



State University of New York



Upstate
Medical
University

SYRACUSE, NEW YORK

Research Mission Statement

To foster highly integrative, collaborative-rich, multidisciplinary research programs that cross institutional borders, the research mission of Upstate Medical University is

- To improve the health of the global community through the execution of internationally recognized, innovative, and extramurally funded biomedical research programs;
- To meet current and future health needs by expanding knowledge in the biomedical sciences and developing new approaches for disease and disability prevention, management and cure; and
- To educate current and future generations of researchers, teachers, and practitioners.

Strategic Plan for Strengthening Research

Table of Contents

1	Mission Statement
2	Table of Contents
3	Introduction
	RESEARCH PILLARS:
4-5	Disorders of the Nervous System
5-7	Diabetes, Metabolic Disorders and Cardiovascular Diseases
8-9	Cancer
10-11	Infectious Diseases
11	The Foundation
	STRENGTHENING RESEARCH:
12-14	Within Basic Science Departments
14-17	Within Clinical Departments
17-18	Development of Institutes and Centers
18-19	Development and Function of the Center for Clinical and Translational Research
19-21	Research Core Facilities
21-22	Space
22-23	Entrepreneurship, Intellectual Property, and Ties to Industry
23-24	Graduate Education
24-25	Networking with other Medical Schools and Universities Locally, Regionally, Nationally and Worldwide
26	Philanthropy: Partnering With the Community
26-27	Mission Based Management: Measurements of Success
27	Stimulating Innovation: Conclusion
28	Acknowledgements
29-31	Appendix: Space Design Task Force Report, 7/31/08

Introduction

To fulfill our research and education mission requires a well-conceived strategic plan that the SUNY Upstate Medical University community can support and follow as a blueprint for success.

In preparing this plan we first defined a set of disease-centric research pillars: Disorders of the Nervous System; Diabetes, Metabolic Disorders, and Cardiovascular Disease; Cancer; and Infectious Diseases. The pillars are valuable for marketing our research and graduate education programs and for fund-raising. The pillars also allow the establishment of focus areas (figure 1), including one appropriately shared by all pillars: clinical and translational research. The focus areas will be helpful in developing Institutes and Centers, targeting faculty hires for departments, and in developing partnerships with industry and other academic institutions. Faculty will connect to any number of research pillars and focus areas based on their interests.

To succeed in the research focus areas requires strong common foundational sciences (from here on referred to as the foundation), many of which are listed in Figure 1. The foundation is also useful for faculty hires, development of centers, and outside partnerships. In the foundation section of this report we outline those we feel are the highest priority over the coming ten years.

In a time of financial constraints it is absolutely necessary for SUNY Upstate Medical University to set priorities for its limited resources. In this strategic plan we provide a blueprint for the utilization of resources for 2008 to 2018. This being said, SUNY Upstate is committed to all current faculty and their research programs. All must have proper resources—laboratory facilities, core facilities, and other infrastructure—needed for success. This Strategic Plan for Strengthening Research will be followed by a second document: an implementation plan.

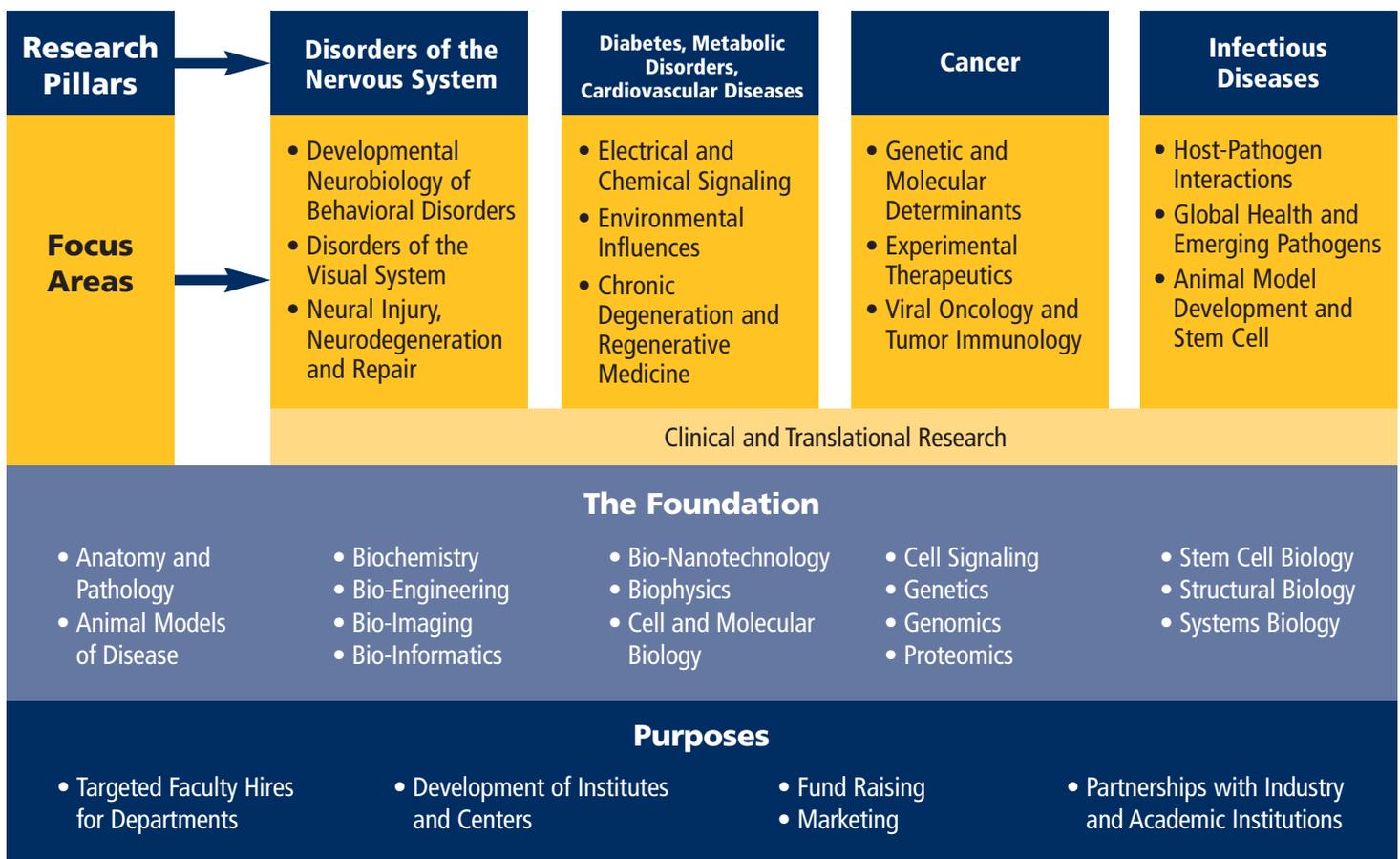


Figure 1. Summary of Research Pillars, Focus Areas, and the Foundation

Research Pillars

DISORDERS OF THE NERVOUS SYSTEM

We propose three research focus areas for future investment:

- 1 **Developmental Neurobiology of Behavioral Disorders;**
- 2 **Disorders of the Visual System; and**
- 3 **Neural Injury, Neurodegeneration and Repair.**

Our goal is to build on current disease-oriented research strengths and to develop new, clinically significant research programs. Although distinct, these areas overlap in the long-term goal to understand the mechanisms driving, and to identify potential cures for, injury- and disease-induced disorders of the nervous system. Consequently, future investments in the specific technologies and new faculty hires suggested here are expected to benefit all three proposed areas. Common objectives include: (a) the discovery, localization, and functional analysis of genes and epigenetic factors responsible for these disorders; (b) the identification of genetic, biological, and environmental risk factors; (c) the development of prognostic and diagnostic biomarkers; (d) the elucidation of the genetic, molecular, and cellular mechanisms underlying brain development, neuronal signaling, as well as synaptic and behavioral plasticity; and (e) the development of simple model systems for understanding the origins and nature of complex neurological disorders. Investment in these research areas will form the foundation to develop clinical/translational linkages between basic researchers and clinicians and lead the way toward new and innovative approaches to prevent and treat neurological disorders.

1. Developmental Neurobiology of Behavioral Disorders: Currently, there is a substantial group of basic and clinical researchers at SUNY Upstate with diverse expertise in the neurosciences, molecular genetics and epigenetics, behavioral science, and brain imaging as they relate to the development and manifestation of a number of behavioral disorders. These include Attention Deficit Hyperactivity Disorder* (ADHD), schizophrenia, autism, Velocardiofacial Syndrome (VCFS), and Fetal Alcohol Spectrum Disorder* (FASD).

*Denotes greater strengths.

Valuable Areas for New Hires:

- 1 Neuroimaging with structural and functional expertise;
- 2 Animal Behaviorist/Neurobiologist to assess brain-behavior relationships;
- 3 Neurotoxicology;
- 4 Statistical Geneticist;
- 5 Neurobiology of dopamine systems;
- 6 Neuropsychologist;
- 7 Epigenetics;
- 8 Bioinformatics; and
- 10 Pharmacogenetics.

Resources will only allow a portion of the “valuable areas for new hires” to be filled in the ten years covered by this strategic plan. However, new hires should be in the areas described here, and in the corresponding research pillar descriptions.

2. Disorders of the Visual System: A significant component of the research within the larger Vision Group is dedicated to understanding retinal development and function. These studies are directed at determining the underlying mechanisms responsible for blindness and visual impairment due to injury, developmental abnormalities, and disease. The group is committed to the translation of basic research discoveries into practical treatments for blinding diseases, including the use of gene therapy and the stem cell based tools of regenerative medicine.

