

Threat to United States from new European E. coli strain unclear

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(Medical Xpress) -- Over the centuries, many unexpected things have come to the United States from Germany and caught on -- lager beer, sauerkraut, bratwurst and the Volkswagen Beetle are a few that come to mind -- but don't necessarily expect the novel strain of E. coli that is responsible for more than 2,800 cases of illness and 27 deaths in Germany to show up immediately in this country, advises a foodborne-disease expert in Penn State's College of Agricultural Sciences.

Because the United States imports just 2 percent of its food from Europe, and because outbreak-related export bans of fresh foods are in place, it is unlikely that the current outbreak [strain of bacteria](#) will arrive here from Germany said Edward Dudley, an assistant professor of [food science](#) at Penn State who studies the biology and evolution of [pathogens](#) that contaminate food.

"But that doesn't mean we won't see something similar at some point in time," he said. "The E. coli strain that is causing the outbreak of illness in Germany has been called a 'superbug,' but I don't like that term because it is sensationalistic. This is not something that was completely unexpected, in retrospect, and it is not accurate to say that we don't understand it."

The most notable aspect of the German outbreak is that it is caused by a new strain of E. coli that possesses [genetic material](#) and traits of two well-known pathogens, making this organism extremely pathogenic, Dudley noted.

"One is EAEC -- enteroaggregative E. coli -- which has the capabilities of sticking to the intestinal lining and producing a mucoid film that protects it," explained Dudley, who has been studying E.coli for a decade. "EAEC normally results in prolonged diarrheal illness.

"The other is Shiga toxin-producing E. coli, or STEC, which causes illness characterized by severe bloody diarrhea and can result in [hemolytic uremic syndrome](#) (HUS), a life-threatening condition that may result in the loss of kidney function."

Scientists know that E. coli, like many pathogens and nonpathogens alike, has the ability through a variety of mechanisms to move pieces of DNA to other bacteria and E. coli [strains](#), said Dudley.

"The most likely scenario is that an EAEC strain acquired the ability to produce Shiga toxin from a STEC strain. What has occurred from an evolutionary standpoint is no surprise to those of us in this field and provides yet another example of the genetic flexibility of the bacterium that is E. coli."

Dudley said what is surprising about the German outbreak is that this novel E. coli strain is causing an unusually high number of HUS cases.

"Most STEC outbreaks in the past caused HUS in approximately 5 percent of patients, and some outbreaks have seen prevalence as high as 15 percent," he said. "But this German strain is causing HUS in more than 30 percent of patients."

Though nobody knows yet why this strain has caused a greater number of cases of HUS -- more than 700 -- Dudley speculates that the strain's ability to persist in the intestinal tract longer increases the risk for HUS.

"This outbreak is the first evidence that such a strain can cause a

devastating illness," he said. "This is a terrible tragedy for all those involved, and we need to understand the reason behind it."

Dudley studies enteroaggregative and Shiga toxin-producing E. coli with an eye toward developing improved methods of tracking the spread of these organisms from farm-to-fork. He has concentrated on understanding the mechanisms that cause certain bacteria to become human pathogens.

"E. coli related to the German strain undoubtedly exist elsewhere in the world, so the big question is whether this outbreak is just a random, isolated case," he said. "It's a very big world out there, and we have a huge food supply. Is this something we won't see for 20 or 30 more years, or is this something we will be seeing with increased regularity?"

Almost nothing is known about where this [novel strain](#) of E. coli exists in agricultural settings in Europe or in the [United States](#), Dudley noted. He emphasized the importance of finding out where the German outbreak originated, and with what kind of food.

"In order to understand how to prevent possible future outbreaks, we first must know where this strain originates from, and the routes by which it might transmit to the food supply. We must find out if this is something that is prevalent in our farm environments.

"This is a significant event -- it's the third largest [outbreak](#) ever recorded by an E. coli that produces Shiga toxin," he said. "We need to know, was this a one-time event, or is some change in agricultural or other practices heightening our risk for this novel strain?"

Provided by Pennsylvania State University

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