Statement of the Association of American Medical Colleges
on "Driving Innovation through Federal Investments"
Submitted for the Record to the
Committee on Appropriations
United States Senate
April 29, 2014

The Association of American Medical Colleges (AAMC) is grateful for the opportunity to submit these comments on the role of federal investments in driving innovation. The AAMC is a not-for-profit association representing all 141 accredited U.S. and 17 accredited Canadian medical schools; nearly 400 major teaching hospitals and health systems; and nearly 90 academic and scientific societies. Through these institutions and organizations, the AAMC represents 128,000 faculty members, 75,000 medical students, 110,000 resident physicians, and thousands of graduate students and postdoctoral trainees.

In a separate statement to this Committee, the AAMC has joined with higher education, business, patient and many other advocates underscoring the importance of federal investments across all fields of scientific research. The Association focuses these additional comments on health and medical research—by which we mean the full spectrum of research from basic biomedical sciences, to clinical and translational investigation, to research on implementation, comparative effectiveness, health services, and community engagement. More than half of the extramural funding provided by the National Institutes of Health (NIH) supports life-saving research and research training at AAMC-member medical schools and teaching hospitals, where scientists, clinicians, fellows, residents, medical and graduate students, and trainees work side-by-side to improve the lives of all Americans.

Medical research has led to innovations in the practice of medicine that have vastly improved the health of average Americans and has bolstered both the length and quality of their lives. The statistics from federally funded research are compelling: the survival rate for children with the most common childhood leukemia is now 90 percent, the five-year breast cancer survival rate has increased from 75 percent in the mid-1970s to 90 percent in 2011, chronic disability among American seniors has dropped nearly 30 percent since 1982, among many other examples. Discoveries from academic and other public sector institutions translated to commercial development have resulted in, by one analysis, 153 new FDA-approved drugs, vaccines, or new indications over the past 40 years.

The successful partnership between the federal government and academic medicine not only lays a foundation for improved health and quality of life, but also strengthens the nation's long-term economy. For many communities, academic medical centers have become major drivers of their local economies. The economic activity generated by academic research also affects firms, such as vendors and suppliers, in other regions or states. The long-term value derived from the products and applications of medical research, including extended productivity and improved quality of life, remain incalculable in their entirety.

One example of exciting research at the frontier of medicine and science--and one that is vulnerable to continued stagnation or sequestration—is in the development of precision medicine. Since the completion of the International Human Genome Project (HGP) in 2003, sequencing technologies have advanced at a remarkable rate; NIH Director Collins notes that the exponential rate of growth in sequencing capacity in biotechnology actually outpaces that for Moore's Law in the semiconductor industry (e.g., the number of transistors on an integrated circuit doubles approximately every two years). As is well known, the cost for sequencing an individual's entire genome is fast approaching $1,000, a many fold reduction in cost compared to the original HGP. New technologies also accelerate the ability to sequence the genomes of cancerous tumors and biological pathogens.

Concurrently, advances in the health care sector are bringing to fruition the long sought goal of establishing comprehensive electronic health records (EHRs) for patients in our health systems. In combining new genomic capabilities with EHRs, scientists and physicians will be increasingly able to match variations in individuals' genetic sequence (genotype) with the expressed physical characteristics (phenotype) across patients and populations. To the extent that genetic variations correlate with increased susceptibility or resistance to certain diseases, or receptivity to certain therapies, physicians will be better able to target medical care more precisely to their patients: for example, in managing the administration of chemotherapy. The FDA in the last decade has approved new genotyping kits, for example an assay detecting certain genetic variations in HIV that make some strains of the virus resistant to some antiretroviral drugs. The application of new genomic and pharmacogenomics technologies, with appropriate funding and effective community engagement, can also help narrow gaps in health disparities among Americans.

The Committee should note that this work is undertaken across many institutions and health systems, and across many sectors, such as the biotechnology and information technology industries. This research is inherently interdisciplinary, bringing together other scientists and engineers, and engenders the full spectrum of medical research described above. But among all research venues, medical schools and teaching hospitals are essential to the realization of precision medicine in that these institutions can effectively integrate research with medical care. A similar effort is already underway in the Veterans Health Administration, which has launched its Million Veterans Program to link veterans' genomic information with the VA's robust comprehensive medical records system. Even where critically important R&D is conducted in non-academic laboratories, such as in biotech, we note that such research is most often led by scientists trained in medical schools and universities, very often on support from NIH grants.