Valuable Areas for New Hires:

- 1 *Drosophila* geneticist/eye development;
- 2 Mouse geneticist/retinal disease models;
- 3 Human geneticist/genetics of inherited retinal degeneration;
- 4 Structural chemist/biochemist/drug development/small molecule screens targeted at pathway manipulation;
- 5 Bioinformatics/genomics/proteomics for identifying candidate disease genes;
- 6 Cancer biologist/eye related diseases;
- 7 Expertise in gene delivery systems and biomaterials engineer to develop biodegradable carriers for cellular transplantation;
- 8 *In vivo* imaging specialist.

3. Neural Injury, Neurodegeneration and Repair: The strength in neural injury focuses on the niche area of cauda equina (CE) injury and repair. CE injury represents ~20% of all spinal cord damage, is under-studied, and is most amenable to repair/recovery. The current expertise is in basic cellular and systems neurobiology, as well as translational rehabilitation studies with injured patients. Through collaborative efforts with the Department of Neurosurgery, a strong component of the research enterprise is to move from bench to bedside with innovative therapeutic strategies. (Note: the VA is building a new major spinal cord injury center with which SUNY Upstate should build research/translational bridges). Neurodegenerative diseases strike primarily in mid- to late-life and the incidence is expected to soar as the population ages. Given the strength in neurosciences at SUNY Upstate, a research focus area that aims to: understand the biological basis of these diseases; develop effective diagnostics and therapeutics; and improve patient care, is a fundamental area that should be developed. A strong component of this research should be in environmental exposure and neurotoxicology.

Valuable Areas for New Hires:

- 1 Animal behaviorist with expertise in functional recovery after injury;
- 2 Molecular biologist with expertise in drug development;
- 3 Systems neurobiologist/neuroanatomist;
- 4 Electrophysiologist;
- 5 Cell biologist for *in vitro* studies;
- 6 Immunologist/neuropathologist with expertise in inflammation;
- 7 Bioengineer/materials scientist; and
- 8 neurotoxicologist.

Technical Foundations to be Developed that Cross Research Pillars:

Small animal functional imaging systems, such as functional Magnetic Resonance Imaging (fMRI), Positron Emission Tomography (PET), or Single Photon Emission Computed Tomography (SPECT) to complement existing micro-Computed Tomography (microCT).

Specific Technical Foundations to be Developed for the Above Focus Areas:

A behavioral phenotyping facility (optimally in, or in close proximity to, the vivarium).

Technical Foundations to be Expanded that Cross Research Pillars:

Genomics (microarray and methylation) and proteomics; Multi-laser confocal microscopy; Flow cytometry.

Note: There are some technologies not indicated here that would depend on specific hires.

DIABETES, METABOLIC DISORDERS, AND CARDIOVASCULAR DISEASES

Diabetes, metabolic disorders and cardiovascular diseases are common chronic diseases which share basic molecular and cellular mechanisms. We propose three research focus areas for future investment in the Diabetes, Metabolic Disorders, and Cardiovascular Diseases research pillar:

- 1 **Electrical and Chemical Signaling**, including responses to stress and mechanisms of hormonal secretion and resistance;
- 2 **Environmental Influences**, including acquired and epigenetic causes;
- 3 **Chronic Degeneration and Regenerative Medicine**, including the study of diabetes and its microvascular (renal, retinal and neurological) and macrovascular (cardiovascular and cerebrovascular) complications, and metabolic disorders including pre-diabetes and its treatment and prevention.

A major goal is to understand processes such as inflammation, oxidative stress and apoptosis responsible for degenerative changes that occur in these chronic diseases. The overall objective is to apply new findings to prevent and better treat these diseases, and ultimately contribute to knowledge that will lead to decreased morbidity and mortality.

1. Electrical and Chemical Signaling: Biochemical and electrical signaling are key areas of research for diabetes, metabolic disorders, and cardiovascular diseases. There are many funded basic science investigators at SUNY Upstate already working in this area. Current examples include: studies of the regulation of insulin secretion; incretin (GLP-1) action; second messenger signaling in beta cells; cellular electrophysiology; gap junction communication; and optical mapping of arrhythmias. This focus area could be expanded to include calcium signaling, signaling mechanisms in cardiac cells and other vascular tissues, GPCR activation, signaling mechanisms involved in cell migration and extracellular matrix interactions. The development of novel pharmacotherapies for the prevention and treatment of cardiac arrhythmias, diabetes and its complications, and metabolic disorders (e.g. metabolic syndrome) are important areas for growth of translational research within this focus area.

Valuable Areas for New Hires:

- 1 Cardiovascular molecular biologist;
- 2 Ion channel electrophysiologist;
- 3 Clinical researcher in cardiac electrophysiology;
- 4 Basic science and clinical researchers in diabetic heart disease;
- 5 Pancreatic beta cell molecular biologist.

2. Environmental Influences: Environmental influences (toxins, small particulate pollutants, dietary factors) contribute significantly to the development of diabetes, metabolic disorders, and cardiovascular diseases and their complications. Chronic inflammation is present in cardiovascular diseases, obesity and diabetes. Factors that alter hormonal secretion or tissue responsiveness to hormones, such as insulin and glucagon-like peptide-1 (GLP-1), are important to understand since they contribute to the abnormal metabolism observed in diabetes, cardiovascular disease, obesity, and even Alzheimer's disease. Investment in this area would further grow environmental research and support our collaboration with the NYSTAR/Center of Excellence and the partnership between Syracuse University and our new Department of Public Health and Preventive Medicine.

Valuable Areas for New Hires:

- 1 Environmental toxicologist;
- 2 Epidemiologist;
- 3 Biostatistician.

3. Chronic Degeneration and Regenerative Medicine: A critical goal is to develop therapeutic approaches to reverse and prevent the degeneration that develops with these diseases. Cell migration, tissue remodeling, immune surveillance, wound repair, angiogenesis as well as a better understanding of metabolic pathways, are vital and currently under study. Basic science research in cell and developmental biology, and clinical studies related to diabetes, represent the current strength of this focus area. Research related to regeneration (including but not limited to stem cells), genetics, as well as the study of innovative pharmacological and behavioral therapies and cellular approaches for the treatment and prevention of these degenerative disorders would be important objectives, and would span investigations from bench to bedside.

Valuable Areas for New Hires:

- 1 Stem cell biologist and geneticist;
- 2 regenerative medicine physician/scientists;
- 3 preventive cardiology and diabetes physician/scientists.

Technical Foundations to be Developed that Cross Research Pillars:

Microlmaging Core to include microCT, microPET, fMRI for functional imaging of small animals.

Specific Technical Foundations to be Developed for the Above Focus Areas:

Integrative Physiology facility for hemodynamic measurements (blood pressure, heart rate, cardiac output) and arrhythmia monitoring in small animals (acute monitoring using electrocardiogram, etc. and chronic monitoring by radiotelemetry).

Technical Foundations to be Expanded that Cross Research Pillars:

Genomics (microarray and methylation) and Proteomics Cores; Flow cytometry; Microscopy Core [two photon and dual spinning disc confocal, total internal reflection fluorescence (TIRF), fluorescence recovery after photobleaching (FRAP), fluorescence resonance energy transfer (FRET) microscopy]; Structural Biology Core [circular dichroism (CD), 3D crystallography, nuclear magnetic resonance (NMR), surface Plasmon resonance (SPR)], Center for Clinical and Translational Research (CCTR).

The studies of prevention and treatment of diabetes and its complications, including cardiovascular diseases, neuropathies, renal disease, eye diseases, obesity and behavioral disorders are attractive areas for bench-to-bedside research. To strengthen the translational research components, the development of the Center for Clinical and Translational Research is essential (see pages 18 to 20). The most active members in this focus area are currently in the Divisions of Endocrinology, Diabetes, and Metabolism within the Departments of Medicine and Pediatrics, and in the Department of Psychiatry. Considerable laboratory experience exists in the areas of diabetes, obesity, cardiac electrical signaling, arrhythmogenesis, and developmental and regenerative cell biology, but clinical research interactions are lacking. To bridge this gap additional faculty are most needed with expertise in clinical and translational research in the Divisions of Endocrinology, Diabetes and Metabolism, Nephrology, and Cardiology related to the prevention and treatment of diabetes, obesity, cardiovascular diseases, renal disease and metabolic disorders. Faculty in biostatistics and informatics are also essential.

Valuable Areas for New Hires:

- 1 Clinical cardiac electrophysiologist and diabetic heart failure researcher;
- 2 Clinical diabetes researchers;
- 3 Structural Biochemist (drug development);
- 4 Translational diabetes researcher;
- 5 Biostatistician;
- 6 Informatics expertise;
- 7 Diabetic kidney disease researcher.

Additional Activities to be Developed for the Above Focus Areas:

To promote more interdisciplinary and translational research, a Journal Club and Research Seminar Series should be initiated to develop interactions among the Focus Areas of the Diabetes/Metabolic/ Cardiovascular Diseases Research Pillar. A major goal is to reestablish an interdisciplinary Research Institute and to develop interdisciplinary Program Project Grants that include extensive utilization of the Research Core facilities and inclusion of all basic and clinical science research components.

CANCER

Cancer affects people of all ages and remains the second leading cause of death for both males and females in the US. It is estimated that more than one million new cases of cancer are diagnosed each year with over half million deaths occurring due to cancer in the US alone. The World Health Organization projects that if current trends are to continue, by 2030 cancer (along with cardiovascular diseases and traffic accidents) will become the most common cause of death worldwide. Clearly, there is an urgent need to improve the management of human malignancies.

The overall goal of the strategic plan pertaining to cancer should be to establish a cancer center at SUNY Upstate. It is envisioned that the Upstate Medical University Cancer Center will develop strong laboratory, clinical and translational, and population-based research activities and that the center will be the focal point of all cancer research and therapy-related activities here.

