

# *E. coli* O157:H7 and Foodborne Illness

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## What is *E. coli* O157:H7?

*E. coli* O157:H7 is a particular strain of *Escherichia coli* bacteria. *E. coli* O157:H7 is different from most other *E. coli* because it produces potent toxins and can cause foodborne or person-to-person transmitted disease.

## How serious is the illness?

The toxin produced by this organism damages the intestinal lining. Severe abdominal cramps and watery, possibly bloody, diarrhea occur. Nausea and vomiting, with or without a low-grade fever, can occur as the colon wall becomes inflamed where the bacteria attach.

Hemorrhagic colitis is usually self-limiting in healthy adults. Recovery occurs within four to 10 days. Children, elderly adults or immunocompromised individuals are more susceptible. Hemorrhagic colitis can be severe, requiring hospitalization in up to 50 percent of patients.

In 2 to 15 percent of the confirmed cases in children, the infection may develop into hemolytic uremic syndrome (HUS). This syndrome begins three to four days after the contaminated food is consumed and lasts eight to 10 days.

HUS symptoms are acute abdominal cramps, bloody diarrhea, hemolytic anemia, low-grade fever, and urinary tract infection. It destroys red blood cells and the lining of blood vessel walls. This ultimately can lead to kidney failure with the possible permanent loss of kidney function. Dialysis may be needed for recovery. HUS is a leading cause of acute kidney failure in children and the elderly.

Extreme cases of HUS may progress to thrombotic thrombo-cytopenic purpura (TTP) in adults, especially the elderly. TTP is a central nervous system disease that causes seizures, coma, and blood clots in the brain. The death rate from *E. coli* O157:H7 is 3 to 5 percent. The incidence of death in the elderly from TTP is as high as 50 percent of confirmed cases.

## How long has *E. coli* O157:H7 been a problem?

This particular *E. coli* strain was first identified with foodborne illness in 1982. Three outbreaks – with hemorrhagic colitis as a common symptom – were linked to the organism.

From 1982 to 1992, 16 deaths in the United States were associated with *E. coli* O157:H7. In 1993, *E. coli* O157:H7 caused a major outbreak of illness in consumers who ate hamburgers at fast-food restaurants in four western states. More than 500 individuals became ill, including 123 who suffered from serious hemorrhagic colitis, at least 35 cases of HUS, and five deaths.

Eighty-eight percent of the cases were linked to undercooked hamburgers from multiple outlets of a single fast-food chain. Nearly 12 percent resulted from secondary person-to-person contamination. The bacteria were transmitted from infected individuals to healthy people through poor hygienic practices. Once infected, individuals shed the bacteria in their feces for two or more weeks.

According to the Centers for Disease Control and Prevention, from 1994 to 1999, reported infections of *E. coli* O157:H7 increased annually to a peak of 4,744 cases. In 2003, the reported cases dropped to 2,671. Kansas reported 36 cases.

Many other outbreaks of foodborne illness from *E. coli* O157:H7 have occurred, with other deaths as a result. None of the outbreaks have been as large or caused as much publicity as the outbreak described above. Outbreaks have been the result of contact with contaminated public waters, including swimming pools. Recent outbreaks have been with children handling petting zoo or farm animals and not washing their hands.

## What foods are most likely to be contaminated?

Most of the confirmed *E. coli* O157:H7 cases have been linked to undercooked ground beef. Other sources of the bacteria have included raw milk, mayonnaise that had been contaminated with meat drippings, unpasteurized apple cider, and salami. Fresh produce can become contaminated in the field, due to exposure to wildlife and contami-

nated water run-off. Fresh sprouts (i.e., alfalfa and radish) contaminated with *E.coli* O157:H7 led to a large outbreak in Japan's public schools.

### **What can you do to protect yourself and your family?**

■ *Avoid eating or serving undercooked ground meat.* When eating hamburgers away from home, check with a fork to make sure they are done all the way through. Send back any undercooked hamburger or other foods made from ground meat.

At home, your best safety measure is to use a thermometer to verify that the internal temperature of ground beef patties reaches 160°F. (The 1997 Food Code for food-service operations specifies a minimum of 155°F.)

Research by Kansas State University, later verified by the U.S. Department of Agriculture, indicates that internal cooked meat color is a poor indication of adequate doneness. Ground beef patties cooked to as low as 130°F. sometimes appear to be fully cooked (termed premature browning).

■ *Quickly freeze or refrigerate all ground meat and other perishable foods after grocery shopping.* Never thaw food on the counter.

■ *Wash your hands, utensils, and work areas with hot, soapy water to keep the bacteria from spreading after you have contact with raw meat.* Also, wash your hands after using the bathroom, diapering a child or handling animals. Wash your

hands with soap and water as hot as your hands can tolerate. Scrub for at least 20 seconds, paying particular attention to your nails, the areas around rings, and between your fingers.

### **What are the government and the food industry doing to deal with *E.coli* O157:H7?**

The USDA has initiated programs to eliminate or reduce bacterial contamination throughout the part of the food system it regulates, from production to consumption.

On-farm production, slaughter operations, processing plants, food services, retail outlets, and consumers are focal points. Research, regulatory changes, methods for detecting organisms, Hazard Analysis Critical Control Point (HACCP) Programs, and education are components.

Food service operations are required to have a manager certified in foodborne disease prevention. This is typically done by passing the ServSafe® Food Safety Training program. Food service employees are also encouraged to take this training.

The U.S. Food and Drug Administration – through the 2001 Food Code – and state health departments are promoting HACCP in food-service and processing plants, with increased attention to hygiene and the use of proper storage, cooking, and holding temperatures. In the wake of foodborne *E.coli* O157:H7 outbreaks traced to apple juice and cider,

the FDA now requires warning labels on fresh, unpasteurized juice products and producers must have HACCP plans for juices.

Food manufacturers and processors, food-service and retail food operations, and others also are working to improve food safety and sanitation. They strive to control harmful organisms that might contaminate food at various points along the path from the farm to the table.

### **References**

Summary of Notifiable Diseases – United States, 2003, Centers for Disease Control and Prevention [www.cdc.gov/mmwr/preview/mmwrhtml/mm5254al.htm](http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5254al.htm). Accessed Sept. 13, 2005.

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