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**MEDIA CONTACT**

Lynn Blenkhorn  
Feinstein Kean Healthcare  
508-851-0930

[lynn.blenkhorn@fkhealth.com](mailto:lynn.blenkhorn@fkhealth.com)

## **The Genome Project-write (HGP-write) to Launch in 2016**

### ***A Grand Challenge to Understand the Blueprint for Life Provided by the Human Genome Project (HGP-read)***

New York, NY – A group of scientific, business and policy leaders today announced their intent to launch The Genome Project-write (HGP-write) in 2016. As detailed in *Science* (<http://science.sciencemag.org/cgi/doi/10.1126/science.aaf6850>), the goal of HGP-write is to reduce the costs of engineering and testing large genomes, including a human genome, in cell lines, more than 1,000-fold within ten years, while developing new technologies and an ethical framework for genome-scale engineering as well as transformative medical applications. HGP-write will be implemented through a new, independent nonprofit organization, the Center of Excellence for Engineering Biology.

HGP-write will build on the knowledge gained by The Human Genome Project (HGP-read), biology's first large-scale project that has sparked scientific and medical transformation, especially in genomic-based discovery, diagnostics, and therapeutics. Whereas HPG-read "read" DNA to understand its code, HGP-write will use the cellular machinery provided by nature to "write" code, constructing vast DNA chains.

According to the authors of the *Science* commentary, although "...sequencing, analyzing and editing DNA continues to advance at breakneck pace, the capability to construct DNA sequences in cells is mostly limited to a small number of short segments, restricting the ability to manipulate and understand biological systems." Hence, the new effort is expected to lead to a massive amount of information connecting the sequence of

nucleotide bases in DNA with their physiological properties and functions. As a result, HGP-write promises to have a significant impact on human health and other critical areas such as energy, agriculture, chemicals, and bioremediation.

HGP-write will be an open, international, multi-disciplinary research project with the following leadership team:

- **Jef Boeke, Ph.D.**, Director, Institute for Systems Genetics, Professor, Department of Biochemistry and Molecular Pharmacology, NYU Langone Medical Center. Dr. Boeke is a leader of the Synthetic Yeast Project (Sc2.0), which seeks to create living yeast cells with entirely redesigned chromosomes by 2017.
- **George Church, Ph.D.**, Robert Winthrop Professor of Genetics at Harvard Medical School, Core Faculty Member at the Wyss Institute for Biologically Inspired Engineering at Harvard University, Professor of Health Sciences and Technology at Harvard and the Massachusetts Institute of Technology (MIT), and Senior Associate Faculty member at the Broad Institute. Among the leaders of the original HGP-read, Dr. Church currently heads an effort to create a version of the bacteria E.coli with a redesigned genome.
- **Andrew Hessel**, Distinguished Researcher, Bio/Nano Research Group, Autodesk. He spearheads a multidisciplinary team exploring computer-aided design and manufacturing for biotechnology and nanotechnology R&D.
- **Nancy J Kelley, J.D., M.P.P.**, President & CEO, Nancy J Kelley & Associates, formerly Founding Executive Director, New York Genome Center. She is lead executive of HGP-write and the related Center of Excellence for Engineering Biology.

“This grand challenge is more ambitious and more focused on understanding the practical applications than the original Human Genome Project, which aimed to “read” a human genome,” said Church. “Exponential improvements in genome engineering technologies and functional testing provide an opportunity to deepen the understanding of our genetic blueprint and use this knowledge to address many of the global problems facing humanity.”

Another proposed benefit of the project is the development of new genomics analysis, design, synthesis, assembly and testing technologies, with the goal of making them more affordable and widely available. “Writing DNA code is the future of science and medicine, but our technical capabilities remain limited,” said Hessel. “HGP-write will

require research and development on a grand scale, and this effort will help to push our current technical limits by several orders of magnitude.”

The goal is to launch HGP-write in 2016 with \$100 million in committed support from public, private, philanthropic, industry, and academic sources globally. Autodesk has already contributed a leadership gift of \$250,000 to seed the planning and launch of HGP-write.

