meetings, seminars and journal clubs in the specific program they are assigned to support. The interactions from these meetings help the statistician understand the scientific questions and current issues in the field and provide the appropriate statistical method to address the right question.
For more information on acquiring Biostatistics service, please consult our website:
http://www.umgcc.org/research/biostatistics.html

Contact:
Ming Tan, Ph.D. (410) 328-8505 MSTF, Room 261
mtan@umm.edu
http://www.umgcc.org/research/biostatistics.html

Bioinformatics Core Facility (SOM)

Scientific Objectives:
To provide a resource to researchers within the UMB community that automates the research process with state of the art software, hardware, and integration of information processing. To provide consultation and software development that accommodates recent developments in research with an expertise in Genomics. To provide expert accurate data acquisition, data management, and customized computing support for research projects in a cost-effective manner. The Bioinformatics Core (BC) is successful if we are enabling researchers to improve their chances of getting funded in grant applications and to streamline the data collection and data management for funded research projects enabling seamless data analysis and results reporting for generating scientific publications.

Instrumentation:
Sun Fire V440 Server---Oracle Server, 2 1.5 GHz UltraSPARC IIIi Processors,
4-GB Memory, 125 GB disk space
Three Dell Servers
Dell PowerEdge 6650 --- main web server, Xeon 2.0 Ghz processor, 2 GB RAM,
33 GB of disk space
Dell PowerEdge 6400 --- Teleform server, Dual processor x86 Family 6 step 7,
2 GB RAM, 100 GB disk
Dell Server P4600 --- Citrix Server and Fax server, Xeon 3.0 Ghz processor,
130 GB disk space

Software Assets:
Oracle 10G 10.2
Teleform 9.0 Workgroup and Elite version
IRIS: A Protocol data and schedule management software developed by the Core
Websites developed for performing studies and collecting data.
Websites for study participant recruitment.
Systems to automate bioinformatics analysis, including a BLAST of thousands of sequences in hours.
Our computing systems are available 24 hours per day with trouble-shooting and additions to programs during normal working hours.

Personnel:
Mark Pohl. Mark Pohl is a genomic bioinformatics specialist who has extensive experience (15 years) leading a software research and development team in private industry in addition to providing these services on campus for the past four years. Mr. Pohl has been an integral part of the continued development and refinement of the IRIS software application and other database management and bioinformatics tools available through the Bioinformatics Core. He has a M.S. in Computer Science and is a Ph.D. candidate in Information Systems.

Teresa Yates. Teresa Yates came to the Bioinformatics Core team with extensive research knowledge and experience. She also has particular expertise with program development. With respect to the research data acquisition activities, Ms. Yates has developed systematic procedures for form design and data capture using Teleform software. She has also used her managerial and program development skills to develop and implement administrative and business practices for the Bioinformatics Core.

Kristin Frey. Kristin Frey has both informatics and research experience and expertise. She has worked eight years in biomedical research and is generally assigned duties that require interaction with researchers and their staff. She serves as a software analyst, tester and sometime developer within the Core. She has a M.S. in Information Systems.

Tamar Pair. Tamar Pair not only creates the majority of Teleforms in all formats, she also is versed enough in all of the Bioinformatics Core's services to operate the help desk. Ms. Pair also has more than five years experience in applied research. She has a B.S. in Management Information Systems.

Lijun Shao. Lijun Shao has extensive experience in database development for research projects. He has been a key developer for the IRIS system and maintains the database for the IRIS and Teleform systems. He has a M.S. in Microbiology and in Information Systems.

Wanput Reanrungroch. Wanput Reanrungroch is experienced in Access and Oracle databases and software development with Oracle tools. She contributes to the maintenance of IRIS systems and Teleform data integrity and maintains all of the tracking software for the Maryland Stroke Center. She has a M.S. in Computer Science.

The Bioinformatics Core has a policy that we will consider working with any investigator who needs our services. All work we do is on either a fee for service basis or as a percentage of an FTE on grant applications. We provide an initial free consultation to investigators who are interested in automating their research. Once we have a verbal agreement to work together, we create a written agreement that defines the work to be done and what the customer can expect with respect to included or excluded services. The customer and management of the BC authorize this statement of work.

Prices:

Service	Hourly rate	Minimum
Consulting for Study Design or Database Design	70	140
Teleform Design (scan able paper)	50	250
Teleform processing (scan/verify)	60	60
Web, eForms, or PDF Teleform design	70	70
Fax forms and image storage	50	250
Setup Teleform workstation and training	60	360
Data management/access and Logic checks	80	320
User support (web site, data management, ODBC/software usage)	70	280
Data capture (any format) into Oracle database	80	160
Software development	90	180
Routine Data Analysis (frequencies, simple descriptive statistics)	60	240

Prices for long term projects or grants are negotiable and specific to the project.

Contact:
Mark Pohl (410) 706-2060 Howard Hall, Room 124
mpohl@som.umaryland.edu
http://medschool.umaryland.edu/departments/bicore

Pharmaceutical Research Computing (SOP)

Ilene Zuckerman, PharmD, Ph.D. (410) 706-3266
Pharmaceutical Health Services Research, Saratoga Street Garage, 12th Floor
izuckerm@rx.umaryland.edu
http://www.pharmacy.umaryland.edu/PRC/ -

Pharmaceutical Research Computing (PRC) is a research center within the Department of Pharmaceutical Health Services Research at the University of Maryland School of Pharmacy. Our mission is to provide computer programming, data management and analytic support for faculty, postdoctoral fellows, graduate students and other health services researchers. PRC offers a full array of data support services, including procuring data, investigating data integrity and completeness, cleaning data, creating and validating analytic files. In addition, PRC are able to provide input on pharmacotherapeutic issues, operationalize variable definitions (drugs, diagnosis, procedures), perform statistical analyses, participate in project management, and manuscript development.

Extensive experience working with large administrative claims data, secondary datasets, and primary data including pharmacy and medical information is a PRC hallmark. PRC's team includes information technology specialists, programmers, and a statistician, as well as pharmacists from the University of Maryland School of Pharmacy. Their clinical expertise in pharmacotherapeutics, knowledge of reference files (e.g. drug dictionaries, ICD-9-CM, CPT, HCPCS, and revenue center codes) and understanding of research methodology add unique strength to the Center. Together, the entire team provides important contributions to study design, operationalization of variables and data analysis.

