

Contact: Diana Gonzalez

**REQUEST TO CREATE NEW INSTITUTE AT THE UNIVERSITY OF IOWA:  
INSTITUTE FOR VISION RESEARCH**

**Action Requested:** Consider recommending approval of the request by the University of Iowa to establish an Institute for Vision Research in the Carver College of Medicine.

**Executive Summary:** The purpose of the proposed institute is to assist the University of Iowa to assume a world-leading role in the eradication of human blindness through interdisciplinary translational research, education, and clinical care. This proposal was reviewed by the Board Office and the Council of Provosts and is recommended for approval. Board of Regents Policy §6.08 requires that all centers and institutes be approved by the Board. This request addresses the Board of Regents Strategic Plan priorities to provide “educational excellence and impact” and “economic development and vitality,” Goal #7 - “Iowa’s public universities shall contribute to the expansion and diversification of the Iowa economy,” and Goal #8 - “Iowa’s public universities and special schools shall be increasingly efficient and productive.”

**Background:**

- ◇ **Description of proposed institute.** The proposed institute will foster interdisciplinary connections between existing academic units with interests and capabilities in vision research. No faculty members will be appointed academically to the proposed institute. All faculty members will hold academic appointments in existing academic departments. Participating departments and colleges will realize the following benefits: (1) financial and scientific resources in the proposed institute will help departments and colleges recruit outstanding new faculty, students, and fellows with an interest in vision research; (2) scientific and professional mentoring central to the culture of the institute will significantly increase the likelihood of success for participating faculty members; (3) enhanced academic achievement and recognition of participating faculty members will increase the stature of their departments and colleges; and (4) financial contribution of the proposed institute to support participating faculty members will lessen the financial burden of their departments and colleges.
  
- ◇ **Need for proposed institute.** During the past 20 years, vision research has become increasingly translational and interdisciplinary. For example, experiments designed to find new eye-disease-causing genes involve frequent interaction of scientists in the Colleges of Medicine (clinical findings, samples, bedside implementation of findings), Engineering (informatics analysis), Public Health (statistical interpretation), and Liberal Arts and Sciences (creation of confirmatory animal models). The proposed institute will provide a trans-departmental, trans-collegiate organization to foster efficient sharing of samples, data, expertise, and equipment during every phase of the projects – from planning and grant writing, to laboratory experimentation, data interpretation, publication, and clinical implementation of the findings. The proposed interdisciplinary institute will provide critical support for the University’s ambitious goal of developing drug-, gene-, and cell-based therapies to arrest and reverse the effects of all forms of heritable blindness.

- ◇ Proposed institute activities and objectives. The primary focus of the proposed institute will be the exploration of genetic factors that contribute to human blindness, and the development of new treatments based on understanding those factors. The diseases that will be studied range from the most common causes of human blindness, such as age-related macular degeneration and glaucoma, to much rarer conditions, such as retinitis pigmentosa and Leber congenital amaurosis.

Clinician scientists in the proposed institute will care for patients affected with these conditions in the clinical facilities of the Department of Ophthalmology of the Carver College of Medicine. They will investigate the clinical aspects of these diseases and publish their findings in the peer-reviewed literature. These scientists will also continue to develop web-based teaching resources that make the extensive inherited eye disease teaching archives of the Department of Ophthalmology available at no cost to interested students, scientists, physicians, and patients.

Genetic testing for these patients as well as similar patients from around the world will be performed in the Carver Nonprofit Genetic Testing Laboratory at the University of Iowa. Some of the more advanced genetic testing will use the “next generation” DNA sequencing capabilities of the University’s Iowa Institute for Genetics. The objective is to discover new disease-causing genes through collaborative projects involving scientists in four colleges – Medicine, Engineering, Public Health, and Liberal Arts and Sciences. Disease-causing mechanism will be explored through similar collaborative research studies.

