Strategic Plan

TRANSFORMING MEDICINE

October 1, 2009

KECK SCHOOL OF MEDICINE

USC
ABOUT THE KECK SCHOOL OF MEDICINE OF USC

The Keck School of Medicine of USC is a place of dynamic activity in patient care, scientific discovery, medical and bioscience education, and community service. Our faculty, staff, students, residents, alumni, donors and friends are committed to excellence. Together we are poised to lead medicine in the 21st Century for the benefit of humankind. This is an exciting time of great transformation as we endeavor to create a truly stellar academic medical center at USC.

Located on USC’s Health Sciences Campus, just east of downtown Los Angeles, the Keck School of Medicine is home to the Doctors of USC — nationally recognized physicians practicing in a multitude of clinical specialties. They practice in private clinics on our campus and at our recently acquired private hospitals, USC University Hospital and USC Norris Cancer Hospital. They also work at at the LAC+USC Medical Center — one of the largest teaching hospitals in the United States — Childrens Hospital Los Angeles and elsewhere around the greater Los Angeles area.

The Keck School of Medicine also is home to several research institutes, including the USC Norris Comprehensive Cancer Center, the Zilkha Neurogenetic Institute, the Eli and Edythe Broad Center for Stem Cell Research and Regenerative Medicine, the Cardiovascular Thoracic Institute and the USC Institute for Global Health.

Established in 1885, the Keck School is the oldest medical school in Southern California.

ON THE COVER: Rendering of the new Eli and Edythe Broad CIRM Center for Regenerative Medicine and Stem Cell Research at USC, currently under construction, which will house some of the country’s most exciting cutting-edge research.
The mission of the Keck School of Medicine is to improve the quality of life for individuals and society by promoting health, preventing and curing disease, advancing biomedical research and educating tomorrow’s physicians and scientists.
The Keck School of Medicine is undergoing a major transformation. It was sparked by the expansion of biomedical research as a result of the Keck naming gift in 1999. It continues today with the restructuring of our clinical enterprise linked to the acquisition of USC University and Norris Cancer Hospitals and the opening of the new Los Angeles County Hospital. Simultaneously, we have implemented major changes in medical and graduate education that have enhanced the candidate pool and significantly improved measurable outcomes of education and training. The School itself and many of its major departments are under new leadership with a mandate to achieve excellence in research, education and health care. Never in the history of USC has there been such an outstanding opportunity for the School of Medicine to become a leader among private academic institutions.

These exciting changes at KSOM are occurring in the context of two major shifts in the nation's biomedical enterprise. The first is an increasing emphasis on interdisciplinary research. Many of the diseases that affect people across the globe result from complex biologic processes interacting with equally complex environmental factors to create morbidity and mortality. Understanding the processes that cause these complex diseases requires expertise in multiple scientific disciplines — a team approach to scientific discovery, whether at the bench, at the bedside, in the community or in populations. The second change is a growing need for translational research. Scientific discoveries remain the “engine” for advances in biomedicine. However, discoveries must be translated to applications in human health if they are to have important societal impact. The future of medical advancement requires teams of bench scientists, clinical researchers, clinicians and other health providers to set research priorities that are most relevant to health needs and to assure that discoveries fulfill their potential to improve health and health care. The prestige and flexibility of the KSOM, one of the top private medical schools in the West, and our location in the diverse urban environment of Los Angeles position us strongly to lead in this changing environment.
Fulfilling our mission in the context of change in science and medicine will require coordination and integration among scientific disciplines and across research, education and patient care activities. Accordingly, our vision is that the Keck School of Medicine will become a leader in the development of interdisciplinary approaches to making scientific discoveries and translating them into improved health.
The success of the Keck School will continue to depend on the innovation and dedication of the individuals who work and study here. Thus, the foundation of success in this era of expansion will be recruitment of the best possible basic scientists, clinicians, educators and trainees. Progressively, our success will also depend on collaboration among those groups within the School, with others at USC, in our local communities and around the world. Accordingly, we have built this strategic plan on a theme of integration among traditional scientific and medical disciplines and across our research, education and clinical enterprises. We will also strive to expand our reach outside the Keck School and USC to maximize opportunities for discovery, translation and improvement of health. The plan contains four main strategies:

>> Integrating Research and Health Care:
We will create teams of researchers and care providers that can identify major opportunities for health advancement, make leading-edge discoveries and translate the discoveries into improved health.