Our experienced staff includes:

- Jane Bacon, MS-Office Manager
- Christine Franey, MPH-Research Analyst
- James Gardner, ScM-Programmer & Statistician
- Van Doren Hsu, PharmD-Assistant Director & Pharmacist
- Ron Kasl, BA-System Administrator
- Diane McNally, MS, RPh.-Assistant Director & Pharmacist
- Patricia Stewart, BS-Programmer
- Lori Walker, BS-Programmer
- Jeanne Yang, MCP-Programmer
- Ilene Zuckerman, PharmD, PhD-Executive Director & Pharmacist

To maintain confidentiality of all data and to meet HIPAA compliance standards, PRC has implemented the following procedures to safeguard data:

- Only personnel authorized by the Principal Investigator have access to data.
- All authorized personnel are required to provide evidence of completion of HIPAA training and to complete a confidentiality form for each study that will be maintained in the office.

- Study data will be loaded on to PRC's secure server only after the PI provides PRC a copy of the Institutional Review Board approval or exemption letter and Data Use Agreement.
- If data require the use of patient identifiers, PRC staff will work with the PI to limit the number of essential identifiers to be loaded on to the server.
- Original data are stored in a locked safe with limited access. Archived and backup data are stored with limited access in either an on-site or an off-site locked safe.
- At the end of the study, PRC staff deletes any data per the instructions of the PI. Original data are returned to the PI. In addition, any hardcopy materials with patient identifiers are shredded.

The PRC computer system consists of two servers. One server is Sun Microsystems Fire V240 with two 1.5GHz 64-bit UltraSPARC IIIi microprocessors and 8GB of main memory that runs UNIX. The second server is a Dell 2650 with a single Intel Xeon CPU 2.80GHz, 1GB of memory and 85GB of Internal RAID 5 storage that runs Linux. The Linux server uses Samba and Network File System to provide a data storage area that is seamlessly available to both the PCs and the Sun server. This area is stored on a highly reliable RAID 5 array. To further increase storage, both servers have access to 2.75TB of storage provided by a Storbank-SE 40 and Altus2600a Network Area Storage on a high performance Gigabit private network. All equipment is maintained in a dedicated server room complete with separate air-conditioning and emergency power supply. Other devices available for data input, archiving and printing include SPARC storage DLT8000 Tape Device, Overland Data LoaderXpress SDLT 320, Internal DVD-ROM, and HP LaserJet 4100N Printer.

PRC's services are available at established cost-based prices on a per-project basis.

Contact:
Ilene Zuckerman, PharmD, Ph.D. (410) 706-3266 Saratoga Street Offices, izuckerm@rx.umaryland.edu or
Jane Bacon, (410) 706-5315 Saratoga Street Offices, jbacon@rx.umaryland.edu
http://www.pharmacy.umaryland.edu/PRC/

Cell Biological Core Facility (SON)

Instrumentation:
1) Richard-Allen Scientific HM560 Cryostar cryostat
2) Invitrogen western blot system
3) Immunohistochemistry work station and slide warmer

Contact:
Cynthia L. Renn, Ph.D., Director (410) 706-5736 renn@son.umaryland.edu

Molecular Diagnostics Laboratory/Division of Molecular Pathology

Clinical Diagnostic Services:
The Molecular Diagnostics Laboratory at the University of Maryland Medical Center offers molecular diagnostic testing in all area of molecular pathology including infectious diseases, genetic disorders, and cancer detections. Our laboratory is certified by Clinical Laboratory Improvement Amendments (CLIA ID#: 21D0923512), the College of American Pathologists (CAP ID#: 1351414) and the Maryland Department of Health and Mental Hygiene (Permit Number 837). A list of the current molecular diagnostic tests is as follows:

Infectious Diseases	Genetic and Familiar Disorders	Hematology/Oncology
Human Immunodeficiency Virus Type 1 (HIV-1) Quantitative RT-PCR (Standard)	Cystic Fibrosis (CF)*	Immunoglobulin Gene Arrangement by Southern Hybridization (VDJ Southern)
Human Immunodeficiency Virus Type 1 (HIV-1) Quantitative RT-PCR (Ultrasensitive)	Ashkenazi Canavan Disease (CD)*	Immunoglobulin Gene Arrangement by PCR (VDJ PCR)
Human Immunodeficiency Virus Type 1 (HIV-1) Genotyping	Ashkenazi Gaucher Disease*	T-cell receptor (TCR) gene arrangement analysis by Southern Hybridization (TCR-b, JH, Jκ Southern)
Human Immunodeficiency Virus Type 1 (HIV-1) Virtual Phenotyping	Ashkenazi Tay-Sachs (TS)*	T-cell receptor gene arrangement analysis by PCR (TCR-γ PCR)
Hepatitis C Virus (HCV) Qualitative RT-PCR	Ashkenazi Niemann-Pick (NP)*	
Hepatitis C Virus (HCV) Genotpying	Ashkenizi Familial Dysautonomia (FD)*	
Herpes Simplex Virus Type 1 and 2 (HSV-1/2) Qualitative PCR	Factor V Leiden Mutation Analysis by PCR	
Cytomegalovirus (CMV) Qualitative Real-time PCR	Factor II Mutation Analysis by PCR	
Cytomegalovirs (CMV) Quantitative Real-time PCR		
Toxoplasma gondii Qualitative PCR		

*special request only

Molecular Pathology Translational Research Services:
The Division of Molecular Pathology at the University of Maryland School of Medicine offers molecular pathology-related services for research in all area of molecular pathology including infectious diseases, cardiovascular diseases, psychiatric and genetic disorders, and cancer detections. The Division of Molecular Pathology currently has sixteen faculty members who are experts in various area of Molecular Pathology. Types of service includes, but are not limited to, gene detection by PCR, quantification of gene expression, molecular typing and SNPs of a specific gene of interest, DNA sequencing, use of Quantum dots

(Qdots) for gene detection and single molecule (nucleic acid, protein or polysaccharide) detections.
In collaboration with the Pathology Biorepository and Research Core (PBRC), led by Dr. William Rodgers, we provide additional services including DNA/RNA extraction of banked tissues, nucleic acid storage of tumor and normal tissues, molecular cataloging of tumor mutation status, e.g., p53 status, molecular profiling and specific cancer detection.
For more information about these translational research-related services, please contact Dr. Richard Zhao at 6-6300 or email: rzhao@som.umaryland.edu.