For future growth, the following three research focus areas are proposed:

- 1 Cancer Biology: Genetic and Molecular Determinants of Human Malignancies**
- 2 Experimental Therapeutics**
- 3 Viral Oncology and Tumor Immunology**

Currently, several investigators are engaged in cancer research. For example, a program in Cancer Biology and Therapeutics currently exists in the Department of Pharmacology. Investigations relevant to Viral Oncology/Immunology are currently ongoing in the Department of Microbiology and Immunology. Investigators in the Departments of Neurosurgery and Neurosciences are engaged in research relevant to Neuro-oncology. Orthopedic Oncology research in the Department of Orthopedic Surgery is also ongoing. Clinical research at SUNY Upstate involves various clinical trials led by clinicians of the Hematology/Oncology Division in the Department of Medicine as well as by faculty in the Departments of Pediatrics, Surgery, and Radiation Oncology. However, as substantive interactions among investigators are generally lacking, an immediate goal is to enhance cross-department awareness of current cancer research at SUNY Upstate. Another important and immediate goal is to improve interactions among cancer researchers on campus and also to develop a mechanism to bridge interactions between basic scientists and clinicians interested in research. Such interactions are expected to foster collaborations and secure additional extramural funding. An initiative to strengthen clinical and translational cancer research is also needed. Several existing investigators whose research intersects multiple disciplines can also be integrated into programmatic themes with a focus on cancer.

1. Cancer Biology: Genetic and Molecular Determinants of Human Malignancies

Cancer is a genetic disorder, as abnormal gene regulation—due to mutations, deletions, gene amplifications or other molecular mechanisms—remains critical to cancer development and progression. Therefore, a focus group studying the genetic and molecular mechanisms underlying abnormal cancer cell growth is needed. Researchers engaged in such endeavors are already in place at SUNY Upstate and additional investigators can be recruited.

Valuable Areas for New Hires:

Investigators engaged in research aiming to elucidate all aspects of genetic traits and molecular determinants linked to cancer development and progression. Some of these investigators may be studying a single malignancy while others may be investigating multiple tumors. In general, these hires are expected to utilize state-of-the-art genetic, cell and molecular biology, genomic and proteomic approaches in their respective research activities. It is envisioned that such research endeavors will facilitate early detection as well as improved diagnosis and prognosis of human malignancies. Such activities are also expected to help identify and develop molecular targets for therapeutic interventions. Investigators on campus are also engaged in research relevant to multiple disciplines including cardiovascular and musculoskeletal abnormalities, inflammation, and metastasis. These activities cross into multiple pillars and, in the case of metastasis, are relevant to Cancer Biology. Therefore, these investigators can also join this focus area and more can be recruited to strengthen activities related to tumor invasion and metastasis.

- 2. Experimental Therapeutics:** Drug development is an important aspect of basic as well as clinical and translational cancer research. Therefore, a focus group engaged in design, development, and utility of novel cancer therapeutics is needed. These investigators can interact with basic scientists to identify novel, drugable molecular targets and with clinicians to initiate early phase clinical trials.

Valuable Areas for New Hires:

Investigators engaged in activities involving drug design and development, mechanisms of cell death and survival of normal and cancer cells, mechanisms of chemosensitivity and resistance, and validation of drug targets are desirable hires.

- 3. Viral Oncology and Tumor Immunology:** Viral infections and alterations in immune response are also associated with human malignancies. For example, human papilloma virus (HPV), Epstein-Bar virus (EBV), and human T-cell lymphotropic virus type 1 (HTLV-1) are linked to human malignancies. Immunotherapy is now becoming an attractive approach to manage human malignancies, e.g., the development and utility of Trastuzumab (Herceptin), an anti-HER2/neu antibody for a subset of breast cancer and Rituximab (Rituxan), an anti-CD20 antibody for lymphoma.

Valuable Areas for New Hires:

Investigators engaged in fundamental studies in viral oncology and tumor immunology as well as those involved in developing cancer immunotherapy. This focus area will also cross into the "Infectious Diseases" research pillar.

Technical Foundations to be Developed that Cross Research Pillars:

Small animal functional imaging systems.

Technical Foundations to be Expanded that Cross Research Pillars:

Genomics and proteomics, Flow cytometry, Confocal and electron microscopy.

Additional Activities for Cancer Research Pillar:

Research should be coordinated with educational programs, and currently two graduate-level courses with a cancer focus are offered by the Department of Pharmacology. Additional team-taught courses and graduate and post-doctoral training programs in Cancer Biology can be developed. A seminar series integrating basic scientists and clinicians can be initiated to foster scholarship and collaborations among SUNY Upstate faculty as well as outside investigators. The major goal of the cancer strategic plan should be to utilize all of SUNY Upstate's cancer-relevant capabilities to create a single unit across departmental boundaries, and then promote its growth. This approach should foster research excellence in broad areas with a common focus on cancer. It also would be expected to achieve a critical mass of highly competitive basic, clinical and translational cancer-relevant research, and ultimately lay the groundwork for the creation of a cancer center at SUNY Upstate.

INFECTIOUS DISEASES

Three research focus areas for future investment involving the research pillar Infectious Disease are proposed:

- 1 **Host-Pathogen Interactions;**
- 2 **Global Health and Emerging Pathogens; and**
- 3 **Animal Model Development.**

The intent of identifying these areas is to build on current disease-oriented research strengths in keeping with the research mission to integrate scientific activities and expertise across the institution. Scientific goals and objectives within these focus areas are: (a) the characterization of host–pathogen interactions through genetics, receptor characterization, proteomics and host immunology; (b) creation of a center of excellence to study pathogens of current and future global health importance; (c) to develop animal models in which to study the pathogenesis of the host-pathogen interactions and to develop translational research models in which to develop and test drugs and vaccines.

1. Host-Pathogen Interactions: Understanding host-pathogen interactions is key in determining the pathogenesis of human illness from infectious diseases, and crosses the field of science to study virulence factors, host-pathogen receptor interactions and human immunology. Currently, institutional expertise and resources exist to study host-pathogen interactions, such as epitope discovery/design for novel methods in vaccine development. This focus area will bring this expertise into a team approach to develop a unified concept behind host-pathogen interactions.

Valuable Areas for New Hires:

- 1 Receptor characterization and identification;
- 2 proteomics;
- 3 T-cell immunology;
- 4 Viral immunologist.

2. Global Health and Emerging Pathogens: Diseases afflicting the global community produce a high degree of morbidity and mortality. Many of these diseases are largely preventable, suffering from inadequate diagnostics, insufficient therapeutics, and a lack vaccines to prevent them. This focus area will create an environment for innovative thinking and visionary solutions to address global health problems. It will be a forum for collaboration, integrated team-building, recruitment for the next generation of faculty and world-leaders and international cooperation. The broad mission will be to facilitate and focus the expertise and resources of the SUNY Upstate Medical University with global collaborators to conduct research and develop products to promote global health. The primary mission will be to carry out translational research to develop products (diagnostics, drugs and vaccines)—from ideas to pre-clinical laboratory studies, animal studies, and human clinical trials targeted to global health problems such as tropical diseases and cancers. This will require a team approach of both clinicians and basic science researchers to develop products and international field sites and collaborators for product testing.

Valuable Areas for New Hires:

- 1 Expertise in malaria, dengue and emerging pathogens;
- 2 funded researchers with field sites in developing nations;
- 3 translational scientists with expertise in epidemiology and field site development.

3. Animal Model Development and Stem Cell Research: The Center for Humanized Severe Combined Immunodeficient Mice Mouse Disease Models (hu-SCID) at SUNY Upstate will be the center for this focus area. This is a unique facility and research unit created to foster interdisciplinary scholarship and research focused on developing and utilizing the humanized severe combined immunodeficient (SCID-hu) mouse. This novel in vivo animal model has the potential to become a broad platform for investigations of stem cell biology, human viral infections, initiation of oncogenesis, and translational development of anti-virals and chemotherapeutics. The focus and goals of the scientists in this highly specialized Center are to better understand disease pathogenesis and to develop preclinical models to test novel anti-virals, vaccines and chemotherapeutic drugs.

Valuable Areas for New Hires:

- 1 Stem cell research;
- 2 Regulatory expertise in good laboratory practice;
- 3 animal model development.

Technical Foundations to be Developed that Cross Research Pillars:

Small animal functional imaging systems such as the IVIS 200 Imaging System.

Specific Technical Foundations to be Developed for the Above Focus Areas:

Center of excellence in global health.

Technical Foundations to be Expanded that Cross Research Pillars:

Genomics, stem cell research and proteomics.

THE FOUNDATION

The Foundation is the backbone to the successful execution of the strategic plan. Each focus area within each research pillar requires strong foundational research to succeed. Faculty with expertise in foundational research are found primarily within basic science departments which need to grow at a rate of 3-to-5% per year over the next ten years.

The figure on page 3 lists 16 foundational research areas which must be on campus or accessible to SUNY Upstate faculty for the research enterprise to become cutting edge. The list is by no means inclusive of all necessary foundational research but does include many that are critical. Some of these components of the foundation are already well represented at SUNY Upstate (examples Biochemistry and Cell and Molecular Biology), others are beginning to emerge but need far more strength (examples Bioimaging, Bioinformatics, Genomics, Proteomics, Structural Biology, Systems Biology and Stem Cell Biology), and still others would be best brought on board through collaborations with Syracuse University and other regional Universities (example Bioengineering and Bionanoscience). Given the stated needs of the research focus areas, we feel that targeted basic science hires should be focused on researchers who will bring the tools represented in the second grouping above and in addition scientists working on animal models of disease and translational research. The latter will be greatly benefited by the transgenic capabilities that will be available in the IHP expansion. The Foundational hires should be scientists applying their technologies to one or more of the pillars and preferably performing research that dovetails with multiple focus areas.

Strengthening Research within Basic Science Departments

STRENGTHENING THE BASIC SCIENCE DEPARTMENTS

The central precept is that a Department is a unit of the College of Medicine that fosters research and teaching in a prescribed area(s). Members of a department should have teaching responsibilities and research activities that address common goals.

