NCI Creates Centers of Cancer Nanotechnology Excellence

The National Cancer Institute (NCI), part of the National Institutes of Health (NIH), announced on October 3 the implementation of a major component of its $144.3 million 5-year initiative for nanotechnology in cancer research. First-year awards totaling $26.3 million will help establish 7 Centers of Cancer Nanotechnology Excellence (CCNEs). "We believe that nanotechnology will have a transformative effect on cancer diagnosis and treatment. In fact, its impact is already visible in the research being conducted through many of the centers we are announcing today," said Andrew von Eschenbach, MD, who on that date was NCI director and moved later in the month to be interim commissioner of the U.S. Food and Drug Administration (FDA). "Through the applications of nanotechnology, we will increase the rate of progress towards eliminating suffering and death due to cancer."

Nanotechnology has demonstrated promising results in cancer research and treatment. NCI launched the plan to create the NCI Alliance for Nanotechnology in Cancer in September 2004 as a comprehensive, integrated initiative to develop and translate cancer-related nanotechnology research into clinical practice. The NCI Alliance for Nanotechnology in Cancer encompasses 4 major program components, including the CCNEs. CCNEs are multi-institutional hubs that will focus on integrating nanotechnology into basic and applied cancer research and provide new solutions for the diagnosis and treatment of cancer.

Each of the CCNE awardees is associated with 1 or more NCI-designated cancer centers, affiliated with schools of engineering and physical sciences, and partnered with not-for-profit organizations and/or private sector firms, with the intent of advancing specific technologies. The CCNE awardees announced on October 3 included:

- **Carolina Center of Cancer Nanotechnology Excellence**; University of North Carolina, Chapel Hill. This center will focus on the fabrication of "smart" or targeted nanoparticles and other nanodevices for cancer therapy and imaging. Principal investigator: Rudolph Juliano, PhD (University of North Carolina).
- **Center of Nanotechnology for Treatment, Understanding, and Monitoring of Cancer**; University of California, San Diego (USCD). This center will focus on a smart, multifunctional, all-in-one platform capable of targeting tumors and delivering payloads of therapeutics. Principal investigator: Sadik Esener, PhD (UCSD).
- **Emory–Georgia Tech Nanotechnology Center for Personalized and Predictive Oncology**; Atlanta, GA. This center will aim to innovate and accelerate the development of nanoparticles attached to biological molecules for cancer molecular imaging, molecular profiling, and personalized therapy. Principal investigators: Shuming Nie, PhD, and Jonathan Simons, MD (Emory University and Georgia Institute of Technology).
- **Massachusetts Institute of Technology (MIT)–Harvard Center of Cancer Nanotechnology Excellence**; Cambridge, MA. This center will focus on diversified nanoplatforms for targeted therapy, diagnostics, noninvasive imaging, and molecular sensing. Principal investigators: Robert Langer, PhD (MIT), and Ralph Weissleder, MD, PhD (Harvard University, Massachusetts General Hospital).
- **Nanomaterials for Cancer Diagnostics and Therapeutics**; Northwestern University, Evanston, IL. This center plans to design and test nanomaterials and nanodevices to improve cancer prevention, detection, diagnosis, and treatment. Principal investigator: Chad Mirkin, PhD (Northwestern University).
- **Nanosystems Biology Cancer Center**; California Institute of Technology (CIT), Pasadena, CA. This center will focus on the development and validation of tools for early detection and stratification of cancer through rapid and quantitative measurement of panels of serum and tissue-based biomarkers. Principal investigator: James Heath, PhD (CIT).
- **The Siteman Center of Cancer Nanotechnology Excellence** at Washington University; St. Louis, MO. This center has a comprehensive set of projects for the development of nanoparticles for in vivo imaging and drug delivery, with special emphasis on translational medicine. Principal investigator: Samuel Wickline, MD (Washington University).

Additional Initiatives

"NCI has supported the application of nanotechnology to cancer through a variety of programs and interactions with the scientific community for more than 7 years, and we're very gratified that our activities are helping to advance a pipeline of new product opportunities," noted NCI Deputy Director Anna Barker, PhD. "In what we believe will be a paradigm shift for cancer research, unprecedented numbers of multidisciplinary teams of basic and clinical researchers at world-class institutions are networking their research together to focus on the key cancer nanotech opportunities. With the advent of the

CCNEs, we are particularly looking forward to new nanotech-based therapeutic delivery systems that could enhance the efficacy and tolerability of cancer treatments—an advance that would greatly benefit cancer patients."

Other components of the NCI Alliance for Nanotechnology in Cancer include:

- **Cancer Nanotechnology Platform Partnerships**, which are highly focused programs designed to develop technologies to underpin new products in 6 key programmatic areas: molecular imaging and early detection, in vivo imaging, reporters of efficacy (e.g., real-time assessment of treatment), multifunctional therapeutics, prevention and control, and research enablers (opening new pathways for research).
- **The Nanotechnology Characterization Laboratory (NCL)**, established at NCI's Frederick, MD, facility, performs analytical tests to guide the research community, support regulatory decisions, and help identify and monitor environmental, health, and safety ramifications of nanotechnology applications. The NCL recently completed its first year of operation and is actively characterizing nanoparticles for academic and commercial researchers through a rigorous set of analytic protocols. The NCL works in concert with the National Institute of Standards and Technology and the FDA. For more information, see: http://ncl.cancer.gov.
- **Multidisciplinary research training and team development in the biological and physical sciences.** The Alliance will support training and career development initiatives to establish integrated teams of cancer researchers, through mechanisms such as the NIH National Research Service Awards for Senior Fellows and the NIH National Research Service Awards for Postdoctoral Fellows. Applications are now at http://grants.nih.gov/grants/guide/rfa-files/RFA-CA-06-010.html. In addition, through NCI collaboration with the National Science Foundation, $12.8 million in 5-year grants were awarded in September to 4 institutions for U.S. science and engineering doctoral students to focus on interdisciplinary nanoscience and technology research with applications to cancer. For more information, see: www.cancer.gov/newscenter/pressreleases/NCINSFIGERT.

For more information about the NCI Alliance on Nanotechnology in Cancer, visit http://nano.cancer.gov.

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taminate the body following exposure. Because different types of radiation and differing levels of exposure can damage the body in a variety of ways, an assortment of medical products is needed.

The University of Kentucky, Lexington; Nanotherapeutics of Alachua, FL; and SRI International of Menlo Park, CA, also are receiving 14-month with renewal option contracts for Development of Improved DTPA for Radionuclide Chelation. The contractors will seek to develop alternate ways to effectively administer DTPA, either by inhalation, oral liquid, or pill.

Interagency Agreements

NIAID also has signed interagency agreements with 2 other federal government research institutes, the Armed Forces Radiobiology Research Institute (AFRRI) and the National Cancer Institute (NCI), both of Bethesda, MD. Under these agreements, AFRRI received $1.3 million in 2005 to screen and evaluate compounds that could be used to prevent, mitigate, or treat the effects of radiation exposure. AFRRI also will develop an automated approach to the assay of blood cell chromosome damage used to measure radiation exposure.

NCI, also part of NIH, received $1 million through a 2005 interagency agreement to develop compounds to protect against radiation exposure, conduct epidemiological studies on the medical consequences of radiation exposure, and identify compounds the body produces when exposed to radiation.

To learn more about these research programs, visit www3.niaid.nih.gov/research/topics/radnuc/.

National Institute of Allergy and Infectious Diseases