

Winthrop University Institutional Biomedical Research Plan

A. **Introduction and Specific Aims:** Improving citizens' health represents a major need for South Carolina. One recent study ranks the State fifth in the nation for stroke deaths, third in cardiovascular disease (CVD) deaths, and seventh in ischemic heart disease deaths. South Carolina also has some of the highest cancer rates in the nation, ranking in the top 10 nationwide for five to 10 different types of cancer with perhaps the highest prostate cancer mortality rate of any state. Particularly hard-hit are African American South Carolinians, for whom CVD illnesses result in ten years of lost life and for whom prostate and lung cancer incidences are 50 to 60 percent higher than national averages.

In recognition of these major human health concerns and as South Carolina's second largest primarily undergraduate institution (PUI), Winthrop University proposes to establish a nationally distinctive biomedical research program. Over the next five years, *Winthrop will invest \$1.7 million of its own funds* and is requesting a similar amount from the National Institutes of Health to accomplish this goal. Winthrop proposes six major biomedical research projects that focus on: 1) examining repair mechanisms for cardiac tissue damage, 2) investigating potential mechanisms that regulate angiogenesis and cell motility in prostate cancer, 3) developing powerful new spectroscopic tools to better understand the wide range of specific interactions between metals and molecules in living systems relevant for developing new therapeutic approaches sought by NIH's "Metals in Medicine" initiative, 4) completing the structural analysis of a protein recently implicated as a key factor in obesity development, 5) revealing the specific role that oncogenic proteins play in cellular transformation and cancer progression by identifying the molecular regions that are critical to these processes, and 6) using bioinformatic techniques to project evolutionary pathways of the Hepatitis B virus.

The *Specific Aims* of Winthrop University's biomedical research program are to:

- Expand the number of Winthrop scientists conducting biomedical research from one to two faculty over the past five years to 10-14 scientists by 2010.
- Increase the number of biomedical research proposals submitted to the National Institutes of Health from zero submissions over the past five years to six submissions annually by 2008.
- Establish biomedical research laboratory capability at Winthrop by hiring four biomedical research staff scientists by August 2006 and by investing \$500,000 of Winthrop funding in biomedical research equipment and supplies between 2005 and 2010.
- Establish an interdisciplinary biology-chemistry biomedical science curriculum and gain curricula approvals for incorporation into the 2007-2008 Winthrop undergraduate catalog.
- Increase African American participation in biomedical research at Winthrop University from no students during the late 1990's to over 25% representation among all biomedical research students at Winthrop by 2010. Increase the number and the percentage of Winthrop minority graduates that enter the biomedical research profession.
- Integrate Winthrop University into South Carolina's regenerative medicine network by adding two new faculty with *biomaterials* and *developmental biology* disciplinary expertise by 2008 and by a tenfold increase in the pipeline of Winthrop students matriculating into the state's biomedical research programs from two total and no minority students over the past five years to five annually and at least two minority students each year by 2010.

B. Background:

*Building on its origins as a women's college, Winthrop enrolls an achievement-oriented, culturally diverse and socially responsible student body of 6,000+ students and will remain a medium-sized comprehensive learning university for the foreseeable future. The University recruits South Carolina's best students as well as highly qualified students from beyond the state whose presence adds diversity and enrichment to the campus and state. Winthrop prides itself on being an institution of choice for groups traditionally under-represented [25% African American Enrollment as of Fall 2003] on the college campus. Winthrop's historic campus, located in a dynamic city [Rock Hill] within a major metropolitan area [Charlotte], provides a contemporary and supportive environment that promotes student learning and development. Winthrop has a diverse and able faculty and professional staff of national caliber and supports their work as effective teachers, scholars, **researchers**, practitioners, and creative artists.*

(From Winthrop University's Approved Mission Statement)

Located in Rock Hill, SC, and 20 minutes south of Charlotte, NC, Winthrop is a comprehensive learning university committed to academic excellence, cultural diversity, and public service. The student body consists of 5,161 undergraduate and 1,397 graduate students; 71% are women and 25% are African Americans. 84.2 % of Winthrop students come from South Carolina with others representing 42 states and 44 countries (fall 2003 statistics). According to the 2005 *U.S. News & World Report's* college rankings, Winthrop is among the South's top 10 public universities that convey bachelor's and master's degrees. Winthrop's mission includes "a commitment to be among the very best institutions of its kind in the nation." Research is a critical part of Winthrop University's mission, is required for faculty tenure and promotion, and provides students with engagement and culminating learning experiences in their disciplines.