Positions

At present, not all departments have a full complement of faculty members. Each Department should have a base of faculty members (historically 11) plus the Chair. Variation beyond this should be based on higher teaching responsibilities in the medical school curriculum. For example, the Department of Cell and Developmental Biology should be allotted additional positions to accommodate their large teaching load. When a faculty member leaves or retires, that slot should be filled with a replacement faculty member in order to maintain the base.

Commitments made by the University to Departments (often through their Chairs) must be honored. If there is any question about this, the University should not make additional commitments until original ones are fulfilled.

Basic Science Departments are equally important to the Institution as Clinical Science Departments. The same sense of urgency and diligence should be afforded to Basic Science Departments as is the Clinical Departments.

The vitality of the research enterprise depends upon the breadth and growth of the faculty. Growth can come from multiple sources.

- 1 The growth of the Basic Science Departments should be matched with its research success and directed in concert with Focus Areas described in the Strategic Plan.
- 2 The loss of a senior faculty member should result in replacement with a new senior faculty member.
- 3 New faculty members may be added to a Department based on funds from non-traditional sources, e.g., endowed positions and Empire Scholars. The allocation of these positions would be primarily based on the wishes of the endower and the Institutional Strategic Plan.

Resources

Traditionally, the integrity of a Department has been husbanded by the Chair with the support of the Dean. Each Department is provided the resources (space and equipment) by the Institution in order to achieve its research and teaching goals. Fiscal support for a Department comes from a per annum from the institution and from a portion of the funds obtained from salary savings (via the Department Development Fund) garnered through extramural support earned by faculty members. Both accounts are under the full control of the Chair of the Department.

Research opportunities

All faculty members are expected to participate in scholarly activity, e.g., original research. The expectation is that each will obtain extramural support for his/her activity. This activity should be fostered by the Chair and the Department, however, all Faculty members are free to collaborate with faculty of other Departments and at other institutions. Indeed, such interactions are encouraged.

In order to strengthen the Basic Science Departments:

Although each Department has historically been provided with the resources (space, equipment and a per annum), by the Institution, to achieve its research and teaching goals, an unambiguous policy regarding the use of these assets should be established. In this regard, the overarching goal of such a policy should be to foster Departmental creativity and provide the means by which precious Departmental assets (personal effort, capital, space, and time, etc.) can be utilized to enhance the institutional mission.

Begin in Years 1-5

- 1 The research enterprise and the success of Departments requires the Institution to maintain first-rate Cores. Cores are a mechanism to foster interactions across Departments and among research programs and they are imperative to maintain the competitiveness of the research programs throughout the school. The responsibility of maintaining and supporting the Cores should lie with Institutes and/or the University.
- 2 Growth of research in the basic sciences must fit the Strategic Plan, and particularly, the further strengthening of Focus Areas. Despite the urge to follow fads in research, resources must be directed to the identified Focus Areas. This includes recruiting, which must be strategically considered.
- 3 A timeline of recruitment should be laid out in line with the priorities of the Focal Areas. This would enhance collaboration among faculty in different Focal Areas (i.e., minimize competition). Hires of opportunity should be pursued, but in the context of fleshing out Focal Areas.
- 4 Research in the basic sciences must be complemented by active, extramurally supported research in the Clinical Departments, but in ways that is consistent with the Strategic Plan and in developing the Focus Areas. This will require that Chairs of Clinical Departments and the University provide "clinic-free time" (ideally months of the year, rather than portions of each week) so that clinical faculty can maintain competitiveness.
- 5 Meaningful bridging between Basic and Clinical Departments should be encouraged. This would allow for proper mentoring of young faculty members and for basic science faculty to develop translational research programs that may be fruitful.
- 6 Postdoctoral fellows are vital to a successful research enterprise as they are arguably the single most productive element of a basic science lab. In addition to their bench productivity they provide important training and lab management functions, engage in peer review activities, contribute significantly to manuscript and grant applications and are a major source of scientific experience and creativity within a laboratory. Despite their importance to building the research enterprise at Upstate, the status of post-docs is poorly defined, their number unknown, and no institutional resources have been dedicated to their recruitment, advising or retention.

The following recommendations are made to improve the training environment for post-docs, make Upstate more attractive, and increase the number of post-docs at Upstate.

- a. It is recommended that a survey of current and past Upstate post-docs be completed. These surveys determine the success of Upstate in the mentoring of the post-docs and the current positions of past post-docs. This information would be in preparation for submitting a training grant.
- b. In a continuing effort to improve the climate for post-doctoral training, the College of Graduate Studies (with the support of Human resources) should develop a plan to aid in the recruitment, training, and support of post-docs.
- c. To increase the number, recruitment, and retention of highly qualified postdoctoral fellows, the Institution should provide financial support for outstanding candidates preferably attracted from outside the University.

Begin in Years 6-10

- 1 The development of new Cores will become necessary as new faculty members are hired and new research directions are pursued. The identity of these Cores is at present unknown, but should become evident during Years 1-5. This may also be partnered with sunseting Cores that are not well used or should be handed off to the responsibility of a Department or Institute.
- 2 Grant applications to support the training of pre- and post-doctoral students should be submitted. This will require changes during Years 1-5 to demonstrate a solid track record in attracting and training the best candidates, and in finding positions for these people after they leave Upstate. This also includes an application for a Medical Scientist Training Program which will have the added requirement of having active research laboratories successfully headed by physician scientists (see Years 1-5 #3 above). To attain these goals, it may be necessary not to “fill” the classes of Ph.D. and M.D./Ph.D. candidates to assure that we matriculate the finest.

STRENGTHENING RESEARCH WITHIN CLINICAL DEPARTMENTS

Clinical research is an important component and extension of clinical medicine. It is necessary to discover better approaches for the prevention and treatment of diseases, and research involving human subjects is critical to the mission of academic medical centers.

Defined as the pursuit of hypothesis-driven scientific inquiry in health and human illness, clinical research encompasses a range of scientific inquiry. This includes: basic laboratory research involving human materials; animal experimentation; clinical trials; community-based translational research; epidemiology; and meta-analysis of published data. A strong clinical research program also supports other scholarly activities: teaching; keeping abreast of new developments and techniques through literature reviews and continuing education; and contributing to the field of medicine by presenting at professional meetings and publishing case reports and patient series.

The growth of clinical research, the teaching of clinical research, and the training of clinical researchers strengthens SUNY Upstate in several important ways:

- Knowledge gained is used to improve the health of patients and enables academic centers to provide innovative, unique services and state-of-the-art tertiary care.
- The teaching of future clinicians is strengthened since an understanding of the scientific method (defining a hypothesis, developing the methods and sample population to test the hypothesis, the generation of meaningful results and the proper analysis that supports or disproves the hypothesis) is essential to excel in clinical medicine.
- Clinical research is a priority of funding agencies such as the NIH, which are encouraging investigations that span bench-to-bedside.
- Growth of clinical and translational research has the potential to significantly increase funding to the institution.

The goal of these recommendations is to expand clinical and translational research in clinical departments by creating an environment conducive to high quality clinical research and by recruiting and developing a cadre of clinical academic investigators who are dedicated to teaching the art of clinical research.

Strategic Planning

ADMINISTRATIVE: Facilitating clinical research requires a strong administrative office to inform investigators of grant opportunities, assist in the development and submission of grants, coordinate collaborative efforts, and assist in the execution of grant funding.

Short-term Administrative Objectives (Years 1-5):**1 Provide centralized administrative support**

Expand and strengthen our current grant office to provide a centralized administrative support center directed to facilitating clinical research. This should include the hiring of an Assistant Vice President for Sponsored Projects and an additional grants specialist (as stated in the Engaging Excellence document). This office will have the capabilities to inform clinical investigators of grant opportunities, assist in the development and submission of grants, coordinate collaborative efforts, and assist in the execution of grant funding.

2 Use a grant service

The immediate implementation of a grant service such as Cayuse (www.cayuse.com) can assist in grant development and submission.

Long-term Administrative Objectives (Years 6-10):

Hiring and strengthening the grants office should be aimed at the long-term objective of providing a seamless entry point for anyone wishing to participate in clinical research. The proposed scenario will be for young investigators with research interests to contact the grants office first. There, they will be given help in finding potential funding opportunities, provided with information on investigators who have potential to collaborate, and guided on grant writing and development. The grant office will then review and submit the grant and assist in developing and submitting the budget. The grant office will facilitate the researcher's integration into the existing infrastructure of SUNY Upstate, such as clinical trials or clinical studies, the IRB for human use protocols, the CHUA for animal studies and the Center for Research and Evaluation (CRE) for statistical support.

CREATING A CLINICAL RESEARCH ENVIRONMENT: The goal is to create an environment that will facilitate the interest of students and young investigators in clinical research, to facilitate initiatives and collaborative efforts across clinical departments, and to develop an energized and cutting edge academic environment.

Short-term Environment Objectives (Years 1-5):**1 Recruit funded researchers to interdisciplinary teams**

Active recruitment of established funded clinical and translational researchers to clinical departments will add members to interdepartmental interdisciplinary teams in established research areas. New faculty would not only contribute to the growth of clinical research, but will serve as mentors for trainees and junior faculty.

2 Establish clinical databases

Establishing clinical database(s) for researchers would help them conduct clinical research using de-identified data and to identify potential subjects for clinical trials. All inpatients and outpatients are required to be given the opportunity to allow review of their medical records for research, for their de-identified information to be used in research studies, and/or for them to be contacted for potential participation in clinical trials. This process needs to be HIPPA-compliant. An EMR is needed as soon as possible, which should be capable of assisting with these processes. Informatics and IMT support are necessary to establish and maintain this database, and assist researchers are needed to obtain data for IRB-approved protocols.

3 Enhance resources for the CCTR

Development and growth of the Center for Clinical and Translational Research (CCTR) requires critical resources of the CRE (statistical, database and informatics support) and the Clinical Research Unit (CRU). (See section "Development and Function of the CCTR")

4 Hold annual symposium

Create an annual clinical research symposium for currently active and funded clinical researchers to present their research activities. This symposium should be across all clinical departments and include and not be limited to the Departments of Medicine, Surgery, Radiology and Pathology. This should be published as an annual compendium of clinical research activities at SUNY Upstate and a reference for anyone interested in getting involved in clinical research.

