

E. COLI INFECTION, SHIGA TOXIN-PRODUCING: Notes about the Disease

Escherichia coli, the “colon bacillus,” is a constant, usually nonpathogenic inhabitant of the lower gastrointestinal tract of humans and other animals. First recognized as a cause of diarrhea in infants during the 1920s, today six different groups of diarrheagenic *E. coli* are recognized: enteroadherent, enterohemorrhagic, enterotoxigenic, enteroinvasive, enteropathogenic, and enteroaggregative. Those strains that elaborate a shiga toxin (verotoxin), such as *E. coli* O157:H7, belong in the enterohemorrhagic *E. coli* group (EHEC).

Shiga toxins can be produced by over 60 *E. coli* strains and certain other bacteria (e.g., *Shigella dysenteriae* type 1). However, *E. coli* O157:H7 accounts for the vast majority of these infections in the US. These toxins can cause colonic vascular damage in humans, resulting in bloody diarrhea; visibly bloody diarrhea occurs in 35-90% of outbreaks. In 2-7% of EHEC cases, the hemolytic-uremic syndrome (HUS) develops as a complication. HUS is characterized by hemolytic anemia, thrombocytopenia, kidney failure, and a variety of central nervous system manifestations, including irritability, seizures, and coma. Most cases occur in children, but adults can occasionally be similarly affected by the adult form of HUS. Most adult HUS cases are not caused by EHEC infections. Approximately 14% of pediatric HUS cases have poor outcomes: chronic renal failure, blindness, seizure disorders, and/or strokes. Death occurs in 3-5% of cases.

Thus, EHEC is a substantial public health problem because it can cause large outbreaks of food- or waterborne disease, with some cases having quite serious manifestations. In North Carolina, memorable outbreaks occurred in Cleveland County in 1998 (142 cases traced to contaminated slaw served at a seafood restaurant); in Robeson County in 2001 (203 cases at a school traced to contaminated home-made butter);¹ and at the NC State Fair in Wake County in 2004 (108 cases traced to visiting a petting zoo).²

The infectious dose of EHEC organisms is quite low and, although adults usually carry the organism in their stool for about a week after infection, a third of infected children carry EHEC for three weeks. Scrupulous personal hygiene, thorough cooking of meat, and protection of water supplies are important in prevention.

1. P. Jenkins, “*E. coli* O157:H7 Outbreak in Robeson County,” *Epi Notes* 2001-04 (Dec 2001-Feb 2002): 7, www.epi.state.nc.us/epi/pdf/en2001-4.pdf.
2. G. Goode, “Outbreak of *E. coli* O157:H7 at the North Carolina State Fair—2004,” *Epi Notes* 2004-4 (Dec 2004-Feb 2005): 3, www.epi.state.nc.us/epi/pdf/en2004-4.pdf.