>> Integrating Education for Science and Medicine:
We will develop educational programs and career paths for individuals who wish to become leaders in translational research that spans traditional biomedical disciplines and approaches.

>> Building an Academic Environment:
We will develop an outstanding academic medical center that includes hospitals emphasizing the integration of care, education and research. We will transform our built environment so that it promotes interaction and collaboration among scientists, clinicians and trainees.

>> Creating Partnerships:
We will create new partnerships within and outside of USC to expand our abilities to make leading-edge discoveries, to train interdisciplinary teams and to translate research findings into improved health.

STRATEGY 1: INTEGRATING RESEARCH AND HEALTH CARE
Central to our plan to achieve leadership in scientific discovery and translation into improved health is close integration of our clinical and research enterprises. We have identified five areas in which we are positioned to have a major impact on the understanding, detection, prevention and treatment of adult and pediatric disease in the next decade: 1) cancer; 2) neurosciences; 3) cardiovascular disease; 4) obesity/diabetes/metabolic diseases; and 5) immunology/infectious disease. Two additional areas were identified for exploration and possible future development: women’s health and trauma/orthopedic disease. Cross-cutting opportunities were identified in five areas: (a) technologies that will allow us to compete effectively in the discovery and translation arenas; (b) stem cell research; (c) community and global health to assure societal impact from our translational research; (d) transgenerational health; and (e) health outcomes/health services research.
Areas for Immediate Development/Expansion

These are areas where KSOM already has significant research and clinical strengths that can be integrated into top-ranked translational programs.

>> Cancer: The Keck School is home to the NIH-designated Norris Comprehensive Cancer Center, a model for integration of basic, clinical and population research with state-of-the-art health care. The Norris will leverage this integrated approach to attain leadership in the areas of novel therapeutic and technology development, with particular focus on stem cells, epigenetics and genetics, molecular- and imaging-guided therapy, computational biology, radiation therapy, molecular pathology and early phase clinical trials. Women’s cancers, urological cancers, gastrointestinal cancers, melanoma, hematological malignancies and pediatric malignancies are targeted for immediate development.

>> Neurosciences: USC has outstanding programs in neuroscience, ranging from basic biology (neurodevelopment, neurogenetics, neural cell biology and neuroplasticity) to applied programs in neuroengineering, to clinical care for neurological, neurosurgical and psychiatric diseases. Five institutes and centers directly affiliated with the Medical School have a neuroscience focus or major component (Zilkha, Doheny, Saban, and House Institutes; Alzheimer’s Center). These programs, centers and institutes are loosely linked at the present time. Creation of a single translational neurosciences program is a major goal. Psychiatric genetics, autism, neurodegeneration and neuroengineering have been identified as key translational research themes for development.

>> Cardiovascular Disease: The Cardiovascular Thoracic Institute (CVTI) has been established recently to become a model of integrated cardiovascular and thoracic care and research. In the next ten years, the CVTI will use virtual (electronic communications) and real (physical space) approaches to become a home for basic, translational and clinical scientists working on cardiovascular and thoracic disease at USC. Enabling technologies developed within the CVTI and with key strategic partners will establish the Institute as an incubator, early tester and training center for cutting-edge diagnostics and therapies. The CVTI will recruit a nationally recognized director of research and establish both clinical and basic research-oriented training programs in cardiovascular and thoracic medicine. Basic and developmental research in the cardiovascular system, stem cell therapeutics, vascular biology, congestive heart failure, valvular heart disease, congenital heart disease, sudden cardiac death and atrial fibrillation have been identified as key research areas for development.

>> Obesity, Diabetes and Metabolic Disease: USC and the KSOM have strong programs in systems biology, translational research, population studies, prevention and clinical care for diabetes and obesity in adults and children. The School has outstanding programs to investigate the basic biology of liver disease. No single entity links these programs at present. Establishment of an institute for obesity and metabolic disease, with a strong
emphasis on diabetes and metabolic liver disease, was identified as a top priority. This will require physical infrastructure (wet- and dry-lab space; human studies space) and recruitment of basic scientists in the areas of appetite regulation, adipose biology, insulin resistance and beta cell biology. Translational/clinical scientists working in metabolic liver disease and in surgical approaches to obesity will be needed as well. These new researchers will complement faculty who are already carrying out nutritional and metabolic studies, genetic research and interventional studies for prevention and treatment. The faculty expansion will create an outstanding environment for development of new training programs in obesity, diabetes and metabolic disease.