5 Protect research time

Create a new paradigm to support funded clinical researchers through protected research time without consequences of reduced salaries due to reduced clinical time.

6 Create and fund research tracks for residency and fellowship programs

Funded clinical research tracks within established residency and fellowship programs would include protected time to research and develop projects, which would result in published manuscripts. Funding will include support for additional residency or fellowship years for established investigators to continue their research.

7 Publicize efforts

Community outreach would engage the community in SUNY Upstate's research efforts. This should include discussion on the importance of clinical research, understanding the IRB process, facilitating the enrollment of individuals into studies and fund-raising for research.

Long-term Environment Objectives (Years 6-10):**1 Support a team approach**

A strong cadre of funded clinical researchers, who are integrated and highly collaborative across clinical and basic science departments, could be comprised of internists, surgeons and others approaching such problems as orthopedic devices, endocrinology, cardiology and infectious diseases.

2 Train residents and fellows

Within this cadre of funded clinical researchers, develop a strong academic training environment for residents and fellows who are integrated and supported in clinical research at SUNY Upstate.

3 Develop a biobank (serum, cells, DNA) from SUNY Upstate patients for future research.

TEACHING CLINICAL RESEARCH: The goal of teaching clinical research is to integrate it into the core of residency and fellowship training and well as graduate school programs. The result will be graduates who have a deep understanding of the principles and practices of clinical research, even if they pursue a clinical or basic science career, and to develop graduates who are motivated to pursue a career involving clinical research.

Short-term Teaching Clinical Research Objectives (Years 1-5):**1 Develop a core curriculum**

Development of a core curriculum involving the principles and practice of clinical research would include such topics as: the scientific method; study designs; biostatistics; data interpretation; grant writing; and publishing a manuscript. Consideration should be given to integrate this activity with the MPH program at SUNY Upstate. Instructors in the MPH program and the CRE should be invited to develop and give courses in this curriculum.

2 Offer the core curriculum across departments and residency/fellowship programs in a unified teaching curriculum.

3 Integrate a journal club

Encourage the critical review of scientific journals through a research-oriented journal club as part of the residency/fellowship program. This should draw full participation across departments of both housestaff and clinical researchers. Integration with the graduate school program with Masters and PhD students and housestaff will achieve cross-talk between disciplines, an improved understanding of each of their specialties, and the beginnings of a team approach to problem solving.

Long-term Teaching Clinical Research Objectives (Years 6-10):

1 Establish an academic clinical research office

Create an academic clinical research office with new hires to coordinate, develop and administer the core curriculum. Hires will include a scientific coordinator, an administrator and a cadre of clinical research instructors.

DEVELOPMENT OF INSTITUTES AND CENTERS

Institutes and centers serve a valuable purpose in stimulating interdepartmental and interdisciplinary research amongst faculty. The development of institutes and centers will help Upstate Medical University improve the number and quality of cross-departmental collaborations, increase program project and center grant proposals, and develop an environment that is more conducive to training PhD students and post-doctoral trainees who will then be better prepared for the scientific world of the 21st century.

Definitions:

Institutes are inter- and trans-departmental activities that actively involve faculty members from three or more departments. These are broad “umbrella” programs akin to a research pillar. Institutes should include SUNY Upstate basic and clinical science faculty as well as faculty from other Institutions.

Centers are focused, theme-based activities that fit within one or more research pillar. Each center is likely to involve faculty members from more than one department, but it must involve six or more faculty members.

Establishment of an Institute or Center:

There are two potential mechanisms for establishing an institute. An institute would be formed by the President, Senior VP, and VP for Research to fit the University’s strategic plan. The institute director would be appointed by the VP for Research. Alternatively, an institute may be created in a similar process to that of a center (see below).

A center would be created by a group of six or more faculty members (including chairs). The proposal should include a plan encompassing academic, financial, and operational strategies. The initiation of this plan should include short- and long-term objectives and measurable outcomes. The plan would be reviewed by the Research Steering Committee in its role as advisors to the VP for Research. The director for the center would be recommended by its constituents and appointed by the VP for Research.

As institutes and centers are research endeavors, the directors of these groups should report to the VP for Research.

Operations of Institutes and Centers:

Directors will serve at the pleasure of the administration and this appointment should be reviewed triennially. Each institute or center would develop bylaws that must be approved by the VP for Research and University Counsel. Membership in an institute or center would be based on an application to the director and reviewed based on a process defined in these bylaws.

All full-time faculty members in an institute or center must have a primary appointment within a department. Promotion and tenure packages will be prepared by the department chair. Institute or center directors will be asked to provide a letter which will appear in the applicant's promotion package.

Although we are in a time of financial constraints, this should not obviate the critical goal of developing research institutes and centers. To accomplish this, it is recommended that SUNY Upstate develop an entrepreneurial model in which any investment be developed around a philosophy of self-sufficiency through the use of indirect costs generated from grants of institute or center faculty members. Likewise, resources developed through contracts, appropriations and philanthropy would be key elements of this entrepreneurial model.

Institute or center performance will be measured by predetermined defined outcomes on a three-year basis. At this time the VP for Research will determine whether to recommend continuance or discontinuance of the institute or center to the Senior VP and President.

Graduate training

Institutes and centers, because of their interdepartmental and interdisciplinary nature, are excellent incubators for novel graduate courses. They should be allowed to conceive courses to be reviewed by the relevant department chairs, the graduate curriculum committee, the Graduate Council, and the Dean of the College of Graduate Studies.

DEVELOPMENT AND FUNCTION OF THE CENTER FOR CLINICAL AND TRANSLATIONAL RESEARCH

The Center for Clinical and Translational Research (CCTR) is essential for conducting clinical and translational research and for expanding research in clinical departments. The CCTR's primary goal is to support and grow clinical and translational research by promoting the applications of new knowledge (developed from basic science, pre-clinical and clinical research) to patient care, disease prevention and improvement of health. The establishment of the CCTR should facilitate the acquisition of increased research funding from government, nongovernmental (nonprofit) and industry sources. The CCTR will foster multidisciplinary and interdisciplinary collaborations and interactions across our campus as well as with the Clinical and Translational Science Program (CTSA) at the University of Rochester and the other Upstate New York Translation Resource Network (UNYTRN) partners. The CCTR most importantly, will create and foster an environment for both basic science and clinical researchers to work together in a team approach to develop products and solutions for health problems applicable to our local and global communities.

The CCTR would be expected to support traditional pre-clinical, clinical and translational research involving animal model development, human subjects (such as clinical trials), as well as research efforts to further translate findings from clinical trials more broadly for adoption into our communities. Established research clusters (neurological disease, vision research, diabetes and metabolism, infectious disease/vaccine research, cardiovascular disease, cancer, orthopedics, environmental health, psychological illnesses,) as well as future/additional areas of clinical research would benefit from the establishment of the CCTR.

A director is needed who has experience working with multidisciplinary teams. This individual should be a faculty member who performs investigator-initiated clinical/translational research. Experience in product development, from pre-clinical to clinical development including human clinical trials, and certification in Good Clinical Practice and Good Laboratory Practice is desired. The director of the CCTR will report to the Vice-President for Research. A multidisciplinary CCTR advisory committee should be formed to assist the director.

The CCTR will include the following:

- 1 A redesigned and more flexible Clinical Research Center (CRU):** To better reflect current needs, the organizational structure and job description of current staff need to be re-examined and revised. There should be an inpatient unit and additional outpatient (satellite) units for use as needed by funded investigators. The Director, with assistance from the nurse manager, should oversee the redesign, expansion, direction, allocation and coordination of the CRU resources. The CRU should have provisions for both inpatient and outpatient exam rooms, study nurses and coordinators, phlebotomists and services for research specimen collection and shipment.
- 2 Expanded Center for Research and Evaluation (CRE):** Biostatisticians and epidemiologists as well as mid-level support staff need to be recruited to the CRE to assist investigators with study design, data collection and data analyses services. A Bioinformatics Division of the CRE is needed, with personnel with expertise in working with establishing, interfacing with and adapting large databases, and expertise in regulatory compliance with privacy, security, interoperability, workflow, usability and standards adapted by HHS for the confidentiality of human data. The CRE should make available to investigators a searchable clinical data warehouse containing data from outpatients and inpatients. Informatics support for investigators working with genetics, genomics and proteomics datasets is also needed.
- 3 Expanded education, training and career development programs:** Faculty, trainees, students and staff should have access to formal instruction in clinical and translational research. Training should be multidisciplinary, and involve not only faculty who are directly involved in the CCTR, but also faculty from the MPH program and other departments and programs across campus, as well as other partners i.e. industry. Academic programs will teach the basic sciences (including translational technologies), clinical research, translational research, ethics in research, Good Clinical/Manufacturing/Laboratory practices, and regulatory compliance.
- 4 Pilot projects:** Limited funding for pilot projects should be made available with approval by the CCTR advisory committee.
- 5 Research Administration:** There will be additional need for IRB and Sponsored Projects offices to support grant submissions and regulatory compliance and to foster industry partnerships and help provide resources for subject recruitment and enrollment. This office should provide additional investigator support in creating and negotiating contracts and budgets. An individual with expertise in product development and regulatory affairs including Good Clinical Practice (GCP), Good Manufacturing Practice (GMP) and Good Laboratory Practice (GLP) requirements and quality assurance/quality compliance is needed.
- 6 SCID Mouse Facility:** A model system for testing therapeutics against cancers and human viruses exists that uses SCID mice and human tissue xenografts, but it needs to have the capability of being GLP compliant. This facility is needed for pre-clinical animal model development for the testing of new drugs, vaccines and therapeutics using a humanized SCID mouse model.

