

# Convergence of Nanotechnologies in Healthcare: Current Challenges and Future Prospects

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**Abstract:** For more than 45 years, the U.S. government declared a “war on cancer” and committed to investing in laboratory and clinical research in order to understand the causes of cancer and thereby aid its diagnosis, treatment, and cure. Despite enormous advances and important improvements in the diagnosis and treatment of many cancers, the “war” has in significant ways progressed less than originally hoped. The complexity of the disease is evident in the dynamic and evolving course the disease takes during its progression and response treatment. Harnessing the power of nanotechnology could lead to a paradigm shift in the way we understand and ultimately and treat cancer. Combined with personalized medicine, one of the promises for nanomedicine is a scenario where an individual diagnosed with a disease will be able to receive the right treatment (*i.e.*, right time and right dose) tailored for that specific individual’s medical need through the use of nanotechnology. Being able to realize this scenario may take some time. While stunning progress in the molecular sciences and other advanced technologies has been made over the past several decades, the complex interplay of genomics and environmental factors for many common diseases, such as cancer, has inhibited substantial improvement in the treatment of these disease. This presentation will describe in details some of the recent advances in nanotechnology to address major questions and barriers in biomedical research and the challenges that nanotechnology faces in integration into healthcare.

## **Biosketch:**

Dr. Larry Nagahara is currently the Associate Dean for Research (ADR) in the Whiting School of Engineering (WSE) and Research Professor in the Department of Chemical and Biomolecular Engineering at Johns Hopkins University (JHU). Previously, he was the Associate Director within the Division of Cancer Biology at National Cancer Institute (NCI)/National Institutes of Health (NIH), where he directed and coordinated programs and research activities related to expanding the role of the physical sciences and engineering in cancer research. This included the largest federally-funded program dedicated to the convergence of physical and life sciences, namely the NCI’s Physical Sciences–Oncology Initiative. In addition, Dr. Nagahara served as the Nanotechnology Projects Manager for the NCI’s Alliance for Nanotechnology in Cancer program. Before joining NCI, Dr. Nagahara was a Distinguished Member of the Technical Staff at Motorola and led their nanosensor effort. He has published over 95 technical papers, 3 book chapters, and over 25 patents issued/filed in these fields. He is also a Fellow of the American Association for the Advancement of Science (AAAS), American Institute for Medical and Biological Engineering (AIMBE), American Physical Society (APS), IEEE, and a former member of Motorola’s Scientific Advisory Board.