

Proposal for a Harvard-wide Multidisciplinary Center on Aging

The Interfaculty Working Group on Aging*

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Background:

The rapid expansion of the global elderly population over the next 25 years will bring enormous medical, social, and economic challenges that are unprecedented in human history. The devastating problem of dementia is just one of many examples, expected to affect nearly 8 million people by the year 2030, at an annual estimated cost to our nation alone of \$27 billion by 2015. Academic institutions must play a major role in discovering how to prevent, treat, and finance the enormous burden of disease and disability that will soon confront our aging society. Universities are particularly well-equipped to address these issues; they have the capacity to generate new knowledge about human aging; translate those findings into practice; assemble the expertise to develop and implement new therapies for disease and models of health care delivery; gather the data necessary to inform policy makers of the needs of seniors; and educate medical professionals and the public about how to promote the health and well-being of elderly people.

With its outstanding faculty and resources in multiple disciplines relevant to the study of aging, Harvard University could be one of our nation's leading institutions in these efforts. However, at the present time there is no focused mission or formal organizational structure at Harvard to facilitate collaborations in the study of aging or to prepare future generations of professionals to meet the needs of our burgeoning elderly population. As a new President of Harvard sets her agenda for the future of the University and a new Dean develops his strategic plan for the Medical School, meeting the challenges of an aging world is a compelling theme.

Opportunity:

Many Harvard faculty members are already engaged in several broad areas of aging research, ranging from studies of basic mechanisms of aging in cells and model organisms to clinical, epidemiologic, and health policy research in aged human populations. Some of these areas and the organizations pursuing them include:

- Probing the basic mechanisms of aging in cells and organisms (e.g., Glenn Laboratories)
- Preventing disease and disability in humans (e.g., Hebrew SeniorLife (HSL) Institute for Aging Research, the MGH Alzheimer Disease Research Center, and the Udall Parkinson's Centers of Excellence)
- Promoting population health (Center for Population and Development Studies, the VA GRECC, the Nurse's Health and Physician's Health Studies)
- Providing appropriate, high quality medical and social services for chronic disease (HSL Institute for Aging Research and MGH Geriatrics Section)
- Establishing and evaluating public policies and payment mechanisms to support the needs of seniors (Department of Health Care Policy and MGH Institute for Health Policy)

Furthermore, Harvard has outstanding programs in molecular biology, genetics, translational medicine, and clinical geriatrics that could support essentially all aspects of aging research. Unfortunately, these programs are currently working in relative isolation of one another. To make a significant impact on the challenges of an aging society, Harvard's expertise and resources need to be connected. By working collaboratively and leveraging their expertise, Harvard faculty members and their trainees can begin to address some of the "big questions" that concern all of us as we age.

Further, by conducting rigorous multidisciplinary research, Harvard can shape the future of aging research, define the standards for research in the field, and work with other academic institutions around the world to apply those standards to address the challenges that lie ahead.

One of the “big questions” in gerontological research is: “*How can we predict and prevent the onset of disease, disability, and cognitive loss as we age?*” This question has significant global health and economic implications. Over the past century, advances in sanitation, antibiotics, vaccines, and cardiovascular risk reduction have extended life expectancy by approximately 30 years, allowing more people than ever to achieve what is considered the maximum human life span of about 100 years. The challenge facing us today is how to compress disease and disability into the final days of life and enable all human beings to experience a full life span; free of morbidity until the day they die. This goal cannot be achieved by one discipline alone, but will require the combined expertise of biologists, geneticists, clinical investigators, epidemiologists, and others.

Biologists are already able to scan the entire genome of an individual and identify genes that place them at risk for a number of chronic illnesses of aging, including cardiovascular disease, cancer, osteoporosis, and dementia. Biochemists can design drugs that target processes controlled by these genes. Engineers can noninvasively monitor a variety of physiologic functions and build devices to rapidly correct detected abnormalities. However, these scientists lack access to large populations of aging individuals who can be tested for genetic risk factors and enrolled in studies to test the efficacy of interventions such as gene therapies, drugs, or devices. Clinical researchers at Harvard have access to these populations and expertise in conducting clinical trials. There is a unique opportunity to bring basic and clinical scientists together in a Harvard-wide initiative that would add value to their individual efforts. This initiative could give rise to a new field of ***Personalized Disease Prevention*** that can detect people at risk and intervene early to prevent chronic disease.

