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Agenda: Driving Innovation through Federal Investments
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Chairman, Ranking Member, and members of the committee, thank you for the opportunity to provide written testimony on this important topic.

Americans see government spending on medical research as a top priority, but they want cures and treatments available when they need them.[1] They see translational research, research that takes cures from the developed idea to clinical trials, as the way forward. The overwhelming majority of Americans, more than 75%, see this as the priority of government-funded medical research. Yet less than 2% of the National Institute of Health budget is specifically allocated for translational research.[2] A more balanced approach to research funding is needed to deliver on our promise to improve quality of life and make effective and innovative treatment available to the public now.

RECOMMENDATIONS FOR DELIVERING ON OUR PROMISE TO ADVANCE MEDICINE

In challenging economic times it is critical to prioritize research that will make real and lasting differences in the lives of those that have funded it through tax dollars. To accomplish this requires dedication to a more effective and efficient model for research funding. The NIH has made a historic and exceptionally valuable investment in basic research at institutions of higher learning. This can best be leveraged with a balanced approach to future funding that equally supports the development of innovative cures and treatments with translational medical research. Translational research is a team-based, doctor-driven, and patient-focused approach that takes fundamental discoveries made by scientists and turns them into real solutions that help people live longer healthier lives. By committing to funding translational research, we are committing to turning knowledge into action and saving lives.

I recommend three key criteria for an effective and efficient strategy to get demonstrable results:

Balance funding for translational research
Focus on bridging the bottlenecks in medical research
Prioritize hospital-based research collaboratives

Balanced Funding for Medical Research

In a national survey, Americans support prioritizing and dedicating resources to life-saving medical research, and more than half (52%) think we should be spending more.[1] They clearly communicated their expectation that we spend research dollars responsibly, by eliminating wasteful spending and delivering on our promises to produce results that help them and their families in real ways. They see a balanced approach to basic and translational research as the answer. While more than 85% of

Americans were unfamiliar with what translational research is, when it was explained to them, 65% supported increased investment in translational research.[1] Most importantly, the majority supported a balance of 50% basic and applied, to 50% translational research.[1]

Bridging the Bottlenecks in Medical Research

There are four main bottlenecks in the research continuum that have slowed the availability of new cures and treatments to the public. The blockages are created by a lack of funding and a lack of technical expertise. Forward thinking institutions that are dedicated to translational research have built the facilities and expertise to 'bridge' these bottlenecks. Yet, these critical areas of research, where the vast majority of cures and treatments are abandoned, are still held back by a lack of funding. This is known as the 'Valley of Death' for new cures and treatments, and there are four critical bridges of research needed to cross it (Figure).

The first bridge is access to GMP facilities to manufacture small amounts of experimental clinical grade materials for research.

The second bridge is the expertise to do FDA compliant preclinical studies, in particular, performing GLP level studies and preparing IND filings.

The third bridge is the ability to do Phase I clinical trials with 15-30 patients to demonstrate safety.

The fourth bridge is the ability to do Phase IIa clinical trials with 100-300 patients to determine how the product is working and set the stage for the larger studies demonstrating how effective it is compared to the standard of care.

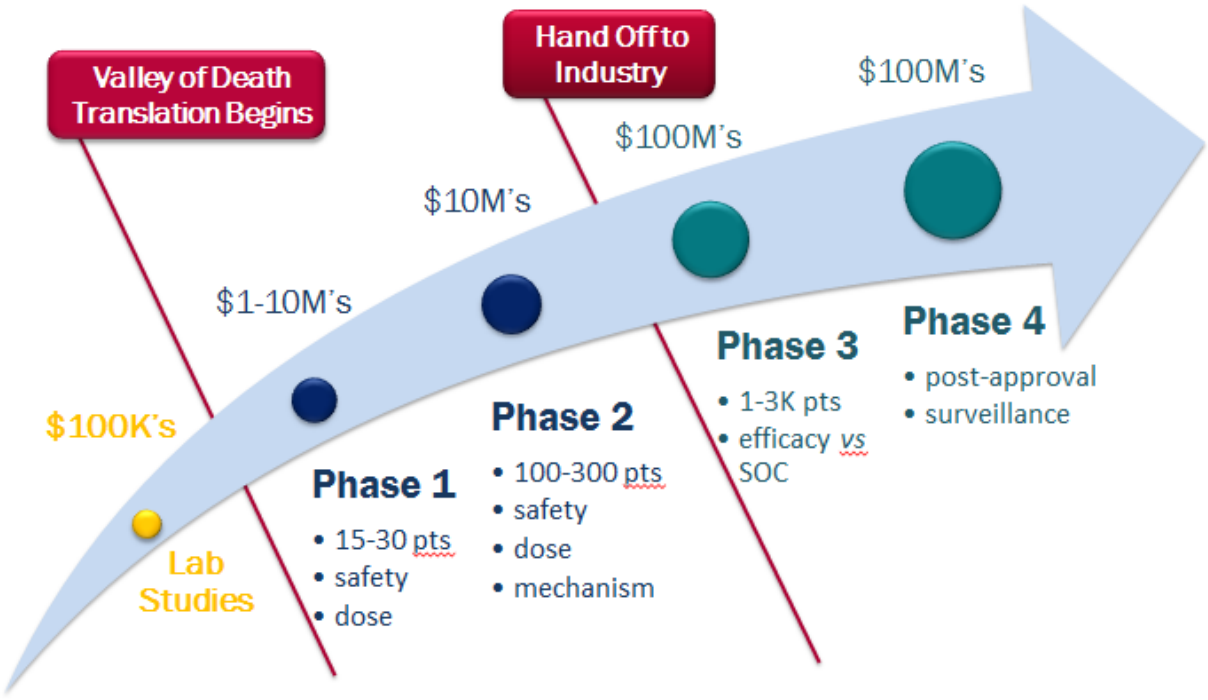

Figure. It is estimated that only one in 10,000 new therapies actually make it to the market for human use, and the process can take 17 years and nearly $1 billion. The reason for these low numbers is that most discoveries never make it through the 'Valley of Death.' This Valley of Death

refers to the many obstacles that stop a basic science discovery from being translated into a therapy or device that can improve human health. These hurdles are exacerbated by increased regulatory oversight and decreased funding – from both the federal government and from pharmaceutical companies – for early stage medical discoveries. Countless innovations that could address some of the worst health scourges of our time – cancer, heart disease, Alzheimer's, diabetes – are abandoned at this stage of research because of lack of funding as well as lack of expertise.

