Team receives funds to advance development of production method for medical isotopes

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(PhysOrg.com) -- An acute shortage of a medical isotope needed by tens of thousands of medical patients daily will be addressed through a federal funding agreement reached Sept. 30 to advance pioneering technology developed at a Middleton, Wis., company and the University of Wisconsin-Madison.

Organized by leaders of the Morgridge Institute for Research, the public-private partnership behind the project includes UW-Madison, the state of Wisconsin, Phoenix Nuclear Labs of Middleton and Lawrence Berkeley National Laboratory. Together, the group has been awarded a six-month, $500,000 cooperative agreement from the U.S. Department of Energy's National Nuclear Security Administration to further technologies needed for domestic production of molybdenum-99. The isotope produces technetium-99m, the most important radioisotope for detecting metastatic cancer and staging heart disease, studying brain and kidney function and creating images of stress fractures.

The cooperative agreement is part of an effort by the agency's Global Threat Reduction Initiative to develop a sustainable means of producing molybdenum-99 as part of a commercial supply network that avoids a single point of failure and does not use highly enriched uranium.

"This critical federal support will allow us to take the next step toward producing a reliable supply of molybdenum-99 for patients while we seek to establish a new and innovative industry in Wisconsin," says Sangtae "Sang" Kim, executive director of the Morgridge Institute for

Research. "This agreement, which will be matched by $500,000 in private funds, will allow us to develop detailed commercial parameters for equipment that is already safely and reliably functioning on a smaller scale. This is a tremendous opportunity that holds the potential to create needed jobs while solving a major challenge in the medical community."

The byproduct of molybdenum-99 is an essential ingredient in roughly 50,000 diagnostic nuclear imaging procedures each day in the U.S. for diagnosing cardiac disease and cancer staging. Only five production sources — none located in the U.S. — supply this critical isotope to the American medical community. Shutdowns at aging production facilities in Canada and the Netherlands have caused serious shortages during the past two years and forced U.S. medical facilities to ration the material for procedures.

An alternative method to produce the life-saving isotope combines a technology developed by UW-Madison medical physics researcher and current university Provost Paul M. DeLuca Jr. with an innovative process developed at Phoenix Nuclear Labs. The new method offers major advantages over existing technologies because it does not use highly enriched uranium, does not require a nuclear reactor, uses a "greener" method for production and fits well with the nation's existing supply chain.

"The National Nuclear Security Administration is committed to supporting technology that offers a new path forward for the creation of a reliable, domestic supply of molybdenum-99 without the use of highly enriched uranium," says Ken Baker, the National Nuclear Security Administration's principal assistant deputy administrator for defense nuclear nonproliferation. "We are pleased to have both the technical capability and commercialization expertise available to help resolve a critical U.S. medical community need while supporting President Obama's goal of reducing the risk posed by global use of highly enriched

uranium."

Last year, the agency's Global Threat Reduction Initiative awarded cooperative agreements for technology development proposals submitted by GE Hitachi and Babcock & Wilcox.

Thomas "Rock" Mackie, director of the medical device challenge area at the Morgridge Institute for Research and principal scientific investigator for the project, says design specifications being developed as part of the initial agreement would enable a plant equipped with the Phoenix technology to supply one half of the total U.S. demand for molybdenum-99, a market worth hundreds of millions of dollars. Mackie is a co-founder of TomoTherapy, a Madison-based maker of precision radiation therapy equipment for cancer treatment with annual sales of $164 million.

"Our collaborative effort — which includes scientists, government and private sector leaders, skilled administrators and experts from a major national lab — brings together exceptional talent," says Mackie, also a medical physics professor at UW-Madison. "In addition to having the right people and skills, the core technologies have been demonstrated. Yet, major federal support is a necessary ingredient to build and integrate the engineering systems to achieve commercial scale production."

Gregory Piefer, president of Phoenix Nuclear Labs, says the company's technology involves a new class of isotope generator that is compact and relatively inexpensive compared with existing technologies.

"Our process has tremendous advantages in terms of safety, efficiency and time and cost to market, and we have assembled a world-class team of scientists and business and community leaders that will ensure success," Piefer says. "The underlying technology promises to expand

into many other markets as well, creating tremendous economic potential."

The announcement of the $500,000 cooperative funding agreement will allow the Morgridge Institute group to immediately begin work to accomplish the early stages of this project. The department has indicated that at the end of the initial award, it may provide follow-on funding (up to $25 million total from the U.S. Department of Energy) to support further activities relating to the construction of a medical production facility capable of achieving commercial volumes by December 2013. The Morgridge Institute team's progress during the initial award will be a factor in the department's decision to make any additional follow-on awards.

To prepare for the possibility of an additional award, the Morgridge Institute team is establishing Phoenix Medical Isotopes as an operating venture to raise capital, manage the technology development and evaluate potential construction sites.

Carl Gulbrandsen, chair of the board of the Morgridge Institute and managing director of the Wisconsin Alumni Research Foundation, says the effort highlights the world-class technology being developed in university laboratories as well as the importance of strategic collaborations that draw on expertise from the public and private sectors.

"To be successful, these major initiatives require the participation of multiple stakeholders with a shared vision for the future," Gulbrandsen says. "Ultimately, the public will reap the benefits through improvements in this critical medical technology and greater access to lifesaving treatments and procedures." Any intellectual property created during the design phase will be owned by WARF and licensed to Phoenix Medical Isotopes.

Provided by University of Wisconsin-Madison