To learn the most recent development of our services, send an email to Dr. Zhao at rzhao@som.umaryland.edu to request a copy of “Molecular Profile” a newsletter of Molecular Diagnostics and Molecular Pathology.

Resources for Research and Compliance

BIORESCO (Biomedical Research Supply Core) (SOM)

Scientific Objective:
To conserve time, money, space and effort for the University of Maryland, Baltimore and its researchers, by maintaining a central supply core facility and expediting service which thrives upon its ability to innovate and re-create itself in accordance with the requirements of the University and its staff. The Program enables scientists to, "do science" instead of procurement and accounting. We endeavor to become a, "one-stop shop" for researchers and their staff. Additionally, the Program assists funding opportunities between University entities and our commercial vendors.

2008 Participating Vendors:

Alexis Biochemicals
American Bioanalytical
Amersham Biosciences
Amresco
Atlanta Biologicals
BD Biosciences (Pharmigen)
Biorad
Lonza - Cambrex (Biowhittaker)
Cell Signaling Technologies
Chemicon (Upstate)
Clontech
Continental Lab Products
Denville Scientific
e-BioSciences
EMD Biosciences (Calbiochem)
Fermentas
Fisher Scientific (Millipore)
Gemini Bio-Products
Hyclone Labs.
Invitrogen
KPL
Mediatech-Cellgro
National Diagnostics
New England Biolabs
Perkin Elmer L.A.S.
Pierce Biotechnology
Promega Corp.
Qiagen
Quality Biological
Research Products Int'L
Roche-Boehringer Mannheim
SABiosciences
Sarstedt
Sigma-Aldrich-Fluka-Supelco

Stratagene-Agilent Technologies
Teknova
Thomas Scientific
USA Scientific, Inc.
USB Corporation
University Pipette Service
VWR Scientific
Valley Bio Medical

Contact:
Carol McKissick, MBA – Director (410) 706-0322 Howard Hall, Room 664
freezer@umaryland.edu
http://cf.umaryland.edu/freezer

Office of Research and Graduate Studies (SOM)

Mission:
The Office for Research and Graduate Studies (ORAGS) contributes to the research mission of the School of Medicine by facilitating and enhancing the ability of the faculty to conduct research and educate graduate students. ORAGS has several reporting units which aid the research effort: the Center for Clinical Trials, General Clinical Research Center, Human Research Protections Office, Animal Care & Use Office, Biosafety Level 3 Facility, Biopolymer Genomics Core Facility, MD/PhD Program, Biomedical Research Supply Core, Transgenic Core Facility and Veterinary Resources. The staff is always willing to assist the School of Medicine community in its research endeavors. Some of the services provided by ORAGS are listed below.

Primary Research Functions:
Grant Routing
Eligibility Requirements/Waivers
Indirect Cost Waivers
Intramural Grant Competition
Research Equipment Enhancement Fund (REEF) Competition
Junior Faculty Mentoring Program
Research Faculty Survival Skills Tutorial

Other Services:
Assistance in locating equipment throughout the School of Medicine.
Assistance in compiling information for Program Project Grants, Center Grants, Training Grants, etc.
Assistance in searching for possible collaborations between investigators, departments, etc.

Contact:
Thomas Hooven, Executive Director for Research Administration
thooven@som.umaryland.edu
Susan Hobbs, Director, Research Administration & Compliance
shobbs@som.umaryland.edu
Mariana Marques, Director, Research Program Development
mmarques@som.umaryland.edu
Diane Lindt, Program Adminstrative Specialist
dlindt@som.umaryland.edu
(410) 706-5485

Office for Research and Graduate Studies
Research Career Development Program

A new Research Career Development Program has been implemented in 2008. In collaboration with the Office for Research and Graduate Studies, the Research Career Development Program offers workshops in subjects that are critical to an academic research career, including Grant Writing, Writing a Scientific Paper and Giving a Research Talk. This new program also includes a consultation service to assist junior faculty in identifying sources of funding. In addition to the workshops and services that are currently offered, several new workshops are being developed.

Current workshops or those planned for the coming year are as follows:

Research Career Development Seminar Series: *Target audience is all SOM faculty.*
Planning a Grant Application
How to Develop a Budget for an NIH Grant Application
Grant-seeking from Private Foundations
Role of a Mentor in a Research Career
Life in the ***FASTLANE***----Keys to NSF Funding Opportunities.

Research Career Development Workshops: *Target audience is all SOM faculty.*
Grant Writing (1.5 day overview)
Intensive Grant Writing Class (10 week session)
Developing Your Research Idea into a Fundable Project
Writing a Competitive Career Development (K) Award
Giving a Research Talk
Project Management and Lab Leadership

Postdoc Research Career Seminar Series: *Target audience is all SOM postdoc fellows.*
Grant Writing for Postdocs
How to Write an NRSA

Contacts:

Wendy Sanders, MA, Assistant Dean for Research Career Development
410-706-5434
wsanders@som.umaryland.edu

Stacie Mendoza, Academic Coordinator
410-706-5434
ssmall@som.umaryland.edu

Website:www.medschool.umaryland.edu/biomedical/.

Center for Clinical Trial (SOM)

Services Provided:
The Center for Clinical Trials (CCT) is a unit of the University of Maryland School of Medicine that brings together University investigators and sponsor organizations in order to place, conduct, and complete clinical research studies as efficiently and safely as possible. CCT serves as a one-stop, full-service resource for University investigators and industrial sponsors who are committed to performing the highest-quality clinical studies. CCT assists investigators in preparing for, implementing, and administering clinical studies, and also assists sponsors in placing and completing studies by facilitating contacts with University investigators and providing ongoing support and expertise in all study phases, from pre-study negotiation through project completion and reporting.
CCT serves all schools at the University of Maryland Baltimore campus in the initiation, administration, and close-out of any type of industry-sponsored clinical study (Phase I through Phase IV, as well as single-site, participating-site, and multiple-site studies). We have a pool of more than 1,500 faculty researchers in the professional schools of Medicine, Dentistry, Nursing, and Pharmacy on which to draw, as well as some of the most advanced equipment and facilities of any academic medical center in the world. In addition, the University of Maryland Medical System is located in the Baltimore/Washington, DC, metropolitan area and is able to draw from a potential patient base of over five million people.

