wisely to encourage a vigorous workforce that is

Network (CAN), which received $10 million for start-up funding in FY 2012. CAN will fund initiatives to address scientific and technical challenges that impede translational research and

Alzheimer's disease, including research to identify genes that cause the disease, to develop tests for high-risk individuals, and to identify possible targets for therapeutic development.

Having summarized the President's FY 2013 request for NIH, I'd like to discuss the continuum between fundamental research and translation by quoting the founder of Apple Computer, the late Steve Jobs. In his biography, Jobs is quoted as saying that a "silver lining" in his battle with pancreatic cancer was that his son Reed had been able to "spend a lot of time studying with some very good doctors." Jobs goes on to say that his son's enthusiasm for biomedical research:

> . . . is exactly how I felt about computers when I was his age. I think the biggest innovations of the twenty-first century will be at the intersection of biology and technology. A new era is beginning, just like the digital one was when I was his age.[3]

As I discuss NIH's commitment to basic and translational research, and our new nation's center for advancing translational sciences, please bear Jobs' words in mind: today technological advances are driving science. We need look no further than the cost of DNA sequencing to see this dynamic at work. The cost curve for sequencing is dropping at a breathtaking rate. Sequencing speed has increased even faster than computer processing speed. What's more, the average cost of sequencing an entire genome has fallen from about $3 billion 12 years ago, to $10 million five years ago, to about $7,700 today. Two U.S. companies have recently announced that they are manufacturing machines that will sequence an individual's genome for approximately $1,000, and that the first such instruments will go on sale before year's end. Lower sequencing costs will likely revolutionize how clinicians diagnose and treat disease, and enable the research community to pursue previously unimaginable scientific questions.

BALANCING BASIC AND APPLIED RESEARCH

NIH is the leading supporter of basic biomedical research in the world. Put plainly, if we don't fund basic research, most of this work would not get done, and it would be only a matter of time before this wellspring of new understanding and new therapies would dry up. NIH's funding

[3] Isaakson, Walter, Steve Jobs (New York: Simon & Schuster, 2011) 539.

for basic research is slightly over half (54 percent) of research funding, and this balance between basic and applied research has remained fairly constant over the past decade.

I also would like to address what may be a misconception about a competitive tension between basic and applied research at NIH. As our support of basic research has enabled new discoveries, NIH-funded scientists have always striven to put the most compelling of them into medical advances. Basic discovery and the development of therapies go hand-in-hand at NIH. The two types of research have - and always will - exist together in a continuum. Today, Mr. Chairman, I would like to highlight just a few areas in which basic research advances are opening up new translational opportunities.

One fascinating area of basic research is the Human Microbiome Project, an initiative supported through the NIH Common Fund. This project is giving us wonderful insights into the sweeping range of bacteria that live on and in each of us, and is expanding our knowledge about the role of these microbial communities in health and disease. Recent scientific evidence suggests that changes in the composition and activity of the human microbiome may contribute to obesity, which may provide us with new ways of addressing this serious threat to our nation's health.

Another recent example emphasizes the "virtuous cycle" between basic and clinical research. The NIH Clinical Center has recently established a groundbreaking program that seeks to identify the cause of illnesses that have remained unsolved by other medical practitioners. Since the program started in 2008 some 1,700 people with undiagnosed conditions have been referred to Dr. Gahl, and more than 300 have been accepted for an initial week of consultations and testing. In the 15 to 20 percent of cases that we have successfully diagnosed, it has taken from a week to as long as two years to resolve. For example, a pair of sisters from Kentucky suffered from joint pain and mysterious calcification of the arteries in their extremities. Full evaluation and DNA sequencing led to the discovery of an entirely new genetic condition, where a previously unknown enzyme pathway in their arteries was blocked. This has led to a dramatic new understanding of how the large arteries

To tackle this problem in a science-driven way, NIH proposed the creation of NCATS with the goal to develop and test innovative tools, technologies, and approaches that will enhance the development of drugs and diagnostics for application in all human diseases. NIH has the expertise and enthusiasm to tackle this as a scientific problem. By focusing on the development of innovative new methods for conducting translational science, as opposed to developing therapeutics themselves, NCATS can enable others to bring new medical products to patients in a highly efficient, cost effective manner. In the four months since it was established, NCATS has already developed three new initiatives in partnership with industry, academia, and other government agencies.

In the first, NIH is working closely with several pharmaceutical companies to develop model agreements for a new pilot program to rescue failed drugs. Pharmaceutical companies have access to promising compounds that have been shown to be safe in humans, but that did not prove effective in treating the condition for which they were intended. Researchers are now learning that a compound that is a failure for one condition may help to treat another. To capitalize on this, NCATS is developing a pilot program in partnership with industry that will seek to crowdsource some of the most promising of these compounds to the brightest minds in science, an unprecedented opportunity for NIH-funded researchers and a new way to bridge academic science with industrial expertise.

Secondly, NCATS is partnering with the Defense Advanced Research Projects Agency (DARPA) to develop a chip that will mimic how humans respond to a drug. Scientists funded by NIH and DARPA will spend five years working closely with each other to place 10 diverse human tissues on a chip so that they will interact with drugs the same way that they do in living patients. By providing a better model tewtew be

In the thirdinitiative, NCATS is working closely with industry to develop systematic ways to

industry, non-profits, and other government agencies to explore critical translational areas and innovative public-private sector partnerships.

With the FY 2013 budget, NIH will pursue efforts to streamline and shorten the pathway from discovery to health through several new and ongoing initiatives and programs.

In conclusion, Mr. Chairman, we have never witnessed a time of greater promise for advances in medicine than right now. NIH is prepared to continue our long tradition of leading the world in the public support of biomedical research. Successful development of prevention strategies, diagnostics, and therapeutics will require bold investments in research across the spectrum from basic science to clinical trials, as well as new partnerships between the public and private sectors. With your support, we can promise continuing advances in medicine, creation of new economic opportunities, and stimulation of American global competitiveness in science, technology, and innovation.

This concludes my statement, Mr. Chairman and Member of the Subcommittee. I will be happy to answer any questions you may have.