Traversing these four bridges prepares cures and treatment for the handoff to industry partners to take them through late phase clinical trials and deliver them to the clinic. This research continuum should be a funding priority. Hospital-based research teams with access to the specialized research facilities to do this kind of work are uniquely positioned for success in shepherding innovations through this bottleneck.

Translational Research Collaboratives

Historically, universities and academic institutions of higher learning theorized ideas for medical advances based on fundamental discoveries about how the body works. However, despite billions of dollars invested by federal, state and private sources, the number of these discoveries that have made their way into improved diagnostics or treatments for the public remains very low.

I believe there is a fundamental disconnect in the way we prioritize and fund research that has created this problem. Basic research produces a brainstorm of valuable ideas, but these have to be mined by others that are interested in realizing medical applications- and we have failed to adequately support and fund this second translational phase.

The most effective translation efforts involve multidisciplinary teams, including physicians, engineers other specialists, and often benefit from partnerships with industry. Together, these teams engage in a second round of ideation for medically useful tools and treatments, and develop a clear pathway through the Valley of Death to the clinical trials that are required to bring real solutions to patients.

The origin of original innovations is also rapidly expanding to the bedsides of patients. With the medical technology available today, the patient has become the nexus of research. Physicians practicing medicine are capturing enormous amounts of information, and they are generating the ideas for the tools and treatments that patients most need. They are ideally positioned to identify clinical challenges and goals, and then bring together the health professionals, scientists, engineers, sponsors, and other specialists that are essential to engineering and delivering solutions to those challenges. This is the definition of translational research: patient-focused research that develops real world applications.

To be effective, translational research requires clinical leadership, teams of expertise from different disciplines, and the kind of facilities that can support and fast track preclinical and clinical studies. I term these teams 'translation research collaboratives' or TRCs- multidisciplinary teams that are grounded in patient care and committed to developing medical applications that work in the clinic.

These facilities are rare, but they exist in academic medical centers across the nation. The most successful are aligned with FDA requirements for preclinical and clinical research, and have built facilities to do translational research in the most effective and efficient way possible. They build relationships with industry to hand-off the medical tools for the final phases of development and commercialization that will bring those cures and treatments to hospitals and clinics.

A REAL LIFE EXAMPLE OF HOW IT WORKS

Orthopedic surgeon Dr. Brad Weiner at Houston Methodist wants to do more for his patients facing amputations due to bone injuries that cannot be healed or repaired with current medical technology. He is now collaborating with nanomedicine researcher Dr. Ennio Tasciotti at Houston Methodist to apply a new nanomaterial he developed to heal and regenerate bone. The original material was created with collaborators from Harvard, UTHealth, MIT, Teas A& M University, and Northwestern University. Their medical solution is called 'bone putty', a material that can be surgically molded to injured bones to quickly regenerate bone tissue, faster and stronger than the normal healing process.

The duo collaborated with the University of Akron and Texas A&M University, and sought guidance from industry partners Akron Polymer Systems, Finceramica, and Lubrizol to figure out how to manufacture prototype materials and further develop the approach. Together, they were able to heal sheep with traumatic bone injuries that would normally require amputation. With the putty, amputation was avoided, and the sheep was able to run and walk naturally in a matter of weeks.

At Houston Methodist, the multi-institutional team has access to the expertise and facilities they need for the next stages of GMP, GLP and clinical trials. They were able to find funding through the US Department of Defense and philanthropy to do Bridge 1 and 2 (GLP-FDA-approved) studies, and are actively seeking funding to advance to Bridge 3-Phase I clinical trials. Private industry has expressed interest in considering the products when they reach this stage, for development and delivery to patients from this point on.

The goal of the team and the funding agencies is to make bone putty available for traumatic injuries in military personnel. The team hopes that after approval for this purpose, bone putty will then be quickly approved for other applications like slow-to-heal injuries in children and older adults, and bone conditions such as fractures, rheumatoid arthritis, and osteoporosis.

A VISION FOR THE FUTURE

As our economy has changed, so has the availability of both private industry and federal funding for all types of research. Yet our model of dedicating the vast majority of federal funding to basic research has not adjusted to the new paradigm and changing public needs. The centers positioned to do translational research are actively moving some projects through, but they are vastly underutilized. This is the bottleneck in delivering on the promise of medical research to improve and save lives.

By committing to the vision of translational research, dedicating to a balanced funding model, and supporting clinically-lead multidisciplinary collaboratives we will be answering the public call for accountability in medical research and real results now. Translational research is the key to turning our wealth of knowledge into action and making the medical breakthroughs the public deserves.

[1] Houston Methodist National Survey performed by LuntzGlobal.
[2] National Center for Advancing Translational Sciences budget as a percentage of the total National Institutes of Health budget 2012. Accessed online 7/01/13, http://officeofbudget.od.nih.gov/spending_hist.html, and http://officeofbudget.od.nih.gov/spending_hist.html