Fighting Cancer through Physical Sciences and Engineering Approaches

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Abstract
More than 40 years ago, 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. Building on progress in the molecular sciences and advanced technologies, exploring the physical laws and principles that shape and govern the emergence and behavior of cancer at all scales may provide a complementary perspective. In an attempt to bring in different perspectives into cancer, the National Cancer Institute (NCI) established the Office of Physical Sciences-Oncology (OPSO) with goal of exploring opportunities to advance cancer research by integrating physical scientists and physical sciences approaches with the more traditional research effort in cancer biology and clinical oncology. In this talk, examples of blending physical sciences perspectives with oncology will be presented to illustrate that fostering the development of innovating and promising approaches could lead to a paradigm shift in the way we understand and ultimately and treat cancer.