RESEARCH CORE FACILITIES

Overall Goal

Our objective is to ensure the quality of research cores by enabling the necessary infrastructure, accessibility, affordability, accountability, oversight, and fiscal responsibility of these institutional investments. Part and parcel to this goal should be the institutional recognition that subsidy of such core facilities is essential to the success of the research enterprise.

Overview of Existing Cores

Philosophy: SUNY Upstate currently underwrites facilities that provide specialized physical resources to the campus Research Community. It has been the institutional intent that multiple departments and investigators would utilize these facilities: with the goal of full cost recovery of ongoing operating expenses. The core facilities that are currently reviewed for revenues and expenses are: (1) IHP facilities – Vitality, MRI, Imaging, CRE, CRU, and Image Visualization and Infrared Spectroscopy (IVIS); and (2) WSK facilities – Confocal & EM, Flow Cytometry & DNA sequencing, SUNY Microarray (SUNY MAC) Core, Confocal Two Photon Imaging, and Small Animal Micro-CT. (It is clear from these lists that a number of previous institutional investments are not being examined (e.g., the Genomic, and Proteomic Mass-Spec facilities in WSK and the Inhalation Exposure Facility at the IHP.)

Analysis: As of the 2006-2007 fiscal review NO core facility is self-sufficient, with sizeable institutional investment in both support staff and other operating expenses. The total institutional overhead was approximately \$740,000. It is expected that the '07-'08 review will yield the same result. As such, continuation of each core as an institutionally supported resource should be evaluated with the following perspective as a guide:

- 1 Relative to a specific core's mission, is the designation as a "core" appropriate?
- 2 Does the Core pass the multi-departmental, multi-investigator litmus test?
- 3 Is there sufficient intra- and inter- departmental use and if not, why?
- 4 Can the services of the core be outsourced more economically? and
- 5 Are there unaccounted benefits beyond fiscal considerations to warrant continued institutional underwriting? (e.g., grants funded through investigator use).

Suggested outcomes of this evaluation to be considered are:

- 1 Continued institutional support;
- 2 Transferring financial responsibility to a more specialized department or program; and
- 3 Eliminating the resource.

It is also recommended that, with the current strategic planning in mind, a more complete campus-wide assessment of "core-like" resources should be considered.

Other Considerations:

- 1 Governance and oversight of the cores is outlined to occur administratively at three levels, each of which report to the Vice President for Research: the Dean's Research Steering Committee; the core's advisory committee; and the core's scientific/administrative director. Reviews at these various levels appear to be minimal, limited to a yearly accounting of finances and activities. It is suggested this be expanded to an in-depth bi-annual review at each oversight level.
- 2 In the evaluation, consideration should be given to the core's potential for enhanced internal and external marketing based on its current level of use. That is: Are members of the institutional research community fully aware of the existing resource and is there a potential for increased utilization by selling our service outside SUNY Upstate?
- 3 There is the general concern that the response to accumulating core deficits will be to increase user fees. This should be avoided since the outcome will likely be to drive use down and/or off campus. The vulnerability of a specific core to this outcome should be carefully considered.

New Cores

The same guiding principles as outlined above should be applied to any consideration of developing a new core facility or expanding an existing core. Moreover, a detailed analysis of the specific modalities that will best serve the needs of the research community should be developed. For each consideration, detailed business plans should be developed outlining fixed costs (e.g., proposed start up investment as well as ongoing equipment needs and staffing) and variable costs (service contracts, supplies, incremental staffing & equipment repairs/ replacement.)

Cores to be Developed that Cross Research Pillars: Small animal functional imaging systems such as fMRI, PET or SPECT to complement existing micro-CT.

Cores to be Expanded that Cross Research Pillars: Genomics (microarray and DNA methylation); Proteomics Mass-Spec; Microscopy core (Multi-laser confocal microscopy, dual spinning disc confocal, TIRF, FRAP, FRET, EM); Structural Biology Core (CD, 3D crystallography, NMR, SPR), Flow Cytometry.

Focus Area Specific Cores to be Developed: Behavioral phenotyping facility and an integrative physiology facility for hemodynamic measurements and arrhythmia monitoring in small animals.

SPACE

Space is an essential resource that must be of high enough quantity and quality for SUNY Upstate to reach its research goals over the next ten years. The current status is that space limits the recruitment of outstanding basic science and clinical research faculty. The 100,000 gross-square-foot expansion of the Institute of Human Performance (IHP) building will substantially improve this situation as will the ongoing renovations to Weiskotten Hall.

In the case of the IHP expansion, we believe that this building gives SUNY Upstate the ability to develop interdisciplinary and interdepartmental themes that will help increase research collaborations between departments, improve the quantity and quality of clinical science, and establish a strong and focused translational research unit. We recommend, based on NIH and non-NIH funding and critical mass, that the research pillar most appropriate to move into this IHP expansion is Disorders of the Nervous System. Based on recommendations in the Space Design Task Force Report, this space should include an equal proportion of open-style and closed-style laboratories. The former can be for faculty members who cross departmental boundaries, and for those who cross basic science and clinical science boundaries within the same open theme-based laboratory. The latter supplies a closed laboratory for those whose research requires it. The IHP expansion will also contain a state-of-the-art small animal vivarium with the capacity to produce and house transgenic animals; cores that are appropriate for researchers located in the building; small meeting rooms; a large seminar room; and equipment selected based on the needs of the investigators. Moving investigators to this building will require a case-by-case, thoughtful discussion with each faculty member and their chair to assure that such a move optimizes their existing and developing collaborations. The Space Task Force Report also suggested that existing IHP space be utilized for investigators performing basic, clinical and translational research in the areas of Disorders of the Nervous System and Diabetes, Metabolic Disorders, and Cardiovascular Disease. We support this suggestion which will increase synergy between investigators in the new and existing sections of the same building. The Space Design Task Force Report (July 31, 2008) is appended to this strategic plan.

All research space at SUNY Upstate Medical University should be under the oversight of the Vice President of Research. There must be openness and transparency in the assignment and usage of space as pointed out in the Engaging Excellence recommendations. There also needs to be a clear process to solicit and allocate research space consistent with existing metrics. The Space Design Task Force is transitioning into a standing SUNY Upstate Research Space Committee which will report to the Vice President for Research. This committee should focus on

- 1 development of the process for space solicitation and allocation,
- 2 recommending to the VP for Research the optimal usage of research space throughout SUNY Upstate, including what becomes available as researchers migrate to the IHP expansion and other destinations, and
- 3 helping to design new research space that will come online during the next ten years.

ENTREPRENEURSHIP, INTELLECTUAL PROPERTY, AND TIES TO INDUSTRY

Increasing numbers of faculty world-wide are appreciating the fact that their bench research can lead to products that will benefit society. These products, in turn, can be profitable for the inventor, the University or medical school, and the company involved in production and marketing. Indeed, when recruiting faculty many want to know what institutional expertise is available in terms of intellectual property, patents, and tech transfer. The spirit of faculty entrepreneurship needs to be well supported at SUNY Upstate; an infrastructure must be put in place, and faculty need to be taught the process that occurs from lab to product.

SUNY Upstate has relied heavily on the SUNY Research Foundation to take care of intellectual property, patents, and tech transfer. The number of resulting patents, products, and profit has been small from SUNY Upstate faculty. This is not surprising as the process of reviewing potential patents, to the patenting process, and then on to tech transfer must be a “contact sport” to be effective. Having a new VP for Research, with expertise in this area, is a start in the right direction. Now the infrastructure must be put in place. The SUNY campuses at Albany, Binghamton, Buffalo and Stony Brook all have their own intellectual property offices. To be successful SUNY Upstate must do the same. To achieve this goal, during a time of financial limitations, a cost-sharing model can be put in place. Dr. James Weyhenmeyer, the SUNY system VP for Research, is willing to share the cost of a new SUNY Foundation/SUNY Upstate tech transfer staff member who would be housed at SUNY Upstate. The cost would be small and the potential benefit very large. This expert could train SUNY Upstate faculty on protecting patentable research, lead a patent committee to review potential patents (currently no such committee even exists), work with the SUNY Foundation in developing the patents and then help to develop a relationship with the appropriate companies. The cost to SUNY Upstate could be made even lower if this tech transfer office is shared with SUNY ESF.

Developing ties to industry requires strong, trusting relationships. An industry partner must know that SUNY Upstate offers expertise, dedicated faculty partners, a reasonable cost to do business, and a user-friendly system to process agreements between the company and SUNY Upstate. Toward this end, the VP for Research has a budget to travel to regional biotech, biodevice and related companies. This process is ongoing and will continue. During these visits the VP for Research begins the process of relationship building by learning about the company’s products and needs, any past experiences with SUNY Upstate, and informs the company of SUNY Upstate’s research focus areas. During the visits, the VP for Research/Dean of the College of Graduate Studies also discusses the possibility of developing short internships for SUNY Upstate PhD students interested in industry careers. It is recommended that the VP for Research sponsor an annual event to bring companies to campus to hear short presentations by entrepreneurial faculty from the focus areas and foundational sciences and then participate in breakout groups to develop potential partnerships.

Partnership development is essential but must be followed by a system that makes it easy and quick for companies to do business with SUNY Upstate. The Sponsored Projects/Clinical Projects and Research Administration staff need clear guidelines and training to be most effective. The VP for Research has approval to hire an Assistant VP for Sponsored Projects/Clinical Trials to oversee all aspects of grants and contracts, from pre-award to post award.

The future CNY Biotech building will also present huge opportunities to bring together industry and SUNY Upstate researchers. The VP for Research's vision is to bring companies involved in the development of small and large molecule therapeutics, biodevices, and stem cell biology into this building. Incubator space for SUNY Upstate faculty who want to spin off their own companies should be fully supported. This would also provide potential student internships with companies in close proximity to our campus.