Biology and Chemistry at Winthrop: Winthrop University offers majors in biology and chemistry; biology offers a graduate Master's program. Winthrop has approximately 300 biology majors and 50 chemistry majors. There are 34-40 biology, 8-12 chemistry, and 3-5 biology Master's degrees awarded annually. Before the late 1990's, Winthrop graduates rarely matriculated in graduate biomedical science programs. Biomedical research professional interest has recently increased as evidenced by the eight biology and six chemistry graduates who have directly entered biomedical Ph.D. research programs as outlined in the below table.

Recent Winthrop Chemistry-Biology Graduates Pursuing Biomedical Research

| <u>Chemistry BS Degree</u> Ph.D Program | <u>Biology BS (*also MS) Degree</u> Ph.D Program | <u>Biology MS (*also BS)Degree</u> Biomedical Research Lab |
|---|---|--|
| <i>Kelley Dwyer</i> Biomedical Engineering Univ. Wisconsin-Madison | <i>Shannon Whirledge</i> Institute of Biomedical Res. Baylor University | <i>Kim Wilson*</i> Cannon Research Center Carolinas Medical Center |
| <i>April Atkinson</i> Neuroscience University of Pittsburgh | <i>Christy Gianniny*</i> Cell Biology and Anatomy Medical Coll. of Georgia | <i>Allan Zillmer*</i> Cannon Research Center Carolinas Medical Center |
| <i>Lisa Miller</i> Biochemistry University of Georgia | <i>Adam Cheely</i> Cell and Dev. Biology UNC – Chapel Hill | <i>Andy McFadden*</i> Department of Pharmacology UNC-Chapel Hill |
| <i>Rebecca Coppins</i> Bioorganic Chemistry Univ. of Illinois-Urbana | <i>Katie Sellers</i> Program in Biomedical Stud. University of Florida | <i>Alex McFadden*</i> Dev. Biology and Anatomy USC School of Medicine |
| <i>James Johnson</i> Bioorganic Chemistry Notre Dame Univ. | <i>Jennifer Barwick</i> Department of Biology USC – Columbia | <i>Jessica Cloy*</i> Molecular Medicine Medical College of Georgia |
| <i>Jennifer Perry</i> Biophysical Chemistry Duke University | <i>Sarah Lageman</i> Neuroscience University of Florida | <i>Nina Spencer</i> Molecular Genetics Centers for Disease Control |

As of fall 2003, there are a total of 145 African American biology and chemistry majors at Winthrop; these students have had success in pursuing health professional paths, but there has been limited placement into biomedical research professional positions.

Chemistry aims to double the number of chemistry graduates within ten years. In September 2004, Winthrop gained American Chemical Society (ACS) approval of its chemistry program. Approval of an ACS biochemistry degree option will soon be sought; a new biochemistry major will be added within a decade. The Masters biology program has moved from one that provided further studies for in-field teachers to also preparing students for Ph.D. programs and research positions. Winthrop offers the only Masters in Biology program in the state outside of the traditional research institutions. Graduate students help faculty mentor research since they are in the lab for longer periods and offer continuity for undergraduate training.

Recent Progress in Removing Barriers to Research Competitiveness: The major historical barriers in gaining external biomedical research funding have been inadequate facilities and equipment, insufficient faculty time, an inadequate infrastructure and staff to support research, and an insufficient number of faculty with biomedical research interests. In 1999, Winthrop opened a new \$12 million Life Sciences Building. During 2002, Winthrop completed a \$7.5 million chemistry renovation financed with Winthrop-issued bonds. Private and state funding for science equipment totaling \$1.7 million was also obtained. Winthrop chemistry-biology faculty have been awarded three major NSF instrumentation grants totaling over \$300,000. Research or equipment grants totaling another \$300,000 include funding from Research Corporation, USDA, NCDAQ, the National Park Service, the Whitehall Foundation, the Palmetto Conservation Foundation, the Sustainable Universities Initiative, and LICOR. These efforts give Winthrop a science complex equal to the best of any institution of comparable size.

In 2002, the “Winthrop University Undergraduate Research Initiative” was launched to establish an Undergraduate Research Committee and a Director of Undergraduate Research. Winthrop has sent faculty teams to CUR Institutes and Dialogues and hopes to host the 2009 NCUR. Winthrop has made a five-fold increase (from \$15,000 to \$85,000 per year) in research money internally available. Recent changes have reduced science faculty teaching loads from as many as 15-18 contact hours per week to the current limit of 12. Winthrop now also provides faculty with up to a one-course reduction of teaching load for mentorship of student research.

