

Investigating *Listeria* Outbreaks

[Announcer] This program is presented by the Centers for Disease Control and Prevention.

[Mike Miller] Hello, I'm Dr. Mike Miller and today I'm talking with Dr. Emily Cartwright, Infectious Disease fellow at Emory University and former EIS Officer with CDC's Division of Foodborne, Waterborne, and Environmental Diseases. Our conversation is based on her study about foodborne *Listeria* outbreaks, which appears in CDC's journal, *Emerging Infectious Diseases*. Welcome, Dr. Cartwright.

[Emily Cartwright] Hello.

[Mike Miller] Let's start by telling us about listeriosis.

[Emily Cartwright] Listeriosis is an infection with bacteria called *Listeria monocytogenes*. This infection is almost always caused by eating contaminated food; it can lead to serious illness, such as bacteremia, which means bacteria are in the blood, or meningitis, which is an infection of the lining of the brain. The CDC estimates that about 1,600 listeriosis cases occur each year in the United States, causing about 1,500 hospitalizations and 260 related deaths. So, it's a rare bacterial foodborne disease, but nearly all patients are hospitalized and about one in six people with it die.

[Mike Miller] Well, who is most likely to get listeriosis?

[Emily Cartwright] Three groups of people are much more likely to get listeriosis. The first group is older adults. Over half of patients with listeriosis are adults aged 65 years and older. The second group is people with weakened immune systems. This group includes transplant recipients, people with leukemia and other cancers, people with AIDS, liver disease, end-stage kidney disease, alcoholism, and diabetes. Medicines that suppress the immune system, like chemotherapy and steroids, may also increase the chance of getting listeriosis. The third group is pregnant women and their newborn babies. In the mother, listeriosis causes fever and other non-specific symptoms, such as fatigue and aches. Listeriosis during pregnancy can cause a miscarriage, stillbirth, or premature labor. Some newborn babies become very ill and some die.

[Mike Miller] When was foodborne transmission of listeriosis first recognized?

[Emily Cartwright] CDC officials and Canadian colleagues investigated a listeriosis outbreak in 1981 that was linked to coleslaw. This investigation is considered to be the earliest report to show conclusively that human listeriosis is a foodborne disease, but several other investigations in the 1980s were linked to additional foods and reached the same conclusion about foodborne transmission.

[Mike Miller] How are listeriosis outbreaks identified?

[Emily Cartwright] In the United States, we use a laboratory-based system called PulseNet to identify outbreaks of listeriosis and other foodborne bacterial diseases. PulseNet was established in 1998 and has been revolutionary for outbreak detection. Public health laboratories throughout

the country participate in making “DNA fingerprints” of *Listeria* strains from sick people. Laboratories can see if there is an unexpected increase in any particular strain. When several patients are infected with the same strain during a certain time period, it suggests that these infections came from a common contaminated food. In other words, the patients may be part of the same outbreak.

[Mike Miller] Well, how are listeriosis outbreaks investigated?

[Emily Cartwright] The goal of any foodborne outbreak investigation is to find a common contaminated food, and remove it from the food supply to protect the public’s health. To accomplish this, we use a surveillance system specifically designed for investigating *Listeria* outbreaks. It’s called the *Listeria* Initiative, and CDC started it in 2004. Like PulseNet, the *Listeria* Initiative’s success depends on the work of state and local health departments. Public health scientists all use the same uniform questionnaire to interview patients diagnosed with listeriosis about foods they ate before they became ill. Interviews are done as soon as the patient’s illness is reported to the public health department; in fact, the interviews often happen even before an outbreak is detected. During an outbreak investigation, information from PulseNet and the *Listeria* Initiative are used together. Scientists compare foods eaten by patients who are known to be part of the outbreak with foods eaten by patients diagnosed in the past – those who are not part of the outbreak. The large outbreak of listeriosis in 2011 is a good example. Many people remember this outbreak, which was caused by contaminated cantaloupe from a single farm. This outbreak could have been bigger, but public health investigators used PulseNet and the *Listeria* Initiative to help quickly identify cantaloupe as the source of illness and get the contaminated cantaloupe off the market.

[Mike Miller] Tell us about the reports of outbreaks in your analysis.

[Emily Cartwright] Sure. We analyzed the 24 listeriosis outbreaks that occurred between 1998 and 2008 and were reported to CDC. This time period starts when PulseNet began in 1998, and includes 2004 and later, when the *Listeria* Initiative was in place. So, it was an ideal period to review listeriosis outbreaks because these two systems had been established.