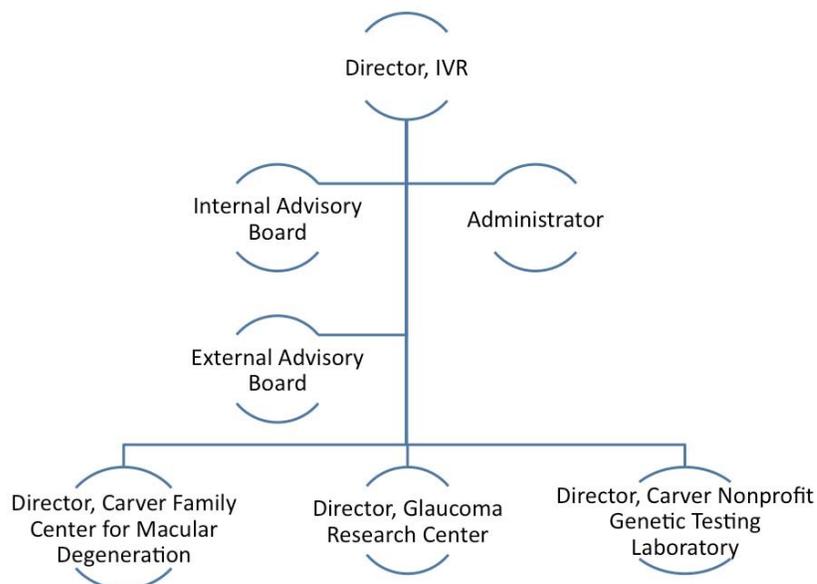
Drug-based, gene-based, and cell-based therapies for these diseases will be developed in the laboratories of the Carver College of Medicine, and clinical trials of these and other therapies will be conducted in the Department of Ophthalmology. The following educational areas will be emphasized:

- ⇒ Genetics lectures in the medical school curriculum and graduate program in genetics.
- ⇒ Bioinformatics lectures in the engineering curriculum.
- ⇒ Web-based inherited eye disease and genetics testing education.
- ⇒ Stem-cell lectures in the Molecular and Cellular Biology and Developmental Neurobiology programs.
- ⇒ Weekly inherited eye disease lectures to medical students, residents, and fellows in the Department of Ophthalmology.

- ◇ Proposed institute structure and organization. The initial director of the proposed institute will be Dr. Edwin Stone, professor of Ophthalmology at the University of Iowa since 1997. He is an internationally recognized clinical scientist and is currently the Director of the Carver Family Center for Macular Degeneration, Seamans-Hauser Chair of Molecular Ophthalmology, and investigator of the Howard Hughes Medical Institute.

The initial faculty of the proposed institute will include 28 faculty members whose primary appointments span eight departments and four colleges – Medicine, Engineering, Public Health, and Liberal Arts and Sciences. Collaboration with a 5<sup>th</sup> college (Pharmacy) is anticipated to facilitate high-throughput drug discovery using cell-based models of human eye diseases.

## Institute for Vision Research



The purpose of the Internal Advisory Board will be to (1) assess the goals of the institute biannually; assess scientific progress; assess institutional resources that are needed and available; and (4) develop a strategic vision for the future of the institute. The purpose of the External Advisory Board will be to (1) review the progress of the institute quarterly from the perspective of society as a whole; and (2) identify and help develop philanthropic opportunities.

- ◆ Relationship of proposed institute to University's Strategic Plan. Since 1847, the mission of the University of Iowa has been "teaching, research, and public service." The proposed institute is expected to make substantive contributions in the three domains. The Department of Ophthalmology, which teaches the next generation of eye doctors how to protect and restore vision with their diagnostic and surgical skills, is consistently ranked in the top five residency programs in the country. The faculty members of the proposed institute will teach undergraduate and graduate courses in eight departments and four colleges. In particular, they will teach students how to overcome the traditional barriers between disciplines for the societally-important goal of curing blindness.

Scientists conducting vision research at the university are already among the leaders of vision science. Expanded opportunities for collaboration within and outside the University will help scientists realize the goal of understanding and curing heritable eye diseases. The Carver Nonprofit Genetic Testing Laboratory provides state-of-the-art genetic tests to patients around the world as a public service. The Department of Ophthalmology physicians provide sight-saving medical and surgical care to all patients. The mission statement of the University of Iowa Health Care is "Changing Medicine, Changing Lives." Translation of the fundamental scientific discoveries made in the proposed institute will result in restoring vision (a life-changing event) for many people in Iowa and beyond. Furthermore, the experimental approaches and methodologies developed will likely be adaptable to other diseases. Therefore, it is expected that the proposed institute will assume a leadership role in innovation within the University.

