DEPARTMENT OF HEALTH AND HUMAN SERVICES

NATIONAL INSTITUTES OF HEALTH

Continuing America's Leadership: The Future of Medical Innovation for Patients

Witness before the

Senate Health, Education, Labor, and Pensions Committee

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Good morning, Chairman Alexander, Ranking Member Murray, and distinguished Members of the Committee. I am Christopher P. Austin, M.D., and I am the Director of the National Center for Advancing Translational Sciences (NCATS), one of the Institutes and Centers of the National Institutes of Health (NIH).

It is an honor to appear before you today, alongside my NIH colleague Dr. Pettigrew and our colleagues from Food and Drug Administration (FDA), Dr. Woodcock and Dr. Shuren, to discuss how we stimulate innovation through Federal investments in scientific research. On behalf of the NCATS and the NIH, I want to thank the Committee for your continued support and for the opportunity to talk about some of the innovative and exciting efforts that NCATS is undertaking to improve the process for transforming research discoveries into cures so that we can bring more treatments to more patients more quickly.

Recent and rapid discoveries of mechanisms of disease, sequencing of the human genome, and advances in technology have led to greater scientific opportunities that have the potential to substantially improve human health. NCATS is working on innovative ways to improve the process for transforming these discoveries into cures so that we can bring more treatments to more patients more quickly.

NCATS defines *translation* as the process of turning observations in the laboratory and clinic into interventions that improve the health of individuals and the public – from diagnostics and therapeutics to medical procedures and behavioral changes. *Translational science* is the field of investigation focused on understanding the scientific and operational principles underlying each step of the translational process. NCATS studies translation on a system-wide level. NCATS' translational science efforts focus on the entire spectrum of translational research – basic research, pre-clinical research, clinical research, medical practice, and public health. At

all stages of the spectrum, NCATS develops new approaches, demonstrates their usefulness, and disseminates the findings. Patient involvement is a critical feature of all stages in translation.

INNOVATION IN METHODS AND TOOLS

The translational science approach generates new technologies and data that overcome common roadblocks to translational success, thus making the process more efficient and effective for all. One technological innovation is a bioengineered system that represents human organs, more commonly known as a tissue chip. Through the NCATS Tissue Chip for Drug Screening program, a collaborative effort with the Defense Advanced Research Projects Agency and FDA, researchers are creating human tissue chips that consist of miniature 3D models of living organs and tissues on transparent microchips. The chips contain living cells and are designed to replicate the complex biological functions of specific human organs. The tissue chips are being developed to test drug safety and effectiveness more accurately and cost-effectively than current methods. NCATS is building on its initial success in developing chips that contain single tissue or organ models by funding projects to integrate several of the organ-specific chips into a full system that represents a "human on a chip." Once completed, these integrated systems will be used to predict whether a drug, vaccine or biologic agent would be toxic to, or effective in, humans.

NCATS shares its unique research approaches and resources so that they can be broadly applied to translational science efforts at other public and private sector organizations. In a recent collaboration with the National Institute of Neurological Disorders and Stroke, NCATS scientists incorporated an innovative approach to find a compound that could enhance the activity of the parkin protein, which is implicated in Parkinson's disease. Parkin is suspected of playing an important role in the removal of faulty mitochondria (a cell's "powerhouse") in brain

cells, but for patients with Parkinson's disease, this maintenance mechanism is disrupted. NCATS researchers designed a test (called an assay) to measure the activity of the gene for parkin. With this assay, the research team is now conducting high-throughput screens using the NCATS' chemical libraries to identify compounds that increase parkin activity. While specifically designed to address this problem, the screening and assay methods designed by NCATS researchers can be used by other scientists to solve many other translational research problems.