Recent progress has been made in attracting new faculty with expertise in key biomedical science disciplines. Two biochemistry faculty have recently been added; two new chemistry faculty have biomedical interests in molecular dynamics and organic synthesis. In 2004, a biomedical scientist was hired and has been added to the Winthrop INBRE team. Biology recently hired three new faculty with biomedical research interests: a microbiologist with an interest in viral evolution and bioinformatics, an immunologist working on angiogenesis and prostate cancer, and an anatomist with an interest in mammalian respiratory systems. Biology will soon be hiring a new geneticist with an interest in human genetics and biomedical research.

C. BRIN Progress/Results: While Winthrop did not have the opportunity to become a mentored institution during the SC-BRIN program, Winthrop was particularly active in the program. Two Winthrop faculty were competitively awarded three BRIN collaborative research grants. Winthrop was also one of four institutions in the state to be awarded a SC-BRIN seminar grant that brought research seminars to campus. Dr. Christian Grattan received support for two summers of research activity involving four undergraduate students. This resulted in Dr. Grattan publishing two peer-reviewed publication papers with another paper currently being completed. Four student presentations at ACS conferences have resulted and one at the recent NCUR. One graduate is now enrolled in a USC Ph.D. program, another in dental school, a third in pharmacy

school, and a fourth still at Winthrop. BRIN funding for Dr. Chasta Parker has sparked a rapid start-up of biochemistry research at Winthrop University. Seven students have been funded from BRIN grants; to date, these have resulted in four conference presentations. One graduate is conducting research at MUSC, another entered the Clemson genetics Ph.D. Program this fall, and three are still students at Winthrop. As done with the BRIN program, Winthrop will continue to track the professional paths of its graduates who participate in INBRE research.

D. Winthrop University INBRE Program Design

1) Strategic Plan and Rationale: Winthrop University proposes to establish a multidisciplinary biomedical research program that focuses major efforts on addressing important problems in medicine with an overriding goal of enhancing human health. Recent initiatives in modernizing science facilities, in hiring new biomedical faculty, in new research instrumentation, and in developing research-supportive teaching policies have laid a foundation to take full advantage of the NIH support to significantly expand biomedical capacity to foster health-related research. Winthrop's philosophical approach is to develop a broad multidisciplinary program to recruit and educate students in the chemical and biological sciences that underpin biomedical research and to train students by offering advanced coursework and meaningful research experiences that center on important questions in biomedical science and that provide the necessary foundation for SC's regenerative medicine graduate research programs.

Key elements of the proposed multidisciplinary biomedical research program include:

- A vigorous and aggressive mentoring program for targeted faculty
- A 50% reallocation of faculty teaching time for biomedical research
- Establishment of a biomedical laboratory core facility with a director, four new staff scientist positions, and major investments in biomedical research equipment
- Funding for student research assistantships, summer student and faculty stipends
- A major recruitment effort to increase the participation of science majors and minority students in biomedical research projects
- Establishment of a formal chemistry-biology biomedical science curriculum.
- Integration of biomedical research efforts at Winthrop
- Integration of Winthrop into South Carolina biomedical research network

Vigorous and Proactive Target Faculty Mentoring Program: For each faculty investigator, a mentor with extensive NIH research funding has been recruited (as staff scientists are hired, additional mentors will be recruited). All mentors are from research universities and have the necessary expertise to proactively guide Winthrop's young faculty through the necessary steps to submit competitive research proposals and to gain independence as scientists. Particular emphasis will be placed on target faculty achieving independence from previous research advisors; steps have already been taken to identify a second mentor for those projects mentored by the investigator's graduate advisor. For each project, timelines will be established with a schedule for NIH proposal submission. Investigators will be accountable to mentors and to the Winthrop Steering Committee for meeting project milestones; in the unlikely event that satisfactory progress is not being made, mechanisms will be in place to address this situation. A Winthrop mentor—normally the department chair—will work with the investigator and project mentor to evaluate the effectiveness of the external mentorship. Periodic reviews will monitor progress and will identify critical resources to help successfully attain goals. Resources will be allocated for target faculty to attend workshops to keep abreast of new developments, to become familiar with new tools in their research field, and to strengthen proposal preparation skills.