**Immunology and Infectious Disease:**
The KSOM has a strong tradition of clinical research in infectious disease (e.g., adult and pediatric AIDS clinical trials; tuberculosis consortium) and prevention research in HIV and sexually transmitted diseases. We have recently added new strengths in basic research in molecular immunology and virology. We are well positioned strategically and geographically to become a leading institution in translational research for emerging infections. Development of an integrated institute for immunology and infectious disease was identified as a high priority for the next ten years. Development would require physical infrastructure and recruitment of basic, translational and population researchers in the areas of HIV/AIDS, tuberculosis/microbiology, virology and immunology. Establishment of a training program in immunology and infectious disease and creation of international partnerships, especially in developing countries, are additional goals.

**Areas for Exploration**
These areas represent significant clinical strengths at the Keck School. They warrant exploration to determine the types and scope of investments that would be required to move them to leading programs integrating basic and translational research with leading clinical care.

>> **Women’s Health:** The KSOM has strong clinical programs in benign gynecology and gynecological oncology, perinatal medicine and reproductive endocrinology. Complementing these programs with basic and translational research could allow the Keck School to develop a leading program in women’s health.

>> **Trauma and Musculoskeletal Disease:** The KSOM’s location in the center of Los Angeles has provided an ideal setting for development of leading clinical programs in emergency medicine, trauma and musculoskeletal diseases. Complementing these clinical programs with basic and health services research could allow the KSOM to develop a leading translational program in orthopedic disease and trauma.

**Cross-Cutting Themes**
These areas represent developing strengths at the Keck School that transcend specific disease areas, but are requisite for creation of an outstanding translational research environment.

>> **Translational Technologies:** Effective discovery and translation require not only great ideas, but also the technical sophistication to actualize them. Six areas of translational technologies — indeed sciences in their own
right — were identified as high priority for new or continued development at the Keck School: >> imaging science; >> biomedical informatics; >> systems biology integrating genomics, proteomics and metabolomics; >> stem cell biology and therapeutics; >> bioengineering; and >> tissue banking. In addition, the School must develop a single information architecture that will allow effective communication among researchers, clinicians, educators and trainees within the School as well as with partners across the university and outside of USC. These activities require a flexible organization and the ability to adopt solutions that may be outside the current boundaries of traditional medical and scientific experience.

>> Stem Cell Research: Development of new tissues and organs from stem cells is on the cutting edge of biomedicine. USC and the KSOM have already invested heavily in this field through development of the Eli and Edythe Broad Center for Regenerative Medicine and Stem Cell Research. The Broad Center is home to a growing cadre of basic stem cell biologists. A top priority for the next ten years will be recruitment of translational stem cell researchers who can work as part of the translational teams in cancer, neurosciences, cardiovascular disease, obesity/diabetes/metabolic diseases and immunology/infectious disease.

>> Community and Global Health: To realize our vision of improving health and health care, we need to strengthen our activities related to the health problems that affect the people of Los Angeles and California, and to extend our reach globally. Our location in Los Angeles and the Pacific Rim provides an ideal springboard to leadership in community and global health. Two major priorities were identified. One is the development of the University-wide Institute for Global Health, which is already being led by the Keck School. The second is development of an institute for community health, which would engage the diverse local communities of Los Angeles to participate in the research planning and development, and enhance the translation and dissemination of research findings.

>> Transgenerational Health: This is a major strategic theme for Childrens Hospital Los Angeles (CHLA). There is growing evidence that risks for chronic adult diseases begin in utero and during childhood. Also, growing numbers of adults are survivors of important perinatal and childhood diseases. Establishment of a Multigenerational Health Center by CHLA will provide important opportunities for collaborative research that will define optimal long-term care for survivors of pediatric illnesses, identify early-life events that create risks for adult illnesses, and develop interventions to reduce the burden of adult diseases that begin in early life.