- ◇ Relationship of proposed institute to existing centers/institutes. The proposed institute will integrate and coordinate the activities of three existing research centers at the University – Carver Family Center for Macular Degeneration, Glaucoma Research Center, and Carver Nonprofit Genetic Testing Laboratory – and will strengthen the collaborative opportunities between the scientists in these centers and those in the Center for Bioinformatics and Computational Biology and the Iowa Institute for Genetics.

The proposed institute anticipates synergies with the following training programs:

- ⇒ *T32 Genetics, Predoctoral Training Program.* The Genetics Ph.D. program is a broad-based interdisciplinary program that incorporates cutting-edge techniques to answer the foremost questions facing biology, medicine, evolution, and bioinformatics. The program is designed to provide both a core curriculum in Genetics and sufficient flexibility to fit students' individual needs. It provides research opportunities across the spectrum of genetics and fosters independent thinking to equip students to meet modern challenges of doctoral graduates.
  - ⇒ *T32 Computational Biology Predoctoral Training Program.* This program accepts students with either a computational or biological sciences background into a Ph.D. program that provides training in both. The goal is to create a cadre of new investigators fluent in both biology and computer sciences who can work at the interface of genetic analysis, technology, and diseases.
  - ⇒ *TL1 Program, Institute for Clinical and Translational Science.* This program facilitates the training of scholars in Ph.D. program in translational science.
- ◇ Existence of proposed institute at other Iowa institutions. The proposed institute is a unique concept that has not been developed by any other Iowa institution. The University of Iowa is the only university in the state that has the components (Department of Ophthalmology, Institute for Genetics, Center for Bioinformatics and Computational Biology, Genetic Testing Laboratory for Inherited Eye Diseases, and a large group of externally funded vision scientists working on the same campus) required to create and support an institute of the size and scope proposed.

The Institute of Clinical and Translational Science (ICTS) fosters many forms of translational research at the University of Iowa. The ICTS has embarked on a major effort to establish a biorepository connected to the EPIC electronic medical records system to enable investigators to conduct broad-based, population research on the role of genetic and environmental factors in health and disease, with a particular focus on those disorders which are undergoing intensive study at the University. These resources are likely to be particularly valuable to the vision research community served by the proposed institute.

- ◇ Inter-institutional and collaborative efforts with other entities. Inter-institutional cooperation and collaboration will be strongly encouraged by the proposed institute leadership. The veterinary ophthalmology and genomics programs at Iowa State University will provide excellent opportunities for collaboration with the proposed institute at the University of Iowa. Currently, the University of Iowa is collaborating with ISU's College of Veterinary Medicine and Department of Animal Science where large animal retinal transplantation, long-term post-transplant survival and analysis, and large animal model production studies are being conducted. Coupling ISU's strengths, which include a world-class genomics faculty, comparative genomics research, animal models for human disorders, additional bioinformatics capabilities and additional DNA, RNA, and sequencing capabilities, with the proposed institute will create synergies and new opportunities for collaboration between both universities.

- ◇ Unique features of the University of Iowa to support the proposed institute. The eradication of blindness is a major scientific goal similar to the pursuit of cures for cancer, heart disease, stroke, Alzheimer's disease, and AIDS. Common blinding diseases like age-related macular degeneration (AMD) and glaucoma affect millions of people worldwide. As the population ages, the number of individuals affected by these blinding eye diseases is increasing dramatically. In fact, if it would be possible to cut the rate of blindness from the most common disease (AMD) in half, there would be just as many cases in the year 2025 as there are today which signals a tidal wave of impending blindness.

The Department of Ophthalmology and Visual Sciences has been consistently ranked among the top 10 departments in the United States for more than 50 years and is currently the only top 10-ranked department in the College of Medicine. In the early 1990s, researchers at the University pioneered the field of Molecular Ophthalmology; during the ensuing two decades attracted faculty and built laboratory capabilities that are unrivalled in the world. For example, the Molecular Ophthalmology Laboratory currently has 60,000 human DNA samples from patients affected with every conceivable inherited eye disease; the Research Eye Bank has more than 1,200 human eyes available for study; and the Patient-Derived Stem Cell Laboratory has more than 1,000 skin-derived stem cell lines from patients with different inherited eye diseases. Each of these collections is the largest of its kind in the world.