Reallocation of Faculty Teaching Time for Research: All supported faculty will be provided a 50% reallocation of teaching time to focus on biomedical research. Winthrop will also commit to this same 50% reallocation for all external grants these faculty receive. As faculty gain external funding, others with biomedical research interests will be recruited into INBRE-supported positions to maximize impact or new regenerative medicine faculty (e.g. biomaterials or developmental biology) will be hired to further support South Carolina's regenerative medicine theme and to take advantage of the Clemson-Winthrop dual-degree agreement.

Establishment of a Biomedical Core Laboratory Capability: Winthrop University will establish a core biomedical research laboratory capability that will be staffed by four new staff scientist positions—two senior (Ph.D.) and two junior (M.S.)—and led by a fifth member who will act as director. This Core will be augmented with support from Dr. Julian Smith, Professor of Biology and Director of Winthrop's Electron Microscopy Facility (TEM, SEM, confocal). The core laboratory will include the equipment centers (*key equipment listed in resources section*) in molecular biology and biochemistry established under the recent modernization program in adjacent Life Science and Sims buildings. Over the next five years, Winthrop will invest an additional \$500,000 of its own funds for equipment and supplies targeted to support the proposed research projects. The core facility would directly expand capacity since more students could be mentored, research projects would be more productive, and a clear critical mass of scientists would be available for effective collaboration.

The four new staff scientist positions will be permanent staff or faculty lines; their existence after the INBRE grant will not be dependent on future grant funding. The Core Laboratory Director (Calloway) will work with project investigators and program co-directors, will set priorities, and will allocate staff scientist time among the projects. A vigorous mentoring program will also be implemented for staff scientists.

Staff scientists will have many important roles as shown below:

Infrastructure Development and Research Capacity Expansion

- Manage Biochemistry & Molecular Biology Biomedical Research Centers
- Maintain Winthrop Biomedical Research Lab Currency
- Improve Biomedical Research Laboratory Capabilities
- Set up Research Instruments
- Interface with counterparts at Comprehensive Research Universities to take advantage of analysis capabilities throughout South Carolina

Faculty Development and Support

- Develop Research Methods
- Provide Specialized Expertise
- Maintain & Operate Equipment
- Identify and Order Research Supplies and Accessories
- Design Research Experiments

Student Development and Support

- Train Research Students
- Supervise Student Biomedical Research
- Mentor student research
- Enhance Research Continuity
- Enhance Biomedical Science Curriculum

The two junior staff scientists will occupy 12-month, permanent staff positions. They will have M.S. degrees; 100% of their time will be devoted to support of biomedical research. It is anticipated that one of the junior scientists will be well trained in molecular and cell biology techniques. The other junior staff scientist will have expertise in a broad range of biochemical laboratory techniques. The two junior staff scientists will manage molecular biology and biochemistry research instrumentation—to include training and supervising research students, ordering necessary supplies, and developing methods needed by project investigators. Junior staff scientists will have expertise in proteins and nucleic acids as well as experience with a variety of research tools used in these fields.

The two senior staff scientists will occupy permanent, State employee, faculty lines; as with other faculty, these will be nine-month positions. Senior scientists will be hired at the faculty rank and salary of assistant professor, will be expected to teach six hours (50%) advanced biomedical science courses each semester (only Winthrop funds--and no NIH funds--will be used for teaching time), will be full participants in the Biology-Chemistry Biomedical Science dual major program, will be expected to support project investigator needs and will be essential collaborators for other faculty and students as research blossoms at Winthrop. It is anticipated that one of the senior scientists will be a mass spectroscopist with extensive expertise and experience in using MS tools to support biomedical research, with the required knowledge to keep Winthrop at the forefront of having the most effective tools available, and with the ability to independently plan, complete and interpret MS analyses needed to support a wide array of biomedical research projects. It is anticipated that the other senior staff scientist will be a Ph.D.-level molecular geneticist with post-doctoral experience in biomedical research, with a strong background in bioinformatics. The senior scientists bring to Winthrop new biomedical expertise at an advanced level that spans a broad range of potential biomedical research projects. This expertise is essential for research productivity and will lead to new biomedical research collaborations among faculty at Winthrop and to a critical mass of biomedical scientists.

Winthrop's staff scientist opportunities are desirable positions; national recruiting efforts during the first year will attract strong candidates. Salaries will be very competitive. The positions are permanent and not dependent upon future grants. Winthrop has new or recently modernized facilities and is very well equipped. There is also a strong institutional commitment to quality research and a realistic understanding of the resource commitments this requires. Most importantly, there is an exceptional core of talented and enthusiastic young faculty already at Winthrop. The prospect of collaborative research opportunities in a supportive environment will appeal to many outstanding candidates. Winthrop is also located within one of the most attractive metropolitan regions (Charlotte) in the nation.