Contact:
Timothy Gilbert, MD, MBA, MSc., FACC, Medical Director
tgilbert@anes.umaryland.edu
Patrice Holtz, RN, MBA, Executive Director (410) 706-2328 HSFI Room 196
cct@som.umaryland.edu
http://medschool.umaryland.edu/cct

Animal Care and Use Office (SOM)

The Animal Care and Use Office (ACUO) is located within the School of Medicine and reports functionally and administratively to the Executive Vice Dean. The ACUO is the regulatory oversight office for the SOM Animal Care and Use Program, and provides support for the UM SOM Institutional Animal Care and Use Committee (IACUC) which conducts ethical and scientific review, compliance, and oversight activities for ~ 450 laboratory animal research protocols. The office, in collaboration with Veterinary Resources, also provides education and training for ~1000 investigators, staff and students involved in research utilizing laboratory animals.

The ACUO's responsibilities include:

- IACUC Administration
- Animal Welfare Inspections and Compliance
- Regulatory reporting
- Training
- Outreach and Communications

The ACUO is committed to ensuring the health and welfare of the animals used in research and teaching at this institution and is committed to the advancement of science. In doing so, the ACUO staff work closely with faculty to assist and facilitate their requests such that they can conduct scientifically justified research that is in full compliance with the Animal Welfare Act, Public Health Service (PHS) Policy on Humane Care and Use of Laboratory Animals, the Guide for the Care and Use of Laboratory Animals and all other applicable regulations, policies and procedures.

Contact:
Angela Peiser, Program Director 410-706-4365 HSF1, Room 210
acuo@som.umaryland.edu
http://medschool.umaryland.edu/acuo

Human Research Protections Office (SOM)

Scientific Objectives:
The University of Maryland School of Medicine HRPO's mission is to cultivate a culture of conscience in the University of Maryland, Baltimore's research community to ensure the highest levels of human participants' advocacy and protections.

The Human Research Protections Office (HRPO) is located within the School of Medicine and reports functionally and administratively to the Dean of the School of Medicine. The HRPO is the coordinating office for the Human Research Protections Program, and provides support for the UMB Institutional Review Board (IRB) which conducts ethical and scientific review, compliance, and oversight activities for over 1,000 clinical research protocols. The office also provides education and training for over 2000 investigators and staff involved in research involving human subjects.

IRB:
The IRB is an administrative body established to protect the rights and welfare of human research subjects recruited to participate in research activities conducted under the auspices of University of Maryland, Baltimore. The IRB has the authority to approve, require modifications in, or disapprove all research activities that fall within its jurisdiction as specified by both the federal regulations and local institutional policy. Research that has been reviewed and approved by UMB IRB may be subject to review and disapproval by officials of the institution. However, those officials may not approve research if it has been disapproved by the IRB.

The IRB also functions independently of but in coordination with other committees. For instance, research proposals involving the use of radiation above and beyond standard of care, and for the purpose of research, are required to be reviewed by the Radiation Safety Committee. The IRB, however, makes its independent determination whether to approve or disapprove the protocol based upon whether or not human subjects are adequately protected, which includes determination of a favorable benefit/risk analysis of the research.

Research that has been reviewed and approved by an IRB may be subject to further review and disapproval by officials of the institution. Those officials may not, however, approve research if it has been disapproved by the IRB. Furthermore, approved research is subject to continuing IRB review and must be reevaluated at least annually (and more frequently, as specified by the IRB).

UMB IRB is comprised of four panels, which meet monthly on Thursday afternoons. Committees #1 through #4 meet the corresponding week during the month. Months extending to a Thursday in a fifth week, do not have a meeting during the fifth week.

All panels of the UMB IRB review biomedical and social behavioral research, and are constituted of appropriate expertise to review the type of research conducted at UMB. Each panel has at least two, and sometimes three non-scientist and non-affiliated members. In addition, a Research Subject Advocate sits on each panel.

The IRB is led by a Chair and four Vice-Chairs, who are experienced researchers, former IRB Members, and are respected among the research community.

The IRB Chair reports directly to the Institutional Official, Bruce Jarrell, M.D., Executive Vice Dean, School of Medicine and is supported administratively by the Human Research Protections Office.

Personnel:
Staffing structure for the Human Research Protections Office includes six IRB Analysts, six Research Compliance Monitors, Four Clinical Protocol Analysts, one Education & Support Specialist, one Information Systems Engineer, and two Program Managers who report to the Executive Director. The Executive Director is the designated Human Research Protections Administrator and exercises operational responsibility, on a day-to-day basis, for the institution's program for protecting human research subjects. Two full-time Office Clerks provide administrative support for this office.

Contact:
Susan Buskirk, Executive Director (410) 706-5037 Biopark 1, Suite 100
hrpo@som.umaryland.edu
http://medschool.umaryland.edu/orags/hrpo

Veterinary Resources

All veterinary support at The University of Maryland, Baltimore campus are provided by Veterinary Resources or through the Program for Comparative Medicine. Veterinary Resources maintains oversight for the acquisition, care and use of all research animals on campus. All animal facilities and the care and use programs on campus are accredited by the Association for Assessment and Accreditation of Laboratory Animal Care, International (AAALAC) and meet federal laws and guidelines for the humane and appropriate care and use of laboratory animals. Animals are housed at nine locations; each of these facilities is maintained by a staff of experienced laboratory animal technicians.
The primary mission of Veterinary Resources is to provide humane and scientifically appropriate care of research animals at The University of Maryland, Baltimore. The facilities and program of animal care and use are maintained in compliance with the Animal Welfare Act of 1966 and all subsequent revisions (regulated by the USDA), and Public Health Service (PHS) guidelines. Veterinary Resources provides support as economically as possible by having a centralized animal care staff and by wholesale purchase of feed, bedding, caging and husbandry supplies. PHS Resource Improvement Grants submitted by Veterinary Resources have also provided monies for large capital improvements on campus. Veterinary Resources is the service division of Comparative Medicine.

