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Natick plays key role in helping to fight spread of Ebola

October 21, 2014


By NSRDEC Public Affairs

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Story Highlights

- Army science and technology helps to fight Ebola in West Africa

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- Army science and technology helps to fight Ebola in West Africa



Researchers Dr. Christopher Doona (right) and Florence Feeherry of the U.S. Army Natick Soldier Research, Development, and Engineering Center developed next-generation decontamination technologies that safely, conveniently, and controllably generate chlorine dioxide without acids or power. ClO2 kills bacterial spores, viruses, and vegetative cells, while minimizing hazards to the user and the environment.

NATICK, Mass. (Oct. 21, 2014) -- Researchers at the U.S. Army Natick Soldier Research, Development and Engineering Center here, invented a next-generation disinfectant system that kills the Ebola virus on surfaces.

The scientists developed and patented a novel chemical system, which is being used to sterilize medical equipment and electronic items used in the treatment of patients on the front lines of the war on Ebola in West Africa.

This came about through the transfer of the technology from the Army lab to a privately held company, ClorDiSys Solutions, which is manufacturing the portable "no power required" chemical compound, and supplying it worldwide.

One of the key research thrusts at the U.S. Army Natick Soldier Research, Development and Engineering Center is the discovery and development of decontamination technologies to keep the warfighter healthy and safe from bioterror attack. Natick's invention is a portable "no power required" method of generating chlorine dioxide, known as ClO2, gas, one of the best biocides available for combating contaminants, which range from benign microbes and food pathogens to Category A Bioterror agents.

The starting ingredients used to generate ClO2 are now produced and marketed by Lebanon, New Jersey-based ClorDiSys Solutions, and they can be quickly mobilized and applied as a gas to decontaminate or sterilize equipment and surfaces.

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Dr. Christopher Doona, the lead inventor of this field-portable method for generating ClO₂, is a senior research chemist at the center, known locally as Natick Labs, with extensive experience in ClO₂ reaction chemistry. Doona and his team are credited with inventing and perfecting this process of converting dry powder chemicals into ClO₂.

Doona says an important exponent of ClO₂ is its versatility as a disinfectant suitable for any industry, ranging from textiles, medicine, wastewater treatment and public health, to food safety, personal hygiene, and household uses. ClO₂ can be activated in small or large quantities and in varying strength levels from potent enough to sterilize medical instruments to mild enough to use in toothpaste to fight off germs in the mouth.

This technology could have ended up like many military technologies, in a warfighter-only product. However, the Army patented it and the technology transfer specialists at TechLink in Bozeman, Montana, collaborated with Natick's Technology Transfer Office, to transfer the technology to ClorDiSys, so it could be commercialized and made widely available. Technology transfer such as this, from a government lab to private enterprise, is mandated by Congress and ensures that useful technologies don't just gather dust on a shelf, but find application in U.S. industry.

Jeff DiTullio, business development lead at Natick, is always searching for opportunities where military innovation can be licensed for commercial application. Natick is one of dozens of DOD laboratories actively involved in research and technology aimed at benefiting the U.S. warfighter, and giving the military unrivaled operational capability. Working as a conduit between the DOD and the private sector, TechLink assisted ClorDiSys in navigating the Army's licensing process.

"It was a perfect scenario. We needed something and the Army had it. TechLink helped us get to the finish line," said Paul Lorcheim, ClorDiSys Solutions' director of operations.

"This transfer would not have happened without TechLink," added DiTullio.

ClorDiSys Solutions is a spinout of Johnson & Johnson. The company focuses on generating and using ClO₂, providing both powered and unpowered solutions for a variety of applications, and in particular for decontamination and sterilization of pharmaceutical, medical, veterinary, and food facilities. When the opportunity came along to provide ClO₂ on the Ebola front, ClorDiSys was willing and ready.

"ClorDiSys is proud to be helping to fight the spread of Ebola in Africa," said Mark Czarneski, ClorDiSys Solutions' director of technology. "Various world health organizations, including the U.S. government, are using ClorDiSys's gaseous chlorine dioxide to sterilize medical equipment contaminated with Ebola. It has been tested and is being utilized by these organizations for a number of applications."

The company's ultraviolet light disinfection system, called TORCH, was also utilized by the University of Nebraska Medical Center to perform the terminal disinfection after the release of their first Ebola patient.

Chlorine dioxide is a yellow-green gas with a faint odor similar to chlorine bleach, but otherwise it is very different. It has been recognized as a disinfectant since the early 1900s, and has been approved by the U.S. EPA for many applications.

In the modern age, the effectiveness of ClO₂ was confirmed at the dawn of the new millennium. In the weeks after the 9/11 attacks when terrorists sent anthrax in letters to public officials, hazardous materials teams used ClO₂ to decontaminate the Hart Senate Office Building, and the Brentwood Postal Facility.

Unlike other methods of preparing chlorine dioxide, no electricity or caustic acids are needed to activate the powdered ClO₂, nor is clean water required, making it ideal for use in remote field locations. Packets of ClorDiSys's ClO₂ product, which until recently did not exist, are portable enough to be carried in backpacks.

Chlorine dioxide is a broad-based biocide that kills spores, bacteria, viruses, and fungi. To date no organism tested against ClO₂ has proved resistant. It has effectively been used to kill bacterial spores, which are much more difficult to kill than viruses, such as Ebola, according to Doona.

"Americans hear in the news about outbreaks of E. coli, Listeria, and Salmonella from fresh fruits and vegetables. ClO₂ holds promise for the food industry but also, on a smaller scale as a home sanitizer for rinsing fresh produce or appliances," Doona said.

The success of ClO₂ in combating Ebola and other pathogens follows collaboration between the DoD and a biotech company that yielded a potential treatment for victims sickened by Ebola. The Ebola antibody that is a key component of the experimental drug called ZMapp was developed in the Army Medical Research Institute of Infectious Diseases, and transferred with assistance from TechLink to Mapp Biopharmaceutical of San Diego. ZMapp is credited with having saved the lives of two American medical missionaries who contracted Ebola last July, and is regarded as one of the most promising treatments for Ebola currently under development.

The Natick Soldier Research, Development and Engineering Center is part of the U.S.

Army Research, Development and Engineering Command, which has the mission to develop technology and engineering solutions for America's Soldiers.

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