Nebraska Health and Human Services System
Office of Epidemiology
Shiga toxin producing Escherichia coli Disease Fact Sheet

What is shiga toxin producing Escherichia coli?
Shiga toxin producing Escherichia coli (STEC) is an emerging cause of food borne illness with approximately 65 persons reported with STEC infections each year in Nebraska. STEC is one of hundreds of strains of the bacterium Escherichia coli. Although most strains are harmless and live in the intestines of healthy humans and animals, this strain produces a powerful toxin and can cause severe illness. STEC was first recognized as a cause of illness in 1982 during an outbreak of severe bloody diarrhea; the outbreak was traced to contaminated hamburgers.

The combination of letters and numbers in the name of the bacterium refers to the specific markers found on its surface and distinguishes it from other types of E. coli.

How is STEC spread?
The organism can be found on a small number of cattle farms and can live in the intestines of healthy cattle. Meat can become contaminated during slaughter, and organisms can be thoroughly mixed into beef when it is ground. Bacteria present on the cow's udders or on equipment may get into raw milk.

Most illness has been associated with eating undercooked, contaminated ground beef. Eating meat, especially ground beef, which has not been cooked sufficiently to kill STEC, can cause infection. Contaminated meat looks and smells normal. Although the number of organisms required to cause disease is not known, it is suspected to be very small.

Person-to-person contact in families and child care centers is also an important mode of transmission. Infection can also occur after drinking raw milk and after swimming in or drinking sewage-contaminated water.

Bacteria in diarrheal stools of infected persons can be passed from one person to another if hygiene or handwashing habits are inadequate. This is particularly likely among toddlers who are not toilet trained. Family members and playmates of these children are at high risk of becoming infected.

Outbreaks of STEC have been associated with unpasteurized apple cider, dry fermented sausage, deer jerky, alfalfa sprouts, and radish sprouts.

Young children typically shed the organism in their feces for a week or two after their illness resolves. Older children rarely carry the organism without symptoms.

What illness does STEC cause?
Onset of illness ranges 3 to 8 days after exposure, commonly 3 to 4 days. STEC infection often causes severe bloody diarrhea and abdominal cramps; sometimes the infection causes non-bloody diarrhea or no symptoms. Usually little or no fever is present, and the illness resolves in 5 to 10 days.

In some persons, particularly children under 5 years of age and the elderly, the infection can also cause a complication called hemolytic uremic syndrome, in which the red blood cells are destroyed and the kidneys fail. About 2%-7% of infections leads to this complication. In the United States, hemolytic uremic syndrome is the principal cause of acute kidney failure in children, and most cases of hemolytic uremic syndrome are caused by STEC.

How is STEC infection diagnosed?

Infection with STEC is diagnosed by detecting the toxin or the bacterium in the stool. All persons who suddenly have diarrhea with blood should get their stool tested for STEC. If a test to detect the toxin is positive, public health authorities usually request that laboratories to send the remaining stool sample for culture to determine the specific strain of E. coli is causing the illness. Public health laboratories then can determine the "DNA fingerprint" to compare with cases occurring elsewhere.

How is the illness treated?

Most persons recover without antibiotics or other specific treatment in 5-10 days. There is no evidence that antibiotics improve the course of disease, and it is thought that treatment with some antibiotics may precipitate kidney complications. Antidiarrheal agents, such as Loperamide (Imodium), should also be avoided.

Hemolytic uremic syndrome is a life-threatening condition usually treated in an intensive care unit. Blood transfusions and kidney dialysis are often required. With intensive care, the death rate for hemolytic uremic syndrome is 3%-5%.

What are the long-term consequences of infection?

Persons who only have diarrhea usually recover completely. About one-third of persons with hemolytic uremic syndrome have abnormal kidney function many years later, and a few require long-term dialysis. Another 8% of persons with hemolytic uremic syndrome have other lifelong complications, such as high blood pressure, seizures, blindness, paralysis, and the effects of having part of their bowel removed.

What can be done to prevent the infection?

STEC will continue to be an important public health concern as long as it contaminates food. Preventive measures may reduce the number of cattle that carry it and the contamination of meat during slaughter and grinding. Research into such prevention measures is just beginning.

What can you do to prevent STEC infection?

- Cook all ground beef or hamburger thoroughly. Make sure that the cooked meat is gray or brown throughout (not pink), any juices run clear, and the inside is hot.
- If you are served an undercooked hamburger in a restaurant, send it back for further cooking.
- Consume only pasteurized milk and milk products. Avoid raw milk.
- Make sure that infected persons, especially children, wash their hands carefully and frequently with soap to reduce the risk of spreading the infection.
- Drink municipal water that has been treated with adequate levels of chlorine or other effective disinfectants.
- Infected child care workers or attendees should be held out of the child care center until the diarrhea has stopped and two successive stool cultures are negative.