'Fingerprint' to identify foodborne pathogens moves closer to production

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A Purdue University innovation creates a "fingerprint" to identify foodborne pathogens by using a light-scatter field in a pathogen colony shown in the upper right corner just above the fingerprint of a pathogen. The patented device, called the Bacteria Rapid Detection using Optical Scattering Technology or BARDOT, has shown great promise in identifying dangerous pathogens such as Listeria, Staphylococcus, Salmonella, Vibrio, and E. coli. Since the technology does not require a reagent, it reduces the cost of the pathogen identification and provides immediate test results. The Purdue Research Foundation Office of Technology Commercialization licensed the innovation to Hettich Lab Technology. Credit: Purdue Research Foundation/Oren Darling

A Purdue University innovation that creates a "fingerprint-like pattern" to identify foodborne pathogens without using reagents has been licensed by Hettich Lab Technology. The technology is being demonstrated at the Society of Laboratory Automation and Screening Conference and Exhibition held now through Wednesday (Jan. 27) in San Diego.

Hettich Lab Technology designs, engineers and commercializes software and automated incubation systems for identifying pathogens using elastic light scatter techniques that fire lasers at a pathogen colony to create a light-scatter field that gives the pathogen a pattern or fingerprint.

"The use of elastic light-scatter technology could change the way foodborne pathogens are identified," said Klaus-Günter Eberle, Hettich's CEO and general manager. "We are excited about the potential of the technology to advance the process of protecting society from foodborne pathogens."

Foodborne pathogens continue to be an international health and safety concern. In the United States, the Centers for Disease Control and Prevention estimates that one in six Americans, or 48 million people, become ill from foodborne illnesses with 128,000 becoming hospitalized and nearly 3,000 deaths. In addition, an estimated cost of $152 billion in medical expenses, lost productivity and business, lawsuits and compromised branding is attributed to foodborne illnesses.

"Improving our ability to quickly and accurately detect foodborne pathogens is a top priority for the USDA's Agricultural Research Service," said George Paoli, research microbiologist and lead scientist at the USDA-ARS in Wyndmoor, Pennsylvania. "ARS has supported the development of the BARDOT technology through funding and collaboration with Purdue's Center for Food Safety Engineering. The potential applications of BARDOT (Bacteria Rapid Detection using Optical Scattering Technology) for bacterial classification and identification are intriguing, particularly for the facile, rapid and low-cost detection of bacterial foodborne pathogens, because foodborne pathogen identification often takes days to complete using conventional microbiological detection methods."

The USDA-ARS, National Science Foundation and National Institutes of Health all provided funding to the Purdue colleges of Agriculture and Veterinary Medicine to develop the technology, which uses an optical sensor in the detection and identification of foodborne pathogens and other bacteria of interest.

"The development of this innovation is a prime example of how research funding from public and private sources can positively lead to innovations to help our global society," said Dan Hasler, president of the Purdue Research Foundation, which is the licenser of the technology. "We are eager to see this technology come to fruition and move to the public."

The device, called the Bacteria Rapid Detection using Optical Scattering Technology, or BARDOT, has shown great promise in identifying dangerous pathogens such as listeria, staphylococcus, salmonella, vibrio, and E. coli. Since the technology does not require a reagent, it reduces the cost of the pathogen identification. The technology can be used to test any food source for contamination, changing the model for rapid and definitive identification of pathogens.

"The technology can transmit a pathogenic organism fingerprint across the country instantly without the danger of physically transporting the pathogenic organism. This can be achieved without any reagents or assay requirements, which makes this a unique feature for this technology," said J. Paul Robinson, the SVM Professor of Cytomics in the Purdue Department of Basic Medical Sciences, and member of the Purdue Center for Food Safety Engineering who helped develop the technology. "Another attribute is that the technology evaluates every colony on a Petri-dish, so it eliminates or significantly minimizes the sampling bias, and as a result dramatically lowers dramatically the rate of false negatives - something that no other technology in organism identification can claim."

Other innovators of this technology are Dan Hirleman, Purdue's chief corporate and global partnerships officer; Arun Bhunia, professor of food science; Bartlomiej Rajwa, research associate in the Department of Basic Medical Sciences; and Euiwon Bae, senior research scientist in the Department of Basic Medical Sciences. The Purdue Center for Food Safety Engineering, under the leadership of director Lisa Mauer, also contributed to the development of the technology.

"The Purdue Center for Food Safety Engineering, established as a cooperative agreement with USDA-ARS, has a valuable history of combining engineering and microbiological expertise to develop pathogen detection technologies," Mauer said. "The technologies developed by the center translate science and engineering into practical tools for improving the detection of foodborne hazards."

Provided by Purdue University