disease prevention news

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Make that well done...

E. Coli O157:H7 Infection/HUS Update

On October 26 , 1993, a Forth Worth physician reported 3 cases of hemolytic uremic syndrome (HUS) that had occurred during a two-week period. In response to a statewide Texas Department of Health request for reporting, TDH had received ten reports of hemolytic uremic syndrome (HUS) and/or *Escherichia coli* O157:H7 infection by November 15. While TDH continues to investigate these cases, no common source of infection has yet been determined.

Of the ten reported Texas patients, two had *E. coli* O157:H7 infection alone and eight developed HUS. *E. coli* O157:H7 was cultured from three of the HUS patients. HUS can lead to kidney failure, seizures, blindness, neurological disorders, and death. Of the eight HUS patients, five were three years old or younger; two of these children died.

Background

A 1982 investigation of two outbreaks of a distinctive bloody diarrheal syndrome led to the identification of a new bacterial pathogen, *Escherichia coli* O157:H7. Since that time, the incidence of infection in developed countries has shown a marked increase, with outbreaks in the United States, the United Kingdom, and Canada. In the U.S. from 1982-1992, 17 outbreaks were reported. In 1993, 16 clusters of *E. coli* O157:H7 have been investigated to date.

Because many laboratories do not screen for this infection, and many states in the United States do not require reporting, definitive data are not available. However, data from areas where laboratory tests for *E. coli* O157:H7 are done routinely suggest that up to 20,000 cases may occur nationwide each year. Reports indicate that the infection is common in Canada and some of the northernmost states of the United States, with increasing incidence in Europe and Japan.

Most laboratories in Canada screen stools for this organism and report isolates. However, outbreaks usually are detected because of a cluster of hemolytic uremic syndrome or thrombotic thrombocytopenic purpura cases, or because a large number of persons are hospitalized simultaneously with severe diarrheal illness.

The following answers to the most common questions about *Escherichia coli* O157:H7 are adapted from public educational materials provided by the Enteric Disease Branch of the Centers for Disease Control and Prevention (CDC).

◆ What is *Escherichia coli* O157:H7?

E. coli O157:H7 is one of hundreds of strains of the bacterium *Escherichia coli*. Most strains are harmless and live in the intestines of healthy humans and animals. This particular strain produces powerful toxins that can cause severe illness. The combination of letters and numbers refers to the specific markers found on the surface of the bacterium, and distinguishes it from other *E. coli*, which have other O and H markers.

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◆ What sort of illness does it cause?

Most persons who are infected with the bacterium develop severe diarrhea and painful abdominal cramps, while some persons show few or no symptoms. The diarrhea is often very bloody. Because there is usually little or no fever, the patient and doctor may think it is not an infection, but some other condition that causes the bowel to bleed. The illness usually lasts 5 to 10 days. In some persons, particularly children less than 5 years old and the elderly, the infection can lead to destruction of red blood cells (hemolytic anemia) and acute kidney failure (also known as uremia). This complication, the hemolytic uremic syndrome (HUS), can lead to stroke, seizures, and death. About 2-7% of infections lead to HUS. Most children with HUS are hospitalized for about two weeks. In the United States, *E. coli* O157:H7 infection is the principal cause of HUS, and HUS is the principal cause of acute kidney failure in children.

Stool cultures that include a screening medium such as sorbitol-MacConkey agar will identify E. coli O157:H7.

◆ How can it be diagnosed?

The many causes of bloody diarrhea and abdominal cramps can be differentiated only by laboratory tests. Stool cultures that include a screening medium such as sorbitol-MacConkey agar will identify *E. coli* O157:H7. However, these tests often are not performed unless the laboratory is instructed to do them. In special cases, a blood test can be used to determine whether someone has been infected recently with *E. coli* O157:H7.

What can I do to prevent HUS infection?

- Avoid raw, rare, or undercooked ground beef or hamburger. Make sure the cooked meat is gray or brown throughout (not pink), that any juices run clear, and that it is hot on the inside.
- If you are served an undercooked hamburger in a restaurant, send it back for further cooking.
- Avoid raw, unpasteurized milk or products made from such milk. Consume pasteurized milk and milk products, instead.
- Anyone infected with *E. coli* O157:H7 infection, and everyone in contact with the infected person, should practice frequent careful handwashing with soap. Supervised handwashing is particularly important for a young child.
- Separate diapered children with infection from uninfected children, if possible.
- When pipes leak or repairs are made, treat drinking and food preparation water with adequate levels of chlorine or other effective disinfectants (even if the source is a municipal water supply) to guard against chance contamination of water.
- Chlorinate, iodinate, or boil any drinking water of unknown purity.
- Wash all vegetables thoroughly.

