

# E. coli O157:H7



#### NATURE OF ACUTE DISEASE

Hemorrhagic colitis is the name of the acute disease caused by *E. coli* O157:H7.

#### NATURE OF DISEASE

The illness is characterized by severe cramping (abdominal pain) and diarrhea which is initially watery but becomes grossly bloody. Occasionally vomiting occurs. Fever is either low-grade or absent. The illness is usually self-limited and lasts for an average of 8 days. Some individuals exhibit watery diarrhea only. The infective dose is unknown, but from a compilation of outbreak data, including the organism's ability to be passed person-to-person in the day-care setting and nursing homes, the dose may be as few as 10 organisms.

#### DIAGNOSIS OF HUMAN ILLNESS

Hemorrhagic colitis is diagnosed by isolation of *E. coli* of serotype O157:H7 or other verotoxin-producing *E. coli* from diarrheal stools. Alternatively, the stools can be tested directly for the presence of verotoxin. Confirmation can be obtained by isolation of *E. coli* of the same serotype from the incriminated food.

#### ASSOCIATED FOODS

Undercooked or raw hamburger (ground beef) has been implicated in many of the documented outbreaks, however *E. coli* O157:H7 outbreaks have implicated alfalfa sprouts, unpasteurized fruit juices, dry-cured salami, lettuce, game meat, and cheese curds. Raw milk has also been implicated.

#### TARGET POPULATIONS

All people are believed to be susceptible to hemorrhagic colitis, but young children and the elderly appear to progress to more serious symptoms more frequently.

#### RELATIVE FREQUENCY OF DISEASE

Hemorrhagic colitis infections are not too common, but this is probably not reflective of the true frequency. In the Pacific Northwest, *E. coli* O157:H7 is thought to be second only to *Salmonella* as a cause of bacterial diarrhea. Because of the unmistakable symptoms of profuse, visible blood in severe cases, those victims probably seek medical attention, but less severe cases are probably more numerous.

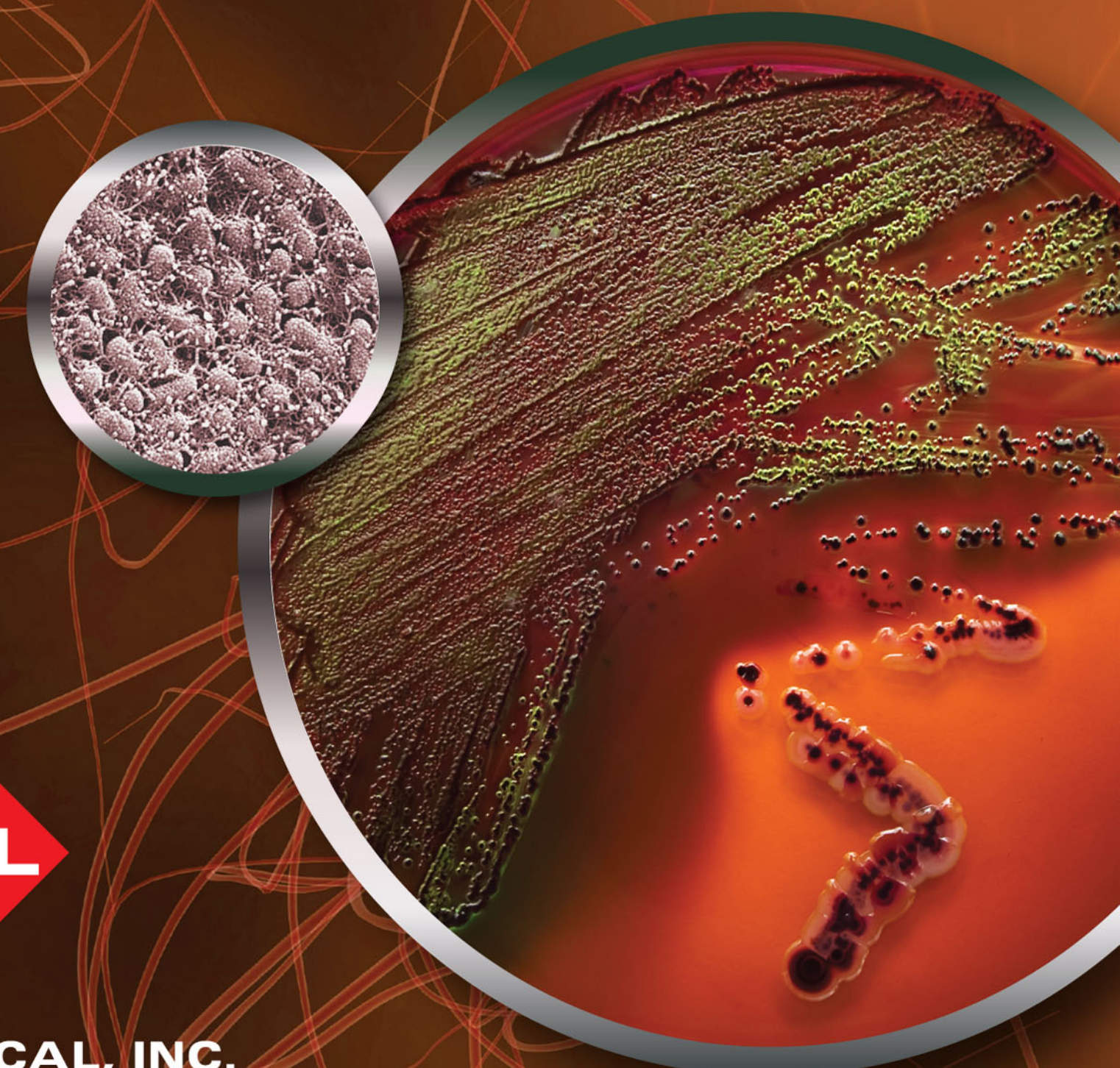
#### COURSE OF DISEASE AND COMPLICATIONS

