

Test finds E. coli in beef faster, could better trace outbreaks

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Infrared spectroscopy can detect E. coli faster than current testing methods and can cut days off investigations of outbreaks, according to a study at Purdue University.

Lisa Mauer, an associate professor of food science, detected E. coli in ground beef in one hour using Fourier transform infrared [spectroscopy](#), much less than the 48 hours required for conventional plating technology, which requires culturing cells in a laboratory. Mauer said spectroscopy could be done in the same laboratories, just in much less time.

The spectroscopy method also differentiates between strains of E. coli O157:H7, meaning outbreaks could be tracked more effectively and quickly. Current tests are multistep and take almost one week to get results.

"Even with all the other [bacteria](#) present in ground beef, we could still detect E. coli and recognize different strains," said Mauer, whose findings were reported in the August issue of the *Journal of Food Science*.

Mauer demonstrated two methods for separating bacteria from ground beef for testing. An antibody-capture method, which binds bacteria to [antibodies](#) attached to magnetic beads, gave results in four hours. A filtration method achieved results in about an hour.

[Infrared spectroscopy](#) could detect as little as one E. coli cell if the bacteria was cultured for six hours. Conventional plating techniques used for E. coli detection require culturing cells for 48 hours.

E. coli has a specific [infrared spectrum](#) that can be read with a Fourier transform infrared spectrometer. Infrared light is passed over a sample. The spectrometer reads the spectrum created by the combination of energy that has been absorbed and energy that has been reflected back.

"Energy is only absorbed by certain components of a sample," Mauer said. "If that component or bacteria isn't there, the energy is reflected back."

About 70,000 Americans are sickened by E. coli each year, according to the Centers for Disease Control and Prevention. People become infected after ingesting food contaminated with the bacteria, which comes from human or animal feces. Symptoms include severe stomach cramps, diarrhea and vomiting, and in rare occasions the infection can be life-threatening.

Mauer's testing methods also can differentiate between living and dead E. coli cells, something current testing methods cannot.

"If the cells are dead, they're not harmful. But the presence of that dead population could tell you something about the quality of the product," Mauer said.

Mauer believes the [ground beef](#) tests show promise for using the technology to find other pathogens in additional types of foods. She has already shown that spectroscopy can detect melamine -- which sickened about 300,000 infants in China and killed at least six in 2008 -- down to one part per million in powdered baby formula.

Mauer next plans to assess spectroscopy for detection of more pathogens in different food products. The U.S. Department of Agriculture Agricultural Research Service and the Purdue Center for Food Safety Engineering funded the study.

Provided by Purdue University

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