Addition of a Biology-Chemistry Biomedical Science Curriculum: Winthrop will develop a biomedical science chemistry-biology dual major to provide students with a strong background in key sciences that underpin biomedical research. The curriculum will include advanced courses in biomedical science and one in medical ethics. The students will be required to complete a two-semester biomedical research journal course and a two-semester biomedical research project. A biomedical research seminar series will draw from biomedical researchers in the State and strengthen ties with research institutions. A representative listing of biomedical science courses expected to be incorporated in the developed curriculum has been developed (* represents a new course):

Representative Courses for Biology-Chemistry Integrated Biomedical Science Curriculum

- Calculus, Advanced Mathematics, and Computer Programming
- Physics I & II
- Organic Chemistry I & II
- Cell Biology and Molecular Biology
- Physiology and Histology
- Quantitative Analysis and Bioinorganic Chemistry
- Biochemistry I & II and Biochemical Lab Techniques
- Microbiology and Immunology
- Biophysical Chemistry*
- Human Genetics and Electron Microscopy
- Biomedical Research Seminar* and Biomedical Ethics*
- Biomedical Research I & II
- Biomedical Literature I & II*
- Cancer Biochemistry* and Advanced Protein Structure & Function*
- Mechanism of Disease Processes and Bioinformatics

Implementation of a Biomedical Science Recruitment Initiative: In conjunction with the new biomedical science curriculum, Winthrop University will implement a major recruitment initiative to bring additional students to campus to study biomedical science. Many exceptional high school graduates interested in medicine will be impressed by the demonstrated commitment to biomedical research at Winthrop. The integrated biomedical science curriculum offered, the excellent biomedical research facilities available, the personal attention from a strong core of biomedical faculty mentors, the variety of relevant biomedical research projects available, and Winthrop's desirable location within the Charlotte metropolitan area are all key factors that will appeal to many young students interested in advancing science to improve the human condition. Winthrop's diverse student population will also provide strong incentives to attract women and African American students, groups that have been historically underrepresented in the biomedical sciences. This "biomedical scholars" initiative will increase the number of science graduates, the percentage that do biomedical research, and the number and the percentage of minority graduates and biomedical researchers. Winthrop Admissions Office advertising campaigns, high school seminars by Winthrop faculty and students, Winthrop's hosting of summer workshops for students and high school teachers, and networking with schools in the Charlotte region are planned components of the biomedical scholar initiative. Winthrop's proximity to many highly rated schools in the Carolinas, along with the significant minority population at these schools, provides evidence of the potential for success of planned efforts.

Growth and Integration of Biomedical Science Research Activities

The addition of four new biomedical staff scientists, the development of a biomedical science curriculum, and the formation of a large team of scientists at Winthrop with biomedical research interests will create a supportive environment for biomedical research to flourish. Project investigators share research interests with colleagues by presenting research seminars at Winthrop each year. Annual student biomedical research poster sessions will be conducted to advertise the work, to show results, and to make younger students aware of ongoing biomedical research activities. The planned curriculum integration in biomedical science will further increase interactions and discussions among faculty and students. Staff scientists have expertise that will be used on multiple projects; this will further integrate biomedical research efforts. The end result will be the development of new ideas and the formation of new research partnerships among Winthrop's growing team of biomedical scientists. Since many supported faculty are at

an early stage in their professional development, these new collaborations and ideas would be particularly productive. Two of the project investigators have an interest in cancer and share many common interests; two others have already begun collaborative discussion on potential projects. Another has an interest in bioinformatics, an area that spans a number of projects.

The growth of biomedical research at Winthrop will greatly increase ties with other institutions throughout the state. A number of mentors are from USC and will provide opportunities for students to visit in their labs, to meet with graduate students, and to use advanced facilities and instrumentation. The staff scientists hired will have specialized expertise (e.g. mass spectrometry, bioinformatics) and will be expected to develop cooperative relationships with counterparts at research universities. This interface will minimize equipment redundancy and will provide a mechanism to take full advantage of instrumentation capabilities throughout the state to support Winthrop biomedical research efforts. Winthrop's biomedical seminar program will bring researchers from across the state to share interests, to discuss projects, and to better understand capabilities. All of these efforts will serve to recruit more Winthrop students into biomedical research; many will then matriculate into graduate or health professional programs. The recruited students will include a significant minority representation.