Research Consultation:
The staff of Veterinary Resources will provide technical support such as blood withdrawal, administration of anesthetics, animal transportation, etc. to aid investigators in their research activities. Support may also be provided for surgery, pathology and radiology. Certain support is provided as a direct collaboration. Inquiries and prior arrangements can be arranged by contacting our office. Through pre-research consultations, budgeting for this support can be included in research grant applications.

Pre-Research Consultation: The program, through its faculty, has as one of its missions the provision of information and advice regarding:

- Special caging or experimental techniques.
- Selection of appropriate animal species to carry out specific animal techniques.
- Animal models of human diseases.
- Anatomical and physiological peculiarities of animals used in research.
- Techniques of anesthesia, analgesia, chemical restraint, and dosages.
- Techniques of blood and other sampling and drug or chemical administration.
- Pathological and clinical effects of intercurrent animal disease.
- Estimates of animal purchase prices and future per diem rates.

We encourage such consultations prior to the preparation of grant and contract applications.

Contact:
Louis Detolla, V.M.D., Ph.D. (410) 706-8537 MSTF, Room G100
detolla@vetmed.umaryland.edu
http://vetmedicine.umaryland.edu

General Clinical Research Center (SOM)

Scientific Objectives:
The University of Maryland General Clinical Research Center (GCRC) supports our mission to serve the medical needs of the people of Maryland and the region by providing comprehensive care for the community, tertiary care to the state and surrounding areas, and serving as the primary site for health education and research. The GCRC serves as the primary location for NIH/NCRR funded inpatient and outpatient clinical research and training.

Research projects may include off site studies related to long-term care, preventive and interventional medical care. Participants may have a disease process or be normal volunteers, who serve as study subjects or controls, and whose ages may range from children to geriatric age groups. Participants may come from the local community or be recruited nationally or internationally. Participants may enroll in studies that include unproved forms of therapy or diagnostic techniques that may become future healthcare standards. GCRC services support clinical research activities and include nursing, dietary, laboratory, genomics core laboratory, data management, biostatistical and administrative support. Each service adheres to national practice standards and guidelines such as the Code of Federal Regulations & ICH Guidelines, JCAHO, American Nurses Association (ANA), NIH Guidelines for Clinical Research Centers Program (MO1) (November 2001), Recommendations for Patient Safety in Clinical Research (May 17, 2001), the University of Maryland Institutional Review Board for Human Subjects in Research (IRB), and General Clinical Research Center Advisory Committee (GAC) as well as the policies and procedures of the UMMC.

GCRC services are available 24 hours a day, seven days a week as dictated by the research protocols. Studies involve varying levels of complexity such as simple data collection or complex assessment of physiologic stability. Staff coordinates both non-invasive and invasive studies such as tissue biopsies and frequent blood sampling. Participants are provided instructions regarding their rights and responsibilities as research subjects and given information for protocol-specific procedures such as questionnaire completion, medication administration, diet records, return appointments, radiological and other medical procedures. Discharge instructions include medical follow-up for potential adverse experiences related to study drugs or invasive procedures. Nursing staffing patterns are determined by a nursing intensity and participant acuity rating scale.

Facilities:
Outpatient:
* Four Outpatient Exam Rooms
* Outpatient Area:
* 5 comfortable recliners with privacy curtains
* 5 phlebotomy chairs
* Nursing station with computer workstation
* DEXA (Duel Energy X-Ray Absorptiometry) Facility
* Conference Room
* Reception and Waiting Areas
* Specimen Processing Laboratory with:
* Countertop Refrigerated Centrifuge
* Laminar Flow Hood

* Refrigerator and –70 Freezer

Inpatient:

* Six Inpatient Rooms (11 JCAHO approved beds), 24 hour nursing care
* Kitchen/Activities Lounge
* Stool Processing Room and Rehydration Station
* Nursing station with computer workstation

Resources Available Through the GCRC:

Genomics Core Facility

O. Colin Stine, Ph.D. 6-1607 ostin001@umaryland.edu
Nick Ambulos, Ph.D. 6-8553 nambulos@umaryland.edu

Bioinformatics Core

L. Samuel Dongmo, Ph.D. 8-8008 sdongmo@medicine.umaryland.edu

Education and Training

Mary-Claire Roghmann, MD, MS 6-0062 mroghman@epi.umaryland.edu

Biostatistical Core

Patricia Langenberg, Ph.D. 6-3251 plangenb@umaryland.edu
Hegang Chen, Ph.D. 6-4067 hchen@epi.umaryland.edu

Bionutrition Services

Nursing Support for inpatient and outpatient data collection and patient care

Resources to pay for ancillary laboratory testing

General Information, Contact:
Margaret Testa (410) 328-7368 UMMC, 10th Floor, Wings C, D
mtesta@medicine.umaryland.edu
http://medschool.umaryland.edu/gcrc

Office of Research and Development (UMB)

The Office of Research and Development is organized to leverage the University's position as a major biomedical research institution and to capture and market its growing portfolio of intellectual property. ORD directs UMB's Research Administration and Commercial Ventures and Intellectual Property efforts. Our staff is available to assist you.

Research Administration:
The Grants and Contracts Office within the Office of Research and Development provides administrative support to faculty and departmental administrators for all sponsored project activities. UMB faculty were awarded more than $410.9 million in research, service, and training awards in FY07. We will work with you to submit successful grant applications, negotiate agreements and navigate the world of sponsored project administration.

Technologies Available for Licensing:
Innovation is thriving on the campus of the University of Maryland, Baltimore (UMB) - a multidisciplinary campus of six professional schools. UMB is internationally recognized for professional and graduate education in medicine, dentistry, nursing, pharmacy, social work, and law. Our $410 million in funded research, from basic to clinical trials, has led to commercially viable discoveries in areas including:

Oncology, Infectious Disease, Vaccine Development, Cardiovascular Disease, Neuroscience, Autoimmune Diseases, Antisense Technologies, Gene Therapy, Imaging Diagnostics, Drug Delivery

Please contact Ruchika Nijhara, Manager, Commercial Ventures and Intellectual Property for more information about any of the technologies described here.