Some victims, particularly the very young, have developed the hemolytic uremic syndrome (HUS), characterized by renal failure and hemolytic anemia. From 0 to 15% of hemorrhagic colitis victims may develop HUS. The disease can lead to permanent loss of kidney function. In the elderly, HUS, plus two other symptoms, fever and neurologic symptoms, constitutes thrombotic thrombocytopenic purpura (TTP). This illness can have a mortality rate in the elderly as high as 50%.

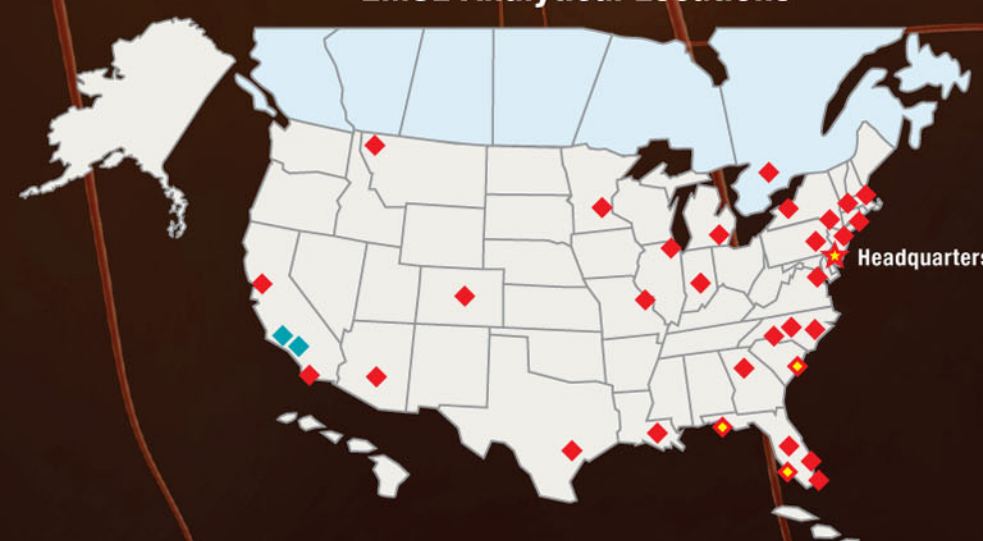
#### FOOD ANALYSIS

Several microbiological methods can be used to isolate *E. coli* O157:H7 from foods. Unlike typical *E. coli*, isolates of O157:H7 do not ferment sorbitol and are negative with the MUG assay; therefore, these criteria are commonly used for selective isolation. Sorbitol-MacConkey agar has been used extensively to isolate this organism from clinical specimens. Hemorrhagic colitis agar, a selective and differential medium, is used in a direct plating method to isolate O157:H7 from foods. A third procedure uses Sorbitol-MacConkey medium containing potassium tellurite and Cefixime. Rapid methods using a variety of technologies also exist.

CURRENTLY, THERE ARE FOUR RECOGNIZED CLASSES OF ENTEROVIRULENT *E. COLI* (COLLECTIVELY REFERRED TO AS THE EEC GROUP) THAT CAUSE GASTROENTERITIS IN HUMANS. AMONG THESE IS THE ENTEROHEMORRHAGIC (EHEC) STRAIN DESIGNATED *E. COLI* O157:H7. *E. COLI* IS A NORMAL INHABITANT OF THE INTESTINES OF ALL ANIMALS, INCLUDING HUMANS. WHEN AEROBIC CULTURE METHODS ARE USED, *E. COLI* IS THE DOMINANT SPECIES FOUND IN FECES. NORMALLY *E. COLI* SERVES A USEFUL FUNCTION IN THE BODY BY SUPPRESSING THE GROWTH OF HARMFUL BACTERIAL SPECIES AND BY SYNTHESIZING APPRECIABLE AMOUNTS OF VITAMINS. A MINORITY OF *E. COLI* STRAINS ARE CAPABLE OF CAUSING HUMAN ILLNESS BY SEVERAL DIFFERENT MECHANISMS. *E. COLI* SEROTYPE O157:H7 IS A RARE VARIETY OF *E. COLI* THAT PRODUCES LARGE QUANTITIES OF ONE OR MORE RELATED, POTENT TOXINS THAT CAUSE SEVERE DAMAGE TO THE LINING OF THE INTESTINE.



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