The full realization of the potential for precision medicine will be much more difficult to achieve if the NIH and other investments continue to diminish.

A related frontier for medical research is the development of vast new data resources and analytic capacity, or "big data." While much has been written recently about this topic, the AAMC considers the challenge of managing vast data resources to be a logical outgrowth of the 20th Century biomedical revolution, accomplished in large part through NIH funding to academic institutions, which helped transform biology into a quantitative science. New informatics tools are needed to build upon that foundation. However, while there have been many important initiatives in bioinformatics to date, the biomedical community is only beginning to address big

data. In many ways, medicine is behind other sciences and even commercial sectors in applying new informatics tools and harnessing huge data resources. The NIH has now recruited its first associate director for data science, and a special challenge for the agency and our member organizations will be training a new generation of biomedical informaticists and statisticians who can support such studies. The National Science Foundation, Department of Energy, DARPA and other agencies are also major sources of support and innovation in developing the nation's "digital" capital.

Much as the genomic revolution has transformed our understanding of the basic biology of cancer, leading to innovative approaches to diagnosis and therapy, the BRAIN (Brain Research through Advancing Innovative Neurotechnologies) Initiative offers the potential to transform our approach to neurological and psychiatric disorders such as Alzheimer's disease, Parkinson's disease, autism, epilepsy, schizophrenia, depression, and traumatic brain injury. The goal of the BRAIN Initiative is to accelerate the development and application of innovative new technologies to construct a dynamic picture of brain function that integrates neuronal and circuit activity over time and space, an undertaking that would not be possible without federal investment.

Complementing the medical research supported by NIH, the Agency for Healthcare Research and Quality (AHRQ) sponsors health services research designed to improve the quality of health care, decrease health care costs, and provide access to essential health care services by translating research into measurable improvements in the health care system. Health services research is a critical element as the nation continues to strive to provide high-quality, evidence-based, efficient, and cost-effective health care to all of its citizens. As the only federal agency with the sole purpose of generating evidence to make health care safer; higher quality; and more accessible, equitable, and affordable, AHRQ also works to ensure such evidence is available across the continuum of health care stakeholders, from patients to payers to providers. These research findings will better guide and enhance consumer and clinical decision-making, provide improved health care services, and promote innovation and efficiency in the organization of public and private systems of health care delivery.

Congress's long-standing bipartisan support for medical research through the NIH has created a scientific enterprise that is the envy of the world and has contributed greatly to improving the health and well-being of all Americans. The foundation of scientific knowledge built through NIH-funded research drives medical innovation, improving health through new and better diagnostics, prevention strategies, and more effective treatments.

But we are now engaged in "un-doubling" the NIH budget. In 2014, the federal appropriations for NIH—while nominally about $30 billion—is closer to the year 2000 level ($20 billion) adjusting for inflation in the costs of research. This year's appropriation fell far short of simply breaking even with 2012. As a result, there are far fewer NIH-funded research project grants. Some of the brightest scientists in the nation have lost federal support and are shutting down their laboratories and laying off skilled technicians, unable to support their research teams and forced to put bold new ideas on hold.

Alarmingly, cuts and decline in NIH funding are affecting new generations of scientists. In a recent survey conducted by the AAMC, nearly two-thirds of the PhD programs that responded reported that they have decreased or are anticipating decreasing the size of their programs and nearly one in five MD-PhD programs indicated a decrease or anticipated decrease in students in the coming year. Even the most committed of our younger scientists must think twice about beginning a career in research in the public interest. This lost momentum and collapse of research infrastructure stifles potential breakthroughs from high-risk basic science that will take decades to recover, or may not be salvageable at all. A post doc put it succinctly in a message to her senator, “Science takes time, and the work that we don't pay for now we will cost us future discoveries.”

Nurturing and sustaining public support for the full spectrum of medical research from bench to bedside to community, and for ensuring a diverse, robust research pipeline is essential for our future.

AAMC urges Congress and the Administration to work in a bipartisan manner to end sequestration and restore stable and predictable growth to medical research funding to build on these and other invaluable scientific opportunities, to encourage young scientists, continue progress in innovation and our nation's health, and to secure our economic future.