The scientific and societal value of these samples has been significantly augmented in recent years by the development of outstanding bioinformatics and DNA sequencing expertise at the University; this expertise has been fostered by the recent formation of the Iowa Institute for Genetics. The University also houses the world's largest genetic testing facility for inherited eye diseases (Carver Nonprofit Genetic Testing Laboratory) which serves patients in all 50 states and 22 foreign countries. In addition, during the last few years, the University developed human gene therapy capability and is now actively involved in providing gene replacement therapy to human research subjects affected with an inherited form of childhood blindness known as Leber congenital amaurosis.

The University of Iowa is poised to take a world-leading position in the eradication of inherited blindness by combining these resources in a funded, efficient, collaborative institute with an intense focus on developing effective treatments for these diseases.

As a group, the proposed faculty members have maintained an external funding rate of more than 75% during the past five years. Two of the proposed faculty members are investigators of the Howard Hughes Medical Institute. As a group, the proposed faculty members have garnered more than \$30 million dollars in philanthropic gifts during the past 10 years.

- ◇ Resources. In addition to the 28 charter faculty members, the proposed institute plans to recruit 10 additional faculty members to the University during the next five years. These faculty members will likely hire an average of three additional staff members apiece.

The proposed institute will be housed in the top two floors of the Medical Education and Research Facility (MERF). The 4<sup>th</sup> floor of the building is currently devoted to vision research; the proposed institute is expected to gradually expand into the 3<sup>rd</sup> floor following the opening of the Pappajohn Institute for Biomedical Discovery in 2014.

The equipment needed to establish the proposed institute will be contributed by the charter faculty of the institute; for example, the equipment is already in place in the faculty members' laboratories. Additional equipment needed to maintain the proposed institute will be obtained through a combination of grant funding and philanthropy as new faculty are hired and as new projects and initiatives are undertaken.

The charter faculty members are already well-funded by long-term external grants and philanthropy; these grants and gifts together with the clinical activities of the faculty are anticipated to generate sufficient revenue to cover the expenses of the proposed institute for the long term. The proposed institute is anticipated to be entirely self-sufficient functioning independently of the Carver College of Medicine and departmental support beginning in Year Three.

- ◇ Expected need. The proposed institute is expected to be in existence for more than 10 years. It will be evaluated annually by both its internal and external advisory boards to ensure that the institute is progressing toward its goals and that its goals are still relevant to the University and society.
- ◇ Support from existing campus structures. The deans of the Colleges of Engineering, Law, Liberal Arts and Sciences, Education, Nursing, Pharmacy, Dentistry, and Public Health expressed strong support for the proposed institute and identified numerous opportunities for synergy with each college. There was consensus that the proposed institute will address an important institutional need and will be viewed as a valuable institutional resource.
- ◇ Costs and funding sources. The total cost to operate the proposed institute will be \$11,120,132 in Year One and increasing to \$18,556,102 in Year Five. The major funding sources for the proposed institute will be grants from the National Institutes of Health, Howard Hughes Medical Institute, Foundation Fighting Blindness, and major philanthropic organizations. The Carver College of Medicine and the Department of Ophthalmology and Visual Sciences will each commit \$150,000 per year for the next two years to assist in the early developmental phase of the proposed institute. If grant or philanthropic support is lower than expected at any time, the rate of recruitment of new faculty/number of staff people assisting each faculty member will be adjusted proportionately to keep the proposed institute financially sound and independent of other University units.

**PROPOSED INSTITUTE COSTS AND FUNDING SOURCES**

<b>Funding Source</b>	<b>YEAR 1</b>	<b>YEAR 2</b>	<b>YEAR 3</b>	<b>YEAR 4</b>	<b>YEAR 5</b>
Grants	\$4,691,824	\$5,582,579	\$8,506,669	\$10,194,369	\$11,887,700
Gifts	\$3,609,715	\$4,149,089	\$6,021,437	\$6,198,756	\$6,453,882
Howard Hughes Medical Institute	\$2,411,372	\$2,483,714	\$0	\$0	\$0
Department Support	\$407,220	\$419,437	\$101,103	\$208,272	\$214,520
<b>Total</b>	<b>\$11,120,132</b>	<b>\$12,634,818</b>	<b>\$14,629,208</b>	<b>\$16,601,396</b>	<b>\$18,556,102</b>

- ◇ Implementation. After obtaining Board approval, the Carver College of Medicine is prepared to implement the Institute for Vision Research in Fall 2013.