>> Health Services/Health Outcomes Research: These areas are high priorities on the national agenda for clinical research and health care. They are requisite for comprehensive programs in translational research. To date the Keck School has not developed significant strengths in these areas,
although strengths exist and are being developed in other schools at USC. Exploration of these as targeted areas of development, in particular in primary care departments and in collaboration with other schools at USC, will be important for the ultimate success of translational research in the KSOM.

**STRATEGY 2: INTEGRATING EDUCATION FOR SCIENCE AND MEDICINE**

A core component of the mission of the medical school is the education of physicians and scientists, including future leaders of academic medicine. Our vision of attaining leadership in interdisciplinary scientific discovery and translation to better health adds a new dimension to our training mission, a dimension that must be woven into faculty development as well. This training effort will require continued development of interdisciplinary approaches in basic research and continued improvement of medical and post-doctoral training. It will also require new programs to attract the best medical and graduate students, along with faculty members to teach and mentor them. We will create a nurturing and stimulating environment that equips our students, trainees and faculty members with the tools they need to achieve success in the integration and interpretation of translational research spanning traditional medical disciplines and approaches.

These training efforts must be superimposed on our constant efforts to maximize the effectiveness and relevance of our current training programs. For example, the KSOM is in the progress of establishing a competency-based medical education curriculum to guarantee the success of our students. A critical component of the program will be a new building/center dedicated to medical education. It should include a clinical skills center, an educational “clinic” for training and testing, and a state-of-the-art simulation center. These will be set up like an actual clinic so that students can develop their interviewing and physical exam skills with standardized patients and have skills evaluated in an actual clinic environment.

In the next ten years, we propose five new major areas of emphasis. Procuring training grants will be a major tactic for attaining success in each of these areas.

**Medical and Graduate Students:** We will integrate into the general curricula for both types of students an emphasis on the tenets of evidence-based medicine and a basic understanding of what is needed to translate scientific discovery to effective prevention, diagnosis and treatment. In addition, we will develop in-depth cross-training opportunities (tracks or degree programs) for a subset of students who wish to pursue careers in interdisciplinary and/or translational research. These should be developed with partners such as the Viterbi School of Engineering and the Schools of Pharmacy and Dentistry.

**Post-Graduate Trainees:** For post-graduate medical trainees, we will incorporate education on the clinical relevance of basic, translational and clinical research. For post-doctoral research fellows, we will incorporate education on clinical medicine that is relevant to their area(s) of research.
We will also develop in-depth cross-training programs for a subset of both types of trainees who are interested in interdisciplinary and translational research careers.

**Faculty Members:** We will develop “cross-training” programs in team building that expose selected clinical faculty members to basic, translational and clinical research techniques and methods, and that expose selected research faculty to clinical and translational medicine. These programs must include interdisciplinary mentorship and protected time for career development. We will work within the University to provide transparent guidelines for promotion based on rigorous interdisciplinary and translational research.

**Health Care Delivery and Health Economics:** Health care is a national political focus because of its rising costs, the aging population of the U.S. and varied accessibility of care, particularly across ethnic and socioeconomic groups. The Keck School has placed relatively little emphasis on health care delivery and health economics as academic disciplines. It is critical that we begin to train individuals who can help develop solutions to problems of health care access, delivery and affordability. Natural partners in this enterprise would be the Marshall School of Business, the School of Policy, Planning, and Development, and the School of Pharmacy, which has a strong pharmaco-economics program.

**STRATEGY 3: BUILDING AN ACADEMIC ENVIRONMENT**

There are two aspects of building an academic environment that are essential to achieving our vision of leadership in making and translating discoveries into improved health: the development of an outstanding academic medical center and the strategic implementation of a master plan for a built environment that promotes interaction and collaboration among scientists, clinicians, educators and trainees.

