Duke Awarded up to $43 Million to Develop Test for Dirty Bomb / Radiation Exposure

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Duke University has received a $3.7 million contract from the Biomedical Advanced Research and Development Authority (BARDA) to develop a rapid and accurate genomic-based diagnostic test that can determine if a person has been exposed to radiation from a dirty bomb or nuclear attack.

In the event that all option years are exercised by the government, Duke University could receive up to $43.6 million from the contract.

"Since 9/11, there has been national concern about the possibility of a terrorist attack in the U.S. involving radiological or nuclear materials. Such an attack could kill or injure hundreds of thousands of people," says John Chute, MD, associate professor of medicine at Duke and principal investigator of the project.

"The problem is that right now, we don't have any way to rapidly screen thousands of people to determine their level of radiation exposure. Many people who suffer radiation injury can recover and survive if they are promptly and properly treated."

BARDA is part of the Office of the Assistant Secretary for Preparedness and Response in the U.S. Department of Health and Human Services. It manages Project BioShield and the Public Health Emergency Medical Countermeasures Enterprise, two organizations charged with the development of medical response to pandemic disease and countermeasures for chemical, biological and nuclear attacks.

The award builds upon Chute's previous collaborations at Duke with Joseph Nevins, PhD, and Nelson Chao, MD, that identified a set of 25 genes in human peripheral blood that are activated in response to radiation. Chute says that radiation exposure causes a characteristic pattern of expression in those 25 genes and this "signature" can diagnose radiation status with over 90 percent accuracy.

Chute's earlier work was supported by a $25 million grant from the National Institutes

of Allergy and Infectious Diseases that established the Duke Center for Medical Countermeasures Against Radiation, now in its fifth year of funding.

The new contract calls for Chute and his team at Duke to further validate the accuracy of the gene profile in animal and human testing.

Collaborators at DxTerity Diagnostics, a biotechnology company based in California, will utilize the Duke gene panel to develop a rapid gene expression test while colleagues at the University of Arizona and Invetech Corporation will design and develop the instrument in which the assay will be performed.

The end product will be a portable, 30-minute test for radiation injury that can be used to triage thousands of individuals in a short time following a radiological or nuclear attack.

"The Homeland Security Council document, 'Planning Guidance for Response to a Nuclear Detonation' indicates that a 10-kiloton improvised nuclear device would likely be lethal to individuals within about a half-mile radius of the blast," says Chute.

"Outside this zone, however, thousands of individuals would be exposed to highdose radiation but may be able to survive with prompt medical intervention. Further from the blast area, there would be additional thousands who have suffered little or no exposure, and may not need medical attention, but who will still be seeking it."

Chute says that such a scenario will require early and accurate triage of mass casualties to provide an effective health care response.

"Imagine a blast zone with a ring of triage stations at the perimeter. We believe that using our diagnostic assay in such points would allow us to screen tens of thousands of individuals in a 24-hour period and to distinguish true radiation victims from the uninjured," says Chute.

Chute says the assay will involve a single collection of only a few drops of blood that will be analyzed in a fully automated instrument with each result provided in about 30 minutes. That dramatically shortens the time it currently takes to analyze large numbers of genes, a process that takes several days and requires large equipment.

Researchers hope to have a prototype ready for demonstration by 2012.

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