GRADUATE EDUCATION

The SUNY Upstate College of Graduate Studies, under the leadership of the past Dean Max Mozell, has transitioned from a departmentally-based program to a unified program. The graduate faculty are strongly committed to the unified program and students are receiving excellent training in the classroom and laboratory. New Dean Steven R. Goodman has requested and received strong budgets to support both graduate studies and research. With the change of leadership and new resources we can take a fresh look at recruitment, curriculum, post-graduation issues, and new programmatic initiatives to further optimize the PhD program.

Recruitment: The new resources have allowed us to become an executive account for Peterson's Guides. This allows unique opportunities described below. One purpose of developing disease-centric research pillars is marketing, which is especially apt in the recruitment of top-notch graduate students. We co-developed a system with Peterson's staff that allows a student to find SUNY Upstate whether they search by department or by research interest. This new approach, developed by the Dean, his staff and SUNY Upstate marketing division, widens our electronic net to capture a greater number of potential applicants. Fresh text brings our Peterson's web site up-to-date and graduate faculty will be featured in twice-yearly "e-blasts" to undergraduate students. Concurrent with the Peterson's account, the College's own website has been updated. In addition, we continue to send the Graduate Studies program guide to students who took the GREs and indicated an interest in bio-related disciplines. In addition to improved electronic and other marketing capabilities, it is recommended that we vigorously pursue the Dean's idea to enhance face-to-face advertisement of our PhD program. That is, to develop a speakers' bureau of committed graduate faculty willing to visit local bachelor's degree granting colleges and universities in a 250-mile radius. Although similar visits have been made in the past, the new budget allows us to send out brochures to science deans, highlighting researchers who can come to their campus to give a free seminar. In return we ask for an opportunity to meet with their bio-related undergraduates to discuss our graduate program. We should also pursue bringing undergraduate advisors to our campus, on a specified graduate education day, to educate them about our PhD and MD/PhD programs and SUNY Upstate.

Curriculum: The graduate faculty has done a wonderful job of preparing a unified course in the first-year fall semester that surveys the basics of biochemistry, molecular and cell biology, microbiology and immunology, neuroscience and physiology, and signaling pathways. During the first year spring semester the students begin taking department-specific electives that continue into the second year. As students do not make their selection of a thesis laboratory, and therefore home department, until the end of the first year the Dean has initiated a dialog on the prudence of offering a new core course in Genomics, Proteomics and Bioinformatics in the spring semester of the

first year. Then, department-specific elective courses would be offered in the second year fall semester. It is recommended the dialogue on this subject take place in conjunction with a critically related discussion of whether institutional stipend support should go from twelve to eighteen months.

Tracking our Graduates/Training Grants: To apply for training grants for graduate students we must increase the number of applicants and the quality of those accepted, further strengthen our curriculum, and demonstrate that our graduates go on to strong careers in academic and industry research. Past tracking of our graduates has been sketchy and must be improved. The graduate college staff must, with the help of past PhD sponsors, launch a strong effort to retrospectively track our past graduates. The College of Graduate Studies Dean's Office should put in place a system for tracking future graduates.

New Programmatic Initiatives: With the new focus on interdepartmental and interdisciplinary research should come a dialog about the development of new programmatic offerings. An example of a relatively new interdepartmental and intra-university graduate program is one in Structural Biology that combines faculty from multiple departments at SUNY Upstate and Syracuse University. We would recommend that other new interdepartmental programs be considered. An intriguing example is a PhD and MD/PhD program in Clinical and Translational Science. These programs are beginning to surface at medical schools throughout the United States because they fill a national need for scientists that know how to conduct both clinical and translational studies. At SUNY Upstate such a program would support several critical needs including creating greater collaborative efforts between basic and clinical researchers; strengthening our clinical and translational research; increasing the involvement of clinical research faculty in the graduate program; and creating a pipeline for potential future clinical science faculty at our institution. Another creative idea that should be discussed is potential collaborations with Syracuse University in areas such as economics, philosophy, and political science that could lead to joint graduate programs in medical ethics or policy. We should also hold conversations with their LC Smith College of Engineering and Computer Science to discuss SUNY Upstate involvement in a joint graduate program in biomedical engineering. In addition we should begin discussions on becoming involved in a joint effort with the Syracuse University departments of mathematical sciences and biology on a graduate program in bioinformatics.

NETWORKING WITH OTHER MEDICAL SCHOOLS AND UNIVERSITIES LOCALLY, REGIONALLY, NATIONALLY AND WORLDWIDE

The changes that have occurred in research in the post human genome world, coupled with the advances in electronic communication and telecommunication, have broken down boundaries that separate scientific disciplines and collaborations. SUNY Upstate has local, regional, national, and international opportunities for collaboration that have, to date, not fully been explored or utilized. The VP for Research has extensive experience in creating operational networks of interdisciplinary researchers and should be encouraged to develop such relationships for SUNY Upstate.

Local: SUNY Upstate Medical University is adjacent to Syracuse University—a comprehensive university with liberal arts, biological, physical, engineering, computer and mathematical science departments. They have much to offer and, reciprocally, with our biomedical basic, translational and clinical research strengths, our partnership would be important in developing cutting edge research programs at SU. The Vice Presidents for Research from the two institutions should meet to discuss establishing partnerships in areas of joint benefit. In addition to existing partnerships in areas such as structural biology and neuroscience, targeted areas that should be pursued include bioengineering, bionanoscience, bioinformatics and biostatistics.

Regional: The SUNY Upstate Vice President for Research is meeting with VPs for Research and financial officers at SUNY campuses (Albany, Binghamton, Buffalo, Downstate, ESF, and Stony Brook) at SUNY Foundation meetings and one-on-one meetings are planned. He also has met with administrators from Albany College of Pharmacy, Bassett Healthcare, Cornell University, the Ordway Research Institute, RPI, and the University of Rochester at the Foundation of Healthy Living retreat. We support this continuing dialog with institutional leaders at these regional universities, medical schools and health centers to find areas of mutual interest for collaboration in basic and clinical research. RPI, for example, has just opened a state-of-the-art biotechnology building where they hope to draw users from other regional universities and medical schools. New RPI basic science faculty members are looking for regional collaborations. The University of Rochester has a funded CTSA and is looking for partners for clinical and translational collaborative projects. These relationships need to be pursued.

National and International: The VP for Research plans to launch an institute similar to one he previously founded. In 2003, while Dr. Steven Goodman was at UT Dallas, he created the Institute of Biomedical Sciences and Technology (IBMST). The vision for IBMST was to combine multidisciplinary faculty in interdisciplinary research at the boundaries of the biological, physical and engineering sciences. Another foundation for IBMST was to create a better pipeline between the work done by academic researchers and the products, developed by industry, based upon those results. The four IBMST Focus areas were Blood Disorders; Diseases of the Aging Brain; Molecular Diagnostics; and Bioengineering, Biosecurity and Biodefense. In four years, IBMST grew from 11 UT Dallas faculty to 126 faculty from 26 universities and medical schools, holding \$100 million in extramural support. IBMST also received a \$1.6 million congressional earmark from the DOD. The distinguished IBMST Advisory Board included three Nobel Laureates and leaders in the academic and industrial sectors. With the support of President David Smith and Senior Vice President Steven Scheinman, Dr. Goodman is in the process of establishing an international version of IBMST (IIBMST). IIBMST would radiate from three home bases: SUNY Upstate Medical University for North, Central and South American university partners; the Technion in Israel for European and Middle Eastern university partners; and the National Cheng Kung University (NCKU) in Taiwan to cover Asia and Africa. A document establishing the principles for an MOU has been prepared and approved by the SUNY Upstate legal counsel and President and is currently under review by the Technion and NCKU Presidents and their staff. Once finalized, and areas of research focus established, SUNY Upstate faculty will be invited to join this international network of researchers. We recommend that the IIBMST focus areas align with the research pillars described in this document. Members hold monthly meetings in specifically defined focus areas. These focus group meetings lead to the development of team research efforts, in turn leading to grant proposals, collaborative science and joint publications, and sometimes commercial products. This concept will convert SUNY Upstate from a relatively isolated medical university to the center of an international network or consortium of outstanding researchers.

Philanthropy: Partnering With the Community

At a time of flat budgets at NIH and decreasing budgets from the State of New York, SUNY Upstate must broaden its research funding portfolio by partnering with our community in a major fundraising effort. The Vice President for Research should lead the effort to raise funds for research from private and corporate donors and foundations. This fundraising should be focused in the areas of the research pillars. This must be coordinated with the SUNY Upstate Medical University Foundation. (For example, the annual Foundation gala focus could be rotated amongst the research pillars.) Beyond this approach, the Vice President should both train and work with department chairs and directors of institutes and centers in how best to raise funds from private donors, corporate donors, and foundations in support of their research programs. He should assist these program leaders in developing the necessary contacts and participate with them in these fundraising efforts.

Mission Based Management: Measurements of Success

Developing metrics to measure success and productivity is essential to track our achievements or shortfalls in reaching short and long-term strategic objectives. The ability to generate reliable metrics will allow the research mission to focus on specific areas for improvement or to define our successes.

Productivity is defined as the rate at which goods or services are produced, especially output per unit of labor. For our research mission such “goods or services” can be defined by a number of parameters such as:

- 1 number of funded grants;
- 2 direct and indirect funds from grants;
- 3 extramural funds;
- 4 research expenditures;
- 5 number of publications and their impact factor;
- 6 national and international presentations;
- 7 service on national and international committees;
- 8 service on institutional committees; and
- 9 number of funded research trainees.

Though productivity is in its essence an individual effort, for this strategic planning objective the research mission productivity should be measured institutionally as it pertains specifically to our strategic mission goals.

Broad Mission Objectives: We propose to develop metrics to measure institutional productivity and success in reaching our mission goals. A subcommittee at SUNY Upstate recently developed parameters for mission based management. These parameters should be reformulated from an individual-based productivity model to an institutional strategic planning one, and this subcommittee should be engaged to assist in this strategic planning.