Winthrop INBRE Goals:

Specific Goals: Infrastructure Development and Research Capacity Expansion

- Equipment Acquisition:
 - Apr '05: Develop and finalize acquisition plan to initiate the procurement of \$100,000 of Winthrop-funded biomedical research equipment on Jul 1 '05 with installation by Dec '05. (*Similar targets for the other four years*)
- Facilities and Searches:
 - Dec '05: Install the planned cold room.
 - Dec '05: Complete necessary facility modifications to accommodate four new staff scientists.
 - Dec '05: Complete searches for two junior staff scientists to meet 1 Mar '06 start dates; complete equipping offices with furniture, computers, printers, and phones.
 - Apr '06: Complete searches for two senior staff scientists to meet 15 Aug '06 start dates; complete equipping offices.
 - Dec '07: Complete facility modifications—offices and laboratories—for two new faculty with *expertise tied to SC's regenerative medicine theme*.
 - Apr '08: Complete searches for two new faculty with expertise tied to state's regenerative medicine theme to meet 15 Aug '08 start dates; equip offices.

Specific Goals: Faculty Development and Support

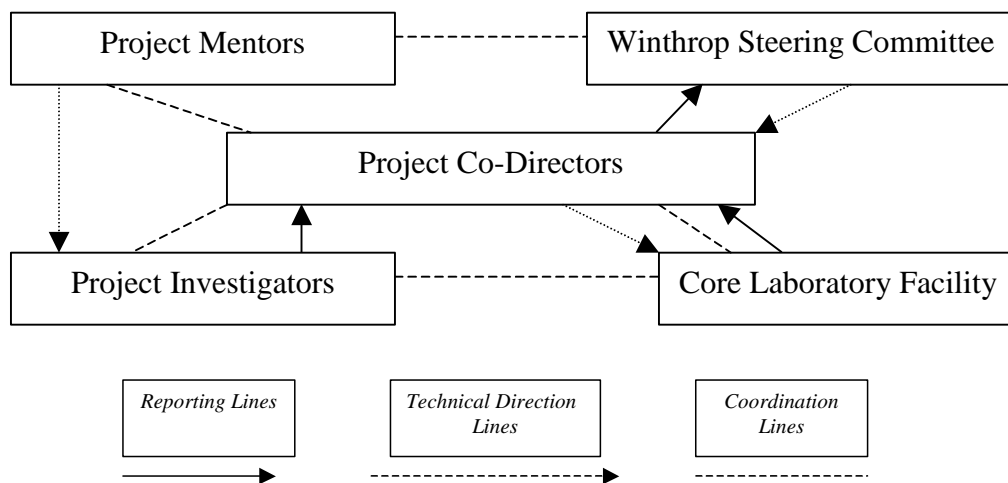
- Biomedical research proposal submission:
 - AY 06-07: Three faculty submit research proposals.
 - AY 07-08: Six faculty submit research proposals.
 - AY08-AY10: Six biomedical research proposals submitted annually.
- Position authorizations:
 - AY 04-05: Four staff scientist positions approved.
 - AY 05-06: Laboratory chemist position approved.
 - AY 05-06: Obtain FTE approval for two regenerative medicine faculty positions.

Specific Goals: Student Development and Support

- Development of biomedical science curriculum:
 - AY 04-05: Continue discussions and review similar programs being implemented.
 - AY 05-06: Develop integrated biomedical science curriculum.
 - AY 06-07: Gain curricula approval for biomedical program.
- Student recruitment:
 - AY 05-06: Develop a formal recruitment plan.
 - AY 09-10: Have at least 20 students engaged in biomedical research projects.
- Student research results:
 - AY 09-10: 20 students make conference presentations and five students are co-authors on peer-reviewed publications from biomedical research.

Administrative Structure: Winthrop's INBRE program will be functionally managed with clearly understood roles and effective rapport among the various groups. The Steering Committee provides overall technical direction. Project Mentors provide technical direction on the individual projects; mentors also give feedback to the Steering Committee and Project Directors to assist project investigators. Based upon feedback from the Steering Committee, Mentors, and Investigators; Project Directors provide technical direction and priorities to the Core Laboratory. The Core Laboratory works with the various project investigators to support their needs and to keep critical equipment fully functional.

Diagram of Winthrop University's Functional INBRE Structure and Interactions



Project Directors: The proposed program will be co-directed by the chairs of the Biology and Chemistry departments. They will chair search committees, manage budgets, mentor faculty, recruit students, and serve as advocates and problem solvers for the project. The involvement of the two department chairs in facilitating and in supporting these efforts provides a particularly effective management structure to ensure the requirements are met, the faculty involved are fully supported, and that the administration is made aware of resource and support requirements.