**Outstanding Academic Medical Center:** More Than Just Hospitals: The purchase by USC of the University Hospital and the Norris Cancer Hospital, combined with the opening of the new Los Angeles County Hospital facility, provide both an opportunity and a mandate to create an outstanding academic medical center on our campus. Delivery of outstanding clinical care is and will remain a primary focus of our hospitals. But to assure that care is at the cutting edge of biomedicine, we must merge three cultures — clinical care, research and education — into one in which development of new approaches to care and to training new clinicians and researchers are integral parts of an the enterprise. Creation of a single culture will require careful development of our new facilities to assure that they are not only patient-friendly, but also strongly supportive of research and education. High priorities that were identified for the next ten years include:
Development of an electronic medical record system that supports clinical care, research and education

Development of communication and information resource systems, including cross-campus communication information and support that can promote and disseminate USC clinical, research and educational activities to the lay, scientific and medical communities

Cross-training of clinical, research and education faculty and staff to understand the importance of using clinical, research and educational approaches to improve health care — one mission, one enterprise

Development of physical and technical (e.g., major equipment) infrastructure that supports clinical care, research and education

Development of financial systems that streamline the interface between care and research

Marketing not only clinical care, but also clinical research and education as part of the academic medical center

Strategic recruitment of outstanding faculty leaders, faculty members and staff who share our vision of a single culture of care, research and education

**Master Building Plan:** The Health Sciences Campus lacks two features that are important to our emphasis on interdisciplinary science and translational research and medicine: (a) a physical center that draws scientists, clinicians, students and staff and facilitates their interactions; and (b) a surrounding community with which we are well-integrated. Development of a campus that has these features will be approached step-wise, starting in the next ten years with development of a vibrant central campus that is convenient to our new hospitals and research buildings. The focal point of the new central campus will be an Education and Wellness Center that is devoted to interdisciplinary education and to the wellness of the campus community. It should contain lecture rooms equipped for distance learning; educational labs including simulation laboratories for cross-training of medical students, graduate students, residents and fellows; and exercise facilities for the entire HSC community. Ideally, it will also contain commercial tenants to serve the campus, a first step in the integration with our local community. A parallel virtual community should mirror the activities on the campus, providing easily accessible information for members of the USC community. Finally, there is a critical need for housing for students and visiting faculty members on or close to campus.

In addition, several high-priority items were identified to improve our infrastructure for research and clinical care:

- **Dry Lab Space:** Physical expansion in the KSOM over the past decade has focused on “wet” lab space, which we need to accommodate the discovery research that is an integral part of this strategic plan. However, we also envision important expansion in areas such as bioinformatics, imaging, prevention research, and global and community health, which require “dry” lab space, a scarce commodity on the Health Sciences Campus. Thus, the next ten years...
must see a significant expansion of space that can accommodate offices, computing infrastructure, imaging and outpatient clinical research.

> Animal Facilities: Animal space on the HSC is severely limited. We have difficulties accommodating existing research programs and we are hard-pressed to meet the needs of new basic researchers. Expansion of animal space must be an immediate and preeminent priority for the Keck School.

> BSL-3 Facility: Attaining leadership in translational research for emerging infections will require a BSL-3 facility for safe performance of basic research on viruses and other highly contagious pathogens.

> Ambulatory Facility for Clinical Research: Clinical research is a traditional strength of the Keck School and a critical component of interdisciplinary and translational research. Our clinical research enterprise is scattered across campus, often competing with clinical care for space and other resources. Development of an ambulatory facility that can serve as the central home for clinical research and trials was identified as a high priority. There is an outstanding opportunity to integrate clinical research and care in several of our disease focus areas, most prominently cancer.

**CREATING PARTNERSHIPS**

Achieving our vision of leadership in interdisciplinary discovery and translation will require strong partners outside of the Keck School. These should include other schools at USC, other academic institutions, other health care organizations, community or governmental organizations, and the private sector. Three opportunities of high priority were identified for the next ten years: (a) continued development of the Keck-Viterbi partnership; (b) clinical and community health partnerships (e.g., that exist or are being developed as part of the Clinical and Translational Science Institute and the Institute for Prevention Research); and (c) development of an Academic Research Organization that can serve as a single point of contact for outside entities and, with USC Stevens, promote technology development within the Keck School and foster novel strategic partnerships under the USC banner.
Against a backdrop of change at the Keck School and in biomedicine overall, we have developed a strategic plan that will position the KSOM as a leader in interdisciplinary and translational research, from its conduct and application to training of the teams who conduct it. Our goal is to have the betterment of health prominent in the minds and actions of our students, trainees, faculty members and staff. Our success will create a campus that is more vibrant, an environment that is more interactive and a school that has ever greater impact on the health of our patients and of society.
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