Proposal:

On March 5, 2008, a group of 15 academic leaders from major Harvard-affiliated hospitals, departments, and laboratories, met to discuss the key scientific questions and identify the resources needed to bring faculty together from multiple disciplines and enable them to tackle the most challenging problems of aging. Their shared vision is to establish a ***Harvard Multidisciplinary Center on Aging*** that will connect Harvard faculty members by providing the necessary resources to answer large questions such as the one above. The group identified a need to link scientists skilled in genomics, proteomics, epidemiology, technology, health policy and other disciplines to large populations of elderly individuals who can be followed longitudinally with rigorous assessments to determine the causes of disease and disability in old age, and to intervene before serious morbidity, caregiver burden, and societal costs set in.

To address this need, the Multidisciplinary Center would work closely with the Hebrew SeniorLife Institute for Aging Research to create a ***Living Laboratory of Aging***. Hebrew SeniorLife is already raising funds to recruit a Director for this initiative. This large, Harvard-affiliated, multicampus organization, which serves nearly 5,000 well-characterized seniors at all levels of physical and cognitive function, provides a unique population for a Living Laboratory. This population would be joined with others, such as the large Veteran’s Administration clinical population and elderly housing sites in minority communities throughout Boston, to create an invaluable resource for scientists engaged in clinical, translational and basic research in aging.

Just as the Framingham Heart Study revolutionized our understanding of the risks and prevention of cardiovascular disease, so could the Living Laboratory lead to a better understanding of ways to promote successful aging. Once established, the laboratory would build a large database of clinical information, and a biorepository for blood, tissue, and DNA from well-characterized individuals whose life trajectories are known. The Partners Center for Genetics and Genomics could process, store, and genotype these biological samples. Subsequently, the Living Laboratory could study the impact of genetic, environmental, nutritional, behavioral, and various social, medical, and psychological factors on the process of aging. It could collaborate with the Center for Integration of Medicine and Innovative Technology (CIMIT) to build and test wearable monitors and feedback systems to help people better manage diabetes, prevent falls, or remember to take their medications. The Laboratory could also test innovative models of health-care delivery, alternative models of home and institutional care for elders with chronic disabilities, and creative solutions to health-care financing. It would become an attractive resource for the larger community of engineers, pharmaceutical companies, and industry leaders to test their products, and for other Universities to obtain expert consultation and valuable longitudinal data.

Several resources would enable the proposed Harvard Multidisciplinary Center on Aging to pursue this vision:

- Infrastructure support for clinical assessments, blood or tissue collection, DNA extraction and storage, genotyping, and analyses. This would include salary for a research coordinator to direct the project; a research assistant to collect, prepare, and store biosamples; a research nurse to examine subjects and record clinical data; a database manager to code and compile clinical and genetic information and prepare analytic files; a programmer/analyst to perform statistical analyses; and a genetic statistician to guide the analyses of genotype and phenotype data. Funds would also be needed for sample storage, DNA extraction or cell-line production, bar coding, genotyping, and laboratory equipment.
- Training grants for talented postdoctoral MD and PhD investigators to enable them to conduct multidisciplinary research in aging across Harvard institutions and scientific disciplines. These trainees and junior faculty are the “glue” that will bring senior investigators and their institutions together to focus on aging research.
- Seed grants to enable investigators to test new ideas that will eventually lead to NIH grants. These can be awarded to projects that pair investigators from different disciplines and institutions.
- Support for scientific seminars and conferences that will promote communication and collaboration between basic and clinical scientists from different disciplines.
- An administrator to assist in the development and implementation of a website, list-serve, seminar series, grants, and training activities.

By uniting Harvard’s outstanding faculty and resources in the multiple disciplines relevant to the study of aging, a Harvard Multidisciplinary Center on Aging can be much more than the sum of its parts and make an important impact on the future of our aging society. The need is clear; the faculty are interested; many of the resources are present; the potential for philanthropic, industrial, and NIH support is large; and the timing is right for Harvard University to take the lead on addressing one of the most pressing issues of our time, the rapid aging of the world population.

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