NIH invests in the Promise of Nanotechnology for Biomedicine and Healthcare

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ABSTRACT

The National Institutes of Health (NIH) has substantial investments in most of the important scientific and technical areas of greatest promise in nanotechnology. The NIH is the nation's medical research agency, comprising of 27 institutes and centers that fund biomedical research across the United States and around the world to improve human health. For more than 7 years, the NIH has recognized the tremendous opportunities in nanotechnology R&D that could transform our ability to prevent and treat diseases. Most of this research is funded by individual institutes with disease-specific, technology-driven, or basic research missions. With investments approaching $200 million per year, the NIH supports a wide range of basic and clinical research designed to achieve: *(i)* a better understanding of biology and pathobiology at the nanoscale, and *(ii)* novel approaches to engineering nanostructures and evaluate the health and safety implications of these engineered materials. This includes fundamental research to enhance our understanding of the design principles of living systems, studies to optimize *in vivo* self-assembly and molecular recognition, and research to improve detection, imaging, and real-time surveillance of biological systems. At the interface between nanotechnology and biomedicine, nanotechnology offers novel tools for the prevention, detection, diagnosis and treatment of diseases. This includes multifunctional systems that have the ability to target therapeutics to specific pathways in particular cell or tissue types and to modulate the release or activation of the agent in response to cellular signals, achieving specific intervention in disease pathways while minimizing side effects. Similar targeting concepts can be used to deliver *in vivo* imaging agents for diagnosis, monitoring of disease and therapy, and early disease detection. This presentation will outline the NIH infrastructure, programs and initiatives, in addition to several important scientific advances and technology-based solutions to biomedical research and applications.