

REDUCING THE SPREAD OF FOOD-BORNE PATHOGENS

## BRED TO KILL

■ Researchers contaminate foods with bacteria such as salmonella to study ways to kill the disease-causing germs

By **Ally Marotti**  
Chicago Tribune

After the scientists step safely out of the airtight lab in the biocontainment plant, and after their spacesuitlike protective wear is disinfected, the room is flooded with chlorine dioxide gas.

"We make sure anything that's in there stays in there," said Robert Brackett, director of the Institute for Food Safety and Health, a unit within the Illinois Institute of Technology that manages the Bedford Park facility.

The sterilizing gas and claustrophobia-inducing suits are mandatory in the lab, where researchers from the Food and Drug Administration and Illinois Tech come together to conduct research on foodborne bacteria.

Once a 5-gallon bucket of salmonella-infected peanut butter splattered all over the researchers. The impervious suits were well-warranted then, Brackett said.

The research conducted at the facility, just a half-hour outside Chicago, isn't purely academic. The scientists there work to give the FDA and food companies tools to make the things we eat safer and healthier. Human lives and billions of dollars are on the line — the annual cost of foodborne illness in the U.S. is estimated to be between \$5.5 billion and \$9.2 billion, according to a 2015 Ohio State University study. America's food industry, for which the Chicago area is a hub, has a major stake in the institute's research and at times helps conduct it.

At the schoollike facility just off the Stevenson Expressway, scientists study all the big-name bacteria: salmonella, listeria, E. coli. They infect foods and test the bacteria's resistance. They validate technology and processes the food industry might use to prevent contamination, like a cyclospora outbreak linked to salads at McDonald's that sickened almost 300 people in Illinois this summer or recent salmonella outbreaks connected to pre-cut melon sold in grocery stores and to Kellogg's Honey Smacks cereal.

The Illinois Department of Public Health has completed 15 foodborne illness investigations so far this year and continues to monitor the cyclospora outbreaks.

The possibility of contamination also has led companies to recall products, including Ritz and Goldfish crackers. Deerfield-based

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— **Robert Brackett, director, Institute for Food Safety and Health in Illinois**

Mondelez International, which makes Ritz, and Campbell Soup Co., which makes Goldfish, recalled several of their products in July over fears of salmonella.

News that a dry product could have contained salmonella shocked some, as traditional wisdom taught the bacteria grows in wet foods, Brackett said. But research and experience have shown that salmonella can survive for years in a dry state, he said. At the Bedford Park facility, researchers are testing technology that could kill the resilient bacteria on dry goods, such as nuts, grains or spices.

"When I went to school, no one ever thought the dry ingredients would be a problem," Brackett said, standing next to a piece of machinery that rains down cool plasma gas on the food moving along its belt like a waterfall of blue fire.

The energized gas kills the bacteria in the food — or at least that's the idea. A nearby glass-walled chamber housed flour and peanut butter in containers marked with the dates they were contaminated. Researchers will monitor those substances after subjecting them to the bacteria-killing technology.

"Sometimes bacteria can be injured," Brackett said. "If you keep them around long enough, they can come back."

Another machine nearby tests how high-intensity light kills bacteria. Though the machine is fairly compact, the light it emits could be powerful enough to strip paint off an airplane, Brackett said. Of course, it's not used at such high levels in the lab.

As the researchers at the lab test the technology, the science behind it will be validated for the FDA. They re-create the environment in which foodborne bacteria would survive and figure out how to kill it. Findings are published in scientific journals for the food-safety community to learn from. Meanwhile, scientists closely monitor outbreaks in the wild — like the salmonella-infected Honey Smacks

— to inform their research. Outbreaks can generate more questions than can be answered with the research funding available, Brackett said.

The FDA supports four food research facilities, each of which specializes in certain areas of food safety. The Institute of Food Safety and Health is the oldest and largest. Students in Illinois Tech's Department of Food Science and Nutrition also train with the researchers. The institute includes a public-private partnership that does collaborative work with the FDA, Illinois Tech and members of the food industry, such as Chicago-based Conagra Brands and Starbucks.

Snack and condiment giant Kraft Heinz is a member. Half a decade ago, company, co-headquartered in Chicago and Pittsburgh, was looking for ways to improve its cleaning methods for the belts, ovens and mixing equipment that processed dry items such as peanut butter and stuffing mix.

Other companies in the industry had the same problem, said Kurt Deibel, vice president of food safety and quality for North America at Kraft Heinz. The lines can't be cleaned with water because the moisture creates other microbial problems. Undeclared allergens are a major cause of food recalls, and allergen regulations were becoming more stringent.

So the company worked with the researchers in Bedford Park to develop different ways of removing allergens from the lines.