[Mike Miller] Do these outbreaks represent some kind of shift in the number and severity of outbreaks?

[Emily Cartwright] Yes, in fact, we did find some important shifts in foods responsible for outbreaks. Outbreaks that occurred later in the study period, after 2004, were generally smaller in the number of sick people and shorter in duration. We believe that these improvements reflect better detection of outbreaks through PulseNet and better investigation through the *Listeria* Initiative. In other words, rapid detection and response to listeriosis outbreaks, finding the contaminated food, and removing it from the food supply, resulted in fewer illnesses and ended the outbreaks sooner.

[Mike Miller] What types of foods cause *Listeria* outbreaks?

[Emily Cartwright] We grouped the types of foods that cause *Listeria* outbreaks into three categories: ready-to-eat meats, such as deli meats and hot dogs; dairy products, including cheese; and other foods. The other foods included some foods that have not been identified as causes of *Listeria* infection before, such as sprouts and taco salad.

[Mike Miller] And what were some of the trends in listeriosis outbreaks you identified?

[Emily Cartwright] Well, some of the most important trends related to the types of foods that caused listeriosis outbreaks. Ready-to-eat meats were the most common source of outbreaks early in the study period, from 1998 to 2003. But later in the study period, after 2004, they were associated with only one outbreak. We know that, after several multistate outbreaks caused by ready-to-eat meats in the late 90s and early 2000s, industry and regulatory agencies responded with interventions to prevent *Listeria* contamination in ready-to-eat meats, such as hot dogs and turkey deli meat. So this is an example of how findings from outbreak investigations can lead to enhanced efforts to control *Listeria* contamination, which has national benefits.

[Mike Miller] Apparently only five outbreaks were reported to CDC before 1998. Do you have any theories about the increase in reporting of outbreaks after 1998?

[Emily Cartwright] Great question. Our analysis focused on the 24 US outbreaks from 1998 to 2008. But we also compared this number, 24, with the number of outbreaks reported in the 20 years before our analysis. From 1978 to 1997, only five outbreaks were reported. We think that listeriosis outbreaks were probably just as common in these earlier years as in later years, but they just weren't being detected.

[Mike Miller] Do you think that foodborne listeriosis is under control and we'll start seeing fewer outbreaks?

[Emily Cartwright] That's a tough question. We *have* made progress nationally in controlling listeriosis. Data from FoodNet, a system that tracks incidence rates of listeriosis, tells us that these rates have declined by about a quarter since 1996. But progress in the last decade has stalled. Outbreak investigations are opportunities to learn about gaps in the food safety system and ways to prevent *Listeria* contamination in food. If we continue to monitor infections using PulseNet and the *Listeria* Initiative, we can continue to find outbreaks, and to discover new foods that may be transmitting this deadly infection.

[Mike Miller] What can people do to protect themselves from getting *Listeria* infections?

[Emily Cartwright] The first step is to know whether you or someone you care for is in one of the three groups who are much more likely to get listeriosis. Those groups are older adults, people with weakened immune systems, and pregnant women and their newborn babies. Next, understand that food safety is important because listeriosis can be life-threatening. We caution people in these groups to not eat deli and lunch meats, cold cuts, or hot dogs, unless they are heated to an internal temperature of 165° Fahrenheit or until steaming hot just before serving. Also, they should not eat soft cheeses unless they are made from pasteurized milk. In fact, no one should drink raw milk or eat un-aged cheese or other products made from raw milk because many different pathogens are sometimes found in raw milk and can make people sick.

You can learn more about foods to avoid and how to safely prepare and store food by visiting CDC's website cdc.gov/listeria.

[Mike Miller] Well, thank you, Dr. Cartwright. I've been talking with Dr. Emily Cartwright about her study, *Listeriosis Outbreaks and Associated Food Vehicles, United States, 1998–2008*,

which appears in the January 2013 issue of the CDC's journal, *Emerging Infectious Diseases*. You can see the entire article online at cdc.gov/eid.

If you'd like to comment on this podcast, send an email to eideditor@cdc.gov. That's e-i-d-editor at c-d-c-dot-gov. I'm Dr. Mike Miller, for *Emerging Infectious Diseases*.

[Announcer] For the most accurate health information, visit www.cdc.gov or call 1-800-CDC-INFO.