◆ How can it be treated?

Although the *E. coli* O157:H7 organism is killed in the test tube by many antibiotics, there is little evidence at this time that antibiotics improve the course of disease. Some studies suggest that treatment with antibiotics might even precipitate HUS. Most persons recover without antibiotics or other specific treatment in 5-10 days. Antidiarrheal agents such as loperamide or Imodium® should be avoided.

HUS is a life threatening condition that usually is treated in an intensive care unit and often requires blood transfusions and kidney dialysis. With intensive care, the fatality rate for HUS is still 3-5%.

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◆ Are there long term consequences?

Persons with diarrhea alone usually recover completely, but their bowel functions may take several months to return to normal.

About 14% of persons with HUS have poor outcomes such as chronic kidney failure, bowel resection, blindness, stroke, or chronic treatment for seizures. Because a decline in kidney function may appear years after a person has been ill with HUS, this infection may be a preventable cause of chronic kidney failure.

◆ How is *E. coli* O157:H7 spread?

Most cases of *E. coli* O157:H7 infection are caused by undercooked meat, especially ground beef. Contaminated meat looks and smells normal. Ground beef that is still pink, or has blood-tinged juices, has not been cooked enough to kill *E. coli* O157:H7. The general pattern of transmission suggests that the infectious dose is very low. Lean ground beef often is made from dairy cattle, a potential reservoir for *E. coli* O157:H7.

Other outbreaks have been traced to drinking raw unpasteurized milk, drinking or swimming in sewage-contaminated water, or eating raw vegetable fertilized with cow manure. At least one cluster of U.S. cases occurred after unwashed apples were used to make apple cider.

The bacterium is present in the diarrheal stools of infected persons and can be passed from one person to another if hygiene and handwashing habits are inadequate. This type of transmission is particularly likely to occur among toddlers who are not fully toilet trained. Family members and playmates of such children are at high risk of becoming infected.

The bacteria usually are cleared from the stools within a week after the diarrhea stops. Especially in young children, however, the organism can persist in the stool for weeks after the child no longer has diarrhea. Daycare centers have been sites of *E. coli* O157;H7 outbreaks.

◆ How does food become contaminated with this organism?

The organism can live in the intestines of healthy cattle. When the animal is slaughtered, contamination of the meat with intestinal contents may occur. When the meat is made into ground beef, fecal organisms that were on the outside of the meat are mixed throughout the ground beef. The bacteria are killed when meat is thoroughly cooked (to a core temperature of 155° F), but can survive in rare or inadequately cooked meat.

Most cases of E. coli O157:H7 infection are caused by undercooked meat, especially ground beef.

Bacteria present on the cow's udders or on farm equipment may get into raw milk.

◆ How can I learn more about this infection?

Most publications on *E. coli* O157:H7 are of a technical nature. The references following this article provide good recent reviews from the medical literature. Health care providers can obtain information by calling the Foodborne and Diarrheal Disease Branch of the Centers for Disease Control and Prevention (CDC) at (404) 639-2206. Information for the public is available from a CDC recorded message at (404)332-4597.

For information regarding this infection in Texas, contact Jim Schuermann of the TDH Infectious Disease Epidemiology and Surveillance Division (IDEAS) at (512)458-7328.

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◆ What can the community do to prevent this illness?

E. coli O157:H7 will continue to be an important public health concern as long as it contaminates meat. Control measures must be developed to reduce infection of cattle and contamination of farm animals and equipment, and reduce the contamination of meat during slaughter and grinding. New research into such preventive measures even includes a possible vaccine for cattle. The United States Department of Agriculture is responsible for the safety and wholesomeness of beef, and the Food and Drug Administration for the safety and adequacy of milk pasteurization.

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For additional advice on how to cook meat safely, call the USDA Meat and Poultry Hotline, (800-535-4555), or your county extension home economist.