NCATS also applies innovative methods through its Discovering New Therapeutic Uses for Existing Molecules ("New Therapeutic Uses") program. Launched in 2012, this initiative uses an innovative strategy that matches the ideas of academic researchers to pharmaceutical industry compounds that have already undergone significant research and development, and are available for testing on other diseases. To accelerate the "match-making" process, NCATS developed template agreements to streamline the legal and administrative process of research collaboration among multiple parties. NCATS is celebrating one of the first promising results from this program, a potential treatment for Alzheimer's disease. Alzheimer's disease is the most common form of dementia, a group of disorders that cause progressive loss of memory and other mental processes. About 5 million Americans have Alzheimer's disease, and current drug therapies can only ease symptoms of the disease without stopping its progression. New treatments — so-called disease-modifying therapies — are needed to halt Alzheimer's by targeting its underlying mechanisms. Blocking that path to therapeutic success is the costly, complex process of drug development. Through the New Therapeutic Uses program, NCATS-supported scientists at Yale University School of Medicine collaborated with AstraZeneca to find that an experimental compound originally developed by AstraZeneca as a cancer therapy

potentially could be used to treat Alzheimer's disease. The compound successfully reversed brain problems in mouse models of the condition, and now the researchers are testing it in humans to assess its effectiveness. But, we know that there is more that we can be doing to address this disease, and multiple institutes at NIH are aggressively pursuing other research on possible clinical therapies and a better understanding of the changes in the brain that lead to Alzheimer's disease, including through partnerships with the private sector. To that end, the President's FY 2016 Budget includes $638 million for Alzheimer's disease research.

COLLABORATION AND PATIENT ENGAGEMENT

NCATS also applies innovative approaches to translation by fostering collaboration and patient engagement. NCATS' Rare Disease Clinical Research Network is a highly collaborative network of 22 clinical research consortia and a data management center. The network is composed of approximately 2,600 researchers, including NIH scientific program staff, academic investigators, and members of 98 patient-advocacy groups. Scientists from multiple disciplines at hundreds of clinical sites around the world work together with patient advocacy groups to study more than 200 rare diseases. Since its launch, nearly 29,000 patients have been enrolled in network clinical studies. Ninety-one studies are currently under way.

The NCATS Therapeutics for Rare and Neglected Diseases program establishes robust collaborations among NIH, academic scientists, nonprofit organizations, and pharmaceutical and biotechnology companies to support faster translation of drug discovery and development. When successful, these projects are acquired by biopharmaceutical companies for further development toward approved treatments for patients.

A NATIONAL NETWORK FOR CLINICAL AND TRANSLATIONAL RESEARCH

The NCATS Clinical and Translational Science Awards (CTSA) program focuses its efforts on addressing the inefficiencies and roadblocks in clinical and translational research, from scientific discovery to improved patient care. The 62 CTSA sites serve as research hubs to support a national network for clinical and translational studies. The hubs support collaborations in education and training initiatives, share best practices and methods, promote team science, and conduct multi-site clinical studies through a shared infrastructure. A good example of such collaboration happened in the wake of the April 2013 Boston Marathon bombing. Doctors from several local hospitals quickly formed a team to design a high-quality multi-site study to examine blast-related ear injuries. Harvard's CTSA hub had an Institutional Review Board reliance agreement in place that enabled these institutions to rely on a single committee to review, approve, and monitor the study. Therefore, this seven-site study was launched within weeks rather than the more typical months. This innovative ability to streamline the review of multi-site clinical research studies enables NIH-funded research to generate results more quickly without compromising the protection of human participants. NCATS has announced plans to support the evolution of the CTSA program by soliciting innovative approaches to increasing clinical trial efficiency and effectiveness, addressing the roadblocks common to clinical studies recruitment of research study participants, and supporting collaborative innovative research in both translational science and its methods.

CONCLUSION

NCATS' mission is to catalyze the generation of innovative methods and technologies that will enhance the development, testing and implementation of diagnostics and therapeutics

across a wide range of human diseases and conditions. NCATS looks forward to building on its recent successes to bring more treatments to more patients more quickly.

This concludes my testimony, Mr. Chairman. I look forward to your questions.