Contact:
ORD, 110 South Paca Street, 4th Floor (410) 706-6723
http://www.ord.umaryland.edu

Environmental Health and Safety Department (UMB)

The Department of Environmental Health and Safety (EHS) supports the university's mission of education, research, patient care, and public service with programs and services that protect the environment and the safety of our employees and the community. EHS services include:

- Programs that promote the responsible use and disposal of chemical, biological and radioactive material
- Loss prevention programs to protect university assets and limit financial losses
- Emergency management and fire prevention programs
- Programs that promote a safe learning, research, and working environment
- Staff experts to assist the research community comply with safety and environmental regulations

Hours of Operation: 8:00am – 4:30pm.

Contact:
James J. Jaeger, Ph.D., Director
714 West Lombard Street, Baltimore, MD 21201
(410) 706-7055
Fax: (410) 706-8212
After Hours Emergencies should be referred to University Police at 711
http://www.ehs.umaryland.edu

Center on Drugs and Public Policy (SOP)

This Center conducts research on major drug policy issues, organizes conferences and workshops and serve as a consultant on drug issues to organizations in the public and private sectors.

Contact:
Francis Palumbo, Ph.D., J.D. (410) 706-0133 Saratoga Street Offices
fpalumbo@rx.umaryland.edu

Resources for Faculty Development and Education

Multi-Disciplinary Clinical Research Career Development Program (K12) (SOM)

The Multidisciplinary Clinical Research Career Development Program (MCRCDP), funded by the NIH Roadmap Initiative, supports the early career development of Clinical Research Scholars in all types of clinical research, including patient-oriented research, translational research, small and large-scale clinical investigation and trials and epidemiologic studies. It will prepare scientists from a broad range of disciplines, specialties and subspecialties for independent careers in clinical research.

The program brings together the collaborative efforts of the University of Maryland's School of Medicine, Dental School, School of Pharmacy, the Institute of Human Virology, and the Institute for Genome Sciences. Every Scholar accepted into the program will have the opportunity to pursue educational offerings pertaining to best practices in clinical research, research ethics and regulations; working in multidisciplinary teams; and management and leaderships skills.

The University of Maryland Baltimore provides a large number of experienced well-funded primary and secondary mentors engaged in a broad range of disciplines, along with the strength of its existing K30 Clinical Research Curriculum for Scholars' didactic training. The Program receives robust institutional support from UMB and the University of Maryland General Clinical Research Center for the conduct of Scholar's projects.

Within the context of diverse scientific and investigational disciplines, the Program instructs Scholars in the development and coordination of a multidisciplinary research team.

Contact:
Laura Bell-Martin, Academic Coordinator MSTF, Room 314
lmartin@medicine.umaryland.edu (410) 706-6283
http://medschool.umaryland.edu/careerdev/index.asp

Building Interdisciplinary Research Careers in Women's Health Program (BIRCWH) (SOM)

The Women's Health Research Group was awarded a five-year NIH BIRCWH (Building Interdisciplinary Research Careers in Women's Health) grant to train faculty-level scholars to conduct interdisciplinary research in women's health. The WHRG program, called Maryland's Organized Research Effort in Women's Health (MORE-WH), provides opportunities for individuals in the early stages of their research careers to work with experienced faculty scientists from a variety of different disciplines. The University of Maryland Baltimore is an ideal training environment because of the strong basic, clinical and epidemiological research in women's health currently being conducted in four of the seven professional Schools (Dentistry, Medicine, Nursing, and Pharmacy) on the UMB Campus.

Contact:
Patricia Langenberg, Ph.D., Principal Investigator, plangenb@umaryland.edu
Istvan Merchenthaler, MD, Ph.D., D.Sc., Program Director, imerchen@epi.umaryland.edu

MD/Ph.D. Program (SOM)

Scientific Objective:
The goal of the M.D./Ph.D. program is to provide outstanding aspiring medical scientists with broad biomedical training. This experience consists of rigorous research training in the basic sciences, resulting in a Ph.D., complemented by inter-related clinical training that leads to the M.D. degree. Graduates of our program can combine medical needs of society with scientific opportunities in an efficient manner to address important health problems. The clinician/investigators from our program are well equipped to become future leaders in medical research in medical schools and other research institutes.

Training Plan:
The M.D./Ph.D. Program has constructed a well-conceived and thoughtfully implemented interdisciplinary training curriculum that combines clinical medicine with basic research. The approach is to build upon the solid, well-formulated curricula of the Medical School and the Graduate Programs. The guiding philosophy is that M.D./Ph.D. students are not merely MD students with Ph.D. training but rather the Program provides enhancements that illuminate the inter-relatedness of clinical medicine and basic research. Further, other activities provide career guidance and mentoring experiences that allow the students to progress toward their career goals as clinician-scientists in an efficient and confident manner.

Contact:
Terry B. Rogers, Ph.D., Director, MD/PhD Program (410) 706-3990 HSF II, Room S-012
trogers@som.umaryland.edu
Nancy C. Malson, Program Administrator (410) 706-3990 HSF II, Room S-012
nmalson@som.umaryland.edu

Combined DDS-PhD Program

In response to a growing interest in research among students of dentistry and today's strong demand for biomedical researchers in the oral health arena, the University of Maryland Dental School is offering a combined DDS-PhD program. The program is designed to prepare outstanding clinical and basic biomedical scientists, thoroughly versed in the science underlying clinical practice and capable of identifying and addressing significant problems in oral health. Although designed as a seven-year program, an exceptional student can complete the program in six years. A maximum of two students are admitted into the program each year. A student may enter the program in year 1, 2, or prior to entering the third year of dental school.

The combined degree program builds on the School's tradition of attracting and cultivating high-caliber, research-oriented students. Since the start of the program in 1997, more than 90 University of Maryland dental students have undertaken research training at the School or at other Baltimore-area institutions. Many have presented their work at national or international meetings and several have published their studies in peer-reviewed journals. University of Maryland Dental School students have been especially successful in garnering prestigious NIH Summer Research grants. Their research experience at the University of Maryland Dental School has prepared them for new opportunities in the field of biomedical science at universities, hospitals, and laboratories around the country.

