ESCHERICHIA COLI, ENTEROHEMORRHAGIC

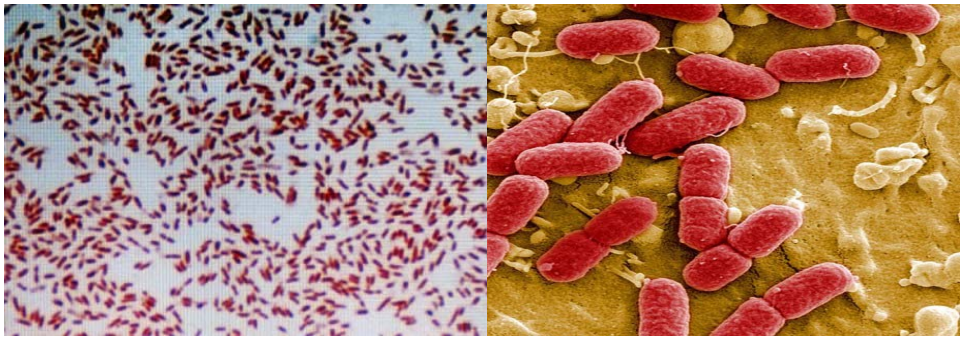
PATHOGEN SAFETY DATA SHEET - INFECTIOUS SUBSTANCES

INFECTIOUS AGENT

NAME: *Escherichia coli,* enterohemorrhagic

SYNONYM OR CROSS REFERENCE: Enterohemorrhagic *Escherichia coli* (EHEC), Verotoxin producing *Escherichia coli* (VTEC), Shiga toxin producing *Escherichia coli* (STEC).

CHARACTERISTICS: Gram negative rod; motile, aerobic; produce Vero / Shiga toxins (VT/STx), 2 types, VT1/Stx1 and VT2/Stx2; serotyping to determine somatic and flagellar antigens.



Escherichia coli, gram-stained[1)]

Escherichia coli cells[2)]

HAZARD IDENTIFICATION

PATHOGENICITY: Hemorrhagic colitis, intestinal disease accompanied by cramps and abdominal pain; initially watery, followed by bloody diarrhea; low grade fever; last about 8 days; 5-10% of hemorrhagic colitis victims may develop hemolytic uremic syndrome (HUS); affects all ages, higher death rates occur in elderly and young; can cause thrombocytopenic purpura (TTP) in elderly.

EPIDEMIOLOGY: Sporadic and in outbreaks of bloody diarrhea; associated with 15-30% of patients where no other pathogen has been identified; main EHEC serotype in North America from infections is *E. coli* 0157:H7.

HOST RANGE: Humans; animals (O157:H7 - piglets, calves and cattle).

INFECTIOUS DOSE: Appears to have low infectious dose, may be similar to that of *Shigella* spp., 10 organisms by ingestion.

MODE OF TRANSMISSION: Ingestion of contaminated food (undercooked hamburger meat, unpasteurized milk); fecal-oral transmission; person-to-person transmission (extremely high).

INCUBATION PERIOD: 2-8 days (median of 3-4 days).

COMMUNICABILITY: Communicable for duration of fecal excretion (7-9 days); 3 weeks in one third of children.

DISSEMINATION

RESERVOIR: Infected persons, animals (sheep, goats, pigs, poultry, calves, cattle).

ZOONOSIS: Yes - direct or indirect contact with infected animal and waste.

VECTORS: Birds may be a vector.

STABILITY AND VIABILITY

DRUG SUSCEPTIBILITY: Sensitive to a wide spectrum of antibiotics.

SUSCEPTIBILITY TO DISINFECTANTS: Susceptible to many disinfectants - 1% sodium hypochlorite, 70% ethanol, phenolics, glutaraldehyde, iodines, formaldehyde.

PHYSICAL INACTIVATION: Heat sensitive, inactivated by moist heat (121° C for at least 15 min) and dry heat (160-170° C for at least 1 hour).

SURVIVAL OUTSIDE HOST: Butter - up to 50 min; cream - 10 days; hamburger meat - survives well; does not survive long in slurry systems (inoculum of 10^8 cfu/mL became undetectable after 9 days); survives well in contaminated feces and soil, only small reduction in organism number over 2 months.

FIRST AID / MEDICAL

SURVEILLANCE: Monitor for symptoms; confirm bacteriologically, DNA probe to detect Verotoxins VT1 and VT2.

FIRST AID/TREATMENT: Electrolyte fluid therapy; antibiotics may be administered in very severe cases.

IMMUNIZATION: None

PROPHYLAXIS: Not usually administered.

LABORATORY HAZARDS

LABORATORY-ACQUIRED INFECTIONS: 4 reported cases of laboratory infections with *E. coli* since 1981.

SOURCES/SPECIMENS: Contaminated food (raw milk, hamburger, apple juice and water); feces.

PRIMARY HAZARDS: Ingestion.

SPECIAL HAZARDS: None

EXPOSURE CONTROLS / PERSONAL PROTECTION

RISK GROUP CLASSIFICATION: Risk Group 2.

CONTAINMENT REQUIREMENTS: Biosafety level 2 practices, containment equipment and facilities for activities involving cultures and infected clinical materials.

PROTECTIVE CLOTHING: Laboratory coat; gloves when contact with infectious materials is unavoidable.

OTHER PRECAUTIONS: Good personal hygiene and frequent hand washing essential.

HANDLING AND STORAGE

SPILLS: Allow aerosols to settle; wearing protective clothing, gently cover spill with absorbent paper towel and apply 1% sodium hypochlorite, starting at perimeter and working towards the centre; allow sufficient contact time (30 min) before clean up.

DISPOSAL: Decontaminate before disposal; steam sterilization, chemical disinfection.

STORAGE: In sealed containers that are appropriately labeled.

REFERENCE

Pathogen Safety Data Sheet (PSDS) for *Escherichia coli*, enterohemorrhagic has been modified from the ones produced by the Public Health Agency of Canada as educational and informational resources for laboratory personnel working with infectious substances.

1) Picture from Amazingnotes.com
2) Picture from Helmholtz Center for Research on Infectious Diseases/Getty Images