Winthrop University INBRE Institutional Steering Committee: A distinguished committee has been formed to oversee Winthrop’s INBRE program. Members include biomedical scientists from three major medical research centers, a fourth with extensive experience in undergraduate research, and two ex-officio members who are Winthrop administrators. The committee meets every six months, assesses progress, identifies priorities, and makes recommendations. This panel met on September 9, 2004, reviewed Winthrop’s pre-proposal, toured facilities, discussed projects with investigators, and reviewed program details with program co-directors.

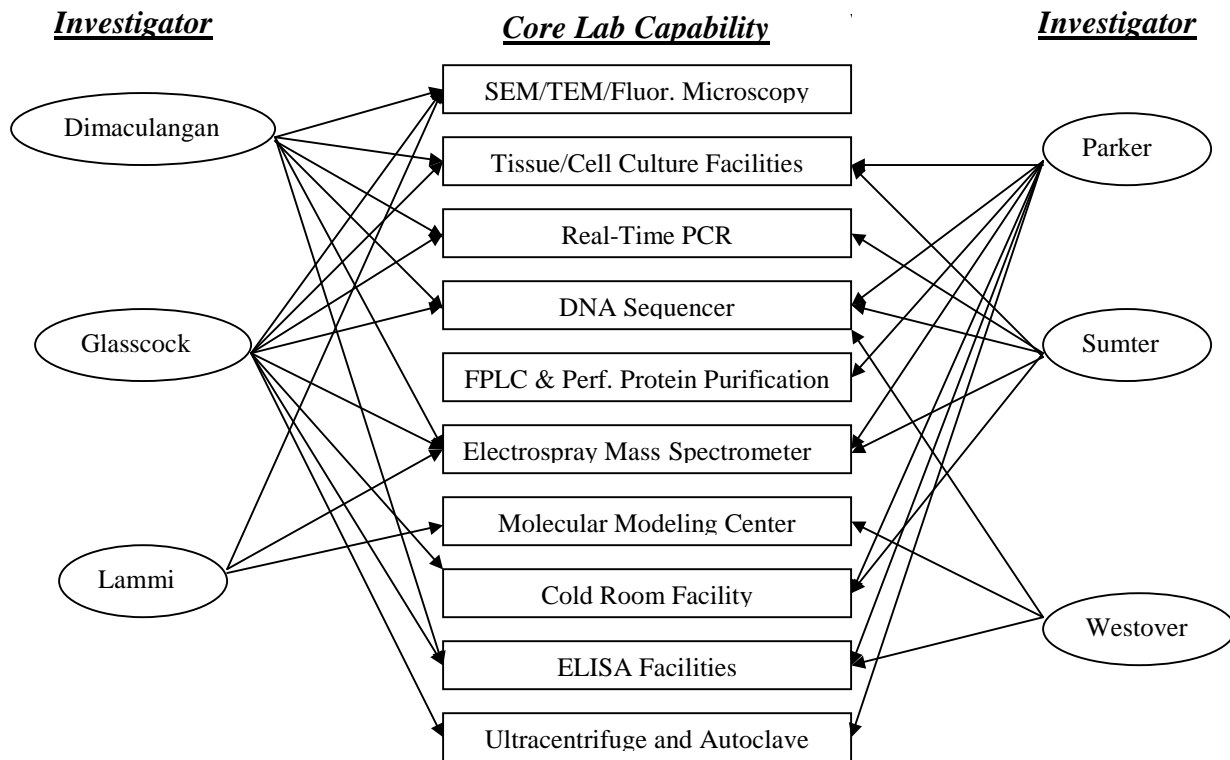
Table of Winthrop University’s INBRE Institutional Steering Committee

| | |
|---|--|
| Dr. Ralph A. Meyer <i>Committee Chair</i> | Director Biology Division, Orthopaedic Research Laboratory, Department of Orthopaedic Surgery, Carolinas Medical Center, Charlotte, NC |
| Dr. Franklin G. Berger | Director, Center for Colon Cancer Research and Professor, Department of Biological Sciences, University of South Carolina |
| Dr. Merlyn Schuh | Councilor on the Council of Undergraduate Research and Professor of Chemistry, Davidson College |
| Dr. Gary G. Schwartz | Scientific Director, Prostate Cancer Center for Excellence, Comprehensive Cancer Center of Wake Forest University |
| Dr. Debra C. Boyd <i>Ex-officio Member</i> | Dean of the College of Arts and Sciences, Winthrop University |
| Dr. Thomas F. Moore <i>Ex-officio Member</i> | Vice-President for Academic Affairs, Winthrop University |