Contact:
Norman Capra, Ph.D. (410) 706-4219
ncapra@umaryland.edu

Graduate Program in Life Sciences (UMB)

We are in the midst of extraordinary and rapid change in the nature of biomedical research. The combination of technological advances leading to the sequencing of the human genome, as well as many experimental animal models, and the advent of new therapeutic approaches in a time of rapidly increasing globalization has revolutionized our understanding of human health and disease. Steady funding provided to the National Science Foundation and the National Institutes of Health and effective resource management by many private research foundations generate the resources need to continue to make the United States premier in the world of biomedical research.
The University of Maryland Baltimore is a leading research institution located in the nexus of biomedical research on the Northeast coast of North America. In order to continue to grown and maintain our competitive edge, in 2005 we reorganized our graduate training under the umbrella of the Graduate Program in Life Sciences (GPILS) and created five integrated programs:

- Program in Biochemistry and Molecular Biology
- Program in Molecular Medicine
- Program in Molecular Microbiology and Immunology
- Program in Neuroscience
- Physical Rehabilitation Science

These 5 programs cover the entire range of biomedical research, from the basics of protein structure and molecular biology, through integrative systems physiology, virology and vaccine development up to behavior, cognition, population based genetics, prospective studies and the impact of the environment on human health.
Each independent degree granting program maintains its own admission criteria and standards for advancement through to graduation. Programs are independent from departments and consist of faculty in the basic science and clinical departments of the School of Medicine, School of Dentistry, University of Maryland Biotechnology Institute, The Institute for Human Virology and other UM campuses. The reorganized structure provides greater coordination between and within the graduate programs in order to better serve the training and education needs of our graduate students. We strive to train the next generation of scientists and to provide them the tools for solving the many problems facing mankind today and to anticipate and hopefully prevent those emerging in the future.

Personnel:
Margaret M. McCarthy, Ph.D. - Assistant Dean for Graduate Studies
Tom McHugh - Program Manager, Graduate Program in Life Sciences
tmchugh@som.umaryland.edu (410) 706-6041 Fax: (410) 706-6040
Kathleen S. Reinecke, A.A. - Program Coordinator, Program in Molecular Biology and Biochemistry kreineck@umaryland.edu (410) 706-8417 Fax (410) 706-8297
June Green -program Coordinator, Program in Microbiology and Immunology
jgreen@umaryland.edu (410) 706-7126 Fax (410) 706-2129
Sharron Graves - Program Coordinator, Program in Molecular Medicine
sgraves@som.umaryland.edu (410) 706-6044 Fax (410) 706-6040
Jennifer Guy - Program Coordinator, Program in Neuroscience
neurosci@umaryland.edu (410) 706-4701 Fax (410) 706-4724
Terry Heron - Coordinator, Program in Physical Rehabilitation Science
theron@som.umaryland.edu

Faculty Affairs and Professional Development (SOM)

The Office of Faculty Affairs and Professional Development was created to help faculty find the resources and answers they need to build successful careers at the School of Medicine. We will help campus faculty, community-based faculty and teaching residents develop skills as teachers, evaluators and mentors in our teaching programs.

Our research faculty will find courses and consultation available in grant writing and revision. We'll help faculty develop skills to navigate an academic career successfully, from new faculty orientation through promotion and tenure reviews to retirement.

Graduate Medical Education (GME):

- Serves as a liaison between the School of Medicine faculty and the sponsoring institution for GME programs, the University of Maryland Medical Center in providing oversight for ACGME and other accredited GME programs
- Develops and implements curricula for faculty in competency-based teaching skills, evaluation, feedback skills and other areas.
- Develops and implements teaching skills programs for residents and fellows.
- Oversees external affiliation agreements for GME training.

Continuing Medical Education (CME):

- The office maintains the School of Medicine's accreditation as an approved provider of CME by the ACCME.
- The office helps School faculty plan and implement courses, from on-site Grand Rounds to live multi-day courses in offsite locations, employing traditional and innovative educational technologies and methods.
- The office provides expertise in the management of commercial support for CME activities, and for managing identified conflicts of interest.

Faculty Development:

- The office oversees a comprehensive faculty development program
- The office offers professional development opportunities for physicians planning careers in academic medicine, including programs for Women in Medicine and Minority Faculty in Medicine.

Contact:
Nancy Ryan Lowest, MD, Edam, Associate Dean for Professional Development
nlowitt@som.umaryland.edu (410) 706-8633
Roberta Simpson, Academic Coordinator (410) 706-8631
rsimpson@som.umaryland.edu
http://medschool.umaryland.edu/opd

Maryland Poison Center (SOP)

One of 70 poison centers throughout the country, its mission is to decrease the cost and complexity of poisoning and overdose care while maintaining and/or improving patient outcomes. The Center receives more than 60,000 calls per year, from the routine to the life threatening.

Contact:
Bruce Anderson, PharmD, Director (410) 706-7604 Saratoga Street Offices
banderso@rx.umaryland.edu

Office of Substance Abuse Studies (SOP)

Maryland's Drug Information Service provides drug information to citizens from the State and around the world. As a free service on the Internet, drug information is available on-line 24 hours a day.

Contact:
Anthony Tommasello, PharmD, Ph.D., Director (410) 706-7513 Saratoga Street Offices
atommase@rx.umaryland.edu

Internet Drug Information Center (SOP)

Maryland's Drug Information Service provides drug information to citizens from the State and around the world. As a free service on the Internet, drug information is available on-line 24 hours a day.

Contact:
Bruce Anderson, PharmD, Director (410) 706-7604 Saratoga Street Offices
banderso@rx.umaryland.edu

Peter Lamy Center on Drug Therapy and Aging (SOP)

The Center serves as the focal point of education and outreach programs about the social and psychological aspects of drug use among the elderly and administers the Elder-Health Program for pharmacy students and retired pharmacists.

Contact:
Bruce Stuart, Ph.D., Director (410) 706-5389 Saratoga Street Offices
bstuart@rx.umaryland.edu

Office of Information and Learning Technologies (SON)

The Office of Information and Learning Technologies (OILT) at the University of Maryland School of Nursing is dedicated to improving the quality of teaching, learning, research and community service through technology. The OILT offers a variety of services through Computer Network and Support Services, distance education classrooms, student computer laboratories, video production facilities and the Computer Teaching Theater.