“Autodesk is deeply invested in the future of making things. Synthesizing a genome is incredibly difficult but will make significant improvement in health possible, and innovative software tools will be essential to the process,” said Jeff Kowalski, chief technology officer of Autodesk. “We all want to be part of a better, more sustainable world, and Autodesk works to promote that through our products and initiatives. As such, we’re pleased to support HGP-write and to help further the knowledge it will create.”

“Initially, our efforts will focus on synthesizing about 1% of the human genome to evaluate feasibility and value, just as was done for the HGP-read and just as we did for the Synthetic Yeast Genome Project, or Sc2.0,” said Boeke. “The difference is that these 1% pilot projects will not be random; instead, they will be selected based on their ability to provide early-stage resources for biomedical research and development.”

The Center of Excellence for Engineering Biology will coordinate and support the formation and work of multi-institutional and interdisciplinary research teams working in a highly integrated fashion, responsive to and engaged with a broad public outreach. Additional Centers could be included in the future.

“The Center will help to strengthen and support the efforts of the national and international communities on this endeavor,” said Kelley. “But more importantly, the Center will represent a visible, stable, accountable and long-term commitment to advancing the field of engineering biology in the public interest.”

This project developed from a series of meetings held over the last several years, including a meeting held at NYU Langone Medical Center on October 31, 2015. The latest meeting, held on May 10 in Boston, brought together a diverse group of 130 participants from many different countries, including biologists, ethicists, engineers, plus representatives from industry, law and government to discuss the next chapter in

our understanding of the blueprint of life. A video of that meeting will soon be posted on <http://www.hgpwrite.org>.

### **About The Genome Project-write (HGP-write)**

The Genome Project-write (HGP-write) will be an open, international research project led by a multi-disciplinary group of scientific leaders who will oversee a reduction in the costs of engineering and testing large genomes, including a human genome, in cell lines more than 1,000-fold within ten years. The overarching goal of this effort is to understand the blueprint of life provided by the Human Genome Project (HGP-read). The goal is to launch HGP-write in 2016 with \$100 million in committed support from public, private, philanthropic, industry, and academic sources globally. The project will be implemented through a new, independent nonprofit organization, the Center of Excellence for Engineering Biology.

All interested parties are welcome to participate. To ensure public engagement and transparency, HGP-write will include mechanisms to encourage public discourse around the emerging HGP-write capabilities. The Woodrow Wilson Center for International Scholars will help to lead such efforts for HGP-write.

Website: <http://www.hgpwrite.org> or <http://www.engineeringbiologycenter.org>

### **About Autodesk**

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### **About Nancy J Kelley + Associates**

**Nancy J Kelley + Associates** (NJK+A) builds things that matter for science and medicine in order to solve some of the world's most intractable problems. Whether advancing translational genomic research that has the potential to cure human disease and improve quality of life or facilitating ways that we can feed, fuel and heal the world through technological innovation in biology, NJK+A is committed to delivering scientific and medical breakthroughs. NJK+A has experience in every function of building, financing, growing and scaling organizations from strategic planning to executing a

grand strategy. NJK+A has also successfully managed and negotiated large, complex, public/private healthcare and research related transactions with extensive public approval processes, design and construction programs, zoning and related legal documentation. For more information, visit [www.nancyjkelley.com](http://www.nancyjkelley.com).

### **About NYU Langone Medical Center**

NYU Langone Medical Center, a world-class, patient-centered, integrated academic medical center, is one of the nation's premier centers for excellence in clinical care, biomedical research, and medical education. Located in the heart of Manhattan, NYU Langone is composed of four hospitals—Tisch Hospital, its flagship acute care facility; Rusk Rehabilitation; the Hospital for Joint Diseases, the Medical Center's dedicated inpatient orthopaedic hospital; and Hassenfeld Children's Hospital, a comprehensive pediatric hospital supporting a full array of children's health services across the Medical Center—plus the NYU School of Medicine, which since 1841 has trained thousands of physicians and scientists who have helped to shape the course of medical history. The Medical Center's tri-fold mission to serve, teach, and discover is achieved 365 days a year through the seamless integration of a culture devoted to excellence in patient care, education, and research. For more information, go to [www.NYULMC.org](http://www.NYULMC.org), and interact with us on Facebook, Twitter, and YouTube.

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