3) Research Plans of Target Faculty: Winthrop has identified six talented faculty with specific biomedical research interests; five are assistant professors fresh from postdoctoral fellowships and one is an established faculty member undergoing retraining. Five of the six were recommended for inclusion by South Carolina’s external review panel based upon their evaluation of the 10 Winthrop proposals submitted in 2003; the sixth is a biomedical scientist and new faculty member. As faculty “graduate” by gaining external funding, other faculty will be added based upon Steering Committee recommendations. New faculty would have expertise (e.g. biomaterials and developmental biology) reflective of SC’s regenerative medicine theme.

Faculty goals target the development and submission of competitive AREA R15 research proposals. Underfunded NIH states have historically submitted fewer research proposals. As of April 1, 2004, NIH lists the current R15 funding rate at over 35%. A reasonable expectation is that approximately 1/3 of submitted proposals will be funded. If lower award rates occur, this will delay the point at which new or other current faculty are added to the INBRE program over years 3-5 of the grant. If higher award rates are achieved, this will accelerate the addition of other investigators to Winthrop’s biomedical research program.

Core Laboratory Support of Target Faculty Projects: Strong core support is imperative for timely research progress. The diagram below illustrates key core-investigator relationships; arrows below depict the specific core capabilities the six investigators will need to use in their proposed research projects; these illustrate the critical need for staff scientist expertise.



Professional Development of Target Faculty: Winthrop faculty are evaluated in the areas of 1) teaching, 2) scholarship and professional recognition, and 3) service and academic responsibility. Participation in the INBRE program will provide substantive opportunities to excel in all three areas. The primary purpose of research at undergraduate universities is for the educational development of students. Mentoring undergraduate research is an intensive teaching experience that engages students and that challenges faculty. The scholarly work products of the proposed projects must be peer-reviewed prior to publication; evidence of this is necessary to document scholarly achievements. The proposed INBRE program will involve the development of an integrated biomedical science curriculum; this initiative will place important academic responsibilities upon project investigators and serve the needs of both students and the institution. Biomedical research accomplishments also serve the needs of the citizens of South Carolina, a state with some of the nation's most significant human health concerns. The intensive engagement of faculty and scientists in the INBRE program is clearly aligned with evaluation mechanisms already in place for tenure and for promotion. INBRE provides increased opportunities for excellence in all of these areas and for increased mentorship and professional development of targeted faculty.

Table of Faculty Targeted for Development of Biomedical Research Competitiveness

| <u>Investigator</u> | <u>Project Title</u> | <u>Project Mentor(s)</u> |
|--|--|---|
| <i>Dwight Dimaculangan</i> (Molecular Biology) | <i>Stem Cell-Augmented Repair in a Bioengineered Cardiac Model</i> | Dr. Wayne Carver, Associate Professor, USC- Columbia |
| <i>Laura Glasscock</i> (Experimental Pathology) | <i>The Role of Thrombomodulin in Prostate Cancer-Associated Angiogenesis</i> | Dr. Frank C. Church UNC-Chapel Hill Chris M. Tieglund, MD Dept of Urology, CMC |
| <i>Robin Lammi</i> (Bioinorganic/Biophysical Chemistry) | <i>Monitoring Metal-Ion Concentration and Metal-Induced Conformational Change at the Level of Single Ions and Enzymes</i> | Dr. John H. Dawson USC-Columbia Dr. Dewey Holten Washington University |
| <i>Chasta Parker</i> (Protein Biochemistry) | <i>Structural Studies of a Recombinant Membrane Interacting Region of Complement Component C8a and Adiponectin Membrane Receptor 1</i> | Dr. James M. Sodetz USC-Columbia Dr. Lukasz Lebioda USC-Columbia |
| <i>Takita Felder Sumter</i> (Biochemistry) | <i>Functional Mapping of High Mobility Group A1 (HMGA1) Binding Domains Required for Tumor Transformation</i> | Dr. Frank G. Berger Professor USC-Columbia |
| <i>Kristi Westover</i> (Molecular Microbiology and Bioinformatics) | <i>Hepatitis B Virus: Adaptive Evolution of Immune Recognition and Evasion</i> | Dr. Austin L. Hughes Professor USC-Columbia |