The OILT supports the School of Nursing faculty and students in the following key areas: desktop computer support, remote computer access, audio-visual support, video production, distance education, on-line learning, faculty development in teaching with technology, and computer laboratory support.

The Information and Learning Technologies Customer Service Center (ILT) provides services to faculty, students and staff. Experienced staff and student assistants aid faculty in media applications in the classroom and presentations for conferences. The ILT customer service center is the central location for student questions on how to access video, audio and other multi-media materials required by instructors.

Services available:

- Classrooms and Conference Rooms. Almost all classrooms, conference rooms and labs at the School of Nursing have some type of audio-visual equipment installed. The ILT customer service center also maintains and operates equipment in the 450-seat auditorium. Equipment not installed in classrooms can be signed out from the ILT customer service window by faculty and staff. If equipment or technical assistance is needed, the ILT customer service center is open and staffed during all scheduled classes. Additional audiovisual equipment for seminars and conference rooms are available upon request.
- Multimedia Viewing. Depending on the media resources the faculty requires, students can access and view them in a variety of ways. All multimedia viewing is available in the computer labs. In the computer labs, students can access video, audio, instructor's notes and presentations from the School of Nursing network servers. Using the web/internet, students can have access to limited media at home or elsewhere on the internet. VHS players and monitors are available in the computer labs to view videos that are not available on the computer.
- Distance Learning. Distance learning can be divided into two different learning experiences. Each requires using the latest technology for delivering a course or content. This capability of teleconferencing and web casting also allows the School of Nursing to present and view conferences and presentations from across the state and around the country.
- Interactive Video Network (IVN)/Teleconferencing/Web casting. IVN is basically teleconferencing in a classroom environment. Rooms W202 and W208 are classrooms designed to compress, send and receive audio and video signals. This capability provides two-way interactive video broadcasting via IP, ISDN or over Internet 2. Connections can be made to various locations throughout the state of Maryland or even around the world. This technology enables faculty t conduct transmissions of entire courses simultaneously to multiple sites. Courses have been sent to sites at UMBC, Frostburg State University, Easton Memorial Hospital, Chesapeake College, College of Southern Maryland, UM at

Shady Grove, as well as to individual students who are out-of-state. Each site has audio-visual capabilities that are accessible to faculty and students. Teleconferences have been connected to various sites in the United States. Web casting is a one-way communication capability that allows presenters to "televise" their presentations to a mass audience on the internet. The viewers watch and listen to programs like a show on television. Viewers access a web page connecting them to the video server located on the UMB campus. Web casts can be viewed live or on-demand via a maintained archive.

- Web-based Instruction. Web-based instruction is using the power of the internet to provide course materials (lectures, notes, visual and audio resources) with the capabilities of two-way communication (chat and email) between instructor and student. Courses are now available from the School of Nursing on the Web. The University of Maryland Baltimore uses web-based instruction with Blackboard software. This system provides a uniform and ergonomic platform for students and instructors to access, maintain and complete course work. The School of Nursing has a full time staff position of Instructional Designer dedicated to support Web-based courses.
- Computer Labs. The School of Nursing has more than 105-student computer workstations in four computer laboratories and a computerized classroom that accommodates 25 students, the Teacher Theater. The computer Labs provide students access to class materials and a workstation to complete course work. Each of the four computer laboratories is equipped with 20-24 Pentium IV computers with 15" or 17" monitors, running Windows 2000. All of these public access computers are equipped with Microsoft Office software, SPSS, Internet Explorer, and other Internet-based tools and computer-aided instruction. Each computer's desktop profile and configuration is controlled dynamically via Microsoft Windows 2003 Active Directory.
- The Teaching Theater. The Teaching Theater is a technology and media-rich classroom. It provides faculty with an environment in which technology can be used to improve the lecture process, changing it from its traditional unidirectional information flow to a more collaborative venture. The focus is not on the technology but rather on its use as s tool for accomplishing effective learning.

Contact:
Roger Falsis (410) 706-0658
falsis@son.umaryland.edu

Clinical Simulations Laboratory (SON)

The Clinical Simulations Laboratory (SCL) provides contemporary clinical simulation setting in which undergraduate and graduate nursing students may learn and enhance their skills. This is accomplished through the integration of simulation, clinical scenarios, and resources that facilitate clinical decision making in nursing practice into the curriculum. Non-clinical advanced practice (i.e., informatics, education) students use the lab to see how to integrate their specialty into the practice/education of nurses. The CSL offers opportunities for research related to education and clinical practice. The labs are equipped with state-of-the-art mannequins and clinical simulators.

There are 24 labs on the Baltimore Campus:

- 4 Basic clinical labs (6 to 7 beds each)
- 1 Maternity and woman's health lab (6 beds)
- 2 Adult critical care units (5 beds each)
- 1 Operating room suite
- 1 Pediatric care unit
- 1 Neonate intensive care unit
- 9 Basic and advanced nurse practitioner health assessment labs
- 1 Diagnostic laboratory for nurse practitioners
- 2 Community/home health labs (1 bedroom apartment)
- 1 Simulated hospital room with virtual reality with control room (2 beds)
- 1 Individual practice lab (2 beds)

A full time director and coordinator staff each Clinical Simulation Laboratory. Doctoral and master's level graduate nursing students who work as teaching assistants, provide a high level of resource expertise within the labs.

Contact:
Regina Twigg, MS, RN (410) 706-7898
rtwigg@son.umaryland.edu

Education Support Services, Office of Medical Education (SOM)

Curriculum support services are provided by the Office of Medical Education as follows:

Instructional Technology Group:

- Maintaining and modifying Medscope, the Medical Education website for all students and faculty.
- Issuing laptops to all incoming students and providing support for their use.
- Planning and conducting a Medical Informatics Block, the first course of the curriculum for first year students.
- Laboratory simulation and a digital curriculum.
- Electronic exams and course evaluations.
- Room Scheduling/reservations

Audiovisual & MultiMedia:

- Supporting education instruction with MultiMedia expertise and AudioVisual materials and equipment.

Photo & Graphics Group:

- Providing expert photographers for the campus community
- Offering optical and digital slides and prints
- Specializing in presentation posters and special services

Contact:
Kevin Brown (410) 706-6613 MSTF, Room 334
kbrown@clc.umaryland.edu
http://ome.umaryland.edu