

# ***YERSINIA ENTEROCOLITICA***

## **PATHOGEN SAFETY DATA SHEET - INFECTIOUS SUBSTANCES**

### **INFECTIOUS AGENT**

**NAME:** *Yersinia enterocolitica*

**SYNONYM OR CROSS REFERENCE:** Yersiniosis, enterocolitis

**CHARACTERISTICS:** This bacterium is a gram negative, coccoid shaped, non-spore-forming bacillus of the genus *Yersinia*, family *Enterobacteriaceae*. It is a facultative anaerobe and is motile at room temperature but non-motile at 37°C. Strains are usually 0.5-0.8 µm by 1-3 µm in size. There are 6 biotypes (1A, 1B, 2, 3, 4 and 5 based on their genomic sequence) containing 50 different serogroups of *Yersinia enterocolitica*; however, only certain serogroups are pathogenic for humans. The serogroups are group serotypes that share the same surface antigens and are categorized according to which O-antigen they express. Serogroups O:3 and O:9 are responsible for outbreaks in Europe, whereas O:8 is found in the US and O:5 and O:27 are found in Canada and Japan.



*Yersinia enterocolitica*, gram-stained<sup>1)</sup>

*Yersinia enterocolitica* cells<sup>2)</sup>

### **HAZARD IDENTIFICATION**

**PATHOGENICITY/TOXICITY:** *Yersinia enterocolitica* infection is characterized by enteritis, enterocolitis (particularly in children), fever (39°C), watery stools, abdominal pain and acute mesenteric lymphadenitis (which may mimic appendicitis). In some cases acute terminal ileitis and enteric fever can occur. 1-3 weeks after the initial clinical symptoms, reactive arthritis and erythema nodosum may occur which can last about 6 months after infection. The infection

is a greater health risk for immunosuppressed individuals and if untreated, the mortality rate due to septicemia can be up to 50%.

**EPIDEMIOLOGY:** The disease is spread worldwide although it is less common in tropical areas. Certain serogroups (O:3 and O:9 in Europe, O:8 in the US and O:5 and O:27 in Japan and Canada) are specific to different geographical areas. It is common year-round but reaches its peak in fall and winter.

**HOST RANGE:** *Yersinia enterocolitica* has been found in humans, warm blooded animals (particularly in farm animals and pets), birds and rarely in reptiles, fish and shellfish. It has been found in the intestinal tracts of pigs, dogs and cats without any clinical manifestations.

**INFECTIOUS DOSE:** The infectious dose is  $10^8$  bacteria or more orally.

**MODE OF TRANSMISSION:** Human-to-human transmission has been reported rarely in schools, daycares and hospitals. Nosocomial infections and blood transfusion related infections by this bacterium have been reported. Fecal-oral transmission from animal-to-human or consumption of contaminated foods (raw pork products, undercooked pork, tofu and unpasteurized milk have been shown to be a source of outbreaks) and untreated water are also common modes of transmission.

**INCUBATION PERIOD:** The incubation period for this bacterium is between 3-10 days.

**COMMUNICABILITY:** Although rare, the disease can be spread from human-to-human and bacteria can still be present in stool weeks after the clinical symptoms have ceased.

## DISSEMINATION

**RESERVOIR:** Pigs are an important reservoir host although the bacterium has been found in several warm blooded animals, including farm animals and pets.

**ZOONOSIS:** The disease can be spread from animals to humans via contaminated water, stools and food sources (for example contaminated pork).

**VECTORS:** None

## STABILITY AND VIABILITY

**DRUG SUSCEPTIBILITY:** *Yersinia enterocolitica* is susceptible to chloramphenicol, fluoroquinolones, gentamicin, tetracycline, and trimethoprim-sulfamethoxazole. It is generally resistant to penicillin and its derivatives and to narrow spectrum cephalosporins.

**SUSCEPTIBILITY TO DISINFECTANTS:** Susceptible to 2-5% phenol, 1% sodium hypochlorite, 70% ethanol, 4% formaldehyde, 2% glutaraldehyde, 2% peracetic acid, 3-6% hydrogen peroxide and 0.16% iodine.

**PHYSICAL INACTIVATION:** Bacteria are sensitive to moist heat (121°C for at least 12 minutes) and dry heat (170°C for 1 hour).

**SURVIVAL OUTSIDE HOST:** The bacterium can survive 448 days in water between -4 and 8°C, and 10 days in water between 20 and 30°C. It can live up to 10 days in soil and cattle manure between -4 and 30°C.

## FIRST AID / MEDICAL

**SURVEILLANCE:** Monitor for symptoms. The bacterium can be isolated in stool, tissue samples, blood and pus. Polymerase chain reaction (PCR) and enzyme-linked immunosorbent assay (ELISA) can also be used to diagnose the disease.

**FIRST AID/TREATMENT:** Although infections by *Yersinia enterocolitica* are usually self-limiting, antibiotic treatment is necessary for severe or complicated cases. The antibiotics commonly used are gentamicin, cotrimoxazole, and ciprofloxacin. Surgery may be required to treat acute terminal ileitis.

**IMMUNIZATION:** None

**PROPHYLAXIS:** None

## LABORATORY HAZARDS

**LABORATORY-ACQUIRED INFECTIONS:** None

**SOURCES/SPECIMENS:** The bacterium can be found in stool, blood or lymph node tissues.

**PRIMARY HAZARDS:** Accidental parenteral inoculation is always a risk when working with pathogens and ingestion of the infectious agent (via contaminated hands) is a hazard for laboratory personnel working with enteric pathogens.

**SPECIAL HAZARDS:** Contact with infected animals can be a risk.

## EXPOSURE CONTROLS / PERSONAL PROTECTION

**RISK GROUP CLASSIFICATION:** Risk group 2.

**CONTAINMENT REQUIREMENTS:** Containment Level 2 facilities, equipment, and operational practices for work involving infectious or potentially infectious materials, animals, or cultures.

**PROTECTIVE CLOTHING:** Lab coat. Gloves when direct skin contact with infected materials or animals is unavoidable. Eye protection must be used where there is a known or potential risk of exposure to splashes.

**OTHER PRECAUTIONS:** All procedures that may produce aerosols, or involve high concentrations or large volumes should be conducted in a biological safety cabinet (BSC). The

use of needles, syringes, and other sharp objects should be strictly limited. Additional precautions should be considered with work involving animals or large scale activities.

## **HANDLING AND STORAGE**

**SPILLS:** Allow aerosols to settle and, wearing protective clothing, gently cover spill with paper towels and apply an appropriate disinfectant, starting at the perimeter and working towards the centre. Allow sufficient contact time before clean up.

**DISPOSAL:** Decontaminate all wastes that contain or have come in contact with the infectious organism by autoclave, chemical disinfection, gamma irradiation, or incineration before disposing.

**STORAGE:** The infectious agent should be stored in leak-proof containers that are appropriately labeled.

## **REFERENCE**

Pathogen Safety Data Sheet (PSDS) for *Yersinia enterocolitica* 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 [www.britannica.com](http://www.britannica.com)
- 2) Picture from [www.hepatit.com](http://www.hepatit.com)