

Nanotechnology Frontiers at 20 years of NNI

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**National Cancer Institute Alliance for Nanotechnology in Cancer
- 15 years Perspective**

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Abstract

Nanotechnology has been providing novel, paradigm shifting solutions to medical problems and to cancer, in particular. In order to further these research goals, National Cancer Institute (NCI) of National Institutes of Health formed a program called the Alliance for Nanotechnology in Cancer and initiated it in 2004. The program supports Centers of Cancer Nanotechnology Excellence (CCNEs) – translational arm of the effort, smaller grants focused on fundamental mechanisms of delivery and device characterization, and cancer nanotechnology training programs. An intramural arm of the Alliance - Nanotechnology Characterization Laboratory provides a characterization support to evaluate clinically promising nanomaterials and establish their physical, pharmacological and toxicological characteristics.

CCNEs, which had a tremendous impact, both scientifically and commercially, on cancer nanotechnology community will be closing in summer 2020 after 15 years of successful operation and \$330M investment from NCI. They contributed to a significant increase in overall interest in nanotechnology for cancer and NCI growing its investment into nanotechnology from \$100M per year in 2008 to over \$200M in 2018. CCNEs produced over 3400 papers, but more importantly, the technologies that the CCNEs were developing resulted in the formation of over 100 start-up companies, and several clinical trials (Phase I and Phase II) to-date. These accomplishments went well beyond what NCI funding could support and were possible due to significant leveraging of NCI investment with additional funds from the government, philanthropy, and corporate investment. Nanotechnology has integrated well into NCI funding portfolio and continues to be supported through multiple funding opportunities of the institute.

In this presentation I will discuss a current status of cancer nanotechnology efforts funded by NCI and describe future opportunities and strategies in this growing field. Further progress is likely to follow two parallel tracks. First one will be associated with on-going translation to the clinical environment; while the second with the development of new tools and techniques in research arena. It is expected that nanomedicine will be moving beyond the delivery of small molecule drugs and will be exploring new exciting opportunities in immunotherapy, gene therapy, combination therapies, and intra-operative imaging.