"We took that and applied that in our plants," Deibel said. "We have a way to now clean the plants, to verify that the allergens are removed and to make sure that we don't have any cross-contamination."

At first glance, the labs at the facility look like any other — safety goggles and lab coats by the entrance, sinks and racks of equipment lining the walls. The occasional researcher moves from one lab to another or tests a piece of equipment. But visitors to these labs are met with stark warning signs. "DANGER: Hazardous chemicals," one reads. "Restricted Access Area, Authorized Personnel Only," says another. A bright orange warning screams, "BIOHAZARD," and another has a skull and crossbones.

A loud industrial area at



Brian Cassella / Chicago Tribune-TNS

Sanjana Potluri (left) and Sargun Malik use high-intensity pulse light to kill food-borne pathogens at the Institute for Food Safety and Health, a unit within the Illinois Institute of Technology.

the facility substitutes the lab coats by its door for hard hats. Some of the machinery towers above the people who run it. A cylindrical piece of equipment that targets botulism spores in soup cans requires the user to turn a wheel that wouldn't be out of place on a pirate ship.

A nearby machine applies pressure equivalent to that at the bottom of the ocean onto foods. Pressurizing kills bacteria such as listeria, salmonella and E. coli without compromising the freshness or flavor with heat, Brackett said.

The potentially fatal listeria has been the focus of several recent recalls, including one earlier this month in which Whole Foods Market voluntarily recalled Explorateur French Triple Creme cheese from nine stores in Illinois, New Mexico, Texas, Arkansas, Connecticut and New Jersey.

It is common to process products like fresh guacamole, deli meats and juices with high pressure, Brackett said. It maintains the quality of the product better because it doesn't subject it to such high heat as other processing methods. The process isn't new, but as consumers demand fresher food with fewer ingredients, it's gaining popularity as a way to kill bacteria in fresh products.

"They're trying to reduce the number of ingredients in the food," Brackett said. "Many of those ingredients were anti-microbial."

In the facility, a white board next to the high-pressure processor tracks other products that were recently tested: apple sauce, Crisco, mashed potatoes and peanut butter, which has been the source of the highest-profile foodborne illness outbreaks in recent decades.

In 2016, Conagra agreed to pay an \$8 million fine plus \$3.2 million in cash forfeitures for its role in an outbreak that sickened hundreds in the mid-2000s. The culprit was Peter Pan peanut butter contaminated with salmonella. It was the largest criminal fine to date in a U.S. food safety case.

A year earlier, former Peanut Corporation of America owner Stewart Parnell was sentenced to 28 years in prison for his role in a deadly salmonella outbreak in 2008 and 2009. The recall was one of the largest in U.S. history, and it caused the company to go bankrupt.

At the time of sentencing, Parnell's punishment was the stiffest ever handed out to a producer in a foodborne illness case.

The former executive was convicted of knowingly shipping contaminated peanut butter and faking test results intended to screen for salmonella. The outbreak caused nine deaths and sickened hundreds of people.

Fortunately, the peanut butter sitting on store shelves now is much safer than it was a decade ago, Brackett said. Technology

has advanced and new protocols have been established. The Food Safety Modernization Act, which became law in 2011, requires food producers to create better safety measures. Companies and regulatory agencies are paying more attention to products like peanut butter that previously posed high risks.

Besides the testing and tracking the researchers do at the institute, companies can also come to be trained on good manufacturing processes. Some Kraft Heinz employees, for example, are trained at the institute on how to identify and control the risks of ingredients and processes.

"In many cases, the outbreaks can be prevented if everyone just did what we knew they were supposed to be doing," Brackett said.

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## Cellphones & crosswalks: Hang it up

New York Times News Service

Pedestrians who are using their phones cross the street at a slower pace than others, a new study has found, a behavior that may increase their risk of being hit by a car.

Regardless of whether they are talking on the phone or texting, distracted pedestrians using phones take smaller steps and walk in a more erratic fashion when crossing the street than those who are not on their phones, the study found.

Researchers used a system of auto-

mated video analysis to examine the movements of 357 pedestrians crossing a busy four-way intersection near a university in Kamloops, British Columbia, over the course of two days of good weather in April 2016.

Nearly 38 percent of the pedestrians were using their cellphones while crossing the street, with most of them texting or reading. The paper was published in Transportation Research Record.

Crossing a street slowly increases the

risk to a pedestrian, said Tarek Sayed, the paper's senior author and a professor of civil engineering at the University of British Columbia in Vancouver. "The longer you are in the crosswalk, the longer you are exposed to potential conflicts and collisions," he said. Texting also takes cognitive effort and limits visual sensory input, which can impair balance and lead to falls, he said.

Sayed's advice for people who cross the street while talking or texting was simple: "Don't do it."

