

University of Maine researchers awarded \$150,000 USDA grant to examine foodborne pathogens

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University of Maine researchers have been awarded a \$150,000 grant from the U.S. Department of Agriculture and the National Institute of Food and Agriculture to study foodborne pathogens, according to those involved in the project.

The grant will fund the novel approach of using magnetic resonance imaging (MRI) to observe the internalization of foodborne pathogens inside produce, the first research of its kind, according to Dr. Vivian Wu, a professor of food science at UMaine and lead researcher on the project. Internalization of foodborne pathogens, the process by which harmful bacteria move into the edible parts of produce, poses great health threats because bacteria cannot be easily washed away, Wu said.

“Either microorganisms will contaminate a surface of produce — leaves, plants, fruit — but there is another possibility microorganisms can actually internalize, get inside of the plant cell tissues. That will make the control of microorganisms and contamination even more difficult. Once microorganisms internalize inside of a plant tissue, it’s very difficult to get rid of them,” Wu said.

Using MRI technology, Dr. Wu and her collaborators hope to trace bacterial internalization of fresh produce in order to understand the process and how to prevent it.

“It is hard to understand or actually identify whether produce has been internalized by harmful microorganisms. Traditional methods of trying to analyze this internalization are not very efficient and also results are inconsistent,” Wu said.

Use of MRI technology is novel in the studies of food science and microbiology. The approach will allow researchers to study pathogens without having to use invasive methods on the products they are studying.

“I came up with this idea that we may be able to use MRI imaging technology to develop non-invasive methods so we can better understand how pathogens internalize inside of plant cells, and whether how severe or what the possibility is of internalization,” Wu said. “This is actually the beginning stage because I think this idea has never been proposed or brought up to the food safety society, and we are probably the first one developing this.”

The research will have tremendous implications for the food industry, produce in particular, Wu said, citing recent outbreaks of *Escherichia coli* in spinach and other leafy greens in 2012. In that year, 33 people became infected with *E. coli* 0157:H7 — one of the most virulent strains of the bacteria — in five states, with 26 cases in N.Y. alone, according to the U.S. Centers for Disease Control and Prevention. In August 2014, 19 people in the Midwest and on the West coast became infected by another strain of *E. coli*, *E. coli* 0121, after eating contaminated raw clover sprouts, according to the CDC.

Wu hopes the research will expand to studying animal matters, after its initial studies on produce. She hopes to study animal matters in order to understand how bacterial microorganisms infect meat without having to harm the animals.

“I think for animal matters it’s more meaningful to have something that is non-invasive so you don’t need to sacrifice a lot of animals to understand internalization of foodborne pathogens,” she said.

The acquisition of \$150,000 from the USDA is a fraction of more than \$17 million in grants issued to the College of Natural Sciences, Forestry and Agriculture this year, a near record according to Edward Ashworth, dean of that college. Ashworth said these grants are pivotal to the undergraduate experience.

“As a land grant institution, we try to do research on issues that are important to the public, both the food producers but also consumers, and food safety is a big issue,” Ashworth said.

“The chance that you might be involved in helping on that work through a capstone experience, or a special project or working in a lab is I think a real benefit. That’s true not just for this grant but for grants across the college,” Ashworth said.

In addition to enhancing the undergraduate and graduate experience, Ashworth said the acquisition of grants is also a draw for potential students, particularly students from away, which has been a long-term goal of the university system.

“Last year, most of the people who applied to come to this college were from away,” Ashworth said. “I think the growth has been mostly in nonresident students seeing the opportunities here and wanting to be part of it.”

Wu says her research is just in the beginning stages, but will take a multidisciplinary approach as it progresses. She will be working with engineers at collaborating universities where MRI technology is available, including the University of California, Davis. As the project continues to develop, Wu will explore MRI technology options within Maine.

Going into the project, Wu said she is excited to get started.

“When I had this crazy idea, I didn’t know whether that was possible,” she said. “Now we have received USDA support so it’s a very exciting moment that we are ready to get this party started, and hopefully we can make a successful story.”