Strategic Planning:

Administrative: The ability to develop metrics, and more importantly to implement them, requires the input of reliable and meaningful data that can be tracked and summarized in a timely fashion in order to influence strategic planning. Thus, an administrative office should be identified and funded to be able to define, track and interpret parameters of productivity.

Short-term and Long-Term Strategic Planning Objectives (Years 1-5):

- 1 Utilize the current administrative staff to be able to collect and analyze parameters of productivity in a timely manner.
- 2 Validate these findings by the end of year using past and current data.
- 3 The long-term goal is to have a business office that will track elements of productivity in real time, and to produce quarterly reports that are directly relevant to strategic planning goals. The VP of Research to the Research Steering Committee to department chairs will utilize these reports to have a relevant view of the productivity of each of their research areas allowing improvements and changes to occur to meet strategic planning objectives.

Summary: Measurements of success and productivity are essential to be able meet short and long-term strategic objectives. The ability to generate reliable metrics will allow the research mission to focus on areas for improvement or to emphasize our successes. It will allow total quality management to assess the effects of change or reprioritization of research objectives to strategic objectives.

Stimulating Innovation/Conclusion

Professor Alan MacDiarmid (Nobel Prize in Chemistry, 2000) used to say in his lectures that "Science is People". Innovation also is people, meaning that all innovation begins with a brilliant idea from a researcher or a team. However, to develop that innovative idea takes other elements. It requires the necessary scientific collaborators, research facilities, equipment, and infrastructure.

How can true innovation occur in a situation when resources are limited? The first answer is simple: Resources are always limited no matter where one finds themselves, yet innovation still occurs. Another way of saying this is that a brilliant idea and a motivated researcher are unstoppable. Yet this answer does not get at the question of how an institution can best nurture that brilliant idea and motivated researcher. Here we believe that when resources are limited a medical university needs to target those scientific areas that are most likely to be successful and which will have the greatest impact on human health. We believe that this strategic plan has identified those areas through the research pillars, research focus areas, and the foundation. We have also provided a suggested infrastructure that will best utilize available institutional resources for cores, sponsored projects and tech transfer staff, graduate education and the development of a translational research unit as a few examples. In other words, this strategic plan provides a blueprint for stimulating innovation and a successful research enterprise over the period of 2008 to 2018 for SUNY Upstate Medical University. If we follow this blueprint as an Institution we will (1) give that motivated researcher, with the brilliant idea, the best chance to see his or her vision realized and (2) provide SUNY Upstate Medical University the opportunity to rise up the ranks of research-intensive medical centers even during a time of financial austerity. We hope and expect that this will become a living document that drives administrative decisionmaking concerning research and graduate education over the next ten years. While we cannot predict or determine the national economy or the related NIH budget over these upcoming years, we firmly believe that we are providing the administration, faculty, staff, and students of SUNY Upstate Medical University with a recipe that will make us a stronger and more dynamic research enterprise in 2018 than we are at present.

Acknowledgements

This strategic plan was drafted by a dedicated strategic planning subcommittee, composed of members of the Research Steering Committee, as well as other faculty members who brought necessary expertise to the process. The draft report was then sent to the entire Research Steering committee for suggested revisions and the document was again reviewed by the Research Steering committee. This vetted version was then sent to Senior Vice President Steven Scheinman for review and comment. Dr. Scheinman then met with Dr. Steven Goodman and the Research Steering Committee to discuss his thoughts on the strategic plan. Based on this discussion final revisions were made leading to the document above.

I want to thank all of the members of the Strategic Planning Subcommittee, the Research Steering Committee and Dr. Steven Scheinman for their dedication and perseverance to this project. Their efforts have led to this document, which will drive the research and graduate education missions of SUNY Upstate Medical University over the next ten years. It has been my honor and privilege to work with the faculty listed below on this strategic plan.

Dr. Steven R. Goodman
Vice President for Research
Dean, College of Graduate Studies

Strategic Planning Subcommittee

Timothy Endy, MD, MPH
Michael Miller, PhD
M. Saeed Sheikh, MD/PhD
MaryGrace Van Nortwick
Richard Veenstra, PhD
Ruth Weinstock, MD/PhD
Steven Youngentob, PhD
Michael Zuber, PhD

Research Steering Committee

Gary Brooks, DrPH
Timothy Damron, MD
Firouz Danesgari, MD
Timothy Endy, MD, MPH
Gerold Feuer, PhD
Melanie Kalman, PhD, CNS
Wendy Kates, PhD
Stewart Loh, PhD
Frank Middleton, PhD
Michael Miller, PhD
Nancy Nussmeier, MD
M. Saeed Sheikh, MD/PhD
Jeremy Shefner, MD/PhD
Christopher Turner, PhD
Ruth Weinstock, MD/PhD
MaryGrace VanNortwick
Michael Zuber, PhD

Space Design Task Force Report

July 31, 2008

Steven R. Goodman, PhD, Co-Chair

Jeremy Shefner, MD/PhD, Co-Chair

Timothy Damron, MD

Firouz Daneshgari, MD

Patricia Kane, PhD

Robert Quinn, DVM

Thomas Pelis

Rosemary Rochford, PhD

M. Saeed Sheikh, MD/PhD

Mary Grace VanNortwick

Ruth Weinstock, MD/PhD

Steven Youngentob, PhD

Space Design Task Force Report

July 31, 2008

The Space Design Task Force has met regularly over the last three months. Our primary charge was to provide recommendations for the design of the Research Expansion of the Institute for Human Performance. Disregarding space for parking, we acted under the assumption that three floors of usable space will be constructed, each of which will contain approximately 25,000 sq ft of usable space. Of the three floors, we propose that the top floor contain the vivarium, with the two lower floors designed for laboratory investigation. From the early stages of our discussion, we were advised to assume that the major occupants of the IHP expansion will be investigators whose research focus is in diseases of the nervous system.

Vivarium. We recommend that the IHP vivarium be designed for small animal use only, given that a new large animal facility is currently under construction on the 7th floor of UH, and the expected needs for large animals are not expected to exceed capacity of the UH vivarium for the foreseeable future. We recommend that the IHP vivarium occupy approximately 20,000 sq ft, with an additional 2000 sq ft of adjacent space designed to accommodate a behavioral phenotyping core, to include rotorods, activity mazes, and other behavioral measures. We also recommend that small animal imaging modalities (small animal CT, MR) also be housed adjacent to the vivarium; this will require additional space estimated at 1000 sq ft. The vivarium should include barrier facilities for SCID mouse investigation and housing, use of infectious agents and for the breeding and housing of transgenic animals. All functions necessary for the operation of the vivarium should be housed on the same floor, including cage and rack washing facilities, and operating rooms for small animal surgery.

We recognize that there will be some duplication of function, as a fully functional vivarium for small animals will also be maintained in Weiskotten Hall; this vivarium also requires a barrier facility for SCID mouse and infectious disease investigations.

Research Space. With regard to laboratory space on the other two floors of the IHP expansion, we suggest the two floors be organized in similar but not identical fashion. After discussion with neuroscience faculty, it is clear that a design in which most research space is in the form of open bays is not ideal for many investigators. Therefore, we recommend that one floor should contain approximately 60% open bays and 40% separable rooms, plus smaller rooms for offices. The other should have 40% open bays and 60% separable rooms, plus smaller rooms for offices. Both small rooms for specific activities and large single enclosed areas are necessary for the separable rooms. Given the realities that research needs change with individual researchers, consideration should be given to a flexible plan that would allow conversion of open bays into separable rooms, perhaps using movable walls. Specifics of design (percentage open/small) should be done in discussion with planned occupants.

For simplicity, we allocated space by active RO1 grants. We assume that an investigator with a single RO1 will require 1300 sq ft of space, including office space and research space. An investigator with two RO1 grants will be allocated 2600 sq ft. A newly recruited but unfunded investigator will be treated identically to an investigator with a single RO1. For each RO1 funded investigator, we allocate 150 sq ft faculty office, 200 sq ft for four lab personnel; either graduate student, fellow, or tech., and 950 sq ft of bench space. We also recognize that shared space is required for collaborative research, and allocate one 150 sq ft cold room per five faculty, one 300 sq ft dish-washing and glass room for 10 faculty, and one 300 sq ft unspecified common equipment room per 10 faculty members. We also allocate one break room of 150 sq ft per 10 faculty members.

We also recognize that core facilities will have to be present in the IHP, and may have to be duplicated in Weiskotten Hall. A Genetics core and an Imaging core will be housed in the IHP, each of which will require 800 sq ft of bench space and 150 sq ft of office space. A third core with the same space requirements will be specified later after consultation with identified occupants of the expansion. Other shared space required includes general administrative space housing fax machines, copiers etc; we estimate the need for 150 sq ft of such space per 10 faculty. In addition, four conference rooms at 300 sq ft per room and one large lecture hall at 2600 sq ft is recommended.

For 30 faculty, the above considerations lead to a total of 39,000 sq ft of dedicated research space, 3150 sq ft of shared space, 2850 sq ft for core facilities, 450 sq ft for administrative space, and 3800 sq ft of teaching areas. The estimated total space requirements are thus 49,250.

The committee discussed use of the existing IHP. Currently, the IHP houses clinical functions, research laboratories from multiple disciplines, the Clinical Research Unit, and the offices for the Center for Outcomes Research. It was the consensus of the committee that both research and clinical academic activities related to the Neurosciences would be facilitated by locating clinical neurosciences in the same area as neurosciences laboratory investigation. A brief consideration of the first floor of the IHP suggested that if some research and clinical programs were moved, this could be accomplished. Centralizing clinical and research neurosciences would encourage the development of translational and clinical projects, would help with branding and marketing, and would provide an environment that would foster the development of interdepartmental clinical programs and clinical research programs. The Clinical Research Unit currently resides on the first floor of the IHP, and its presence in its current location is deemed appropriate. Given that clinical research on diabetes is a major funded activity at the CRU, we suggest that current laboratory research efforts related to diabetes also remain in the existing building.